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# Appendix F Biology Appendixes



# Appendix F-1

## Common and Scientific Names of Species Mentioned in the Text

**Table F-1-1**  
Common and Scientific Names of Plant Species Mentioned in the Text

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>

**Table F-1-1**  
Common and Scientific Names of Plant Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
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>
Black oak	<i>Quercus kelloggii</i>
Black walnut	<i>Juglans</i> sp.
Black willow	<i>Salix gooddingii</i>
Blackberry	<i>Rubus</i> sp.
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</i> var. <i>bolanderi</i>
Box elder	<i>Acer negundo</i>
Brass buttons	<i>Cotula coronopifolia</i>
Brazilian peppertree	<i>Schinus terebinthifolius</i> , <i>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>

**Table F-1-1**  
Common and Scientific Names of Plant Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
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</i> sp.
Ceanothus	<i>Ceanothus</i> sp.
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>
Chinese water spinach	<i>Ipomoea aquatic</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>

**Table F-1-1**  
Common and Scientific Names of Plant Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
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>
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>

**Table F-1-1**  
Common and Scientific Names of Plant Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
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 wislezenii</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 lilaepsis	<i>Lilaeopsis masonii</i>
Mexican or banana water lily	<i>Nymphaea mexicana</i>

**Table F-1-1**  
Common and Scientific Names of Plant Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
Mosquito fern, water velvet	<i>Azolla pinnata</i>
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>Artubus 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 virginica</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>Adenostema sparsifolium</i>
Red willow	<i>Salix laevigata</i>

**Table F-1-1**  
Common and Scientific Names of Plant Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
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 depauperatum</i> var. <i>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> )
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>
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>
Spongeplant	<i>Limnobium laevigatum</i> , <i>L. spongia</i>

**Table F-1-1**  
Common and Scientific Names of Plant Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
Star-thistle	<i>Centaurea</i> sp.
Stinkbells	<i>Fritillaria agrestis</i>
Stonewort	<i>Chara</i> sp.
Succulent owl's clover	<i>Ceanothus prostratus</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>
Tamarisk	<i>Tamarix</i> sp.
Tan oak	<i>Lithocarpus densiflorus</i>
Telegraph weed	<i>Heterotheca grandiflora</i>
Toyon	<i>Heteromeles arbutifolia</i>
Tree of heaven	<i>Ailanthus altissima</i>
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>

**Table F-1-1**  
Common and Scientific Names of Plant Species Mentioned in the Text

Common Name	Scientific Name
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 2010; Cal-IPC 2010; CDFA 2010; Hickman 1993; data compiled by AECOM in 2011

Note: Scientific and common plant names follow Hickman (1993) when common names are provided. Taxonomic updates and common plant names not provided in Hickman (1993) 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.

**Table F-1-2**  
Common and Scientific Names of Fish and Wildlife Species Mentioned in the Text

Common Name	Scientific Name
<b>Invertebrates</b>	
Antioch adrenid bee	<i>Perdita scitula antiochensis</i>
Antioch Dunes anthicid beetle	<i>Anthicus antiochensis</i>
Antioch Dunes halcetid 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>

**Table F-1-2**  
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<b>Common Name</b>	<b>Scientific Name</b>
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>
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>
Molestan 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 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>
<b>Fish</b>	
American shad	<i>Alosa sapidissima</i>
Bass	<i>Micropterus</i> spp.
Bluegill	<i>Lepomis macrochiris</i>
Bullheads	<i>Ameiurus</i> spp.
California roach	<i>Hesperoleucus symmetricus</i>
Catfish	<i>Ictalurus</i> spp.
Chinook salmon	<i>Oncorhynchus tshawytscha</i>

**Table F-1-2**  
Common and Scientific Names of Fish and Wildlife Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
Common carp	<i>Cyprinus carpio</i>
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>Hysteroecarpus traski</i>
Western mosquitofish	<i>Gambusia affinis</i>

**Table F-1-2**  
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<b>Common Name</b>	<b>Scientific Name</b>
<b>Amphibians</b>	
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>
<b>Reptiles</b>	
Blunt-nosed leopard lizard	<i>Gambelia silus</i>
California horned lizard	<i>Phrynosoma coronatum (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>

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Common and Scientific Names of Fish and Wildlife Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
Western rattlesnake	<i>Crotalus oreganus</i>
Western terrestrial garter snake	<i>Thamnophis elegans</i>
<b>Birds</b>	
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>
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>

**Table F-1-2**  
Common and Scientific Names of Fish and Wildlife Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
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 clapper rail	<i>Rallus longirostris obsoletus</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>

**Table F-1-2**  
Common and Scientific Names of Fish and Wildlife Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
Grasshopper sparrow	<i>Ammodramus savannarum</i>
Great blue heron	<i>Ardea herodias</i>
Great egret	<i>Ardea alba</i>
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>Picooides 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>

**Table F-1-2**  
Common and Scientific Names of Fish and Wildlife Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
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>
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>
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>

**Table F-1-2**  
Common and Scientific Names of Fish and Wildlife Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
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>Rallus 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>
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>

**Table F-1-2**  
Common and Scientific Names of Fish and Wildlife Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
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>
<b>Mammals</b>	
Allen's chipmunk	<i>Neotamias senex</i>
American badger	<i>Taxidea taxus</i>
American beaver	<i>Castor canadensis</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 nitratoides 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>

**Table F-1-2**  
Common and Scientific Names of Fish and Wildlife Species Mentioned in the Text

<b>Common Name</b>	<b>Scientific Name</b>
Muskrat	<i>Ondatra zibethicus</i>
Northern flying squirrel	<i>Glaucomys sabrinus</i>
Norway rat	<i>Rattus norvegicus</i>
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 2010; AOU 2010; ASM 2010; DFG 2009; DFG 2010; SSAR 2010; Xerces Society for Invertebrate Conservation 2010; data compiled by AECOM in 2011

Note: Scientific and common names of special-status species follow the California Department of Fish and Game (DFG) Special Animal List (2009). Sources for common wildlife species names are the DFG 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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# Appendix F-2

## Relevant Goals and Policies from Applicable Planning Documents Affecting the Delta and Suisun Marsh

This appendix provides the text of goals and policies related to vegetation and wildlife resources in the Delta Protection Commission's (DPC) *Land Use and Resource Management Plan for the Primary Zone of the Delta* (DPC 2010), and in the adopted general plans for each county and incorporated city within the Sacramento–San Joaquin Delta (Delta) and Suisun Marsh.

### 1.1 Land Use and Resource Management Plan for the Primary Zone

The DPC is charged with preparing a regional plan for the Primary Zone to address land uses and resource management, with particular emphasis on agriculture (which, as described in Section 4.9, Land Use, was designated by the Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992 as the primary use of this zone) on wildlife habitat and on recreation. DPC initially adopted the *Land Use and Resource Management Plan for the Primary Zone of the Delta* on February 23, 1995. The updated plan was approved by the California Office of Administrative Law on October 7, 2010, and became effective on November 6, 2010. The following policies from the plan are applicable to the proposed project:

- ◆ **Natural Resources Policy P-3:** Lands managed primarily for wildlife habitat should be managed to maximize ecological values. Appropriate programs, such as “Coordinated Resource Management and Planning” (Public Resources Code Section 9408[c]) should ensure full participation by local government and property owner representatives.
- ◆ **Natural Resources Policy P-7:** Incorporate, to the maximum extent feasible, suitable and appropriate wildlife protection, restoration and enhancement on publicly-owned land as part of a Delta-wide plan for habitat management.
- ◆ **Natural Resources Policy P-10:** Ensure that design, construction, and management of any flooding program to provide seasonal wildlife and aquatic habitat on agricultural lands, duck club lands and additional seasonal and tidal wetlands, shall incorporate “best management practices” to minimize vectors including mosquito breeding opportunities, and shall be coordinated with the local vector control districts, (each of the four vector control districts in the Delta provides specific wetland/mosquito management criteria to landowners within their district.)

## 1.2 Suisun Marsh Protection Plan

The *Suisun Marsh Protection Plan* was originally prepared by BCDC in 1974. It was last amended in November 2007 (BCDC 2007). The plan includes a primary and secondary management area. BCDC serves as the land use permitting agency for major projects in the primary management area and as an appellate body with limited functions in the secondary management area. Solano County has jurisdiction over the secondary management area and is responsible for preparing and administering a local protection program. Policies from the Environment, Water Supply and Quality, Recreation and Access, and Land Use and Marsh Management components of the Suisun Marsh Protection Plan that are applicable to the proposed project are listed below.

### 1.2.1 Environment

- ◆ **Policy 1:** The diversity of habitats in the Suisun Marsh and surrounding upland areas should be preserved and enhanced wherever possible to maintain the unique wildlife resource.
- ◆ **Policy 2:** The Marsh waterways, managed wetlands, tidal marshes, seasonal marshes, and lowland grasslands are critical habitats for marsh-related wildlife and are essential to the integrity of the Suisun Marsh. Therefore, these habitats deserve special protection.
- ◆ **Policy 3:** Existing uses should continue in the upland grasslands and cultivated areas surrounding the critical habitats of the Suisun Marsh in order to protect the Marsh and preserve valuable marsh-related wildlife habitats. Where feasible, the value of the upland grasslands and cultivated lands as habitat for marsh related wildlife should be enhanced.
- ◆ **Policy 4:** The eucalyptus groves in and around the Marsh, particularly those on Joice and Grizzly Islands, should not be disturbed.

### 1.2.2 Water Supply and Quality

- ◆ **Policy 7:** Disruption or impediments to runoff and stream flow in the Suisun Marsh watershed should not be permitted if it would result in adverse effects on the quality of water entering the Marsh. Riparian vegetation in the immediate Suisun Marsh watershed should be preserved, and stream modification permitted only if it is necessary to ensure the protection of life and existing structures from floods. Only the minimum amount of modification necessary should be allowed in such cases. Local runoff, erosion and sediment control ordinances should be established to protect the Marsh from potential adverse impacts.

### 1.2.3 Recreation and Access

- ◆ **Policy 2:** The Fish and Game Commission and the Department of Fish and Game have the ultimate responsibility and authority for management of the fish and wildlife resources of California and the Suisun Marsh. Lands acquired with State funds for the purpose of enhancing and managing wildlife habitat and providing related recreation use should be administered and managed by the Department of Fish and Game.

### 1.2.4 Land Use and Marsh Management

- ◆ **Policy 1:** The managed wetlands, tidal marshes, lowland grasslands and seasonal marshes should be included in a primary management area. Within the primary management area existing uses should continue and both land and water areas should be protected and managed to enhance the quality and diversity of the habitats.

- 1 ♦ **Policy 2:** Agriculture within the primary management area should be limited to activities  
2 compatible with, or intended for, the maintenance or improvement of wildlife habitat. These  
3 include extensive agricultural uses such as grain production and grazing. Intensive agricultural  
4 activities, involving removal or persistent plowing of natural vegetation and maintenance of  
5 fallow land during part of the year, should not be permitted. Grain production should be confined  
6 to the Grizzly Island Wildlife Area and relatively small, well-suited areas of some of the large  
7 duck clubs. Grazing should be used to control vegetation on duck clubs where plant cover is  
8 sub-optimum for waterfowl use and should be discouraged on those clubs where there is already a  
9 good mixture of preferred waterfowl food plants. Grazing pressures should not exceed sound  
10 range management practices.
- 11 ♦ **Policy 4:** The water management schedule developed by the U.S.D.A. Soil Conservation Service  
12 and the California Department of Fish and Game and ratified by the Solano County Mosquito  
13 Abatement District should be used to the maximum extent possible in the managed wetlands.  
14 This schedule provides the most desirable habitat for waterfowl as well as many other types of  
15 marsh wildlife, and will also result in good mosquito control if properly managed.
- 16 ♦ **Policy 8:** Permanent ponding, which provides only marginal wildlife benefits, should be practiced  
17 only in the following situations: (a) in deep ponds that are difficult to drain and manage as  
18 seasonally flooded marshes; (b) in limited shallow areas where habitat diversity is desired; (c) in  
19 areas of high salinity concentrations. To control mosquitoes, the water level in permanent ponds  
20 should be kept constant, and the water should be circulated.
- 21 ♦ **Policy 9:** The upland grasslands and cultivated lands surrounding the Marsh should be included  
22 in a secondary management area. The function of the secondary management area should be to  
23 act as a buffer area insulating the habitats within the primary management area from adverse  
24 impacts of urban development and other uses and land practices incompatible with preservation  
25 of the Marsh. The boundaries of the secondary management area should, for the most part,  
26 correspond to physical barriers to wildlife movement, with exceptions where necessary to control  
27 specific potential threats to the Marsh from beyond the wildlife barrier.
- 28 ♦ **Policy 10:** Agricultural uses consistent with protection of the Marsh, such as grazing and grain  
29 production, should be maintained in the secondary management area. In the event such uses  
30 become infeasible, other uses compatible with protection of the Marsh should be permitted. The  
31 value of the upland grassland and cultivated lands as habitats for Marsh-related wildlife should be  
32 maintained and enhanced where possible by planting or encouraging valuable wildlife food or  
33 cover plant species.

## 34 1.3 City and County General Plans

### 35 1.3.1 Contra Costa County General Plan

36 A comprehensive update to the *Contra Costa County General Plan* was adopted on January 18, 1991.  
37 General plan amendments followed in 1996 and 2005 to reflect changes to the land use map and the  
38 incorporation of the City of Oakley (Contra Costa County 2005).

39 Goals 8-D, 8-E, and 8-F (below) from the Conservation Element of the *Contra Costa County General*  
40 *Plan* provide broad guidance for preservation of plant and animal habitat in the county. The Conservation  
41 Element includes various policies that are intended to protect natural habitat, ecological resources, and  
42 riparian zones in the county. Goals and policies from the Conservation Element that are applicable to the  
43 proposed project are listed below (Contra Costa County 2005).

### 1.3.1.1 Conservation Element—Vegetation and Wildlife

- ◆ **Goal 8-D:** To protect ecologically significant lands, wetlands, plant and wildlife habitats.
- ◆ **Goal 8-E:** To protect rare, threatened and endangered species of fish, wildlife and plants, significant plant communities, and other resources which stand out as unique because of their scarcity, scientific value, aesthetic quality or cultural significance. Attempt to achieve a significant net increase in wetland values and functions within the County over the life of the General Plan. The definition of rare, threatened and endangered includes those definitions provided by the Federal Endangered Species Act, the California Endangered Species Act, the California Native Plant Protection Act and the California Environmental Quality Act.
- ◆ **Goal 8-F:** To encourage the preservation and restoration of the natural characteristics of the San Francisco Bay/Delta estuary and adjacent lands, and recognize the role of Bay vegetation and water area in maintaining favorable climate, air and water quality, and fisheries and migratory waterfowl.
  - **Policy 8-6:** Significant trees, natural vegetation, and wildlife populations generally shall be preserved.
  - **Policy 8-7:** Important wildlife habitats which would be disturbed by major development shall be preserved, and corridors for wildlife migration between undeveloped lands shall be retained.
  - **Policy 8-9:** Areas determined to contain significant ecological resources, particularly those containing endangered species, shall be maintained in their natural state and carefully regulated to the maximum legal extent. Acquisition of the most ecologically sensitive properties within the County by appropriate public agencies shall be encouraged.
  - **Policy 8-10:** Any development located or proposed within significant ecological resource areas shall ensure that the resource is protected.
  - **Policy 8-11:** The County shall utilize performance criteria and standards which seek to regulate uses in and adjacent to significant ecological resource areas.
  - **Policy 8-12:** Natural woodlands shall be preserved to the maximum extent possible in the course of land development.
  - **Policy 8-15:** Existing vegetation, both native and non-native, and wildlife habitat areas shall be retained in the major open space areas sufficient for the maintenance of a healthy balance of wildlife populations.
  - **Policy 8-17:** The ecological value of wetland areas, especially the salt marshes and tidelands of the bay and delta, shall be recognized. Existing wetlands in the County shall be identified and regulated. Restoration of degraded wetland areas shall be encouraged and supported whenever possible.
  - **Policy 8-18:** The filling and dredging of lagoons, estuaries, and bays which eliminate marshes and mud flats shall be allowed only for water-oriented projects which will provide substantial public benefits and for which there are not reasonable alternatives, consistent with State and Federal laws.
  - **Policy 8-24:** The County shall strive to identify and conserve remaining upland habitat areas which are adjacent to wetlands and are critical to the survival and nesting of wetland species.

- 1 • **Policy 8-27:** Seasonal wetlands in grassland areas of the county shall be identified and  
2 protected.
- 3 • **Policy 8-28:** Efforts shall be made to identify and protect the County's mature native oak,  
4 bay, and buckeye trees.

### 5 **1.3.1.2 Conservation Element—Riparian Zones**

- 6 ♦ **Policy 8-80:** Wherever possible, remaining natural watercourses and their riparian zones shall be  
7 restored to improve their function as habitats.
- 8 ♦ **Policy 8-84:** Riparian resources in the Delta and along the shoreline shall be protected and  
9 enhanced.
- 10 ♦ **Policy 8-92:** Revegetation of a watercourse shall employ native vegetation, providing the type of  
11 vegetation is compatible with the watercourse's maintenance program and does not adversely  
12 alter channel capacity.
- 13 ♦ **Policy 8-93:** Particular care shall be exercised by development proposals to preserve and enhance  
14 riparian corridors along creeks which connect to the freshwater marsh segments of coastal areas  
15 in the North Central and East County areas.

## 16 **1.3.2 City of Brentwood General Plan**

17 The *City of Brentwood General Plan 2001-2021* was adopted on June 8, 1993, and updated in 2001 and  
18 2005. The City of Brentwood is a participant in the East Contra Costa HCP/NCCP.

### 19 **1.3.2.1 Land Use Element**

20 The Land Use Element includes several goals, policies and implementation measures embody the  
21 direction of the City of Brentwood's future mix, density and intensity of land uses. Goals and policies  
22 from the Land Use Element that are applicable to the proposed project are listed below (City of  
23 Brentwood 2001):

- 24 ♦ **Goal 5 – Natural Environment:** A high quality natural environment in Brentwood.
  - 25 • **Policy 5.1 Habitat Areas:** Protect selected significant habitat areas for their ecological,  
26 educational, scenic and recreational values.
  - 27 • **Policy 5.2 Other Environmental Features:** Protect those environmental features that make  
28 Brentwood an attractive and desirable place to live, work and visit.

### 29 **1.3.2.2 Conservation/Open Space Element**

30 The following goal and policies from the Conservation/Open Space Element are applicable to the  
31 proposed project (City of Brentwood 2001):

- 32 ♦ **Goal 1 – Conservation:** Preserve productive agricultural lands in Brentwood's Planning Area.
  - 33 • **Policy 1.1 Agricultural Preservation:** Support preservation of productive agricultural lands  
34 and provide appropriate programs
  - 35 • **Policy 1.2 Minimize Conflicts:** Minimize conflicts between agricultural and urban land uses.
  - 36 • **Policy 1.3 Development Impacts:** Minimize impacts of development on agricultural uses.
  - 37 • **Policy 1.4 Landowner Programs:** Assist agricultural landowners with a variety of programs.

- 1       ♦ **Goal 3 – Water Quality:** Maintain the quality of Brentwood’s ground and surface water.
- 2             • **Policy 3.1 Control Pollution:** The City should control the amount and quality of nonpoint
- 3             source pollution.
- 4             • **Policy 3.2 Water Quality:** Protect Brentwood’s water quality.
- 5             • **Policy 3.3 Air Quality:** Preserve and improve air quality in the Brentwood Planning Area.
- 6       ♦ **Goal 6 – Mineral Resources:** Utilize Brentwood’s mineral resources while preserving
- 7             development and conservation options for the future.
- 8             • **Policy 6.1 Mine Reuse:** Ensure that areas of mineral resources can be mined while
- 9             productive, and are ultimately reused for urbanization or open space.
- 10       ♦ **Goal 7 – Natural Resources:** Protect the Brentwood Planning Area’s natural resources.
- 11            • **Policy 7.1 Reduce Solid Waste: Minimize** the disposal of solid waste into landfills.
- 12            • **Policy 7.2 Preserve Vegetation:** Preserve vegetation and associated wildlife habitat in the
- 13            Brentwood Planning Area.
- 14            • **Policy 7.3 Waterways:** Maintain and improve wildlife and plant values along waterways and
- 15            within flood control facilities.
- 16       ♦ **Goal 8 – Open Space:** Preserve and enhance natural open space in and around the Brentwood
- 17            Planning Area.
- 18            • **Policy 8.1 Open Space Planning:** Promote the preservation of open space and natural
- 19            features through land use planning and development proposals.
- 20            • **Policy 8.2 Tree Protection:** Protect mature trees and areas of natural vegetation.
- 21            • **Policy 8.3 Hillside:** Preserve steep hillsides from development and mass grading.
- 22            • **Policy 8.4 Drainage Facilities:** Provide for the multiple use of drainage facilities, including
- 23            retention and detention basins.
- 24       ♦ **Goal 9 – Urban Open Space:** Create an urban form that is based on open space throughout and
- 25            around the community.
- 26            • **Policy 9.1 Parkway Corridors:** Provide for the multiple use of transportation and utility
- 27            corridors with parkways.

### 28   1.3.3   City of Oakley General Plan

29   The *City of Oakley General Plan* was adopted on December 16, 2002. The general plan’s Open Space and  
30   Conservation Element addresses protection and enhancement of environmental resources, including  
31   biological resources in the Delta. The following goal and policies from the Open Space and Conservation  
32   Element are applicable to the proposed project (City of Oakley 2002):

- 33       ♦ **Goal 6.3:** Encourage preservation of important ecological and biological resources.
- 34            • **Policy 6.3.5:** Encourage preservation and enhancement of Delta wetlands, significant trees,
- 35            natural vegetation, and wildlife populations.
- 36            • **Policy 6.3.6:** Encourage preservation of portions of important wildlife habitats that would be
- 37            disturbed by major development, particularly adjacent to the Delta.

## 1.3.4 City of Antioch General Plan

The City of Antioch General Plan, adopted in 2003, contains a resource management element that includes the following objectives and policies applicable to the proposed project (City of Antioch 2003).

- ◆ **Open Space Objective:** Maintain, preserve and acquire open space and its associated natural resources by providing parks for active and passive recreation, trails, and by preserving natural, scenic, and other open space resources.
  - **Open Space Policy a:** Establish a comprehensive system of open space that is available to the public, including facilities for organized recreation; active informal play; recreational travel along formal, natural, and riverfront trails; passive recreation; and enjoyment of the natural environment.
  - **Open Space Policy c:** Maintain the shoreline of the San Joaquin River as an integrated system of natural (wetlands) and recreational (trails and viewpoints) open space as set forth in the Land Use Element and Public Services and Facilities Element.
  - **Open Space Policy d:** Where significant natural features are present (e.g., ridgelines, natural creeks and other significant habitat areas, rock outcrops, and other significant or unusual landscape features), require new development to incorporate natural open space areas into project design. Require dedication to a public agency or dedication of a conservation easement, preparation of maintenance plans, and provision of appropriate long-term management and maintenance of such open space areas.
  - **Open Space Policy e:** Require proposed development projects containing significant natural resources (e.g. sensitive or unusual habitats, special-status species, habitat linkages, steep slopes, cultural resources, wildland fire hazards, etc.) to prepare Resource Management Plans to provide for their protection or preservation consistent with the provisions of the Antioch General Plan, other local requirements, and the provisions of State and Federal law.
- ◆ **Biological Resources Objective:** Preserve natural streams and habitats supporting rare and endangered species of plants and animals.
  - **Biological Resources Policy a:** Comply with the Federal policy of no net loss of wetlands through avoidance and clustered development. Where preservation in place is found not to be feasible (such as where a road crossing cannot be avoided, or where shore stabilization or creation of shoreline trails must encroach into riparian habitats), require 1) on-site replacement of wetland areas, 2) off-site replacement, or 3) restoration of degraded wetland areas at a minimum ratio of one acre of replacement/restoration for each acre of impacted onsite habitat, such that the value of impacted habitat is replaced.
  - **Biological Resources Policy b:** Preserve in place and restore existing wetlands and riparian resources along the San Joaquin River and other natural streams in the Planning Area, except where a need for structural flood protection is unavoidable.
  - **Biological Resources Policy c:** Require appropriate setbacks adjacent to natural streams to provide adequate buffer areas ensuring the protection of biological resources, including sensitive natural habitat, special-status species habitats and water quality protection.
  - **Biological Resources Policy d:** Through the project approval and environmental review processes, require new development projects to protect sensitive habitat areas, including, but not limited to, oak woodlands, riparian woodland, vernal pools, and native grasslands. Ensure

- 1 the preservation in place of habitat areas found to be occupied by state and federally protected  
2 species.
- 3 • **Biological Resources Policy e:** Limit uses within preserve and wilderness areas to  
4 resource-dependent activities and other uses compatible with the protection of natural habitats  
5 (e.g., passive recreation and public trails).
  - 6 • **Biological Resources Policy f:** Through the project review process, review, permit the  
7 removal of healthy, mature oak trees on a case-by-case basis only where it is necessary to do  
8 so.
  - 9 • **Biological Resources Policy g:** Preserve heritage trees throughout the Planning Area.
  - 10 • **Biological Resources Policy h:** Within areas adjacent to preserve habitats, require the  
11 incorporation of native vegetation and avoid the introduction of invasive species in the  
12 landscape plans for new development.
  - 13 • **Biological Resources Policy i:** Design drainage within urban areas so as to avoid creating  
14 perennial flows within intermittent streams to prevent fish and bullfrogs from becoming  
15 established within a currently intermittent stream.
  - 16 • **Biological Resources Policy j:** Whenever a biological resources survey is undertaken to  
17 determine the presence or absence of a threatened or endangered species, or of a species of  
18 special concern identified by the U.S. Fish and Wildlife Service or the California Department  
19 of Fish and Game, require the survey to follow established protocols for the species in  
20 question prior to any final determination that the species is absent from the site.
  - 21 ♦ **Open Space Transitions and Buffers Objective:** Minimize the impacts of development located  
22 adjacent to natural areas, preserved in open space, and protected environmental resources.
  - 23 • **Open Space Transitions and Buffers Policy a:** Minimize the number and extent of  
24 locations where residential, commercial, industrial, and public facilities land use designations  
25 abut lands designated for open space and protected resource areas (e.g., lands with  
26 conservation easements or set aside as mitigation for development impacts).
  - 27 • **Open Space Transitions and Buffers Policy b:** Ensure that the design of development  
28 proposed along a boundary with open space or protected resources provides sufficient  
29 protection and buffering for the open space and protected resources. The provision of buffers  
30 and transitions to achieve compatibility shall occur as part of the proposed development.

### 31 1.3.5 City of Pittsburg General Plan

32 The *City of Pittsburg General Plan* was adopted in 2001 and has been amended several times. The  
33 Resource Conservation Element of the General Plan includes the following goals related to biological  
34 resources and habitats addressed by the Delta Plan (City of Pittsburg 2001).

- 35 ♦ **Biological Resources and Habitats Objective 9-G-1:** Protect conservation areas, particularly  
36 habitats that support special status species, including species that are State or Federally listed as  
37 endangered, threatened, or rare.
- 38 ♦ **Biological Resources and Habitats Objective 9-G-2:** Guide development in such a way that  
39 preserves significant ecological resources.
- 40 ♦ **Biological Resources and Habitats Objective 9-G-3:** Support the reclamation of wetlands and  
41 marshlands along local industrial waterfronts.

- 1 The Resource Conservation Element of the General Plan includes the following policies related to  
2 biological resources and habitats addressed by the Delta Plan (City of Pittsburg 2001).
- 3 ♦ **Biological Resources and Habitats Policy 9-P-1:** Ensure that development does not  
4 substantially affect special status species, as required by State and federal agencies. Conduct  
5 assessments of biological resources as required by CEQA prior to approval of development  
6 within habitat areas of identified special status species.
  - 7 ♦ **Biological Resources and Habitats Policy 9-P-2:** Establish an on-going program to remove and  
8 prevent the re-establishment of invasive species and restore native species as part of development  
9 approvals on sites that include ecologically sensitive habitat.
  - 10 ♦ **Biological Resources and Habitats Policy 9-P-3:** Participate in the development of a regional  
11 Habitat Conservation Plan (HCP) and consider its adoption for preservation of native species  
12 throughout eastern Contra Costa County.
  - 13 ♦ **Biological Resources and Habitats Policy 9-P-5:** Work with Contra Costa County, the East Bay  
14 Regional Park District, and the City of Antioch, to expand the regional open-space system in the  
15 southern hills to preserve California annual grasslands habitat.
  - 16 ♦ **Biological Resources and Habitats Policy 9-P-7:** During the design of hillside residential  
17 projects, encourage clustering of housing to preserve large, unbroken blocks of open space,  
18 particularly within sensitive habitat areas. Encourage the provision of wildlife corridors to ensure  
19 the integrity of habitat linkages.
  - 20 ♦ **Biological Resources and Habitats Policy 9-P-8:** As a condition of approval of new  
21 development, ensure revegetation of cut-and-fill slopes with native plant species.
  - 22 ♦ **Biological Resources and Habitats Policy 9-P-9:** Establish creek setbacks along riparian  
23 corridors, extending a minimum of 50 to 150 feet laterally on each side of the creekbed. Setback  
24 buffers for habitat areas of identified special status species and wetlands may be expanded as  
25 needed to preserve ecological resources.
  - 26 ♦ **Biological Resources and Habitats Policy 9-P-10:** Prohibit development within creek setback  
27 areas, except as part of greenway enhancement (for example, trails and bikeways). Encourage  
28 developers to reserve space outside of the creek setbacks where endangered species habitat makes  
29 trail development inappropriate.
  - 30 ♦ **Biological Resources and Habitats Policy 9-P-11:** Ensure that riparian corridor characteristics  
31 are retained. Encourage the retention and/or reestablishment of creeks in the design of new  
32 development.
  - 33 ♦ **Biological Resources and Habitats Policy 9-P-12:** Protect and restore threatened natural  
34 resources, such as estuaries, tidal zones, marine life, wetlands, and waterfowl habitat.
  - 35 ♦ **Biological Resources and Habitats Policy 9-P-13:** Ensure that special-status species and  
36 sensitive habitat areas are preserved, as required by State and federal agencies, during  
37 redevelopment and intensification of industrial properties along the Suisun Bay waterfront. Limit  
38 dredging and filling of wetlands and marshlands, particularly adjacent to Browns Island Preserve.
  - 39 ♦ **Biological Resources and Habitats Policy 9-P-14:** Work with industrial property-owners along  
40 the waterfront to improve urban runoff and water quality levels within Suisun Bay wetlands.

## 1.3.6 Sacramento County General Plan

The *Sacramento County General Plan* was adopted on December 15, 1993. Since 1993, several of the separate general plan elements have been revised, including the Open Space Element (revised as of May 2, 1997) and the Conservation Element (revised as of August 29, 2007).

The Open Space Element addresses preservation of natural resources over an extensive area of the southern half of Sacramento County that is designated for open space uses. Natural resources discussed in the Open Space Element include terrestrial and aquatic habitats and agricultural areas. Policies OS-1 and OS-2 (below) provide overall guidance for Sacramento County's efforts to protect open space. The Conservation Element addresses habitat protection and restoration. Policies have been identified from both of these elements of the *Sacramento County General Plan* that are applicable to the proposed project, as listed below (Sacramento County 1997; Sacramento County 2007).

### 1.3.6.1 Open Space Element

- ◆ **Policy OS-1:** Permanently protect, as open space, areas of natural resource value, including wetlands preserves, riparian corridors, woodlands, and floodplains.
- ◆ **Policy OS-2:** Maintain open space and natural areas that are interconnected and of sufficient size to protect biodiversity, accommodate wildlife movement and sustain ecosystems.

### 1.3.6.2 Conservation Element

#### 1.3.6.2.1 Habitat Protection

- ◆ **Policy CO-62:** Ensure no net loss of marsh and riparian woodland acreage, values or functions.
- ◆ **Policy CO-64:** Seasonal and permanent marshland within designated natural preserves shall not be drained or filled for the purpose of converting the land to another use.
- ◆ **Policy CO-65:** In any cases where complete or selective removal of riparian woodland or scrub habitat is necessary for channel maintenance, public safety, or installation of infrastructure, it will be planned and carried out, or mitigated, so as to minimize unavoidable impacts upon biological resources.
- ◆ **Policy CO-66:** Encroachments within the designated floodway of Sacramento waterways shall be consistent with policies to protect marsh and riparian areas.
- ◆ **Policy CO-68:** Consistent with overall land use policies, the County shall support and facilitate the creation and biological enhancement of large natural preserves or wildlife refuges by other government entities or by private individuals or organizations. Such areas may, but need not necessarily, function as mitigation banks for other impacts upon biological resources due to development.

#### 1.3.6.2.2 Habitat Restoration

- ◆ **Policy CO-70:** Public or private projects involving filling or removal of marsh/riparian habitat shall be mitigated outside of natural preserves where on-site mitigation is not desirable or appropriate shall be mitigated through the purchase of mitigation credits for restored wetlands/riparian areas at no net loss.
- ◆ **Policy CO-72:** New or restored marsh/riparian woodlands shall be under ownership of a public agency or subject to a permanent conservation easement.

## 1 1.3.6.2.3 Vernal Pools

- 2 ♦ **Policy CO-83:** Ensure no net loss of vernal pool acreage, and/or values and functions, and  
3 mitigate any loss in relation to the values of quality of habitat.
- 4 ♦ **Policy CO-84:** Evaluate feasible on-site alternatives in the environmental review process that  
5 reduce impacts on vernal pools and provide effective on-site preservation in terms of minimum  
6 management requirements, effective size, and evaluation criteria identified in the report  
7 “Sacramento County Vernal Pools” (1990).
- 8 ♦ **Policy CO-85:** Require in-kind compensation for the type and functional values of vernal pools  
9 eliminated by development.
- 10 ♦ **Policy CO-86:** When on-site preservation or mitigation is infeasible or undesirable, require  
11 off-site mitigation at County-approved mitigation banks within Sacramento County.
- 12 ♦ **Policy CO-87:** Mitigation for vernal pool loss shall be considered in the environmental review  
13 process, and mitigation shall be required based on information contained within the  
14 environmental documents on the quality of those resources and their ability to be sustained within  
15 an urban setting.

## 16 1.3.6.2.4 Channel Modifications

- 17 ♦ **Policy CO-112:** Channel modifications shall retain marsh and riparian vegetation whenever  
18 possible or otherwise recreate the natural stream channel consistent with the ecological integrity  
19 of the preexisting stream. Modifications resulting in wetland or riparian loss shall be mitigated.
- 20 ♦ **Policy CO-114:** Encourage revegetation of native plant species and avoid nonindigenous species.

## 21 1.3.6.2.5 Native and Landmark Tree Protection

- 22 ♦ **Policy CO-130:** Make every effort to protect and preserve non-oak native, excluding  
23 cottonwoods, and landmark trees and protect and preserve native oak trees measuring 6 inches in  
24 diameter at 4.5 feet above ground in urban and rural areas, excluding parcels zoned exclusively  
25 for agriculture.
- 26 ♦ **Policy CO-131:** Native trees other than oaks, which cannot be protected, shall be replaced with  
27 in-kind species in accordance with established tree planting specifications, the combined diameter  
28 of which shall equal the combined diameter of the trees removed. In addition, with respect to  
29 oaks, a provision for a comparable on-site area for the propagation of oak trees may substitute for  
30 replacement tree planting requirements at the discretion of the County Tree Coordinator when  
31 removal of a mature oak tree is necessary in accordance with consistent policy.
- 32 ♦ **Policy CO-132:** If the project site is not capable of supporting all the required replacement trees,  
33 a sum equivalent to the replacement cost of the number of trees that cannot be accommodated  
34 shall be paid to the County’s Tree Preservation Fund. The replacement cost of trees shall be  
35 established in accordance with the Council of Tree and Landscape Appraiser’s standards for  
36 appraising trees.
- 37 ♦ **Policy CO-133:** For discretionary projects involving native oaks, ensure no net loss of canopy  
38 area by (1) preserving the main, central portions of consolidated and isolated groves constituting  
39 the existing healthy and unhealthy native oak canopy and (2) provide an area on-site to mitigate  
40 any canopy lost. Native oak mitigation area must be a contiguous area on-site which is equal to  
41 the size of canopy area lost and shall be adjacent to existing oak canopy to ensure opportunities  
42 for regeneration. If on-site mitigation area is not available due to area limitations, developer shall  
43 provide off-site mitigation consistent with policy proposed in CO-136.

- 1       ♦ **Policy CO-134:** Mitigate for loss of trees for road expansion and development consistent with  
2       County Tree Ordinance and General Plan policies.
- 3       ♦ **Policy CO-135:** In 15 years the native oak canopy within on-site mitigation areas shall be  
4       50 percent canopy coverage for valley oak and 30 percent canopy coverage for blue oak and other  
5       native oaks.
- 6       ♦ **Policy CO-136:** If on-site mitigation is not possible given site limitation, off-site mitigation may  
7       be considered. Such a mitigation area must meet all of the following criteria to preserve, enhance,  
8       and maintain a natural woodland habitat in perpetuity, preferably by transfer of title to an  
9       appropriate public entity. Protected woodland habitat could be used as a suitable site for  
10      replacement tree plantings required by ordinances or other mitigations.
- 11      a. Equal or greater in area to the total area that is included within a radius of 30 feet of the  
12      dripline of all trees to be removed;
- 13      b. Adjacent to protected stream corridor or other preserved natural areas;
- 14      c. Supports a significant number of native broadleaf trees; and
- 15      d. Offers good potential for continued regeneration of an integrated woodland community.

#### 16 1.3.6.2.6 Rare and Endangered Species

- 17      ♦ **Policy CO-141:** Manage vegetation on public lands with special status species to encourage  
18      native species and discourage nonindigenous invasive species.

### 19 1.3.7 City of Isleton General Plan

20 The *Comprehensive General Plan for the City of Isleton* was adopted in 1999. The general plan's  
21 Resource Management Element addresses landscaping and the planting of street trees. No policies were  
22 identified relating to biological resources that would be considered relevant to the proposed project (City  
23 of Isleton 1999).

### 24 1.3.8 City of Sacramento General Plan

25 The City of Sacramento recently completed the first comprehensive revision of its general plan in more  
26 than 20 years. The *City of Sacramento 2030 General Plan* was adopted on March 3, 2009. The  
27 Environmental Resources Element of the revised general plan addresses protection of biological  
28 resources, including wildlife habitat, open space corridors, and ecosystems. The following policies from  
29 the Environmental Resources Element are applicable to the proposed project (City of Sacramento 2009):

- 30      ♦ **Policy ER 2.1.4:** Retain Habitat Areas. The City shall retain plant and wildlife habitat areas  
31      where there are known sensitive resources (e.g., sensitive habitats, special-status, threatened,  
32      endangered, candidate species, and species of concern). Particular attention shall be focused on  
33      retaining habitat areas that are contiguous with other existing natural areas and/or wildlife  
34      movement corridors.
- 35      ♦ **Policy ER 2.1.5:** Riparian Habitat Integrity. The City shall preserve the ecological integrity of  
36      habitat areas, creek corridors, canals, and drainage ditches that support riparian resources by  
37      preserving native plants and, to the extent feasible, removing invasive nonnative plants. If not  
38      feasible, the mitigation of all adverse impacts on riparian habitat shall comply with State and  
39      Federal regulations.
- 40      ♦ **Policy ER 2.1.6:** Wetland Protection. The City shall preserve and protect wetland resources  
41      including creeks, rivers, ponds, marshes, vernal pools, and other seasonal wetlands, to the extent

1 feasible. If not feasible, the mitigation of all adverse impacts on wetland resources shall be  
2 required in compliance with State and Federal regulations protecting wetland resources, and if  
3 applicable, threatened or endangered species.

- 4 ♦ **Policy ER 2.1.7:** Annual Grasslands. The City shall preserve and protect grasslands and vernal  
5 pools that provide habitat for rare and endangered species to the extent feasible. If not feasible,  
6 the mitigation of all adverse impacts on annual grasslands shall comply with State and Federal  
7 regulations protecting foraging habitat for those species known to utilize this habitat.
- 8 ♦ **Policy ER 2.1.8:** Oak Woodlands. The City shall preserve and protect oak woodlands, and/or  
9 significant stands of oak trees in the city that provide habitat for common native, and  
10 special-status wildlife species, to the extent feasible. If not feasible, the mitigation of all adverse  
11 impacts on oak woodlands shall comply with the standards of the Oak Woodlands Conservation  
12 Act.
- 13 ♦ **Policy ER 2.1.9:** Wildlife Corridors. The City shall preserve, protect, and avoid impacts to  
14 wildlife corridors. If corridors are adversely affected, damaged habitat shall be replaced with  
15 habitat of equivalent value.
- 16 ♦ **Policy ER 2.1.10:** Habitat Assessments. The City shall require preconstruction surveys and/or  
17 habitat assessments for sensitive plant and wildlife species for any project requiring discretionary  
18 approval.
- 19 ♦ **Policy ER 2.1.11:** Agency Coordination. The City shall coordinate with State and Federal  
20 resource agencies (e.g., California Department of Fish and Game (CDFG), Corps [U.S. Army  
21 Corps of Engineers], United States Fish and Wildlife Service (USFWS)) to protect areas  
22 containing rare or endangered species of plants and animals.

### 23 1.3.9 Elk Grove General Plan

24 The *Elk Grove General Plan* was adopted on November 19, 2003. The most recent revision occurred on  
25 July 22, 2009 (City of Elk Grove 2009). The Conservation and Air Quality Element of the General Plan  
26 includes the following goals related to biological resources and habitats addressed by the Delta Plan.

- 27 ♦ **Guiding Goal 3: Protection of the Natural Environment**
  - 28 • **Focused Goal 3-1:** Development which recognizes environmental constraints and is designed  
29 and operated to minimize impacts on the environment.
  - 30 • **Focused Goal 3-2:** Open space lands in proximity to Elk Grove that provide for agricultural  
31 use and habitat for native species.
  - 32 • **Focused Goal 3-3:** Natural resources managed and protected for the use and enjoyment of  
33 current and future generations.
  - 34 • **Focused Goal 3-4:** Preservation and enhancement of Elk Grove's natural areas, in particular  
35 the areas within the floodplain of the Cosumnes River.

36 The following Conservation and Air Quality (CAQ) policies implement these goals:

- 37 ♦ **CAQ-6:** Within the Primary Zone of the Legal Delta (as defined by the State of California in the  
38 State Water Code, Section 12220), the City's land use and other policies shall conform with the  
39 "Land Use and Resource Management Plan for the Primary Zone of the Delta" developed by the  
40 Delta Protection Commission.

- 1       ♦ **CAQ-7:** Encourage development clustering where clustering would facilitate on-site protection of  
2       woodlands, grasslands, wetlands, stream corridors, scenic areas, or other appropriate natural  
3       features as open space.
- 4       ♦ **CAQ-8:** Large trees (both native and non-native) are an important aesthetic (and, in some cases,  
5       biological) resource. Trees which function as an important part of the City's or a neighborhood's  
6       aesthetic character or as natural habitat should be retained to the extent possible during the  
7       development of new structures, roadways (public and private, including roadway widening),  
8       parks, drainage channels, and other uses and structures.
- 9       ♦ **CAQ-9:** Wetlands, vernal pools, marshland and riparian (streamside) areas are considered to be  
10       important resources. Impacts to these resources shall be avoided unless shown to be technically  
11       infeasible. The City shall seek to ensure that no net loss of wetland areas occurs, which may be  
12       accomplished by avoidance, re-vegetation and restoration onsite or creation of riparian habitat  
13       corridors.
- 14       ♦ **CAQ-10:** Consider the adoption of habitat conservation plans for rare, threatened, or endangered  
15       species.
- 16       ♦ **CAQ-11:** The City shall seek to preserve areas, where feasible, where special-status plant and  
17       animal species and critical habitat areas are known to be present or potentially occurring based on  
18       City biological resource mapping and data provided in the General Plan EIR or other technical  
19       material that may be adversely affected by public or private development projects. Where  
20       preservation is not possible, appropriate mitigation shall be included in the public or private  
21       project. "Special-status" species are generally defined as species considered to be rare,  
22       threatened, endangered, or otherwise protected under local, state, and/or federal policies,  
23       regulations or laws.

### 24    1.3.10 San Joaquin County General Plan

25    The *San Joaquin County General Plan 2010* was adopted on July 29, 1992. The Resources Element  
26    contained in Volume 1 of the general plan addresses protection of biological resources. The following  
27    policies from the Resources Element are applicable to the proposed project (San Joaquin County 1992):

- 28       ♦ **Policy 1:** Resources of significant biological and ecological importance in San Joaquin County  
29       shall be protected. These include wetlands; riparian areas; rare, threatened and endangered  
30       species and their habitats as well as potentially rare of commercially important species; vernal  
31       pools; significant oak groves and heritage trees.
- 32       ♦ **Policy 2:** No public action shall significantly diminish the wildlife and vegetative resources of the  
33       County; cumulatively significant impacts shall be avoided.
- 34       ♦ **Policy 5:** No net loss of riparian or wetland habitat or values shall be caused by development.
- 35       ♦ **Policy 6:** Development projects which have the potential to destroy wetlands shall not be  
36       permitted, unless:
  - 37       a. no suitable alternative site exists for the land use, and the use is considered necessary to the  
38       public;
  - 39       b. there is no degradation of the habitat or numbers of any rare, threatened, or endangered plant,  
40       or animal species as a result of the project; and
  - 41       c. habitat of superior quantity and superior or comparable quality will be created or restored to  
42       compensate for the loss.

- 1       ♦ **Policy 16:** Habitat that is required to be protected, restored, or created as mitigation for a  
2       project's impacts shall be monitored and maintained in accord with a County-approved program.

### 3   1.3.11 City of Stockton General Plan

4   The *Stockton General Plan 2035 Goals and Policy Report* includes a Natural and Cultural Resources  
5   Element that outlines the city's long-term goals and policies regarding the protection of natural resources.  
6   The Natural and Cultural Resources Element of the General Plan includes the following goals related to  
7   biological resources and habitats addressed by the Delta Plan (Stockton 2007).

- 8       ♦ **NCR-1:** To protect, restore, and maintain natural and cultural resources in Stockton.
- 9           • **NCR-1.1 Protect Natural Resources:** The City shall strive to protect natural resource areas,  
10          fish and wildlife habitat, scenic areas, open space areas, agricultural lands, parks, and other  
11          cultural/historic resources (including Oak trees) from encroachment or destruction by  
12          incompatible development.
- 13          • **NCR-1.2 Establish Buffer Areas:** The City shall encourage the use of open space or  
14          recreational buffers between incompatible land uses.
- 15          • **NCR-1.3 Preserve Open Space:** The City shall promote contiguous and compact  
16          development to preserve open space land.
- 17          • **NCR-1.4 Environmental Review Process:** The City shall use its environmental and design  
18          review process to ensure effective protection of natural and cultural resources and compliance  
19          with Federal, State, and City policies and regulations.
- 20       ♦ **NCR-2:** To preserve and protect sensitive habitats and species in the Planning Area and the  
21       Sacramento-San Joaquin Delta.
- 22           • **NCR-2.1 Protect Sensitive Habitats:** The City shall support preservation, restoration, and  
23          enhancement of habitats of State or Federally-listed rare, threatened, endangered and/or other  
24          sensitive and special status species.
- 25           • **NCR-2.2 Management of Wetlands:** The City shall support the management of wetland and  
26          riparian plant communities for passive recreation, groundwater recharge, and wildlife  
27          habitats. Where possible and appropriate, such communities shall be restored or expanded.
- 28           • **NCR-2.3 Management of Sensitive Habitats:** The City shall favor sensitive habitat  
29          protection and enhancement of contiguous areas over small segmented remainder parcels.
- 30           • **NCR-2.4 Impacts to Sensitive Habitats:** The City shall consider the loss of sensitive  
31          habitats due to development to be a significant environmental impact. All development that is  
32          proposed to disturb or remove sensitive habitat shall demonstrate mitigation for this loss.
- 33           • **NCR-2.5 SJCOG Multi-Species Habitat Conservation and Open Space Plan:** The City  
34          shall continue to coordinate with the San Joaquin Council of Governments and comply with  
35          the terms of the Multi Species Habitat Conservation and Open Space Plan to protect critical  
36          habitat areas that support endangered species and other special-status species.
- 37           • **NCR-2.6 New Development in Sensitive Areas:** The City shall require careful planning of  
38          new development in areas that are known to have particular value for biological resources to  
39          maintain sensitive vegetation and wildlife habitat.

- 1           • **NCR-2.7 Development Review:** The City shall review development proposals against the  
2           California NDDDB to assist in identifying potential conflicts with sensitive habitats or special  
3           status species.
- 4           • **NCR-2.8 Development Review:** The City shall review development proposals in accordance  
5           with applicable Federal, State, and local statutes protecting special-status species and  
6           jurisdictional wetlands.
- 7           • **NCR-2.9 Appropriate Mitigation Measures:** The City, in its lead agency role, shall take  
8           into consideration mitigation standards and policies of resource and regulatory agencies with  
9           jurisdiction over biological resources (e.g., USFWS, CDFG, etc.).
- 10          • **NCR-2.10 Wetland Resources:** The City shall require that a wetland delineation be prepared  
11          using the protocol defined by the U.S. Army Corps of Engineers. On development sites with  
12          the potential to contain wetland resources, a report on the findings of this survey shall be  
13          submitted to the City as part of the application process.
- 14          • **NCR-2.11 Maintain Biological Resource Database:** The City shall maintain a current  
15          database of biological resources, including maps that identify the locations of specific  
16          environmentally-sensitive habitats and lists of special-status species.
- 17          • **NCR-2.12 Requirements for Biological Studies:** On sites that have the potential to contain  
18          critical or sensitive habitats or special-species or are within 100 feet of such areas, the City  
19          shall require the project applicant to have the site surveyed by a qualified biologist. A report  
20          on the findings of this survey shall be submitted to the City as part of the application process.
- 21          • **NCR-2.13 Encourage Planting of Native Vegetation:** The City shall encourage the planting  
22          of native trees, shrubs, and grasslands in order to preserve the visual integrity of the  
23          landscape, provide habitat conditions suitable for native vegetation, and ensure the a  
24          maximum number and variety of well-adapted plants are maintained.
- 25          • **NCR-2.14 Protect Delta Habitats:** The City shall approve only those activities in the Delta  
26          and related waterways that are consistent with the sensitive environmental characteristics of  
27          these areas.
- 28          • **NCR-2.15 Levee Vegetation:** The City shall require disturbance of levee vegetation be  
29          minimized and vegetation replacement be consistent with flood control and reclamation  
30          district constraints.
- 31          • **NCR-2.16 Fisheries and Riparian Habitat:** The City shall protect the fisheries and riparian  
32          habitat of the Delta and waterways from damage caused by the operation of marinas or the  
33          Port of Stockton.
- 34          • **NCR-2.17 Development within the Primary Zone of the Delta:** The City shall ensure that  
35          future changes to the City's General Plan and Development Code for lands in the city located  
36          within the Primary Zone of the Delta, as defined by the Delta Protection Act of 1992, be  
37          consistent with the goals of, and comply with, the Land Use and Resources Management Plan  
38          for the Primary Zone of the Delta adopted pursuant to Section 29763.5 of the Delta Protection  
39          Act of 1992.
- 40          • **NCR-2.18 Minimize Lighting Impacts:** The City shall ensure that lighting associated with  
41          new development or facilities (including street lighting, recreational facilities, and parking)  
42          shall be designed to prevent artificial lighting from illuminating adjacent natural areas at a  
43          level greater than one foot candle above ambient conditions.

- **NCR-2.19 Interim SJMSCP Compliance for Biological Resources:** Until a Major Amendment to the existing SJMSCP is adopted to incorporate all areas of the City's proposed Sphere of Influence into the SJMSCP coverage area, the City shall use the requirements of the SJMSCP to ensure effective protection of natural resources and compliance with applicable Federal, State, and City policies and regulations.

### 1.3.12 City of Lathrop General Plan

The *Comprehensive General Plan for the City of Lathrop, California* was adopted in 1991 and amended several times, most recently in 2004. The general plan includes a Resource Management Element that contains several policies that relate to vegetation, fish, and wildlife. The Resource Management Element of the General Plan includes the following objectives and policies related to vegetation, fish, and wildlife addressed by the Delta Plan (City of Lathrop 2004):

#### 1. The objective of habitat retention calls for:

- The integration of waterway habitat areas as part of the area wide system of open space.
- The preservation of all stands of vegetation along waterways which provide habitat, and achieving a standard of "no net loss of wetland acreage".
- The careful introduction of public and private recreation activities within habitat areas which will not disturb natural conditions either through intensity of operations, high levels of noise generation, or scarring of the landscape through development activity.
- The retention of hedgerows and other habitat areas within intensively farmed acreage which are compatible with agricultural operations.
- The protection of fisheries by preventing discharge of contaminated surface waters to waterways.

#### 2. The objective of habitat enhancement calls for:

- The improvement of natural habitat along waterways.
- The creation of new habitat within multi-purpose open space area designated for reuse of treated wastewater for wildlife management and recreation.
- Cooperative approaches among landowners to manage farmlands so as to increase the numbers of desirable species of wildlife.

#### 3. The City has adopted (effective October 15, 1996) a Habitat Conservation Plan (HCP) for the Swainson's hawk. The acquisition of lands required as replacement habitat for nesting and foraging is to be funded by fees imposed upon developers whose land development activities would threaten, endanger or eliminate existing habitat within the Lathrop planning area. The HCP shall be based upon a current habitat field survey taken during the Swainson's hawk nesting season to determine whether Core Conservation Areas or only foraging habitat exists.

#### 4. Developments proposed in sensitive biological areas shall be required to provide a site-specific analysis of the impacts of the project on fish and wildlife habitat. Because of the large-scale character of development proposed in the vicinity of biologically sensitive environments, including the conversion of several thousand acres of agricultural land to urban use, project proposals should be made to address ways in which new or enhanced habitat may be created as a trade-off to the general environmental impacts on biological resources associated with development under the General Plan.

1       **6. A naturally landscaped corridor shall be provided along the western perimeter of SPA #2,**  
2       **which lies west of Interstate 5.** This corridor should be wide enough to serve as a major  
3       component of the recreation and open space system, and should provide for a system of pedestrian,  
4       bicycle and equestrian trails where such uses are compatible with riparian habitats, where they  
5       exist. This corridor will also assure public access to the San Joaquin River as required by State  
6       policy and law and as permitted by RD-17.

7       **7. The visual amenities of water and its potential as wildlife habitat are to be reflected where**  
8       **feasible in all developments by the inclusion of bodies of water as components of urban form.**  
9       Such bodies of water may be in the form of lakes, ponds, lagoons, simulated streams or similar  
10      features which can be integrated by design within recreation open space corridors, parks,  
11      commercial and residential areas and public sites. The multi-purposes use of water bodies for  
12      surface water drainage, flood control, wastewater reclamation, wildlife management, recreation  
13      and visual amenity is encouraged.

### 14    1.3.13 City of Tracy General Plan

15    The Open Space and Conservation Element of the *City of Tracy General Plan* contains the following  
16    goals, objectives and policies related to protection of rare, endangered, and threatened plant and animal  
17    species and the habitats that support them (City of Tracy 2011).

18      ◆ **Goal OSC-1: The protection of rare, endangered and threatened plant and animal species.**

- 19      • **Objective OSC-1.1:** Preserve habitats that may support rare, endangered or threatened plant  
20      and animal species.

21      - P1. New development shall meet all federal, State and regional regulations for habitat and  
22      species protection.

23      - P2. The City shall continue to participate with the San Joaquin Council of Governments  
24      and other agencies to implement and enforce the San Joaquin Multi Species Habitat  
25      Conservation and Open Space Plan.

26      - P3. New development should incorporate native, drought tolerant vegetation into  
27      landscape plans and reduce the use of invasive, non-native plant species.

28      ◆ **Goal OSC-2: Identification, preservation and protection of significant agricultural**  
29      **resources.**

- 30      • **Objective OSC-2.1:** Support San Joaquin County efforts to preserve existing agricultural  
31      lands in the Planning Area and outside of the Sphere of Influence.

32      - P1. The City shall support San Joaquin County's efforts to preserve agricultural uses in  
33      the Tracy Planning Area.

34      - P2. The City shall support San Joaquin County policies and zoning actions that maintain  
35      agricultural lands in viable farming units for those areas not currently designated for  
36      urban uses.

37      - P3. The City shall support the preservation of Williamson Act lands and Farmland  
38      Security Zone lands within the Tracy Planning Area.

39      - P4. The City shall encourage the continued agricultural use of land within the Planning  
40      Area and outside the Sphere of Influence that is currently being farmed.

- 1           - P5. The City shall work cooperatively with non-profit organizations, such as land trusts,  
2           to preserve agricultural land in the Planning Area.
- 3           • **Objective OSC-2.2:** Minimize conflicts between agricultural and urban uses.
- 4           - P1. Development projects shall have buffer zones, such as roads, setbacks and other  
5           physical boundaries, between agricultural uses and urban development. These buffer  
6           zones shall be of sufficient size to protect the agriculture operations from the impacts of  
7           incompatible development and shall be established based on the proposed land use, site  
8           conditions and anticipated agricultural practices. Buffers shall be located on the land  
9           where the use is being changed, and shall not become the maintenance responsibility of  
10          the City.
- 11          - P2. Land uses allowed near agricultural operations should be limited to those not  
12          negatively impacted by dust, noise and odors.
- 13          - P3. The City shall review, maintain and update, as necessary, its Right-to-Farm  
14          Ordinance.

### 15 1.3.14 Solano County General Plan

16 The *Solano County General Plan* was adopted on August 5, 2008, and was subject to voter approval as  
17 Measure T on the November 4, 2008, ballot. Measure T was passed by the voters, thereby confirming the  
18 approval of the new general plan.

19 The general plan's Resources Element addresses conservation of resources, including biological resources  
20 throughout Solano County and specifically within the Delta. The following policies from the Resources  
21 Element are applicable to the proposed project (Solano County 2008a):

- 22           ♦ **Policy RS.P-1:** Protect and enhance the county's natural habitats and diverse plant and animal  
23           communities, particularly occurrences of special-status species, wetlands, sensitive natural  
24           communities, and habitat connections.
- 25           ♦ **Policy RS.P-2:** Manage the habitat found in natural areas and ensure its ecological health and  
26           ability to sustain diverse flora and fauna.
- 27           ♦ **Policy RS.P-4:** Together with property owners and federal and state agencies, identify feasible  
28           and economically viable methods of protecting and enhancing natural habitats and biological  
29           resources.
- 30           ♦ **Policy RS.P-5:** Protect and enhance wildlife movement corridors to ensure the health and long-  
31           term survival of local animal and plant populations. Preserve contiguous habitat areas to increase  
32           habitat value and to lower land management costs.
- 33           ♦ **Policy RS.P-6:** Protect oak woodlands and heritage trees and encourage the planting of native  
34           tree species in new developments and along road rights-of-way.
- 35           ♦ **Policy RS.P-21:** Preserve and protect the natural resources of the Delta including soils and  
36           riparian habitat. Lands managed primarily for wildlife habitat should be managed to provide  
37           inter-related habitats.

38 The following specific *Solano County General Plan* policies governing the Suisun Marsh were  
39 incorporated into the Solano County component of the Suisun Marsh Local Protection Program certified  
40 by the Bay Conservation and Development Commission on November 3, 1982, and amended on  
41 February 2, 1999 (Solano County 2008b). The following policies apply specifically to the Suisun Marsh

1 area. These policies are more specific than the balance of the general plan to address the requirements of  
2 the *Suisun Marsh Protection Plan* and the Suisun Marsh Protection Act of 1977.

3 ♦ **Policy RS.P-10:** The County shall preserve and enhance wherever possible the diversity of  
4 wildlife and aquatic habitats found in the Suisun Marsh and surrounding upland areas to maintain  
5 these unique wildlife resources.

6 ♦ **Policy RS.P-11:** The County shall protect its marsh waterways, managed and natural wetlands,  
7 tidal marshes, seasonal marshes and lowland grasslands which are critical habitats for marsh-  
8 related wildlife.

9 ♦ **Policy RS.P-12:** Existing uses should continue in the upland grasslands and cultivated areas  
10 surrounding the critical habitats of the Suisun Marsh in order to protect the Marsh and preserve  
11 valuable marsh-related wildlife habitats. Where feasible, the value of the upland grasslands and  
12 cultivated lands as habitat for marsh-related wildlife should be enhanced.

13 ♦ **Policy RS.P-13:** Agriculture within the Primary Management Area of the Suisun Marsh should  
14 be limited to activities compatible with, or intended for, the maintenance or improvement of  
15 wildlife habitat. These include extensive agricultural uses such as grain production and grazing.  
16 Intensive agricultural activities involving removal or persistent plowing of natural vegetation and  
17 maintenance of fallow land during part of the year should not be permitted.

18 ♦ **Policy RS.P-15:** In marsh areas, the County shall encourage the formation and retention of  
19 parcels of sufficient size to preserve valuable tidal marshes, seasonal marshes, managed wetlands  
20 and contiguous grassland areas for the protection of aquatic and wildlife habitat.

21 ♦ **Policy RS.P-16:** The County shall ensure that development in the County occurs in a manner  
22 which minimizes impacts of earth disturbance, erosion and water pollution.

23 ♦ **Policy RS.P-17:** The County shall preserve the riparian vegetation along significant County  
24 waterways in order to maintain water quality and wildlife habitat values.

25 ♦ **Policy RS.P-18:** The County shall ensure that public access at appropriate locations is provided  
26 and protected along the County's significant waterways within the Suisun Marsh.

27 ♦ **Policy RS.P-19:** Within the watershed of the Suisun Marsh, the County shall encourage sound  
28 agricultural practices which conserve water quality and the riparian vegetation.

### 29 1.3.15 City of Benicia General Plan

30 The *City of Benicia General Plan*, as adopted on June 15, 1999 and amended on November 4, 2003,  
31 includes the following goals, policies, and programs for the preservation and enhancement of habitat for  
32 special-status plants and animals (City of Benicia 1999).

33 ♦ **Goal 3.19: Preserve and enhance habitat for special-status plants and animals.**

34 • **Policy 3.19.1:** Protect essential habitat of special-status plant and animal species.

35 - Program 3.19.A. Require biological assessments in sensitive habitat areas as part of  
36 environmental review of proposed development.

37 - Program 3.19.B. Require retention of essential habitat for special status species. If  
38 infeasible, require adequate mitigation for loss of special status species and/or habitat in  
39 compliance with State and federal regulations.

- 1       ♦ **Goal 3.20: Protect and enhance native vegetation and habitats.**
- 2           • **Policy 3.20.1:** Protect native grasslands, oak woodlands, and riparian habitat.
- 3           • **Policy 3.20.2:** Restore native vegetation, such as birch grasses and oaks, wherever possible
- 4           for open spaces of existing developed areas.
- 5           - Program 3.20.A. Encourage community groups to carry out native plant restoration
- 6           efforts.
- 7           - Program 3.20.B. Limit the loss of native vegetation or require mitigation, or both.
- 8           - Program 3.20.C. Require native and compatible non-native plant species, especially
- 9           drought-resistant species, to the extent possible in landscaping new development and
- 10          public areas.
- 11          • **Policy 3.20.3:** Encourage preservation of existing trees. Especially preserve and protect
- 12          mature, healthy trees whenever practicable, particularly where such trees are of significant
- 13          size or are of significant aesthetic value to the immediate vicinity or to the community as a
- 14          whole.
- 15          - Program 3.20.D. Strive to incorporate existing mature, healthy trees into proposed
- 16          developments.
- 17          • **Policy 3.20.4:** Require protection of movement corridors.
- 18          - Program 3.20.E. Require preservation of open space corridors between Lake Herman,
- 19          Sulphur Springs Mountain, the Northern Area, the northeast hills, the Benicia State
- 20          Recreation Area, and the marshlands east of I-680.
- 21       ♦ **Goal 3.21: Permanently protect and enhance wetlands so that there is no net loss of**
- 22       **wetlands within the Benicia Planning Area.**
- 23           • **Policy 3.21.1:** Encourage avoidance and enhancement of sensitive wetlands as part of future
- 24           development.
- 25           - Program 3.21.A. Continue to require wetland delineation and mitigation as part of
- 26           environmental review of proposed development.
- 27           • **Policy 3.21.2:** Require replacement for wetlands eliminated as a result of development at a
- 28           higher wetlands value and acreage than the area eliminated.
- 29           - Program 3.21.B. Continue to coordinate with the California Department of Fish and
- 30           Game, United States Fish and Wildlife Service, and the United States Army Corps of
- 31           Engineers in reviewing proposed wetland modifications.
- 32           • **Policy 3.21.4:** Restore and increase marshland areas.
- 33           - Program 3.21.D. Prepare a Local Protection Program (LPP) for the portion of the Suisun
- 34           Marsh Secondary Management Area within the Benicia General Plan Planning Area.
- 35           - Program 3.21.E. Identify small wetlands and require their protection, restoration, and
- 36           enhancement as part of open space dedication in proposed development and in citywide
- 37           open space improvements.

## 1.3.16 Sutter County General Plan

The Conservation/Open Space - Natural Resources chapter and Land Use chapter of the 1996 *Sutter County General Plan* and amendments set forth several goals, policies, and implementation measures to preserve and protect open space and natural resources and reduce pollution (Sutter County 2006).

Following is a list of pertinent goals and policies.

### 1.3.16.1 Land Use Chapter

- ◆ **Policy 1.G-1:** The County shall encourage development projects to minimize their impacts to open space areas and wildlife habitats.

### 1.3.16.2 Conservation/Open Space – Natural Resources Chapter

#### 1.3.16.2.1 Wetland and Riparian Areas

- ◆ **Goal 4.B:** Protect wetland and riparian areas throughout Sutter County.
  - **Policy 4.B-1:** The County shall require new development to fully mitigate the loss of federally regulated wetlands to achieve a “no net loss” through any combination of avoidance, minimization, or compensation.
  - **Policy 4.B-2:** The County shall discourage direct discharge of surface runoff into wetland areas. New development shall be designed in such a manner that pollutants and siltation will not significantly affect wetlands.
  - **Policy 4.B-3:** The County encourages the preservation and restoration of natural wetland environments when feasible and practical as part of the development review process. Additionally, the County shall encourage and support the Resource Conservation District programs that facilitate these objectives if the programs do not significantly affect agricultural operations.
  - **Policy 4.B-4:** The County will encourage the creation and use of wetland mitigation banks as long as their creation and existence will not adversely impact existing and/or planned agriculture or urban development.
    - Implementation Measure 4.1: Where surface runoff drains directly into wetland and riparian environments, measures to reduce siltation and pollutant levels, consistent with applicable state and federal guidelines, shall be implemented.
    - Implementation Measure 4.2: The County shall coordinate with the Resource Conservation District to support development and implementation of programs that facilitate the preservation and restoration of natural wetland environments.

#### 1.3.16.2.2 Fish and Wildlife Habitat

- ◆ **Goal 4.C:** Protect and enhance habitats that support fish and wildlife species.
  - **Policy 4.C-3:** The County shall support the preservation and re-establishment of fisheries in the rivers and streams within the County.
  - **Policy 4.C-4:** The County should participate in the process of developing mitigation programs for threatened and endangered species to ensure that Sutter County’s agricultural, economic, fiscal, and future urbanization and natural resource goals and policies are met.
  - **Policy 4.C-5:** The County supports the preservation and protection of waterfowl resources and their habitat.

- 1 • **Policy 4.C-6:** The County encourages the preservation of existing wildlife corridors between  
2 natural habitat areas to maintain biodiversity and prevent the creation of biological islands.  
3 This would also include promoting the re-establishment of previous corridors where feasible.

- 4 • **Policy 4.C-7:** The County encourages the preservation of rare, threatened, or endangered  
5 animal species.

### 6 1.3.16.2.3 Vegetation

- 7 ♦ **Goal 4.D:** Preserve and protect the vegetation resources of Sutter County.

- 8 • **Policy 4.D-1:** The County shall encourage the preservation of important areas of natural  
9 vegetation, including, but not limited to, oak woodlands, riparian areas, and vernal pools.

- 10 • **Policy 4.D-2:** The County encourages the preservation of rare, threatened, or endangered  
11 plant species.

- 12 • **Policy 4.D-3:** The County shall require that new development projects avoid, to the  
13 maximum extent possible, ecologically-fragile areas (e.g., areas of rare, threatened or  
14 endangered species of plants, riparian areas, vernal pools).

- 15 • **Policy 4.D-4:** The County shall strive to protect major groves of native trees located in the  
16 unincorporated areas of the County.

- 17 • **Policy 4.D-5:** The County shall encourage the use of native and drought tolerant plant  
18 materials in all public and private revegetation/landscaping projects.

- 19 - **Implementation Measure 4.3:** The County shall prepare a Preferred Plant Material List  
20 of native and drought tolerant plant materials. Public and private development projects  
21 shall incorporate plant materials from the Preferred Plant Material List within their  
22 landscape plans. (See Implementation Program 3.4) Responsibility: Community Services  
23 Department.

- 24 - **Implementation Measure 4.4:** The County shall incorporate native and drought tolerant  
25 plant materials in future County buildings, facilities, and parks.

### 26 1.3.16.2.4 Open Space for the Preservation of Natural Resources

- 27 ♦ **Goal 4.E:** Conserve, protect, and enhance open space lands and natural resources in Sutter  
28 County.

- 29 • **Policy 4.E-1:** The County shall support the preservation of natural land forms, natural  
30 vegetation, and natural resources as open space to the maximum extent feasible.

## 31 1.3.17 City of Rio Vista General Plan

32 The *City of Rio Vista General Plan 2001* was adopted on July 18, 2002. The general plan's Resource  
33 Conservation and Management Element addresses conservation of resources, including biological  
34 resources. The following policies from this element of the plan are applicable to the proposed project  
35 (City of Rio Vista 2002):

- 36 ♦ **Policy 10.4.D:** The City shall require new development to mitigate wetland loss in both regulated  
37 and non-regulated wetlands to achieve "no net loss" through any combination of the following, in  
38 descending order of their desirability: (1) avoidance; (2) where avoidance is not possible,  
39 minimization of impacts on the resource; or (3) compensation that provides the opportunity to  
40 mitigate impacts on rare, threatened, and endangered species or the habitat that supports these  
41 species in wetland and riparian areas.

- 1       ♦ **Policy 10.4.E:** The City shall require new private or public developments to preserve and  
2       enhance existing native riparian habitat, unless public safety concerns require removal of habitat  
3       for flood control or other public purposes.

### 4    **1.3.18 Yolo County General Plan**

5    The *Yolo County General Plan* was adopted on July 17, 1983. The general plan integrates, by reference,  
6    locally effective parts of the DPC's *Land Use and Resource Management Plan for the Primary Zone of*  
7    *the Delta*. In May 2003, the Yolo County Board of Supervisors gave direction to begin the process for a  
8    comprehensive update to the county's general plan. The *2030 Countywide General Plan* was adopted on  
9    November 10, 2009. Several policies from the Conservation and Open Space Element are applicable to  
10   the proposed project (Yolo County 2009):

- 11       ♦ **Policy CO-2.3:** Preserve and enhance those biological communities that contribute to the  
12       county's rich biodiversity including blue oak and mixed oak woodlands, native grassland prairies,  
13       wetlands, riparian areas, aquatic habitat, agricultural lands, heritage valley oak trees, remnant  
14       valley oak groves, and roadside tree rows.
- 15       ♦ **Policy CO-2.4:** Coordinate with other regional efforts (e.g., Yolo County HCP/NCCP [Habitat  
16       Conservation Plan/Natural Community Conservation Plan]) to sustain or recover special-status  
17       species populations by preserving and enhancing habitats for special-status species.
- 18       ♦ **Policy CO-2.9:** Protect riparian corridors to maintain and balance wildlife values.
- 19       ♦ **Policy CO-2.10:** Encourage the restoration of native habitat.
- 20       ♦ **Policy CO-2.16:** Existing native vegetation shall be conserved where possible and integrated into  
21       new development if appropriate.

### 22   **1.3.19 West Sacramento General Plan**

23   The *West Sacramento General Plan* was adopted on May 3, 1990, and amended on multiple occasions,  
24   including the most recent revision on December 8, 2004 (City of West Sacramento 1990). The plan  
25   contains the following goals and policies to protect sensitive native vegetation and wildlife communities  
26   and habitat in West Sacramento. The general plan also directs the City to prepare and adopt a habitat  
27   conservation program in conjunction with other jurisdictions.

- 28       ♦ **Goal C:** To protect sensitive native vegetation and wildlife communities and habitat in West  
29       Sacramento.
  - 30           • **Policy 1:** The City shall encourage and support development projects and programs that  
31           enhance public appreciation and awareness of the natural environment.
  - 32           • **Policy 2:** The City shall support state and federal policies for preservation and enhancement  
33           of riparian and wetland habitats by incorporating, as deemed appropriate, the findings and  
34           recommendations of the Sacramento Greenway Plan, California Department of Fish and  
35           Game and the U.S. Fish and Wildlife Service into site-specific development proposals.
  - 36           • **Policy 3:** The City shall require site-specific surveys to identify significant wildlife habitat  
37           and vegetation resources for development projects located in or near riparian or wetland  
38           areas.
  - 39           • **Policy 4:** The City shall support mitigation measures which provide for no net loss of riparian  
40           or wetland habitat acreage and value by regulating development in and near these habitats  
41           and promoting projects that avoid sensitive areas. Where habitat loss is unavoidable, the City

- 1 shall seek replacement on at least a 1:1 basis. Replacement entails creating habitat that is  
2 similar in extent and ecological value to that displaced by the project. The replacement  
3 habitat should consist of locally occurring, native species and shall be located as close as  
4 possible to the project site or be part of a larger replacement habitat project.
- 5 • **Policy 5:** To minimize disturbance to wildlife, the City shall require the provision and  
6 maintenance of an adequate setback between significant wetland habitat and adjacent  
7 development. The buffer shall be landscaped with native or compatible introduced  
8 ornamental vegetation and may be used for passive recreation purposes.
  - 9 • **Policy 6:** The City shall encourage the maintenance of marsh and riparian vegetation along  
10 irrigation/drainage canals and along the Deep Water Ship Channel by encouraging that  
11 routine maintenance and clearing disturb only one bank per year and maintain the fringes of  
12 marsh vegetation.
  - 13 • **Policy 7:** The City shall seek to minimize the loss or degradation of wetland and riparian  
14 habitats at the following sites: Lake Washington and associated wetlands; Bee Lakes and  
15 associated riparian woodlands; riparian woodlands along the Sacramento River north of the  
16 I Street Bridge and south of the barge canal; and riparian woodlands along the Deep Water  
17 Ship Channel and the Yolo Bypass.
  - 18 • **Policy 8:** The City shall seek a cooperative effort with other jurisdictions, the State, and the  
19 federal government to conserve habitat. The goal of this effort shall be to preserve and  
20 enhance habitat values in appropriate large areas while allowing the orderly development  
21 within the incorporated areas of the County.
  - 22 • **Policy 9:** The City shall seek to preserve populations of rare, threatened, and endangered  
23 species by ensuring that development does not adversely affect such species or by fully  
24 mitigating adverse effects.
  - 25 • **Policy 10:** The City shall not approve projects that would cause unmitigatable impacts on  
26 rare, threatened, or endangered wildlife or plant species.
  - 27 • **Policy 11:** The City shall implement measures to ensure that development in the city does not  
28 adversely affect fishery resources in the Sacramento River, Deep Water Ship Channel, and  
29 Lake Washington.
  - 30 • **Policy 12:** Public access and recreation facilities shall not eliminate or degrade riparian  
31 habitat values. Trails, picnic areas, and other developments shall be sited to minimize impacts  
32 on sensitive wildlife habitat or riparian vegetation.
  - 33 • **Policy 13:** The City shall promote the use of native plants, especially valley oaks, for  
34 landscaping roadsides, parks, and private properties. In particular, native plants should be  
35 used along the Sacramento River and in areas adjacent to riparian and wetland habitats.
  - 36 • **Policy 14:** Golf course development shall incorporate, to the maximum extent possible, areas  
37 of native vegetation and wildlife habitat.

### 38 1.3.20 Alameda County East County Area Plan

39 Land use planning in the eastern portion of Alameda County is governed by the *East County Area Plan*,  
40 which was adopted by the county in 1994. In 2000, the Alameda County electorate approved Measure D,  
41 the Save Agriculture and Open Space Lands Initiative, which amended portions of the county's general  
42 plan, including the *East County Area Plan* (Alameda County 2000). The Sensitive Lands and Regionally  
43 Significant Open Space Element of the *East County Area Plan* includes the following policies to support

- 1 the goal to protect regionally significant open space and agricultural land from development which may  
2 affect biological resources covered by the Delta Plan (Alameda County 2000).
- 3 ♦ **Policy 52:** The County shall preserve open space areas for the protection of public health and  
4 safety, provision of recreational opportunities, production of natural resources (e.g., agriculture,  
5 windpower, and mineral extraction), protection of sensitive viewsheds, preservation of biological  
6 resources, and the physical separation between neighboring communities.
- 7 ♦ **Policy 53:** The County shall preserve a continuous band of open space consisting of a variety of  
8 plant communities and wildlife habitats to provide comprehensive, rather than piecemeal, habitat  
9 conservation for all of East County. This open space should, as much as possible, be outside of  
10 the Urban Growth Boundary and contiguous to large open space areas of Contra Costa, Santa  
11 Clara, and San Joaquin Counties.
- 12 ♦ **Policy 60:** The County shall encourage active public use of publicly-owned open space lands  
13 close to existing and planned communities in locations where such use does not conflict with the  
14 protection of biological resources.
- 15 ♦ **Policy 63:** The County shall require that open space within developed areas be designed and  
16 maintained to minimize fire hazards and ensure compatibility between development and any  
17 significant biological resources.

## 18 1.4 References

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25 Resolution No. 02-62. Community Development Department. Rio Vista, CA.
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30 Administrative Law October 7, 2010, effective November 6, 2010. Walnut Grove, CA.
- 31 Sacramento County. 1997. Open Space Element of the *County of Sacramento General Plan*. Adopted  
32 December 15, 1993. Includes revisions as of May 2, 1997. Sacramento, CA.
- 33 Sacramento County. 2007. Conservation Element of the *County of Sacramento General Plan*. Adopted  
34 December 15, 1993. Includes revisions as of August 29, 2007. Sacramento, CA.
- 35 San Joaquin County. 1992. *San Joaquin County General Plan*. Volume I. Stockton, CA. July.
- 36 Solano County. 2008a. *Solano County General Plan*. Fairfield, CA. December.
- 37 Solano County. 2008b. Suisun Marsh policy addendum of Appendix C of the *Solano County General*  
38 *Plan*. Fairfield, CA. December.

- 1 Sutter County. 2006. *Sutter County General Plan*. Adopted 1996. Includes revisions as of December 12,
- 2 2006. Yuba City, CA.
- 3 Yolo County. 2009. *2030 Countywide General Plan*. Woodland, CA.



# Appendix F-3

## Special-status Plant Species Accounts for the Delta and Suisun Marsh

### 1.1 Introduction

This appendix contains accounts of special-status plant species that have the potential to exist in the Delta and Suisun Marsh.

Information was compiled and reviewed to develop lists of and describe special-status plant species that are known to exist, could potentially exist, or historically existed in the Delta and Suisun Marsh. Several data sources were used to develop these lists: records from the California Department of Fish and Game's (DFG) California Natural Diversity Database (CNDDDB) (CNDDDB 2010) and the California Native Plant Society's (CNPS) Electronic Inventory of Rare and Endangered Plants of California (CNPS 2010). The following U.S. Geological Survey 7.5-minute quadrangles encompass the Delta and Suisun Marsh and were searched in the CNDDDB and CNPS inventory: Bouldin Island, Brentwood, Bruceville, Clarksburg, Clifton Court Forebay, Courtland, Florin, Holt, Isleton, Jersey Island, Liberty Island, Lodi South, Rio Vista, Saxon, Stockton West, Terminous, Thornton, Union Island, Woodward Island, Altamont, Antioch North, Antioch South, Birds Landing, Byron Hot Springs, Davis, Dozier, Galt, Lathrop, Lodi North, Midway, Sacramento East, Sacramento West, Clayton, Dixon, Honker Bay, Ripon, Tracy, Vernalis, Cordelia, Fairfield South, Denverton, Benicia, and Vine Hill.

These quadrangles provided adequate coverage of the Delta and Suisun Marsh.

“Special-status species,” as defined in this document, are plant species legally protected under the federal Endangered Species Act (ESA) or California Endangered Species Act (CESA) or other State regulations, and species considered sufficiently rare by the scientific community to warrant conservation concern.

Special-status species considered in this appendix include those plant species included in one of the following categories:

- ◆ Federally listed as threatened or endangered
- ◆ Proposed for federal listing as threatened or endangered
- ◆ Candidate for federal listing
- ◆ State listed as threatened or endangered
- ◆ State listed as rare
- ◆ Candidate for State listing
- ◆ Plant species with a California Rare Plant Rank (CRPR) of 1A, 1B, 2, and 3

1 For each of the plant species addressed below, information is provided about the legal status, distribution,  
 2 relevant natural history, and threats. For listed species, information is also provided on relevant  
 3 conservation efforts and guidance.

4 CRPR categories were developed jointly by DFG and CNPS. They are listed in the CNDDDB and CNPS  
 5 Inventory of Rare and Endangered Plants of California. The CRPR categories presented in the text are  
 6 defined as follows (DFG 2011):

- 7 1A = Plants presumed to be extinct
- 8 1B = Plants rare, threatened, or endangered in California and elsewhere
- 9 2 = Plants rare, threatened, or endangered in California but more common elsewhere
- 10 3 = Plants about which more information is needed (a review list)
- 11 4 = Plants of limited distribution (a watch list)

12 The following extensions are used in some of the CRPR categories presented in the species accounts:

- 13 .1 = Seriously endangered in California (>80 percent of occurrences are threatened and/or  
 14 high degree and immediacy of threat)
- 15 .2 = Fairly endangered in California (20 to 80 percent of occurrences are threatened)

## 16 1.2 Species Accounts

17 The species accounts in this appendix provide an overview of federally or State-listed special-status plants  
 18 known to occur or have an appreciable likelihood of occurring in the Delta and Suisun Marsh or are  
 19 otherwise likely to be substantially affected by the Delta Plan. Table F-3-1 lists identified plant species  
 20 that were removed from further discussion in this document because they are not likely to be affected by  
 21 the Delta Plan.

**Table F-3-1**  
 Special-status Plant Species That Are Not Likely to Be Affected by the Delta Plan

Common Name	Scientific Name	Listing Status			Reason Not Likely Affected
		Federal <sup>a</sup>	State <sup>b</sup>	CRPR <sup>c</sup>	
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
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

**Table F-3-1**  
Special-status Plant Species That Are Not Likely to Be Affected by the Delta Plan

Common Name	Scientific Name	Listing Status			Reason Not Likely Affected
		Federal <sup>a</sup>	State <sup>b</sup>	CRPR <sup>c</sup>	
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
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

**Table F-3-1**  
**Special-status Plant Species That Are Not Likely to Be Affected by the Delta Plan**

Common Name	Scientific Name	Listing Status			Reason Not Likely Affected
		Federal <sup>a</sup>	State <sup>b</sup>	CRPR <sup>c</sup>	
Mt. Diablo bird's-beak	<i>Cordylanthus nidularius</i>	–	R	1B	No suitable serpentine habitat in the Delta and Suisun Marsh
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
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
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
Nodding harmonia	<i>Harmonia nutans</i>	–	–	4	Occurs only at higher elevation
Diablo helianthella	<i>Helianthella castanea</i>	–	–	1B	Occurs only at higher elevation
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

**Table F-3-1**  
Special-status Plant Species That Are Not Likely to Be Affected by the Delta Plan

Common Name	Scientific Name	Listing Status			Reason Not Likely Affected
		Federal <sup>a</sup>	State <sup>b</sup>	CRPR <sup>c</sup>	
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
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
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

**Table F-3-1**  
**Special-status Plant Species That Are Not Likely to Be Affected by the Delta Plan**

Common Name	Scientific Name	Listing Status			Reason Not Likely Affected
		Federal <sup>a</sup>	State <sup>b</sup>	CRPR <sup>c</sup>	
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
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> <i>ssp. 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: CNDDB 2010, CNPS 2010

<sup>a</sup> **U.S. Fish and Wildlife Service—Federal Listing Categories:**

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

<sup>b</sup> **California Department of Fish and Game—State Listing Categories:**

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

<sup>c</sup> **California Rare Plant Rank:**

- 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)

1 The special-status plant species accounts provided below present an overview of each species' listing  
2 status, known distribution in California and the Delta and Suisun Marsh, description of the plant,  
3 information on life history, habitat requirements, and known threats. The species are featured in  
4 alphabetical order by scientific name. Information in these accounts was compiled from many of the same  
5 sources used to prepare Section 4, Biological Resources. Table 4-1, Special-Status Plant Species Known  
6 to Occur or with Potential to Occur in the Delta and Suisun Marsh, presents a comprehensive list of the  
7 special-status plant species known to occur or have the potential to occur in the Delta and Suisun Marsh.

## 8 1.2.1 Alkali Milk-vetch

9 Alkali milk-vetch (*Astragalus tener* var. *tener*) is a CRPR 1B.2 species.

10 Alkali milk-vetch was historically distributed throughout the southern Sacramento Valley, northern San  
11 Joaquin Valley, and San Francisco Bay Area but is believed to be extirpated from all historic occurrences  
12 except those in Alameda, Merced, Solano, and Yolo counties (CNPS 2010). Its elevation range is up to  
13 2,000 feet. Several reported occurrences are known from the Delta. Small groups of up to 20 plants are  
14 found on suitable habitat throughout the Tule Ranch in the southern part of the Yolo Bypass (Witham  
15 2003). South of that location, the species has been observed one-fourth mile south of Saxon Station. To  
16 the west, it was reported as observed growing in clay soils west of Bunker Station. To the south, multiple  
17 sightings have been observed in vernal wet grassland in the Jepson Prairie Preserve and adjacent  
18 properties. Further south, alkali milk-vetch was observed in an alkaline vernal pool in the Montezuma  
19 Wetlands Restoration Project area. On the southwest edge of the Delta, it has been observed in alkaline  
20 grassland vegetation northwest of the junction of Byron Hot Springs Road and Armstrong Road (CNDDDB  
21 2010). A previous instance observed in the Stockton area near Smith Canal is believed to be extirpated  
22 (CNDDDB 2010).

23 Alkali milk-vetch is a herbaceous annual plant in the pea family (Fabaceae) that grows 2 to 16 inches tall  
24 (Hickman 1993). It is distinguished from Ferris' milk-vetch (*Astragalus tener* var. *ferrisiae*), which  
25 co-occurs, based on the morphology of its fruits. Alkali milk-vetch has short, stout, strongly curved pods  
26 (Liston 1990, 1992 as cited in USFWS 2001). Its leaves are 1 to 3 inches long, with 7 to 17 pinnately  
27 compound, well-separated leaflets. Three to 12 pink-purple, pealike flowers form a dense inflorescence.

28 The main threat to the survival of alkali milk-vetch is conversion of habitat to agricultural land uses  
29 (CNPS 2010). Competition from nonnative species is another threat. Livestock grazing is frequently  
30 mentioned as a possible threat in CNDDDB occurrence reports, but some level of grazing may be beneficial  
31 to control competition from nonnative species. Because remaining populations are small and scattered,  
32 extirpation from random events such as flood, drought, or disease is also a concern (USFWS 2005).

## 33 1.2.2 Suisun Thistle

34 Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*) is a CRPR 1B.1 species. It is listed as endangered  
35 under the ESA. It is not listed under CESA. USFWS recently designated critical habitat that specifies the  
36 protection of Suisun thistle populations in three areas that contain the largest and most intact populations  
37 and habitat (72 *Federal Register* [FR] 18517).

38 In 1975, Suisun thistle was presumed to be extinct because it had not been observed for 15 years  
39 (62 FR 61916; USFWS 2009a); however, during extensive surveys conducted at the Suisun Marsh in  
40 1989, this species was rediscovered at two locations (62 FR 61916; USFWS 2009a). Recent surveys have  
41 found Suisun thistle within relict undiked high tidal marshes at Rush Ranch, the Joice Inland portion of  
42 the Grizzly Island Wildlife Area, and the Peytonia Slough Ecological Reserve (Fiedler et al. 2007).  
43 Thousands of plants were observed at Rush Ranch, much smaller numbers were observed at Grizzly

1 Island Wildlife Area, and the population at the Peytonia Slough Ecological Reserve had declined to a  
2 single plant in 1996 (USFWS 2009a).

3 Suisun thistle is a 3- to 7-foot-tall plant in the sunflower family. Most known occurrences are found in  
4 regularly flooded and permanently saturated habitats, along the banks of canals or ditches, within 50 to  
5 100 feet of the high-water mark of natural tidal channels, as well as on tidal floodplains within tidal  
6 marshes. Habitat for the species does not occur within diked seasonal wetlands with drainage ditches that  
7 are dry part of the year. However, permanent ponds and perennially flooded tidal ditches that supply such  
8 ponds within managed marsh may potentially harbor *C. hydrophilum* var. *hydrophilum* (72 FR 18517).

9 Current threats to Suisun thistle include the nonnative and highly invasive perennial pepperweed, feral  
10 pigs, and fire during sensitive periods of the species' lifecycle (Fiedler et al. 2007; USFWS 2009a). Other  
11 potential but unquantified threats include hybridization with bull thistle (*Cirsium vulgare*) and seed  
12 predation by the introduced biocontrol thistle weevil (*Rhinocyllus conicus*) (Fiedler et al. 2007; USFWS  
13 2009a).

### 14 1.2.3 Soft Bird's-beak

15 Soft bird's-beak (*Cordylanthus mollis* ssp. *mollis*) is a CRPR 1B.2 species. It is listed as endangered  
16 under the ESA and listed as rare under the California Native Plant Protection Act). The U.S. Fish and  
17 Wildlife Service (USFWS) recently designated critical habitat that specifies the protection of soft  
18 bird's-beak populations in the four areas that contain the largest and most intact populations and habitat  
19 (71 FR 67089, November 20, 2006).

20 There are 18 known occurrences of soft bird's-beak, and 8 of these are known or believed to be  
21 extirpated. The remaining 10 occurrences are widely scattered throughout San Pablo and Suisun bays in  
22 Contra Costa, Napa, and Solano counties (CNDDDB 2010). A single occurrence has been reported in the  
23 Delta in Sacramento County along the north bank of the San Joaquin River, immediately west of the  
24 Antioch Bridge (CNDDDB 2010). This occurrence was last observed in 1972 and may have been  
25 extirpated, but there are no additional data describing the site, which aerial photographs now show to be a  
26 ripped shoreline. No voucher specimen for this occurrence is on record at any California herbarium  
27 (Consortium of California Herbaria 2008).

28 Soft bird's-beak is a semiparasitic annual plant in the figwort family. It grows 10 to 16 inches tall and  
29 occurs in coastal salt marshes and brackish marshes (Hickman 1993). The species is restricted to a narrow  
30 tidal band, typically in a marsh's higher elevation zones, growing with species such as saltgrass,  
31 pickleweed (*Salicornia virginica*), jaumea (*Jaumea carnosa*), and spearscale (*Atriplex triangularis*). The  
32 remaining populations range in size from a single individual to more than 100,000 plants, and within  
33 populations the number of individuals fluctuates considerably from year to year, often by more than an  
34 order of magnitude.

35 Conversion of wetlands to other land uses has contributed to the decline of soft bird's-beak. Current  
36 threats to the remaining populations include competition from nonnative plants (in particular pepperweed  
37 [*Lepidium latifolium*]), alteration of wetland hydrology (including trenching of wetlands for mosquito  
38 abatement and diking), grazing and trampling, and erosion (CNDDDB 2010; CNPS 2010).

### 39 1.2.4 Palmate-bracted Bird's-beak

40 Palmate-bracted bird's-beak (*Cordylanthus palmatus*) is federally and State listed as endangered and is a  
41 CRPR 1B.1 species.

42 Seven known populations of palmate-bracted bird's-beak exist: four in the Sacramento Valley, one in the  
43 Livermore Valley, and two in the San Joaquin Valley. The elevation range of this species is 15 to

1 500 feet. There are no known occurrences of palmate-bracted bird's-beak in the Delta and Suisun Marsh,  
2 but suitable habitat exists around Clifton Court Forebay.

3 Palmate-bracted bird's-beak is a hemiparasitic annual herb species in the figwort family. Saltgrass is  
4 believed to be the host plant for this species. Palmate-bracted bird's-beak is glandular and softly hairy and  
5 is typically 4 to 12 inches tall. The flower corollas are whitish with pale lavender sides, and they bloom  
6 between June and September. This species grows in alkaline soils in chenopod scrub and valley and  
7 foothill grassland habitat. It is found primarily at the edges of channels with individuals scattered in  
8 seasonally wet depressions, alkali scalds, and grassy areas (CNDDDB 2010).

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

## 11 1.2.5 Delta Button-celery

12 Delta button-celery (*Eryngium racemosum*) is State listed as endangered and is a CRPR 1B.1 species. Of  
13 approximately 26 occurrences of Delta button-celery recorded in the CNDDDB, several have been  
14 extirpated, including all occurrences in San Joaquin County and most in Stanislaus County. Most of the  
15 extant occurrences are in Merced County along the San Joaquin River, including four in the West Bear  
16 Creek Unit and several in Great Valley Grasslands State Park. The species' elevation range is 10 to  
17 100 feet. Delta button-celery is known to occur in two locations in the Delta: one on the alluvial plain of  
18 Kellogg and Marsh creeks immediately west of Discovery Bay and one along the San Joaquin River  
19 northeast of Tracy (CNDDDB 2010). The population near Discovery Bay was last observed in 1998, in a  
20 small area with approximately 1,500 individuals in alkali sink habitat with iodine bush (*Allenrolfea*  
21 *occidentalis*), alkali heath (*Frankenia salina*), and saltgrass (CNDDDB 2010). The other occurrence in the  
22 Delta, located approximately 3 miles south of Lathrop, was first observed in 1984 and is believed to have  
23 been subsequently extirpated owing to development of a walnut orchard (CNDDDB 2010).

24 Delta button-celery, a perennial herbaceous member of the carrot family (Apiaceae), has prostrate or  
25 decumbent stems that are branched above the basal rosettes. The tiny flowers are produced in small heads  
26 subtended by spiny bracts, are white to faintly purplish, and bloom between June and September. This  
27 species is found on clay soils in seasonally inundated floodplain depressions in riparian scrub habitat.  
28 Disturbance also may be important in creating and maintaining, or conversely in eliminating, habitat for  
29 this species. Much of the occupied habitat is inundated periodically, and recently deposited fine sediment  
30 has been observed at several occupied sites (CNDDDB 2010). Several occupied sites also experience  
31 grazing and various anthropogenic disturbances (e.g., from off-road vehicles, road maintenance).

32 Delta button-celery is threatened by agricultural conversion and flood control activities (CNPS 2010).

## 33 1.2.6 Contra Costa Wallflower

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

39 Contra Costa wallflower grows naturally only in sand dune habitat along the San Joaquin River east of  
40 Antioch. It forms a persistent dormant seed bank. Areas of suitable habitat (riverine or wind-blown sandy  
41 soils near Antioch) that do not contain visible vegetative, reproductive, or senescent/dead plants may  
42 support viable seed banks.

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

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

### 13 1.2.7 Boggs Lake Hedge-hyssop

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

16 Boggs Lake hedge-hyssop is found in the northern portion of the Central Valley and in the foothills of the  
17 inner North Coast Ranges, Sierra Nevada, and Cascade Range from Fresno County north into Oregon  
18 (CNDDDB 2010; CNPS 2010). The primary area of concentration is the Modoc Plateau. Boggs Lake  
19 hedge-hyssop occurs in large numbers on the Jepson Prairie in Solano County. Five populations have  
20 been reported on and in the vicinity of Jepson Prairie Preserve. Population sizes range from a hundred to a  
21 million plants (CNDDDB 2010; CNPS 2010). These occurrences are just outside of the Delta.

22 Boggs Lake hedge-hyssop is an annual herb, less than 4 inches tall, in the figwort family. The upper  
23 portion of the plant is glandular-sticky. The leaves and sepals (outer floral structures) are truncate, the  
24 latter unequally fused. The small tubular flowers are yellow, except for the three white lower lobes, and  
25 are borne singly in the upper leaf-axils (Hickman 1993; CNPS 2010).

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

34 Boggs Lake hedge-hyssop plants are threatened by agricultural conversion, urban development, intensive  
35 grazing and trampling, nonnative species, and off-road vehicles (CNDDDB 2010; CNPS 2010). Moderate  
36 grazing is believed to be a compatible use if it occurs after seeds are set (USFWS 2005).

### 37 1.2.8 Contra Costa Goldfields

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

42 Contra Costa goldfields inhabits seasonal wetlands including vernal pools and swales, moist flats and  
43 depressions in mesic grasslands with typically clay or alkaline soils generally below 200 feet, though

1 some occurrences are recorded from above 1,000 feet. Historically Contra Costa goldfields was  
2 distributed from the North Coast, southern Sacramento Valley, and the San Francisco Bay to the south  
3 Coast in seven vernal pool regions, Central Coast, Lake-Napa, Livermore, Mendocino, Santa Barbara,  
4 Santa Rosa, and Solano-Colusa and outside of defined vernal pool regions in Contra Costa County. It is  
5 currently extant in Mendocino, Napa, Marin, Contra Costa, Alameda, Solano, and Monterey counties  
6 (USFWS 2005; USFWS 2008; USFWS 2010).

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

## 15 1.2.9 Mason's Lilaepsis

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

18 The range of Mason's lilaepsis extends from Napa and Solano counties in the north to Contra Costa and  
19 Alameda counties in the south, and from Marin County in the west to Sacramento and San Joaquin  
20 counties in the east (CNDDDB 2010). Although population trends of Mason's lilaepsis have not been  
21 documented, this species has been determined to be stable to declining (CNDDDB 2010). According to  
22 CNPS, occurrences of Mason's lilaepsis in California are highly limited, and the species is at serious  
23 risk throughout its range. Mason's lilaepsis is found throughout the Delta and Suisun Marsh along rivers  
24 and sloughs (CNDDDB 2010). Most occurrences are known from the central and west Delta. In the south  
25 Delta, occurrences are predominately along Old River and Middle River. In the north Delta, it occurs in  
26 the Cache Slough Complex and near Delta Meadows State Park.

27 Mason's lilaepsis is a small (up to 3 inches tall), rhizomatous, perennial herb in the carrot family. The  
28 threadlike leaves with obscure internal cross-walls are tufted on creeping stems. The inflorescences  
29 consist of few-flowered umbels of tiny white or maroon flowers (Hickman 1993; CNPS 2010). It flowers  
30 from April to November and produces narrow, grasslike, bright green leaves and small, inconspicuous  
31 flowers in umbels.

32 Mason's lilaepsis grows in regularly flooded tidal zones; on mudbanks and flats along erosional  
33 creekbanks, sloughs, and rivers (Fiedler and Zebell 1993); and in freshwater marshes, brackish marshes,  
34 and riparian scrubs that are influenced by saline water. It is a colonizing species (i.e., it "exploits" newly  
35 deposited or exposed sediments). Mason's lilaepsis occurs with other rare plants, such as delta mudwort  
36 (*Limosella subulata*), Suisun Marsh aster (*Symphotrichum lentum*), and delta tule pea. It blooms from  
37 April through November (CNDDDB 2010; CNPS 2010).

38 Mason's lilaepsis is threatened by erosion, bank and channel stabilization, flood-control projects,  
39 development, and agricultural conversion. In some areas, it is also threatened by trampling by fishermen  
40 and encroachment of water hyacinth (*Eichhornia crassipes*), an extremely invasive aquatic plant  
41 (CNDDDB 2010; CNPS 2010).

## 42 1.2.10 Colusa Grass

43 Colusa grass (*Neostapfia colusana*) is federally listed as Threatened, state listed as Endangered, and  
44 CRPR 1B.1. A recovery plan was established in 2005 (USFWS 2005) and critical habitat was designated

1 in 2006 (71 FR 7117, February 10, 2006). Colusa grass is a covered species in the Habitat Conservation  
2 Plan for the Natomas Basin in Sacramento and Sutter Counties

3 Colusa grass grows in large or deep vernal pools with substrates of high mud content. It is found at the  
4 edges of alkaline basins and vernal pools in the Sacramento and San Joaquin valleys and on acidic soils of  
5 alluvial fans and stream terraces at the eastern margin of the San Joaquin Valley and adjacent foothills  
6 (USFWS 2005; USFWS 2009b). Currently, no more than 43 occurrences of Colusa grass remain extant.  
7 The majority of the extant occurrences are in the southern Sierra Foothills, where they are concentrated  
8 northeast of the City of Merced in Merced County and east of Hickman in Stanislaus County. The closest  
9 occurrence of Colusa grass to the Delta is immediately adjacent to the northwest boundary in Grasslands  
10 County Park south of Davis, also the location of Critical Habitat Unit 1 (CNPS 2010).

11 Colusa grass is a robust, tufted annual in the grass family (Poaceae) that grows 3-12 inches tall. The plant  
12 is pale-gray-green when young turning brown as it ages due to the hardening of sticky, glandular exudates  
13 on the stems. The lower portions of the stems lie on the ground; the upper portions are erect and terminate  
14 in dense cylindrical, spike-like inflorescences that superficially resemble small ears of corn. The  
15 blooming period is May to August (CNPS 2010; USFWS 2009b). The two biggest threats to Colusa grass  
16 agricultural conversion and development, especially in Stanislaus and Merced counties, respectively.  
17 Other threats are herbicide contaminated runoff, contaminated groundwater by industrial chemicals, flood  
18 control and alteration of hydrology, inappropriate grazing practices, and competition from nonnative  
19 plants.

## 20 1.2.11 Antioch Dunes Evening Primrose

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

25 The historic range of Antioch Dunes evening primrose is unknown and open to speculation. Presumably,  
26 it was limited to the sandy soil type (Oakley or Delhi sand) found near the town of Antioch and over a  
27 substantial portion of eastern Contra Costa County. Nevertheless, no known evidence demonstrates that  
28 the subspecies historically occupied any area other than the Antioch Dunes proper. The subspecies has  
29 been transplanted to Brannan Island State Recreation Area. There are also two small colonies on Brown's  
30 Island in Contra Costa County. The most recently discovered population is located on private property  
31 north of Oakley. The subspecies now occurs in several locations near the confluence of the Sacramento  
32 and San Joaquin rivers. The only natural stand exists in the sand dunes near Antioch in Contra Costa  
33 County.

34 Antioch Dunes evening primrose is an herbaceous annual in the evening primrose family (Onagraceae). It  
35 grows 15 to 30 inches tall and is grayish green with spreading hairs and wavy-lobed leaves. White to pink  
36 flowers are 0.8 to 1.6 inches long, have obtuse tips in bud, and bloom between March and September.  
37 Antioch Dunes evening primrose occurs at elevations of zero to 100 feet on sandy bluffs and dunes  
38 (Hickman 1993; CNPS 2010).

39 The extent and quality of habitat for Antioch Dunes evening primrose has declined substantially as a  
40 result of recent land use changes and because of human disturbance and the spread of nonnative invasive  
41 plants. Inland dunes are now restricted to 67 acres within the approved boundary of the Antioch Dunes  
42 NWR, which includes 12 acres of land owned by the Pacific Gas and Electric Company and some lands  
43 on the adjoining properties owned by Kemwater North American Company and Georgia-Pacific (USFWS  
44 2001). Because the primrose prefers disturbed sites with nearly pure sand, it is vulnerable to  
45 encroachment from nonnative weedy species, which has been identified as the primary threat to the  
46 primrose (USFWS 2001).

## 1.2.12 Solano Grass

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

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

Solano grass occurs in alkaline vernal pools or playa pools within annual grassland. It is a grayish-green, small, hairy, 1- to 8-inch-long semi-aquatic annual grass with decumbent stems that turn up only at the tips. The stems and leaves are covered with sticky, acrid secretions characteristic of the genus. The leaves lack ligules and the lemma bract terminates in a single sharp tooth. Solano grass blooms from June to July. The 0.3- to 4-inch flowering spike contains 7 to 19 overlapping spiklets and remains partially sheathed by the uppermost leaf (Hickman 1993; USFWS 2009c; USFWS 2009d).

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

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# Appendix F-4 Special-status Fish and Wildlife Species Accounts for the Delta and Suisun Marsh

## 1.1 Introduction

This appendix contains accounts of special-status fish and wildlife species that have potential to occur in the Delta and Suisun Marsh, which encompasses the Sacramento–San Joaquin Delta (Delta) and Suisun Marsh.

Information was compiled and reviewed to develop lists of and describe special-status wildlife species that are known to occur, could potentially occur, or historically have occurred in the Delta and Suisun Marsh. Several data sources were used to develop these lists: records from the California Department of Fish and Game’s (DFG) California Natural Diversity Database (CNDDDB) (CNDDDB 2010), and U.S. Fish and Wildlife Service (USFWS) species lists. The following U.S. Geological Survey 7.5-minute quadrangles encompass the Delta and Suisun Marsh and its vicinity and were searched in the CNDDDB: Altamont, Antioch North, Antioch South, Benicia, Birds Landing, Bouldin Island, Brentwood, Bruceville, Byron Hot Springs, Clarksburg, Clayton, Clifton Court Forebay, Cordelia, Courtland, Davis, Denverton, Dixon, Dozier, Fairfield South, Florin, Galt, Holt, Honker Bay, Isleton, Jersey Island, Lathrop, Liberty Island, Lodi North, Lodi South, Midway, Rio Vista, Ripon, Sacramento East, Sacramento West, Saxon, Stockton West, Terminous, Thornton, Tracy, Union Island, Vernalis, Vine Hill, and Woodward Island. These quadrangles provided adequate coverage of the Delta, Suisun Marsh, and the vicinity.

“Special-status species,” as defined in this document, are wildlife species legally protected under the federal Endangered Species Act (ESA), California Endangered Species Act (CESA), or other State regulations, and species considered sufficiently rare by the scientific community to warrant conservation concern.

Special-status species considered in this appendix are those animal species included in at least one of the following categories:

- ◆ Federally listed as threatened or endangered
- ◆ Proposed for federal listing as threatened or endangered
- ◆ Candidate for federal listing
- ◆ State listed as threatened or endangered
- ◆ Candidate for State listing
- ◆ Fully protected species under the California Fish and Game Code

- 1       ♦ State species of special concern
- 2       ♦ Species on DFG’s watch list

3 Descriptions of these potentially occurring special-status animal species are provided below. Sources used  
 4 include CNDDDB records; existing species accounts available from DFG, USFWS, and other agencies;  
 5 recovery plans for special-status species with potential to occur in the Delta; critical habitat designations;  
 6 and relevant scientific literature.

## 7       1.2 Species Accounts

8 The species accounts in this appendix provide an overview of special-status wildlife species that are  
 9 known to occur or that have an appreciable likelihood of occurring in the Delta and Suisun Marsh and are  
 10 likely to be affected by the implementation of the Delta Plan. Table F-4-1 lists identified wildlife species  
 11 that were removed from further discussion in this document because they are not likely to be affected by  
 12 the Delta Plan.

**Table F-4-1**  
**Special-status Wildlife Species That Are Not Likely to Be Affected by the Delta Plan**

Common Name	Scientific Name	Legal Status			Reason Not Evaluated in EIR/EIS
		Federal <sup>a</sup>	State <sup>b</sup>	Other Status <sup>c</sup>	
<b>Invertebrates</b>					
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
<b>Amphibians</b>					
Foothill yellow-legged frog	<i>Rana boylei</i>	–	SSC	–	Not likely to occur in the Delta and Suisun Marsh
<b>Reptiles</b>					
Alameda whipsnake (=striped racer)	<i>Masticophis lateralis euryxanthus</i>	T	T	–	Not likely to occur in the Delta and Suisun Marsh
<b>Birds</b>					
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

**Table F-4-1**  
**Special-status Wildlife Species That Are Not Likely to Be Affected by the Delta Plan**

Common Name	Scientific Name	Legal Status			Reason Not Evaluated in EIR/EIS
		Federal <sup>a</sup>	State <sup>b</sup>	Other Status <sup>c</sup>	
<b>Mammals</b>					
Berkeley kangaroo rat	<i>Dipodomys heermanni berkeleyensis</i>	–	–	CNDDDB-G3G4, T1, S1	Does not occur in the Delta and Suisun Marsh
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

Sources: CNDDDB 2010; USFWS 2010a

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

<sup>a</sup> **Federal Status:**

- BCC = U.S. Fish and Wildlife Service bird of conservation concern (no legal status, but may warrant future listing under the federal Endangered Species Act (ESA) without additional conservation efforts).
- E = Listed as endangered under the ESA.
- T = Listed as threatened under the ESA.
- = No status.

<sup>b</sup> **State Status:**

- SSC = California species of special concern.
- T = Listed as threatened under the California Endangered Species Act (CESA).
- WL = California Department of Fish and Game watch list (list of species formerly listed as SSC, under ESA or CESA, or as Fully Protected).
- = No status.

<sup>c</sup> **Other Status:**

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

**Global Rank:**

- G3 = Vulnerable—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
- G4 = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
- G5 = Secure—Common; widespread and abundant.
- 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.
- T = Intraspecific Taxon (trinomial)—The status of infraspecific taxa (subspecies or varieties) are indicated by a “T-rank” following the species’ global rank.

**State Rank:**

- S1 = Critically Imperiled—Critically imperiled in the state because of extreme rarity (often five or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.
- S4 = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
- ? = Inexact or Uncertain—Denotes inexact or uncertain numeric rank (The ? qualifies the character immediately preceding it in the S-rank.).

1 Table 4-2, Special-Status Wildlife Species Known to Occur or with Potential to Occur in the Delta and  
 2 Suisun Marsh, in Section 4, presents a comprehensive list of the special-status fish and wildlife and their  
 3 habitat associations for species known to occur or that have the potential to occur in the Delta and Suisun  
 4 Marsh. Of the species listed in Table 4-2, those that are federally listed and/or State listed or fully  
 5 protected are described in more detail in the sections below. For each of the fish and wildlife species  
 6 addressed below, information is provided on the legal status, distribution, relevant natural history, and  
 7 threats. For listed species, information is also provided on relevant conservation efforts and guidance.  
 8 Invertebrates are presented first, followed by vertebrates.

## 1 1.2.1 Invertebrates

### 2 1.2.1.1 *Lange's Metalmark Butterfly*

#### 3 1.2.1.1.1 Legal Status

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

#### 6 1.2.1.1.2 Distribution

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

#### 11 1.2.1.1.3 Relevant Natural History

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

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

#### 23 1.2.1.1.4 Threats

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

#### 26 1.2.1.1.5 Relevant Conservation Efforts and Guidance

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

### 29 1.2.1.2 *Conservancy Fairy Shrimp*

#### 30 1.2.1.2.1 Legal Status

31 The Conservancy fairy shrimp (*Branchinecta conservatio*) was listed as endangered throughout its range  
32 under the federal ESA on September 19, 1994 (59 *Federal Register* [FR] 48136). In September 2007,  
33 USFWS published a 5-year review recommending that the species remain listed as endangered. Revised  
34 critical habitat was designated on February 10, 2006 (71 FR 7118), although none of the critical habitat  
35 units are within the Delta. The Conservancy fairy shrimp has no State regulatory status.

#### 36 1.2.1.2.2 Distribution

37 The historical distribution of the Conservancy fairy shrimp is not known, but the distribution of vernal  
38 pool habitats in the areas where the species is now known to occur was once more continuous and larger  
39 in area than today (USFWS 2005). The species is currently found in disjunct and fragmented habitats

1 across the Central Valley of California from Tehama County to Merced County and at two Southern  
2 California locations on the Los Padres National Forest in Ventura County (USFWS 2005; USFWS 2007a;  
3 CNDDDB 2010).

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

### 9 1.2.1.2.3 Relevant Natural History

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

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

20 Inundation triggers some of the dormant cysts to hatch; other cysts remain dormant as a cyst bank,  
21 analogous to the seed bank of annual plants (USFWS 2005). After hatching, the life span and maturation  
22 rate of Conservancy fairy shrimp are similar to those of other fairy shrimp species. Conservancy fairy  
23 shrimp can reach maturity in about 6 or 7 weeks, and populations of adults can remain active for more  
24 than 4 months (Helm 1998). However, maturation and reproduction rates of vernal pool crustaceans are  
25 controlled by 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-type vernal  
27 pools or long inundation smaller vernal pools (Eng et al. 1990; USFWS 2007a). The pools generally last  
28 until June, but the Conservancy fairy shrimp adult life stage has typically been completed before then  
29 (Eng et al. 1990). They have been collected from early November to early April (Eng et al. 1990). As with  
30 other vernal pool crustaceans, Conservancy fairy shrimp are sporadic in their distribution, often  
31 inhabiting only one or a few vernal pools in otherwise more widespread pool complexes. Pools within a  
32 complex typically are separated by distances on the order of 5 or more feet and may form dense,  
33 interconnected mosaics of small pools or a sparser scattering of larger pools (USFWS 2005).  
34 Conservancy fairy shrimp have been found in vernal pools ranging in size from 323 square feet to  
35 88 acres at elevations ranging from 16 to 5,577 feet (USFWS 2005; USFWS 2007a).

36 The Conservancy fairy shrimp occupies the same vernal pool habitats as many of the other vernal pool  
37 species, including several other rare and endangered vernal pool crustaceans. This species has been found  
38 in association with the vernal pool fairy shrimp (*Branchinecta lynchi*), federally listed as threatened;  
39 vernal pool tadpole shrimp (*Lepidurus packardii*), federally listed as endangered; and California fairy  
40 shrimp (*Lindleriella occidentalis*), a species of concern. Although these species may all be found in one  
41 general location, they have rarely been collected from the same pool at the same time. In general,  
42 Conservancy fairy shrimp have very large populations within a given pool, and it is usually the most  
43 abundant fairy shrimp when more than one species is present (USFWS 2005; USFWS 2007a).

#### 1 1.2.1.2.4 Threats

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

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

#### 11 1.2.1.2.5 Relevant Conservation Efforts and Guidance

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

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

### 19 1.2.1.3 Longhorn Fairy Shrimp

#### 20 1.2.1.3.1 Legal Status

21 The longhorn fairy shrimp (*Branchinecta longiantenna*) was federally listed as endangered by USFWS on  
22 September 19, 1994 (59 FR 48136). On October 9, 2007, USFWS published a 5-year review  
23 recommending that the species remain listed as endangered (USFWS 2007b). Revised critical habitat was  
24 designated on February 10, 2006 (71 FR 7118), and species by unit designations were published for  
25 Contra Costa, Alameda, Merced, and San Luis Obispo counties on February 10, 2006 (71 FR 7118). None  
26 of the critical habitat units are within the Delta.

#### 27 1.2.1.3.2 Distribution

28 The known distribution of the longhorn fairy shrimp extends from Contra Costa and Alameda counties to  
29 San Luis Obispo County and also includes Merced County (USFWS 2005; CNDDDB 2010). Within this  
30 geographic range, it is extremely rare in vernal pools and swales. Occurrences are rare and highly disjunct  
31 with specific pool characteristics largely unknown (USFWS 2005; USFWS 2007b).

32 The closest populations to the Delta are in Contra Costa County (Vasco Caves Preserve) and Alameda  
33 County (Brushy Peak Preserve). These occurrences are in seasonal pools that fill sandstone depressions in  
34 rocky outcrops that are not present anywhere within the Delta. This species also occurs in pools within  
35 alkali sink vegetation in other parts of its known range (USFWS 2005; USFWS 2007b; CNDDDB 2010);  
36 although surveys have been conducted for at least 14 years, no longhorn fairy shrimp have been detected  
37 in similar pools in the Delta (USFWS 2005; USFWS 2007b). Critical habitat for this species is located  
38 outside the Delta, more than 5 miles southwest of Clifton Court Forebay.

#### 39 1.2.1.3.3 Relevant Natural History

40 Longhorn fairy shrimp are omnivorous filter feeders that indiscriminately filter particles of the  
41 appropriate size from their surroundings, and in turn they are prey to a wide variety of animals. The diet  
42 of the longhorn fairy shrimp consists of bacteria, unicellular algae, protists, and suspended plant and

1 animal particles (Eriksen and Belk 1999). Animals feeding on longhorn fairy shrimp likely include birds,  
2 fish, amphibians, dragonfly and damselfly larvae, other insects, and vernal pool tadpole shrimp (Eriksen  
3 and Belk 1999; USFWS 2005).

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

8 Inundation triggers some of the dormant cysts to hatch; other cysts remain dormant as a cyst bank,  
9 analogous to the seed bank of annual plants (USFWS 2005). After hatching, the life span and maturation  
10 rate of longhorn fairy shrimp are similar to those of other fairy shrimp species. The longhorn fairy shrimp  
11 can complete its life cycle in 3 to 7 weeks (Helm 1998). However, maturation and reproduction rates of  
12 vernal pool crustaceans are controlled by water temperature and can vary greatly (Eriksen and Brown  
13 1980; Helm 1998).

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

#### 16 1.2.1.3.4 Threats

17 The longhorn fairy shrimp has likely experienced habitat loss and fragmentation as a result of the  
18 expansion of agricultural and developed land uses. However, it is now threatened by habitat loss and  
19 disturbance resulting from several site-specific activities at the few locations from which it is known:  
20 wind energy development, a water storage project, construction of a dirt access road, and land  
21 management activities (USFWS 2005). Additional threats to longhorn fairy shrimp may include  
22 incompatible grazing practices (e.g., overgrazing, undergrazing, or cessation of grazing where it has  
23 historically occurred) and replacement of native plants by nonnatives (Robins and Vollmar 2002; Marty  
24 2005; Pyke and Marty 2005; USFWS 2005).

#### 25 1.2.1.3.5 Relevant Conservation Efforts and Guidance

26 Longhorn fairy shrimp is covered by the Recovery Plan for Vernal Pool Ecosystems of California and  
27 Southern Oregon (USFWS 2005). This recovery plan addresses a large number of vernal pool-associated  
28 species through an ecosystem approach to recovery that is focused on habitat protection and management.  
29 The species is covered by the approved Natomas Basin, San Joaquin County, and East Contra Costa  
30 County HCPs.

### 31 1.2.1.4 Vernal Pool Fairy Shrimp

#### 32 1.2.1.4.1 Legal Status

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

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

#### 40 1.2.1.4.2 Distribution

41 The vernal pool fairy shrimp is found throughout the Central Valley and west to the central Coast Ranges,  
42 at sites 30 to 4,000 feet in elevation (USFWS 2005). The species has also been reported from the Agate

1 Desert region of Oregon near Medford, and disjunct populations occur in San Luis Obispo, Santa Barbara,  
2 and Riverside counties.

3 Within this geographic range, the vernal pool fairy shrimp inhabits primarily vernal pools (Eng et al.  
4 1990). It also occurs in other wetlands that provide habitat similar to vernal pools: alkaline rain-pools,  
5 ephemeral drainages, rock outcrop pools, ditches, stream oxbows, stock ponds, vernal swales, and some  
6 seasonal wetlands (Helm 1998). Occupied wetland habitats range in size from several square feet to more  
7 than 10 acres. This species is not found in riverine or other permanent waters.

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

#### 12 1.2.1.4.3 Relevant Natural History

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

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

23 Individuals go through the rest of their life cycle while pools are inundated. Inundation triggers some of  
24 the dormant cysts to hatch; other cysts remain dormant as a cyst bank, analogous to the seed bank of  
25 annual plants (USFWS 2005). After hatching, vernal pool fairy shrimp develop rapidly into adults,  
26 reaching sexual maturity in as little as 18 days, and complete their life cycle within 9 weeks (Helm 1998).  
27 However, maturation and reproduction rates can vary greatly with water temperature (Eriksen and Brown  
28 1980; Helm 1998). Multiple episodes of cyst hatching may occur within a season if conditions are  
29 suitable (Helm 1998; Gallagher 1996). However, populations also often disappear early in the season,  
30 long before the vernal pools dry up.

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

#### 33 1.2.1.4.4 Threats

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

#### 1 1.2.1.4.5 Relevant Conservation Efforts and Guidance

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

6 The vernal pool fairy shrimp is covered under the approved San Joaquin County and East Contra Costa  
7 HCPs. In addition, the species is proposed for coverage under the Solano County, South Sacramento  
8 County, and Yolo County HCPs, which are under development.

#### 9 1.2.1.5 Vernal Pool Tadpole Shrimp

##### 10 1.2.1.5.1 Legal Status

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

##### 15 1.2.1.5.2 Distribution

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

19 Within this geographic range, vernal pool tadpole shrimp occur in a wide variety of seasonal habitats:  
20 vernal pools, ponded clay flats, alkaline pools, ephemeral stock tanks, and roadside ditches (CNDDDB  
21 2010; Helm 1998; Rogers 2001). Habitats where vernal pool tadpole shrimp have been observed range in  
22 size from small, clear, vegetated vernal pools to highly turbid pools to large winter lakes (Helm 1998  
23 Rogers 2001). This species has not been reported in pools that contain high concentrations of sodium  
24 salts, but may occur in pools with high concentrations of calcium salts. The largest concentration of  
25 occurrences of vernal pool tadpole shrimp is found in the Southeastern Sacramento Vernal Pool Region,  
26 where the species occurs on a number of public and private lands in Sacramento County (USFWS 2005;  
27 USFWS 2007c).

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

##### 31 1.2.1.5.3 Relevant Natural History

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

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

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

10 Vernal pool tadpole shrimp commonly co-occur with the fairy shrimp (*Lindleriella occidentalis*,  
11 *Branchinecta conservatio*, *B. lindahli*, *B. coloradensis*) and the vernal pool fairy shrimp (*B. lynchi*). The  
12 midvalley fairy shrimp (*B. mesovallensis*) and longhorn fairy shrimp (*B. longiantenna*) both occur within  
13 the range of the vernal pool tadpole shrimp but are typically found in different habitats (USFWS 2005;  
14 USFWS 2007c).

#### 15 1.2.1.5.4 Threats

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

#### 25 1.2.1.5.5 Relevant Conservation Efforts and Guidance

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

30 The vernal pool tadpole shrimp is covered under the Natomas Basin, San Joaquin County, and East  
31 Contra Costa County HCPs. In addition, the species is proposed for coverage in the Solano County, South  
32 Sacramento County, and Yolo County HCPs currently under development.

### 33 1.2.1.6 Valley Elderberry Longhorn Beetle

#### 34 1.2.1.6.1 Legal Status

35 The valley elderberry longhorn beetle (VELB) (*Desmocerus californicus dimorphus*) is listed as  
36 threatened under the ESA (50 FR 52803) on August 8, 1980. On October 2, 2006, USFWS announced a  
37 recommendation that this species be removed from the endangered species list (USFWS 2006a). Critical  
38 habitat was designated for this species in the initial listing of the species (50 FR 52803), although none is  
39 designated within the Delta.

#### 40 1.2.1.6.2 Distribution

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

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

### 3 1.2.1.6.3 Relevant Natural History

4 Adults feed on the foliage and possibly the flowers of elderberries from March to early June (USFWS  
5 1991; USFWS 2006a). During this period, the beetles mate and lay eggs on the bark of elderberry shrubs.  
6 After the eggs hatch, the larvae bore into and feed on the pith of the stems (i.e., the soft tissue at the center  
7 of elderberry stems) and also may feed on the wood. The larval stage may last for 1 to 2 years.  
8 Immediately before pupating, larvae excavate exit holes in the stems and temporarily fill them. During  
9 mid-March to early June, after pupation, the adults emerge.

### 10 1.2.1.6.4 Threats

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

### 14 1.2.1.6.5 Relevant Conservation Efforts and Guidance

15 A recovery plan was prepared for this species during the 1980s (USFWS 1984), and regularly  
16 implemented conservation measures have included avoidance and minimization of effects on occupied  
17 habitat, elderberry transplantation and replacement plantings, and habitat preservation. In part as a result  
18 of these measures, extensive areas of habitat have been preserved (USFWS 2006a). As noted above, the  
19 species has been recommended for delisting.

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

## 23 1.2.2 Amphibians

### 24 1.2.2.1 California Tiger Salamander

#### 25 1.2.2.1.1 Legal Status

26 The California tiger salamander (*Ambystoma californiense*) (Central Population) is federally listed as  
27 threatened (69 FR 47211, August 4, 2004). On February 5, 2009, the California tiger salamander was  
28 accepted as a candidate for protection under CESA. The California Fish and Game Commission has  
29 issued a special order allowing incidental take under specific circumstances during the candidacy period  
30 (DFG 2009).

31 Critical habitat for the central population of California tiger salamander was designated by USFWS on  
32 August 23, 2005 (70 FR 49379 to 49458). A portion of one unit is located in the Delta, in Solano County  
33 at Jepson Prairie.

#### 34 1.2.2.1.2 Distribution

35 The California tiger salamander, endemic to California, ranges across the Central Valley and the eastern  
36 foothills of the Sierra Nevada from Yolo County (possibly up to Colusa County) south to Kern County,  
37 and coastal grasslands from Sonoma County to Santa Barbara County at elevations ranging from  
38 approximately 10 to 3,500 feet above mean sea level (Shaffer and Fisher 1991).

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

### 1 1.2.2.1.3 Relevant Natural History

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

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

13 Following metamorphosis, juvenile salamanders seek refugia, typically mammal burrows, traveling  
14 distances of about 1 mile or more from their breeding sites (Austin and Shaffer 1992; Ibis Environmental  
15 2007), in which they may remain until they emerge during a subsequent breeding season.

### 16 1.2.2.1.4 Threats

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

### 24 1.2.2.1.5 Relevant Conservation Efforts and Guidance

25 The California tiger salamander is not covered by the Recovery Plan for Vernal Pool Ecosystems of  
26 California and Southern Oregon (USFWS 2005). However, this recovery plan addresses a large number  
27 of vernal pool-associated species through an ecosystem approach focused on habitat protection and  
28 management. Thus, the California tiger salamander likely will benefit from many of these recovery  
29 actions.

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

## 33 1.2.2.2 California Red-Legged Frog

### 34 1.2.2.2.1 Legal Status

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

37 USFWS designated critical habitat on April 13, 2006 (71 FR 19243), and proposed a revision to expand  
38 the area designated as critical habitat on September 16, 2008 (73 FR 53491). The Delta does not contain  
39 any designated critical habitat. However, if the proposed revision to expand the area of critical habitat  
40 becomes final, the Delta would include a small amount of critical habitat in grasslands southwest of  
41 Clifton Court Forebay (Unit CCS-2).

#### 1 1.2.2.2 Distribution

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

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

#### 10 1.2.2.3 Relevant Natural History

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

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

29 Breeding typically begins between November and mid-December and lasts through April in most years,  
30 but is dictated by winter rainfall (Stebbins 2003; Jennings and Hayes 1994; Bulger et al. 2003). Breeding  
31 typically occurs in permanent ponds and may occur in streams where water moves relatively slowly  
32 (e.g., pools or backwaters) (Hayes and Jennings 1988) and in ponds that dry in late summer. Typically,  
33 the female deposits the mass of eggs on emergent vegetation (Storer 1925; Jennings and Hayes 1994);  
34 however, breeding has also been documented in ponds that lack emergent vegetation (EBRPD 2007).  
35 Larvae typically hatch in 18 to 22 days and metamorphosis is usually completed in 4 to 5 months  
36 (EBRPD 2007; Jennings and Hayes 1994). In several documented cases, tadpoles have overwintered, then  
37 metamorphosed the following spring (Storer 1925; Fellers et al. 2001; EBRPD 2007). Males and females  
38 usually attain sexual maturity at 2 and 3 years, respectively (Jennings and Hayes 1994).

#### 39 1.2.2.4 Threats

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

#### 1 1.2.2.5 Relevant Conservation Efforts and Guidance

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

7 The California red-legged frog is covered under the San Joaquin County and East Contra Costa County  
8 HCPs. In addition, the species is proposed for coverage in the Solano County and Yolo County HCPs  
9 currently under development.

### 10 1.2.3 Reptiles

#### 11 1.2.3.1 Giant Garter Snake

##### 12 1.2.3.1.1 Legal Status

13 The giant garter snake (*Thamnophis gigas*) is federally and State listed as threatened. The State listed the  
14 giant garter snake as threatened on June 27, 1971 (DFG 2008a). USFWS listed the species as federally  
15 threatened on October 20, 1993 (58 FR 54053). Critical habitat has not been designated for this species.

##### 16 1.2.3.1.2 Distribution

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

26 No occurrences of giant garter snakes are known from the northern portion of the San Joaquin Valley  
27 north to the eastern fringe of the Delta, where the floodplain of the San Joaquin River is limited to a  
28 relatively narrow trough (Hansen and Brode 1980). The resulting gap of approximately 62 miles separates  
29 the southern and northern populations, with no giant garter snakes known from the lowland regions of  
30 Stanislaus County (Hansen and Brode 1980; CNDDDB 2010). Scattered records within the Delta suggest  
31 that giant garter snakes may have occupied this region at one time, but longstanding reclamation of  
32 wetlands for intense agricultural applications has eliminated most suitable habitat (Hansen 1986; CNDDDB  
33 2010). Recent records within the Delta are haphazard, and repeated surveys at focused locations within  
34 the Delta have failed to identify any extant population clusters in the region (Hansen 1986; Patterson and  
35 Hansen 2002; Patterson 2005); however, the entire Delta has not been systematically surveyed.

36 Recent or historic records of giant garter snake have been documented in the Delta north of State Route  
37 (SR) 4. Although recent findings demonstrate that giant garter snake is extant in the Yolo Basin (Hansen  
38 2007; Wylie et al. 2003; Wylie et al. 2004; Wylie and Amarello 2006; CNDDDB 2010), and potentially in  
39 other areas within or near the Delta, repeated attempts to assess local distribution have not been  
40 successful. There is concern that isolated populations may be subject to greater risk of extirpation  
41 (USFWS 2006b).

### 1.2.3.1.3 Relevant Natural History

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

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

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

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

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

### 1.2.3.1.4 Threats

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

### 1.2.3.1.5 Relevant Conservation Efforts and Guidance

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

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

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

19 The Multi-Species Conservation Strategy (MSCS) of the CALFED Bay-Delta Program's (CALFED)  
20 Ecosystem Restoration Program (ERP) designates the giant garter snake as "Contribute to Recovery"  
21 (CALFED Bay-Delta Program 2000). This designation means that CALFED will undertake actions under  
22 its control and within its scope that are necessary to recover the species. Recovery is equivalent to the  
23 requirements of delisting a species under the federal ESA and CESA.

24 The CALFED Bay-Delta Program's ERP has funded several projects designed to supplement current  
25 knowledge of giant garter snake populations and habitat use. Two projects were recently funded that  
26 contain actions benefiting giant garter snake. These projects include ongoing monitoring of  
27 semipermanent wetlands, rice-cover crop rotation fields, and waterways adjacent to agriculture lands.  
28 Another project will evaluate the effects of fallowing agricultural habitat on giant garter snake by  
29 monitoring habitat use under normal rice-growing conditions and comparing results with analogous data  
30 from those same fields and adjacent irrigation ditches after fallowing. This project will also monitor  
31 habitat use on wetland restoration sites and assess population demographics and viability of the giant  
32 garter snake. Study areas for all three projects include Barker Slough and Hastings Cut in Yolo County,  
33 Gilsizer Slough in Sutter County, areas within Richvale Water District in Butte County, and various other  
34 rice fields and managed wetlands in Butte County.

35 These coordinated ERP projects began work in 2007 and are in the initial stages of data collection.  
36 They are designed to provide information that will help guide future restoration and conservation  
37 activities as they pertain to managing rice farms and surrounding natural habitats for the giant garter  
38 snake. Continuing project activities include ongoing telemetry of radio-marked snakes to evaluate habitat  
39 use and behavior, and trapping of snakes to develop mark/recapture estimates. Results from these projects  
40 will support filling in some of the research data gaps for the giant garter snake, which include determining  
41 optimal habitat, effects of cropping patterns and specific agricultural practices on movement patterns and  
42 viability, value of restored habitats, and species status and distribution. Additionally, results from these  
43 research projects will directly facilitate future revisions of the conservation measures within this strategy.

44 In addition, the ERP implementing agencies have facilitated the development and preparation of the draft  
45 Sacramento Valley Giant Garter Snake Conservation Strategy.

46 The giant garter snake is covered by the Draft Recovery Plan for the Giant Garter Snake (USFWS 1999a).  
47 The giant garter snake is covered under the San Joaquin County and East Contra Costa County HCPs. In

1 addition, the species is proposed for coverage in the Solano County, South Sacramento County, and Yolo  
2 County HCPs currently under development.

## 3 1.2.4 Fish

### 4 1.2.4.1 *Anadromous Salmonids*

5 The term anadromous salmonids refers to a group of fishes, including salmon and trout, that spend a  
6 portion of their life at sea, but return to spawn in fresh water. In the Central Valley, Chinook salmon and  
7 steelhead, the primary anadromous salmonids, share a common life history that typically includes passage  
8 through the Delta twice during their lifetime: once as juveniles emigrating to the ocean from the  
9 Sacramento and San Joaquin rivers and their tributaries where they were born, and again as adults on their  
10 return migration to their natal streams to spawn. Salmon die after spawning, but adult steelhead may  
11 return to the ocean after spawning and make the journey more than once. The timing of upstream  
12 migration and spawning varies, with runs of Chinook salmon identified by their spawning migration  
13 period. Four runs of Chinook salmon occur in the Sacramento River system: fall-run, late-fall-run,  
14 winter-run, and spring-run. Only spring- and winter-run Chinook salmon and Central Valley steelhead are  
15 listed under the federal and/or ESA and are described below.

#### 16 1.2.4.1.1 Legal Status

##### 17 *Spring-run Chinook Salmon*

18 The Central Valley Evolutionarily Significant Unit (ESU) of spring-run Chinook salmon is federally  
19 listed as Threatened and listed as Threatened by the State of California. Critical habitat for Central Valley  
20 spring-run Chinook salmon has been designated within specified stream reaches in Tehama, Butte, Glenn,  
21 Shasta, Yolo, Sacramento, Solano, Colusa, Yuba, Sutter, Trinity, Alameda, San Joaquin, and Contra  
22 Costa counties (70 FR 52488). Critical habitat includes the stream channels within the designated stream  
23 reaches, and includes a lateral extent as defined by the ordinary high-water line (33 CFR 329.11). Critical  
24 habitat in estuaries (e.g., San Francisco-San Pablo-Suisun Bay, Humboldt Bay, and Morro Bay) is defined  
25 by the perimeter of the water body as displayed on standard 1:24,000 scale topographic maps or the  
26 elevation of extreme high water, whichever is greater (70 FR 52488).

27 Essential Fish Habitat (EFH) has been designated for a number of species managed under a variety of  
28 fishery management plans and the Magnuson-Stevens Fishery Conservation and Management Act. For  
29 Chinook salmon, EFH overlaps and extends Critical Habitat designated for the individual ESUs. Essential  
30 Fish Habitat for Chinook salmon in California includes all streams, lakes, ponds, wetlands, and other  
31 water bodies currently or historically accessible to salmon in California. Chinook Salmon EFH excludes  
32 areas upstream of longstanding naturally impassible barriers (i.e., natural waterfalls in existence for  
33 several hundred years), but includes aquatic areas above all artificial barriers except specifically named  
34 impassible dams. Chinook Salmon EFH also extends from the nearshore and tidal submerged  
35 environments within State territorial waters out to the full extent of the exclusive economic zone  
36 (200 miles or 370.4 km) offshore of California north of Point Conception.

##### 37 *Winter-run Chinook Salmon*

38 The Sacramento River ESU of winter-run Chinook salmon is federally listed as Endangered and listed as  
39 Endangered by the State of California. Critical habitat for Central Valley winter-run Chinook salmon has  
40 been designated and includes the following waterways and adjacent riparian zones: the Sacramento River  
41 from Keswick Dam, Shasta County to Chipps Island at the westward margin of the Delta; all waters from  
42 Chipps Island westward to the Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and  
43 Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San  
44 Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate

1 Bridge (58 FR 33212). Essential Fish Habitat for winter-run Chinook salmon is the same as described  
2 above for spring-run Chinook.

### 3 *Central Valley Steelhead*

4 The Central Valley Distinct Population Segment (DPS) of steelhead is federally listed as Threatened.  
5 Critical habitat for this DPS of steelhead has been designated within specified stream reaches in Tehama,  
6 Butte, Glenn, Shasta, Yolo, Sacramento, Solano, Yuba, Sutter, Placer, Calaveras, San Joaquin, Stanislaus,  
7 Tuolumne, Merced, Alameda, Contra Costa (70 FR 52488). Critical habitat includes the stream channels  
8 within the designated stream reaches, and includes a lateral extent as defined by the ordinary high-water  
9 line (33 CFR 329.11). Critical habitat in estuaries (e.g. San Francisco-San Pablo-Suisun Bay, Humboldt  
10 Bay, and Morro Bay) is defined by the perimeter of the water body as displayed on standard 1:24,000  
11 scale topographic maps or the elevation of extreme high water, whichever is greater (70 FR 52488).

### 12 *Central California Coast Steelhead*

13 The Central California Coast Distinct Population Segment (DPS) of steelhead is federally listed as  
14 Threatened. Critical habitat for this DPS of steelhead has been designated within specified stream reaches  
15 in Lake, Mendocino, Sonoma, Napa, Marin, San Francisco, San Mateo, Santa Clara, Santa Cruz,  
16 Alameda, Contra Costa, and San Joaquin counties (70 FR 52488). Critical habitat includes the stream  
17 channels within the designated stream reaches, and includes a lateral extent as defined by the ordinary  
18 high-water line (33 CFR 329.11).

## 19 1.2.4.1.2 Distribution

### 20 *Spring-run Chinook Salmon*

21 Historically, spring-run Chinook salmon were found in the upper and middle elevation (1,000 to  
22 6,000 feet) reaches of the San Joaquin, American, Yuba, Feather, Sacramento, McCloud, and Pit rivers,  
23 with smaller populations in most tributaries with sufficient habitat for over-summering adults (NMFS  
24 2009a, p. 93). Naturally spawning populations of spring-run Chinook salmon currently are restricted to  
25 accessible reaches of the upper Sacramento River and tributaries such as Antelope, Battle, Beegum, Big  
26 Chico, Butte, Clear, Deer, and Mill creeks; and the Feather and Yuba rivers (DFG 1998, pp. V-16 to  
27 V-22). A restoration program is underway to re-establish spring-run Chinook salmon in the mainstem San  
28 Joaquin River below Friant Dam.

### 29 *Winter-run Chinook Salmon*

30 The historical distribution of winter-run spawning and rearing was limited to the upper Sacramento River  
31 and its tributaries, where spring-fed streams provided cold water throughout the summer, allowing for  
32 spawning, egg incubation, and rearing during the mid-summer period (Yoshiyama et al. 1998, p. 490).  
33 The construction of Shasta Dam in 1943 blocked access to all of these waters except Battle Creek (NMFS  
34 2009a, p. 79).

### 35 *Central Valley Steelhead*

36 Prior to dam construction, water development and watershed perturbations, Central Valley steelhead were  
37 widely distributed throughout the Sacramento and San Joaquin rivers (McEwan 2001, p. 13). Existing  
38 wild steelhead stocks in the Central Valley are mostly confined to the upper Sacramento River and its  
39 tributaries, including Antelope, Deer, and Mill creeks and the Yuba River. A few wild steelhead are  
40 produced in the American and Feather rivers (McEwan 2001, p. 15). Until recently, steelhead were  
41 thought to be extirpated from the San Joaquin River system. Recent monitoring has detected small  
42 self-sustaining populations of steelhead in the Stanislaus, Mokelumne, and Calaveras rivers (NMFS  
43 2009b, p. 41).

### 1 1.2.4.1.3 Relevant Natural History

#### 2 *Spring-run Chinook Salmon*

3 Adult spring-run Chinook salmon enter freshwater in the spring, hold over the summer, and spawn in the  
4 fall; juveniles typically spend a year or more in freshwater before emigrating. Adult spring-run Chinook  
5 salmon leave the ocean to begin their upstream migration in late January and early February (DFG 1998,  
6 p. III-6) and enter the Sacramento River between March and September, primarily in May and June  
7 (Fisher 1994, p. 871 Table 1; Yoshiyama et al. 1998, p.489 Table 1 ). Adult spring-run Chinook salmon  
8 migrate from the Sacramento River into spawning tributaries primarily between mid April and mid June.  
9 Peak spring-run spawning generally occurs in September but may occur from mid-August to mid-October  
10 depending on water temperatures (NMFS 2009a, p. 94-95 Table 4-4).

11 Spring-run Chinook salmon fry emerge from the gravel from November to March (Yoshiyama et al.  
12 1998, p. 489 Table 1) and the emigration timing is highly variable, as they may migrate downstream as  
13 young-of-the-year, as juveniles, or as yearlings. Depending on flow conditions in their natal streams and  
14 the Sacramento River, spring-run Chinook salmon fry may enter the Delta as early as January and as late  
15 as June; yearlings can enter the Delta from October to March or April (DFG 1998, p. III-9). Spring-run  
16 juveniles have been observed rearing in the lower reaches of non-natal tributaries and intermittent streams  
17 in the Sacramento Valley during the winter months (Maslin et al. 1997, p. 17 Table 2).

#### 18 *Winter-run Chinook Salmon*

19 Adult winter-run Chinook salmon enter freshwater in winter or early spring, and delay spawning until  
20 spring or early summer; juvenile winter-run Chinook salmon emigrate to the sea after only 5 to 9 months  
21 of river and estuary life (NMFS 1997, p. II-1). Adults enter San Francisco Bay from November through  
22 June, enter the Sacramento River basin between December and July, and migrate past the Red Bluff  
23 Diversion Dam (RBDD) from mid-December through early August (NMFS 1997, p. II-3). Spawning  
24 occurs primarily in the reach between Keswick Dam and RBDD primarily from mid-April to mid-August,  
25 with the peak occurring in May and June (Yoshiyama et al. 1998, p. 489 Table 1)

26 Winter-run fry begin to emerge from the gravel in late June to early July and emergence continues  
27 through October (Fisher 1994, p. 871 Table 1). Emigration of juvenile winter-run past RBDD may begin  
28 as early as mid July, typically peaks in September, and can continue through March in dry years (NMFS  
29 1997, p. II-4). Juvenile winter-run Chinook salmon occur in the Delta primarily from November through  
30 early May (USFWS 2001, p. 16 Table 3). The timing of migration may vary somewhat due to changes in  
31 river flows, dam operations, and water year type (NMFS 2009a, p. 81). Winter-run juveniles remain in the  
32 Delta until 5 to 10 months of age, and then begin emigrating to the ocean from November through May  
33 (Fisher 1994, p. 871 Table 1).

#### 34 *Central Valley Steelhead*

35 Central Valley steelhead generally leave the ocean and begin their upstream migration in August and  
36 September (Busby et al. 1996, p. 22 Table 3). They spawn from December through April, with peak  
37 spawning activity from January through March, in small headwater streams and tributaries where cool,  
38 well oxygenated water is available year-round (Hallock et al. 1961, p. 16; McEwan and Jackson 1996,  
39 p. 19). Timing of upstream migration is correlated with higher flow events, such as freshets, with  
40 associated lower water temperatures (NMFS 2009a, p. 104). Steelhead fry usually emerge from the gravel  
41 about 4 to 6 weeks after hatching, but factors such as redd depth, gravel size, siltation, and temperature  
42 can affect emergence timing (Shapovalov and Taft 1954, p. 156). Newly emerged fry move to the  
43 shallow, protected areas associated with the stream margin (McEwan and Jackson 1996), but soon move  
44 to other areas of the stream and establish and defend feeding territories (Shapovalov and Taft 1954,  
45 p. 156).

1 Juvenile steelhead in the Sacramento River basin migrate downstream during most months of the year,  
2 but the peak period of emigration occurs in the spring, with a much smaller peak in the fall (Hallock et al.  
3 1961, p.14; Nobriga and Cadrett 2001, p. 32-33 Figure 3). Emigrating Central Valley steelhead use the  
4 lower reaches of the Sacramento River and the Delta for rearing and as a migration corridor to the ocean.  
5 Some juvenile steelhead may rear in tidal marsh areas, and connected non-tidal freshwater marshes and  
6 other shallow water areas in the Delta for short periods prior to their final emigration to the ocean (NMFS  
7 2009a, p. 106).

#### 8 1.2.4.1.4 Threats

9 Access to most of the historical upstream spawning habitat for Chinook salmon and steelhead has been  
10 eliminated or degraded by manmade structures (e.g., dams and weirs) associated with water storage,  
11 conveyance, flood control, and diversions and exports for municipal, industrial, agricultural, and  
12 hydropower purposes (Yoshiyama et al. 1998, p. 500; McEwan 2001, p. 15; Lindley et al. 2006, p. 2).  
13 Upstream diversions and dams have decreased downstream flows and altered the seasonal hydrologic  
14 patterns. Reduced flows from dams and upstream water diversions result in spawning delays, increased  
15 straying, and increased mortality of outmigrating juveniles (Yoshiyama et al. 1998, p. 501; DWR 2005).

16 Channel margins throughout the Delta have been leveed, channelized, and fortified with riprap for flood  
17 protection and island reclamation, which generally degrades the quality of habitat available for juvenile  
18 rearing. Modification of natural flow regimes due to upstream reservoir operations has resulted in a  
19 reduction in the extent and duration of seasonal floodplain inundation and other flow dependent habitat  
20 used by migrating juvenile Chinook salmon (70 FR 52488, Sommer et al. 2001, p. 326; DWR 2005).  
21 Reduced flows have also resulted in increased water temperatures, increased residence times, and  
22 reductions in dissolved oxygen levels in localized areas of the Delta (e.g., Stockton Deep Water Ship  
23 Channel) that adversely affect the quality of rearing habitat for juvenile salmonids.

24 Predation on juvenile salmon by nonnative fish has been identified as an important threat to salmon and  
25 steelhead in areas with high densities of nonnative fish (e.g., smallmouth and largemouth bass, striped  
26 bass, and catfish) that prey on outmigrating juveniles (Lindley and Mohr 2003, p. 321). The invasion of  
27 nonnative aquatic vegetation, such as Brazilian waterweed and water hyacinth, has provided suitable  
28 habitat for nonnative fish that prey on juvenile salmon and steelhead (Brown and Michniuk 2007, p. 196).  
29 Channelized waterways (e.g., riprap-lined levees) provide virtually no cover protection from predators  
30 and little spatial diversity.

31 Juvenile salmonids are also subject to entrainment at the SWP and CVP export facilities, various smaller  
32 facilities, and agricultural diversions in the Delta, although the level of entrainment at the SWP and CVP  
33 facilities is regulated by the resource agencies. Changes in environmental cues as a result of SWP and/or  
34 CVP export operations during the migration period may contribute to delays in migration, attraction to  
35 false migration pathways, or increased movement of migrating salmon toward the export facilities, which  
36 increases the risk that these fish will be entrained into the fish salvage facilities. For example, net water  
37 movement in the central and southern Delta towards the pumping facilities alters the migratory cues for  
38 emigrating fish in these regions (NMFS 2009a). Unscreened or insufficiently screened intakes can result in  
39 the entrainment of juvenile salmonids into these agricultural diversions. Many juvenile salmon migrate  
40 downstream through the Delta during the late winter or early spring when many of the agricultural  
41 irrigation diversions are not operating or are only operating at low levels. No quantitative estimates have  
42 been developed to assess the potential magnitude of entrainment losses for juvenile salmonids. The effect  
43 of entrainment mortality on salmonid population dynamics and overall adult abundance is not well  
44 understood.

45 Operation of the CVP and SWP water projects alter flow patterns in the Delta and create entrainment  
46 issues in the Delta at the pumping and fish facilities (NMFS 2009a, p. 131). At the SWP and CVP export  
47 facilities, multiple factors influence the vulnerability of juvenile salmonids to entrainment, including their

1 geographic distribution within the Delta and hydrodynamic factors such as reverse flows in Old and  
2 Middle rivers. Salmonids respond behaviorally to various cues (e.g., water currents, salinity) during both  
3 upstream adult and downstream juvenile migration through the Delta. Changes in these cues as a result of  
4 SWP and/or CVP export operations during the migration period may result in delays in their migration.  
5 This can increase their time of residence in the Delta, which may make them more vulnerable to  
6 entrainment into the central and southern Delta waterways, and increase their exposure to predation  
7 within the central and southern Delta waterways (NMFS 2009a, p. 313).

8 As a result of the extensive agricultural development within the Central Valley, exposure to pesticides and  
9 herbicides has been identified as a significant concern for salmon and other fish species (Bennett et al.  
10 2001, p.2). Other contaminants of concern for salmonids include, but are not limited to, mercury, copper,  
11 oil and grease, ammonia, and localized areas of depressed dissolved oxygen (e.g., Stockton Deep Water  
12 Ship Channel). In addition, sublethal concentrations of toxics may interact with other stressors on  
13 salmonids, increasing their vulnerability to mortality as a result of exposure to seasonally elevated water  
14 temperatures, predation, or disease (Werner 2007, slide 25).

15 Chinook salmon and steelhead are subject to illegal harvest (poaching) in inland waters. Adult spring-run  
16 Chinook salmon are particularly vulnerable because they hold in pool habitat within streams where they  
17 are easily accessible during the summer months. The level and effect of illegal harvest on salmon  
18 abundance and reproduction is unknown.

19 Hatchery produced salmon and steelhead in the Central Valley also present multiple threats to wild  
20 salmonid populations, including competition for food and habitat, direct predation on wild fish, and  
21 interbreeding with wild fish that can reduce their genetic fitness (NMFS 2009a, p. 143; Goodman 2005;  
22 p. 374). Hatchery production has been shown to negatively affect the genetic diversity and fitness of wild  
23 salmonid populations. Moderate to high numbers of hatchery fish may impact the genetic diversity of  
24 wild populations of Central Valley salmon. Hatchery fish compete with wild fish for food, habitat, and  
25 mates. Hatchery fish are frequently less productive than wild fish. Nonetheless, a very large portion of the  
26 existing genetic diversity in Central Valley salmonids is contained in hatchery origin stocks and, in some  
27 cases, properly managed hatchery stocks may be important contributors to recovery of the species.

#### 28 1.2.4.1.5 Relevant Conservation Efforts and Guidance

29 Current conservation efforts and guidance for anadromous salmonids are provided primarily by NMFS in  
30 its 2009 Biological Opinion and Conference Opinion on the Long-term Operations of the Central Valley  
31 Project and State Water Project and the 2009 Public Draft Recovery Plan for the Evolutionarily  
32 Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run  
33 Chinook Salmon and the Distinct Population Segment of Central Valley Steelhead (NMFS 2009a; NMFS  
34 2009b). According to the NMFS web site (NMFS 2011), implementation of the measures in the  
35 Biological Opinion have likely contributed to habitat improvements benefiting the Central Valley  
36 spring-run and Sacramento River winter-run Chinook salmon ESUs and the Central Valley steelhead  
37 DPS. The two large, comprehensive conservation programs in the Central Valley, CALFED and the  
38 Central Valley Project Improvement Act (CVPIA), also have provided ecosystem and species-specific  
39 protections for these species, as have the Delta Pumping Plant Fish Protection Agreement and the Tracy  
40 Fish Collection Mitigation Agreement, which contribute to mitigating SWP and pumping plant impacts.

41 In addition to federal conservation efforts, the State of California has established specific in-river fishing  
42 regulations and no-retention prohibitions designed to protect these species.

## 1 **1.2.4.2 Delta Smelt**

### 2 **1.2.4.2.1 Legal Status**

3 Delta smelt were listed as a threatened species under both the federal ESA and the California ESA in  
4 1993. In 2009, the California Fish and Game Commission elevated the status of delta smelt to  
5 Endangered under the California ESA in response to an emergency petition. Critical habitat for Delta  
6 smelt was designated by USFWS in 1995 (59 FR 65256). The designated critical habitat extends  
7 throughout Suisun Bay (including Grizzly and Honker bays), the length of Goodyear, Suisun, Cutoff, first  
8 Mallard and Montezuma sloughs, and the contiguous waters of the legal Delta.

### 9 **1.2.4.2.2 Distribution**

10 Delta smelt are endemic to the Bay-Delta estuary. The geographic distribution of delta smelt is primarily  
11 downstream of Isleton on the Sacramento River, downstream of Mossdale on the San Joaquin River, and  
12 Suisun Bay and Suisun Marsh. Delta smelt have also been collected in the Petaluma and Napa rivers.  
13 Delta smelt adults occur primarily in the tidally influenced low salinity region of Suisun Bay and the  
14 freshwater regions of the Delta and the Sacramento and San Joaquin rivers (Moyle 2002, p 229). Recent  
15 evidence suggests that a fairly large proportion of the delta smelt population inhabits the Cache Slough  
16 region during the summer (Sommer et al. 2009, p. 11).

### 17 **1.2.4.2.3 Relevant Natural History**

18 Delta smelt spawn in the freshwater reaches of the San Francisco estuary, primarily in the Delta. Adult  
19 delta smelt spawn during the late winter and spring months, with most spawning occurring during April  
20 through mid-May (Moyle 2002, p. 229). After hatching, larvae disperse into low salinity habitats,  
21 generally moving into Suisun Bay, Montezuma Slough, and the lower Sacramento River below Rio Vista  
22 as they mature (Grimaldo et al. 1998, p. 27). In general, delta smelt prefer to rear in or just above the  
23 region of the estuary where fresh water and brackish water mix as a result of tidal and river currents; this  
24 region is typically in Suisun Bay (Bennett 2005, p. 11). Delta smelt are zooplanktivorous throughout their  
25 lives, feeding mainly on tiny organisms such as copepods, cladocerans, and amphipods with which they  
26 co-occur (Moyle et al. 1992, p. 71; Nobriga, 2002, p. 156).

### 27 **1.2.4.2.4 Threats**

28 Because of their short life span (one or two years), low fecundity, current low abundance and limited  
29 geographic range, changes in the Delta have influenced the distribution and abundance of delta smelt in  
30 complex and synergistic ways. Delta smelt have been affected by loss of habitat and reductions in the  
31 quality of their habitat, largely as a result of changes in Delta inflows that affect salinity and human  
32 activities such as wetland and floodplain reclamation. The amount of spawning habitat may have been  
33 reduced as a result of reclamation, channelization, and riprapping of historical intertidal and shallow  
34 subtidal wetlands.

35 Delta smelt are lost to entrainment in the CVP and SWP water export facilities, various smaller facilities,  
36 and agricultural diversions in the Delta, most of which are unscreened or inadequately screened (Herren  
37 and Kawasaki 2001, p. 343). The risk of entrainment to delta smelt varies seasonally and among years.  
38 The greatest entrainment risk has been hypothesized to occur during winter when pre-spawning adults  
39 migrate into the Delta in preparation for spawning (Reclamation 2008, p. 7-28). In addition, the CVP and  
40 SWP water export facilities and other diversions export phytoplankton, zooplankton, nutrients, and  
41 organic material that would otherwise support the base of the food web in the Delta, thus reducing food  
42 availability for delta smelt (Jassby and Cloern 2000, p. 345; Resources Agency 2007, p. 21). The direct  
43 impacts of water diversions on the overall population dynamics of delta smelt is not well understood and  
44 there is disagreement among experts about the magnitude of these impacts (Bennett 2005, p. 36).

1 The introduction and invasion of nonnative species has also contributed to adversely affecting delta smelt.  
2 Introduced clams have reduced phytoplankton and zooplankton abundance throughout the region  
3 (Thompson 2007, slide 8) and altered the abundance and species composition of the zooplankton (Jassby  
4 et al. 2002, p. 699). Changes in the zooplankton species composition have affected the quality of food  
5 resources available to delta smelt because some of the nonnative zooplankton species are less suitable as a  
6 food resource than the native species (Resources Agency 2007, p. 16). Several potential nonnative fish  
7 predators of delta smelt have been introduced into the Delta, including largemouth bass, threadfin shad  
8 and inland silversides (Bennett 2005, p. 51).

9 Brazilian waterweed and water hyacinth (both introduced plants) grow in dense aggregations and can  
10 indirectly affect delta smelt by reducing dissolved oxygen levels, suspended sediment concentrations and  
11 turbidity within the water column. Reduced turbidity as a result of these plants and filter feeding by the  
12 introduced clams may reduce foraging efficiency and increase the vulnerability of delta smelt to  
13 predation. Because of the structure and shade they provide, these aquatic plants also create excellent  
14 habitat for bass and sunfish, nonnative predators of delta smelt.

15 Numerous toxic chemicals including agricultural pesticides, herbicides, heavy metals, and other  
16 agricultural and urban product can enter delta smelt habitat from a variety of sources. Chemicals, such as  
17 pesticides, herbicides, endocrine disrupting compounds, and metals may have lethal and sublethal effects  
18 on delta smelt that make them more vulnerable to other sources of mortality (Werner 2007).

#### 19 1.2.4.2.5 Relevant Conservation Efforts and Guidance

20 The 1996 Delta Native Fishes Recovery Plan provided initial guidance on recovery of delta smelt;  
21 however, that document is out of date and currently under revision by USFWS. Efforts to minimize  
22 impacts on delta smelt and contribute to their conservation are currently guided primarily by the  
23 interagency consultation conducted by USFWS on the State and federal water export projects in the Delta  
24 and the associated Reasonable and Prudent Alternatives as influenced by the December 2010 ruling by  
25 Judge Wanger. Restoration projects funded through the Ecosystem Restoration Program also contribute to  
26 the conservation of delta smelt, and the Bay-Delta Conservation Plan is expected to contribute upon  
27 completion and implementation.

### 28 1.2.4.3 *Green Sturgeon*

#### 29 1.2.4.3.1 Legal Status

30 The southern DPS of green sturgeon is federally listed as Threatened. Critical habitat for this green  
31 sturgeon DPS has been designated and includes the Sacramento River, lower Feather River, and lower  
32 Yuba River in California; and the Sacramento-San Joaquin Delta and Suisun, San Pablo, and San  
33 Francisco bays in California (74 FR 52300).

#### 34 1.2.4.3.2 Distribution

35 In the Pacific Ocean, green sturgeon range from the Bering Sea, Alaska, to Ensenada, Mexico. Green  
36 sturgeon occupy freshwater rivers from the Sacramento River up through British Columbia (Moyle 2002,  
37 p. 110), but spawning has been confirmed in only three rivers: the Rogue River in Oregon and the  
38 Klamath and Sacramento rivers in California. Based on genetic analyses and spawning site fidelity  
39 (Adams et al. 2002, p. 12; Israel et al. 2004, p. 926), NMFS determined that there are at least two distinct  
40 population segments of green sturgeon. Green sturgeon in the Delta and Sacramento River Basin belong  
41 to the southern DPS, consisting of populations originating from coastal watersheds south of the Eel River  
42 (“Southern DPS”). The only known spawning population for the Southern DPS is in the Sacramento  
43 River.

#### 1.2.4.3.3 Relevant Natural History

Green sturgeon spend a large portion of their lives in coastal marine waters as subadults and adults. Subadult male and female green sturgeon spend at least approximately 6 and 10 years at sea, respectively, before reaching reproductive maturity and returning to freshwater to spawn for the first time (Nakamoto et al. 1995, p. iv, 14). Adult green sturgeon spend as many as 2 to 4 years at sea between spawning events (70 FR 17386, April 6, 2005; Erickson and Webb 2007, p. 264). Adults typically begin their upstream spawning migration in the spring and either migrate downstream after spawning, or reside within the river over the summer (Erickson et al. 2002, p. 568; Benson et al. 2007, pp. 10-12). Subadults may also migrate upstream, but for unknown purposes. Adults and subadults occupy the San Francisco Bay, San Pablo Bay, Suisun Bay, and the Delta adjacent to the Sacramento River. Adults and subadults primarily inhabit the Delta and bays during summer months, most likely for feeding and growth (Kelly et al. 2007, p. 292).

#### 1.2.4.3.4 Threats

Like the anadromous salmonids, access to historical spawning habitat for green sturgeon has been reduced by construction of migration barriers, such as major dams, that block or impede access. The Red Bluff Diversion Dam (RBDD) is a major impediment to sturgeon migration on the Sacramento River. Adult sturgeon can migrate past RBDD when gates are raised to allow passage for winter-run Chinook salmon. However, when the gates are closed, a substantial number of adult green sturgeon fail to use fish ladders at the dam and are unable to access upstream spawning habitats (Heublein 2006, p.3). The locks at the end of the Sacramento River Deep Water Ship Channel at the connection with the Sacramento River block migration of fish from the deep water ship channel back to the Sacramento River (DWR 2005, p. 3-49). In addition, green sturgeon are attracted by high floodwater flows into the Yolo Bypass basin and then concentrate behind Fremont Weir, which blocks passage and may strand sturgeon when flood flows recede (DWR 2005, p. 4-16). Larval and juvenile sturgeon are susceptible to entrainment in multiple diversions along the Sacramento and Feather rivers.

Reclamation of wetlands and islands have reduced and degraded the availability of rearing habitat for green sturgeon. The impacts of channelization and riprapping are thought to affect all life stages. Dredging operations to maintain commercial and recreational vessel passage in the Sacramento and San Joaquin rivers, and the navigation channels within the Delta, and Suisun, San Pablo, and San Francisco bays pose risks to bottom dwelling fish such as green sturgeon through entrainment. In addition, dredging operations can decrease the abundance of locally available prey species, contribute to resuspension of toxics such as ammonia, hydrogen sulfide, and copper during dredging and dredge spoil disposal, and alter bathymetry and water movement patterns.

Green sturgeon are vulnerable to recreational sport fishing within the Bay-Delta estuary and Sacramento River. Regulations require the release of green sturgeon caught incidentally, but illegal harvest may still occur. High water temperatures in the Feather River and San Joaquin River may affect sturgeon migration, spawning, and egg development. Water temperatures in the Sacramento River may no longer be a major concern for green sturgeon because temperatures in the upper Sacramento River are actively managed for Sacramento River winter-run Chinook salmon. Juvenile sturgeon are also exposed to increased water temperatures in the Delta during the late spring and summer due to the loss of riparian shading and by thermal inputs from municipal, industrial, and agricultural discharges.

Subadults and adults feeding in bays and estuaries may be exposed to contaminants that may affect their growth and reproduction (Fairey et al. 1997, p. 1063 Table 2; Greenfield et al. 2005, p. 33 Table 2). Studies on white sturgeon in estuaries indicate that the bioaccumulation of pesticides and other contaminants adversely affects growth and reproductive development and may result in decreased reproductive success (Kruse and Scarnecchia 2002, p. 437; Feist et al. 2005, p. 1681). Green sturgeon are believed to experience similar risks from contaminants (70 FR 17386, April 6, 2005). Because green sturgeon spend more time in marine waters than white sturgeon, they may have less exposure to

1 contaminants in estuaries compared to white sturgeon. However, green sturgeon may be more sensitive  
2 than white sturgeon to certain contaminants found in coastal estuaries, including methylmercury and  
3 selenium, that affect their routine and active metabolic rates, swimming performance, and ability to avoid  
4 predators (Kaufman et al. 2008, slide 20).

#### 5 1.2.4.3.5 Relevant Conservation Efforts and Guidance

6 Current conservation and guidance for green sturgeon is provided by NMFS 2009 Biological Opinion and  
7 Conference Opinion on the Long-term Operations of the Central Valley Project and State Water Project  
8 (NMFS 2009a). The measures identified in that document are expected to benefit green sturgeon,  
9 particularly the change in seasonal operations of Red Bluff Diversion dam to allow access to spawning  
10 areas above the dam. The closure of the California recreational fishery may also provide benefits to this  
11 species.

### 12 1.2.4.4 Longfin Smelt

#### 13 1.2.4.4.1 Legal Status

14 Longfin smelt are listed as Threatened by the State of California. In 2009, the USFWS issued a 12-month  
15 finding concluding that the Delta population of longfin smelt did not meet the definition of a distinct  
16 population segment, and therefore did not qualify for listing under the federal ESA. Shortly thereafter, the  
17 Center for Biological Diversity and The Bay Institute filed a lawsuit challenging the Service's decision.  
18 On February 2, 2011, the United States District Court for the Northern District of California approved a  
19 settlement agreement between the USFWS, the Center for Biological Diversity, and The Bay Institute,  
20 obligating the USFWS to reconsider the status of the longfin smelt, including the San Francisco  
21 Bay-Delta population. Under the terms of the settlement, the USFWS must conduct a rangewide review  
22 of the species and issue a new listing determination by September 30, 2011. No critical habitat for this  
23 species has been designated.

#### 24 1.2.4.4.2 Distribution

25 The historical and current range of the longfin smelt is from Alaska southward to the San Francisco  
26 Bay-Delta in California (74 FR 16171). In California, longfin smelt are known from the Klamath River,  
27 Humboldt Bay and its tributaries, the Eel River, the Van Duzen River, the Russian River, and the San  
28 Francisco Bay-Delta (Moyle 2002, p. 235-236). During its life cycle, the longfin smelt uses the entire  
29 estuary from the freshwater Sacramento-San Joaquin Delta downstream to South San Francisco Bay and  
30 out into coastal marine waters (Baxter 1999, p. 180; Moyle 2002, p. 236; Rosenfield and Baxter 2007,  
31 p. 1590). Longfin smelt are dispersed broadly in the San Francisco Bay-Delta estuary by high outflows  
32 and currents, which could transport larvae or small juveniles long distances before they mature and start  
33 living near the bottom of the water column (74 FR 16171).

#### 34 1.2.4.4.3 Relevant Natural History

35 The longfin smelt is a euryhaline (tolerant of variable salinities) pelagic fish that inhabits various depths  
36 of the water column depending on the individual's life stage. Longfin smelt reportedly cannot tolerate  
37 water temperatures greater than 68 °F (20 °C) (Moyle 2002, p. 236), and will move farther downstream  
38 (west) during the summer months when water temperatures in the Delta are higher. Longfin smelt have  
39 been found throughout the year in fresh and brackish waters with salinities ranging from 14 to 28 parts  
40 per thousand (ppt) (DFG 2001, p. 477).

41 Longfin smelt may spawn as early as November and as late as June, although spawning typically occurs  
42 from February to April (Moyle 2002, p. 236). However, longfin smelt at various life stages are detected in  
43 the San Francisco Bay estuary trawl surveys in numerous months of the year (Rosenfield and Baxter  
44 2007, p. 1587), suggesting that the spawning period may not be restricted to November to June or that

1 growth and development between individuals varies. Spawning occurs in areas of relatively low salinity,  
2 which are considered essential nursery habitat for estuarine organisms. Spawning usually occurs over  
3 rocky or gravelly substrates and aquatic plants (Moyle 2002, p. 236). Newly hatched embryos are  
4 transported in the upper portion of the water column downstream (west) into more brackish parts of the  
5 San Francisco Bay-Delta system (Moyle 2002, p. 236). Longfin smelt usually live for 2 years, although  
6 some individuals may spawn as 1- or 3-year-old fish, and die soon after spawning (Moyle 2002, p. 236).

7 Longfin smelt first begin feeding on copepods and cladocerans. With subsequent growth, their diet  
8 expands to include mysids and amphipods among a variety of lesser food items (Slater 2008, p. 418).  
9 Longfin smelt are preyed upon by fishes, birds, and mammals (Barnhart et al. 1992, p. 44). Predation of  
10 longfin smelt in the San Francisco Bay Estuary is known to occur by both striped bass and inland  
11 silversides, but the effects of predation on the population are not well understood (Moyle 2002, p. 238).

#### 12 1.2.4.4.4 Threats

13 Due to their similarity in habitat use, longfin smelt are subject to many of the same stressors and  
14 population threats as delta smelt (see discussion above).

#### 15 1.2.4.4.5 Relevant Conservation Efforts and Guidance

16 Longfin smelt are being managed through a protective State regulation that governs SWP and CVP  
17 operations in the south Sacramento-San Joaquin Delta, research and monitoring, local water diversions  
18 and the State water Project North Bay Aqueduct, dredging, and sand mining.

## 19 1.2.5 Birds

### 20 1.2.5.1 *Golden Eagle*

#### 21 1.2.5.1.1 Legal Status

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

#### 30 1.2.5.1.2 Distribution

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

#### 36 1.2.5.1.3 Relevant Natural History

37 Golden eagles favor open grasslands, foothills, and mountain terrain. They nest on cliffs and large oaks,  
38 sycamores, pines and other trees in open areas in areas with good prey availability, especially where  
39 updrafts are common, which aid in soaring. Breeding territories are typically large and found at low  
40 densities across the landscape (e.g., average territory size of 48 square miles in Northern California

1 (Zeiner et al. 1990a), however, some of the highest breeding densities for this species (about 7 square  
2 miles per territory) are found in eastern Contra Costa County (Hunt et al. 1998).

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

#### 5 1.2.5.1.4 Threats

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

#### 9 1.2.5.1.5 Relevant Conservation Efforts and Guidance

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

### 14 1.2.5.2 Swainson's Hawk

#### 15 1.2.5.2.1 Legal Status

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

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

#### 23 1.2.5.2.2 Distribution

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

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

38 More than 60 percent of the Statewide Swainson's hawk population occurs within Sacramento, San  
39 Joaquin, Solano, and Yolo counties (DFG 2007). Although intensively farmed for more than 100 years,  
40 much of this area retains a relative abundance of nesting habitat—narrow riparian corridors along rivers  
41 and streams, remnant oak groves and trees, roadside trees—and an agricultural pattern that is conducive

1 to Swainson's hawk foraging. Thus, the species is relatively common in the central portion of the Central  
2 Valley (Estep 2007; Estep 2008; DFG 2007).

3 A fairly dense nesting population of Swainson's hawk occurs in or near the northern and southern  
4 portions of the Delta (north of SR-12 and south of SR-4, respectively). These areas support a relatively  
5 abundant potential nesting habitat and an agricultural landscape that is suitable for Swainson's hawk  
6 foraging. In the northern portion, nest sites are distributed mainly east of the Deep Water Ship Channel in  
7 areas that support mainly annually rotated irrigated agricultural lands, hayfields, and irrigated  
8 pasturelands, and that include an abundance of potential nesting habitat, including riparian woodlands,  
9 roadside trees, tree rows, and isolated trees. The area immediately west of the Deep Water Ship Channel  
10 and the area immediately north of SR-12 support few potential nest trees, and thus fewer known nest  
11 sites. Similarly, the area south of SR-4 also supports a dense nesting population. The agricultural  
12 landscape in this area includes an abundance of alfalfa hay and annually rotated irrigated cropland and  
13 many potential nest trees, mostly along riparian corridors and roadside tree rows. Areas that lack nest sites  
14 typically also lack sufficient nest trees to support many nesting pairs.

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

### 21 1.2.5.2.3 Relevant Natural History

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

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

43 The value of foraging habitat is a function of three factors: patch size (Swainson's hawks are sensitive to  
44 fragmented landscapes, and their use of a field will decline as suitable patch size decreases); prey  
45 accessibility (the ability of hawks to access prey depends on the structure of the vegetation and on land  
46 management activities); and prey availability, which refers to the abundance of prey populations in a  
47 field. Data on minimum foraging-patch size are largely anecdotal, but are generally thought to be between

1 5 and 25 acres (Estep and Teresa 1992; DFG 1994). In the Central Valley, agricultural land use or specific  
2 crop type determine the foraging value of a field at any given time.

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

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

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

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

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

#### 34 1.2.5.2.4 Threats

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

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

43 Loss of riparian and other nesting habitat continues throughout the Central Valley from levee projects,  
44 agricultural practices, and local development along watercourses. A related issue is the loss and lack of  
45 regeneration of valley oak and other native trees. This is an ongoing problem in areas that have continued

1 to support remnant valley oaks and oak groves. Nesting habitat continues to decline as these trees and  
2 small groves die off or are removed and not replaced through natural regeneration or replanting.

### 3 1.2.5.2.5 Relevant Conservation Efforts

4 Conservation efforts have focused on developing and implementing HCPs and natural community  
5 conservation plans. These regional conservation approaches can be an effective tool to managing and  
6 sustaining Swainson's hawk populations if sufficient suitable landscape is preserved (Estep and Teresa  
7 1992).

8 The CALFED ERP's MSCS designates the Swainson's hawk as "Contribute to Recovery" (CALFED  
9 Bay-Delta Program 2000). This designation means that CALFED will undertake actions under its control  
10 and within its scope that are necessary to recover the species. Recovery is equivalent to the requirements  
11 of delisting a species under the federal ESA and CESA.

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

## 15 1.2.5.3 Western Snowy Plover

### 16 1.2.5.3.1 Legal Status

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

### 21 1.2.5.3.2 Distribution

22 The Pacific coast population of western snowy plover is defined by USFWS as those individuals that nest  
23 adjacent to tidal waters of the Pacific Ocean, including all nesting birds on the mainland coast, peninsulas,  
24 offshore islands, adjacent bays, estuaries, and coastal rivers (USFWS 2010b). DFG's description of the  
25 interior population of western snowy plover includes those individuals breeding in California's Central  
26 Valley. Western snowy plovers breed irregularly in the Central Valley; however, there are several historic  
27 (1960s to 1970s) and more recent (1998, 2006) extralimital breeding records from Yolo County,  
28 including from the Yolo Bypass Wildlife Area in 2006 (Shuford et al. 2008). The western snowy plovers  
29 that occasionally breed in the Delta (i.e., estuarine) portions of the DP Planning Area meet the definitions  
30 of the Pacific coastal (USFWS) and interior (DFG) populations.

### 31 1.2.5.3.3 Relevant Natural History

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

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

#### 1 1.2.5.3.4 Threats

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

#### 4 1.2.5.3.5 Relevant Conservation Efforts and Guidance

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

### 6 1.2.5.4 *White-tailed Kite*

#### 7 1.2.5.4.1 Legal Status

8 The white-tailed kite (*Elanus leucurus*) is a fully protected species under the California Fish and Game  
9 Code Section 3511 and is protected under the federal Migratory Bird Treaty Act. Most fully protected  
10 species have also been listed as threatened or endangered species under the State endangered species laws  
11 and regulations; however, several species, including white-tailed kite, remain only on the fully protected  
12 list. The white-tailed kite has no federal regulatory status and therefore no critical habitat has been  
13 designated for the white-tailed kite.

#### 14 1.2.5.4.2 Distribution

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

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

#### 31 1.2.5.4.3 Relevant Natural History

32 The white-tailed kite inhabits low-elevation, open grasslands, savanna-like habitats, agricultural areas,  
33 wetlands, and oak woodlands (Dunk 1995). They usually nest in trees with a dense canopy, but nest trees  
34 can vary from single, isolated trees to trees within large woodlands. Habitat elements that influence nest  
35 site selection and nesting distribution include habitat structure (usually a dense canopy) and prey  
36 abundance and availability (primarily the association with meadow vole), whereas the association with  
37 specific vegetation types (e.g., riparian, oak woodland) appears less important (Erichsen 1995; Dunk  
38 1995).

39 The peak breeding season occurs from May through August but can start as early as January and may  
40 continue until October (Dunk 1995). The nest is usually placed near the top of a dense oak, willow, or  
41 other tree. Females typically lay a clutch of four eggs, with a range of three to six. The female incubates  
42 exclusively and performs most brooding while the male provisions the female and nestlings. Eggs are

1 incubated for approximately 28 days. Young fledge in 35 to 40 days following hatching, with the peak  
2 fledging period occurring in June (Erichsen 1995).

3 The white-tailed kite preys mostly on voles but also takes other small, diurnal mammals and occasionally  
4 birds, insects, reptiles, and amphibians. Small mammal prey comprises 95 percent of the kite diet (Dunk  
5 1995). It forages in undisturbed, open grasslands, meadows, farmlands and emergent wetlands, ungrazed  
6 grasslands, fence rows and irrigation ditches adjacent to grazed lands (Dunk 1995). Cover types that  
7 appear to be preferred include alfalfa and other hay crops, irrigated pastures, and some cultivated habitats,  
8 particularly sugar beets and tomatoes, both of which can support relatively large populations of voles  
9 (DFG 1989) and that have been highly correlated with kite nest site densities (Erichsen et al. 1994). Kites  
10 also forage in dry pastures, annual grasslands, rice stubble fields, and occasionally in orchards (Erichsen  
11 1995).

#### 12 1.2.5.4.4 Threats

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

#### 20 1.2.5.4.5 Relevant Conservation Efforts and Guidance

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

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

### 28 1.2.5.5 *American Peregrine Falcon*

#### 29 1.2.5.5.1 Legal Status

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

#### 34 1.2.5.5.2 Distribution

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

### 1 1.2.5.5.3 Relevant Natural History

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

### 7 1.2.5.5.4 Threats

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

### 15 1.2.5.5.5 Relevant Conservation Efforts

16 The Natomas Basin HCP covers the peregrine falcon and the species is proposed for coverage in the Yolo  
17 County HCP currently under development.

## 18 1.2.5.6 Greater Sandhill Crane

### 19 1.2.5.6.1 Legal Status

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

### 25 1.2.5.6.2 Distribution

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

31 Pogson and Lindstedt (1991) identified eight distinct wintering locations in the Central Valley from  
32 Chico/Butte Sink on the north to Pixley National Wildlife Refuge near Delano on the south, with more  
33 than 95 percent occurring within the Sacramento Valley between Butte Sink and the Delta. Use varies  
34 seasonally within this area, probably as a function of the winter flooding regime and food resources. Butte  
35 Sink has been reported to support a large segment of the population (more than 50 percent) during  
36 October and November. Greater sandhill cranes move into the Delta and Cosumnes River floodplain from  
37 the Butte Basin in October, and 3,000 to 4,000 cranes remain in the Delta region in October and  
38 November. The Delta population peaks in December and January, and an estimated two-thirds of the  
39 population (5,000 to 6,000 cranes) resides in the Delta for the remainder of the winter (Pogson and  
40 Lindstedt 1988; Littlefield and Ivey 2000).

41 Populations of greater sandhill cranes have shifted over the years in response to changing agricultural  
42 patterns, particularly the increase in the number of vineyards. The islands and tracts traditionally used the  
43 most by cranes are Staten Island, Terminous Island, Canal Ranch, and New Hope Tract. Bouldin Island,

1 Empire Tract, King Island, Grand Island, Tyler Island, Ryer Island, Brannan Island, Twitchell Island,  
2 Bradford Island, Venice Island, Manderville Island, and Webb, Holland, and Palm tracts are used by  
3 cranes occasionally to regularly (Pogson 1990; Littlefield and Ivey 2000).

4 The Cosumnes River floodplain, much of it protected within The Nature Conservancy's Cosumnes River  
5 Preserve, also supports substantial winter crane use. Use may have increased in this area as continued  
6 land conversion to vineyards on Delta islands has reduced habitat availability there (Littlefield and Ivey  
7 2000).

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

### 15 1.2.5.6.3 Relevant Natural History

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

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

25 Loafing generally occurs at midday when birds loosely congregate along agricultural field borders,  
26 levees, rice checks, or ditches, or in alfalfa fields or pastures. Cranes will often loaf in rocky uplands or  
27 along gravel roads where they collect grit, which is important to the cranes' digestion of grain seeds.  
28 During the late afternoon and evening, cranes begin to congregate into large, dense communal groups  
29 where they remain until the following morning. Roost sites, which provide protection from predators  
30 during the night, are typically within 2 to 3 miles of foraging and loafing areas, and thus available  
31 roosting sites are an essential component of winter habitat. Roosting habitat typically consists of  
32 shallowly flooded open fields of variable size (1 to 300 acres) or wetlands interspersed with uplands.  
33 Water depth is important and averages 4.5 inches. Littlefield (1993) reported cranes abandoning roosting  
34 sites when water depth reached 8 to 11 inches. He recommended that roost sites be a minimum of  
35 20 acres in size with water maintained from early September to mid-March. If properly managed, roost  
36 sites are often used for many years.

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

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

#### 1 1.2.5.6.4 Threats

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

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

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

#### 22 1.2.5.6.5 Relevant Conservation Efforts and Guidance

23 Several important efforts have been made to protect and enhance wintering habitat for greater sandhill  
24 cranes. Among them is DFG's management of the Woodbridge Ecological Reserve. Purchased in 1985  
25 specifically for management as a crane roosting area, this site has been a traditional crane roost for  
26 decades and continues to be one of the most important roosts for this wintering population.

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

34 Beginning in 1984, The Nature Conservancy began acquiring lands that today encompass approximately  
35 40,000 acres on the Cosumnes River Preserve. Portions of the preserve are managed specifically for  
36 winter crane use and have attracted up to 20 percent of the wintering population of greater sandhill cranes  
37 at certain times of the wintering season (Littlefield and Ivey 2000).

38 The San Joaquin County Multi-Species Conservation Program (SJMSCP) covers greater sandhill crane.  
39 In addition, the species is proposed for the South Sacramento County HCP, currently under development.

#### 40 1.2.5.7 California Black Rail

##### 41 1.2.5.7.1 Legal Status

42 The California black rail (*Laterallus jamaicensis coturniculus*) is listed as a threatened species under  
43 CESA. It was listed by the California Fish and Game Commission in 1971. It is also designated as a fully  
44 protected species in California. California black rail has no federal regulatory status; however, it is on the

1 USFWS Region 1 list of birds of conservation concern. Species on this list are those that USFWS  
2 considers potential candidates for federal listing. Critical habitat has not been designated for the  
3 California black rail.

#### 4 1.2.5.7.2 Distribution

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

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

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

33 Surveys conducted by DFG in the early 1990s found small numbers of California black rail at several  
34 locations in the central Delta: White, Little Potato, Disappointment, and Whiskey sloughs; midchannel  
35 islands in the Middle and San Joaquin rivers; Holland and Palm tracts; and Mildred, Bacon, and  
36 Mandeville islands (CNDDDB 2010).

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

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

### 1.2.5.7.3 Relevant Natural History

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

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

California black rails occur only in marshland, a habitat mostly destroyed or modified in the western United States since the mid-1800s (Zeiner et al. 1990a). Populations and numbers have declined and will continue to decline as loss and alteration of habitat continues. The species is currently confined to mostly pristine remnants of historical tidal marshlands, mainly along the large tributaries and shoreline of northern San Pablo Bay, along the Carquinez Strait, and throughout parts of Suisun Bay (Evens et al. 1991). The marshes of San Pablo and Suisun bays are important in that they are the last large refuge areas for a viable population. No evidence exists that California black rails recolonize restored marshes for breeding (Evens et al. 1989).

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

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

### 1.2.5.7.4 Threats

Throughout the range of the California black rail, the species' primary threat is the loss and fragmentation of habitat from urbanization, flood control projects, agricultural practices, and hydrologic changes that

1 affect water regimes. The most important historical threat is the draining of tidal marshes, which may be  
2 responsible for more than 90 percent of the population declines of this species.

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

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

### 13 1.2.5.7.5 Relevant Conservation Efforts and Guidance

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

20 The CALFED ERP's MSCS designates the California black rail as "Contribute to Recovery" (CALFED  
21 Bay-Delta Program 2000). This designation means that CALFED will undertake actions under its control  
22 and within its scope that are necessary to recover the species. Recovery is equivalent to the requirements  
23 of delisting a species under the federal ESA and CESA.

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

## 26 1.2.5.8 California Clapper Rail

### 27 1.2.5.8.1 Legal Status

28 The California clapper rail (*Rallus longirostris obsoletus*) is listed as endangered under the federal ESA  
29 and CESA. Critical habitat has not been designated for this species.

### 30 1.2.5.8.2 Distribution

31 The historical distribution of California clapper rail in San Francisco Bay appears to have been restricted  
32 to marshes west of Suisun Bay; however, systematic survey data from the Suisun Marsh area were not  
33 available until the 1970s. California clapper rails have been consistently detected in the Suisun Marsh  
34 area since the 1970s, although abundance has been low (USFWS 2010c). It is likely that low numbers of  
35 California clapper rail were present in this area before large-scale marsh reclamation.

36 California clapper rails are present sporadically and in low numbers at various locations throughout the  
37 Suisun Marsh area. Areas where rails have been found recurrently since 1978 include the shoreline  
38 marshes from Martinez east to Concord Naval Station, marshes near the mouth of Goodyear Slough  
39 (Bahia), Suisun and Hill sloughs, and the western reaches of Cutoff Slough (USFWS 2010c). The results  
40 of surveys conducted from the late 1990s to 2000 indicate that California clapper rails were present in  
41 marshes associated with Pacheco Creek and Point Edith in Contra Costa County. Surveys in 2005 found  
42 no California clapper rails in Suisun Marsh or Point Edith, and surveys in 2006 found only two clapper  
43 rails, one at Rush Ranch (Suisun Marsh) and one at Point Edith. Similar sporadic results were found

1 during a multiyear survey by DFG, during which no California clapper rails were detected in 2002, eight  
2 in 2003, one in 2004, none in 2005, five in 2006, and none in 2007 (DFG 2008c as cited in USFWS  
3 2010c).

#### 4 1.2.5.8.3 Relevant Natural History

5 Throughout their distribution, California clapper rails occur within a range of salt and brackish marshes.  
6 In south and central San Francisco Bay and along the perimeter of San Pablo Bay, rails typically inhabit  
7 salt marshes dominated by pickleweed (*Salicornia virginica*) and Pacific cordgrass (*Spartina foliosa*).  
8 Pacific cordgrass dominates the middle marsh zone throughout the south and central bay. In the north bay  
9 (Petaluma Marsh, Napa-Sonoma Marsh, Suisun Marsh), California clapper rails also inhabit tidal brackish  
10 marshes that vary significantly in vegetation structure and composition. Use of brackish marshes by  
11 California clapper rails is largely restricted to major sloughs and rivers of San Pablo Bay and Suisun  
12 Marsh and along Coyote Creek in south San Francisco Bay. California clapper rails have rarely been  
13 recorded in nontidal marsh areas (USFWS 2010d).

14 Rail foraging and refuge habitat encompasses the lower, middle, and high marsh zones, as well as the  
15 adjacent transitional zone. Lower and middle marsh zones provide foraging habitat at low tide. Small tidal  
16 channels with dense vegetation covering the banks provide important foraging habitat and hidden routes  
17 for travel close to nesting. Higher marsh areas (high marsh and transitional zones) with dense vegetation  
18 are used for nesting and high-tide refugia habitat (USFWS 2010c). California clapper rails are relatively  
19 indiscriminate in their choice of nesting substrate and prefer to use the tallest cover regardless of plant in  
20 the upper-middle tidal marsh plain or high tidal marsh zones but not upland habitat transition zones  
21 bordering tidal marsh. Vegetation must be 20 inches high or greater near mean high water to allow for  
22 nest concealment and prevent tidal inundation (USFWS 2010c).

23 Abundance of California clapper rails is positively correlated with channel density, and rails prefer  
24 locations with a greater number of tidal creeks, *Grindelia* shrubs, and higher elevations. Physical habitat  
25 characteristics critical to California clapper rails include marsh size, location relative to other marshes,  
26 presence of buffers or transitional zones between marshes and upland areas, marsh elevation, and  
27 hydrology (USFWS 2010c).

#### 28 1.2.5.8.4 Threats

29 Loss and degradation of tidal marsh habitats continues to be the most important threat to California  
30 clapper rail and other tidal marsh species. The loss of tidal marsh habitat through filling and diking has  
31 been largely curtailed. However, other current factors are associated with declining populations:  
32 nonnative invasive species, disturbance, environmental contaminants, sea level rise attributable to climate  
33 change, and risk of extinction attributable to vulnerability of small populations in the face of random  
34 naturally occurring events (USFWS 2010d).

#### 35 1.2.5.8.5 Relevant Conservation Efforts and Guidance

36 The CALFED ERP's MSCS designates the California clapper rail as "Contribute to Recovery" (CALFED  
37 Bay-Delta Program 2000). This designation means that CALFED will undertake actions under its control  
38 and within its scope that are necessary to recover the species. Recovery is equivalent to the requirements  
39 of delisting a species under the federal ESA and CESA.

40 The Salt Marsh Harvest Mouse and California Clapper Rail Recovery Plan was finalized in 1984. That  
41 plan is considered outdated, and the California clapper rail is covered under the Draft Tidal Marsh  
42 Ecosystem Recovery Plan (USFWS 2010c).

## 1 **1.2.5.9 Bank Swallow**

### 2 **1.2.5.9.1 Legal Status**

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

### 6 **1.2.5.9.2 Distribution**

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

9 During the breeding season the species occurs throughout the northern two-thirds of the United States,  
10 most of Canada, and into northern Alaska (Garrison 1999). Bank swallow historically occurred along the  
11 larger lowland rivers throughout California, with the exception of Southern California, where the species  
12 occurred principally along the coast and at the mouths of large rivers such as the Los Angeles River  
13 (Grinnell and Miller 1944). The current breeding range (about 50 percent of the historical range) is  
14 primarily confined to parts of the Sacramento Valley and northeastern California, including the banks of  
15 the Sacramento and Feather rivers; a few scattered colonies persist along the central and northern coast  
16 (DFG 2005). The main stronghold of the bank swallow is along the banks of the Sacramento River and its  
17 major tributaries (DFG 2005). This species has been documented nesting in the Delta on Brannan Island  
18 along Sevenmile Slough near its confluence with Threemile Slough, and it could occur elsewhere in the  
19 Delta.

### 20 **1.2.5.9.3 Relevant Natural History**

21 Foraging bank swallows take insects on the wing from over a variety of land cover types (Garrison 1999;  
22 DFG 2005). They use holes dug in cliffs and riverbanks for cover. Bank swallows also nest in burrows  
23 that they dig in nearly vertical banks and cliff faces. For bank swallows to dig these burrows, they require  
24 substrates made up of soft soils such as fine sandy loam, loam, silt loam, and sand. Suitable banks for  
25 nesting also must be more than 3 feet above the ground or water for predator avoidance. Colonies of  
26 several to more than 3,000 bank swallows may nest at locations that have these qualities. Suitable nest  
27 sites are few and are scattered throughout the species' remaining California range; they are found most  
28 often at coastal river mouths, large rivers (primarily in the Sacramento Valley), and occasionally in gravel  
29 and sand mines that provide and maintain nesting habitat (Grinnell and Miller 1944). Bank swallows  
30 usually initiate a single breeding attempt in April. They incubate their eggs for about 2 weeks and then  
31 care for their nestlings for another 3 weeks, until they are fledged (Garrison et al. 1999; DFG 2005).

### 32 **1.2.5.9.4 Threats**

33 The greatest threat to the bank swallow has been loss of breeding sites along rivers and natural waterways  
34 resulting from conversion to concrete-lined flood control channels (in Southern California), and the  
35 application of riprap to natural riverbanks in the Central Valley (DFG 2000a; DFG 2005). Other threats  
36 come from predators that have access to colonies, changes in gravel and sand mining operations that  
37 destroy or no longer create nesting habitat, and high spring floods that can scour out colonies along  
38 riverbanks (Garrison 1999).

### 39 **1.2.5.9.5 Relevant Conservation Efforts and Guidance**

40 A State recovery plan for the bank swallow was completed and adopted by the California Fish and Game  
41 Commission in 1992. The recovery plan identifies habitat preserves and a return to a natural, meandering  
42 riverine ecosystem as the two primary strategies for recovering the bank swallow. Also, California

1 Partners in Flight has written a bird conservation plan that addresses riparian-associated birds, including  
2 bank swallow (RHJV 2004).

### 3 **1.2.5.10 California Least Tern**

#### 4 **1.2.5.10.1 Legal Status**

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

#### 7 **1.2.5.10.2 Distribution**

8 The species nests from the San Francisco Bay Area south into Baja California. Most nesting sites are  
9 concentrated in Southern California (USFWS 2006d); nesting in San Francisco Bay was first confirmed  
10 in 1967. Nesting was documented in Contra Costa County in the 1980s, and there is one record from  
11 Suisun Marsh in 2006 (CNDDDB 2010).

#### 12 **1.2.5.10.3 Relevant Natural History**

13 California least tern prefers to nest on open or sparsely vegetated sandy or gravelly shores on beaches or  
14 near shallow-water estuaries, where it often feeds. Although it prefers undisturbed sites, it has reportedly  
15 also nested on landfills and paved areas (CNDDDB 2010). California least tern lives along the coastline and  
16 migrates north into California to nest from April to May. When feeding, it follows schools of fish and is  
17 sometimes seen as far north as southern Oregon. California least tern feeds primarily in shallow estuaries  
18 or lagoons where small fish are abundant. Considerable feeding also takes place near shore in the open  
19 ocean (Cogswell 1977 as cited in Zeiner et al. 1990a), especially where lagoons are nearby, or at mouths  
20 of bays. Although this species is listed as endangered, its population numbers have increased from  
21 600 pairs in 1973 to roughly 7,100 pairs in 2005, and USFWS believes it should now be relisted as  
22 threatened (USFWS 2006d; USFWS 2007b). The number of California least tern sites has nearly doubled  
23 since the time of listing. The species is known to occur in the DP Planning Area in Suisun Marsh.

#### 24 **1.2.5.10.4 Threats**

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

#### 29 **1.2.5.10.5 Relevant Conservation Efforts and Guidance**

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

### 32 **1.2.5.11 Least Bell's Vireo**

#### 33 **1.2.5.11.1 Legal Status**

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

#### 37 **1.2.5.11.2 Distribution**

38 Least Bell's vireo is a neotropical migrant species and is found in California and other states in the  
39 southwest and central western United States during the breeding season and during migration. Formerly,

1 the vireo was known to breed from throughout the Sacramento and San Joaquin valleys, the Sierra  
2 Nevada foothills, and the Coast Ranges. It historically nested throughout riparian areas in the Central  
3 Valley and in other low-elevation riparian zones in California (RHJV 2004). The species was  
4 characterized as abundant at one time, but it is now absent from most of its historical range. By 1980, it  
5 was extirpated from the entire Central Valley (RHJV 2004). However, recent observations indicate that  
6 the species' range is expanding northward and that individuals are recolonizing areas that have been  
7 unoccupied by the species for decades (RHJV 2004). Least Bell's vireos successfully nested at the San  
8 Joaquin River National Wildlife Refuge in 2005 and 2006 (USFWS 2006e).

### 9 1.2.5.11.3 Relevant Natural History

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

15 Least Bell's vireos arrive in breeding habitats in California from mid-March to April (USFWS 1998a).  
16 Males establish and defend territories ranging in size from less than 1 acre to about 8 acres. Nest building  
17 by both members of a pair begins within several days of pair formation, and the nest takes 4 to 5 days to  
18 complete. Eggs are then laid and incubated for approximately 2 weeks. After hatching, nestlings are fed  
19 by both parents for 10 to 12 days, until fledging. Fledglings continue to be cared for by both parents for  
20 about an additional 2 weeks and generally remain in the territory for the remainder of the season. Least  
21 Bell's vireos depart from late July until late September.

### 22 1.2.5.11.4 Threats

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

### 28 1.2.5.11.5 Relevant Conservation Efforts and Guidance

29 USFWS prepared a draft recovery plan for least Bell's vireo (USFWS 1998a). The species is also  
30 addressed in most habitat conservation and multiple species planning efforts in Southern California (DFG  
31 2005), including the Coachella Valley Multi-Species Habitat Conservation Plan (MSHCP), the Western  
32 Riverside MSHCP, the Camp Pendleton Resource Management Plan, and the Orange County Natural  
33 Community Conservation Plan. Recovery and management recommendations in these plans include  
34 continuing cowbird removal programs, nest monitoring for cowbird parasitism, and restoration of riparian  
35 vegetation.

## 36 1.2.6 Mammals

### 37 1.2.6.1 San Joaquin Valley (Riparian) Woodrat

#### 38 1.2.6.1.1 Legal Status

39 The San Joaquin Valley (or riparian) woodrat (*Neotoma fuscipes riparia*) is federally listed as endangered  
40 and is a California species of special concern. Critical habitat has not been designated for this species.

### 1 1.2.6.1.2 Distribution

2 Historically found along the San Joaquin, Stanislaus, and Tuolumne rivers, the San Joaquin Valley  
3 woodrat species likely occurred throughout the riparian forests of the northern San Joaquin Valley  
4 (USFWS 1998b). Its range has become much more restricted because of extensive modification and  
5 destruction of riparian habitat along streams in its former range in the Central Valley. The only verified  
6 extant population is restricted to about 250 acres of riparian forest in Caswell Memorial State Park on the  
7 Stanislaus River, at the confluence with the San Joaquin River (USFWS 1998b). There are no current  
8 records of the riparian woodrat from the DP Planning Area. A record northeast of Vernalis along the San  
9 Joaquin River, which is near the extreme southeastern tip of the DP Planning Area, is considered extant  
10 by CNDDDB (2010); however, occupancy has not been verified.

### 11 1.2.6.1.3 Relevant Natural History

12 The San Joaquin Valley woodrat is most abundant in areas with deciduous valley oaks and some live oaks  
13 and dense shrub cover. In riparian areas, the highest densities of woodrats and their houses are typically in  
14 willow thickets with an oak overstory. Riparian woodrats build and live in houses of sticks and other  
15 litter, the same as other populations of dusky-footed woodrats. These conical structures are commonly  
16 leaned up against the base of an oak or willow. They can also be found high up in trees, in crotches and  
17 cavities of trees, and in hollow logs. The woodrat is mostly active at night; its diet is diverse and  
18 principally herbivorous, with leaves, fruits, twig tips, flowers, nuts, and fungi (USFWS 1998b). With their  
19 general dependence on terrestrial stick houses, riparian woodrats may be vulnerable to flooding. Although  
20 the woodrat can be arboreal and can escape flooding, its terrestrial houses, which are essential for  
21 survival, can be affected by flooding, potentially affecting population viability (USFWS 1998b).

### 22 1.2.6.1.4 Threats

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

### 26 1.2.6.1.5 Relevant Conservation Efforts and Guidance

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

## 32 1.2.6.2 Salt Marsh Harvest Mouse

### 33 1.2.6.2.1 Legal Status

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

### 37 1.2.6.2.2 Distribution

38 The historical range of the salt marsh harvest mouse likely included most of the marshland in the San  
39 Francisco Bay Area. Closely associated with saline habitats, this species' eastern distribution is generally  
40 considered to extend as far as approximately Collinsville. The waters of wetlands and marshes east of this  
41 point are considered too fresh to support the habitat of this species (USFWS 2010e). Today, the salt  
42 marsh harvest mouse potentially occupies an area representing approximately 15 percent of the historical  
43 salt marsh habitat that formerly existed in the San Francisco Bay Area (Dedrick 1989). Most remaining

1 populations are small and separated by large areas of unsuitable habitat, the exception being habitat in  
2 Suisun Marsh, where they occur throughout suitable habitat, and the northern part of San Pablo Bay.

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

#### 7 **1.2.6.2.3 Relevant Natural History**

8 Salt marsh harvest mice depend on thick cover of native halophytes. They use pickleweed as their  
9 primary habitat as long as they have nonsubmerged, salt-tolerant vegetation for escape during the highest  
10 tides. Refuge is taken from high tides in the upper zones of most marshes, usually in stands of fat hen and  
11 Australian salt bush (*Atriplex semibaccata*). These mice have also been found in the top zone of tidal  
12 marshes, and in transitional zones, which rarely flood (Shellhammer 1989). As a pure stand, salt grass  
13 (*Distichlis spicata*) has little habitat value for this species, though it may be advantageous as part of a  
14 component mixture (Shellhammer et al. 1982). The salt marsh harvest mouse does not use marshlands  
15 with low salinities and sparse pickleweed populations. This distinction is important, because most diked  
16 marshes within the Suisun Marsh exist where less saline conditions are encouraged to optimize habitat for  
17 waterfowl (Shellhammer et al. 1982).

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

#### 22 **1.2.6.2.4 Threats**

23 Loss and degradation of tidal marsh habitats continues to be the most important threat to the salt marsh  
24 harvest mouse and other tidal marsh species. Tidal marshes have been reduced by 84 percent since  
25 historical times (Dedrick 1989). The loss of tidal marsh habitat through filling and diking has been largely  
26 curtailed. However, other current factors are associated with declining populations: the conversion of salt  
27 marshes to brackish marshes by freshwater discharges from sewage treatment plants; introduction of  
28 nonnative cordgrass, bulrush, saltgrass, and other plant species; predation by nonnative red foxes and  
29 feral cats; and invasion of runoff, industrial discharges, and sewage effluent (Shellhammer et al. 1982;  
30 DFG 2000b). Probably the most important long-term issue is the predicted sea level rise of as much as  
31 4 feet within this century.

#### 32 **1.2.6.2.5 Relevant Conservation Efforts and Guidance**

33 The CALFED ERP's MSCS designates the salt marsh harvest mouse as "Contribute to Recovery"  
34 (CALFED Bay-Delta Program 2000). This designation means that CALFED will undertake actions under  
35 its control and within its scope that are necessary to recover the species. Recovery is equivalent to the  
36 requirements of delisting a species under the federal ESA and CESA.

37 The Salt Marsh Harvest Mouse and California Clapper Rail Recovery Plan was finalized in 1984. This  
38 recovery plan is considered outdated. The salt marsh harvest mouse is covered under the Draft Tidal  
39 Marsh Ecosystem Recovery Plan (USFWS 2010c).

### 40 **1.2.6.3 Riparian Brush Rabbit**

#### 41 **1.2.6.3.1 Legal Status**

42 The riparian brush rabbit (*Sylvilagus bachmani riparius*) is listed as endangered under the federal ESA  
43 and CESA. It was initially listed as endangered by the State of California on May 29, 1994. USFWS

1 proposed the species for listing under the federal ESA on November 21, 1997 (62 FR 62276), and  
2 reopened the proposal for further public input on April 13, 1998, to include survey data from the 1998  
3 winter floods in its final determination on whether to list the species (63 FR 17981). USFWS issued its  
4 final determination to list the species as endangered on February 23, 2000 (65 FR 8881).

5 Critical habitat has not been designated for this species because USFWS believed that such a designation  
6 would not provide any additional benefit beyond that provided by the ESA listing as endangered and  
7 because the species was known to occur only within Caswell Memorial State Park (65 FR 8881,  
8 February 23, 2000).

#### 9 1.2.6.3.2 Distribution

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

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

#### 23 1.2.6.3.3 Relevant Natural History

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

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

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

#### 40 1.2.6.3.4 Threats

41 The primary threats to the survival of the riparian brush rabbit are the limited extent of its existing habitat,  
42 extremely low numbers of individual animals, and few extant populations. The small size of the  
43 remaining population of riparian brush rabbits, the species' behavior, and the highly limited and  
44 fragmented nature of remaining habitat restricts natural dispersal and puts the species at risk from a

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

#### 10 1.2.6.3.5 Relevant Conservation Efforts and Guidance

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

#### 17 1.2.6.4 San Joaquin Kit Fox

##### 18 1.2.6.4.1 Legal Status

19 The San Joaquin kit fox (*Vulpes macrotis mutica*) is federally listed as endangered and State listed as  
20 threatened. No critical habitat rules have been published for this species.

##### 21 1.2.6.4.2 Distribution

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

28 USFWS (1998a) reports that the largest extant populations of kit foxes are in western Kern County on and  
29 around the Elk Hills and Buena Vista Valley and in San Luis Obispo County in the Carrizo Plain National  
30 Monument. Other relatively large populations have been reported from the central coast around Fort  
31 Hunter Liggett, Monterey County, and Camp Roberts, Monterey and San Luis Obispo counties.  
32 Occurrences further north are fewer and less frequent and include several in the Los Vaqueros watershed  
33 and surrounding area in Contra Costa County in the early 1990s (USFWS 1998b; CNDDDB 2010).

##### 34 1.2.6.4.3 Relevant Natural History

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

39 Dens are used for cover. Kit foxes either dig their own dens, use those constructed by other animals, or  
40 use human-made structures (e.g., culverts, abandoned pipelines, or banks in sumps or roadbeds) (USFWS  
41 2009). Kit foxes often change dens and may use many dens throughout the year.

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

#### 4 1.2.6.4.4 Threats

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

#### 12 1.2.6.4.5 Relevant Conservation Efforts and Guidance

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

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

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40 Bollibokka Mountain, Brush Creek, Brush Lake, Butte City, Carmichael, Cherokee, Citrus  
41 Heights, Clarksville, Columbia, Colusa, Cottonwood, Crows Landing, Delta Ranch, Devils Rock,

- 1 El Dorado Bend, Enterprise, Escalon, Firebaugh, Folsom, Forbestown, Foster Island, Fresno  
2 North, Friant, Gerber, Glenn, Gravelly Ford, Gridley, Grimes, Gustine, Hanland Peak, Hatch,  
3 Herndon, Honcut, Keystone, Kirkville, Knights Ferry, Lamoine, Lanes Bridge, Llano Seco, Los  
4 Banos Valley, Los Molinos, Mariposa Peak, Melones Dam, Mendota Dam, Meridian, Millerton  
5 Lake East, Millerton Lake West, Minnesota Mountain, Moulton Weir, Nicolaus, Nord, Oakdale,  
6 Oak Run, O'Brien, Olive Hurst, Ord Ferry, Oroville, Oroville Dam, Oxalis, Pacheco Pass,  
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