

Appendix E – Biological Resources – Terrestrial

September 2021



Delta Stewardship Council

A CALIFORNIA STATE AGENCY

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E.1 Common and Scientific Names of Species Mentioned in Draft PEIR Section 5.6 Biological Resources – Terrestrial

**Table E-1
Common and Scientific Names of Plant Species Mentioned in Draft PEIR Section
5.6 Biological Resources - Terrestrial**

Common Name	Scientific Name
Alkali bulrush	<i>Schoenoplectus americanus</i>
Alkali heath	<i>Frankenia salina</i>
Alkali mallow	<i>Malvella leprosa</i>
Alkali milk-vetch	<i>Astragalus tener</i> var. <i>tener</i>
Alkali weed	<i>Cressa truxillensis</i>
Alligatorweed	<i>Alternanthera philoxeroides</i>
Ambulia	<i>Limnophila indica</i> , <i>L. sessiliflora</i>
Anchored water hyacinth	<i>Eichhornia azurea</i>
Annual tule	<i>Isolepis cernua</i>
Antioch Dunes buckwheat	<i>Eriogonum nudum</i> var. <i>psychichola</i>
Antioch Dunes evening primrose	<i>Oenothera deltoides</i> ssp. <i>howellii</i>
Arroyo willow	<i>Salix lasiolepis</i>
Baker's navarretia	<i>Navarretia leucocephala</i> ssp. <i>bakeri</i>
Baltic rush	<i>Juncus balticus</i>
Barnyard grass	<i>Echinochloa crus-galli</i>
Beach suncup	<i>Camissonia cheiranthifolia</i> ssp. <i>cheiranthifolia</i>
Bearded popcorn-flower	<i>Plagiobothrys hystriculus</i>
Beggar's tick	<i>Bidens frondosa</i>
Bent flowered fiddleneck	<i>Amsinckia lunaris</i>
Bermuda grass	<i>Cynodon dactylon</i>
Big tarplant	<i>Blepharizonia plumosa</i>
Bigleaf maple	<i>Acer macrophyllum</i>
Bindweed	<i>Convolvulus arvensis</i>
Bitter cherry	<i>Prunus emarginata</i>
Black locust	<i>Robinia pseudoacacia</i>

Table E-1 (continued)
Common and Scientific Names of Plant Species Mentioned in Draft PEIR
Section 5.6 Biological Resources - Terrestrial

Common Name	Scientific Name
Black oak	<i>Quercus kelloggii</i>
Black walnut	<i>Juglans sp</i>
Black willow	<i>Salix gooddingii</i>
Blackberry	<i>Rubus sp.</i>
Blessed milk thistle	<i>Silybum marianum</i>
Blue oak	<i>Quercus douglasii</i>
Bog yellowcress	<i>Rorippa palustris</i>
Bogg's Lake hedge-hyssop	<i>Gratiola heterosepala</i>
Bolander's water-hemlock	<i>Cicuta maculata var. bolanderi</i>
Box elder	<i>Acer negundo</i>
Brass buttons	<i>Cotula coronopifolia</i>
Brazilian peppertree	<i>Schinus terebinthifolius, S. molle</i>
Brazilian waterweed	<i>Egeria densa</i>
Brewer's calandrinia	<i>Calandrinia breweri</i>
Brewer's western flax	<i>Hesperolinon breweri</i>
Bristly sedge	<i>Carex comosa</i>
Brittlescale	<i>Atriplex depressa</i>
Broadleaf arrowhead	<i>Sagittaria latifolia</i>
Bull thistle	<i>Cirsium vulgare</i>
Bur-reed	<i>Sparganium eurycarpum</i>
Burhead	<i>Echinodorus berteroi</i>
Bush chinquapin	<i>Chrysolepis sempervirens</i>
Buttonbush	<i>Cephalanthus occidentalis</i>
California bulrush	<i>Schoenoplectus californicus</i>
California coffeeberry	<i>Rhamnus californica</i>
California jewelflower	<i>Caulanthus californicus</i>
California sycamore	<i>Platanus racemosa</i>
Canyon live oak	<i>Quercus chrysolepis</i>
Caper-fruited tropidocarpum	<i>Tropidocarpum capparideum</i>
Carquinez goldenbush	<i>Isocoma arguta</i>
California bay	<i>Umbellularia californica</i>
Carolina fanwort	<i>Cabomba caroliniana</i>
Cattail	<i>Typha sp.</i>
Ceanothus	<i>Ceanothus sp.</i>
Central coast iris	<i>Iris longipetala</i>
Chamise	<i>Adenostema fasciculatum</i>
Chamisso's lupine	<i>Lupinus chamissonis</i>
Chinese tallow	<i>Sapium sebiferum</i>
Chinese tamarisk	<i>Tamarix chinensis</i>

Table E-1 (continued)
Common and Scientific Names of Plant Species Mentioned in Draft PEIR
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Common Name	Scientific Name
Chinese water spinach	<i>Ipomoea aquatic</i>
Coast Iris	<i>Iris longipetala</i>
Cocklebur	<i>Xanthium strumarium</i>
Columbian watermeal	<i>Wolffia brasiliensis</i>
Colusa grass	<i>Neostapfia colusana</i>
Common mallow	<i>Malva neglecta</i>
Common spikerush	<i>Eleocharis macrostachya</i>
Common spikeweed	<i>Centromadia pungens</i>
Congdon's tarplant	<i>Centromadia parryi</i> ssp. <i>congdonii</i>
Contra Costa goldfields	<i>Lasthenia conjugens</i>
Contra Costa wallflower	<i>Erysimum capitatum</i> ssp. <i>angustatum</i>
Cottonwood	<i>Populus</i> sp.
Cotulaleaf pincushionplant	<i>Navarretia cotulifolia</i>
Creeping water primrose	<i>Ludwigia peploides</i> ssp. <i>montevidensis</i>
Creeping wildrye	<i>Leymus triticoides</i>
Crownscale	<i>Atriplex coronata</i> var. <i>coronata</i>
Curly dock	<i>Rumex crispus</i>
Currant	<i>Ribes</i> sp.
Dallisgrass	<i>Paspalum dilatatum</i>
Deer brush	<i>Ceanothus integerrimus</i>
Deerweed	<i>Lotus scoparius</i>
Delta button-celery	<i>Eryngium racemosum</i>
Delta mudwort	<i>Limosella subulata</i>
Delta tule pea	<i>Lathyrus jepsonii</i> var. <i>jepsonii</i>
Delta woolly marbles	<i>Psilocarphus brevissimus</i> var. <i>multiflorus</i>
Diamond-petaled California poppy	<i>Eschscholzia rhombipetala</i>
Douglas fir	<i>Pseudotsuga menziesii</i>
Dwarf downingia	<i>Downingia pusilla</i>
Eel-grass pondweed	<i>Potamogeton zosteriformis</i>
Eurasian milfoil	<i>Myriophyllum spicatum</i>
Fennel	<i>Foeniculum vulgare</i>
Ferris' goldfields	<i>Lasthenia ferrisiae</i>
Ferris' milk-vetch	<i>Astragalus tener</i> var. <i>ferrisiae</i>
Fig	<i>Ficus carica</i>
Filaree	<i>Erodium</i> sp.
Floating water primrose	<i>Ludwigia peploides</i>
Foothill pine	<i>Pinus sabiniana</i>
Fox sedge	<i>Carex vulpinoidea</i>
Fragrant fritillary	<i>Fritillaria liliacea</i>

Table E-1 (continued)
Common and Scientific Names of Plant Species Mentioned in Draft PEIR
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Common Name	Scientific Name
Fremont cottonwood	<i>Populus fremontii</i>
French tamarisk	<i>Tamarix gallica</i>
Gairdner's yampah	<i>Perideridia gairdneri</i> ssp. <i>gairdneri</i>
Giant reed	<i>Arundo donax</i>
Goodding's black willow	<i>Salix gooddingii</i>
Gooseberries	<i>Ribes</i> sp.
Goosefoot	<i>Chenopodium</i> sp.
Grand redstem	<i>Ammannia robusta</i>
Greenleaf manzanita	<i>Arctostaphylos patula</i>
Hairless popcorn flower	<i>Plagiobothrys glaber</i>
Hard-stem bulrush	<i>Schoenoplectus acutus</i>
Heartscale	<i>Atriplex cordulata</i>
Heckard's peppergrass	<i>Lepidium latipes</i> var. <i>heckardii</i>
Himalayan blackberry	<i>Rubus discolor</i>
Hispid bird's-beak	<i>Cordylanthus mollis</i> ssp. <i>hispidus</i>
Hogwallow starfish	<i>Hesperevax caulescens</i>
Hoover's cryptantha	<i>Cryptantha hooveri</i>
Huckleberry oak	<i>Quercus vacciniifolia</i>
Hydrilla	<i>Hydrilla verticillata</i>
Iodine bush	<i>Allenrolfea occidentalis</i>
Incense cedar	<i>Calocedrus decurrens</i>
Interior live oak	<i>Quercus wislizenii</i>
Italian ryegrass	<i>Lolium multiflorum</i>
Japanese dodder	<i>Cuscuta japonica</i>
Johnny-nip	<i>Castilleja ambigua</i> ssp. <i>ambigua</i>
Kern mallow	<i>Eremalche kernensis</i>
Knotweed	<i>Polygonum</i> sp.
Legenere	<i>Legenere limosa</i>
Lesser saltscate	<i>Atriplex minuscula</i>
Little mousetail	<i>Myosurus minimus</i> ssp. <i>apus</i>
Lobb's aquatic buttercup	<i>Ranunculus lobbii</i>
Lost Hills crownscale	<i>Atriplex vallicola</i>
Mahala mat	<i>Ceanothus prostratus</i>
Mallow	<i>Malva</i> sp.
Manzanita	<i>Arctostaphylos</i> sp.
Marsh skullcap	<i>Scutellaria galericulata</i>
Mason's lilaeopsis	<i>Lilaeopsis masonii</i>
Mexican or banana water lily	<i>Nymphaea mexicana</i>
Mosquito fern, water velvet	<i>Azolla pinnata</i>

Table E-1 (continued)
Common and Scientific Names of Plant Species Mentioned in Draft PEIR
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Common Name	Scientific Name
Mountain mahogany	<i>Cercocarpus betuloides</i>
Mountain misery	<i>Chamaebatia foliolosa</i>
Mt. Diablo buckwheat	<i>Eriogonum truncatum</i>
Mt. Diablo fairy-lantern	<i>Calochortus pulchellus</i>
Mulefat	<i>Baccharis salicifolia</i>
Mustard	<i>Brassica</i> sp.
Narrow-leaved willow	<i>Salix exigua</i>
Nude buckwheat	<i>Eriogonum nudum</i>
Oregon ash	<i>Fraxinus latifolia</i>
Pacific cordgrass	<i>Spartina foliosa</i>
Pacific madrone	<i>Arbutus menziesii</i>
Palmate-bracted bird's-beak	<i>Cordylanthus palmatus</i>
Pampas grass	<i>Cortaderia selloana</i>
Pappose tarplant	<i>Centromadia parryi</i> ssp. <i>parryi</i> , <i>Centromadia parryi</i> ssp. <i>rudis</i>
Parrot feather	<i>Myriophyllum aquaticum</i>
Perennial pepperweed	<i>Lepidium latifolium</i>
Pickleweed	<i>Salicornia pacifica</i>
Pinemat manzanita	<i>Arctostaphylos nevadensis</i>
Poison hemlock	<i>Conium maculatum</i>
Poison oak	<i>Toxicodendron diversilobum</i>
Ponderosa pine	<i>Pinus ponderosa</i>
Pondweed	<i>Potamogeton</i> sp.
Purple loosestrife	<i>Lythrum salicaria</i>
Rabbit's-foot grass	<i>Polypogon monspeliensis</i>
Recurved larkspur	<i>Delphinium recurvatum</i>
Red gum	<i>Eucalyptus camaldulensis</i>
Red sesbania	<i>Sesbania punicea</i>
Redshank	<i>Adenostoma sparsifolium</i>
Red willow	<i>Salix laevigata</i>
Ripgut brome	<i>Bromus diandrus</i>
Rose-mallow	<i>Hibiscus lasiocarpus</i> var. <i>occidentalis</i>
Round-leaved filaree	<i>Erodium macrophyllum</i>
Sacramento Orcutt grass	<i>Orcuttia viscida</i>
Sago pondweed	<i>Stuckenia pectinatus</i>
Saline clover	<i>Trifolium hydrophilum</i>
Saltbush	<i>Atriplex</i> sp.
Saltcedar	<i>Tamarix ramosissima</i>
Saltgrass	<i>Distichlis spicata</i>
Salvinia	<i>Salvinia auriculata</i> (= <i>S. biloba</i> , <i>S. herzogii</i> , <i>S. molesta</i>)

Table E-1 (continued)
Common and Scientific Names of Plant Species Mentioned in Draft PEIR
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Common Name	Scientific Name
Sanford's arrowhead	<i>Sagittaria sanfordii</i>
San Joaquin spearscale	<i>Atriplex joaquiniana</i>
San Joaquin Valley Orcutt grass	<i>Orcuttia inaequalis</i>
Santa Barbara sedge	<i>Carex barbarae</i>
Scrub oak	<i>Quercus berberidifolia</i>
Shining navarretia	<i>Navarretia nigelliformis</i> ssp. <i>radians</i>
Showy madia	<i>Madia radiata</i>
Side-flowering skullcap	<i>Scutellaria lateriflora</i>
Silky cryptantha	<i>Cryptantha crinita</i>
Silvery bush lupine	<i>Lupinus albifrons</i>
Slough thistle	<i>Cirsium crassicaule</i>
Small-flowered morning glory	<i>Convolvulus simulans</i>
Smallflower tamarisk	<i>Tamarix parviflora</i>
Small spikerush	<i>Eleocharis parvula</i>
Smartweed	<i>Polygonum</i> sp.
Snowbrush ceanothus	<i>Ceanothus velutinus</i>
Snow bush	<i>Ceanothus cordulatus</i>
Soft bird's beak	<i>Cordylanthus mollis</i> ssp. <i>mollis</i>
Solano grass	<i>Tuctoria mucronata</i>
Spiny redberry	<i>Rhamnus crocea</i>
Spiny-sepaled button-celery	<i>Eryngium spinosepalum</i>
Spongeplant	<i>Limnobia laevigatum</i> , L. <i>spongia</i>
Star-thistle	<i>Centaurea</i> sp.
Stinkbells	<i>Fritillaria agrestis</i>
Stonewort	<i>Chara</i> sp.
Succulent owl's clover	<i>Castilleja campestris</i> ssp. <i>succulenta</i>
Sugar pine	<i>Pinus lambertiana</i>
Suisun Marsh aster	<i>Symphotrichum lentum</i>
Suisun thistle	<i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>
Sunflower	<i>Helianthus</i> sp.
Swamp smartweed	<i>Polygonum amphibium</i>
Swamp timothy	<i>Crypsis schoenoides</i>
Sweet marsh ragwort	<i>Senecio hydrophiloides</i>
Tamarisk	<i>Tamarix</i> sp.
Tan oak	<i>Lithocarpus densiflorus</i>
Telegraph weed	<i>Heterotheca grandiflora</i>
Toren's grimmia	<i>Grimmia torenii</i>
Toyon	<i>Heteromeles arbutifolia</i>
Tree of heaven	<i>Ailanthus altissima</i>

Table E-1 (continued)
Common and Scientific Names of Plant Species Mentioned in Draft PEIR
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Common Name	Scientific Name
Tule	<i>Schoenoplectus</i> sp.
Tumbleweed	<i>Salsola tragus</i>
Uruguay water primrose	<i>Ludwigia hexapetala</i>
Valley oak	<i>Quercus lobata</i>
Vernal pool smallscale	<i>Atriplex persistens</i>
Vetch	<i>Vicia</i> sp.
Watergrass	<i>Echinochloa crus-galli</i>
Water hyacinth	<i>Eichhornia crassipes</i>
Water primrose	<i>Ludwigia</i> sp.
Watershield	<i>Brasenia schreberi</i>
Water smartweed	<i>Polygonum amphibium</i>
Waxy mannagrass	<i>Glyceria declinata</i>
White alder	<i>Alnus rhombifolia</i>
White fir	<i>Abies concolor</i>
Whorled marsh pennywort	<i>Hydrocotyle verticillata</i>
Wild barley	<i>Hordeum</i> sp.
Wild heliotrope	<i>Heliotropium curassavicum</i>
Wild lettuce	<i>Lactuca serriola</i>
Wild oat	<i>Avena</i> sp.
Wild radish	<i>Raphanus sativus</i>
Willow	<i>Salix</i> sp.
Willowherb	<i>Epilobium brachycarpum</i>
Wright's trichocoronis	<i>Trichocoronis wrightii</i> var. <i>wrightii</i>
Yarrow	<i>Achillea millefolium</i>
Yellow flag	<i>Iris pseudoacorus</i>
Yellow star-thistle	<i>Centaurea solstitialis</i>
Yerba mansa	<i>Anemopsis californica</i>
Yerba santa	<i>Eriodictyon californicum</i>

Sources: Calflora 2017; Cal-IPC 2010; CDFA 2017

Note: Scientific and common plant names follow the Jepson Manual (2nd Edition) (2012). Taxonomic updates and common plant names not provided in the Jepson Manual follow the Calflora Web site, which follows four nomenclature authorities for wild plants in California, as indicated on the Web site. Nomenclature for invasive species follows the Cal-IPC or CDFA Web site.

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1 **Table E-2**
 2 **Common and Scientific Names of Fish and Wildlife Species Mentioned in Draft**
 3 **PEIR Section 5.6 Biological Resources - Terrestrial**

Type	Common Name	Scientific Name
Invertebrates	Antioch adrenid bee	<i>Perdita scitula antiochensis</i>
	Antioch Dunes anthicid beetle	<i>Anthicus antiochensis</i>
	Antioch Dunes halcitud bee	<i>Sphecodogastra antiochensis</i>
	Antioch efferian robberfly	<i>Efferia antiochi</i>
	Antioch multilid wasp	<i>Myrmosula pacifica</i>
	Antioch specid wasp	<i>Philanthus nasalis</i>
	Blennosperma vernal pool andrenid bee	<i>Andrena blennospermatis</i>
	Bridges' Coast Range shoulderband	<i>Helminthoglypta nickliniana bridgesi</i>
	California freshwater shrimp	<i>Syncaris pacifica</i>
	California linderiella	<i>Linderiella occidentalis</i>
	Callippe silverspot butterfly	<i>Speyeria callippe callippe</i>
	Conservancy fairy shrimp	<i>Branchinecta conservatio</i>
	Curved-foot hygrotus diving beetle	<i>Hygrotus curvipes</i>
	Delta green ground beetle	<i>Elaphrus viridis</i>
	Hairy water flea	<i>Dumontia oregonensis</i>
	Hurd's metapogon robberfly	<i>Metapogon hurdi</i>
	Lange's metalmark butterfly	<i>Apodemia mormo langei</i>
	Longhorn fairy shrimp	<i>Branchinecta longiantenna</i>
	Middlekauff's shieldback katydid	<i>Idiostatus middlekauffi</i>
	Midvalley fairy shrimp	<i>Branchinecta mesovallensis</i>
	Moestan blister beetle	<i>Lytta molesta</i>
	Monarch butterfly	<i>Danaus plexippus</i>
	Redheaded sphecid wasp	<i>Eucerceris ruficeps</i>
	Ricksecker's water scavenger beetle	<i>Hydrochara rickseckeri</i>
	Sacramento anthicid beetle	<i>Anthicus sacramento</i>
	Sacramento Valley tiger beetle	<i>Cicindela hirticollis abrupta</i>
	San Bruno elfin butterfly	<i>Callophrys mossii bayensis</i>
	San Joaquin dune beetle	<i>Coelus gracilis</i>
	Valley elderberry longhorn beetle	<i>Desmocerus californicus dimorphus</i>
	Vernal pool fairy shrimp	<i>Branchinecta lynchi</i>
Vernal pool tadpole shrimp	<i>Lepidurus packardi</i>	
Fish	American shad	<i>Alosa sapidissima</i>
	Bass	<i>Micropterus</i> spp.
	Bluegill	<i>Lepomis macrochirus</i>
	Bullheads	<i>Ameiurus</i> spp.
	California roach	<i>Hesperoleucus symmetricus</i>
	Catfish	<i>Ictalurus</i> spp.
	Chinook salmon	<i>Oncorhynchus tshawytscha</i>
	Common carp	<i>Cyprinus carpio</i>

Table E-2 (continued)
Common and Scientific Names of Fish and Wildlife Species Mentioned in Draft
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Type	Common Name	Scientific Name
Fish (cont.)	Crappie	<i>Pomoxis</i> spp.
	Delta smelt	<i>Hypomesus transpacificus</i>
	Fathead minnow	<i>Pimephales promelas</i>
	Golden shiner	<i>Notemigonus crysoleucas</i>
	Green sturgeon	<i>Acipenser medirostris</i>
	Green sunfish	<i>Lepomis cyanellus</i>
	Hardhead	<i>Mylopharodon conocephalus</i>
	Hitch	<i>Lavinia exilicauda</i>
	Inland silverside	<i>Menidia beryllina</i>
	Largemouth bass	<i>Micropterus salmoides</i>
	Longfin smelt	<i>Spirinchus thaleichthys</i>
	Northern anchovy	<i>Engraulis mordax</i>
	Pacific lamprey	<i>Lampetra tridentata</i>
	Prickly sculpin	<i>Cottus asper</i>
	Riffle sculpin	<i>Cottus gulosus</i>
	River lamprey	<i>Lampetra ayresii</i>
	Sacramento blackfish	<i>Orthodon microlepidotus</i>
	Sacramento perch	<i>Archoplites interruptus</i>
	Sacramento pikeminnow	<i>Ptychocheilus grandis</i>
	Sacramento splittail	<i>Pogonichthys macrolepidotus</i>
	Sacramento sucker	<i>Catostomus occidentalis</i>
	Starry flounder	<i>Platichthys stellatus</i>
	Steelhead	<i>Oncorhynchus mykiss irideus</i>
	Striped bass	<i>Morone saxatilis</i>
	Sunfish	<i>Lepomis</i> spp.
	Threadfin shad	<i>Dorosoma petenense</i>
	Tule perch	<i>Hysterothorax traski</i>
	Western mosquitofish	<i>Gambusia affinis</i>
Amphibians	Black salamander	<i>Aneides flavipunctatus</i>
	Bullfrog	<i>Rana catesbiana</i>
	California red-legged frog	<i>Rana draytonii</i>
	California slender salamander	<i>Batrachoseps attenuatus</i>
	California tiger salamander	<i>Ambystoma californiense</i>
	Ensatina	<i>Ensatina eschscholtzii</i>
	Foothill yellow-legged frog	<i>Rana boylei</i>
	Pacific chorus frog	<i>Pseudacris regilla</i>
	Western spadefoot	<i>Spea hammondi</i>
Western toad	<i>Bufo boreas</i>	

Table E-2 (continued)
Common and Scientific Names of Fish and Wildlife Species Mentioned in Draft PEIR Section 5.6 Biological Resources - Terrestrial

Type	Common Name	Scientific Name
Reptiles	Alameda whipsnake (=striped racer)	<i>Masticophis lateralis euryxanthus</i>
	Blunt-nosed leopard lizard	<i>Gambelia silus</i>
	California horned lizard	<i>Phrynosoma corantum (frontale population)</i>
	California mountain kingsnake	<i>Lampropeltis zonata (pulchra)</i>
	Coast horned lizard	<i>Phrynosoma blainvilli</i>
	Common garter snake	<i>Thamnophis sirtalis</i>
	Garter snake	<i>Thamnophis sp.</i>
	Giant garter snake	<i>Thamnophis gigas</i>
	Gopher snake	<i>Pituophis catenifer</i>
	Rubber boa	<i>Charina bottae</i>
	Sagebrush lizard	<i>Sceloporus graciosus</i>
	San Joaquin whipsnake	<i>Masticophis flagellum ruddocki</i>
	Sharp-tailed snake	<i>Contia tenuis</i>
	Side-blotched lizard	<i>Uta stansburiana</i>
	Silvery legless lizard	<i>Anniella pulchra pulchra</i>
	Western fence lizard	<i>Sceloporus occidentalis</i>
	Western pond turtle	<i>Actinemys marmorata</i>
	Western racer	<i>Coluber mormon</i>
	Western rattlesnake	<i>Crotalus oreganus</i>
Western terrestrial garter snake	<i>Thamnophis elegans</i>	
Birds	Acorn woodpecker	<i>Melanerpes formicivorus</i>
	Aleutian cackling goose	<i>Branta hutchinsii leucopareia</i>
	American avocet	<i>Recurvirostra americana</i>
	American bittern	<i>Botaurus lentiginosus</i>
	American crow	<i>Corvus branchyrhychos</i>
	American goldfinch	<i>Carduelis tristis</i>
	American kestrel	<i>Falco sparverius</i>
	American peregrine falcon	<i>Falco peregrinus anatum</i>
	American pipit	<i>Anthus rubescens</i>
	American robin	<i>Turdus migratorius</i>
	American widgeon	<i>Anas americana</i>
	Ash-throated flycatcher	<i>Myiarchus cinerascens</i>
	Bald eagle	<i>Haliaeetus leucocephalus</i>
	Band-tailed pigeon	<i>Columba fasciata</i>
	Bank swallow	<i>Riparia riparia</i>
	Barn owl	<i>Tyto alba</i>
	Belted kingfisher	<i>Ceryle alcyon</i>
	Bewick's wren	<i>Thryomanes bewickii</i>
	Black-crowned night-heron	<i>Nycticorax nycticorax</i>

Table E-2 (continued)
Common and Scientific Names of Fish and Wildlife Species Mentioned in Draft
PEIR Section 5.6 Biological Resources - Terrestrial

Type	Common Name	Scientific Name
Birds (cont.)	Black-headed grosbeak	<i>Pheucticus melanocephalus</i>
	Black-necked stilt	<i>Himantopus mexicanus</i>
	Black phoebe	<i>Sayornis nigricans</i>
	Black tern	<i>Chlidonias niger</i>
	Blue grosbeak	<i>Passerina caerulea</i>
	Blue grouse	<i>Dendragapus obscurus</i>
	Brewer's blackbird	<i>Euphagus cyanocephalus</i>
	Bufflehead	<i>Bucephala albeola</i>
	Bullock's oriole	<i>Icterus bullockii</i>
	Burrowing owl	<i>Athene cunicularia</i>
	Bushtit	<i>Psaltriparus minimus</i>
	California black rail	<i>Laterallus jamaicensis coturniculus</i>
	California brown pelican	<i>Pelecanus occidentalis californicus</i>
	California gull	<i>Larus californicus</i>
	California horned lark	<i>Eremophila alpestris actia</i>
	California least tern	<i>Sternula antillarum browni</i>
	California quail	<i>Callipepla californica</i>
	California spotted owl	<i>Strix occidentalis occidentalis</i>
	California towhee	<i>Melospiza crissalis</i>
	Canada goose	<i>Branta canadensis</i>
	Canvasback	<i>Aythya valisineria</i>
	Cinnamon teal	<i>Anas cyanoptera</i>
	Common goldeneye	<i>Bucephala clangula</i>
	Common yellowthroat	<i>Geothlypis trichas</i>
	Cooper's hawk	<i>Accipiter cooperii</i>
	Coot	<i>Fulica americana</i>
	Double-crested cormorant	<i>Phalacrocorax auritus</i>
	Downy woodpecker	<i>Picoides pubescens</i>
	Dunlin	<i>Calidris alpina</i>
	Egret	<i>Ardea</i> sp.
	Eurasian collared-dove	<i>Streptopelia decaocto</i>
	European starling	<i>Sturnus vulgaris</i>
	Ferruginous hawk	<i>Buteo regalis</i>
	Gadwall	<i>Anas strepera</i>
	Golden eagle	<i>Aquila chrysaetos</i>
	Golden-crowned kinglet	<i>Regulus satrapa</i>
	Grasshopper sparrow	<i>Ammodramus savannarum</i>
	Great blue heron	<i>Ardea herodias</i>
	Great egret	<i>Ardea alba</i>

Table E-2 (continued)
Common and Scientific Names of Fish and Wildlife Species Mentioned in Draft
PEIR Section 5.6 Biological Resources - Terrestrial

Type	Common Name	Scientific Name
Birds (cont.)	Greater sandhill crane	<i>Grus canadensis tabida</i>
	Greater yellowlegs	<i>Tringa melanoleuca</i>
	Great horned owl	<i>Bubo virginianus</i>
	Grebe	Family Podicipedidae
	Green-winged teal	<i>Anas crecca</i>
	Gull	<i>Larus</i> sp.
	Hairy woodpecker	<i>Picoides villosus</i>
	House finch	<i>Carpodacus mexicanus</i>
	House sparrow	<i>Passer domesticus</i>
	Hutton's vireo	<i>Vireo huttoni</i>
	Killdeer	<i>Charadrius vociferus</i>
	Lazuli bunting	<i>Passerina amoena</i>
	Least Bell's vireo	<i>Vireo bellii pusillus</i>
	Least bittern	<i>Ixobrychus exilis</i>
	Least sandpiper	<i>Calidris minutilla</i>
	Le Conte's thrasher	<i>Toxostoma lecontei</i>
	Lesser sandhill crane	<i>Grus canadensis canadensis</i>
	Lesser yellowlegs	<i>Tringa flavipes</i>
	Loggerhead shrike	<i>Lanius ludovicianus</i>
	Long-billed curlew	<i>Numenius americanus</i>
	Long-billed dowitcher	<i>Limnodromus scolopaceus</i>
	Loon	<i>Gavia</i> sp.
	Mallard	<i>Anas platyrhynchos</i>
	Marsh wren	<i>Cistothorus palustris</i>
	Merlin	<i>Falco columbarius</i>
	Mountain plover	<i>Charadrius montanus</i>
	Mourning dove	<i>Zenaida macroura</i>
	Northern flicker	<i>Colaptes auratus</i>
	Northern goshawk	<i>Accipiter gentilis</i>
	Northern harrier	<i>Circus cyaneus</i>
	Northern pintail	<i>Anas acuta</i>
	Northern shoveler	<i>Anas clypeata</i>
	Northern spotted owl	<i>Strix occidentalis caurina</i>
	Oak titmouse	<i>Baeolophus inornatus</i>
	Olive-sided flycatcher	<i>Contopus cooperi</i>
	Orange-crowned warbler	<i>Vermivora celata</i>
Osprey	<i>Pandion haliaetus</i>	
Pacific-slope flycatcher	<i>Empidonax difficilis</i>	
Pied-billed grebe	<i>Podilymbus podiceps</i>	

Table E-2 (continued)
Common and Scientific Names of Fish and Wildlife Species Mentioned in Draft
PEIR Section 5.6 Biological Resources - Terrestrial

Type	Common Name	Scientific Name
Birds (cont.)	Prairie falcon	<i>Falco mexicanus</i>
	Purple martin	<i>Progne subis</i>
	Red crossbill	<i>Loxia curvirostra</i>
	Redhead	<i>Aythya americana</i>
	Red-shouldered hawk	<i>Buteo lineatus</i>
	Red-tailed hawk	<i>Buteo jamaicensis</i>
	Red-winged blackbird	<i>Agelaius phoeniceus</i>
	Ridgway's Rail	<i>Rallus longirostris obsoletus</i>
	Ring-necked duck	<i>Aythya collaris</i>
	Ring-necked pheasant	<i>Phasianus colchicus</i>
	Rock dove	<i>Columba liviato</i>
	Ruddy duck	<i>Oxyura jamaicensis</i>
	Saltmarsh common yellowthroat	<i>Geothlypis trichas sinuosa</i>
	San Pablo song sparrow	<i>Melospiza melodia samuelis</i>
	Savannah sparrow	<i>Passerculus sandwichensis</i>
	Short-billed dowitcher	<i>Limnodromus griseus</i>
	Short-eared owl	<i>Asio flammeus</i>
	Snowy egret	<i>Egretta thula</i>
	Song sparrow "Modesto" population	<i>Melospiza melodia</i>
	Spotted towhee	<i>Pipilo maculatus</i>
	Steller's jay	<i>Cyanocitta stelleri</i>
	Suisun song sparrow	<i>Melospiza melodia maxillaris</i>
	Swainson's hawk	<i>Buteo swainsoni</i>
	Tree swallow	<i>Tachycineta bicolor</i>
	Tricolored blackbird	<i>Agelaius tricolor</i>
	Tule greater white-fronted goose	<i>Anser albifrons elgasi</i>
	Tundra swan	<i>Cygnus columbianus</i>
	Virginia rail	<i>Rullus limicola</i>
	Warbling vireo	<i>Vireo gilvus</i>
	Western grebe	<i>Aechmophorus occidentalis</i>
	Western meadowlark	<i>Sturnella neglecta</i>
	Western sandpiper	<i>Calidris maurim</i>
	Western scrub-jay	<i>Aphelocoma californica</i>
	Western snowy plover	<i>Charadrius alexandrinus nivosus</i>
	Western tanager	<i>Piranga ludoviciana</i>
	Western wood-pewee	<i>Contopus sordidulus</i>
	Western yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>
	Whimbrel	<i>Numenius phaeopus</i>
	White-breasted nuthatch	<i>Sitta carolinensis</i>

Table E-2 (continued)
Common and Scientific Names of Fish and Wildlife Species Mentioned in Draft
PEIR Section 5.6 Biological Resources - Terrestrial

Type	Common Name	Scientific Name
Birds (cont.)	White-faced ibis	<i>Plegadis chihi</i>
	White-fronted goose	<i>Anser albifrons</i>
	White-tailed kite	<i>Elanus leucurus</i>
	Wild turkey	<i>Meleagris gallopavo</i>
	Williamson's sapsucker	<i>Sphyrapicus thyroideus</i>
	Wilson's phalarope	<i>Phalaropus tricolor</i>
	Wood duck	<i>Aix sponsa</i>
	Wrentit	<i>Chamaea fasciata</i>
	Yellow-billed magpie	<i>Pica nuttalli</i>
	Yellow-breasted chat	<i>Icteria virens</i>
	Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>
	Yellow warbler	<i>Dendroica petechia brewsteri</i>
Mammals	Allen's chipmunk	<i>Neotamias senex</i>
	American badger	<i>Taxidea taxus</i>
	American beaver	<i>Castor canadensis</i>
	Berkeley kangaroo rat	<i>Dipodomys heermanni berkeleyensis</i>
	Big free-tailed bat	<i>Nyctinomops macrotis</i>
	Black bear	<i>Ursus americanus</i>
	Black rat	<i>Rattus rattus</i>
	Black-tailed deer	<i>Odocoileus hemionus</i>
	Black-tailed jackrabbit	<i>Sylvilagus bachmani</i>
	Botta's pocket gopher	<i>Thomomys bottae</i>
	California ground squirrel	<i>Spermophilus beecheyi</i>
	California myotis	<i>Myotis californicus</i>
	California vole	<i>Microtus californicus</i>
	Coyote	<i>Canis latrans</i>
	Desert cottontail	<i>Sylvilagus audubonii</i>
	Douglas squirrel	<i>Tamiasciurus douglasii</i>
	Dusky-footed woodrat	<i>Neotoma fuscipes</i>
	Fresno kangaroo rat	<i>Dipodomys nitratooides exilis</i>
	Giant kangaroo rat	<i>Dipodomys ingens</i>
	Gray fox	<i>Urocyon cinereoargenteus</i>
	Hoary bat	<i>Lasiurus cinereus</i>
	Long-tailed vole	<i>Microtus longicaudus</i>
	Mink	<i>Mustela vison</i>
	Mule deer (=black-tailed deer)	<i>Odocoileus hemionus</i>
	Muskrat	<i>Ondatra zibethicus</i>
	Northern flying squirrel	<i>Glaucomys sabrinus</i>
	Norway rat	<i>Rattus norvegicus</i>

Table E-2 (continued)
Common and Scientific Names of Fish and Wildlife Species Mentioned in Draft PEIR Section 5.6 Biological Resources - Terrestrial

Type	Common Name	Scientific Name
Mammals (cont.)	Opossum	<i>Didelphis virginiana</i>
	Ornate shrew	<i>Sorex ornatus</i>
	Pallid bat	<i>Antrozous pallidus</i>
	Raccoon	<i>Procyon lotor</i>
	Ringtail	<i>Bassariscus astutus</i>
	Riparian brush rabbit	<i>Sylvilagus bachmani riparius</i>
	Riparian woodrat	<i>Neotoma fuscipes riparia</i>
	River otter	<i>Lutra canadensis</i>
	Salt marsh harvest mouse	<i>Reithrodontomys raviventris</i>
	San Joaquin kit fox	<i>Vulpes macrotis mutica</i>
	Striped skunk	<i>Mephitis mephitis</i>
	Suisun shrew	<i>Sorex ornatus sinuosus</i>
	Tipton's kangaroo rat	<i>Dipodomys nitratoides nitratoides</i>
	Townsend's big-eared bat	<i>Corynorhinus townsendii</i>
	Tule elk	<i>Cervus elaphus</i>
	Western gray squirrel	<i>Sciurus gresius</i>
	Western harvest mouse	<i>Reithrodontomys megalotis</i>
	Western mastiff bat	<i>Eumops perotis californicus</i>
	Western red bat	<i>Lasiurus blossevillii</i>

Sources: AmphibiaWeb 2017; AOU 2017; DFW 2017a; DFW 2017b; DFW 2017c; SSAR 2017; Xerces Society for Invertebrate Conservation 2017

Note: Scientific and common names of special-status species follow the California Department of Fish and Wildlife (DFW) Special Animal List (2017). Sources for common wildlife species names are the DFW Species Explorer data portal, the Xerces Society for Invertebrate Conservation, the Society for the Study of Amphibians and Reptiles, AmphibiaWeb, the American Ornithologists' Union, and the American Society of Mammalogists.

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E.3 Special-Status Plant Species Accounts

The species accounts in this appendix provide an overview of federally or state-listed special-status plants known to occur or have an appreciable likelihood of occurring in the Delta and Suisun Marsh or that are otherwise likely to be substantially affected by the proposed Delta Plan Amendments (Proposed Project or proposed amendments). Additionally, this appendix identifies invasive weeds and noxious plants known to occur, or with the potential to occur, within the Primary Planning Area. Table E-3 also lists identified plant species that were removed from further discussion in the Draft Program Environmental Impact Report (PEIR) because they are not likely to be affected by the Proposed Project.

Table E-3
Special-status Plant Species That Are Not Likely to Be Affected by the Proposed Delta Plan Amendments in the Primary Planning Area

Common Name	Scientific Name	Federal ^a	State ^b	CRPR ^c	Reason Not Likely Affected
Santa Clara thorn-mint	<i>Acanthomintha lanceolata</i>	–	–	4	Occurs only at higher elevation
Purdy's onion	<i>Allium fimbriatum</i> var. <i>purdyi</i>	–	–	4	Occurs only at higher elevation
Large-flowered fiddleneck	<i>Amsinckia grandiflora</i>	E	E	1B	Occurs only at higher elevation
Bent-flowered fiddleneck	<i>Amsinckia lunaris</i>	–	–	1B	Occurs only outside the range of the Delta and Suisun Marsh
California androsace	<i>Androsace elongata</i> ssp. <i>acuta</i>	–	–	4	Occurs only at higher elevation
Slender silver moss	<i>Anomobryum julaceum</i>	–	–	2	Occurs only at higher elevation
Twig-like snapdragon	<i>Antirrhinum virga</i>	–	–	4	Occurs only at higher elevation
Coast rock cress	<i>Arabis blepharophylla</i>	–	–	4	No suitable coastal habitat in the Delta
Modest rock cress	<i>Arabis modesta</i>	–	–	4	Occurs only at higher elevation
Mt. Diablo manzanita	<i>Arctostaphylos auriculata</i>	–	–	1B	No suitable chaparral habitat present in the Delta and Suisun Marsh
Contra Costa manzanita	<i>Arctostaphylos manzanita</i> ssp. <i>laevigata</i>	–	–	1B	Occurs only at higher elevation
Serpentine milkweed	<i>Asclepias solanoana</i>	–	–	4	Occurs only at higher elevation
Carlotta Hall's lace fern	<i>Aspidotis carlotta-halliae</i>	–	–	4	Occurs only at higher elevation
Brewer's milk-vetch	<i>Astragalus breweri</i>	–	–	4	Occurs only at higher elevation
Cleveland's milk-vetch	<i>Astragalus clevelandii</i>	–	–	4	Occurs only at higher elevation

Table E-3 (continued)
Special-status Plant Species That Are Not Likely to Be Affected by the Proposed Delta Plan Amendments in the Primary Planning Area

Common Name	Scientific Name	Federal ^a	State ^b	CRPR ^c	Reason Not Likely Affected
Ocean bluff milk-vetch	<i>Astragalus nuttallii</i> var. <i>nuttallii</i>	–	–	4	No suitable coastal habitat in the Delta and Suisun Marsh
Big-scale balsamroot	<i>Balsamorhiza macrolepis</i> var. <i>macrolepis</i>	–	–	1B	Occurs only at higher elevation
Oakland star-tulip	<i>Calochortus umbellatus</i>	–	–	4	Occurs only at higher elevation
Large-flowered mariposa lily	<i>Calochortus uniflorus</i>	–	–	4	No suitable forest or coastal habitat in the Delta and Suisun Marsh
Chaparral harebell	<i>Campanula exigua</i>	–	–	1B	No suitable serpentine habitat in the Delta and Suisun Marsh
Tiburon paintbrush	<i>Castilleja affinis</i> ssp. <i>Neglecta</i>	E	–	1B.2	No suitable serpentine habitat in the Delta and Suisun Marsh
Succulent owl's clover	<i>Castilleja campestris</i> ssp. <i>Succulenta</i>	T	E	1B	Occurs only outside the range of the Delta and Suisun Marsh
Lemmon's jewel flower	<i>Caulanthus coulteri</i> var. <i>lemmonii</i>	–	–	1B	Occurs only at higher elevation
Holly-leaved ceanothus	<i>Ceanothus purpureus</i>	–	–	1B	Occurs only at higher elevation
Brewer's clarkia	<i>Clarkia breweri</i>	–	–	4	Occurs only at higher elevation
Santa Clara red ribbons	<i>Clarkia concinna</i> ssp. <i>Automixa</i>	–	–	4	Occurs only at higher elevation
Serpentine collomia	<i>Collomia diversifolia</i>	–	–	4	Occurs only at higher elevation
Mt. Diablo bird's-beak	<i>Cordylanthus nidularius</i>	–	R	1B	No suitable serpentine habitat in the Delta and Suisun Marsh
Peruvian dodder	<i>Cuscuta obtusiflora</i> var. <i>glandulosa</i>	–	–	2B.2	Presumed extirpated
Livermore tarplant	<i>Deinandra bacigalupi</i>	–	–	1B	Occurs only at higher elevation
Hospital Canyon larkspur	<i>Delphinium californicum</i> ssp. <i>Interius</i>	–	–	1B	Occurs only at higher elevation
Gypsum-loving larkspur	<i>Delphinium gypsophilum</i> ssp. <i>gypsophilum</i>	–	–	4	Occurs only at higher elevation
Norris' beard moss	<i>Didymodon norrisii</i>	–	–	2	Occurs only at higher elevation
Western leatherwood	<i>Dirca occidentalis</i>	–	–	1B.2	No suitable habitat in the Delta and Suisun Marsh
Brandegee's eriastrum	<i>Eriastrum brandegeeeae</i>	–	–	1B	Occurs only at higher elevation

Table E-3 (continued)
Special-status Plant Species That Are Not Likely to Be Affected by the Proposed Delta Plan Amendments in the Primary Planning Area

Common Name	Scientific Name	Federal ^a	State ^b	CRPR ^c	Reason Not Likely Affected
Lime Ridge eriastrum	<i>Eriastrum erterae</i>	–	–	1B.1	Known only to occur in Lime Ridge area
Streamside daisy	<i>Erigeron biolettii</i>	–	–	3	No suitable forest habitat in the Delta and Suisun Marsh
Tiburon buckwheat	<i>Eriogonum luteolum</i> var. <i>caninum</i>	–	–	1B.2	No suitable serpentine habitat in the Delta and Suisun Marsh
Kings River buckwheat	<i>Eriogonum nudum</i> var. <i>regirivum</i>	–	–	1B.2	Occurs only at higher elevation
Bay buckwheat	<i>Eriogonum umbellatum</i> var. <i>bahiiforme</i>	–	–	4	Occurs only at higher elevation
Jepson's woolly sunflower	<i>Eriophyllum jepsonii</i>	–	–	4	Occurs only at higher elevation
Spiny-sepaed button-celery	<i>Eryngium spinosepalum</i>	–	–	1B.2	Occurs only at higher elevation
Adobe-lily	<i>Fritillaria pluriflora</i>	–	–	1B	No suitable habitat in the Delta and Suisun Marsh
Purdy's fritillary	<i>Fritillaria purdyi</i>	–	–	4	Occurs only at higher elevation
Phlox-leaf serpentine bedstraw	<i>Galium andrewsii</i> ssp. <i>gatense</i>	–	–	4	Occurs only at higher elevation
Toren's grimmia	<i>Grimmia torenii</i>	–	–	1B.3	Occurs only at higher elevation
Nodding harmonia	<i>Harmonia nutans</i>	–	–	4	Occurs only at higher elevation
Diablo helianthella	<i>Helianthella castanea</i>	–	–	1B	Occurs only at higher elevation
Coast Iris	<i>Iris longipetala</i>	–	–	4	Occurs only outside the range of the Delta and Suisun Marsh
Northern California (Hinds) black walnut	<i>Juglans californica</i> var. <i>hindsii</i> (<i>Juglans hindsii</i>)	–	–	1B	No native populations within the Delta and Suisun Marsh
Ahart's dwarf rush	<i>Juncus leiospermus</i> var. <i>ahartii</i>	–	–	1B	Occurs only outside the range of the Delta and Suisun Marsh
Bristly leptosiphon	<i>Leptosiphon acicularis</i>	–	–	4	Occurs only at higher elevation
Serpentine leptosiphon	<i>Leptosiphon ambiguus</i>	–	–	4	Occurs only at higher elevation
Large-flowered leptosiphon	<i>Leptosiphon grandiflorus</i>	–	–	4	No suitable coastal habitat in the Delta and Suisun Marsh
Woolly-headed lessingia	<i>Lessingia hololeuca</i>	–	–	3	No suitable serpentine habitat in the Delta and Suisun Marsh
Spring lessingia	<i>Lessingia tenuis</i>	–	–	4	Occurs only at higher elevation

Table E-3 (continued)
Special-status Plant Species That Are Not Likely to Be Affected by the Proposed Delta Plan Amendments in the Primary Planning Area

Common Name	Scientific Name	Federal ^a	State ^b	CRPR ^c	Reason Not Likely Affected
Hoover's lomatium	<i>Lomatium hooveri</i>	–	–	4	Occurs only at higher elevation
Napa lomatium	<i>Lomatium repostum</i>	–	–	4	Occurs only at higher elevation
Hall's bush-mallow	<i>Malacothamnus hallii</i>	–	–	1B	No suitable chaparral habitat within the Delta and Suisun Marsh
Heller's bush-mallow	<i>Malacothamnus helleri</i>	–	–	4	Occurs only at higher elevation
Mt. Diablo cottonweed	<i>Micropus amphibolus</i>	–	–	3	No suitable shrub or woodland habitat in the Delta and Suisun Marsh
Sylvan microseris	<i>Microseris sylvatica</i>	–	–	4	Occurs only at higher elevation
Sierra monardella	<i>Monardella candicans</i>	–	–	4	Occurs only at higher elevation
Robust monardella	<i>Monardella villosa</i> ssp. <i>globosa</i>	–	–	1B.2	Only occurs at higher elevation
Green monardella	<i>Monardella viridis</i> ssp. <i>Viridis</i>	–	–	4	Occurs only at higher elevation
Woodland woollythreads	<i>Monolopia gracilens</i>	–	–	1B.2	Occurs only at higher elevation
Hoary navarretia	<i>Navarretia eriocephala</i>	–	–	4	Occurs only at higher elevation
Lime Ridge navarretia	<i>Navarretia gowenii</i>	–	–	1B.1	Occurs only at higher elevation
Jepson's navarretia	<i>Navarretia jepsonii</i>	–	–	4	Occurs only at higher elevation
Adobe navarretia	<i>Navarretia nigelliformis</i> ssp. <i>nigelliformis</i>	–	–	4	Occurs only at higher elevation
Shining navarretia	<i>Navarretia nigelliformis</i> ssp. <i>radians</i>	–	–	1B.2	Occurs only at higher elevation
Mt. Diablo phacelia	<i>Phacelia phacelioides</i>	–	–	1B	Occurs only at higher elevation
Michael's rein orchid	<i>Piperia michaelii</i>	–	–	4	No suitable coastal habitat within the Delta and Suisun Marsh
Victor's gooseberry	<i>Ribes victoris</i>	–	–	4	Occurs only at higher elevation
Rock sanicle	<i>Sanicula saxatilis</i>	–	R	1B	Occurs only at higher elevation
Rayless ragwort	<i>Senecio aphanactis</i>	–	–	2	No suitable coastal or woodland habitat in the Delta and Suisun Marsh
Sweet marsh ragwort	<i>Senecio hydrophiloides</i>	–	–	4	Occurs only at higher elevation

Table E-3 (continued)
Special-status Plant Species That Are Not Likely to Be Affected by the Proposed Delta Plan Amendments in the Primary Planning Area

Common Name	Scientific Name	Federal ^a	State ^b	CRPR ^c	Reason Not Likely Affected
Keck's checkerbloom	<i>Sidalcea keckii</i>	E	–	1B.1	No suitable serpentine habitat in the Delta and Suisun Marsh
Most beautiful jewel-flower	<i>Streptanthus albidus</i> ssp. <i>peramoenus</i>	–	–	1B	No suitable serpentine habitat in the Delta and Suisun Marsh
Mt. Diablo jewel-flower	<i>Streptanthus hispidus</i>	–	–	1B	No suitable serpentine habitat in the Delta and Suisun Marsh
Slender-leaved pondweed	<i>Stuckenia filiformis</i>	–	–	2.2	Occurs only at higher elevation
Showy Indian clover	<i>Trifolium amoenum</i>	E	–	1B	No suitable coastal habitat present in the Delta and Suisun Marsh
Coastal triquetrella	<i>Triquetrella californica</i>	–	–	1B	No suitable coastal habitat present in the Delta and Suisun Marsh
Dark-mouthed triteleia	<i>Triteleia lugens</i>	–	–	4	Occurs only at higher elevation
Oval-leaved viburnum	<i>Viburnum ellipticum</i>	–	–	2	Occurs only at higher elevation

Sources: CNDDDB 2020, CNPS 2020

^a U.S. Fish and Wildlife Service—Federal Listing Categories:

- T = Threatened.
- E = Endangered.
- = No status.

^b California Department of Fish and Game—State Listing Categories:

- R = Rare.
- E = Endangered.
- = No status.

^c California Rare Plant Rank (CRPR) Listing Categories:

- 1B = Plants rare, threatened, or endangered in California and elsewhere.
- 2 = Plants rare, threatened, or endangered in California, but more common elsewhere.
- 3 = Plants for which more information is needed—a review list.
- 4 = Plants of limited distribution—a watch list.

Extension:

- .2 = Fairly endangered in California (20–80% of occurrences are threatened)

The special-status plant species accounts provided below present an overview of each species' listing status, known distribution in California and the Delta and Suisun Marsh, description of the plant, information on life history, habitat requirements, and known threats. The species are featured in alphabetical order by scientific name. Table E-4 below presents a comprehensive list of the special-status plant species known to occur or with potential to occur in the Delta and Suisun Marsh. Species that are known to occur in the Primary Planning Area or that have suitable habitat are described in more detail below Table E-4.

1 **E.3.1 Alkali Milk-vetch**

2 Alkali milk-vetch (*Astragalus tener* var. *tener*) is a CRPR 1B.2 species. Alkali milk-vetch
3 was historically distributed throughout the southern Sacramento Valley, northern San
4 Joaquin Valley, and San Francisco Bay Area but is believed to be extirpated from all
5 historic occurrences except those in Alameda, Merced, Solano, and Yolo counties
6 (CNPS 2020). Several reported occurrences are known from the Delta. Small groups of
7 up to 20 plants are found on suitable habitat throughout the Tule Ranch in the southern
8 part of the Yolo Bypass (Witham 2003).

9 Alkali milk-vetch is an herbaceous annual plant in the pea family (Fabaceae) (CNPS
10 2020). It is distinguished from Ferris' milk-vetch (*Astragalus tener* var. *ferrisiae*), which
11 co-occurs, based on the morphology of its fruits. Alkali milk-vetch has short, stout,
12 strongly curved pods (Liston 1990, 1992 as cited in USFWS 2001). Its elevation range
13 is up to 2,000 feet.

14 The main threat to the survival of alkali milk-vetch is conversion of habitat to agricultural
15 land uses (CNPS 2020). Competition from nonnative species is another threat.
16 Livestock grazing is frequently mentioned as a possible threat in CNDDDB occurrence
17 reports, but some level of grazing may be beneficial to control competition from
18 nonnative species. Because remaining populations are small and scattered, extirpation
19 from random events such as flood, drought, or disease is also a concern (USFWS 2005).

20 **E.3.2 Heartscale**

21 Heartscale (*Atriplex cordulata*) is a CRPR 1B.2 species. Heartscale is endemic to
22 California. Its range extends through the Central Valley from Glenn County in the north
23 to Fresno County in the south (CNPS 2020). Heartscale is found in meadows, seeps,
24 riparian wetlands, chenopod scrub, and valley and foothill grasslands in various soils
25 that are either saline or alkaline (CNPS 2020).

26 Heartscale is a small- to medium-sized 4- to 20-inch- (10- to 50-centimeter) tall annual
27 herb of the goosefoot family (Chenopodiaceae) that blooms from April to October
28 (CNPS 2020). Heartscale can be found at elevations up to 1,840 feet (560 meters)
29 (CNPS 2020).

30 Reported threats to heartscale include agriculture intensification, development,
31 nonnative plants, overgrazing, and trampling (CNPS 2020).

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**Table E-4
Special-status Plant Species Known to Occur or with Potential to Occur in the Primary Planning Area**

Common Name Scientific Name	Federal ^a	State ^b	CRPR ^c	Habitat	Distribution in California	Flowering Period	Potential for Occurrence
Bent flowered fiddleneck <i>Amsinckia lunaris</i>	–	–	1B.2	Found in coastal bluff scrub, cismontane woodland, and valley and foothill grassland; 0- to 1,600-foot elevation	Alameda, Contra Costa, Colusa, Lake, Marin, Napa, San Benito, Santa Clara, Santa Cruz, San Mateo, and Yolo counties	March– June	Could occur; suitable habitat is present, and species is known from the vicinity
Ferris’ milk-vetch <i>Astragalus tener</i> var. <i>ferrisiae</i>	–	–	1B.1	Vernally mesic meadows and mildly alkaline flats in valley and foothill grassland, usually on dry, heavy clay or adobe soil; 0- to 2,500-foot elevation	Western edge of the Central Valley from Butte to Solano counties	April–May	Could occur; suitable habitat is present, and species is known from the vicinity
Alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	–	–	1B.2	Alkaline vernal pools and playas, and valley and foothill grassland with alkaline adobe clay soils; 3- to 2,000-foot elevation	Central Valley and eastern San Francisco Bay Area	March– June	Known to occur in the Primary Planning Area
Heartscale <i>Atriplex cordulata</i>	–	–	1B.2	Sandy, saline, or alkaline flats or scalds, in chenopod scrub, meadows, and valley and foothill grassland	Central Valley, from Kern County in the south to Butte and Glenn counties in the north, and from Alameda County, Contra Costa, and Solano counties in the west to Madera and Tulare counties in the east; believed to be extirpated from San Joaquin, Stanislaus, and Yolo counties and has not been reported from Sacramento County	April– October	Known to occur in the Primary Planning Area
Crownscale <i>Atriplex coronata</i> var. <i>coronata</i>	–	–	4.2	Alkaline soils in vernal pools, valley foothill grassland, and chenopod scrub	Central Valley, the foothills of the Sierra Nevada, and the inner south coast ranges	March– October	Known to occur in the Primary Planning Area

Table E-4 (continued)
Special-status Plant Species Known to Occur or with Potential to Occur in the Primary Planning Area

Common Name Scientific Name	Federal ^a	State ^b	CRPR ^c	Habitat	Distribution in California	Flowering Period	Potential for Occurrence
Lost Hills crownscale <i>Atriplex coronata</i> var. <i>vallicola</i>	–	–	1B.2	Alkaline soils; chenopod scrub, valley and foothill grassland, and vernal pools	Fresno, Kings, Kern, Merced, San Luis Obispo, Tulare Counties	April–September	Unlikely to occur; nearly all known occurrences of this species in southwestern San Joaquin County.
Brittlescale <i>Atriplex depressa</i>	–	–	1B.2	Alkaline clay soils in chenopod scrub, meadows and seeps, playas, valley and foothill grassland, or vernal pools; 3- to 1,050-foot elevation	Central Valley and Tulare Basin	May–October	Known to occur in the Primary Planning Area
Lesser saltscale <i>Atriplex minuscula</i>	–	–	1B.1	Alkaline sandy soils in chenopod scrub, playas, valley and foothill grassland; 45- to 600-foot elevation	Central Valley from Kern County to Stanislaus County and in Alameda and Butte counties	May–October	Could occur; suitable habitat is present, and species is known from the vicinity
Vernal pool smallscale <i>Atriplex persistens</i>	–	–	1B.2	Alkaline vernal pools; 30- to 400-foot elevation	Scattered locations throughout the Central Valley from Glenn County to Tulare County	June–October	Could occur; suitable habitat is present, and species is known from the vicinity
Big tarplant <i>Blepharizonia plumosa</i>	–	–	1B.1	Valley and foothill grassland; 100- to 1,600-foot elevation	Scattered locations throughout the inner Coast Ranges from Solano County to Stanislaus County	July–October	Could occur; suitable habitat is present, and species is known from the vicinity
Watershield <i>Brasenia schreberi</i>	–	–	2.3	Freshwater marshes and swamps	North Coast Ranges, Cascade Range, Sierra Nevada, and Central Valley	June–September	Unlikely to occur; presumed extirpated in the Delta and other known populations are found at higher elevations
Brewer's calandrinia <i>Calandrinia breweri</i>	–	–	4.2	Sandy or loamy soils on disturbed sites; burns in chaparral and coastal scrub; 30- to 4,000-foot elevation	Widely scattered locations from Shasta County to San Diego County, but always uncommon; many collections are old	March–June	Could occur; suitable habitat is present, and species is known from the vicinity
Round-leaved filaree <i>California macrophylla</i>	–	–	1B.2	Open sites, grassland, scrub, vertic clay, occasional serpentine; 50- to 4,000-foot elevation	Inner Coast Ranges of California and Central Valley	March–May	Could occur; suitable habitat is present, and known historical occurrences of species in the Delta

Table E-4 (continued)
Special-status Plant Species Known to Occur or with Potential to Occur in the Primary Planning Area

Common Name Scientific Name	Federal ^a	State ^b	CRPR ^c	Habitat	Distribution in California	Flowering Period	Potential for Occurrence
Mt. Diablo fairy-lantern <i>Calochortus pulchellus</i>	–	–	1B.2	Openings in chaparral, coastal scrub, and associated grasslands; 100- to 2,800-foot elevation	Inner Coast Ranges in Alameda, Contra Costa, and Solano counties	April–June	Unlikely to occur; where found in the vicinity, it grows at higher elevations
Bristly sedge <i>Carex comosa</i>	–	–	2.1	Coastal prairie, marshes and swamps, valley and foothill grassland, on lake margins, and wet places; 0- to 2,100-foot elevation	Fairly widely distributed in California ranging from Shasta County to San Bernardino County	May–September	Known to occur in the Delta
Johnny-nip <i>Castilleja ambigua</i> ssp. <i>ambigua</i>	–	–	4.2	Coastal bluff scrub, coastal prairie, coastal scrub, marshes and swamps, valley and foothill grassland, vernal pool margins	Coastal counties from San Luis Obispo to Del Norte, Napa, Contra Costa, and Alameda counties	March–August	Could occur; suitable habitat is present and species is known from the vicinity
Lemmon's jewelflower <i>Caulanthus lemmonii</i>	–	–	1B.2	Grassland, chaparral, scrub	South Coastal Ranges, San Joaquin Valley, and San Francisco Bay Area	March–May	Unlikely to occur; where found in the vicinity, it grows at higher elevations
Congdon's tarplant <i>Centromadia parryi</i> ssp. <i>congdonii</i>	–	–	1B.2	Alkaline, often heavy clay soils in mesic areas within grassland communities with ruderal and native alkali-tolerant plants; 0- to 600-foot elevation	Alameda, Contra Costa, Monterey, Santa Clara, Santa Cruz, San Luis Obispo, San Mateo, and Solano counties	June–November	Could occur; suitable habitat is present, and species is known from the vicinity
Pappose tarplant <i>Centromadia parryi</i> ssp. <i>parryi</i>	–	–	1B.2	Mesic areas in coastal prairie, meadow, and grassland habitats, often on alkaline substrates; 0- to 1,400-foot elevation	Butte, Colusa, Glenn, Lake, Napa, San Mateo, Solano, and Sonoma counties	June–November	Could occur; suitable habitat is present, and species is known from the vicinity
Parry's tarplant <i>Centromadia parryi</i> ssp. <i>rudis</i>	–	–	4.2	Mesic areas in coastal prairie, meadow, and grassland habitats, often on alkaline substrates; 0- to 300-foot elevation	Butte, Colusa, Glenn, Lake, Merced, Sacramento, San Joaquin, Solano, Sutter, and Yolo counties	June–November	Could occur; suitable habitat is present, and species is known from the vicinity

Table E-4 (continued)
Special-status Plant Species Known to Occur or with Potential to Occur in the Primary Planning Area

Common Name Scientific Name	Federal ^a	State ^b	CRPR ^c	Habitat	Distribution in California	Flowering Period	Potential for Occurrence
Hispid salty bird's-beak <i>Chloropyron molle</i> ssp. <i>hispidum</i>	–	–	1B.1	Mesic alkaline soils in meadows and seeps, playas, and valley and foothill grassland; 3- to 500-foot elevation	Scattered locations in San Joaquin Valley from Solano County to Kern County	June–September	Could occur; suitable habitat is present, and species is known from the vicinity
Soft salty bird's-beak <i>Chloropyron molle</i> ssp. <i>molle</i>	E	R	1B.2	Coastal salt marshes and swamps; 0- to 10-foot elevation	Endemic to the San Pablo Bay and Suisun Bay area; may have historically occurred in the Delta	July–September	Could occur; suitable habitat is present, and species is known from the vicinity
Palmate-bracted salty bird's-beak <i>Chloropyron palmatum</i>	E	E	1B.1	Alkaline soils in chenopod scrub and valley and foothill grassland; 15- to 500-foot elevation	Glenn, Colusa, Yolo, Alameda, Madera, and Fresno counties	June–August	Could occur; suitable habitat is present, and species is known from the vicinity
Bolander's water hemlock <i>Cicuta maculata</i> var. <i>bolanderi</i>	–	–	2.1	Coastal, fresh, or brackish marshes; 0- to 600-foot elevation	Contra Costa, Los Angeles, Marin, Sacramento, Santa Barbara, San Luis Obispo, and Solano counties	July–September	Known to occur in the Primary Planning Area
Slough thistle <i>Cirsium crassicaule</i>	–	–	1B.1	Chenopod scrub habitat or along sloughs in marshes, and swamps and riparian scrub habitat; 0- to 300-foot elevation	Kings, Kern, and San Joaquin counties	May–August	Known to occur in the Delta
Suisun thistle <i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>	E	–	1B.1	Salt and brackish marshes; 0- to 3-foot elevation	Restricted to the Suisun Marsh in Solano County	June–September	Known to occur in Suisun Marsh
Small flowered morning glory <i>Convolvulus simulans</i>	–	–	4.2	Serpentine seeps in valley and foothill grassland; openings in chaparral and coastal scrub; 100- to 2,100-foot elevation	Fairly widely distributed in California, ranging from Contra Costa County to San Diego County	March–July	Could occur; suitable habitat is present, and species is known from the vicinity
Hoover's cryptantha <i>Cryptantha hooveri</i>	–	–	1A	Inland dunes and sandy soils in valley and foothill grassland; 30- to 500-foot elevation	Contra Costa, Merced, Stanislaus, Madera, and Kern counties	April–May	Unlikely; although there is a historical record from the city of Antioch, this species is presumed extinct by CNPS

Table E-4 (continued)
Special-status Plant Species Known to Occur or with Potential to Occur in the Primary Planning Area

Common Name Scientific Name	Federal ^a	State ^b	CRPR ^c	Habitat	Distribution in California	Flowering Period	Potential for Occurrence
Recurved larkspur <i>Delphinium recurvatum</i>	–	–	1B.2	Alkaline soils in cismontane woodland and valley and foothill grassland; 10- to 2,500-foot elevation	Central Valley and foothills from Contra Costa County to Kern County	March–June	Known to occur in the Delta
Dwarf downingia <i>Downingia pusilla</i>	–	–	2.2	Vernally mesic sites in valley and foothill grassland and vernal pools; 3- to 1,500-foot elevation	Central Valley from Tehama County to Fresno County	March–May	Known to occur in the Primary Planning Area
Small spikerush <i>Eleocharis parvula</i>	–	–	4.3	Marshes and swamp; 0- to 10,000-foot elevation	Distributed in 14 counties in California from Siskiyou County to Orange County	June–August	Could occur; suitable habitat is present
Antioch Dunes buckwheat <i>Eriogonum nudum</i> var. <i>psychichola</i>	–	–	1B.1	Inland dunes; 0- to 60-foot elevation	Contra Costa County	July–October	Known to occur; known from single occurrence in Antioch Dunes, but species may also be present in other areas where conditions are favorable
Mt. Diablo buckwheat <i>Eriogonum truncatum</i>	–	–	1B.1	Sandy soils in chaparral, coastal scrub, and valley and foothill grasslands; 10- to 1,050-foot elevation	Alameda, Contra Costa, and Solano counties	April–December	Unlikely to occur; presumed extinct but rediscovered in Mt. Diablo State Park, the only known extant occurrence
Jepson's coyote-thistle <i>Eryngium jepsonii</i>	–	–	1B.2	Clay soils in valley and foothill grasslands or vernal pools	Alameda, Amador, Calaveras, Contra Costa, Fresno, Napa, San Mateo, Solano, Stanislaus, Tuolumne, Yolo Counties	April-August	Could occur; suitable habitat is present
Delta button-celery <i>Eryngium racemosum</i>	–	E	1B.1	Vernally mesic clay depressions in riparian scrub habitat; 10- to 100-foot elevation	Delta and floodplains	June–September	Known to occur in the Delta
Spiny-sepaled button-celery <i>Eryngium spinosepalum</i>	–	–	1B.2	Valley and foothill grassland and vernal pools; 250- to 3,000-foot elevation	Contra Costa, Fresno, Kern, Madera, Merced, San Luis Obispo, Stanislaus, Tulare, Tuolumne Counties	April-June	Unlikely; most known occurrences are at higher elevations

Table E-4 (continued)
Special-status Plant Species Known to Occur or with Potential to Occur in the Primary Planning Area

Common Name Scientific Name	Federal ^a	State ^b	CRPR ^c	Habitat	Distribution in California	Flowering Period	Potential for Occurrence
Contra Costa wallflower <i>Erysimum capitatum</i> <i>ssp. angustatum</i>	E	E	1B.1	Inland dunes, generally on stabilized dunes of sand and clay near Antioch along the San Joaquin River; 0- to 70-foot elevation	Documented occurrences restricted to near Antioch Dunes National Wildlife Refuge	March–July	Known to occur in the Delta
Diamond-petaled California poppy <i>Eschscholzia</i> <i>rhombipetala</i>	–	–	1B.1	Alkaline and clay soils in valley and foothill grassland; 0- to 1,000-foot elevation	Rediscovered on Carrizo Plain in San Luis Obispo County by David Keil in 1992; not seen there since 1995; also found at Lawrence Livermore Laboratory in Alameda County 1997, where extant as of 2003; historical occurrences known from San Joaquin, Stanislaus, and Colusa counties	March– April	Could occur; suitable habitat is present, and species is known from the vicinity
San Joaquin spearscale <i>Extriplex joaquinana</i>	–	–	1B.2	Alkaline soils in chenopod scrub, meadows and seeps, playas, and valley and foothill grassland; 3- to 2,750-foot elevation	Western edge of the Central Valley from Glenn County to Tulare County	April– October	Known to occur in the Primary Planning Area
Stinkbells <i>Fritillaria agrestis</i>	–	–	4.2	Chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grasslands; often found on clay soils, sometimes serpentinite soils; 30- to 5,000-foot elevation	Distributed in 20 counties in California from Mendocino County to Ventura County	March– June	Could occur; suitable habitat is present, and species is known from the vicinity
Fragrant fritillary <i>Fritillaria liliacea</i>	–	–	1B.2	Heavy clay soils (often with a serpentine influence) in cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland	Found in all counties surrounding the San Francisco Bay region except for Napa County	February– April	Could occur; suitable habitat is present, and species is known from the vicinity

Table E-4 (continued)
Special-status Plant Species Known to Occur or with Potential to Occur in the Primary Planning Area

Common Name Scientific Name	Federal ^a	State ^b	CRPR ^c	Habitat	Distribution in California	Flowering Period	Potential for Occurrence
Bogg's Lake hedge- hyssop <i>Gratiola heterosepala</i>	–	E	1B.2	Lake margin marshes and swamps and vernal pools in clay soils; 30- to 7,800-foot elevation	Fresno, Lake, Lassen, Madera, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano, and Tehama counties	April– August	Could occur; suitable habitat is present, and species is known from the vicinity
Hogwallow starfish <i>Hesperevax caulescens</i>	–	–	4.2	Shallow vernal pools and mesic, clay soils in valley and foothill grassland; 0- to 1,500-foot elevation	Widespread in the Central Valley and south coast ranges from Tehama County to Kern County	March– June	Could occur; suitable habitat is present, and species is known from the vicinity
Brewer's western flax <i>Hesperolinon breweri</i>	–	–	1B.2	Rocky, serpentine soils in chaparral, cismontane woodland, and valley and foothill grassland; 100- to 3,000-foot elevation	Found only in the inner Coast Ranges of Contra Costa, Napa, and Solano counties	May–July	Unlikely to occur; plant is found primarily on serpentine soils that do not occur in the Delta
Rose-mallow <i>Hibiscus lasiocarpus</i> var. <i>occidentalis</i>	–	–	1B.2	Freshwater marshes and swamps; generally found on wetted riverbanks and low peat islands in sloughs; 0- to 100-foot elevation	Central Valley from Butte County to San Joaquin County	June– September	Known to occur in the Primary Planning Area
Central coast iris <i>Iris longipetala</i>	–	–	4.2	Grows in mesic coastal prairie, lower montane coniferous forest, and meadows and seeps; 0- to 2,000-foot elevation	Coast Ranges from Humboldt County to Monterey County	March–May	Unlikely to occur; many collections are old and need field surveys to verify; may hybridize with <i>Iris missouriensis</i>
Carquinez goldenbush <i>Isocoma arguta</i>	–	–	1B.1	Grows in alkaline soils on flats and low hills in valley and foothill grassland; often occurs on low benches near drainages and on mounds in swale areas	Solano County	August– December	Could occur; suitable habitat is present, and species is known from the vicinity.
Contra Costa goldfields <i>Lasthenia conjugens</i>	E	–	1B.1	Grows in vernal pools, swales, and other depressions in open grassland and woodland communities, often in alkaline soils	Alameda, Contra Costa, Mendocino, Monterey, Marin, Napa, Santa Barbara, Santa Clara, Solano, and Sonoma counties	March– June	Could occur; suitable habitat is present, and species is known from the vicinity

Table E-4 (continued)
Special-status Plant Species Known to Occur or with Potential to Occur in the Primary Planning Area

Common Name Scientific Name	Federal ^a	State ^b	CRPR ^c	Habitat	Distribution in California	Flowering Period	Potential for Occurrence
Ferris' goldfields <i>Lasthenia ferrisiae</i>	–	–	4.2	Alkaline and claypan vernal pools; 60- to 2,300-foot elevation	Distributed in 18 counties from Butte County to Ventura County	February–May	Could occur; suitable habitat is present, and species is known from the vicinity
Delta tulle pea <i>Lathyrus jepsonii</i> var. <i>jepsonii</i>	–	–	1B.2	Freshwater and brackish marshes at sea level	Restricted to the Delta	May–September	Known to occur in the Primary Planning Area
Legenere <i>Legenere limosa</i>	–	–	1B.1	Bottoms of vernal pools and other wet depressions in grassland communities	Central Valley and north Coast Ranges from Shasta County to Santa Clara County	April–June	Known to occur in the Primary Planning Area
Heckard's peppergrass <i>Lepidium latipes</i> var. <i>heckardii</i>	–	–	1B.2	Alkaline flats and in alkaline grasslands along the edges of vernal pools	Glenn, Solano, and Yolo counties	March–May	Known to occur in the Delta
Mason's lilaepsis <i>Lilaeopsis masonii</i>	–	R	1B.1	Freshwater and brackish marshes, riparian scrub, generally found in tidal zones, on depositional soils; 0- to 30-foot elevation	Restricted to the Delta	April–November	Known to occur in the Primary Planning Area
Delta mudwort <i>Limosella subulata</i>	–	–	2.1	Riparian scrub, freshwater marsh, brackish marsh, generally on mud banks of the Delta in marshy or scrubby riparian; 0- to 10-foot elevation	Restricted to the Delta	May–August	Known to occur in the Primary Planning Area
Showy madia <i>Madia radiata</i>	–	–	1B.1	Grows in cismontane woodland and valley and foothill grassland; 75- to 2,700-foot elevation	Scattered locations in the Coast Ranges from Contra Costa County to Ventura County; most collections are old and need field verification	March–May	Low potential; suitable habitat could be present at outer margins of the Delta but this species is generally found at higher elevations

Table E-4 (continued)
Special-status Plant Species Known to Occur or with Potential to Occur in the Primary Planning Area

Common Name Scientific Name	Federal ^a	State ^b	CRPR ^c	Habitat	Distribution in California	Flowering Period	Potential for Occurrence
Little mousetail <i>Myosurus minimus</i> <i>ssp. apus</i>	–	–	3.1	Alkaline vernal pools and other wetland habitats in valley and foothill grassland and coastal sage scrub; 65- to 2,100-foot elevation	Scattered locations in the northern Sacramento Valley and inner north Coast Ranges, San Francisco Bay area, San Joaquin Valley from Stanislaus County to Tulare County, southern coast and southern Coast Ranges, Peninsular and Transverse ranges, and the Mohave Desert	March– June	Could occur; suitable habitat is present, and species is known from the vicinity
Cotula leaf pincushionplant <i>Navarretia cotulifolia</i>	–	–	4.2	Adobe clay soils in chaparral, cismontane woodland, and valley and foothill grassland; 0- to 6,000-foot elevation	Distributed in 16 counties in Northern California from Mendocino County to San Benito County (possibly in Siskiyou County)	May–June	Could occur; suitable habitat is present, and species is known from the vicinity
Tehama navarretia <i>Navarretia heterandra</i>	–	–	4.3	Heavy soil, vernal pools, wet or drying flats; 0- to 3500-foot elevation	Butte, Colusa, Lake, Napa, Shasta, Tehama, Trinity, Yuba Counties	April-June	Could occur; suitable habitat is present
Baker's navarretia <i>Navarretia leucocephala</i> <i>ssp. bakeri</i>	–	–	1B.1	Vernal pools and other wet depressions in cismontane woodland, lower montane coniferous forest, meadows, and valley and foothill grassland, in adobe or alkaline soils; 0- to 5,500-foot elevation	Colusa, Glenn, Lake, Mendocino, Marin, Napa, Solano, Sonoma, Sutter, Tehama, and Yolo counties	May–July	Could occur; suitable habitat is present, and species is known from the vicinity
Colusa grass <i>Neostapfia colusana</i>	T	E	1B.1	Large vernal pools with adobe clay soils; 15- to 4,000-foot elevation	Merced, Solano, Stanislaus, and Yolo counties	May– August	Could occur; suitable habitat is present, and species is known from the vicinity
Antioch Dunes evening primrose <i>Oenothera deltoides</i> <i>ssp. howellii</i>	E	E	1B.1	Inland dunes, remnant river bluffs, and sand dunes east of Antioch, along river bluffs, and in loose sand; 0- to 100-foot in elevation	Known from three native occurrences in Contra Costa and Sacramento counties	March– September	Known to occur in the Delta

Table E-4 (continued)
Special-status Plant Species Known to Occur or with Potential to Occur in the Primary Planning Area

Common Name Scientific Name	Federal ^a	State ^b	CRPR ^c	Habitat	Distribution in California	Flowering Period	Potential for Occurrence
Gairdner's yampah <i>Perideridia gairdneri</i> ssp. <i>gairdneri</i>	–	–	4.2	Vernal pools and vernal mesic areas in broadleafed upland forest, chaparral, coastal prairie, and valley and foothill grasslands; 0- to 1,200-foot elevation	Distributed throughout the northern and southern Coast Ranges from Mendocino County to San Diego County; status of many occurrences is unknown	June–October	Could occur; suitable habitat is present, and species is known from the vicinity
Hairless popcorn flower <i>Plagiobothrys glaber</i>	–	–	1A	Coastal salt marsh and alkaline meadows and seeps	Historical occurrences are all located in the San Francisco Bay region; the last confirmed sighting was in 1954; possibly relocated near Antioch, but the identification of this collection is uncertain	March–May	Low potential; suitable habitat is present, but this species is presumed extirpated in California
Bearded popcorn-flower <i>Plagiobothrys hystriculus</i>	–	–	1B.1	Habitat and life history not well understood; probably grows in vernal pools or wet sites in grasslands	Known from only a few occurrences in the Montezuma Hills region of Solano County	April–May	Could occur; suitable habitat is present, and species was rediscovered in 2000 just outside of the Suisun Marsh in the Montezuma Hills
Marin knotweed <i>Polygonum marinense</i>	–	–	3.1	Coastal salt, brackish marshes, swamps; 0- 30-foot elevation	Marin, Napa, Solano, Sonoma Counties	April-August	Low potential to occur; suitable habitat may be present in Suisun Marsh but this species tends to be observed in more saline habitats.
Eel-grass pondweed <i>Potamogeton zosteriformis</i>	–	–	2.2	Marshes and swamps; 0- to 6,000-foot elevation	Contra Costa, Lake, Lassen, Modoc, and Shasta counties	June–July	Known to occur in the Delta
Delta woolly marbles <i>Psilocarphus brevissimus</i> var. <i>multiflorus</i>	–	–	4.2	Vernal pools; 0- to 1,500-foot elevation	Alameda, Napa, Santa Clara, San Diego, San Joaquin, Solano, Stanislaus, and Yolo counties	May–June	Could occur; suitable habitat is present, and species is known from the vicinity

Table E-4 (continued)
Special-status Plant Species Known to Occur or with Potential to Occur in the Primary Planning Area

Common Name Scientific Name	Federal ^a	State ^b	CRPR ^c	Habitat	Distribution in California	Flowering Period	Potential for Occurrence
California alkali grass <i>Puccinellia simplex</i>	–	–	1B.2	Alkaline, vernal mesic; sinks, flats, and lake margins; 6- to 3000 feet elevation	Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kings, Kern, Lake, Los Angeles, Madera, Merced, Napa, San Bernardino, Santa Clara, Santa Cruz, San Luis Obispo, Solano, Stanislaus, Tulare, Yolo	March-May	Known to occur in the Delta
Lobb's aquatic buttercup <i>Ranunculus lobbii</i>	–	–	4.2	Vernal pools in cismontane woodland, north coast coniferous forest, and valley and foothill grassland; 50- to 1,550-foot elevation	Alameda, Contra Costa, Mendocino, Marin, Napa, Santa Cruz, San Mateo, Solano, and Sonoma counties	February– May	Could occur; suitable habitat is present, and species is known from the vicinity
Sanford's arrowhead <i>Sagittaria sanfordii</i>	–	–	1B.2	Assorted shallow freshwater marshes and swamps; 0- to 2,000-foot elevation	Butte, Del Norte, Fresno, Kern, Merced, Orange, Sacramento, Shasta, San Joaquin, Tehama, and Ventura counties	May– October	Known to occur in the Delta
Marsh skullcap <i>Scutellaria galericulata</i>	–	–	2.2	Lower montane coniferous forest, meadows and seeps, marshes and swamps, wet places; 0- to 7,000-foot elevation	El Dorado, Lassen, Modoc, Nevada, Placer, Plumas, Shasta, Siskiyou, and San Joaquin counties	June– September	Could occur; suitable habitat is present, and species is known from the vicinity
Side-flowering skullcap <i>Scutellaria lateriflora</i>	–	–	2.2	Marshes and swamps, meadows and seeps; 0- to 1,500-foot elevation	Known in California from only three occurrences in Inyo, Sacramento, and San Joaquin counties	July– September	Known to occur in the Delta
Suisun Marsh aster <i>Symphotrichum lentum</i>	–	–	1B.2	Marshes and swamps, often along sloughs; 0- to 10-foot elevation	Endemic to the Delta	May– November	Known to occur in the Primary Planning Area

**Table E-4 (continued)
Special-status Plant Species Known to Occur or with Potential to Occur in the Primary Planning Area**

Common Name Scientific Name	Federal ^a	State ^b	CRPR ^c	Habitat	Distribution in California	Flowering Period	Potential for Occurrence
Wright’s trichocoronis <i>Trichocoronis wrightii</i> var. <i>wrightii</i>	–	–	2.1	Alkaline soils of marshes and swamps, meadows and seeps, riparian forest, and vernal pools, usually on mud flats; 15- to 1,500-foot elevation	Central Valley and south coast	May–September	Known to occur in the Primary Planning Area
Saline clover <i>Trifolium depauperatum</i> var. <i>hydrophilum</i>	–	–	1B.2	Salt marshes and in alkaline soils in moist valley and foothill grasslands and vernal pools; 0- to 1,000-foot elevation	Alameda, Colusa, Monterey, Napa, San Benito, Santa Clara, Santa Cruz, San Luis Obispo, San Mateo, Solano, and Sonoma counties	April–June	Known to occur in the Primary Planning Area
Caper-fruited troidocarpum <i>Troidocarpum capparideum</i>	–	–	1B.1	Mesic alkaline soils in valley and foothill grassland, vernal pools; 160- to 1,300-foot elevation	Scattered locations in the Central Valley and central West Coast	March–April	Could occur; suitable habitat is present, and species is known from the vicinity
Solano grass <i>Tuctoria mucronata</i>	E	E	1B.1	Alkaline/saline clay bottoms of vernal pools, lakes, and shallow playa pools; associated with other vernal pool and wetland plants, including the endangered Colusa grass (<i>Neostapfia colusana</i>)	Known from only three occurrences in Solano County	April–July	Could occur; suitable habitat is present, and species is known from the vicinity

Sources: CNDDB 2020; CNPS 2020

^a U.S. Fish and Wildlife Service—Federal Listing Categories:

- T: Threatened.
- E: Endangered.
- : No status.

^b California Department of Fish and Game—State Listing Categories:

- R: Rare.
- E: Endangered.
- : No status.

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Table E-4 (continued)
Special-status Plant Species Known to Occur or with Potential to Occur in the Primary Planning Area

- 1 ° **California Rare Plant Rank (CRPR) Listing Categories:**
- 2 1A: Presumed extinct.
- 3 1B: Plants rare, threatened, or endangered in California and elsewhere.
- 4 2: Plants rare, threatened, or endangered in California, but more common elsewhere.
- 5 3: Plants for which more information is needed—a review list.
- 6 4: Plants of limited distribution—a watch list.
- 7 **Extensions:**
- 8 1: Seriously endangered in California (>80 percent of occurrences are threatened and/or high degree and immediacy of threat).
- 9 2: Fairly endangered in California (20–80 percent of occurrences are threatened).
- 10 3: Not very endangered in California (<20 percent of occurrences are threatened or no current threats are known).
- 11
- 12 CNPS: California Native Plant Society
- 13 CRPR: California Rare Plant Rank
- 14 Delta: Sacramento–San Joaquin Delta.

1 **E.3.3 Crownscale**

2 Crownscale (*Atriplex coronata* var. *coronata*) is a CRPR 4.2 species and is endemic to
3 California. Its range includes southern Sacramento Valley, the San Joaquin Valley, and
4 the eastern Inner South Coast Ranges. There are documented occurrences of this plant
5 species in Alameda, Contra Costa, Fresno, Glenn, Kings, Kern, Merced, Monterey, San
6 Luis Obispo, Solano, and Stanislaus counties. Its blooming period is from March to
7 October and occurs in alkaline, often clay soils, including grasslands and vernal pools.

8 **E.3.4 Brittlescale**

9 Brittlescale (*Atriplex depressa*) is a CRPR 1B.2 species and is endemic to California. Its
10 range extends from Glenn and Colusa Counties in the north, to Merced County in the
11 south. Yolo, Solano, Contra Costa, and Alameda Counties are within its range (CNDDDB
12 2020, CNPS 2020). Brittlescale has been observed to occur in the Suisun Marsh and in
13 the Delta near Byron. Brittlescale is found in meadows, seeps, and vernal pools, with
14 alkaline clay soils (CNPS 2020).

15 Brittlescale is a small (less than 8 inches [20 centimeters]) annual herb of the goosefoot
16 family (Chenopodiaceae) that blooms from June to October (CNPS 2020). Brittlescale is
17 found at elevations of 3 to 1,050 feet (1 to 320 meters) (CNPS 2020).

18 The primary threat to brittlescale is the loss of suitable habitat within its range (CNPS
19 2020). Other threats include livestock grazing and trampling invasive species, and the
20 periodic inundation of managed marshes to create habitat for waterfowl (CNDDDB 2020).

21 **E.3.5 Bristly Sedge**

22 Bristly sedge (*Carex comosa*) is a CRPR 2.1 species. It is known from scattered
23 occurrences in California, primarily in Northern California; it also occurs in Oregon,
24 Washington, and elsewhere in North America. It occurs in marshes at the margins of
25 sloughs and lakes (CNPS 2020). Threats to bristly sedge are road maintenance, marsh
26 drainage, agriculture, grazing, competition from nonnative plants, and control treatments
27 for water hyacinth (CNPS 2020).

28 **E.3.6 Bolander's water hemlock**

29 Bolander's water hemlock (*Cicuta maculata* var. *bolanderi*) is a CRPR 2.1 species. It is
30 a perennial herb with a blooming period from July to September (CNPS 2020). It is
31 known from occurrences along California's South Coast and Central Coast regions and
32 from Suisun Marsh. It grows in coastal brackish and freshwater marshes. Threats to
33 Bolander's water-hemlock are development, competition from nonnative plants, and
34 hydrological alterations (CNPS 2020).

35 **E.3.7 Slough thistle**

36 Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*) is a CRPR 1B.1 species. It is
37 listed as endangered under the ESA. It is not listed under CESA. USFWS recently
38 designated critical habitat that specifies the protection of Suisun thistle populations in

1 three areas that contain the largest and most intact populations and habitat (72 *Federal*
2 *Register* [FR] 18517).

3 In 1975, Suisun thistle was presumed to be extinct because it had not been observed
4 for 15 years (62 FR 61916; USFWS 2009a); however, during extensive surveys
5 conducted at the Suisun Marsh in 1989, this species was rediscovered at two locations
6 (62 FR 61916; USFWS 2009a). Recent surveys have found Suisun thistle within relict
7 undiked high tidal marshes at Rush Ranch, the Joice Inland portion of the Grizzly Island
8 Wildlife Area, and the Peytonia Slough Ecological Reserve (Fiedler et al. 2007).
9 Thousands of plants were observed at Rush Ranch, much smaller numbers were
10 observed at Grizzly Island Wildlife Area, and the population at the Peytonia Slough
11 Ecological Reserve had declined to a single plant in 1996 (USFWS 2009a).

12 Suisun thistle is a 3- to 7-foot-tall plant in the sunflower family. Most known occurrences
13 are found in regularly flooded and permanently saturated habitats, along the banks of
14 canals or ditches, within 50 to 100 feet of the high-water mark of natural tidal channels,
15 as well as on tidal floodplains within tidal marshes. Habitat for the species does not
16 occur within diked seasonal wetlands with drainage ditches that are dry part of the year.
17 However, permanent ponds and perennially flooded tidal ditches that supply such ponds
18 within managed marsh may potentially harbor *C. hydrophilum* var. *hydrophilum* (72 FR
19 18517).

20 Current threats to Suisun thistle include the nonnative and highly invasive perennial
21 pepperweed, feral pigs, and fire during sensitive periods of the species' lifecycle (Fiedler
22 et al. 2007; USFWS 2009a). Other potential but unquantified threats include
23 hybridization with bull thistle (*Cirsium vulgare*) and seed predation by the introduced
24 biocontrol thistle weevil (*Rhinocyllus conicus*) (Fiedler et al. 2007; USFWS 2009a).

25 **E.3.8 Recurved larkspur**

26 Recurved larkspur (*Delphinium recurvatum*) is a CRPR 1B.2 species. It is a perennial
27 herb endemic to California with a blooming period during the months from March to
28 June (CNPS 2020). It was formerly widespread in the Central Valley from Colusa
29 County to Kern County, although it has been extirpated from the Sacramento Valley
30 (Koontz and Warnock 2012 p. 1411). It occurs in chenopod scrub and grassland on
31 poorly drained, fine, alkaline soils (Koontz and Warnock 2012 p. 1411). Natural
32 community types that may provide habitat for recurved larkspur are grassland and
33 seasonal alkali wetland complex. Threats to recurved larkspur are grazing and trampling
34 (CNPS 2020).

35 **E.3.9 Dwarf downingia**

36 Dwarf downingia (*Downingia pusilla*) is a CRPR 2.2 species. In California, its range
37 extends from southern Tehama County to Fresno County and from Sonoma County to
38 Placer County. Throughout its distribution, dwarf downingia occurs in vernal pools,
39 vernal swales, pools in seasonal streambeds, vernal marshes, tire ruts, hydrologically
40 altered sloughs, and irrigation ponds.

1 Dwarf downingia is a small submerged to emergent aquatic annual plant in the bluebell
 2 family (Campanulaceae). It flowers from March to May (CNPS 2020; Schultheis 2012).
 3 Dwarf downingia seed dispersal is apparently aided by waterfowl, as it appeared
 4 spontaneously in vernal pools constructed as part of the Montezuma Wetlands
 5 Restoration Project (San Francisco Estuary Institute 2006).

6 Development, intensive agriculture, grazing, and invasive plant species, especially
 7 ryegrass are considered to be the primary threats to dwarf downingia (CNPS 2020).
 8 Additionally, the nonnative waxy mangrass (*Glyceria declinata*) may pose a threat to
 9 this species and many other vernal pool species.

10 **E.3.10 Antioch Dunes buckwheat**

11 Antioch Dunes buckwheat (*Eriogonum nudum* var. *psychichola*) is a CRPR 1B.1
 12 species. The species is endemic to California. It is known from a single occurrence in
 13 the Antioch Dunes and is possible threatened by non-native plants (CNPS 2020). It
 14 occurs in inland dunes at an elevation range of 0- to 60-feet and is restricted to sandy,
 15 well drained soils.

16 Antioch Dunes buckwheat is a perennial herb in the buckwheat (Polygonaceae) family.
 17 It flowers from June to October (CNPS 2020). It serves as the primary host plant for the
 18 endangered Lange's metalmark butterfly.

19 **E.3.11 Delta Button-celery**

20 Delta button-celery (*Eryngium racemosum*) is State listed as endangered and is a
 21 CRPR 1B.1 species. The species' elevation range is 10 to 100 feet. Delta button-celery,
 22 a perennial herbaceous member of the carrot family (Apiaceae), has prostrate or
 23 decumbent stems that are branched above the basal rosettes. The tiny flowers are
 24 produced in small heads subtended by spiny bracts, are white to faintly purplish, and
 25 bloom between June and September. This species is found on clay soils in seasonally
 26 inundated floodplain depressions in riparian scrub habitat. Disturbance also may be
 27 important in creating and maintaining, or conversely in eliminating, habitat for this
 28 species. Much of the occupied habitat is inundated periodically, and recently deposited
 29 fine sediment has been observed at several occupied sites (CNDDDB 2020). Several
 30 occupied sites also experience grazing and various anthropogenic disturbances
 31 (e.g., from off-road vehicles, road maintenance). Delta button-celery is threatened by
 32 agricultural conversion and flood control activities (CNPS 2020).

33 **E.3.12 Contra Costa Wallflower**

34 Contra Costa wallflower (*Erysimum capitatum* ssp. *angustatum*) is a CRPR 1B.1
 35 species. Contra Costa wallflower is listed as endangered under the ESA and as
 36 endangered under CESA. USFWS has designated critical habitat that specifies the
 37 protection of Contra Costa wallflower populations at the Antioch Dunes National Wildlife
 38 Refuge (NWR), located within the Delta along the San Joaquin River (43 FR 39042,
 39 August 31, 1978).

40 Contra Costa wallflower grows naturally only in sand dune habitat along the San Joaquin
 41 River east of Antioch. It forms a persistent dormant seed bank. Areas of suitable habitat

1 (riverine or wind-blown sandy soils near Antioch) that do not contain visible vegetative,
2 reproductive, or senescent/dead plants may support viable seed banks.

3 Contra Costa wallflower is an erect, coarse-stemmed, biennial herb in the mustard
4 family (Brassicaceae). Plants grow from a somewhat woody caudex (trunk-like base)
5 that typically elongates into multiple branched stems 8 to 32 inches tall in mature plants.
6 The elongated woody base distinguishes this subspecies of *E. capitatum* from related
7 subspecies. The lower leaves are lance-like to linear, up to 6 inches long and nearly half
8 an inch wide, with minute teeth. Leaves taper to a petiole (leaf stalk) at the base.

9 The historic range of Contra Costa wallflower is unknown but likely encompassed the
10 original Contra Costa interior dune field, which has been greatly reduced by historic
11 sand mining and industrial development. Nonnative grasses and vegetation encroached
12 on the sand dunes to crowd the few remaining endangered plants. Habitat improvement
13 activities have included restoring dune, hand-clearing nonnative plant species, planting
14 buckwheat seedlings, and restricting public access to avoid trampling and fire
15 (USFWS 2001).

16 **E.3.13 San Joaquin spearscale**

17 San Joaquin spearscale (*Extriplex joaquinana*), has a CRPR of 1B.2. It is endemic to
18 California and its range includes Glenn, Colusa and Yolo counties to the north; Contra
19 Costa, Santa Clara, San Benito, Napa, Solano, and Alameda counties to the west; and
20 Sacramento, Fresno, Merced, and San Joaquin counties to the south. It is an annual
21 herb with a blooming period from April to October. San Joaquin spearscale occurs in
22 alkali grassland and meadows and other seasonal wetlands with alkaline soils (CNPS
23 2020). Threats to this species include development, intensive agricultural, waterfowl
24 management, and invasive plant species which lead to loss of habitat and degradation
25 of the specific soils this species requires.

26 **E.3.14 Diamond-petaled California poppy**

27 Diamond-petaled California poppy (*Eschscholzia rhombipetala*) has a CRPR of 1B.1. It
28 is endemic to California was known historically from the interior foothills of the North and
29 South Coast Ranges but is currently known from only three locations in Alameda
30 County and San Luis Obispo County (Hannan and Clark 2012). It is annual herb with a
31 flowering period from March to April. The natural community type in the Delta that may
32 provide habitat for diamond-petaled California poppy is grassland.

33 **E.3.15 Fragrant fritillary**

34 Fragrant fritillary (*Fritillaria liliacea*) has a CRPR of 1B.2. The species is known from the
35 southern Sacramento Valley, southern North Coast Ranges, San Francisco Bay Area,
36 and northern Central Coast (CNPS 2020). Its blooming period occurs February to April.
37 Fragrant fritillary occurs in grasslands, coastal prairie, and open, grassy areas in coastal
38 scrub and oak woodlands, often on serpentine soils (CNPS 2020). The natural
39 community type in the study area that provides habitat for fragrant fritillary is grassland.
40 Threats to fragrant fritillary are grazing, agriculture, urbanization, competition from
41 nonnative plants, and possibly recreational activities (CNPS 2020).

1 **E.3.16 Rose-mallow**

2 Rose-mallow (*Hibiscus lasiocarpus* var. *occidentalis*) is a CRPR 1B.2 species. It is
3 known from scattered occurrences in the Cascade Range foothills, Sacramento Valley
4 and the Delta (Hill 2012b). It grows in freshwater marsh along river banks and sloughs
5 (Hill 2012). Rose-mallow is a perennial rhizomatous herb that blooms from June to
6 September (CNPS 2020). It can often be found in riprap on sides of levees (CNPS
7 2020). Threats to Rose-mallow are habitat disturbance, development, agriculture,
8 recreational activities, weed control measures, erosion, and channelization of the
9 Sacramento River and its tributaries (CNPS 2020).

10 **E.3.17 Carquinez goldenbush**

11 Carquinez goldenbush (*Isocoma arguta*) is a CRPR 1B.1 species. It is endemic to
12 California, and is known only from a very limited geographic range in Solano County.
13 Known occurrences of this species consist of small populations restricted to ephemeral
14 drainages, within a very narrow elevation band between uplands and Suisun Marsh, or
15 adjacent to a large alkaline playa.

16 Carquinez goldenbush is a very small shrub in the sunflower family (Asteraceae) with
17 flowering heads that bloom from August to December and contain 10 to 13 yellow
18 flowers (Chambers 2012). Carquinez goldenbush is threatened by development and
19 agriculture (CNPS 2020).

20 **E.3.18 Delta Tule Pea**

21 Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*) is a CRPR 1B.2 species. It is endemic to
22 California and its current range extends from Sacramento and Solano Counties to the
23 north, Napa and Sonoma Counties in the west, and Contra Costa and San Joaquin
24 Counties in the south. It was historically reported as common in Suisun Marsh, but it is
25 currently reported as occasional to rare in Suisun Marsh. It currently occurs throughout
26 the Delta and along the Napa River.

27 Delta tule pea occurs on the borders of fresh and brackish marshes from 0 to 13 feet in
28 elevation (CNPS 2020). Delta tule pea blooms from May to September (CNPS 2020).

29 The primary threat to Delta tule pea is the loss of marsh and floodplain habitat.
30 Agriculture, water diversions, and erosion can potentially eliminate or degrade these
31 habitats (CNPS 2020). Fishing and hunting access also pose a threat to Delta tule pea
32 through trampling impacts (Witham and Kareofelas 1994).

33 **E.3.19 Legenere**

34 Legenere (*Legenere limosa*) is a CRPR 1B.1 species. Its range extends from
35 southwestern Shasta County to southern Santa Clary County. The species has been
36 documented to occur in the Delta and Suisun Marsh, in vernal pools, vernal swales, and
37 alkaline flats. Throughout its distribution, legenere occurs in vernal pools, vernal swales,
38 pools in seasonal streambeds, vernal marshes, and stock ponds (CNDDDB 2020)

1 Legenere is a small aquatic annual herbaceous plant in the bellflower family
2 (Campanulaceae) that is submerged to emergent during the wet season when habitat is
3 ponded. It typically blooms between April and June (CNPS 2020).

4 Development, grazing, intensive agriculture, and exotic plant species (especially
5 ryegrass) are the primary threats to legenere (Dawson et al. 2007, CNPS 2020).
6 Additionally, the nonnative waxy mannagrass (*Glyceria declinata*) may pose a threat to
7 legenere and many other vernal pool species.

8 **E.3.20 Heckard's peppergrass**

9 Heckard's peppergrass (*Lepidium latipes* var. *heckardii*) is a CRPR 1B.2 species. It is
10 endemic to California and its reported range extends from Glenn and Colusa Counties
11 in the north to Merced County to the south. Heckard's peppergrass has been observed
12 west of the Yolo Bypass and around Suisun Marsh in the greater Jepson Prairie area
13 (Witham 2006).

14 Little is known regarding the ecology of Heckard's peppergrass. Occurrence records
15 and survey reports suggest that Heckard's peppergrass is closely associated with
16 Sacramento Valley populations of alkali milk-vetch (*Astragalus tener* var. *tener* (CNDDDB
17 2020). Heckard's peppergrass flowers March through May (CNPS 2020). Studies are
18 needed to shed light on basic biological and ecological requirements such as pollination
19 systems, seed dormancy and germination cues, dispersal vectors, and seed predation.

20 Development, waterfowl management, agricultural conversion, urban development, and
21 exotic plant species are considered the primary threats to Heckard's peppergrass
22 (Dawson et al. 2007; CNPS 2020). All of these threats lead to the loss of habitat or the
23 degradation of conditions the plant requires to survive.

24 **E.3.21 Mason's Lilaepsis**

25 Mason's lilaepsis (*Lilaepsis masonii*) is State listed as rare under the California Native
26 Plant Protection Act. In addition, it is listed on CRPR 1B.1.

27 The range of Mason's lilaepsis extends from Napa and Solano counties in the north to
28 Contra Costa and Alameda counties in the south, and from Marin County in the west to
29 Sacramento and San Joaquin counties in the east. Although population trends of
30 Mason's lilaepsis have not been documented, this species has been determined to be
31 stable to declining (CNDDDB 2020). According to CNPS, occurrences of Mason's
32 lilaepsis in California are highly limited, and the species is at serious risk throughout its
33 range. Mason's lilaepsis is found throughout the Delta and Suisun Marsh along rivers
34 and sloughs (CNDDDB 2020). Most occurrences are known from the central and west
35 Delta. In the south Delta, occurrences are predominately along Old River and Middle
36 River. In the north Delta, it occurs in the Cache Slough Complex and near Delta
37 Meadows State Park.

38 Mason's lilaepsis is a small (up to 3 inches tall), rhizomatous, perennial herb in the
39 carrot family. The threadlike leaves with obscure internal cross-walls are tufted on
40 creeping stems. The inflorescences consist of few-flowered umbels of tiny white or

1 maroon flowers (CNPS 2020). It flowers from April to November and produces narrow,
2 grasslike, bright green leaves and small, inconspicuous flowers in umbels.

3 Mason's lilaepsis grows in regularly flooded tidal zones; on mudbanks and flats along
4 erosional creekbanks, sloughs, and rivers (Fiedler and Zebell 1993); and in freshwater
5 marshes, brackish marshes, and riparian scrubs that are influenced by saline water. It is
6 a colonizing species (i.e., it "exploits" newly deposited or exposed sediments). Mason's
7 lilaepsis occurs with other rare plants, such as delta mudwort (*Limosella subulata*),
8 Suisun Marsh aster (*Symphyotrichum lentum*), and delta tule pea. It blooms from April
9 through November (CNPS 2020).

10 Mason's lilaepsis is threatened by erosion, bank and channel stabilization, flood-
11 control projects, development, and agricultural conversion. In some areas, it is also
12 threatened by trampling by fishermen and encroachment of water hyacinth (*Eichhornia*
13 *crassipes*), an extremely invasive aquatic plant (CNPS 2020).

14 **E.3.22 Delta mudwort**

15 Delta mudwort (*Limosella subulata*) is a CRPR 2.1 species. Delta mudwort is an
16 aquatic, perennial herb in the snapdragon family (Scrophulariaceae). Within California, it
17 is only found in the Delta. It occurs in tidal zones of marshes, rivers, and creeks. It
18 blooms from May to August (Wetherwax 2012, CNPS 2020).

19 Delta mudwort is threatened by habitat destruction, including alteration of hydrology and
20 recreational activities, such as boating, which creates wakes that erode banks and
21 shorelines. Fishing and hunting access also pose a threat to this species (Witham and
22 Kareofelas 1994). Petroleum product spills could have a significant impact on tidal flat
23 biota, and non-biodegradable litter such as plastics could collect near the tidal drift line,
24 inhibiting plant establishment and growth (Witham and Kareofelas 1994).

25 **E.3.23 Baker's navarretia**

26 Baker's navarretia (*Navarretia leucocephala* ssp. *Bakeri*) is a CRPR 1B.1 species. It is
27 known from the inner North Coast Ranges and western Sacramento Valley (CNPS
28 2020). It blooms from April to July and is found at an elevation range of about 15 feet to
29 5,000 feet (CNPS 2020). It occurs in vernal pools and swales on clay or alkali soils
30 (CNDDDB 2020). Threats to Baker's navarretia are agriculture, development, habitat
31 alteration, and road construction (CNPS 2020).

32 **E.3.24 Antioch Dunes Evening Primrose**

33 Antioch Dunes evening primrose (*Oenothera deltoides* ssp. *howelli*) is a CRPR 1B.1
34 species. It is listed as endangered under the ESA and as endangered under CESA.
35 USFWS has designated critical habitat that specifies the protection of Antioch Dunes
36 evening primrose populations at the Antioch Dunes NWR, which is located in the Delta
37 along the San Joaquin River (43 FR 39042, August 31, 1978).

38 The historic range of Antioch Dunes evening primrose is unknown and open to
39 speculation. Presumably, it was limited to the sandy soil type (Oakley or Delhi sand)
40 found near the town of Antioch and over a substantial portion of eastern Contra Costa

1 County. Nevertheless, no known evidence demonstrates that the subspecies historically
2 occupied any area other than the Antioch Dunes proper. The subspecies has been
3 transplanted to Brannan Island State Recreation Area. There are also two small
4 colonies on Brown's Island in Contra Costa County. The most recently discovered
5 population is located on private property north of Oakley. The subspecies now occurs in
6 several locations near the confluence of the Sacramento and San Joaquin rivers. The
7 only natural stand exists in the sand dunes near Antioch in Contra Costa County.

8 Antioch Dunes evening primrose is an herbaceous annual in the evening primrose
9 family (Onagraceae). It grows 15 to 30 inches tall and is grayish green with spreading
10 hairs and wavy-lobed leaves. White to pink flowers are 0.8 to 1.6 inches long, have
11 obtuse tips in bud, and bloom between March and September. Antioch Dunes evening
12 primrose occurs at elevations of zero to 100 feet on sandy bluffs and dunes
13 (CNPS 2020).

14 The extent and quality of habitat for Antioch Dunes evening primrose has declined
15 substantially as a result of recent land use changes and because of human disturbance
16 and the spread of nonnative invasive plants. Inland dunes are now restricted to 67 acres
17 within the approved boundary of the Antioch Dunes NWR, which includes 12 acres of
18 land owned by the Pacific Gas and Electric Company and some lands on the adjoining
19 properties owned by Kemwater North American Company and Georgia-Pacific (USFWS
20 2001). Because the primrose prefers disturbed sites with nearly pure sand, it is
21 vulnerable to encroachment from nonnative weedy species, which has been identified
22 as the primary threat to the primrose (USFWS 2001).

23 **E.3.25 Bearded popcorn-flower**

24 Bearded popcorn-flower (*Plagiobothrys hystriculus*) is a CRPR 1B.1 species. This
25 species is endemic to California and it is present in the southern interior North Coast
26 Range and the southern Sacramento Valley (Preston et al. 2010). It is an annual herb
27 with a bloom period from April to May (CNPS 2020). Bearded popcorn-flower was
28 presumed extinct until rediscovered in 2005 (Preston et al. 2010). It occurs in vernal
29 pools and vernal swales and also in other vernal moist areas in grasslands (Preston et
30 al. 2010). Threats to bearded popcorn-flower are disking, development, and competition
31 with nonnative plants (CNPS 2020).

32 **E.3.26 Eel-grass pondweed**

33 Eel-grass pondweed (*Potamogeton zosteriformis*) is a CRPR 2.2 species. It is an
34 aquatic annual herb with a blooming period in June to July (CNPS 2020). It is known in
35 California from scattered occurrences in the southern interior North Coast Ranges, the
36 Central Valley, and the Modoc Plateau (Hellquist et al. 2012 p. 1501). It grows in ponds,
37 lakes and streams (Hellquist et al. 2012 p. 1501). Natural community types that provide
38 potential habitat for eel-grass pondweed consist of nontidal perennial aquatic and
39 nontidal freshwater perennial emergent wetland.

1 **E.3.27 California alkali grass**

2 California alkali grass (*Puccinellia simplex*) is as CRPR 1B.2 species. This annual grass
3 is native to California but is also currently known to occur in Utah. It has a blooming
4 period from March to May (CNPS 2020). The species occurs on alkaline soils in areas
5 such as chenopod scrub, meadows, seeps, valley and foothill grasslands, and vernal
6 pools. It is mainly documented to be present within the Central Valley, and there are
7 scattered occurrences in the Coast Ranges and the western Mojave Desert. Threats to
8 California alkali grass include changes in hydrology, urbanization, agricultural
9 conversion, and habitat fragmentation (CNPS 2020).

10 **E.3.28 Sanford's arrowhead**

11 Sanford's arrowhead (*Sagittaria sanfordii*) is a CRPR 1B.2 species. This perennial
12 rhizomatous herb is endemic to California and has a typical blooming period between
13 the months of May to October (CNPS 2020). This species is known from widely
14 scattered locations in the North Coast, Klamath ranges, Cascade Range foothills,
15 Central Valley, and South Coast (Turner et al. 2012). It occurs in freshwater ponds,
16 marshes, streams and ditches with standing or slow-moving water (CNPS 2020).
17 Natural community types that provide potential habitat for Sanford's arrowhead are
18 nontidal perennial aquatic and tidal and nontidal freshwater perennial emergent
19 wetlands. Threats to Sanford's arrowhead are grazing, development, recreational
20 activities, competition with nonnative plants, road widening, and channel alteration
21 (CNPS 2020).

22 **E.3.29 Marsh skullcap**

23 Marsh skullcap (*Scutellaria galericulata*) is a CRPR 2.2 species. It occurs in the
24 northern Sierra Nevada and Modoc Plateau (Olmstead 2012 p. 856). Disjunct
25 populations have been reported from the Delta (CNDDDB 2020). It is a perennial
26 rhizomatous herb and its flowering time is from June to September. It occurs in
27 marshes, wet meadows, and other wetland communities, often on streambanks
28 (Olmstead 2012 p. 856, CNDDDB 2020). Natural community types in the study area that
29 provide potential habitat for marsh skullcap consist of tidal and nontidal freshwater
30 perennial emergent wetland and valley/foothill riparian. Potential threats include
31 hydrology alteration (CNPS 2020).

32 **E.3.30 Side-flowering skullcap**

33 Side-flowering skullcap (*Scutellaria lateriflora*) is a CRPR 2.2 species. It is a widespread
34 but scattered species of swamps, marshes, and bogs in the central and eastern United
35 States, but in California it is limited to a small area of the Delta. Side-flowering skullcap
36 occurs in wet meadows, seeps, marshes and swamps (CNDDDB 2020, CNPS 2020).

37 Side-flowering skullcap is a perennial rhizomatous herb in the mint family (Lamiaceae).
38 Little is known about reproduction in this species, but based on similar species, it is
39 probably insect-pollinated and reproduces by seed, but it may also spread vegetatively
40 by rhizomes.

1 While side-flowering skullcap is deemed secure globally (CNDDDB 2020), general threats
2 to wetland habitats include development, intensive agriculture, and invasive plant
3 species. In the Delta, side-flowering skullcap grows on logs, stumps, and other large
4 woody material along shoreline that supports primarily riparian and marsh vegetation,
5 and lack of shoreline coarse woody material may be a limiting factor in parts of the Delta.

6 **E.3.31 Suisun Marsh aster**

7 Suisun Marsh aster (*Symphyotrichum lentum*) is a CRPR 1B.2 species. The range of
8 Suisun Marsh aster extends from Napa and Solano Counties in the north, to San
9 Joaquin County in the south, to Contra Costa County in the west, and Sacramento
10 County in the east. It is endemic to the Delta. Historically, it ranged from marshes in the
11 East Bay portion of San Francisco Bay (California State Coastal Conservancy 2003) to
12 the Sonoma and Napa Rivers (Goals Project 2000).

13 Suisun Marsh aster grows on the upper margins of brackish and freshwater marshes in
14 the ecotone with terrestrial habitats (Goals Project 2000). It is found above erosional
15 cuts and along the banks of sloughs and watercourses. Suisun Marsh aster is a
16 perennial, rhizomatous herb in the sunflower family (Asteraceae) (Allen 2012). Some
17 occurrences may be single plants with one to several main stems (Witham and
18 Kareofelas 1994). It blooms from May through November, depending on environmental
19 conditions.

20 Historically, the marsh habitat suitable for Suisun Marsh aster has been lost mostly
21 through development, dredge disposal, agricultural conversion, and diking. Diked
22 marshes generally lack rare tidal marsh species. It is believed that the conditions
23 brought about by dikes favor robust generalist species that can better tolerate the
24 extremes of inundation and dryness in diked wetlands (Goals Project 2000). Such
25 habitat losses as a result of human activities still occur, but many of the large marshes
26 are now parts of preserves or are otherwise in highly restrictive development zones.
27 Current threats to Suisun Marsh aster include invasive plants, erosion, creek
28 channelization, levee maintenance and construction, and possibly herbicide applications
29 (CNPS 2020).

30 **E.3.32 Wright's trichocoronis**

31 Wright's trichocoronis (*Trichocoronis wrightii* var. *wrightii*) is a CRPR 2.1 species. It is
32 an annual herb with a blooming period from May to September (CNPS 2020). It is
33 known from scattered locations in the Central Valley and South Coast. It has been
34 found in various wetland types, including alkaline meadow and floodplain wetlands,
35 sometimes in drying mud (CNDDDB 2020). Wright's trichocoronis is threatened by habitat
36 loss to agriculture and urbanization (CNPS 2020).

37 **E.3.33 Saline clover**

38 Saline clover (*Trifolium depauperatum* var. *hydrophilum*) is a CRPR 1B.2 species. It is
39 an annual herb endemic to California with a blooming period from April to June (CNPS
40 2020). It is known from the Sacramento Valley, the northwestern San Joaquin Valley,
41 the San Francisco Bay Area, and the Central Coast (Vincent and Isely 2012 p. 795). It

1 occurs in marshes, vernal pools and swales, and iodine bush scrub, generally on saline
 2 or alkaline soils (CNDDDB 2020). Threats to saline clover are development, trampling,
 3 road construction, and vehicles (CNPS 2020).

4 **E.3.34 Caper-fruited tropidocarpum**

5 Caper-fruited tropidocarpum (*Tropidocarpum capparideum*) is a CRPR 1B.1 species. It
 6 is an annual herb endemic to California and flowers from March to April (CNPS 2020). It
 7 is historically known from the northwest San Joaquin Valley and adjacent Diablo Range
 8 foothills and has recently been reported from Fresno, Monterey, and San Luis Obispo
 9 Counties (CNDDDB 2020). It grows in alkali grasslands. Possible threats to caper-fruited
 10 tropidocarpum are grazing, military activities, competition with nonnative plants, and
 11 trampling (CNPS 2020).

12 **E.3.35 Soft Salty Bird's-beak**

13 Soft salty bird's-beak (*Chloropyron molle* ssp. *molle*) is a CRPR 1B.2 species. It is listed
 14 as endangered under the ESA and listed as rare under the California Native Plant
 15 Protection Act). The U.S. Fish and Wildlife Service (USFWS) recently designated critical
 16 habitat that specifies the protection of soft bird's-beak populations in the four areas that
 17 contain the largest and most intact populations and habitat (71 FR 67089, November
 18 20, 2006).

19 Soft salty bird's-beak is a semiparasitic annual plant in the figwort family. It grows 10 to
 20 16 inches tall and occurs in coastal salt marshes and brackish marshes. The species is
 21 restricted to a narrow tidal band, typically in a marsh's higher elevation zones, growing
 22 with species such as saltgrass, pickleweed (*Salicornia virginica*), jaumea (*Jaumea*
 23 *carcosa*), and spearscale (*Atriplex triangularis*). The remaining populations range in size
 24 from a single individual to more than 100,000 plants, and within populations the number
 25 of individuals fluctuates considerably from year to year, often by more than an order of
 26 magnitude.

27 Conversion of wetlands to other land uses has contributed to the decline of soft bird's-
 28 beak. Current threats to the remaining populations include competition from nonnative
 29 plants (in particular pepperweed [*Lepidium latifolium*]), alteration of wetland hydrology
 30 (including trenching of wetlands for mosquito abatement and diking), grazing and
 31 trampling, and erosion (CNDDDB 2020; CNPS 2020).

32 **E.3.36 Palmate-bracted Bird's-beak**

33 Palmate-bracted bird's-beak (*Chloropyron palmatum*) is federally and State listed as
 34 endangered and is a CRPR 1B.1 species.

35 Seven known populations of palmate-bracted bird's-beak exist: four in the Sacramento
 36 Valley, one in the Livermore Valley, and two in the San Joaquin Valley. The elevation
 37 range of this species is 15 to 500 feet. There are no known occurrences of palmate-
 38 bracted bird's-beak in the Delta and Suisun Marsh, but suitable habitat exists around
 39 Clifton Court Forebay.

1 Palmate-bracted bird's-beak is a hemiparasitic annual herb species in the figwort family.
2 Saltgrass is believed to be the host plant for this species. Palmate-bracted bird's-beak is
3 glandular and softly hairy and is typically 4 to 12 inches tall. The flower corollas are
4 whitish with pale lavender sides, and they bloom between June and September. This
5 species grows in alkaline soils in chenopod scrub and valley and foothill grassland
6 habitat. It is found primarily at the edges of channels with individuals scattered in
7 seasonally wet depressions, alkali scalds, and grassy areas (CNDDDB 2020).

8 Palmate-bracted bird's-beak is threatened by agricultural conversion, urbanization,
9 industrial development, off-road vehicle use, altered hydrology, and grazing.

10 **E.3.37 Boggs Lake Hedge-hyssop**

11 Boggs Lake hedge-hyssop (*Gratiola heterosepala*) was State listed as endangered in
12 November 1978 and is a CRPR 1B.2 species.

13 Boggs Lake hedge-hyssop is found in the northern portion of the Central Valley and in
14 the foothills of the inner North Coast Ranges, Sierra Nevada, and Cascade Range from
15 Fresno County north into Oregon (CNDDDB 2020; CNPS 2020). The primary area of
16 concentration is the Modoc Plateau.

17 Boggs Lake hedge-hyssop is an annual herb, less than 4 inches tall, in the figwort
18 family. The upper portion of the plant is glandular-sticky. The leaves and sepals (outer
19 floral structures) are truncate, the latter unequally fused. The small tubular flowers are
20 yellow, except for the three white lower lobes, and are borne singly in the upper leaf-
21 axils (CNPS 2020).

22 Boggs Lake hedge-hyssop grows on clay substrates in vernal pools, in small playa-type
23 pools, in marshy areas, on the margins of reservoirs and lakes, and in artificial habitats
24 such as borrow pits and cattleponds. It has been found in several types of vernal pools,
25 such as those with northern basalt flow, northern claypan, northern hardpan, and
26 northern volcanic ashflow or mudflow substrates (USFWS 2005). Habitat for this
27 species is found in annual grassland, oak woodland, juniper woodland, and conifer
28 forest communities. Boggs Lake hedge-hyssop co-occurs with other rare vernal pool
29 species, such as dwarf downingia, little mousetail (*Myosurus minimus* ssp. *apus*), and
30 possibly Heckard's peppergrass (*Lepidium latipes* var. *heckardii*).

31 Boggs Lake hedge-hyssop plants are threatened by agricultural conversion, urban
32 development, intensive grazing and trampling, nonnative species, and off-road vehicles
33 (CNPS 2020). Moderate grazing is believed to be a compatible use if it occurs after
34 seeds are set (USFWS 2005).

35 **E.3.38 Contra Costa Goldfields**

36 Contra Costa goldfields (*Lasthenia conjugens*) is listed as Endangered by the USFWS
37 (70 FR 46923, August 11, 2005) and is on the CRPR 1B.1. Eight units of Critical habitat
38 were designated in 2006 (71 FR 7117) for the protection of Contra Costa Goldfield
39 populations in Alameda, Contra Costa, and Solano counties in the Delta and Suisun
40 Marsh and north in Napa and Mendocino counties.

1 Contra Costa goldfields inhabits seasonal wetlands including vernal pools and swales,
 2 moist flats and depressions in mesic grasslands with typically clay or alkaline soils
 3 generally below 200 feet, though some occurrences are recorded from above 1,000
 4 feet. Historically Contra Costa goldfields was distributed from the North Coast, southern
 5 Sacramento Valley, and the San Francisco Bay to the south Coast in seven vernal pool
 6 regions, Central Coast, Lake-Napa, Livermore, Mendocino, Santa Barbara, Santa Rosa,
 7 and Solano-Colusa and outside of defined vernal pool regions in Contra Costa County.
 8 It is currently extant in Mendocino, Napa, Marin, Contra Costa, Alameda, Solano, and
 9 Monterey counties (USFWS 2005; USFWS 2008; USFWS 2010).

10 Contra Costa goldfields (*Lasthenia conjugens*) is a low herbaceous annual in the
 11 sunflower family with light green, hairless, opposite leaves. It grows to a height of 4 to
 12 12 inches and the stem may be branched or unbranched. It produces yellow daisy-like
 13 flower heads with 6 to 13 ray flowers with numerous disc flowers from March through
 14 June (USFWS 2008; USFWS 2010). Contra Costa goldfields is threatened by urban
 15 development, conversion of land to agriculture, competition from nonnative plants,
 16 alteration of hydrology, and inappropriate grazing practices. The species has been
 17 extirpated from Santa Barbara and Santa Clara counties by agricultural land conversion,
 18 urbanization, and alteration of hydrology (USFWS 2005; USFWS 2010).

19 **E.3.39 Colusa Grass**

20 Colusa grass (*Neostapfia colusana*) is federally listed as Threatened, state listed as
 21 Endangered, and CRPR 1B.1. A recovery plan was established in 2005 (USFWS 2005)
 22 and critical habitat was designated in 2006 (71 FR 7117, February 10, 2006). Colusa
 23 grass is a covered species in the Habitat Conservation Plan for the Natomas Basin in
 24 Sacramento and Sutter Counties

25 Colusa grass grows in large or deep vernal pools with substrates of high mud content. It
 26 is found at the edges of alkaline basins and vernal pools in the Sacramento and San
 27 Joaquin valleys and on acidic soils of alluvial fans and stream terraces at the eastern
 28 margin of the San Joaquin Valley and adjacent foothills (USFWS 2005; USFWS 2009b).
 29 Currently, no more than 43 occurrences of Colusa grass remain extant. The majority of
 30 the extant occurrences are in the southern Sierra Foothills, where they are concentrated
 31 northeast of the City of Merced in Merced County and east of Hickman in Stanislaus
 32 County. The closest occurrence of Colusa grass to the Delta is immediately adjacent to
 33 the northwest boundary in Grasslands County Park south of Davis, also the location of
 34 Critical Habitat Unit 1 (CNPS 2020).

35 Colusa grass is a robust, tufted annual in the grass family (Poaceae) that grows 3-12
 36 inches tall. The plant is pale-gray-green when young turning brown as it ages due to the
 37 hardening of sticky, glandular exudates on the stems. The lower portions of the stems
 38 lie on the ground; the upper portions are erect and terminate in dense cylindrical, spike-
 39 like inflorescences that superficially resemble small ears of corn. The blooming period is
 40 May to August (CNPS 2020; USFWS 2009b). The two biggest threats to Colusa grass
 41 agricultural conversion and development, especially in Stanislaus and Merced counties,
 42 respectively. Other threats are herbicide contaminated runoff, contaminated

1 groundwater by industrial chemicals, flood control and alteration of hydrology,
2 inappropriate grazing practices, and competition from nonnative plants.

3 **E.3.40 Solano Grass**

4 Solano grass is listed as endangered under both the federal and California ESAs and is
5 a CRPR 1B.1 species. USFWS has designated critical habitat that specifies protection
6 of populations of Solano grass in one location immediately adjacent to the Delta in
7 southern Yolo County (71 FR 7117, February 10, 2006).

8 Only two other populations are known, one located in Jepson Prairie and the other
9 nearby on private land, in Solano County. Solano grass is endemic to the western
10 Sacramento Valley, which was likely the extent of its historical range. Prior to the
11 conversion of large areas to agriculture it may have been more widely distributed in
12 seasonally flooded areas behind natural levees of watercourses in the western valley
13 (USFWS 2009c).

14 Solano grass occurs in alkaline vernal pools or playa pools within annual grassland. It is
15 a grayish-green, small, hairy, 1- to 8-inch-long semi-aquatic annual grass with
16 decumbent stems that turn up only at the tips. The stems and leaves are covered with
17 sticky, acrid secretions characteristic of the genus. The leaves lack ligules and the
18 lemma bract terminates in a single sharp tooth. Solano grass blooms from June to July.
19 The 0.3- to 4-inch flowering spike contains 7 to 19 overlapping spiklets and remains
20 partially sheathed by the uppermost leaf (USFWS 2009c; USFWS 2009d).

21 Solano grass is threatened by destruction of habitat due to alteration of hydrology and
22 invasion of vernal pools by nonnative plants. Other potential threats include grazing
23 (71 FR 7117; USFWS 2009d).

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E.4 Special-Status Terrestrial Wildlife Species Accounts

The species accounts in this appendix provide an overview of special-status wildlife species that are known to occur or that have an appreciable likelihood of occurring in the Delta and Suisun Marsh and are likely to be affected by the implementation of the proposed Delta Plan Amendments (Proposed Project or proposed amendments).

Table E-5 lists identified wildlife species that were removed from further discussion in the Draft Program Environmental Impact Report (PEIR) because they are not likely to be affected by the Proposed Project.

**Table E-5
Special-status Wildlife Species That Are Not Likely to Be Affected by the Proposed Delta Plan Amendments**

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Reason Not Evaluated in PEIR
Invertebrates	San Bruno elfin butterfly	<i>Callophrys mossii bayensis</i>	E	–	–	Not likely to occur in the Delta and Suisun Marsh
	Monarch butterfly	<i>Danaus plexippus</i>	–	–	–	Not likely to occur in the Delta and Suisun Marsh
	Delta green ground beetle	<i>Elaphrus viridis</i>	T	–	–	Distribution limited to Jepson Prairie, which would not be affected by the Delta Plan Project
	Moestan blister beetle	<i>Lytta moesta</i>	–	–	–	Not likely to occur in the Delta and Suisun Marsh
	Callippe silverspot butterfly	<i>Speyeria callippe callippe</i>	E	–	G5 S1	Not likely to occur in the Delta and Suisun Marsh
Amphibians	Foothill yellow-legged frog	<i>Rana boylei</i>	–	SSC	–	Not likely to occur in the Delta and Suisun Marsh
Reptiles	Alameda whipsnake (=striped racer)	<i>Masticophis lateralis euryxanthus</i>	T	T	–	Not likely to occur in the Delta and Suisun Marsh
Birds	California gull	<i>Larus californicus</i>	–	WL - Nesting Colony	–	Does not nest in the Delta and Suisun Marsh
	Long-billed curlew	<i>Numenius americanus</i>	BCC	WL – Nesting	–	Does not nest in the Delta and Suisun Marsh
	San Pablo song sparrow	<i>Melospiza melodia samuelis</i>	BCC	SSC	–	Not likely to occur in the Delta and Suisun Marsh

1 **Table E-5 (continued)**
 2 **Special-status Wildlife Species That Are Not Likely to Be Affected by the**
 3 **Proposed Delta Plan Amendments**

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Reason Not Evaluated in PEIR
	Berkeley kangaroo rat	<i>Dipodomys heermanni berkeleyensis</i>	–	–	CNDDDB -G3G4, T1, S1	Does not occur in the Delta and Suisun Marsh
Mammals	Hoary bat	<i>Lasiurus cinereus</i>	–	–	CNDDDB -G5 S4?	No State or federal status; taxon does not meet CEQA/NEPA definition of a special-status species

4 Sources: CNDDDB 2020; USFWS 2020a; USFWS 2020b

5 Notes: CEQA = California Environmental Quality Act; NEPA = National Environmental Policy Act.

6 ^a **Federal Status Listing Categories:**

7 BCC= U.S. Fish and Wildlife Service bird of conservation concern (no legal status, but may warrant future listing under the
 8 federal Endangered Species Act (ESA) without additional conservation efforts).

9 E = Listed as endangered under the ESA.

10 T = Listed as threatened under the ESA.

11 – = No status.

12 ^b **State Status Listing Categories:**

13 SSC= California species of special concern.

14 T = Listed as threatened under the California Endangered Species Act (CESA).

15 WL = California Department of Fish and Game watch list (list of species formerly listed as SSC, under ESA or CESA, or as Fully
 16 Protected).

17 – = No status.

18 ^c **Other Status Listing Categories:**

19 California Natural Diversity Database Conservation Status Ranks (shown only for species without legal status)

20 **Global Rank:**

21 G3 = Vulnerable—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent
 22 and widespread declines, or other factors.

23 G4 = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

24 G5 = Secure—Common; widespread and abundant.

25 G#G# = Range Rank—A numeric range rank (e.g., G2G3) is used to indicate the range of uncertainty in the status of a species or
 26 community.

27 T = Intraspecific Taxon (trinomial)—The status of intraspecific taxa (subspecies or varieties) are indicated by a “T-rank”
 28 following the species’ global rank.

29 **State Rank:**

30 S1 = Critically Imperiled—Critically imperiled in the state because of extreme rarity (often five or fewer occurrences) or because
 31 of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.

32 S4 = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

33 ? = Inexact or Uncertain—Denotes inexact or uncertain numeric rank (The ? qualifies the character immediately preceding it in
 34 the S-rank.).

35 Table E-6 below presents a comprehensive list of the special-status fish and wildlife and
 36 their habitat associations for species known to occur or that have the potential to occur
 37 in the Delta and Suisun Marsh. Of the species listed in the table below, those that are
 38 federally listed and/or State listed or fully protected are described in more detail in the
 39 sections below. For each of the fish and wildlife species addressed below, information is
 40 provided on the legal status, distribution, relevant natural history, and threats. For listed
 41 species, information is also provided on relevant conservation efforts and guidance.
 42 Invertebrates are presented first, followed by vertebrates.

1 **Table E-6**
 2 **Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area**

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
	Blennosperma vernal pool andrenid bee	<i>Andrena blennospermatris</i>	—	—	G2 S2	Upland areas near vernal pools	Occurs in central California between Lake and San Joaquin counties; known from locations east and west of the Delta; could occur in vernal pool grasslands in the Delta
	Antioch dunes anthicid beetle	<i>Anthicus antiochensis</i>	—	—	G1 S1	Loose sand on sand bars and sand dunes	Likely extinct in Antioch Dunes; also known from Grand Island and southern Sacramento County; could occur in dune habitat in the Delta
	Sacramento anthicid beetle	<i>Anthicus sacramento</i>	—	—	G1 S1	Sandslip faces in willows; associated with riparian and other aquatic habitat	On Sacramento and lower San Joaquin rivers and tributaries from Butte County to San Joaquin County; could occur in sandy riparian habitat in the Delta
Invertebrates	Lange's metalmark butterfly	<i>Apodemia mormo langei</i>	E	—	G5 S1	Stabilized sand dunes along the San Joaquin River; endemic to the Antioch Dunes; host plant is nude buckwheat	Distribution limited to Antioch Dunes, in Contra Costa County
	Crotch bumble bee	<i>Bombus crotchii</i>	—	C	G2 S1S2	Open grassland and scrub. Able to persist in semi-natural habitats surrounded by intensely modified landscapes.	Historically found throughout California, including the Central Valley. Currently found in scattered locations throughout its historic range.
	Western bumble bee	<i>Bombus occidentalis occidentalis</i>	—	C	G4T3	Found in a range of habitats, including mixed woodlands, farmlands, urban areas, montane meadows and into the western edge of the prairie grasslands	Historically found throughout California, but now largely confined to high elevation sites and along the northern California coast.
	Conservancy fairy shrimp	<i>Branchinecta conservatio</i>	E	—	G2 S2	Vernal pools and swales	Occurs from Butte and Tehama counties to Ventura County; could occur in vernal pools in the Delta

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Invertebrates (cont.)	Longhorn fairy shrimp	<i>Branchinecta longiantenna</i>	E	—	G1 S1S2	Small, shallow vernal pools and swales in alkali soils or rock outcrops	Occurs from Contra Costa County south to San Luis Obispo County; could occur in small, shallow pools associated with alkali soils in the Delta
	Vernal pool fairy shrimp	<i>Branchinecta lynchi</i>	T	—	G3 S3	Vernal pools and other seasonal wetlands	Occurs in the Central Valley from Shasta County to Tulare County and the central and southern Coast Ranges from northern Solano County to Ventura County; known to occur in vernal pools near the eastern Delta and Clifton Court Forebay and north and east of the Suisun Marsh; could occur in vernal pools elsewhere in the Delta
	Midvalley fairy shrimp	<i>Branchinecta mesovallensis</i>	—	—	G2 S2S3	Vernal pools	Occurs in Central Valley from Sacramento and Solano counties south to Fresno County; could occur in vernal pools in the Delta
	Sacramento Valley tiger beetle	<i>Cicindela hirticollis abrupta</i>	—	—	G5 SH	Required fine to medium sand, terraced floodplains or low sandy water edge flats	Presumed extinct; therefore, unlikely to occur in the Delta
	San Joaquin Dune beetle	<i>Coelus gracilis</i>	—	—	G1 S1	Fossil dunes in western San Joaquin Valley	Occurred historically from Kings County north to Antioch Dunes; presumed extirpated from Antioch Dunes; unlikely to occur in the Delta because of lack of fossil dune habitat
	Valley elderberry longhorn beetle	<i>Desmocerus californicus dimorphus</i>	T	—	G3 S2	Elderberry shrubs, typically in riparian habitats	Central Valley, including the Delta, below approximately 3,000-foot elevation; could occur throughout the Delta
	Hairy water flea	<i>Dumontia oregonensis</i>	—	—	G1G3 S1	Described in 2003 from a specimen taken from a vernal pool in southern Oregon; little is known about its natural history; subsequently detected in vernal pools located in Mather Field and Travis Air Force Base in California	Known to occur in a vernal pool less than 1 mile outside the Delta; could occur in vernal pools throughout the Delta

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Invertebrates (cont.)	Antioch efferian robberfly	<i>Efferia antiochi</i>	—	—	G1G2 S1S2	None known; robberfly larvae usually develop in the ground or in rotting wood, where they prey on other insect larvae	Antioch, Fresno, and Scout Island (in the San Joaquin River); the Delta is within the range of this species, but lack of specific habitat use limits an assessment of the potential for this species to occur
	Redheaded sphecid wasp	<i>Eucerceris ruficeps</i>	—	—	G1G3 S1S2	Interior dunes	Western Central Valley from Contra Costa County to Fresno County; could occur in the Delta
	Bridges' Coast Range shoulderband	<i>Helminthoglypta nickliniana bridgesi</i>	—	—	G3 S1S2	Open hillsides in grasses and weeds	Central and western Contra Costa and Alameda counties; unlikely to occur in the Primary Planning Area
	Ricksecker's water scavenger beetle	<i>Hydrochara rickseckeri</i>	—	—	G2 S2	Ponds; little is known about specifics of habitat associations	Recorded in central coastal California and southern Sacramento Valley; known from Cosumnes River Preserve; could occur in the Delta
	Curved-foot Hygrotus diving beetle	<i>Hygrotus curvipes</i>	—	—	G1 S1	Small seasonal pools; associated with alkaline plant communities	East Contra Costa and Alameda counties; could occur in the southern part of the Delta, in Contra Costa County
	Middlekauff's shieldback katydid	<i>Idiostatus middlekauffi</i>	—	—	G1G2 S1	Interior dunes	Known only from Antioch Dunes; could occur in dune habitat in the Delta
	Vernal pool tadpole shrimp	<i>Lepidurus packardii</i>	E	—	G4 S3S4	Vernal pools, swales, and other ephemeral wetlands	Northern, central, and portions of Southern California; could occur in the Delta and is known to occur in vernal pools near the Stone Lakes National Wildlife Refuge
	California linderiella	<i>Linderiella occidentalis</i>	—	—	G2G3 S2S3	Vernal pools, swales, and other ephemeral wetlands	Central Valley and central coastal California; could occur in the Delta and is known to occur in vernal pools near the Stone Lakes National Wildlife Refuge
	Molestan blister beetle	<i>Lytta molesta</i>	—	—	G2 S2	Often associated with dried vernal pools	Central California; known to occur in the southernmost portion of the Delta, in eastern Contra Costa County; could occur elsewhere in vernal pools near the Stone Lakes National Wildlife Refuge

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Invertebrates (cont.)	Hurd's metapogon robberfly	<i>Metapogon hurdi</i>	—	—	G1G3 S1S3	Sand dunes	Antioch Dunes and dunes near Fresno; could occur in the Delta but unlikely
	Antioch multilid wasp	<i>Myrmosula pacifica</i>	—	—	GH SH	Unknown	Presumed extinct; therefore, unlikely to occur in the Primary Planning Area
	Antioch adrenid bee	<i>Perdita scitula antiochensis</i>	—	—	G1 T1 S1	Interior sand dunes	Currently known only from Antioch Dunes; formerly occurred in Oakley; unlikely to occur in the Primary Planning Area
	Antioch specid wasp	<i>Philanthus nasalis</i>	—	—	G1 S1	Sand dunes and sand hills	Extirpated from Antioch Dunes, extant in sand hills in Santa Cruz County; unlikely to occur in the Primary Planning Area
	Antioch Dunes halcetid bee	<i>Sphecodogastra antiochensis</i>	—	—	G1 S1	Restricted to Antioch Dunes; host plant is <i>Oenothera deltoids howellii</i>	Distribution limited to Antioch Dunes, in Contra Costa County
Amphibians	California tiger salamander	<i>Ambystoma californiense</i>	T	T, WL	G2G3 S2S3	In winter, breeds in vernal pools and seasonal wetlands with a minimum 10-week inundation period; in summer, aestivates in grassland habitat, primarily in rodent burrows	Occurs from Yolo County to Kern County in the Central Valley and up to 2,000-foot elevation in the Sierra Nevada foothills, and from Sonoma County to Santa Barbara County on the coast; known to occur in the southernmost portion of the Delta near Clifton Court Forebay and in the western portion north of Suisun Bay in the Potrero Hills; could occur elsewhere in vernal pools
	California red-legged frog	<i>Rana draytonii</i>	T	SSC	G2G3 S2S3	Foothill streams with dense shrubby or emergent riparian vegetation, minimum 11-20 weeks of water for larval development, and upland refugia for aestivation	Occurs primarily in the foothills of the central Coast Ranges, with isolated populations in the Sierra Nevada; a few individuals have been documented in the southernmost portion of the Delta near Clifton Court Forebay; unlikely to occur in most areas because it has been extirpated from most of the Delta and valley floor

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Amphibians (cont.)	Western spadefoot	<i>Spea hammondi</i>	–	SSC	G3 S3	In winter, breeds in vernal pools and seasonal wetlands with a minimum 3-week inundation period; in summer, aestivates in grassland habitat, in soil crevices and rodent burrows	Range includes the Central Valley and southern Coast Ranges and foothills; could occur in vernal pools in the southern portion of the Delta near Clifton Court Forebay and in the northern portion near Stone Lake
	Western pond turtle	<i>Actinemys marmorata</i>	–	SSC	G3G4 S3	Forages in ponds, marshes, slow-moving streams, sloughs, and irrigation ditches; nests in nearby uplands with low, sparse vegetation	Range spans across California west of the Sierra-Cascade crest, below 5,000 feet in elevation; documented throughout the Primary Planning Area, except along the Sacramento Deep Water Ship Channel
	Silvery legless lizard	<i>Anniella pulchra pulchra</i>	–	SSC	G3G4 S3	Associated with a variety of vegetation types on sandy soils with accessible moisture, primarily but not exclusively in semistabilized dunes	Patchily distributed from Antioch south along the coast, foothills, San Joaquin Valley, and southern Sierra Nevada; could occur in dunes and tailings in several locations in the Delta
	San Joaquin whipsnake	<i>Masticophis flagellum ruddocki</i>	–	SSC	G4 S2	Open habitats—grasslands, savannas, deserts, open-canopy scrub, chaparral, and pastures—with available rodent burrows for cover	Ranges across the San Joaquin Valley and associated foothills to the west; could occur in southern upland portion of the Delta
Reptiles	Coast horned lizard	<i>Phrynosoma blainvilli</i>	–	SSC	G3G4 S3S4	Variety of open habitats, including chaparral, oak savanna, and grassland; found primarily in areas with sandy, friable soils, scattered shrubs, and abundant ant colonies	Range includes most of west-central and southwestern California below 8,000-foot elevation, including the entire Delta; could occur in stabilized dunes and the grasslands near Clifton Court Forebay and north of Stone Lake
	Giant garter snake	<i>Thamnophis gigas</i>	T	T	G2 S2	Forages in slow-moving streams, sloughs, ponds, marshes, inundated floodplains, rice fields, and irrigation and drainage canals; also requires upland refugia not subject to flooding during the snake's inactive season	Range spans the southern Sacramento and northern San Joaquin valleys; documented in several locations throughout the Delta

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Birds	Cooper's hawk	<i>Accipiter cooperii</i>	–	WL (nesting)	G5 S4	Nests and forages primarily in riparian woodlands and other wooded habitats	Year-round range spans most of the wooded portions of California; could occur throughout the Primary Planning Area where patches of suitable wooded habitat are present but likely in low numbers
	Tricolored blackbird	<i>Agelaius tricolor</i>	BCC	T	G2G3 S1S2	Nests colonially in large, dense stands of freshwater marsh, riparian scrub, and other shrubs and herbs; forages in grasslands and agricultural fields	Ranges primarily throughout the Central Valley and the central and southern coasts, with additional scattered locations throughout California; year-round resident; could occur throughout the Primary Planning Area
	Grasshopper sparrow	<i>Ammodramus savannarum</i>	–	SSC (nesting)	G5 S3	Nests and forages in dense grasslands; favors a mix of native grasses, forbs, and scattered shrubs	Breeding range spans much of the Central Valley and California coast, but populations are typically localized and disjunct; most individuals migrate, although some may be present year-round; known to occur in the Yolo Bypass Wildlife Area and the northeast and southeast portions of the Delta; may occur in other portions of the Primary Planning Area
	Tule greater white-fronted goose	<i>Anser albifrons elgasi</i>	–	SSC (wintering)	–	Forages primarily in marshes dominated by tules, bulrushes, and cattails; forages to a lesser extent in rice and other grain fields	Does not breed in California; wintering populations are concentrated primarily in Sacramento Valley wildlife refuges and surrounding rice fields; the Suisun Marsh, uplands in Grizzly Island Wildlife Area, and nearby duck clubs; and marginally the Napa Marshes; occurs primarily west of the Delta
	Golden eagle	<i>Aquila chrysaetos</i>	BCC	FP, WL	G5 S3	Nests and forages in a variety of open habitats, including grassland, shrubland, and cropland; most common in foothill habitats; rare foothill breeder; nests in cliffs, rock outcrops, and large trees	Winter range spans most of California; breeding range excludes the Central Valley floor; not expected to nest in the Primary Planning Area; nonbreeding individuals may forage throughout the area's uplands; most likely to occur in the scrub and grasslands of the southern portion near Clifton Court Forebay

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Birds (cont.)	Great egret	<i>Ardea alba</i>	–	CFGC (rookeries)	G5 S4	Nests colonially in tall trees; forages in freshwater and saline marshes, shallow open water, and occasionally cropland or low, open upland habitats, such as pastures	Year-round range spans the Central Valley, central coast, and portions of Southern California; winter range expands to include the remainder of the coast; may nest and forage throughout the Primary Planning Area; rookeries have been documented throughout the Delta, especially on protected lands and instream islands
	Great blue heron	<i>Ardea herodias</i>	–	CFGC (rookeries)	G5 S4	Nests colonially in tall trees; forages in freshwater and saline marshes, shallow open water, and occasionally cropland or low, open upland habitats, such as pastures	Year-round range spans most of California except the eastern portion of the state and the highest elevations; winter range expands to include eastern California; nests and forages throughout the Primary Planning Area, especially on protected lands and instream islands
	Short-eared owl	<i>Asio flammeus</i>	–	SSC (nesting)	G5 S3	Nests on the ground among herbaceous vegetation, such as grasses or cattails; forages in grasslands, agricultural fields, and marshes	Breeding range is patchily distributed throughout the state and Delta, including portions of the Sacramento and San Joaquin valleys, northeastern California, and a few scattered coastal sites; Grizzly Island in the Suisun Marsh supports the only known breeding population in the planning area, although small numbers have been documented episodically at the Cosumnes River Preserve and in Byron in Contra Costa County
	Burrowing owl	<i>Athene cunicularia hypugea</i>	BCC	SSC (nesting)	G4 S3	Nests and forages in grasslands, agricultural fields, and low scrub habitats, especially where ground squirrel burrows are present; occasionally inhabits artificial structures and small patches of disturbed habitat	Year-round range includes the Central Valley and Delta and portions of the central coast, eastern California, and Southern California; may occur throughout the Primary Planning Area where habitat is suitable; documented on Brannan Island and near Suisun Bay and Clifton Court Forebay

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Birds (cont.)	Redhead	<i>Aythya americana</i>	–	SSC (nesting)	–	Nests in freshwater emergent wetlands with dense patches of tules or cattails interspersed with open water more than 3 feet deep; forages by diving in deep open water	Year-round range is patchily distributed through portions of the Central Valley, northeastern California, and Southern California; not expected to nest in the Primary Planning Area, although a low potential exists at freshwater duck clubs that maintain summer water at depths greater than 3 feet with suitable surrounding marsh; known to nest in the Yolo Bypass, but no recent nesting records occur elsewhere in the Primary Planning Area
	Ferruginous hawk	<i>Buteo regalis</i>	BCC	WL	G4 S3S4	Forages most commonly in grasslands and shrublands; also forages in agricultural fields	Winter range spans most of California except the higher elevations of the Sierra Nevada and northern Coast Ranges; does not nest in California; may forage in winter throughout the uplands of the Primary Planning Area; most likely to occur in the scrub and grasslands of the southern portion near Clifton Court Forebay
	Swainson's hawk	<i>Buteo swainsoni</i>	BCC	T (nesting)	G5 S3	Nests in isolated trees, open woodlands, and woodland margins; forages in grasslands and agricultural fields	Breeding range spans the Central Valley and Delta west of the Suisun Marsh, northeastern California, and a few additional scattered sites; most of the population migrates south of California in fall, although a small number winters in the Delta

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Birds (cont.)	Western snowy plover	<i>Charadrius alexandrinus nivosus</i>	T, BCC	SSC	G3 S2S3	Nests and forages on sandy and gravelly beaches along the coast and the shores of inland alkali lakes	Breeds in coastal California and near alkali lakes in eastern California and remnant alkali playas in the southern San Joaquin Valley; not expected to occur in the Delta or Suisun Marsh because these areas are outside of the species' known range; nesting has been documented in three Yolo County sites: the Yolo Bypass, Davis Sewage Ponds, and Woodland Sugar Ponds; no other recent records exist for the Delta or Sacramento Valley
	Mountain plover	<i>Charadrius montanus</i>	BCC	SSC (wintering)	G3 S2S3	Forages in short grasslands and plowed agricultural fields where vegetation is sparse and trees are absent	Winter range spans the western Central Valley, including areas of the Delta east of the Suisun Marsh, and portions of Southern California; does not breed in California; may occur throughout the Primary Planning Area where habitat is suitable
	Northern harrier	<i>Circus cyaneus</i>	–	SSC (nesting)	G5 S3	Nests on the ground among herbaceous vegetation, such as grasses or cattails; forages in grasslands, agricultural fields, and marshes	Breeding range encompasses much of lowland California; winter range expands to include the remaining lowland areas; may nest and forage throughout the Primary Planning Area; nesting has been documented in the eastern portion of the Suisun Marsh and near Clifton Court Forebay
	Western yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	T, BCC	E	G5 S1	Nests in valley, foothill, and desert riparian forest with densely foliaged deciduous trees and shrubs, especially willows; other associated vegetation includes cottonwood trees, blackberry, nettle, and wild grape	Historically common but now a rare summer resident at isolated sites in Sacramento Valley in Northern California and along Kern and Colorado River systems in Southern California; occasionally documented in Colusa, Glenn, Butte, Sutter, and Yolo counties within the last 20 years

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Birds (cont.)	Yellow warbler	<i>Dendroica petechia brewsteri</i>	–	SSC (nesting)	–	Nests and forages in early successional riparian habitats	Range includes coastal and Northern California and the Sierra Nevada below approximately 7,000 feet; mostly extirpated from the southern Sacramento and San Joaquin valleys; has recently been documented (1998–2002) in limited locations in the Delta during the breeding season
	Snowy egret	<i>Egretta thula</i>	–	CFGC (rookeries)	G5 S4	Nests colonially in dense marshes and low trees; forages in freshwater and saline marshes, shallow open water, and occasionally irrigated cropland or wet upland habitats	Year-round range spans the Central Valley, Delta, entire coast, central Coast Ranges, and southeastern California; winter range expands to include northeastern California; may nest and forage throughout the Primary Planning Area, especially on protected lands near marshes
	White-tailed Kite	<i>Elanus leucurus</i>	–	FP	G5 S3S4	Forages in ponds, marshes, slow-moving streams, sloughs, and irrigation ditches; nests in nearby uplands with low, sparse vegetation	Year-round range spans the Central Valley, Coast Ranges and coast, Sierra Nevada foothills, and Colorado River; may nest and forage throughout the Primary Planning Area; documented in the Delta along the Sacramento River west of Stone Lake, and in the north-central and east-central Delta
	California horned lark	<i>Eremophila alpestris actia</i>	–	WL	G5 S4	Nests and forages in open habitats with sparse vegetation, including grasslands and fallow agricultural fields	Year-round range spans most of lowland California; may nest and forage in the Primary Planning Area where habitat is suitable, particularly in the grasslands and alkali sink habitat in the southern portion near Clifton Court Forebay
	Merlin	<i>Falco columbarius</i>	–	WL (wintering)	G5 S3S4	Forages in a wide variety of habitats, but in the Central Valley is most common around agricultural fields and grasslands	Winter range encompasses most of California except the highest elevations; does not breed in California; may forage in winter throughout the Primary Planning Area

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Birds (cont.)	Prairie falcon	<i>Falco mexicanus</i>	BCC	WL (nesting)	G5 S4	Forages most commonly in grasslands and low shrublands; also forages in agricultural fields	Year-round range includes eastern California, the Coast Ranges, and much of Southern California; winter range expands to include the Delta, Central Valley, and coast; low probability of nesting in the Primary Planning Area, with a higher likelihood of foraging in suitable habitats during postbreeding dispersal, migration, or winter; most likely to occur in the Delta in the southernmost portion near Clifton Court Forebay; known to nest near Byron in Contra Costa County, although this area is not generally included in the published breeding range
	American peregrine falcon	<i>Falco peregrinus anatum</i>	BCC	FP	G4 S3S4	Forages in a wide variety of habitats, but is most common near water, where shorebirds and waterfowl are abundant	Year-round range includes the Sierra Nevada, Cascade Range, northeastern California, Coast Ranges, and coast; winter range expands to include the Central Valley and the Delta and additional portions of eastern and Southern California; not expected to nest in the Delta because these areas are outside of the published breeding range; may forage in winter throughout these areas
	Saltmarsh common yellowthroat	<i>Geothlypis trichas sinuosa</i>	BCC	SSC	G5 S3	Primarily brackish marsh with dense and continuous wetland or riparian vegetation down to the water surface; however, to a lesser degree, also uses woody swamp and freshwater marsh; often found in rush, tall grass, and willow-dominated communities	Endemic to the greater San Francisco Bay Area with boundaries being Santa Clara County to the south, Carquinez Strait to the east, the Napa Marsh in southern Sonoma County to the north, and western Marin County to the west. CNDDDB also documents several occurrences, some nesting, in the Suisun Marsh; however, subspecies identification may be suspect (Gardali and Evens 2008)

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Birds (cont.)	Lesser sandhill crane	<i>Grus canadensis canadensis</i>	–	SSC (wintering)	–	Forages primarily in croplands with waste grain; also frequents grasslands and emergent wetlands	Winter range is concentrated in scattered patches in the Delta, northern Sacramento Valley, portions of the San Joaquin Valley (especially in Merced County), Carrizo Plain, and Southern California south of the Salton Sea; occurs more widely between these areas during migration; does not breed in California; may forage during winter throughout the Delta
	Greater sandhill crane	<i>Grus canadensis tabida</i>	–	T, FP	G5 S2	Forages primarily in croplands with waste grain; also frequents grasslands and emergent wetlands	Winter range includes the Central Valley and Delta, Carrizo Plain, Southern California south of the Salton Sea, and Colorado River; breeds in northeastern California; may forage during winter throughout the Delta
	Bald eagle	<i>Haliaeetus leucocephalus leucocephalus</i>	BCC	E, FP	G5 S3	Forages primarily in large inland fish-bearing waters with adjacent large trees or snags, and occasionally in uplands with abundant rabbits, other small mammals, or carrion	Breeding range includes the Sierra Nevada, Cascade Range, and portions of the Coast Ranges; winter range expands to include most of the state except southeastern California (although the species occurs along the Colorado River); not expected to nest in the Primary Planning Area; in winter, may forage in the Delta along large rivers and in areas managed for waterfowl
	Yellow-breasted chat	<i>Icteria virens</i>	–	SSC	G5 S3	Nests and forages in riparian thickets of willow and other brushy tangles near water and thick understory in riparian woodland	Breeding range includes the northern Sacramento Valley, Cascade Range, Sierra Nevada foothills, northwestern California, most of the Coast Ranges, the Colorado River, and other scattered sites, including part of the Delta; migrates south of California in fall; nests in patches of the Delta where habitat is suitable

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Birds (cont.)	Least bittern	<i>Ixobrychus exilis</i>	BCC	SSC (nesting)	G5 S2	Nests and forages in cattail and bulrush marshes	Current breeding range is scattered in patches of the Sacramento and San Joaquin valleys, Clear Lake, marshes around several large lakes in eastern California, and portions of Southern California, where they also winter; known to occur on Joice Island in the Suisun Marsh; low probability of occurrence in other portions of the Delta, particularly the marshes in the southeast and central Delta, and potentially in private duck clubs; a few individuals have been documented in the Yolo Bypass, Freeport in Sacramento County, and Palm Tract in Contra Costa County, but the Delta is no longer a major population center for the species
	Loggerhead shrike	<i>Lanius ludovicianus</i>	BCC	SSC (nesting)	G4 S4	Nests in isolated shrubs and trees and woodland edges of open habitats; forages in grasslands, agricultural fields, and low scrub habitats	Breeding range spans much of lowland California, and winter range includes most lowland areas south of Glenn County. May occur throughout the Primary Planning Area, especially in the Clifton Court Forebay area
	California black rail	<i>Laterallus jamaicensis coturniculus</i>	BCC	T, FP	G3G4 S1	Nests and forages in saline, freshwater, or brackish emergent marshes with gently grading slopes and upland refugia with vegetative cover beyond the high-water line	Year-round range includes the Suisun Marsh, San Pablo Bay, Morro Bay, a few patches in the Sierra Nevada foothills, and portions of Southern California; winter range expands to include San Francisco Bay and the Marin County coast; several historic nesting occurrences documented in the southern half of the Delta
	Song sparrow "Modesto" population	<i>Melospiza melodia</i>	–	SSC	G5 S3	Nests and forages primarily in emergent marsh, riparian scrub, and early successional riparian forest habitats, and infrequently in mature riparian forest and sparsely vegetated ditches and levees	Year-round range includes the Delta east of the Suisun Marsh, the Sacramento Valley, and the northern San Joaquin Valley; known to forage in the Delta, along Threemile Slough; nests and forages throughout the Delta

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Birds (cont.)	Suisun song sparrow	<i>Melospiza melodia maxillaris</i>	BCC	SSC	G5 S3	Nests and forages in brackish water marshes dominated by cattails, tules, and pickleweed	Year-round range includes the marshes surrounding Suisun Bay, from the confluence of the Sacramento and San Joaquin rivers to the Carquinez Strait; not expected in the remainder of the Delta
	San Pablo song sparrow	<i>Melospiza melodia samuelis</i>	BCC	SSC	G5 S2	Coastal salt marshes dominated by pickleweed; nests in gumplant bordering slough channels	Year-round range includes the marshes surrounding San Pablo Bay and northern San Francisco Bay; unlikely to occur in the Primary Planning Area
	Osprey	<i>Pandion haliaetus</i>	–	WL	G5 S4	Forages exclusively in fish-bearing waters; nests in nearby trees or tall, constructed platforms	Breeding range includes most of Northern California, the central Coast Ranges, and the southern Sierra Nevada; winter range also includes the central coast and additional portions of Southern California; nests in the Delta and could forage throughout the Primary Planning Area in winter
	California brown pelican	<i>Pelecanus occidentalis californicus</i>	–	FP	G4 S3	Nests colonially on small to moderate sized coastal islands, just outside surf line, building nests with sticks on the ground	Usually found on the coast; may occur in the Delta near deeper water where it can forage
	Double-crested cormorant	<i>Phalacrocorax auritus</i>	–	WL (rookeries)	G5 S4	Forages in open water; breeds colonially in rock ledges and trees	Breeding range spans the Delta, the coast and offshore islands, Clear Lake, the Salton Sea, the Colorado River, and portions of northeastern California; winter range expands to include the Central Valley and additional portions of Southern California; may nest and forage throughout the Primary Planning Area; a rookery has been documented in the Delta, between Sacramento and Stone Lakes National Wildlife Refuge

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Birds (cont.)	White-faced Ibis	<i>Plegadis chihi</i>	–	WL (rookeries)	G5 S3S4	Forages in wetlands and irrigated or flooded croplands and pastures; breeds colonially in dense freshwater marsh	Year-round resident in scattered locations in the Central Valley and Southern California; also nests in northeastern California; breeds in the Yolo Basin Wildlife Area, but there is a low likelihood of nesting in the remainder of the Primary Planning Area; may forage there during winter and migration
	Purple martin	<i>Progne subis</i>	–	SSC (nesting)	G5 S3	Nests in tree cavities, bridges, utility poles, lava tubes, and buildings; forages in foothill and low montane oak and riparian woodlands, and less frequently in coniferous forests and open or developed habitats	Not expected in the Primary Planning Area except small numbers during migration; breeding range includes the Sierra Nevada, Cascade Range, portions of the Coast Ranges and coast, and parts of Southern California; migrates south of California in fall; extirpated from the Delta, and nesting in the Central Valley has been reduced to transportation structures in and around the city of Sacramento
	Ridgway's rail	<i>Rallus longirostris obsoletus</i>	E	E, FP	G5 S1	Nests and forages in dense cordgrass and cattail marshes with vegetated refugia during the highest tides	Year-round near coastal range, surrounds San Francisco and San Pablo bays, and documented at several locations in Suisun Bay; range does not include the Delta
	Bank swallow	<i>Riparia riparia</i>	–	T (nesting)	G5 S2	Nests in vertical banks or bluffs, typically adjacent to water, devoid of vegetation, and with friable, eroding soils; forages in a wide variety of habitats	Breeds in much of lowland and riparian California, with 75 percent nesting colonies along the Sacramento and Feather rivers and their tributaries; additional breeding locations are scattered throughout the northern and central portions of the state; migrates south of California in fall; low probability of nesting in much of the Primary Planning Area because suitable bank conditions are rare; however, one nesting colony has been documented in the Delta in Brannan Island State Recreation Area

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Birds (cont.)	California least tern	<i>Sternula antillarum browni</i>	E	E, FP	G4 S2	Prefers undisturbed nest sites on open or sparsely vegetated, sandy, or gravelly shores on beaches or near shallow-water estuaries where it often feeds; has reportedly also nested on landfills and paved areas	The Pacific Coast from San Francisco to Baja California; winters in Mexico; when feeding, follows schools of fish and is sometimes seen as far north as southern Oregon; documented nesting in the western portion of Delta in Suisun Bay
	Least Bell's vireo	<i>Vireo bellii pusillus</i>	E	E	G5 S2	Nests and roosts in low riparian thickets of willows and shrubs, usually near water but sometimes along dry, intermittent streams; other associated vegetation includes cottonwood trees, blackberry, mulefat, and mesquite (in desert)	Formerly a common and widespread summer resident throughout Sacramento and San Joaquin valleys, and in the coastal valleys and foothills from Santa Clara County south, but its numbers have drastically declined, and the species has vanished from much of its California range; does not occur in the Delta, but could expand range with riparian restoration
	Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	–	SSC (nesting)	G5 S3	Nests in freshwater emergent wetlands with dense vegetation and deep water, often along borders of lakes or ponds	Breeding range includes primarily the Central Valley, northeastern California, and portions of Southern California; most individuals migrate south of California in winter; may occur in freshwater marshes throughout the Delta, particularly in the southern half, but also known to occur in the northern portion of the Delta, south of the city of Sacramento
Mammals	Pallid bat	<i>Antrozous pallidus</i>	–	SSC	G5 S3	Deserts, grasslands, shrublands, woodlands, and forests; most common in open, dry habitats; roosts in rock crevices, oak hollows, bridges, and buildings	Year-round range spans nearly all of California; may roost and forage throughout the Delta, with the highest likelihood in the uplands surrounding Clifton Court Forebay

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Mammals (cont.)	Townsend's Big-eared bat	<i>Corynorhinus townsendii</i>	–	SSC	G3G4 S2	Typically roosts in caves; however, colonies of fewer than 100 individuals occasionally nest in buildings or bridges; forages in all habitats except alpine and subalpine, although most commonly in mesic forests and woodlands	Year-round range spans most of California except the highest elevations of the Sierra Nevada south of Lake Tahoe; low likelihood of occurrence in the Delta
	Western mastiff bat	<i>Eumops perotis californicus</i>	–	SSC	–	Roosts in trees, rock crevices, and buildings in small colonies of fewer than 100 individuals; forages in a variety of grassland, shrub, and wooded habitats, including riparian and urban areas, although most commonly in open, arid lands	Year-round range spans most of California, with records absent from the northwest and northeast portions of the state; may occur throughout the Delta
	Western red bat	<i>Lasiurus blossevillii</i>	–	SSC	G5 S3S4	Roosts primarily in tree foliage, occasionally shrubs; roosts in small family groups rather than large colonies as other bats; prefers habitat edges and mosaics with trees that are protected from above and open below with open areas for foraging, including grasslands, shrublands, and open woodlands	Year-round range spans the Central Valley, Sierra Nevada foothills, Coast Ranges, and coast except Humboldt and Del Norte counties; documented foraging in most habitat types in the Delta; roosting documented in the Delta in Brannan Island State Recreation Area
	Riparian woodrat	<i>Neotoma fuscipes riparia</i>	E	SSC	G5 S1	Riparian forest, particularly dense willow thickets with an oak overstory	Extirpated from most of historic range and now restricted to Caswell Memorial State Park on the Stanislaus River, at the confluence with the San Joaquin River; not expected in the Delta

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

Type	Common Name	Scientific Name	Federal ^a	State ^b	Other Status ^c	Habitat	Range and Potential to Occur
Mammals (cont.)	Big free-tailed bat	<i>Nyctinomops macrotis</i>	–	SSC	G5 S3	Roosts on high cliffs or rocky outcrops in low-lying, arid areas in Southern California	Rare and not thought to breed in California; more common in New Mexico, southern Arizona, and Texas; one female specimen collected in Contra Costa County in 1979, but others are all located in south and southeastern California; also 1916 CNDDDB record from Suisun City
	Salt marsh harvest mouse	<i>Reithrodontomys raviventris</i>	E	E, FP	G1G2 S1S2	Saline emergent marshes with low, dense cover of vegetation (especially pickleweed) and higher elevation refugia	Year-round range includes the marshes surrounding Suisun, San Pablo, and San Francisco bays, with the Collinsville-Antioch area forming the eastern limit of the range; not expected in the Delta
	Suisun shrew	<i>Sorex ornatus sinuosus</i>	–	SSC	G5 S1S2	Marshes bordering Suisun Bay and northern San Pablo Bay	Year-round range includes the marshes surrounding Suisun and San Pablo bays; not expected in the Delta
	Riparian brush rabbit	<i>Sylvilagus bachmani riparius</i>	E	E	G5 S1	Dense thickets of brush associated with riparian habitats	Extirpated from most of historic range and now restricted to Caswell Memorial State Park on the Stanislaus River, at the confluence with the San Joaquin River, and an adjacent portion of an overflow channel; not expected in the Delta
	American badger	<i>Taxidea taxus</i>	–	SSC	G5 S3	Drier open shrub, forest, and herbaceous habitats with friable soils	Year-round range spans all of California except the Humboldt and Del Norte coasts; documented in the Delta, north of Stone Lake; may occur elsewhere in the Delta, particularly in the southern portion near Clifton Court Forebay; most of the Delta, however, is too highly modified for this species
	San Joaquin kit fox	<i>Vulpes macrotis mutica</i>	E	T	G4 S2	Grasslands and oak savannas with friable soils; home range sizes of 600–1,300 acres	Year-round range is fragmented throughout the San Joaquin Valley; breeding documented in May 2000 in the Delta near Clifton Court Forebay; not expected elsewhere in Delta because of lack of suitable habitat

Table E-6 (continued)
Special-status Wildlife Species Known to Occur or with Potential to Occur in the Primary Planning Area

- 1 Sources: CNDDDB 2020; USFWS 2020a, 2020b
- 2 ^a **U.S. Fish and Wildlife Service—Federal Listing Categories:**
- 3 E: Listed as endangered under the federal Endangered Species Act (ESA).
- 4 T: Listed as threatened under the federal ESA.
- 5 BCC: U.S. Fish and Wildlife Service bird of conservation concern.
- 6 C: Candidate for listing.
- 7 –: No status.
- 8 ^b **California Department of Fish and Game—State Listing Categories:**
- 9 E: Listed as endangered under California Endangered Species Act (CESA).
- 10 T: Listed as threatened under CESA.
- 11 C: Candidate for listing
- 12 FP: Fully protected under the California Fish and Game Code.
- 13 SSC: California species of special concern.
- 14 WL: California Department of Fish and Game watch list.
- 15 CFGC: Rookeries protected under the California Fish and Game Code.
- 16 –: No status.
- 17 ^c Other Status (CNDDDB Conservation Status Ranks) (shown only for species without legal status)
- 18 **Global Rank:**
- 19 GH: Possibly Extinct (species)—Missing; known from only historical occurrences but still some hope of rediscovery.
- 20 G1: Critically Imperiled—At very high risk of extinction because of extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
- 21 G2: Imperiled—At high risk of extinction because of very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
- 22 G3: Vulnerable—At moderate risk of extinction because of a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
- 23 G5: Secure—Common; widespread and abundant.
- 24 G#G#: Range Rank—A numeric range rank (e.g., G2G3) is used to indicate the range of uncertainty in the status of a species or community.
- 25 T: Intraspecific Taxon (trinomial)—The status of infraspecific taxa (subspecies or varieties) are indicated by a “T-rank” following the species’ global rank.
- 26 **State Rank:**
- 27 SH: Possibly Extirpated (Historical)—Species or community occurred historically in the state, and there is some possibility that it may be rediscovered.
- 28 S1: Critically Imperiled—Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.
- 29 S2: Imperiled—Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.
- 30 S3: Vulnerable—Vulnerable in the state because of a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
- 31 S#S#: Range Rank—A numeric range rank (e.g., S2S3) is used to indicate the range of uncertainty in the status of a species or community.
- 32
- 33
- 34
- 35 CNDDDB: California Natural Diversity Database
- 36 Delta: Sacramento–San Joaquin Delta

1 **E.4.1 Invertebrates**

2 ***Lange's Metalmark Butterfly***

3 **Legal Status**

4 Lange's metalmark butterfly (*Apodemia mormo langei*) is federally listed as endangered.
5 No critical habitat has been designated for this species.

6 **Distribution**

7 Lange's metalmark butterfly was historically restricted to sand dunes along the southern
8 bank of the Sacramento-San Joaquin River confluence and is currently found only at
9 Antioch Sand Dunes in Contra Costa County. Most of the habitat is now part of the
10 Antioch Dunes National Wildlife Refuge (USFWS 2008).

11 **Relevant Natural History**

12 All the life stages of Lange's metalmark butterfly are found close to the larval food plant,
13 naked-stem buckwheat (*Eriogonum nudum* ssp. *auriculatum*). The eggs are deposited
14 on buckwheat leaves near the leaf petiole throughout the mating flight that occurs
15 during August and September. Larvae hatch during the rainy months. Larvae are known
16 to feed only on buckwheat. The adults may use buckwheat, butterweed (*Senecio*
17 *douglasii*) and snakeweed (*Gutierrezia divergens*) for nectar. Lange's metalmark
18 butterfly also use lupine (*Lupinus albifrons*) for mating (USFWS 2008).

19 Unlike the many butterfly species that have several generations a year, Lange's
20 metalmark has only one, and the fecundity of the wild individuals is low. Detailed life
21 history and physiological requirements of this species are unknown. Several hundred to
22 more than a thousand individuals have been recorded during population counts,
23 however; there was a steeply declining trend from the late 1990s through the late 2000s
24 (USFWS 2008).

25 **Threats**

26 Lange's metalmark butterflies are threatened by loss of dune habitat, by disturbance of
27 dune habitat, and by an invasive vetch species that affects host plants (USFWS 2008).

28 **Relevant Conservation Efforts and Guidance**

29 A peak flight count of only 45 individuals in 2006 led to the implementation of several
30 recovery actions, including aggressive habitat restoration and captive propagation of the
31 butterfly (USFWS 2008).

32 ***Crotch Bumble Bee***

33 **Legal Status**

34 In 2019, the California Fish and Game Commission determined that the petition to list
35 the Crotch bumble bee (*Bombus crotchii*) as a candidate under the CESA was
36 warranted. This species has no federal status.

1 **Distribution**

2 The crotch bumble bee currently has a limited distribution within southwestern portion of
3 North American. This species occurs primarily within California but has also been
4 documented in Baja California in Mexico and in Nevada. This species was historically
5 common throughout most of the southern two-thirds of California, but is largely absent
6 from most of that range, particularly the center of its past range. In the Central Valley,
7 this species has declined in numbers particularly in areas associated within intensive
8 agricultural operations (Xerces Society 2018).

9 **Relevant Natural History**

10 In California, this species inhabits open grassland and scrub habitats (Xerces Society
11 2018). They are generalist foragers and have been reported visiting a wide variety of
12 flowering plants. *B. crotchii* has a very short tongue, and thus is best suited to forage at
13 open flowers with short corollas. The plant families most associated with them include
14 Fabaceae, Apocynaceae, Asteraceae, Lamiaceae, Boraginaceae (Xerces Society
15 2018). Note that these floral associations do not necessarily represent this species'
16 preference for these plants over other flowering plants, but rather may represent the
17 prevalence of these flowers in the landscape where this species occurs.

18 Very little is known about the hibernacula, or overwintering sites utilized by this species.
19 Generally, bumble bees overwinter in soft, disturbed soil, or under leaf litter or other
20 debris.

21 According to Thorp et al. (1983), the flight period for *B. crotchii* queens in California is
22 from late February to late October, peaking in early April, with a second pulse in July.
23 The flight period for workers and males in California is from late March through
24 September; worker and male abundance peak in early July (Thorp et al. 1983).

25 **Threats**

26 The species is threatened primarily by habitat loss of grasslands and meadows, and
27 agricultural intensification which has increased the use of insecticides (Xerces Society
28 2018). Changes in farming operations have led to practices such as elimination of
29 pollinator friendly hedgerows, weed cover, and legume pastures which have further
30 reduced the quality of habitat available to Crotch bumble bee. Other threats to this
31 species include competition with managed honey bee hives used for agricultural
32 pollination, and various parasites and diseases.

33 **Western Bumble Bee**

34 **Legal Status**

35 In 2019, the California Fish and Game Commission placed the western bumble bee
36 (*Bombus occidentalis occidentalis*) as a candidate under the CESA. This species has
37 no federal status.

38 **Distribution**

39 There are two subspecies of western bumble bee: *B. occidentalis mckayi*, which occurs
40 in in Alaska and northwestern Canada, and *B. occidentalis occidentalis*, which occurs
41 from southern British Columbia, southern Alberta, and southwestern Saskatchewan

1 south to multiple western U.S. states, including Arizona, New Mexico, and California. In
2 California, it has been historically documented in Alameda, Alpine, Butte, Calaveras,
3 Contra Costa, Del Norte, El Dorado, Fresno, Humboldt, Lake, Lassen, Madera, Marin,
4 Mariposa, Mendocino, Modoc, Monterey, Napa, Nevada, Placer, Plumas, San Benito,
5 San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Clara, Santa Cruz,
6 Shasta, Sierra, Siskiyou, Solano, Sonoma, Tehama, Trinity, Tulare, Yolo, and Yuba
7 counties (Xerces Society 2018). They are now largely confined to high elevation sites
8 and a small handful of locations on the northern California coast (Xerces Society 2018).

9 **Relevant Natural History**

10 This species utilizes meadows and grasslands with abundant floral resources (Xerces
11 Society 2018). They are generalist foragers and are reported to visit a wide variety of
12 flowering plants. Western bumble bees have a very short tongue, and thus is best
13 suited to forage at open flowers with short corollas. The plant genera most associated
14 with this species in California include *Cirsium*, *Erigonum*, *Solidago*, *Aster*, *Ceanothus*,
15 *Centaurea*, and *Penstemon*. Note that these floral associations do not necessarily
16 represent their preference for these plants over other flowering plants, but rather may
17 represent the abundance of these flowers in the landscape.

18 **Threats**

19 The species is threatened primarily by habitat loss of grasslands and meadows, and
20 agricultural intensification which has increased the use of insecticides (Xerces Society
21 2018). Changes in farming operations have led to practices such as elimination of
22 pollinator friendly hedgerows, weed cover, and legume pastures which have further
23 reduced the quality of habitat available to Crotch bumble bee. Other threats to this
24 species include competition with managed honey bee hives used for agricultural
25 pollination, and various parasites and diseases (Xerces Society 2018).

26 **Conservancy Fairy Shrimp**

27 **Legal Status**

28 The Conservancy fairy shrimp (*Branchinecta conservatio*) was listed as endangered
29 throughout its range under the federal ESA on September 19, 1994 (59 *Federal*
30 *Register* [FR] 48136). In June 2012, USFWS published a 5-year review recommending
31 that the species remain listed as endangered (USFWS 2012a). Revised critical habitat
32 was designated on February 10, 2006 (71 FR 7118), although none of the critical
33 habitat units are within the Delta. The Conservancy fairy shrimp has no State regulatory
34 status.

35 **Distribution**

36 The historical distribution of the Conservancy fairy shrimp is not known, but the
37 distribution of vernal pool habitats in the areas where the species is now known to occur
38 was once more continuous and larger in area than today (USFWS 2005). The species is
39 currently found in disjunct and fragmented habitats across the Central Valley of
40 California from Tehama County to Merced County and at two Southern California
41 locations on the Los Padres National Forest in Ventura County (USFWS 2005; USFWS
42 2007a; USFWS 2012a; CNDDDB 2020).

1 Conservancy fairy shrimp is known to occur in suitable habitat in Yolo County more than
2 3 miles west of the western conveyance area, and in Solano County more than 8 miles
3 west of the western conveyance area. Turbid-water playas and vernal pools that may
4 support the species occur on alkaline soils from the DFG Tule Ranch Reserve
5 southwest to the Montezuma Wetlands Mitigation Projects and from the Byron Airport to
6 Discovery Bay. No critical habitat is present in the Delta.

7 **Relevant Natural History**

8 Conservancy fairy shrimp are omnivorous filter feeders that indiscriminately filter
9 particles of the appropriate size from their surroundings, and in turn are prey to a wide
10 variety of animals. The diet of Conservancy fairy shrimp consists of bacteria, unicellular
11 algae, protists, and suspended plant and animal particles (Eriksen and Belk 1999).
12 Animals feeding on Conservancy fairy shrimp are birds, fish, amphibians, dragonfly and
13 damselfly larvae, other insects, and vernal pool tadpole shrimp (Eriksen and Belk 1999;
14 USFWS 2005).

15 Vernal pool crustaceans reproduce by producing cysts that consist of an embryo within
16 a protective covering (Eriksen and Belk 1999). Cysts may remain viable for a long and
17 undetermined number of years. During summer and fall months, vernal pool crustacean
18 populations are present only as cysts in the dry pool bottom.

19 Inundation triggers some of the dormant cysts to hatch; other cysts remain dormant as a
20 cyst bank, analogous to the seed bank of annual plants (USFWS 2005). After hatching,
21 the life span and maturation rate of Conservancy fairy shrimp are similar to those of
22 other fairy shrimp species. Conservancy fairy shrimp can reach maturity in about 6 or 7
23 weeks, and populations of adults can remain active for more than 4 months (Helm 1998).
24 However, maturation and reproduction rates of vernal pool crustaceans are controlled by
25 water temperature and can vary greatly (Eriksen and Brown 1980; Helm 1998).

26 Typical turbid-water habitats for Conservancy fairy shrimp in California are large, playa-
27 type vernal pools or long inundation smaller vernal pools (Eng et al. 1990; USFWS
28 2007a). The pools generally last until June, but the Conservancy fairy shrimp adult life
29 stage has typically been completed before then (Eng et al. 1990). They have been
30 collected from early November to early April (Eng et al. 1990). As with other vernal pool
31 crustaceans, Conservancy fairy shrimp are sporadic in their distribution, often inhabiting
32 only one or a few vernal pools in otherwise more widespread pool complexes. Pools
33 within a complex typically are separated by distances on the order of 5 or more feet and
34 may form dense, interconnected mosaics of small pools or a sparser scattering of larger
35 pools (USFWS 2005). Conservancy fairy shrimp have been found in vernal pools
36 ranging in size from 323 square feet to 88 acres at elevations ranging from 16 to 5,577
37 feet (USFWS 2005; USFWS 2007a).

38 The Conservancy fairy shrimp occupies the same vernal pool habitats as many of the
39 other vernal pool species, including several other rare and endangered vernal pool
40 crustaceans. This species has been found in association with the vernal pool fairy
41 shrimp (*Branchinecta lynchi*), federally listed as threatened; vernal pool tadpole shrimp
42 (*Lepidurus packardii*), federally listed as endangered; and California fairy shrimp
43 (*Linderiella occidentalis*), a species of concern. Although these species may all be found

1 in one general location, they have rarely been collected from the same pool at the same
2 time. In general, Conservancy fairy shrimp have very large populations within a given
3 pool, and it is usually the most abundant fairy shrimp when more than one species is
4 present (USFWS 2005; USFWS 2007a).

5 **Threats**

6 The Conservancy fairy shrimp is threatened primarily by the habitat loss and
7 fragmentation resulting from expansion of agricultural and developed land uses. Vernal
8 pool habitat can also be lost or degraded by other activities that damage or puncture the
9 hardpan (i.e., water-restrictive layer underlying the pool) or by activities that destroy or
10 degrade uplands that contribute water to vernal pools. Besides habitat conversion,
11 activities causing such loss or degradation include deep ripping of soils, water diversion
12 or impoundment, and application of pesticides, fertilizers, or livestock wastes.

13 Additional threats are incompatible grazing practices (e.g., overgrazing, undergrazing,
14 or cessation of grazing where it has historically occurred), replacement of native plants
15 by nonnatives, and introduction of fish to vernal pools (Robins and Vollmar 2002; Marty
16 2005; Pyke and Marty 2005; USFWS 2005).

17 **Relevant Conservation Efforts and Guidance**

18 The Conservancy fairy shrimp is covered by the Recovery Plan for Vernal Pool
19 Ecosystems of California and Southern Oregon (USFWS 2005). This recovery plan
20 addresses a large number of vernal pool-associated species through an ecosystem
21 approach to recovery that is focused on habitat protection and management.

22 The Conservancy fairy shrimp is covered under the approved Natomas Basin, San
23 Joaquin, and East Contra Costa County habitat conservation plans (HCP). Further, the
24 species is proposed for coverage under the Solano County HCP.

25 ***Longhorn Fairy Shrimp***

26 **Legal Status**

27 The longhorn fairy shrimp (*Branchinecta longiantenna*) was federally listed as
28 endangered by USFWS on September 19, 1994 (59 FR 48136). In June 2012, USFWS
29 published a 5-year review recommending that the species remain listed as endangered
30 (USFWS 2012b). Revised critical habitat was designated on February 10, 2006 (71 FR
31 7118), and species by unit designations were published for Contra Costa, Alameda,
32 Merced, and San Luis Obispo counties on February 10, 2006 (71 FR 7118). None of the
33 critical habitat units are within the Delta.

34 **Distribution**

35 The known distribution of the longhorn fairy shrimp extends from Contra Costa and
36 Alameda counties to San Luis Obispo County and also includes Merced County
37 (USFWS 2005; CNDDDB 2020). Within this geographic range, it is extremely rare in
38 vernal pools and swales. Occurrences are rare and highly disjunct with specific pool
39 characteristics largely unknown (USFWS 2005; USFWS 2007b; USFWS 2012b).

40 The closest populations to the Delta are in Contra Costa County (Vasco Caves
41 Preserve) and Alameda County (Brushy Peak Preserve). These occurrences are in

1 seasonal pools that fill sandstone depressions in rocky outcrops that are not present
2 anywhere within the Delta. This species also occurs in pools within alkali sink vegetation
3 in other parts of its known range (USFWS 2005; USFWS 2007b; CNDDDB 2020);
4 although surveys have been conducted for at least 14 years, no longhorn fairy shrimp
5 have been detected in similar pools in the Delta (USFWS 2005; USFWS 2007b). Critical
6 habitat for this species is located outside the Delta, more than 5 miles southwest of
7 Clifton Court Forebay.

8 **Relevant Natural History**

9 Longhorn fairy shrimp are omnivorous filter feeders that indiscriminately filter particles of
10 the appropriate size from their surroundings, and in turn they are prey to a wide variety
11 of animals. The diet of the longhorn fairy shrimp consists of bacteria, unicellular algae,
12 protists, and suspended plant and animal particles (Eriksen and Belk 1999). Animals
13 feeding on longhorn fairy shrimp likely include birds, fish, amphibians, dragonfly and
14 damsel fly larvae, other insects, and vernal pool tadpole shrimp (Eriksen and Belk 1999;
15 USFWS 2005).

16 Vernal pool crustaceans reproduce by producing cysts that consist of an embryo within
17 a protective covering (Eriksen and Belk 1999). Cysts may remain viable for a long and
18 undetermined number of years. During summer and fall months, populations of vernal
19 pool crustaceans are present only as cysts in the dry pool bottom.

20 Inundation triggers some of the dormant cysts to hatch; other cysts remain dormant as a
21 cyst bank, analogous to the seed bank of annual plants (USFWS 2005). After hatching,
22 the life span and maturation rate of longhorn fairy shrimp are similar to those of other
23 fairy shrimp species. The longhorn fairy shrimp can complete its life cycle in 3 to 7
24 weeks (Helm 1998). However, maturation and reproduction rates of vernal pool
25 crustaceans are controlled by water temperature and can vary greatly (Eriksen and
26 Brown 1980; Helm 1998).

27 Longhorn fairy shrimp have been reported to co-occur in the same general area with the
28 vernal pool fairy shrimp (*Branchinecta lynchi*), but the species did not occupy the same
29 vernal pools (Eng et al. 1990).

30 **Threats**

31 The longhorn fairy shrimp has likely experienced habitat loss and fragmentation as a
32 result of the expansion of agricultural and developed land uses. However, it is now
33 threatened by habitat loss and disturbance resulting from several site-specific activities
34 at the few locations from which it is known: wind energy development, a water storage
35 project, construction of a dirt access road, and land management activities (USFWS
36 2005). Additional threats to longhorn fairy shrimp may include incompatible grazing
37 practices (e.g., overgrazing, undergrazing, or cessation of grazing where it has
38 historically occurred) and replacement of native plants by nonnatives (Robins and
39 Vollmar 2002; Marty 2005; Pyke and Marty 2005; USFWS 2005).

40 **Relevant Conservation Efforts and Guidance**

41 Longhorn fairy shrimp is covered by the Recovery Plan for Vernal Pool Ecosystems of
42 California and Southern Oregon (USFWS 2005). This recovery plan addresses a large

1 number of vernal pool–associated species through an ecosystem approach to recovery
2 that is focused on habitat protection and management. The species is covered by the
3 approved Natomas Basin, San Joaquin County, and East Contra Costa County HCPs.

4 **Vernal Pool Fairy Shrimp**

5 **Legal Status**

6 The vernal pool fairy shrimp (*Branchinecta lynchi*) is listed as threatened under the
7 federal ESA throughout its range (59 FR 48136, September 19, 1994). In September
8 2007, USFWS published a 5-year review recommending that the species remain listed
9 as threatened. Revised critical habitat was designated on February 10, 2006 (71 FR
10 7118). Portions of Critical Habitat Units 19A and 19B occur within the Delta, in the vicinity
11 of Byron and Brentwood. This species is covered by the December 15, 2005, Recovery
12 Plan for Vernal Pool Ecosystems of California and Southern Oregon (USFWS 2005).

13 The vernal pool fairy shrimp has no State regulatory status.

14 **Distribution**

15 The vernal pool fairy shrimp is found throughout the Central Valley and west to the
16 central Coast Ranges, at sites 30 to 4,000 feet in elevation (USFWS 2005). The species
17 has also been reported from the Agate Desert region of Oregon near Medford, and
18 disjunct populations occur in San Luis Obispo, Santa Barbara, and Riverside counties.

19 Within this geographic range, the vernal pool fairy shrimp inhabits primarily vernal pools
20 (Eng et al. 1990). It also occurs in other wetlands that provide habitat similar to vernal
21 pools: alkaline rain-pools, ephemeral drainages, rock outcrop pools, ditches, stream
22 oxbows, stock ponds, vernal swales, and some seasonal wetlands (Helm 1998).
23 Occupied wetland habitats range in size from several square feet to more than
24 10 acres. This species is not found in riverine or other permanent waters.

25 The vernal pool fairy shrimp is known to occur in suitable habitat in and near the Delta
26 in grasslands in the south near Clifton Court Forebay, and in the north, east of the
27 eastern conveyance area. Critical habitat for this species is located within the Delta,
28 less than 0.25 mile west of the western conveyance area. Only one unit, 19B, is partially
29 within the Delta boundary.

30 **Relevant Natural History**

31 Vernal pool fairy shrimp are omnivorous filter feeders that indiscriminately filter particles
32 of the appropriate size from their surroundings, and in turn they are prey to a wide
33 variety of animals. The diet of vernal pool fairy shrimp consists of bacteria, unicellular
34 algae, protists, and suspended plant and animal particles (Eriksen and Belk 1999).
35 Animals feeding on vernal pool fairy shrimp are birds, fish, amphibians, dragonfly and
36 damselfly larvae, other insects, and vernal pool tadpole shrimp (Eriksen and Belk 1999;
37 USFWS 2005).

38 Vernal pool crustaceans reproduce by producing cysts that consist of an embryo within
39 a protective covering (Eriksen and Belk 1999). Cysts may remain viable for a very long
40 and undetermined number of years. During summer and fall months, populations of
41 vernal pool crustaceans are present only as cysts in the dry pool bottom.

1 Individuals go through the rest of their life cycle while pools are inundated. Inundation
2 triggers some of the dormant cysts to hatch; other cysts remain dormant as a cyst bank,
3 analogous to the seed bank of annual plants (USFWS 2005). After hatching, vernal pool
4 fairy shrimp develop rapidly into adults, reaching sexual maturity in as little as 18 days,
5 and complete their life cycle within 9 weeks (Helm 1998). However, maturation and
6 reproduction rates can vary greatly with water temperature (Eriksen and Brown 1980;
7 Helm 1998). Multiple episodes of cyst hatching may occur within a season if conditions
8 are suitable (Helm 1998; Gallagher 1996). However, populations also often disappear
9 early in the season, long before the vernal pools dry up.

10 Vernal pool fairy shrimp have been reported to co-occur in the same general area with
11 longhorn fairy shrimp, but the species did not occupy the same vernal pools (Eng et al.
12 1990).

13 **Threats**

14 The vernal pool fairy shrimp is threatened primarily by the habitat loss and
15 fragmentation resulting from expansion of agricultural and developed land uses. Vernal
16 pool habitat can also be lost or degraded by other activities that damage or puncture the
17 hardpan (i.e., water-restrictive layer underlying the pool) or by activities that destroy or
18 degrade uplands that contribute water to vernal pools. Besides habitat conversion,
19 activities causing such loss or degradation include deep ripping of soils, water diversion
20 or impoundment, and application of pesticides, fertilizers, or livestock wastes. Additional
21 threats include incompatible grazing practices (e.g., overgrazing, undergrazing, or
22 cessation of grazing where it has historically occurred), replacement of native plants by
23 nonnatives, and introduction of fish to vernal pools (Robins and Vollmar 2002; Marty
24 2005; Pyke and Marty 2005; USFWS 2005).

25 **Relevant Conservation Efforts and Guidance**

26 The vernal pool fairy shrimp is covered by the Recovery Plan for Vernal Pool
27 Ecosystems of California and Southern Oregon (USFWS 2005). This recovery plan
28 addresses a large number of vernal pool-associated species through an ecosystem
29 approach to recovery that is focused on habitat protection and management.

30 The vernal pool fairy shrimp is covered under the approved San Joaquin County, East
31 Contra Costa and South Sacramento HCPs. In addition, the species is proposed for
32 coverage under the Solano County HCP under development.

33 **Valley Elderberry Longhorn Beetle**

34 **Legal Status**

35 The valley elderberry longhorn beetle (VELB) (*Desmocerus californicus dimorphus*) is
36 listed as threatened under the ESA (50 FR 52803) on August 8, 1980. In 2012, USFWS
37 sought condition of a proposal that this species be removed from the endangered
38 species list, but in 2014 it withdrew that proposal following a scientific review. Critical
39 habitat was designated for this species in the initial listing of the species (50 FR 52803),
40 although none is designated within the Delta.

1 **Distribution**

2 The VELB is endemic to the Central Valley at elevations below about 3,000 feet. It is
3 found only in association with its host plants, the elderberry shrub (*Sambucus* spp.). In
4 the Central Valley, the elderberry shrub is found primarily in riparian vegetation.

5 The VELB is known to occur in elderberry shrubs present in riparian woodland within
6 1.5 miles of the Delta. The species is also expected to occur in suitable habitat in other
7 locations in the Delta.

8 **Relevant Natural History**

9 Adults feed on the foliage and possibly the flowers of elderberries from March to early
10 June (USFWS 1991; USFWS 2006a). During this period, the beetles mate and lay eggs
11 on the bark of elderberry shrubs. After the eggs hatch, the larvae bore into and feed on
12 the pith of the stems (i.e., the soft tissue at the center of elderberry stems) and also may
13 feed on the wood. The larval stage may last for 1 to 2 years. Immediately before
14 pupating, larvae excavate exit holes in the stems and temporarily fill them. During mid-
15 March to early June, after pupation, the adults emerge.

16 **Threats**

17 Substantial amounts of riparian habitat containing the host plant for the VELB have
18 been lost, and host plants in remaining habitat have been lost and damaged. However,
19 the greatest current threat to the VELB may be predation and displacement by the
20 invasive Argentine ant (*Linepithema humile*) (Huxel 2000).

21 **Relevant Conservation Efforts and Guidance**

22 A recovery plan was prepared for this species during the 1980s (USFWS 1984), and
23 regularly implemented conservation measures have included avoidance and
24 minimization of effects on occupied habitat, elderberry transplantation and replacement
25 plantings, and habitat preservation. In part as a result of these measures, extensive
26 areas of habitat have been preserved (USFWS 2006a).

27 The VELB is covered under the San Joaquin County, East Contra Costa County, South
28 Sacramento, and Yolo HCP. In addition, the species is proposed for coverage in the
29 Solano County HCP currently under development.

30 ***Vernal Pool Tadpole Shrimp***

31 **Legal Status**

32 The vernal pool tadpole shrimp (*Lepidurus packardii*) was listed as endangered
33 throughout its range under the federal ESA on September 19, 1994 (59 FR 48136). In
34 September 2007, USFWS published a 5-year review recommending that the species
35 remain listed as endangered. Revised critical habitat was designated on February 10,
36 2006 (71 FR 7118), although none is designated within the Delta.

37 **Distribution**

38 The vernal pool tadpole shrimp is endemic to the Central Valley, with most populations
39 located in the Sacramento Valley. This species has also been reported from the Delta to
40 the east side of San Francisco Bay.

1 Within this geographic range, vernal pool tadpole shrimp occur in a wide variety of
2 seasonal habitats: vernal pools, ponded clay flats, alkaline pools, ephemeral stock
3 tanks, and roadside ditches (CNDDDB 2020; Helm 1998; Rogers 2001). Habitats where
4 vernal pool tadpole shrimp have been observed range in size from small, clear,
5 vegetated vernal pools to highly turbid pools to large winter lakes (Helm 1998; Rogers
6 2001). This species has not been reported in pools that contain high concentrations of
7 sodium salts, but may occur in pools with high concentrations of calcium salts. The
8 largest concentration of occurrences of vernal pool tadpole shrimp is found in the
9 Southeastern Sacramento Vernal Pool Region, where the species occurs on a number
10 of public and private lands in Sacramento County (USFWS 2005; USFWS 2007c).

11 The vernal pool tadpole shrimp is known to occur in suitable habitat in grasslands
12 surrounding most of the Delta. Critical habitat for this species is in Sacramento, Solano,
13 and Yolo counties, more than 5 miles from the Delta.

14 **Relevant Natural History**

15 Vernal pools and other ephemeral wetlands must dry out and be inundated again for the
16 vernal pool tadpole shrimp cysts to hatch. Vernal pool tadpole shrimp dig in bottom
17 sediments and scramble over objects as they forage. They are omnivores, and in turn
18 they are consumed by a wide variety of animals. Their diet includes plants and various
19 zooplankton, other fairy shrimp, and insect larvae (Eriksen and Belk 1999). Animals
20 feeding on vernal pool tadpole shrimp include birds, fish, amphibians, and dragonfly
21 larvae and other insects (Eriksen and Belk 1999; USFWS 2005).

22 Vernal pool crustaceans reproduce by producing cysts that consist of an embryo within
23 a protective covering (Eriksen and Belk 1999). Cysts may remain viable for a substantial
24 and undetermined number of years. During summer and fall months, vernal pool
25 crustacean populations are present only as cysts in the dry pool bottom.

26 Individuals go through the rest of their life cycle while pools are inundated. Inundation
27 triggers some of the dormant cysts to hatch, while other cysts remain dormant as a cyst
28 bank, analogous to the seed bank of annual plants (USFWS 2005). Vernal pool tadpole
29 shrimp hatch from cysts within several days (Ahl 1991). Vernal pool tadpole shrimp may
30 take 3 to 4 weeks to mature, and longer to reproduce (Helm 1998; Ahl 1991; King
31 1996). (However, maturation and reproduction rates of vernal pool crustaceans are
32 controlled by water temperature and can vary greatly.) Vernal pool tadpole shrimp will
33 continue to grow as long as their vernal pool habitats remain inundated, in some cases
34 for 6 months or longer. They periodically shed their shield like shells, which often can be
35 found along the edges of vernal pools where vernal pool tadpole shrimp occur.

36 Vernal pool tadpole shrimp commonly co-occur with the fairy shrimp (*Linderiella*
37 *occidentalis*, *Branchinecta conservatio*, *B. lindahli*, *B. coloradensis*) and the vernal pool
38 fairy shrimp (*B. lynchi*). The midvalley fairy shrimp (*B. mesovallensis*) and longhorn fairy
39 shrimp (*B. longiantenna*) both occur within the range of the vernal pool tadpole shrimp
40 but are typically found in different habitats (USFWS 2005; USFWS 2007c).

1 Threats

2 The vernal pool tadpole shrimp is threatened primarily by the habitat loss and
3 fragmentation resulting from expansion of agricultural and developed land uses. Vernal
4 pool habitat can also be lost or degraded by other activities that damage or puncture the
5 hardpan (i.e., water-restrictive layer underlying the pool) or by activities that destroy or
6 degrade uplands that contribute water to vernal pools. Besides habitat conversion,
7 activities causing such loss or degradation include deep ripping of soils, water diversion
8 or impoundment, and application of pesticides, fertilizers, or livestock wastes. Additional
9 threats are incompatible grazing practices (e.g., overgrazing, undergrazing, or cessation
10 of grazing where it has historically occurred), replacement of native plants by
11 nonnatives, and introduction of fish to vernal pools (Robins and Vollmar 2002; Marty
12 2005; Pyke and Marty 2005; USFWS 2005).

13 Relevant Conservation Efforts and Guidance

14 The vernal pool tadpole shrimp is covered by the Recovery Plan for Vernal Pool
15 Ecosystems of California and Southern Oregon (USFWS 2005). This recovery plan
16 addresses a large number of vernal pool-associated species through an ecosystem
17 approach to recovery that is focused on habitat protection and management.

18 The vernal pool tadpole shrimp is covered under the Natomas Basin, San Joaquin
19 County, Soouth Sacramento, and East Contra Costa County HCPs. In addition, the
20 species is proposed for coverage in the Solano County HCP currently under
21 development.

22 E.4.2 Amphibians

23 *California Tiger Salamander*

24 Legal Status

25 The California tiger salamander (*Ambystoma californiense*) (Central Population) is
26 federally listed as threatened (69 FR 47211, August 4, 2004). In 2010, the California
27 tiger salamander was designated as threatened under CESA. Critical habitat for the
28 central population of California tiger salamander was designated by USFWS on August
29 23, 2005 (70 FR 49379 to 49458). A portion of one unit is located in the Delta, in Solano
30 County at Jepson Prairie.

31 Distribution

32 The California tiger salamander, endemic to California, ranges across the Central Valley
33 and the eastern foothills of the Sierra Nevada from Yolo County (possibly up to Colusa
34 County) south to Kern County, and coastal grasslands from Sonoma County to Santa
35 Barbara County at elevations ranging from approximately 10 to 3,500 feet above mean
36 sea level.

37 California tiger salamander has been detected in the southern Delta near Clifton Court
38 Forebay, and could occur in suitable habitat east of the Delta in Sacramento County
39 and west of the Delta in Solano County.

1 **Relevant Natural History**

2 The California tiger salamander requires vernal pools, ponds (natural or human-made),
3 or semipermanent calm waters (where ponded water is present for at least 10 to 12
4 weeks) for breeding and larval maturation. It also requires adjacent upland areas that
5 contain small mammal burrows or other suitable refugia for aestivation (70 FR 49390,
6 August 23, 2005; USFWS and DFG 2003).

7 Adult California tiger salamanders spend most of their lives underground in small
8 mammal burrows, typically those of California ground squirrel (*Spermophilus beecheyi*)
9 (Loredo et al. 1996). Adults emerge from underground retreats to feed, court, and breed
10 during warm winter rains, typically from November through March. Adults may migrate
11 long distances, up to a half-mile or more, to reach pools for breeding and egg laying
12 (Jennings and Hayes 1994). (Reproduction may not occur in years with suboptimal
13 conditions.) After hatching in approximately 10 to 14 days, the larvae continue to
14 develop in the pools for several months until they metamorphose, which takes 60 to 94
15 days (69 FR 47215, August 4, 2004).

16 Following metamorphosis, juvenile salamanders seek refugia, typically mammal
17 burrows, traveling distances of about 1 mile or more from their breeding sites (Austin
18 and Shaffer 1992), in which they may remain until they emerge during a subsequent
19 breeding season.

20 **Threats**

21 The alteration of either breeding ponds or upland habitat through the introduction of
22 exotic predators (e.g., bullfrogs [*Rana catesbeiana*] and mosquitofish [*Gambusia*
23 *affinis*]) or the construction of barriers that fragment habitat and reduce connectivity
24 (e.g., roads, berms, certain types of fences) can be detrimental to the survival of the
25 California tiger salamander (Jennings and Hayes 1994; Trenham et al. 2001). Other
26 threats include vehicle-related mortality, especially during breeding migrations (Barry
27 and Shaffer 1994), and rodent-control programs, which lead to loss of aestivation
28 habitats (Loredo et al. 1996; USFWS 2017).

29 **Relevant Conservation Efforts and Guidance**

30 In 2017, USFWS released the recovery plan for the Central California Distinct
31 Population Segment (DPS) of the California tiger salamander (USFWS 2017). The
32 recovery strategy includes alleviating the threat of habitat loss and fragmentation
33 through conservation of remaining aquatic and upland habitat for the species.

34 The California tiger salamander is covered under the San Joaquin County, South
35 Sacramento, Yolo and East Contra Costa County HCPs. In addition, the species is
36 proposed for coverage in the Solano County HCP currently under development.

37 **California Red-Legged Frog**

38 **Legal Status**

39 The California red-legged frog (*Rana draytonii*, also known as *R. aurora draytonii*) is
40 federally listed as threatened and is a California species of special concern.

1 USFWS designated critical habitat on March 17, 2010 (75 FR 12816). The Delta does
2 not contain any designated critical habitat. However, if the proposed revision to expand
3 the area of critical habitat becomes final, the Delta would include a small amount of
4 critical habitat in grasslands southwest of Clifton Court Forebay (Unit CCS-2).

5 **Distribution**

6 The California red-legged frog is endemic to California and Baja California, Mexico
7 (USFWS 2002). The species has been extirpated from 70 percent of its former range
8 and now is found primarily in coastal drainages of central California, from Marin County
9 south to northern Baja California, Mexico, and in isolated drainages in the Sierra
10 Nevada, along the north coast, and in the northern Transverse Ranges. Populations
11 remain in approximately 256 streams or drainages in 28 counties. This species is
12 considered extirpated from the valley floor.

13 California red-legged frogs have been recorded on creeks, canals, and seasonal ponds
14 in and within several miles of the southern Delta near Clifton Court Forebay.

15 **Relevant Natural History**

16 California red-legged frogs are aquatic breeders, using ponds, or pond like areas of
17 marshes, creeks and streams, lagoons, and other slow-moving water for breeding and
18 egg deposition. Aquatic breeding habitat does not include deep lacustrine water habitat
19 (e.g., deep lakes and reservoirs 50 acres or larger in size). To be considered essential
20 breeding habitat, the aquatic feature must have the capacity to hold water for a
21 minimum of 20 weeks in all but the driest of years. This is the average amount of time
22 needed for egg and tadpole development and metamorphosis so that juveniles can
23 become capable of surviving in upland habitats (73 FR 53496). Typical habitat
24 characteristics include water depth of at least 2.5 feet, emergent or shoreline
25 vegetation, and absence of competitors or predators, such as bullfrogs (*Rana*
26 *catesbeiana*) and largemouth bass (*Micropterus salmoides*) (Hayes and Jennings 1988).

27 Adults are highly aquatic, but also make use of terrestrial habitat, especially after
28 precipitation events, for nonmigratory forays into adjacent upland habitats and for
29 migratory overland movements to breeding sites. For example, in a study conducted by
30 Bulger et al. (2003) at a coastal site in northern Santa Cruz County, California red-
31 legged frogs typically remained within 16 feet of aquatic habitat during dry periods, but
32 moved into upland habitat as far as 426 feet during summer rains. Overland routes were
33 often highly oriented toward the nearest breeding pond and were typically traversed in
34 direct, point-to-point movements with little to no preference or avoidance toward any
35 particular topography or habitat type. California red-legged frogs were documented to
36 migrate between breeding and nonbreeding aquatic sites at distances up to 2 miles.

37 Breeding typically begins between November and mid-December and lasts through
38 April in most years, but is dictated by winter rainfall (Stebbins 2003; Jennings and
39 Hayes 1994; Bulger et al. 2003). Breeding typically occurs in permanent ponds and may
40 occur in streams where water moves relatively slowly (e.g., pools or backwaters)
41 (Hayes and Jennings 1988) and in ponds that dry in late summer. Typically, the female
42 deposits the mass of eggs on emergent vegetation (Storer 1925; Jennings and Hayes
43 1994); however, breeding has also been documented in ponds that lack emergent

1 vegetation (EBRPD 2007). Larvae typically hatch in 18 to 22 days and metamorphosis
2 is usually completed in 4 to 5 months (EBRPD 2007; Jennings and Hayes 1994). In
3 several documented cases, tadpoles have overwintered, then metamorphosed the
4 following spring (Storer 1925; Fellers et al. 2001; EBRPD 2007). Males and females
5 usually attain sexual maturity at 2 and 3 years, respectively (Jennings and Hayes 1994).

6 **Threats**

7 The most important threats to the California red-legged frog are habitat loss and
8 alteration, introduced predators, water management, mismanagement of grazing
9 livestock, chemical contamination from urban and industrial runoff, and extended
10 drought conditions.

11 **Relevant Conservation Efforts and Guidance**

12 California red-legged frog is covered by the Recovery Plan for the California Red-
13 Legged Frog (*Rana aurora draytonii*) (USFWS 2002). The recovery strategy of this plan
14 is to (1) protect existing populations by reducing threats; (2) restore and create habitat
15 that will be protected and managed in perpetuity; (3) survey and monitor populations
16 and conduct research on the biology of and threats to the subspecies; and (4)
17 reestablish populations of the subspecies within its historic range.

18 The California red-legged frog is covered under the San Joaquin County and East
19 Contra Costa County HCPs. In addition, the species is proposed for coverage in the
20 Solano County HCP currently under development.

21 **E.4.3 Reptiles**

22 ***Giant Garter Snake***

23 **Legal Status**

24 The giant garter snake (*Thamnophis gigas*) is federally and State listed as threatened.
25 The State listed the giant garter snake as threatened on June 27, 1971 (DFG 2008a).
26 USFWS listed the species as federally threatened on October 20, 1993 (58 FR 54053).
27 Critical habitat has not been designated for this species. In June 2020, USFWS
28 published a 5-year review recommending that the species remain listed as threatened
29 (USFWS 2020c).

30 **Distribution**

31 The giant garter snake is endemic to wetlands in the Sacramento and San Joaquin
32 valleys and was historically distributed throughout the San Joaquin Valley (Hansen and
33 Brode 1980). The current distribution extends from near Chico in Butte County south to
34 the Mendota Wildlife Area in Fresno County. Occurrence records indicate that garter
35 snakes are currently distributed in 13 unique population clusters coinciding with
36 historical flood basins, marshes, wetlands, and tributary streams of the Central Valley
37 (Hansen and Brode 1980; Brode and Hansen 1992; USFWS 1999a). These populations
38 are isolated, without protected dispersal corridors to other adjacent populations, and are
39 threatened by land use practices and other human activities, including development of
40 wetland and suitable agricultural habitats.

1 No occurrences of giant garter snakes are known from the northern portion of the San
2 Joaquin Valley north to the eastern fringe of the Delta, where the floodplain of the San
3 Joaquin River is limited to a relatively narrow trough (Hansen and Brode 1980). The
4 resulting gap of approximately 62 miles separates the southern and northern
5 populations, with no giant garter snakes known from the lowland regions of Stanislaus
6 County (Hansen and Brode 1980; CNDDDB 2020). Scattered records within the Delta
7 suggest that giant garter snakes may have occupied this region at one time, but
8 longstanding reclamation of wetlands for intense agricultural applications has eliminated
9 most suitable habitat (Hansen 1986). Recent records within the Delta are haphazard,
10 and repeated surveys at focused locations within the Delta have failed to identify any
11 extant population clusters in the region (Hansen 1986; Patterson and Hansen 2002;
12 Patterson 2005); however, the entire Delta has not been systematically surveyed.

13 Recent or historic records of giant garter snake have been documented in the Delta. In
14 2017, seven giant garter snakes were observed on each of two consecutive days
15 basking among the rip-rap along the north shore of Jersey Island and in a recent
16 trapping study started in 2018, a single young male giant garter snake was captured on
17 Sherman Island. Although recent findings demonstrate that giant garter snake is extant
18 in the Yolo Basin (Hansen 2007; Wylie et al. 2003; Wylie et al. 2004; Wylie and
19 Amarello 2006), and potentially in other areas within or near the Delta, repeated
20 attempts to assess local distribution have not been successful. There is concern that
21 isolated populations may be subject to greater risk of extirpation (USFWS 2006b).

22 **Relevant Natural History**

23 The giant garter snake resides in marshes, ponds, sloughs, small lakes, low gradient
24 streams, and other waterways, and in agricultural wetlands, including irrigation and
25 drainage canals, rice fields, and the adjacent uplands (58 FR 54053, October 20, 1993).
26 Habitat requirements include (1) adequate water during the snake's active season (early
27 spring through midfall) to provide food and cover; (2) emergent, herbaceous wetland
28 vegetation, such as cattails (*Typha* spp.) and bulrushes (*Schoenoplectus* spp.),
29 accompanied by vegetated banks for escape cover and foraging habitat during the
30 active season; (3) basking habitat of grassy banks and openings in waterside
31 vegetation; and (4) higher elevation uplands for cover and refuge from floodwaters
32 during the snake's dormant season in the winter (Hansen and Brode 1980; Hansen
33 1998; USFWS 2006c). It feeds primarily on small fish, tadpoles, and frogs. In some rice-
34 growing areas, giant garter snakes have adapted well to vegetated, artificial waterways
35 and associated rice fields (Hansen and Brode 1993). The giant garter snake resides in
36 small mammal burrows and soil crevices located above prevailing flood elevations
37 throughout its winter dormancy period (USFWS 2006c). Burrows are typically located in
38 sunny exposures along south- and west-facing slopes.

39 Giant garter snakes may hibernate up to 800 feet from water, and along waterways they
40 may move considerable distances (e.g., up to 2 miles in a single day) (Hansen 1988;
41 USFWS 2006c). Consequently, the size of their home ranges varies widely. Data based
42 on radiotelemetry studies show that home range varies by location, with home range
43 estimates varying from 10 to 203 acres in a seminative perennial marsh system and
44 from 3 to 2,792 acres in a managed refuge (USFWS 1999a).

1 Owing to lack of habitat and emergent vegetative cover, giant garter snakes generally
2 are not present in larger rivers and wetlands with sand, gravel, or rock substrates. In
3 addition, the major rivers have been highly channelized, removing oxbows and
4 backwater areas that probably at one time provided suitable habitat. Riparian
5 woodlands can provide suitable habitat, but this is not likely because most have
6 excessive shade, lack of basking sites, and absence of prey populations. Giant garter
7 snake is also usually absent from most permanent waters that support established
8 populations of predatory game fishes and from sites that undergo routine dredging,
9 mechanical or chemical weed control, or compaction of bank soils (Hansen and Brode
10 1980; Rossman and Stewart 1987; Brode 1988; USFWS 1999a; USFWS 2006c).

11 Giant garter snakes are less active or dormant from October until April, when they
12 emerge to breed and forage (Wylie et al. 1997). They give birth to live young from late
13 July through early September (Hansen and Hansen 1990).

14 Giant garter snakes are vulnerable to predation from both native species (e.g.,
15 raccoons, egrets, herons) and nonnative species (e.g., bullfrogs, feral cats) (58 FR
16 54053 to 54065, October 20, 1993). Predation may be the reason that giant garter
17 snakes tend to be absent from larger rivers that support predatory fish (Hansen and
18 Brode 1980). They are also affected by parasites and contaminants.

19 **Threats**

20 Giant garter snake is threatened primarily by habitat conversion, fragmentation, and
21 degradation resulting from urban development (58 FR 54053 to 54065, October 20,
22 1993). Human disturbance contributes to habitat degradation because giant garter
23 snakes are diurnal predators that are disturbed by human activities. It is also threatened
24 by incompatible agricultural practices such as intensive vegetation control along canal
25 banks and changes in crop composition.

26 **Relevant Conservation Efforts and Guidance**

27 Conservation efforts for the giant garter snake have included restoration efforts on
28 wildlife refuges and through mitigation banking. With the continued loss of habitat within
29 the range of the species, the snake has become increasingly dependent on 10 refuges
30 and wildlife management areas in the Central Valley (Czech 2006).

31 Hundreds of acres in the California refuge system are known to be occupied by the
32 giant garter snake; however, thousands of acres of apparently suitable habitat in the
33 refuge system are currently unoccupied (Czech 2006). This suggests that factors such
34 as winter flooding and predation (especially by nonnative species such as bullfrogs)
35 may be limiting this species' presence in some areas. The giant garter snake prefers
36 summer flooding and winter drying; properties in the Central Valley refuge system are
37 likely managed intensively for wintering waterfowl with a reversed water regime,
38 resulting in habitat features that are problematic for conservation of the giant garter
39 snake. These opposing requirements suggest that separate conservation areas for the
40 snake are necessary. In 1995, the Colusa National Wildlife Refuge acquired 449 acres
41 of fallow rice fields, and efforts to restore the ecological integrity have proven beneficial
42 to the snake (Czech 2006).

1 Other wetland conservation efforts can also prove beneficial to giant garter snake under
2 appropriate management regimes. Conservation of Central Valley wetlands occurs
3 through a combination of publicly and privately managed refuges, mitigation banks, and
4 duck clubs, which create a large network of wetland preserves throughout the historical
5 range of the giant garter snake. A large percentage of these wetland conservation
6 efforts, however, are geared toward waterfowl management, often placing greater
7 emphasis on winter water than on the summer water upon which giant garter snakes
8 depend (USFWS 1999a). With proper consideration given to design, location, and
9 management, these efforts might also substantially benefit the giant garter snake and
10 other wetland-dependent species (USFWS 1999a).

11 The giant garter snake is covered by the Draft Recovery Plan for the Giant Garter
12 Snake (USFWS 2015). The giant garter snake is covered under the San Joaquin
13 County, East Contra Costa County, South Sacramento, and Yolo HCPs. In addition, the
14 species is proposed for coverage in the Solano County HCP currently under
15 development.

16 **E.4.4 Birds**

17 ***Tricolored Blackbird***

18 **Legal Status**

19 The tricolored blackbird (*Agelaius tricolor*) is currently listed as threatened under the
20 California Endangered Species Act. The tricolored blackbird has no federal regulatory
21 status; however, the species is protected under the federal Migratory Bird Treaty Act
22 and is designated as a Bird of Conservation Concern by the U.S. Fish and Wildlife
23 Service (USFWS) (U.S. Fish and Wildlife Service 2002). A petition for federal listing
24 under the Endangered Species Act was submitted to USFWS in 2015, but the petition
25 was denied in 2019.

26 **Distribution**

27 The tricolored blackbird is a colonial nesting passerine bird that is largely restricted to
28 California. The species forms some of the largest colonies of any North American
29 passerine bird, which may number in the tens of thousands of breeding pairs. Most of
30 the California breeding population of tricolored blackbird occurs in the Central Valley;
31 breeding also occurs in the foothills of the Sierra Nevada south to Kern County, the
32 coastal slopes from Sonoma County to the Mexican border, and sporadically in the
33 Modoc Plateau. Wintering tricolored blackbirds often form huge, mixed species flocks
34 that forage across the landscape. The Delta is recognized as major wintering areas for
35 tricolored blackbirds (RHJV 2004). Tricolored blackbirds may make extensive
36 movements during the breeding season and during winter. While the overall range of
37 the tricolored blackbird has been largely unchanged since the 1930s (Neff 1937; Beedy
38 et al. 1991), large gaps now exist in the species' former range.

39 **Relevant Natural History**

40 Tricolored blackbirds have three basic requirements for selecting their breeding colony
41 sites: 1) Open, accessible water; 2) A protected nesting substrate, including flooded,

1 thorny, or spiny vegetation; and 3) A suitable foraging space providing adequate insect
2 prey within five miles of the nesting colony (Beedy and Hamilton 1997).

3 The species typically nests in large, dense colonies twice per season, with the second
4 attempt often in a different, more northerly location. The first nests in a colony generally
5 occur in the densest vegetation, usually in the interior of the nesting habitat. Nest
6 heights range from a few centimeters to about 1.5 meters above water or ground at
7 colony sites in freshwater marshes (Neff 1937), and up to 3 meters in the canopies of
8 willows (*Salix* spp.) and other riparian trees; nests are rarely built on the ground. Over
9 time, the selection of nesting habitat has changed dramatically as freshwater marsh
10 habitat has been removed. Some of the largest recent colonies are in silage and grain
11 fields (Beedy and Hamilton 1997; Hamilton 2000), particularly triticale (a wheat-rye
12 hybrid) fields in the San Joaquin Valley (Kyle and Kelsey 2011).

13 **Threats**

14 The most significant historical and ongoing threat to the tricolored blackbird is habitat
15 loss and alteration. The initial conversion from native landscapes to agriculture removed
16 vast wetland areas in the state and caused initial declines in populations. The more
17 recent conversion of suitable agricultural lands to urban areas has permanently
18 removed historical breeding and foraging habitat for this species. In urbanizing areas,
19 habitat fragmentation and proximity to human disturbances has also led to
20 abandonment of large historical colonies (Beedy and Hamilton 1997).

21 Entire colonies (up to tens of thousands of nests) in cereal crops and silage are often
22 destroyed by harvesting and plowing of agricultural lands (Beedy and Hamilton 1997;
23 Hamilton 2004; Cook and Toft 2005). While adult birds can fly away, eggs and
24 fledglings cannot. The concentrations of a high proportion of the known population in a
25 few breeding colonies increases the risk of major reproductive failures, especially in
26 vulnerable habitats such as active agricultural fields. Other major threats to Tricolored
27 blackbird colonies include human disturbances, predation, and exposure to toxins and
28 contaminants.

29 **Relevant Conservation Efforts and Guidance**

30 The Tricolored Blackbird Working Group was established specifically to address the
31 conservation of the tricolored blackbird across the state. In 2007, the group prepared a
32 conservation strategy for this species (Tricolored Blackbird Working Group 2007). The
33 tricolored blackbird is also a covered species in regional conservation plans, including
34 the approved San Joaquin County Multi-Species Habitat Conservation and Open Space
35 Plan (San Joaquin Council of Governments 2000), the East Contra Costa County
36 Habitat Conservation Plan/Natural Community Conservation Plan (East Contra Costa
37 County 2006), the Natomas Basin Habitat Conservation Plan (Natomas Basin
38 Conservancy 2003), South Sacramento Habitat Conservation Plan (Sacramento County
39 et al. 2018), and Yolo Habitat Conservation Plan/Natural Community Conservation Plan
40 (Yolo Habitat Conservancy 2018). It is proposed to be covered under the the Solano
41 Multispecies Habitat Conservation Plan (Solano County Water Agency 2009) and the
42 Butte Regional Conservation Plan (Butte County Association of Governments 2011).

1 **Golden Eagle**

2 **Legal Status**

3 Golden eagle (*Aquila chrysaetos*) is a fully protected species under the California Fish
4 and Game Code Section 3511 and is protected under the federal Bald Eagle and
5 Golden Eagle Protection Act. The fully protected status confers greater protection than
6 State listing, which has provisions for take of listed species. Fully protected species may
7 not be taken or possessed at any time, and no licenses or permits may be issued for
8 their take except for collecting these species for necessary scientific research and
9 relocation of the bird species for the protection of livestock. Most fully protected species
10 have also been listed as threatened or endangered species under the State endangered
11 species laws and regulations; however, several species, including golden eagle, remain
12 only on the fully protected list.

13 **Distribution**

14 The golden eagle is a regular breeder in the western half of North America from Alaska
15 south to Baja California (Kochert et al. 2002). California breeders remain in the state
16 year round, and birds from northern states migrate south for the winter, including into
17 California. The golden eagle is a resident breeder and migrant in oak woodlands and
18 savannah immediately west of the Delta and Suisun Marsh (Zeiner et al. 1990a), and
19 could forage in grasslands around the Delta and Suisun Marsh year round.

20 **Relevant Natural History**

21 Golden eagles favor open grasslands, foothills, and mountain terrain. They nest on cliffs
22 and large oaks, sycamores, pines and other trees in open areas in areas with good prey
23 availability, especially where updrafts are common, which aid in soaring. Breeding
24 territories are typically large and found at low densities across the landscape (e.g.,
25 average territory size of 48 square miles in Northern California (Zeiner et al. 1990a),
26 however, some of the highest breeding densities for this species (about 7 square miles
27 per territory) are found in eastern Contra Costa County (Hunt et al. 1998).

28 Golden eagles prey mostly on rabbits and rodents, but also take other small animals
29 and some carrion (Zeiner et al. 1990a).

30 **Threats**

31 Threats to golden eagles include direct sources such as trauma from collisions with
32 wind power turbines and power lines and indirect sources such as lead poisoning
33 (Kochert et al. 2002). Disturbance at nests and loss of habitat to human encroachment
34 are other sources of threats.

35 **Relevant Conservation Efforts and Guidance**

36 Conservation efforts in the Delta and Suisun Marsh region are mostly focused on
37 attempts to design wind power turbines that kill fewer raptors, and designing power
38 poles that reduce electrocution risk. Public lands are managed to minimize nest
39 disturbance during the breeding season. Golden eagles are covered under the Eastern
40 Contra Costa County HCP and the San Joaquin County MSCP.

1 **Swainson's Hawk**

2 **Legal Status**

3 The Swainson's hawk (*Buteo swainsoni*) is listed as a threatened species under CESA
4 (California Fish and Game Code, Section 2050 et seq.). The species was listed by the
5 California Fish and Game Commission in 1983.

6 The Swainson's hawk has no federal regulatory status; however, the species is included
7 on the USFWS list of Birds of Conservation Concern for Region 1. Species included on
8 this list are those that USFWS considers potential candidates for federal listing. Critical
9 habitat has not been designated for the Swainson's hawk.

10 **Distribution**

11 Swainson's hawks nest in the grassland plains and agricultural regions of western North
12 America from southern Canada (and possibly in the northern provinces and territories,
13 and Alaska) to northern Mexico. Other than a few documented small wintering
14 populations in the United States (Herzog 1996; England et al. 1997), most Swainson's
15 hawks winter primarily in the Pampas region of Argentina. The Central Valley population
16 winters mainly between Mexico and central South America (FOSH 2011), with a small
17 population that remains in the Delta (Herzog 1996).

18 Early accounts described Swainson's hawk as one of the most common raptors in
19 California, occurring throughout much of lowland California, specifically the Central
20 Valley, coastal valleys, Southern California deserts, and Great Basin deserts east of the
21 Sierra Nevada (Sharp 1902). Although the species has successfully adapted to certain
22 agricultural landscapes, other habitat loss has caused a substantial reduction in the
23 breeding range and in the size of the breeding population in California (DFG 1980;
24 England et al. 1997). Current breeding populations occur primarily in the Central Valley,
25 but also in the Klamath Basin, the northeastern plateau, the Owens Valley, and rarely in
26 the Antelope Valley (Grinnell and Miller 1944; DFG 1980; DFG 2007).

27 More than 60 percent of the Statewide Swainson's hawk population occurs within
28 Sacramento, San Joaquin, Solano, and Yolo counties (DFG 2007). Although intensively
29 farmed for more than 100 years, much of this area retains a relative abundance of
30 nesting habitat—narrow riparian corridors along rivers and streams, remnant oak groves
31 and trees, roadside trees—and an agricultural pattern that is conducive to Swainson's
32 hawk foraging. Thus, the species is relatively common in the central portion of the
33 Central Valley (Estep 2007; Estep 2008; DFG 2007).

34 A fairly dense nesting population of Swainson's hawk occurs in or near the northern and
35 southern portions of the Delta (north of SR-12 and south of SR-4, respectively). These
36 areas support a relatively abundant potential nesting habitat and an agricultural
37 landscape that is suitable for Swainson's hawk foraging. In the northern portion, nest
38 sites are distributed mainly east of the Deep Water Ship Channel in areas that support
39 mainly annually rotated irrigated agricultural lands, hayfields, and irrigated pasturelands,
40 and that include an abundance of potential nesting habitat, including riparian
41 woodlands, roadside trees, tree rows, and isolated trees. The area immediately west of
42 the Deep Water Ship Channel and the area immediately north of SR-12 support few
43 potential nest trees, and thus fewer known nest sites. Similarly, the area south of SR-4

1 also supports a dense nesting population. The agricultural landscape in this area
2 includes an abundance of alfalfa hay and annually rotated irrigated cropland and many
3 potential nest trees, mostly along riparian corridors and roadside tree rows. Areas that
4 lack nest sites typically also lack sufficient nest trees to support many nesting pairs.

5 The central Delta, the region between SR-12 and SR-4, supports fewer Swainson's
6 hawk nests than the northern and southern areas. The agricultural landscape in the
7 central Delta provides generally suitable foraging habitat for Swainson's hawks,
8 although probably less of the high-value types of cover; the lack of nest sites is likely
9 primarily associated with the lack of suitable nest trees in this area. However, it should
10 also be noted that the survey effort has not been as extensive in the Central Delta as
11 elsewhere in the Delta, and this may contribute in part to the lack of reported nesting
12 territories in that area.

13 **Relevant Natural History**

14 Throughout much of its range, both in North and South America, the Swainson's hawk
15 inhabits grasslands, prairies, shrub-steppes, and agricultural landscapes, including dry
16 and irrigated row crops, alfalfa fields and hayfields, pastures, and rangelands. They nest
17 in trees most often in riparian woodlands and farm shelterbelts (England et al. 1997), as
18 well as in urban/suburban areas with large trees adjacent to suitable foraging habitat
19 (James 1992; England et al. 1995). Suitable nest trees are usually deciduous and tall
20 (up to 100 feet); in suburban/urban areas, however, most nest trees are conifers
21 (England et al. 1995; England et al. 1997). In the Central Valley, Swainson's hawks
22 usually nest in large native trees such as valley oak (*Quercus lobata*), cottonwood
23 (*Populus fremontia*), walnut (*Juglans hindsii*), and willow (*Salix* spp.), and occasionally
24 in nonnative trees, such as eucalyptus (*Eucalyptus* spp.). Nests occur in riparian
25 woodlands, roadside trees, trees along field borders, isolated trees, small groves, and
26 on the edges of remnant oak woodlands. Stringers of remnant riparian forest along
27 drainages contain most of the known nests in the Central Valley (DFG 1984; Schlorff
28 and Bloom 1984; England et al. 1997). However, this appears to be a function of nest
29 tree availability rather than dependence on riparian forest.

30 Swainson's hawks are essentially plains or open-country hunters, and they require large
31 areas of open landscape for foraging. Historically, the species used the grasslands of
32 the Central Valley and other inland valleys. With substantial conversion of these
33 grasslands to farming operations, Swainson's hawks have shifted their nesting and
34 foraging into those agricultural lands that provide low, open vegetation for hunting and
35 high populations of rodents for prey. Fields lacking adequate prey populations, such as
36 flooded rice fields, or those that are inaccessible to foraging birds, such as vineyards
37 and orchards, are rarely used (DFG 1989; Babcock 1995; Swolgaard 2003). Meadow
38 vole (*Microtus californicus*) is the principal prey item taken by Swainson's hawks in the
39 Central Valley (DFG 1989).

40 The value of foraging habitat is a function of three factors: patch size (Swainson's
41 hawks are sensitive to fragmented landscapes, and their use of a field will decline as
42 suitable patch size decreases); prey accessibility (the ability of hawks to access prey
43 depends on the structure of the vegetation and on land management activities); and
44 prey availability, which refers to the abundance of prey populations in a field. Data on

1 minimum foraging-patch size are largely anecdotal, but are generally thought to be
2 between 5 and 25 acres (Estep and Teresa 1992; DFG 1994). In the Central Valley,
3 agricultural land use or specific crop type determine the foraging value of a field at any
4 given time.

5 Important land cover or agricultural crops for foraging are alfalfa and other hay, grain,
6 and row crops; bare fallow fields; dry land pasture; and annual grasslands. The matrix
7 of these cover types across a large area creates a dynamic foraging landscape as
8 temporal changes in vegetation result in changing foraging patterns and foraging ranges.

9 Hay crops, particularly alfalfa, provide the highest value because vegetation is low,
10 resulting in high prey accessibility; prey populations are relatively large, resulting in high
11 prey availability; and farming operations (e.g., weekly irrigation and monthly mowing
12 during the growing season) enhance prey accessibility. Most row and grain crops are
13 planted in winter or spring and have foraging value while the vegetation remains low,
14 but become less suitable as vegetative cover and density increases. During harvest,
15 vegetation cover is eliminated while prey populations are highest, substantially
16 enhancing habitat suitability for the Swainson's hawk during this period. Some crop
17 types, such as rice, orchards, and vineyards, provide little to no value because
18 accessibility is reduced and prey populations are relatively low on lands that support
19 these crop types.

20 Immediately upon arrival in breeding territories, breeding pairs begin constructing new
21 nests or repairing old ones. One to four eggs are laid in mid-April to late April, and a 30-
22 to 34-day incubation period follows. Nestlings begin to hatch by mid-May, with an
23 approximately 20-day brooding period following. The young remain in the nest until they
24 fledge 38 to 42 days after hatching (England et al. 1997). Studies conducted in the
25 Sacramento Valley indicate that one or two, and occasionally three, young typically
26 fledge from successful nests.

27 The rate of young fledged per nest in the Central Valley is among the lowest recorded in
28 the species' entire range. This geographic difference in reproductive success may be
29 related to the dietary reliance of Central Valley Swainson's hawks on small voles, which
30 when consumed may not provide enough energy to meet the high demands of breeding
31 adults and developing young; in other locations the hawks' diets include a higher
32 proportion of gophers, rabbits, ground squirrels, and other larger mammals. The
33 difference may also be caused by the energy demands on hawks from foraging in the
34 Central Valley's dynamic agricultural landscape; birds must travel long distances to
35 forage at times when growth of vegetation in agricultural fields reduces available
36 foraging habitat near nests.

37 This species is also highly responsive to farming activities that expose and concentrate
38 prey, such as cultivating, harvesting, and disking. During these activities, particularly
39 late in the season, Swainson's hawks will hunt behind tractors, searching for exposed
40 prey. Other activities, such as flood irrigation and burning, also expose prey and attract
41 foraging Swainson's hawks.

1 Threats

2 Threats to Swainson's hawk include loss and fragmentation of foraging habitat, loss of
3 nesting habitat, disturbance of nests, and pesticide poisoning in wintering habitat (DFG
4 2005).

5 Conversion from compatible to incompatible crop patterns reduces available foraging
6 habitat and influences the distribution of nesting Swainson's hawks. Large regions of
7 the Central Valley that have been converted to rice, vineyards, orchards, cotton, and
8 other incompatible crop types support few nesting Swainson's hawks. The continued
9 conversion of suitable agricultural landscapes (e.g., annually rotated irrigated cropland,
10 hayfields, and pasturelands) to vineyards and other unsuitable cover types continues to
11 reduce available foraging habitat locally and regionally.

12 Loss of riparian and other nesting habitat continues throughout the Central Valley from
13 levee projects, agricultural practices, and local development along watercourses. A
14 related issue is the loss and lack of regeneration of valley oak and other native trees.
15 This is an ongoing problem in areas that have continued to support remnant valley oaks
16 and oak groves. Nesting habitat continues to decline as these trees and small groves
17 die off or are removed and not replaced through natural regeneration or replanting.

18 Relevant Conservation Efforts

19 Conservation efforts have focused on developing and implementing HCPs and natural
20 community conservation plans. These regional conservation approaches can be an
21 effective tool to managing and sustaining Swainson's hawk populations if sufficient
22 suitable landscape is preserved (Estep and Teresa 1992).

23 Several HCPs cover Swainson's hawk, among them the Natomas Basin HCP, the San
24 Joaquin County HCP, the South Sacramento, Yolo, and the East Contra Costa County
25 HCP. In addition, the species is proposed for coverage in the Solano County HCP
26 currently under development.

27 **Western Snowy Plover**

28 Legal Status

29 The western snowy plover (*Charadrius alexandrinus nivosus*) Pacific coast population is
30 federally listed as threatened; the interior population is a California species of special
31 concern. Critical habitat has been designated for the Pacific coast population western
32 snowy plover; however, there is none designated in, or east of, San Francisco and San
33 Pablo bays; therefore, there is none in the DP Planning Area.

34 Distribution

35 The Pacific coast population of western snowy plover is defined by USFWS as those
36 individuals that nest adjacent to tidal waters of the Pacific Ocean, including all nesting
37 birds on the mainland coast, peninsulas, offshore islands, adjacent bays, estuaries, and
38 coastal rivers (USFWS 2010b). DFG's description of the interior population of western
39 snowy plover includes those individuals breeding in California's Central Valley. Western
40 snowy plovers breed irregularly in the Central Valley; however, there are several historic
41 (1960s to 1970s) and more recent (1998, 2006) extralimital breeding records from Yolo

1 County, including from the Yolo Bypass Wildlife Area in 2006 (Shuford et al. 2008). The
2 western snowy plovers that occasionally breed in the Delta (i.e., estuarine) portions of
3 the DP Planning Area meet the definitions of the Pacific coastal (USFWS) and interior
4 (DFG) populations.

5 **Relevant Natural History**

6 Pacific coast plovers typically forage for small invertebrates in wet or dry beach-sand,
7 among tide-cast kelp, and in low foredune vegetation. Some plovers use dry salt ponds
8 and river gravel bars. The breeding season in the United States extends from March 1
9 through September 30, although courtship activities have been observed during
10 February. Clutches are laid in shallow scrapes or depressions in the sand. Snowy
11 plover chicks are precocial, leaving the nest within hours after hatching to search for
12 food. Males attend the young until they fledge, which takes approximately 1 month.
13 Females generally assist the male in caring for the last brood of the season. Adult
14 plovers do not feed their chicks; rather, they lead them to suitable feeding areas
15 (USFWS 2010b).

16 In the interior of California, western snowy plovers breed on flat, barren to sparsely
17 vegetated land, often on the shores of alkaline and saline lakes, such as those found in
18 the southern San Joaquin Valley and east of the crest of the Sierra Nevada. They will
19 also breed next to agricultural and wastewater treatment ponds. Western snowy plover
20 forage on terrestrial and aquatic invertebrates (Shuford et al. 2008).

21 **Threats**

22 Threats to western snowy plover include human-caused changes of water levels during
23 the breeding season, elevated levels of heavy metals, and disturbance at nest sites
24 (Shuford et al. 2008).

25 **Relevant Conservation Efforts and Guidance**

26 USFWS published a recovery plan for the Pacific coast population of western snowy
27 plover in 2007.

28 ***Western yellow-billed cuckoo***

29 **Legal Status**

30 The western yellow billed cuckoo (*Coccyzus americanus occidentalis*) is federally listed
31 as threatened and State listed as endangered. Critical habitat has been proposed for
32 this species but has not been formally adopted yet.

33 **Distribution**

34 The range of western yellow-billed cuckoo historically extended from southern British
35 Columbia to the Rio Grande River in northern Mexico, and east to the Rocky Mountains.
36 Currently, the only known populations of breeding western yellow-billed cuckoo are in
37 several disjunct locations in California, Arizona, and western New Mexico. Yellow-billed
38 cuckoos winter in South America from Venezuela to Argentina after a southern
39 migration that extends from August to October. They migrate north in late June and
40 early July.

1 Most riparian corridors in the Delta do not support sufficiently large riparian patches for
2 cuckoo breeding; however, the species likely continues to migrate along the
3 Sacramento River and other drainages to northern breeding sites in the Sutter Basin
4 and Butte County.

5 **Relevant Natural History**

6 The yellow-billed cuckoo is a riparian obligate species. Its primary habitat association is
7 willow-cottonwood riparian forest, but other tree species such as white alder (*Alnus*
8 *rhombifolia*) and boxelder (*Acer negundo*) may be an important habitat element in some
9 areas, including occupied sites along the Sacramento River. Nests are primarily in
10 willow (*Salix* spp.) trees; however, other tree species are occasionally used, including
11 Fremont cottonwood (*Populus fremontii*) and alder.

12 While yellow-billed cuckoos nest primarily in willow trees, Fremont cottonwood) trees
13 are important foraging habitat, particularly as a source of insect prey. Studies indicate a
14 highly significant association with relatively expansive stands of mature cottonwood-
15 willow forests; however, yellow-billed cuckoos will occasionally occupy a variety of
16 marginal habitats. Continuing habitat succession has also been identified as important
17 in sustaining breeding populations. Meandering streams that allow for constant
18 erosional and depositional processes create habitat for new rapidly growing young
19 stands of willow, which create preferred nesting habitat conditions for western yellow-
20 billed cuckoo. Lateral channel migration and point bar deposition that create new
21 floodplains and channel bend cut-offs that create floodplain lakes are important
22 processes that create viable western yellow-billed cuckoo habitat.

23 **Threats**

24 Historical declines of the western yellow-billed cuckoo are attributed to the removal of
25 riparian forests in California for agricultural and urban expansion. Habitat loss and
26 degradation continue to be the most significant threats to remaining populations. Habitat
27 loss continues as a result of bank stabilization and flood control projects, urbanization
28 along edges of watercourses, agricultural activities, and river management that alter
29 flow and sediment regimes.

30 **Relevant Conservation Efforts and Guidance**

31 Efforts to protect and restore riparian systems can potentially preserve or create habitat
32 for this species. Some regional habitat conservation planning efforts may provide
33 protections, primarily through protection of existing occupied habitat. Western yellow-
34 billed cuckoo is a covered species in some regional conservation plans including the
35 approved San Joaquin County Multi-Species Habitat Conservation and Open Space
36 Plan, and the proposed Butte Regional Conservation Plan and Yolo County Habitat
37 Conservation Plan/Natural Community Conservation Plan.

38 **White-tailed Kite**

39 **Legal Status**

40 The white-tailed kite (*Elanus leucurus*) is a fully protected species under the California
41 Fish and Game Code Section 3511 and is protected under the federal Migratory Bird
42 Treaty Act. Most fully protected species have also been listed as threatened or

1 endangered species under the State endangered species laws and regulations;
2 however, several species, including white-tailed kite, remain only on the fully protected
3 list. The white-tailed kite has no federal regulatory status and therefore no critical habitat
4 has been designated for the white-tailed kite.

5 **Distribution**

6 The white-tailed kite is a resident of lowland areas west of the Sierra Nevada, including
7 coastal valleys and foothills, from the head of the Sacramento Valley south to western
8 San Diego County at the Mexico border. It is common to uncommon and a year-round
9 resident in the Central Valley, in other lowland valleys, and along the entire length of the
10 coast (Dunk 1995). Although white-tailed kite is probably resident through most of its
11 breeding range, dispersal occurs during the nonbreeding season, leading to a winter
12 range expansion that includes most of California (Dunk 1995).

13 White-tailed kite is distributed throughout the Delta, although relatively few nesting
14 locations have been documented. CNDDDB reports only six locations within the Delta.
15 Recent surveys in Yolo and Sacramento counties have documented active nest sites in
16 riparian habitats in the Yolo Bypass and along Steamboat and Georgiana sloughs and
17 along the Sacramento River (Estep 2007; Estep 2008). Most nesting habitat for kites in
18 the Delta consists of riparian woodlands and scrub along large and small drainages.
19 Nesting distribution is limited by the dearth of suitable trees in much of the central Delta,
20 and nesting density in that area is likely substantially lower than that found in the
21 northern and southern portions of the Delta. However, overall, the species is likely
22 underrepresented by reported occurrences throughout the Delta. Most of the Delta,
23 including grassland, seasonal wetland, and agricultural cover types, is potential foraging
24 habitat for kites.

25 **Relevant Natural History**

26 The white-tailed kite inhabits low-elevation, open grasslands, savanna-like habitats,
27 agricultural areas, wetlands, and oak woodlands (Dunk 1995). They usually nest in
28 trees with a dense canopy, but nest trees can vary from single, isolated trees to trees
29 within large woodlands. Habitat elements that influence nest site selection and nesting
30 distribution include habitat structure (usually a dense canopy) and prey abundance and
31 availability (primarily the association with meadow vole), whereas the association with
32 specific vegetation types (e.g., riparian, oak woodland) appears less important
33 (Erichsen 1995; Dunk 1995).

34 The peak breeding season occurs from May through August but can start as early as
35 January and may continue until October (Dunk 1995). The nest is usually placed near
36 the top of a dense oak, willow, or other tree. Females typically lay a clutch of four eggs,
37 with a range of three to six. The female incubates exclusively and performs most
38 brooding while the male provisions the female and nestlings. Eggs are incubated for
39 approximately 28 days. Young fledge in 35 to 40 days following hatching, with the peak
40 fledging period occurring in June (Erichsen 1995).

41 The white-tailed kite preys mostly on voles but also takes other small, diurnal mammals
42 and occasionally birds, insects, reptiles, and amphibians. Small mammal prey
43 comprises 95 percent of the kite diet (Dunk 1995). It forages in undisturbed, open

1 grasslands, meadows, farmlands and emergent wetlands, ungrazed grasslands, fence
2 rows and irrigation ditches adjacent to grazed lands (Dunk 1995). Cover types that
3 appear to be preferred include alfalfa and other hay crops, irrigated pastures, and some
4 cultivated habitats, particularly sugar beets and tomatoes, both of which can support
5 relatively large populations of voles (DFG 1989) and that have been highly correlated
6 with kite nest site densities (Erichsen et al. 1994). Kites also forage in dry pastures,
7 annual grasslands, rice stubble fields, and occasionally in orchards (Erichsen 1995).

8 **Threats**

9 The primary threat to the white-tailed kite is habitat loss, fragmentation, and degradation
10 (Dunk 1995). In the Central Valley, loss of nest trees and human disturbance of nest
11 sites have degraded habitat. Although there are examples of kites nesting and roosting
12 in urban areas, in general, the species is intolerant of noise and human activities and
13 will abandon nesting areas that are subject to increasing levels of human disturbances.
14 Kites are also sensitive to habitat fragmentation. Low-density urbanization or isolation of
15 habitats, even if relatively large patches remain undisturbed, also leads to territory
16 abandonment.

17 **Relevant Conservation Efforts and Guidance**

18 Few conservation efforts have been undertaken to conserve white-tailed kite
19 populations. The lack of State or federal listing limits the extent of regulatory influence.
20 There remain several significant data gaps regarding population status and trends,
21 migration, dispersal from nesting sites, and other aspects of annual movements.

22 Protection typically occurs at the local project level pursuant to the California
23 Environmental Quality Act. Although project-level mitigation may address protection of
24 active sites and avoidance of take of this fully protected species, it does not address
25 conservation or protection at a regional level.

26 ***American Peregrine Falcon***

27 **Legal Status**

28 The American peregrine falcon (*Falco peregrines anatum*) was listed as an endangered
29 species under both the federal Endangered Species Act and California Endangered
30 Species Act in 1973 and 1971. The species was federally delisted 1999 and state
31 delisted in 2009. The peregrine is still considered a state fully-protected species.

32 **Distribution**

33 The peregrine falcon is one of the most widely spread bird species, found on all
34 continents except Antarctica. The subspecies breeding in California (*F. p. anatum*) is
35 found throughout North America south of the tundra, excluding the coastal Pacific
36 Northwest. It is an uncommon breeder in California though active nesting sites are found
37 along the coast north of Santa Barbara, in the Sierra Nevada, and in other mountains of
38 Northern California (DFG 2008b). During migration and in winter it is found inland
39 throughout the Central Valley. It was more common historically throughout its range.

1 **Relevant Natural History**

2 The peregrine prefers areas with cliffs for nesting but has adapted to human-made
3 structures, including bridges, buildings, and power lines and occasionally uses tree
4 snags, cavities, or old nests of other raptors. It breeds early March to late August. For
5 foraging it prefers open areas with good vantage points for perching, usually near water.
6 Its prey is almost exclusively birds, primarily waterbirds and pigeons, which it typically
7 captures in the air from a steep swift dive from above.

8 **Threats**

9 Beginning in the 1940s, widespread and long-term use of organochlorine pesticides in
10 agriculture and forestry, particularly DDT in North America, caused eggshell thinning
11 and embryo deformities in peregrine falcons. At its lowest, the population had been
12 reduced to several hundred breeding pairs in the United States, and only two of these
13 nested in California in 1970. One recent estimate described at least 250 pairs in
14 California. Persistent pesticides and heavy metals including mercury and lead continue
15 to pose a threat to populations. Collisions with structures or objects, electrified wire
16 strikes, and degradation of habitat are other threats to the peregrine falcon.

17 **Relevant Conservation Efforts**

18 The Natomas Basin HCP covers the peregrine falcon.

19 ***Greater Sandhill Crane***

20 **Legal Status**

21 The greater sandhill crane (*Grus canadensis tabida*) is State listed as threatened under
22 CESA (California Fish and Game Code, Sections 2050 et seq.). The species was listed
23 by the California Fish and Game Commission in 1983. The greater sandhill crane is also
24 designated as a State fully protected species. The greater sandhill crane has no federal
25 regulatory status. The greater sandhill crane has no federal regulatory status; therefore,
26 no critical habitat has been designated for the species.

27 **Distribution**

28 The Central Valley population of greater sandhill cranes breeds in northeastern
29 California, central and eastern Oregon, southwestern Washington, and southern British
30 Columbia, and winters in the Central Valley of California (Littlefield and Ivey 2000).
31 Within California, the breeding distribution is restricted to a six-county area in the
32 northeastern corner of the State, comprising Siskiyou, Modoc, Shasta, Lassen, Plumas,
33 and Sierra counties (Littlefield 1982; Littlefield 1989; DFG 2001).

34 Pogson and Lindstedt (1991) identified eight distinct wintering locations in the Central
35 Valley from Chico/Butte Sink on the north to Pixley National Wildlife Refuge near
36 Delano on the south, with more than 95 percent occurring within the Sacramento Valley
37 between Butte Sink and the Delta. Use varies seasonally within this area, probably as a
38 function of the winter flooding regime and food resources. Butte Sink has been reported
39 to support a large segment of the population (more than 50 percent) during October and
40 November. Greater sandhill cranes move into the Delta and Cosumnes River floodplain
41 from the Butte Basin in October, and 3,000 to 4,000 cranes remain in the Delta region in
42 October and November. The Delta population peaks in December and January, and an

1 estimated two-thirds of the population (5,000 to 6,000 cranes) resides in the Delta for
2 the remainder of the winter (Pogson and Lindstedt 1988; Littlefield and Ivey 2000).

3 Populations of greater sandhill cranes have shifted over the years in response to
4 changing agricultural patterns, particularly the increase in the number of vineyards. The
5 islands and tracts traditionally used the most by cranes are Staten Island, Terminous
6 Island, Canal Ranch, and New Hope Tract. Bouldin Island, Empire Tract, King Island,
7 Grand Island, Tyler Island, Ryer Island, Brannan Island, Twitchell Island, Bradford
8 Island, Venice Island, Manderville Island, and Webb, Holland, and Palm tracts are used
9 by cranes occasionally to regularly (Pogson 1990; Littlefield and Ivey 2000).

10 The Cosumnes River floodplain, much of it protected within The Nature Conservancy's
11 Cosumnes River Preserve, also supports substantial winter crane use. Use may have
12 increased in this area as continued land conversion to vineyards on Delta islands has
13 reduced habitat availability there (Littlefield and Ivey 2000).

14 Crane use depends entirely on agricultural crop patterns. Conversion to unsuitable crop
15 types effectively eliminates crane habitat. Over the last two decades, a substantial
16 amount of land on Delta islands has been converted to vineyards; this land conversion
17 is among the most important conservation issues for greater sandhill crane (Littlefield
18 and Ivey 2000). Several important traditionally used areas, such as portions of the
19 Thompson-Folger Ranch along Peltier Road, have been converted to vineyards. Habitat
20 loss from agricultural conversion and disturbances from increasing recreational activities
21 in some areas threaten the long-term sustainability of key wintering areas for this species.

22 **Relevant Natural History**

23 Greater sandhill cranes are primarily birds of open freshwater wetlands. In California,
24 nesting typically occurs in open grazed meadows. Wintering habitat is found almost
25 entirely in agricultural fields and edges. Wintering habitat consists of three primary
26 elements: foraging habitat, loafing habitat, and roosting habitat. Two principal types of
27 foraging habitat are used during winter. In the Delta, harvested corn fields are the most
28 commonly used foraging habitat along with winter wheat, alfalfa, pasture, and fallow
29 fields (Pogson and Lindstedt 1988).

30 In the Butte Basin, harvested rice fields are the most commonly used foraging habitat,
31 followed by winter wheat, harvested and unharvested corn, fallow fields, and grasslands
32 (Pogson and Lindstedt 1988; Littlefield 2002).

33 Loafing generally occurs at midday when birds loosely congregate along agricultural
34 field borders, levees, rice checks, or ditches, or in alfalfa fields or pastures. Cranes will
35 often loaf in rocky uplands or along gravel roads where they collect grit, which is
36 important to the cranes' digestion of grain seeds. During the late afternoon and evening,
37 cranes begin to congregate into large, dense communal groups where they remain until
38 the following morning. Roost sites, which provide protection from predators during the
39 night, are typically within 2 to 3 miles of foraging and loafing areas, and thus available
40 roosting sites are an essential component of winter habitat. Roosting habitat typically
41 consists of shallowly flooded open fields of variable size (1 to 300 acres) or wetlands
42 interspersed with uplands. Water depth is important and averages 4.5 inches. Littlefield
43 (1993) reported cranes abandoning roosting sites when water depth reached 8 to 11

1 inches. He recommended that roost sites be a minimum of 20 acres in size with water
2 maintained from early September to mid-March. If properly managed, roost sites are
3 often used for many years.

4 Greater sandhill cranes are considered intolerant of excessive human disturbances, and
5 the level of disturbance may play a role in habitat selection (Lovvorn and Kirkpatrick
6 1981).

7 Excessive disturbance has caused cranes to abandon foraging and roosting sites, and
8 repeated disturbance may affect their ability to feed and store energy needed for
9 survival. Ivey and Herziger (2003) documented disturbance of greater sandhill cranes
10 on Staten Island, a high-use area, and found that aircraft, vehicles, hunting, and
11 recreational activities (e.g., birding, walking, horseback riding, bicycling, boating) can
12 cause cranes to run or fly away.

13 **Threats**

14 Threats to the wintering grounds of the greater sandhill crane include changes in water
15 availability; flooding of fields for waterfowl, which reduces foraging habitat for cranes;
16 conversion of cereal cropland to vineyards or other incompatible crop types; human
17 disturbances; collision with power lines and other structures; disease; and urban
18 encroachment (Littlefield and Ivey 2000).

19 The most important threat to wintering greater sandhill cranes is the loss of traditional
20 winter habitat from urbanization and agricultural conversion. Although relatively limited
21 urbanization has occurred to date within key crane areas, surrounding development and
22 increased levels of human disturbances may threaten the long-term sustainability of
23 important wintering lands. In the Delta region, the conversion of suitable agricultural
24 foraging and roosting habitats to unsuitable cover types, particularly orchards and
25 vineyards, has removed key habitats and altered the distribution and behavior of
26 wintering greater sandhill cranes.

27 Greater sandhill cranes are sensitive to human presence and do not tolerate regular
28 disturbances, including low-level recreational disturbances. Types of disturbances
29 include hunting, birding, photography, operating equipment for habitat management,
30 boating, and aircraft overflights. Disturbances cause birds to abandon otherwise
31 suitable habitats, and may cause birds to deplete important energy stores they need to
32 survive during wintering and migration. Only one predawn disruption is usually
33 necessary before cranes abandon a site (Littlefield and Ivey 2000). Disturbance from
34 hunting also poses a threat to cranes. Hunters who access hunting areas before dawn
35 flush cranes from their roosts and hunter presence can keep cranes from roosting or
36 foraging in an area (Ivey and Herziger 2003). Flooding of agricultural fields for waterfowl
37 hunting also reduces available foraging habitat for wintering cranes.

38 **Relevant Conservation Efforts and Guidance**

39 Several important efforts have been made to protect and enhance wintering habitat for
40 greater sandhill cranes. Among them is DFW's management of the Woodbridge
41 Ecological Reserve. Purchased in 1985 specifically for management as a crane roosting

1 area, this site has been a traditional crane roost for decades and continues to be one of
2 the most important roosts for this wintering population.

3 Management of Staten Island has also provided substantial benefit to greater sandhill
4 cranes. The island has been managed for several decades to provide benefits to wildlife
5 in conjunction with agricultural production. Use of the island by cranes has particularly
6 increased since the 1980s and 1990s under the successful management of the private
7 landowners and continues to be among the most important crane use areas in the Delta
8 (Littlefield and Ivey 2000). In 2002, The Nature Conservancy established the
9 Conservation Farms and Ranches Program to provide management oversight of Staten
10 Island and to ensure long-term conservation of crane habitat on the island.

11 Beginning in 1984, The Nature Conservancy began acquiring lands that today
12 encompass approximately 40,000 acres on the Cosumnes River Preserve. Portions of
13 the preserve are managed specifically for winter crane use and have attracted up to 20
14 percent of the wintering population of greater sandhill cranes at certain times of the
15 wintering season (Littlefield and Ivey 2000).

16 The San Joaquin County Multi-Species Conservation Program (SJMSCP) and South
17 Sacramento HCP covers greater sandhill crane.

18 ***Bald Eagle***

19 **Legal Status**

20 Bald eagle (*Haliaeetus leucocephalus*) is federally delisted and State listed as
21 endangered and is a California fully protected species.

22 **Distribution**

23 Breeding range extends from Alaska to Florida. In the nonbreeding season, bald eagles
24 occur generally throughout its breeding range except in the far north (e.g., northern
25 Alaska and Canada).

26 **Relevant Natural History**

27 Breeding habitat most commonly includes areas close to coastal areas, bays, rivers,
28 lakes, reservoirs, or other bodies of water that reflect the general availability of primary
29 food sources including fish, waterfowl, or seabirds. Nests are usually in tall trees or on
30 pinnacles or cliffs near water. The same nest may be used year after year, or a nesting
31 pair may use alternate nest sites in successive years.

32 In winter, bald eagles may associate with waterfowl concentrations or congregate in
33 areas with abundant food resources. Wintering eagles tend to avoid areas with high
34 levels of nearby human activity.

35 **Threats**

36 Threats to bald eagle include collisions with wind turbines and electric utility lines, and
37 indirect impacts such as lead poisoning from feeding off carrion that has been shot with
38 lead bullets.

1 **Relevant Conservation Efforts and Guidance**

2 The bald eagle is a covered species in several HCPs; for example, PG&E's San
3 Joaquin Valley Operations and Maintenance HCP and the Kern Water Bank HCP.

4 ***California Black Rail***

5 **Legal Status**

6 The California black rail (*Laterallus jamaicensis coturniculus*) is listed as a threatened
7 species under CESA. It was listed by the California Fish and Game Commission in
8 1971. It is also designated as a fully protected species in California. California black rail
9 has no federal regulatory status; however, its listing status is currently under review.

10 **Distribution**

11 The historical range of the California black rail extended from San Francisco Bay
12 throughout the Delta, along the coast to northern Baja California, other Southern
13 California locales such as the Salton Sea, and along the lower Colorado River. Breeding
14 records from early in the 20th century show California black rail populations existing on
15 coastal marshes in San Diego, Los Angeles, and Santa Barbara counties. Loss of tidal
16 marsh habitat has extirpated populations of California black rail from much of its coastal
17 range, particularly in Southern California and much of the San Francisco Bay Area,
18 since the 1950s (Zeiner et al. 1990a).

19 The species persists in remaining tidal marshes in the northern San Francisco Bay
20 estuary, Tomales Bay, Bolinas Lagoon, the Delta, Morro Bay, the Salton Sea, and the
21 lower Colorado River (Evens et al. 1991; Eddleman et al. 1994). Several small, isolated
22 populations also still exist in southeastern California and western Arizona (Evens et al.
23 1991). The species has also been found more recently at several inland freshwater sites
24 in the Sierra Nevada foothills in Butte, Yuba, and Nevada counties (Tecklin 1999; Aigner
25 et al. 1995), and most recently in Clover Valley within the City of Rocklin, in southern
26 Placer County (The California Black Rail Project 2006). Additional populations of
27 California black rail have been detected recently at the Cosumnes River Preserve in
28 south Sacramento County and Bidwell Park in Chico, Butte County (Central Valley Bird
29 Club 2009). Additional recent unconfirmed sightings from rice fields in Butte Sink and
30 Sutter County suggest that downslope movement from the foothill breeding population
31 may have occurred. Evens et al. (1991) examined the relative abundance of rails at
32 various locations within the species' range and determined that more than 80 percent of
33 the remaining population is confined to the northern reaches of the San Francisco Bay
34 Estuary.

35 Within the San Francisco Bay and Delta region, populations of California black rail are
36 restricted primarily to the remaining tidal marshlands of the northern San Francisco Bay
37 Estuary and the vicinity of Suisun and Napa marshes. In Suisun Marsh, California black
38 rails have been found in high abundance at east Mallard Island and in moderate
39 abundances at South Joice Island, Pacheco Creek, East Peyton Slough, Cutoff Island,
40 and Southampton Bay. It is possible that a small population occurs in the vicinity of Little
41 Honker Bay and on the north shore of Nurse Slough. California black rails were found in
42 moderate abundances in the northern reaches of Suisun Bay in undiked marshes along
43 the northern bank of Cutoff Slough from Beldon's Landing west to Suisun Slough.

1 The National Audubon Society's Important Bird Areas Program reports that most
2 occurrences of California black rail in the Delta have been on instream islands greater
3 than 15 acres that support marsh vegetation elevated above the high-tide and wave line
4 (National Audubon Society 2009).

5 Overall, availability of Delta habitat is restricted to remnant wetland sites that are
6 generally unavailable for agricultural uses. The small populations found in the central
7 Delta likely represent a relatively small proportion of the San Francisco Bay and Delta
8 region. However, those small populations that persist east of Suisun Marsh are
9 important relative to the overall range and dispersal capabilities of the species.

10 **Relevant Natural History**

11 California black rails inhabit tidal saltwater, brackish, and freshwater marshes (Grinnell
12 and Miller 1944; Zeiner et al. 1990a). A highly secretive and rarely observed bird, the
13 California black rail appears to prefer coastal areas with tidal salt marshes dominated by
14 dense pickleweed (*Salicornia* spp.) with an open structure below. Such locations
15 provide a dense canopy for protective cover with nesting habitat and accessibility below
16 the canopy (Evens and Page 1983). Rail nests consist of loosely made, deep cups
17 either at ground level or a slightly elevated level. In tidal areas, nests are concealed in
18 dense marsh vegetation near the upper limits of tidal flooding (Zeiner et al. 1990a).
19 Rails are susceptible to predation by herons, egrets, northern harriers, short-eared owls,
20 and several mammalian predators and so escape cover is critical to these birds. A
21 dense canopy that provides optimal cover is essential for survival.

22 Away from coastal estuaries and salt marshes, California black rails are restricted to
23 breeding in freshwater marshes with stands of tule, cattail, bulrush, and sedge (*Carex*
24 spp.) (Eddleman et al. 1994). These sites are very shallow (usually less than 1 inch) but
25 require a perennial water source. A relatively narrow range of conditions is required for
26 occupancy and successful breeding. Water depth is an important parameter for
27 successful nest sites because rising water levels can prevent nesting or flood nests and
28 reduce access to foraging habitat (Eddleman et al. 1994). Too little water will lead
29 California black rails to abandon the site until the water source is reestablished. Primary
30 factors determining their presence are annual fluctuation in water levels and shallow
31 water depth (less than 1 inch) (Eddleman et al. 1994; Rosenberg et al. 1991; Conway et
32 al. 2002). No information is available on minimum patch size for the California black rail
33 in the Central Valley and Delta region, but in the foothills of the central Sierra Nevada,
34 rails are found in marshes ranging from 0.5 acre to 25 acres in size, with 32 percent of
35 occupied sites in wetlands less than 0.75 acre (Tecklin 1999). The discovery of these
36 Sierra Nevada populations suggests that the species is able to colonize isolated habitat
37 patches (Aigner et al. 1995; Trulio and Evens 2000).

38 California black rails occur only in marshland, a habitat mostly destroyed or modified in
39 the western United States since the mid-1800s (Zeiner et al. 1990a). Populations and
40 numbers have declined and will continue to decline as loss and alteration of habitat
41 continues. The species is currently confined to mostly pristine remnants of historical
42 tidal marshlands, mainly along the large tributaries and shoreline of northern San Pablo
43 Bay, along the Carquinez Strait, and throughout parts of Suisun Bay (Evens et al.
44 1991). The marshes of San Pablo and Suisun bays are important in that they are the

1 last large refuge areas for a viable population. No evidence exists that California black
2 rails recolonize restored marshes for breeding (Evens et al. 1989).

3 The breeding season begins as early as February with pair formation and extends
4 through approximately early to-mid-June. Egg-laying peaks around May 1 (Eddleman et
5 al. 1994). The species is generally known as a medium-distance migrant that winters in
6 Mexico and Central America; however, recently discovered inland populations in
7 California are thought to be year-round residents. At these locations, juveniles disperse
8 and adults relocate to other wetland breeding sites each year sometime during the
9 nonbreeding season, between approximately August and February (Tecklin 1999).

10 Very little information is available on the foraging behavior of the California black rail.
11 The species is assumed to be an opportunistic daytime feeder that forages exclusively
12 within the wetland habitat, presumably on or near the ground at the edges of emergent
13 vegetation. The diet consists of insects, small mollusks, amphipods, and other
14 invertebrates, and seeds from bulrushes (*Schoenoplectus* spp.) and cattails (*Typha*
15 spp.) (Eddleman et al. 1994).

16 **Threats**

17 Throughout the range of the California black rail, the species' primary threat is the loss
18 and fragmentation of habitat from urbanization, flood control projects, agricultural
19 practices, and hydrologic changes that affect water regimes. The most important
20 historical threat is the draining of tidal marshes, which may be responsible for more than
21 90 percent of the population declines of this species.

22 At inland sites, agricultural practices, livestock grazing, and urbanization may threaten
23 individual subpopulations. Use of pesticides, including those used for mosquito control
24 programs, may also have unintended consequences for California black rails. These
25 isolated subpopulations are also susceptible to metapopulation dynamics, including
26 unpredictable environmental factors (Evens et al. 1991). Threats may also be posed by
27 domestic cats and native predators as a result of hydrologic and vegetation changes
28 that increase susceptibility to predation; pollution and its effect on freshwater marshes;
29 and collisions with automobiles and utility lines.

30 Substantial data gaps relating to many aspects of the ecology of the California black rail
31 exist: minimum patch size for successful breeding colonies, parameters of population
32 sinks, sources of mortality, site fidelity and movement in winter, and winter diet and
33 foraging ecology.

34 **Relevant Conservation Efforts and Guidance**

35 The California black rail is a covered species in several regional HCPs and natural
36 community conservation plans, including those prepared for Butte, San Joaquin, and
37 Yolo counties. Several management plans have outlined threats to California black rails
38 and provided recommendations for conservation (Trulio and Evens 2000).
39 Recommendations focus primarily on protecting high-quality habitats. However, few
40 actual habitat protection or species conservation efforts specific to the California black
41 rail have been undertaken to date.

1 The SJMSCP covers California black rail. In addition, the species is proposed for the
2 Solano County HCP, currently under development.

3 **Ridgway's Rail**

4 **Legal Status**

5 Ridgway's rail (*Rallus longirostris obsoletus*) is listed as endangered under the federal
6 ESA and CESA. Critical habitat has not been designated for this species.

7 **Distribution**

8 The historical distribution of Ridgway's rail in San Francisco Bay appears to have been
9 restricted to marshes west of Suisun Bay; however, systematic survey data from the
10 Suisun Marsh area were not available until the 1970s. Ridgway's rails have been
11 consistently detected in the Suisun Marsh area since the 1970s, although abundance
12 has been low. It is likely that low numbers of Ridgway's rail were present in this area
13 before large-scale marsh reclamation.

14 **Relevant Natural History**

15 Throughout their distribution, Ridgway's rails occur within a range of salt and brackish
16 marshes. In south and central San Francisco Bay and along the perimeter of San Pablo
17 Bay, rails typically inhabit salt marshes dominated by pickleweed (*Salicornia virginica*)
18 and Pacific cordgrass (*Spartina foliosa*). Pacific cordgrass dominates the middle marsh
19 zone throughout the south and central bay. In the north bay (Petaluma Marsh, Napa-
20 Sonoma Marsh, Suisun Marsh), Ridgway's rails also inhabit tidal brackish marshes that
21 vary significantly in vegetation structure and composition. Use of brackish marshes by
22 Ridgway's rails is largely restricted to major sloughs and rivers of San Pablo Bay and
23 Suisun Marsh and along Coyote Creek in south San Francisco Bay. Ridgway's rails
24 have rarely been recorded in nontidal marsh areas (USFWS 2010d).

25 Rail foraging and refuge habitat encompasses the lower, middle, and high marsh zones,
26 as well as the adjacent transitional zone. Lower and middle marsh zones provide
27 foraging habitat at low tide. Small tidal channels with dense vegetation covering the
28 banks provide important foraging habitat and hidden routes for travel close to nesting.
29 Higher marsh areas (high marsh and transitional zones) with dense vegetation are used
30 for nesting and high-tide refugia habitat. Ridgway's rails are relatively indiscriminate in
31 their choice of nesting substrate and prefer to use the tallest cover regardless of plant in
32 the upper-middle tidal marsh plain or high tidal marsh zones but not upland habitat
33 transition zones bordering tidal marsh. Vegetation must be 20 inches high or greater
34 near mean high water to allow for nest concealment and prevent tidal inundation.

35 Abundance of Ridgway's rails is positively correlated with channel density, and rails
36 prefer locations with a greater number of tidal creeks, Grindelia shrubs, and higher
37 elevations. Physical habitat characteristics critical to Ridgway's rails include marsh size,
38 location relative to other marshes, presence of buffers or transitional zones between
39 marshes and upland areas, marsh elevation, and hydrology.

1 Threats

2 Loss and degradation of tidal marsh habitats continues to be the most important threat
3 to Ridgway's rail and other tidal marsh species. The loss of tidal marsh habitat through
4 filling and diking has been largely curtailed. However, other current factors are
5 associated with declining populations: nonnative invasive species, disturbance,
6 environmental contaminants, sea level rise attributable to climate change, and risk of
7 extinction attributable to vulnerability of small populations in the face of random naturally
8 occurring events (USFWS 2010d).

9 Relevant Conservation Efforts and Guidance

10 Ridgway's rail (then referred to as the California Clapper Rail) is covered under the
11 Tidal Marsh Ecosystem Recovery Plan (USFWS 2013).

12 **Bank Swallow**

13 Legal Status

14 The bank swallow (*Riparia riparia*) is listed as a threatened species under CESA. It was
15 listed by the California Fish and Game Commission in 1989. The bank swallow has no
16 federal regulatory status; therefore, no critical habitat has been designated for this
17 species.

18 Distribution

19 The bank swallow is a neotropical migrant that winters in South America. The species
20 forages over a wide range of land cover types and nests in bluffs or banks, usually
21 adjacent to water.

22 During the breeding season the species occurs throughout the northern two-thirds of the
23 United States, most of Canada, and into northern Alaska (Garrison 1999). Bank swallow
24 historically occurred along the larger lowland rivers throughout California, with the
25 exception of Southern California, where the species occurred principally along the coast
26 and at the mouths of large rivers such as the Los Angeles River (Grinnell and Miller
27 1944). The current breeding range (about 50 percent of the historical range) is primarily
28 confined to parts of the Sacramento Valley and northeastern California, including the
29 banks of the Sacramento and Feather rivers; a few scattered colonies persist along the
30 central and northern coast. The main stronghold of the bank swallow is along the banks
31 of the Sacramento River and its major tributaries. This species has been documented
32 nesting in the Delta on Brannan Island along Sevenmile Slough near its confluence with
33 Threemile Slough, and it could occur elsewhere in the Delta.

34 Relevant Natural History

35 Foraging bank swallows take insects on the wing from over a variety of land cover types
36 (Garrison 1999). They use holes dug in cliffs and riverbanks for cover. Bank swallows
37 also nest in burrows that they dig in nearly vertical banks and cliff faces. For bank
38 swallows to dig these burrows, they require substrates made up of soft soils such as
39 fine sandy loam, loam, silt loam, and sand. Suitable banks for nesting also must be
40 more than 3 feet above the ground or water for predator avoidance. Colonies of several
41 to more than 3,000 bank swallows may nest at locations that have these qualities.
42 Suitable nest sites are few and are scattered throughout the species' remaining

1 California range; they are found most often at coastal river mouths, large rivers
2 (primarily in the Sacramento Valley), and occasionally in gravel and sand mines that
3 provide and maintain nesting habitat (Grinnell and Miller 1944). Bank swallows usually
4 initiate a single breeding attempt in April. They incubate their eggs for about 2 weeks
5 and then care for their nestlings for another 3 weeks, until they are fledged (Garrison
6 et al. 1999).

7 **Threats**

8 The greatest threat to the bank swallow has been loss of breeding sites along rivers and
9 natural waterways resulting from conversion to concrete-lined flood control channels (in
10 Southern California), and the application of riprap to natural riverbanks in the Central
11 Valley. Other threats come from predators that have access to colonies, changes in
12 gravel and sand mining operations that destroy or no longer create nesting habitat, and
13 high spring floods that can scour out colonies along riverbanks (Garrison 1999).

14 **Relevant Conservation Efforts and Guidance**

15 A State recovery plan for the bank swallow was completed and adopted by the
16 California Fish and Game Commission in 1992. The recovery plan identifies habitat
17 preserves and a return to a natural, meandering riverine ecosystem as the two primary
18 strategies for recovering the bank swallow. Also, California Partners in Flight has written
19 a bird conservation plan that addresses riparian-associated birds, including bank
20 swallow (RHJV 2004).

21 ***California Least Tern***

22 **Legal Status**

23 California least tern (*Sternula antillarum browni*) is federally and State listed as
24 endangered and is a California fully protected species. Critical habitat has not been
25 designated for this species.

26 **Distribution**

27 The species nests from the San Francisco Bay Area south into Baja California. Most
28 nesting sites are concentrated in Southern California (USFWS 2006d); nesting in San
29 Francisco Bay was first confirmed in 1967. Nesting was documented in Contra Costa
30 County in the 1980s, and there is one record from Suisun Marsh in 2006 (CNDDDB 2020).

31 **Relevant Natural History**

32 California least tern prefers to nest on open or sparsely vegetated sandy or gravelly
33 shores on beaches or near shallow-water estuaries, where it often feeds. Although it
34 prefers undisturbed sites, it has reportedly also nested on landfills and paved areas
35 (CNDDDB 2020). California least tern lives along the coastline and migrates north into
36 California to nest from April to May. When feeding, it follows schools of fish and is
37 sometimes seen as far north as southern Oregon. California least tern feeds primarily in
38 shallow estuaries or lagoons where small fish are abundant. Considerable feeding also
39 takes place near shore in the open ocean (Cogswell 1977 as cited in Zeiner et al.
40 1990a), especially where lagoons are nearby, or at mouths of bays. Although this
41 species is listed as endangered, its population numbers have increased from 600 pairs
42 in 1973 to roughly 7,100 pairs in 2005, and USFWS believes it should now be relisted

1 as threatened (USFWS 2006d). The number of California least tern sites has nearly
2 doubled since the time of listing. The species is known to occur in the DP Planning Area
3 in Suisun Marsh.

4 **Threats**

5 Most terns rely on degraded habitat on the beaches of densely populated Southern
6 California, where they are threatened by disturbance. Other treats include exotic plant
7 species, which can invade barren nesting areas, and predation, including by species
8 attracted by human disturbance, such as opossums, rats, and crows (USFWS 2006d).

9 **Relevant Conservation Efforts and Guidance**

10 USFWS published a recovery plan for the California least tern in 1985, but the plan is
11 now considered outdated and has been recommended for updating (USFWS 2006d).

12 ***Least Bell's Vireo***

13 **Legal Status**

14 The least Bell's vireo (*Vireo bellii pusillus*) is federally and State listed as endangered.
15 Critical habitat for least Bell's vireo was designated in 1994 (59 FR 4845 to 4867,
16 February 2, 1994). This critical habitat is located in Southern California and does not
17 include areas in the DP Planning Area.

18 **Distribution**

19 Least Bell's vireo is a neotropical migrant species and is found in California and other
20 states in the southwest and central western United States during the breeding season
21 and during migration. Formerly, the vireo was known to breed from throughout the
22 Sacramento and San Joaquin valleys, the Sierra Nevada foothills, and the Coast
23 Ranges. It historically nested throughout riparian areas in the Central Valley and in
24 other low-elevation riparian zones in California (RHJV 2004). The species was
25 characterized as abundant at one time, but it is now absent from most of its historical
26 range. By 1980, it was extirpated from the entire Central Valley (RHJV 2004). However,
27 recent observations indicate that the species' range is expanding northward and that
28 individuals are recolonizing areas that have been unoccupied by the species for
29 decades (RHJV 2004). Least Bell's vireos successfully nested at the San Joaquin River
30 National Wildlife Refuge in 2005 and 2006 (USFWS 2006e).

31 **Relevant Natural History**

32 Least Bell's vireo is a small, insectivorous bird. It feeds on a wide variety of insects by
33 gleaning them from foliage and by catching them while hovering. This species nests in
34 dense, low, shrubby vegetation, generally early successional stages in riparian areas,
35 particularly cottonwood-willow forest but also brushy fields, young second-growth forest
36 or woodland, scrub oak, coastal chaparral, and mesquite brushlands, often near water
37 in arid regions (Brown 1993).

38 Least Bell's vireos arrive in breeding habitats in California from mid-March to April
39 (USFWS 1998a). Males establish and defend territories ranging in size from less than 1
40 acre to about 8 acres. Nest building by both members of a pair begins within several
41 days of pair formation, and the nest takes 4 to 5 days to complete. Eggs are then laid

1 and incubated for approximately 2 weeks. After hatching, nestlings are fed by both
2 parents for 10 to 12 days, until fledging. Fledglings continue to be cared for by both
3 parents for about an additional 2 weeks and generally remain in the territory for the
4 remainder of the season. Least Bell's vireos depart from late July until late September.

5 **Threats**

6 The primary threats to the least Bell's vireo are habitat loss and brood parasitism by the
7 brown-headed cowbird (which is increased in areas with livestock) (RHJV 2004;
8 USFWS 2006e). Threats also include habitat degradation caused by trampling of
9 vegetation and nests by livestock and recreational activities, as well as habitat
10 degradation resulting from the spread of invasive plants—in particular, giant reed
11 (*Arundo donax*).

12 **Relevant Conservation Efforts and Guidance**

13 USFWS prepared a draft recovery plan for least Bell's vireo (USFWS 1998a). The
14 species is also addressed in most habitat conservation and multiple species planning
15 efforts in Southern California, including the Coachella Valley Multi-Species Habitat
16 Conservation Plan (MSHCP), the Western Riverside MSHCP, the Camp Pendleton
17 Resource Management Plan, and the Orange County Natural Community Conservation
18 Plan. Recovery and management recommendations in these plans include continuing
19 cowbird removal programs, nest monitoring for cowbird parasitism, and restoration of
20 riparian vegetation.

21 **E.4.5 Mammals**

22 ***San Joaquin Valley (Riparian) Woodrat***

23 **Legal Status**

24 The San Joaquin Valley (or riparian) woodrat (*Neotoma fuscipes riparia*) is federally
25 listed as endangered and is a California species of special concern. Critical habitat has
26 not been designated for this species. In July 2020, USFWS published a 5-year review
27 recommending that the species remain listed as endangered (USFWS 2020d).

28 **Distribution**

29 Historically found along the San Joaquin, Stanislaus, and Tuolumne rivers, the San
30 Joaquin Valley woodrat species likely occurred throughout the riparian forests of the
31 northern San Joaquin Valley (USFWS 1998b). Its range has become much more
32 restricted because of extensive modification and destruction of riparian habitat along
33 streams in its former range in the Central Valley.

34 **Relevant Natural History**

35 The San Joaquin Valley woodrat is most abundant in areas with deciduous valley oaks
36 and some live oaks and dense shrub cover. In riparian areas, the highest densities of
37 woodrats and their houses are typically in willow thickets with an oak overstory. Riparian
38 woodrats build and live in houses of sticks and other litter, the same as other
39 populations of dusky-footed woodrats. These conical structures are commonly leaned
40 up against the base of an oak or willow. They can also be found high up in trees, in
41 crotches and cavities of trees, and in hollow logs. The woodrat is mostly active at night;

1 its diet is diverse and principally herbivorous, with leaves, fruits, twig tips, flowers, nuts,
2 and fungi (USFWS 1998b). With their general dependence on terrestrial stick houses,
3 riparian woodrats may be vulnerable to flooding. Although the woodrat can be arboreal
4 and can escape flooding, its terrestrial houses, which are essential for survival, can be
5 affected by flooding, potentially affecting population viability (USFWS 1998b).

6 **Threats**

7 Potential threats to the San Joaquin Valley woodrat include habitat conversion to
8 agriculture, wildfire, disease, predation, flooding, drought, clearing of riparian vegetation,
9 use of rodenticides, and browsing and trampling by ungulates (USFWS 1998b).

10 **Relevant Conservation Efforts and Guidance**

11 A recovery strategy for San Joaquin Valley woodrat was developed by USFWS and
12 included in the Recovery Plan for Upland Species of the San Joaquin Valley, California
13 (USFWS 1998b). This strategy relies on additional preservation, restoration, and
14 enhancement of habitat, and possibly reintroduction of this woodrat to restored but
15 unoccupied habitat. Reducing habitat fragmentation and conserving corridors of riparian
16 habitat are important components of this strategy.

17 ***Salt Marsh Harvest Mouse***

18 **Legal Status**

19 The salt marsh harvest mouse (*Reithrodontomys ravivenstris*) is listed as endangered
20 under the federal ESA and CESA. It is also designated as a State fully protected
21 species. Critical habitat has not been designated for this species.

22 **Distribution**

23 The historical range of the salt marsh harvest mouse likely included most of the
24 marshland in the San Francisco Bay Area. Closely associated with saline habitats, this
25 species' eastern distribution is generally considered to extend as far as approximately
26 Collinsville. The waters of wetlands and marshes east of this point are considered too
27 fresh to support the habitat of this species (USFWS 2010e). Today, the salt marsh
28 harvest mouse potentially occupies an area representing approximately 15 percent of
29 the historical salt marsh habitat that formerly existed in the San Francisco Bay Area
30 (Dedrick 1989). Most remaining populations are small and separated by large areas of
31 unsuitable habitat, the exception being habitat in Suisun Marsh, where they occur
32 throughout suitable habitat, and the northern part of San Pablo Bay.

33 Reported occurrences of the salt marsh harvest mouse from within the Delta are
34 restricted to salt and brackish tidal marshes along the northern edge of the Sacramento
35 River and the southern edge of the San Joaquin River as far east as the vicinity of
36 Collinsville and Antioch, west of Sherman Island. These reports are consistent with the
37 range of the species as described by USFWS (USFWS 2010e).

38 **Relevant Natural History**

39 Salt marsh harvest mice depend on thick cover of native halophytes. They use
40 pickleweed as their primary habitat as long as they have nonsubmerged, salt-tolerant
41 vegetation for escape during the highest tides. Refuge is taken from high tides in the

1 upper zones of most marshes, usually in stands of fat hen and Australian salt bush
2 (*Atriplex semibaccata*). These mice have also been found in the top zone of tidal
3 marshes, and in transitional zones, which rarely flood (Shellhammer 1989). As a pure
4 stand, salt grass (*Distichlis spicata*) has little habitat value for this species, though it
5 may be advantageous as part of a component mixture (Shellhammer et al. 1982). The
6 salt marsh harvest mouse does not use marshlands with low salinities and sparse
7 pickleweed populations. This distinction is important, because most diked marshes
8 within the Suisun Marsh exist where less saline conditions are encouraged to optimize
9 habitat for waterfowl (Shellhammer et al. 1982).

10 Salt marsh harvest mice have shown an ability to disperse considerable distances
11 (Geissel et al. 1988); however, they apparently do not move through unvegetated areas,
12 and thus, fragmentation of salt marsh habitats results in limited dispersal opportunities.
13 A corridor of suitable vegetation is required for movement and dispersal into adjacent
14 habitats.

15 **Threats**

16 Loss and degradation of tidal marsh habitats continues to be the most important threat
17 to the salt marsh harvest mouse and other tidal marsh species. Tidal marshes have
18 been reduced by 84 percent since historical times (Dedrick 1989). The loss of tidal
19 marsh habitat through filling and diking has been largely curtailed. However, other
20 current factors are associated with declining populations: the conversion of salt marshes
21 to brackish marshes by freshwater discharges from sewage treatment plants; introduction
22 of nonnative cordgrass, bulrush, saltgrass, and other plant species; predation by
23 nonnative red foxes and feral cats; and invasion of runoff, industrial discharges, and
24 sewage effluent (Shellhammer et al. 1982). Probably the most important long-term issue
25 is the predicted sea level rise of as much as 4 feet within this century.

26 **Relevant Conservation Efforts and Guidance**

27 The salt marsh harvest mouse is covered under the Tidal Marsh Ecosystem Recovery
28 Plan (USFWS 2013).

29 ***Riparian Brush Rabbit***

30 **Legal Status**

31 The riparian brush rabbit (*Sylvilagus bachmani riparius*) is listed as endangered under
32 the federal ESA and CESA. It was initially listed as endangered by the State of
33 California on May 29, 1994. USFWS proposed the species for listing under the federal
34 ESA on November 21, 1997 (62 FR 62276), and reopened the proposal for further
35 public input on April 13, 1998, to include survey data from the 1998 winter floods in its
36 final determination on whether to list the species (63 FR 17981). USFWS issued its final
37 determination to list the species as endangered on February 23, 2000 (65 FR 8881). In
38 February 2020, DFW published a 5-year status review recommending no change in
39 status for the species (DFW 2020).

40 Critical habitat has not been designated for this species because USFWS believed that
41 such a designation would not provide any additional benefit beyond that provided by the

1 ESA listing as endangered and because the species was known to occur only within
2 Caswell Memorial State Park (65 FR 8881, February 23, 2000).

3 **Distribution**

4 One of eight species of brush rabbit, the riparian brush rabbit occupies a range that is
5 disjunct from the ranges of other brush rabbits, near sea level on the floor of the San
6 Joaquin Valley (USFWS 1998b). Its historical distribution may have extended along
7 portions of the San Joaquin River and its tributaries on the valley floor from at least
8 Stanislaus County to the Delta (Orr 1935 as cited in USFWS 1998b). Populations were
9 known to have occurred in riparian forests along the San Joaquin and Stanislaus rivers
10 and some tributaries to the San Joaquin River on the valley floor. One population
11 estimate within this historical range was about 110,000 individuals (USFWS 1998b).

12 The riparian brush rabbit is currently restricted to several populations at Caswell
13 Memorial State Park, near Manteca in San Joaquin County, along the Stanislaus River,
14 along Paradise Cut, a channel of the San Joaquin River in the southern part of the
15 Delta, and a recent reintroduction on private lands adjacent to the San Joaquin River
16 National Wildlife Refuge (Williams 1993; Williams and Basey 1986). A catastrophic
17 flooding event in winter 1997 greatly reduced the numbers of riparian brush rabbit in
18 Caswell Memorial State Park, spurring the development of a captive breeding and
19 reintroduction program.

20 **Relevant Natural History**

21 Habitat for the riparian brush rabbit consists of riparian forests with a dense understory
22 shrub layer. Brush rabbits have small home ranges that usually conform to the size of
23 available brushy habitat (Basey 1990). Patch size is important and fragmentation of
24 intact riparian forests is a major issue that restricts the species' occupancy and overall
25 distribution. Brushy clumps smaller than 400 square yards are rarely occupied.

26 Flooding is a key issue for this species and is thought to be responsible for major
27 population declines. Riparian brush rabbits are closely tied to brushy cover, rarely
28 moving more than 3 feet from cover. Riparian brush rabbits will not cross large open
29 areas, which limits their dispersal capabilities (USFWS 1998b). They are thus unable to
30 disperse beyond the dense brush, making them susceptible to mortality during flood
31 events (USFWS 1998b; Williams 1988). Riparian brush rabbits have limited ability to
32 climb into bushes and trees. This trait probably is an important factor in the riparian
33 brush rabbit's ability to survive, given that the riparian forests that are the species'
34 preferred habitat are subject to inundation by periodic flooding (Chapman 1974;
35 Williams 1988).

36 Riparian brush rabbits breed from January to May, a shorter breeding season than for
37 other cottontails, which breed year-round. Riparian brush rabbits also have lower
38 reproductive rates than other cottontail species. Five out of six rabbits do not survive to
39 the next breeding season (USFWS 1998b).

40 **Threats**

41 The primary threats to the survival of the riparian brush rabbit are the limited extent of
42 its existing habitat, extremely low numbers of individual animals, and few extant

1 populations. The small size of the remaining population of riparian brush rabbits, the
2 species' behavior, and the highly limited and fragmented nature of remaining habitat
3 restricts natural dispersal and puts the species at risk from a variety of environmental
4 factors. The riparian brush rabbit is therefore considered at high risk of imminent
5 extinction from several consequent threats related to population genetics, population
6 dynamics, and environmental variability (USFWS 1998b). Specifically, populations may
7 become more genetically homogenous because of inbreeding, causing higher
8 vulnerability to disease and lower fitness in general. Small populations are also subject
9 to a higher probability of extirpation from chance events, such as those related to
10 extreme environmental conditions. Other related potential threats to this species are
11 habitat conversion to agriculture, wildfire, disease, predation, flooding, clearing of
12 riparian vegetation, and the use of rodenticides. The species also is at risk from the lack
13 of elevated mounds with protective cover to serve as flood refuges within remaining
14 riparian habitat.

15 **Relevant Conservation Efforts and Guidance**

16 A draft recovery plan has been prepared for upland and riparian species in the San
17 Joaquin Valley, including the riparian brush rabbit (USFWS 1998b). The recovery plan
18 includes three actions: establish an emergency plan and monitoring system to provide
19 swift action to save individuals and habitat at Caswell Memorial State Park in the event
20 of flooding, wildfire, or a disease epidemic; develop and implement a cooperative
21 program with landowners; and reevaluate the status of the rabbit within 3 years of
22 approval of the recovery plan.

23 ***San Joaquin Kit Fox***

24 **Legal Status**

25 The San Joaquin kit fox (*Vulpes macrotis mutica*) is federally listed as endangered and
26 State listed as threatened. In September 2020, USFWS published a 5-year review
27 recommending that the species remain listed as endangered (USFWS 2020e). No
28 critical habitat rules have been published for this species.

29 **Distribution**

30 Although the precise historical range of the San Joaquin kit fox is unknown, it is
31 believed to have extended from Contra Costa and San Joaquin counties in the north to
32 Kern County in the south and along the coast in Monterey, Santa Clara, and Santa
33 Barbara counties. Within portions of this geographic range, the San Joaquin kit fox still
34 occurs in seasonal wetland, alkali desert scrub, grassland, and valley-foothill hardwood
35 vegetation. (A variety of open, level areas with loose-textured soil, scattered shrubby
36 vegetation, and little human disturbance provide habitat.)

37 USFWS reports that the largest extant populations of kit foxes are in western Kern
38 County on and around the Elk Hills and Buena Vista Valley and in San Luis Obispo
39 County in the Carrizo Plain National Monument. Other relatively large populations have
40 been reported from the central coast around Fort Hunter Liggett, Monterey County, and
41 Camp Roberts, Monterey and San Luis Obispo counties. Occurrences further north are
42 fewer and less frequent and include several in the Los Vaqueros watershed and
43 surrounding area in Contra Costa County in the early 1990s (USFWS 1998b).

1 **Relevant Natural History**

2 The San Joaquin kit fox is a carnivore with a varied diet (USFWS 1998b; Zeiner et al.
3 1990b). Prey includes mice, ground squirrels, hares, cottontails, ground-nesting birds,
4 and insects; these foxes also consume plant matter. The San Joaquin kit fox is active
5 year-round and is primarily nocturnal. Its home range may be from 1 mile to several
6 square miles, and home ranges may overlap among individuals.

7 Dens are used for cover. Kit foxes either dig their own dens, use those constructed by
8 other animals, or use human-made structures (e.g., culverts, abandoned pipelines, or
9 banks in sumps or roadbeds) (USFWS 2009). Kit foxes often change dens and may use
10 many dens throughout the year.

11 Litters are born in February or March (USFWS 1998b). Pups emerge from the den after
12 about a month. After 4 to 5 months, usually in August or September, young begin
13 dispersing. Dispersal distances vary from several miles to much greater distances.

14 **Threats**

15 Loss and degradation of habitat by agricultural, industrial, and urban developments and
16 associated practices continue, decreasing the carrying capacity of remaining habitat
17 and threatening kit fox survival (USFWS 2009). Such losses contribute to kit fox
18 declines through displacement, direct and indirect mortalities, barriers to movement,
19 and reduction of prey populations. San Joaquin kit fox is also threatened by rodenticide
20 use and by competitive displacement or predation by other species, such as the
21 nonnative red fox (*Vulpes vulpes*), coyote (*Canis latrans*), domestic dog (*Canis*
22 *familiaris*), bobcat (*Felis rufus*), and large raptors.

23 **Relevant Conservation Efforts and Guidance**

24 A recovery strategy for San Joaquin kit fox was developed by USFWS and was included
25 in the Recovery Plan for Upland Species of the San Joaquin Valley, California (USFWS
26 1998b). This strategy relies on enhanced preservation and management of three core
27 populations, and an important component of this preservation and management is
28 sustaining and increasing habitat connectivity. Additional information on the distribution
29 and movement of kit foxes is also a component of the recovery strategy, as is
30 developing restoration and management prescriptions for the species. San Joaquin kit
31 fox is a covered species under the East Contra Costa Habitat Conservation Plan and
32 the San Joaquin County Multiple Species Conservation Plan.

33 USFWS has also developed recommendations for avoidance and minimization
34 measures for implementation during ground-disturbing activities (USFWS 1999b).
35 These measures aim to reduce effects on dens used by the San Joaquin kit fox.

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