APPENDIX E

BIOLOGICAL RESOURCES

APPENDIX E.1 SOILS IN THE PLAN AREA

SOIL TYPE, TEXTURE, DRAINAGE CLASSIFICATION, HYDRIC SOIL STATUS, AND ACREAGE FOR 89 SOIL TYPES OCCURRING WITHIN THE PLAN AREA

Soil Symbol	Soil Name	Soil Texture	Drainage Classification	Hydric	Acreage
Fresno County					
AeF	Ahwahnee very rocky coarse sandy loam, willow, 30 to 70 percent slopes	Rocky coarse sandy loam	Well drained	No	0.5
AvD	Auberry very rocky coarse sandy loam, 3 to 30 percent slopes	Rocky coarse sandy loam	Well drained	No	6.2
AvF	Auberry very rocky coarse sandy loam, 45 to 70 percent slopes	Rocky coarse sandy loam	Well drained	No	14.8
Canal	Canal	NA	NA	No	0.7
CzF	Colluvial land	NA	NA	No	6.3
DAM	Dams	NA	NA	No	5.5
DhB	Delhi loamy sand, 3 to 9 percent slopes	Loamy sand		No	1.4
Dm	Dello loamy sand	Loamy sand	Somewhat poorly drained	Yes	17.9
Ex	Exeter loam	Loam	Well drained	Yes	6.4
FdF	Fallbrook very rocky sandy loam, willow, 30 to 70 percent slopes	Very rocky sandy loam	Well drained	No	12.1
FyD	Friant fine sandy loam, 9 to 30 percent slopes	Fine sandy loam	Well drained	No	10.4
FyE	Friant fine sandy loam, 30 to 45 percent slopes	Fine sandy loam	Well drained	No	10.7
Ga	Grangeville sandy loam	Sandy loam	Somewhat poorly drained	Yes	346.4
Gd	Grangeville sandy loam, saline alkali	Sandy loam	Somewhat poorly drained	Yes	4.9
Ge	Grangeville sandy loam, sandy substratum	Sandy loam/sandy	Somewhat poorly drained	Yes	26.8
Gf	Grangeville fine sandy loam	Fine sandy loam	Somewhat poorly drained	Yes	1434.3
Gg	Grangeville fine sandy loam, saline alkali	Fine sandy loam	Somewhat poorly drained	Yes	301.2
Gl	Grangeville fine sandy loam, gravelly substratum	Fine sandy loam/gravel	Somewhat poorly drained	Yes	44.9

SOIL TYPE, TEXTURE, DRAINAGE CLASSIFICATION, HYDRIC SOIL STATUS, AND ACREAGE FOR 89 SOIL TYPES OCCURRING WITHIN THE PLAN AREA

Soil Symbol	Soil Name	Soil Texture	Drainage Classification	Hydric	Acreage
Gp	Grangveville soils, channeled	Sandy loam	Somewhat poorly drained	Yes	204.0
GrF	Granitic rock land	Bedrock	Excessively drained	No	2.1
GtA	Greenfield sandy loam, 0 to 3 percent slopes	Sandy loam	Well drained	No	72.3
GtB	Greenville sandy loam, 3 to 9 percent slopes	Sandy loam	Well drained	No	25.3
Ha	Hanford coarse sandy loam	Coarse sandy loam	Well drained	No	69.2
Hc	Hanford sandy loam	Sandy loam	Well drained	No	520.9
Hd	Hanford sandy loam, benches	Sandy loam	Well drained	No	38.5
He	Hanford sandy loam, gravelly substratum	Sandy loam/gravel	Well drained	No	373.9
Hg	Hanford sandy loam, silty substratum	Sandy loam/silty	Well drained	No	1.8
Hl	Hanford gravelly sandy loam	Gravelly sandy loam	Well drained	No	268.6
Hm	Hanford fine sandy loam	Fine sandy loam	Well drained	Yes	441.6
Hn	Hanford fine sandy loam, gravelly substratum	Fine sandy loam/gravelly	Well drained	No	2.1
Ho	Hanford fine sandy loam, silty substratum	Fine sandy loam/silty	Well drained	No	39.4
Hr	Hanford fine sandy loam, hard substratum	Fine sandy loam/hard	Well drained	No	6.0
Hsd	Hesperia sandy loam	Sandy loam	Well drained	No	27.9
Hsr	Hesperia fine sandy loam	Fine sandy loam	Well drained	No	87.3
Hst	Hesperia fine sandy loam moderately deep	Fine sandy loam	Well drained	No	132.4
Ml	Merced clay, moderately saline	Clay	Very poorly drained	Yes	100.2
Pk	Pits	NA	NA	Yes	262.0
PmD	Pollasky sandy loam, 15 to 30 percent slopes	Sandy loam	Well drained	No	3.5

SOIL TYPE, TEXTURE, DRAINAGE CLASSIFICATION, HYDRIC SOIL STATUS, AND ACREAGE FOR 89 SOIL TYPES OCCURRING WITHIN THE PLAN AREA

Soil Symbol	Soil Name	Soil Texture	Drainage Classification	Hydric	Acreage
PnB	Pollasky fine sandy loam, 2 to 9 percent slopes	Fine sandy loam	Well drained	No	2.3
PnC	Pollasky fine sandy loam, 9 to 15 percent slopes	Fine sandy loam	Well drained	No	8.5
PpC	Pollasky-Rocklin sandy loams, 3 to 15 percent	Sandy loam	Well drained	No	0.4
Rh	Riverwash	Cobbles, stones, boulders	Excessively drained	Yes	279.3
RkB	Rocklin sandy loam, 3 to 9 percent slopes	Sandy loam		No	<0.1
SgA	San Joaquin loam, 0 to 3 percent slopes	Loam	Moderately well drained	Yes	<0.1
ThF	Terrace escarpments	NA	NA	No	189.0
TxE	Trimmer loam, 30 to 45 percent slopes	Loam	Well drained	No	1.1
TzbA	Tujunga loamy sand, 0 to 3 percent slopes	Loamy sand	Somewhat excessively drained	Yes	61.4
TzbB	Tujunga loamy sand, 3 to 9 percent slopes	Loamy sand	Somewhat excessively drained	Yes	5.2
TzcA	Tujunga loamy sand, gravelly substratum, 0 to 3 percent slopes	Loamy sand/gravel	Somewhat excessively drained	No	37.3
TzdA	Tujunga cobbly loamy sand, 0 to 3 percent slopes	Cobbly loamy sand	Somewhat excessively drained	No	122.2
TzeB	Tujunga soils, channeled, 0 to 9 percent slopes	Gravelly sand	Somewhat excessively drained	Yes	650.9
VfD	Vista coarse sandy loam, 15 to 30 percent slopes	Coarse sandy loam	Well drained	No	0.1
VgB	Vista coarse sandy loam, willow, 3 to 9 percent slopes	Coarse sandy loam	Well drained	Yes	1.0
VgD	Vista coarse sandy loam, willow, 9 to 30 percent slopes	Coarse sandy loam	Well drained	No	6.8
VlD	Vista very rocky coarse sandy loam, willow, 3 to 30 percent slopes	Rocky coarse sandy loam	Somewhat excessively drained	No	1.1
VlF	Vista very rocky coarse sandy loam, willow, 30 to 70 percent slopes	Rocky coarse sandy loam	Somewhat excessively drained	No	6.4

SOIL TYPE, TEXTURE, DRAINAGE CLASSIFICATION, HYDRIC SOIL STATUS, AND ACREAGE FOR 89 SOIL TYPES OCCURRING WITHIN THE PLAN AREA

Soil Symbol	Soil Name	Soil Texture	Drainage Classification	Hydric	Acreage
VnD	Vista-Fallbrook coarse sandy loams, 9 to 30 percent slopes	Coarse sandy loam	Somewhat excessively drained/ well drained	No	1.5
VoD	Vista-Fallbrook very rocky coarse sandy loams, 3 to 30 percent slopes	Rocky coarse sandy loam	Somewhat excessively drained/ well drained	No	10.6
W	Water	NA	NA	Yes	2187.6
Madera County					
AeD	Ahwahnee and Vista rocky coarse sandy loams, 8 to 30 percent slopes	Rocky coarse sandy loam	Well drained	No	51.6
AeE	Ahwahnee and Vista rocky coarse sandy loams, 30 to 45 percent slopes	Rocky coarse sandy loam	Well drained	No	34.0
ArF	Ahwahnee and Vista very rocky coarse sandy loams, 30 to 75 percent slopes	Very rocky coarse sandy loam	Well drained	No	39.2
CaA	Cajon loamy sand, 0 to 1 percent slopes	Loamy sand	Somewhat excessively drained	No	347.1
DcE	Daulton rocky fine sandy loam, 30 to 75 percent slopes	Rocky fine sandy loam	Well drained	No	53.5
GaA	Grangeville fine sandy loam, 0 to 1 percent slopes	Fine sandy loam	Somewhat poorly drained	Yes	165.1
GbA	Grangeville fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	Fine sandy loam	Somewhat poorly drained	Yes	113.8
Gp	Gravel pits	Very to extremely coarse gravelly sand	NA	No	29.3
GrA	Greenfield coarse sandy loam, 0 to 3 percent slopes	Coarse sandy loam	Well drained	No	24.3
GrB	Greenfield coarse sandy loam, 3 to 8 percent slopes	Coarse sandy loam	Well drained	No	22.5
HaA	Hanford fine loamy sand	Fine sandy loam	Well drained	No	269.2
HdA	Hanford (ripperdan) fine sandy loam, moderately deep and deep over silt, 0 to 3 percent slopes	Fine sandy loam/silt	Well drained	No	27.1
HeB	Hanford gravelly sandy loam, 3 to 8 percent slopes	Gravelly sandy loam	Well drained	No	119.8

SOIL TYPE, TEXTURE, DRAINAGE CLASSIFICATION, HYDRIC SOIL STATUS, AND ACREAGE FOR 89 SOIL TYPES OCCURRING WITHIN THE PLAN AREA

Soil Symbol	Soil Name	Soil Texture	Drainage Classification	Hydric	Acreage
HfA	Hanford sandy loam, 0 to 3 percent slopes	Sandy loam	Well drained	No	31.4
HsD	Hornitos gravelly sandy loam, 8 to 30 percent slopes	Gravelly sandy loam	Well drained	Yes	11.2
HvD	Hornitos very rocky sandy loam, 8 to 30 percent slopes	Rocky sandy loam	Well drained	Yes	3.4
RaA	Ramona sandy loam, 0 to 3 percent slopes	Sandy loam	Well drained	Yes	9.9
Rh	Riverwash	Cobbles, stones, boulders	Excessively drained	Yes	170.7
SaA	San Joaquin sandy loams, 0 to 3 percent slopes	Sandy loam	Moderately well drained	Yes	10.3
Tf	Terrace escarpments	NA	NA	No	198.8
TwA	Tujunga loamy sand, 0 to 3 percent slopes	Loamy sand	Somewhat excessively drained	No	305.0
TwB	Tujunga loamy sand, 3 to 8 percent slopes	Loamy sand	Somewhat excessively drained	Yes	85.4
TxA	Tujunga loamy sand, moderately deep and deep over hardpan, 0 to 3 percent slopes	Loamy sand/hardpan	Somewhat excessively drained	Yes	9.8
TzB	Tujunga and Hanford soils, channeled, 0 to 8 percent slopes	Loamy sand/ sandy loam	Somewhat excessively drained/ well drained	No	672.3
VaA	Visalia fine sandy loam, 0 to 1 percent slopes	Fine sandy loam	Well drained	Yes	24.6
W	Water	NA	NA	Yes	1662.6
WfB	Whitney fine sandy loam, 3 to 8 percent slopes	Fine sandy loam	Well drained	Yes	29.1
WnD	Whitney sandy loam, 15 to 30 percent slopes, eroded	Sandy loam	Well drained	No	118.2
WrC	Whitney and Rocklin sandy loams, 8 to 15 percent slopes	Sandy loam	Well drained	Yes	15.0
WvA	Wunjey very fine sandy loam, moderately saline-alkali, 0 to 1 percent slopes	Very fine sandy loam	Well drained	Yes	15.7
				Total	13,172.9

Source: Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov, accessed July 2012.

APPENDIX E.2 SPECIAL-STATUS PLANT SPECIES REJECTED FOR OCCURRENCE ON THE SAN JOAQUIN RIVER PARKWAY PLAN AREA

Scientific Name	Common Name	Lack of Serpentine (S) or Alkaline (A) Soils	Lack of Other Edaphic Requirements	Outside Elevation Range for Species	Specific Habitat Type Not Present on Site	Habitat on Site too degraded to Support Species	Outside range of species
Acanthomintha obovata ssp. obovata	San Benito thorn-mint			X			
Acanthomintha lanceolata	Santa Clara thorn mint						X
Amsinckia furcata	Forked fiddleneck						X
Androsace elongate ssp. acuta	California androsace						X
Angelica callii	Call's angelica			X			
Antennaria pulchella	beautiful pussy-toes			X			
Antirrhinum ovatum	oval-leaved snapdragon			X			
Arabis repanda var. greenei	Greene's rockcress			X			
Astragalus kentrophyta var. danaus	Sweetwater Mountains milk-vetch			X			
Atriplex cordulata var.cordulata	Heartscale	X	X		X		
Atriplex coronata var. coronata	Crownscale				X		X
Atriplex minuscula	Lesser saltscale	X	X		X		
Benitoa occidentalis	western lessingia			X			
Bulbostylis capillaris	thread-leaved beakseed			X			
Calyptridium pulchellum	Mariposa pussypaws		X	X			
Calystegia collina ssp. venusta	South Coast Range morning-glory			X			
Camissonia sierrae ssp. sierrae	Yosemite evening-primrose			X			
Carex congdonii	Congdon's sedge			X			
Carex incurviformis	Mount Dana sedge			X			
Carex tahoensis	Tahoe sedge			X			
Carex tompkinsii	Tompkins' sedge			X			
Carpenteria californica	Tree-anemone			X	X		
Caulanthus californicus	California jewel-flower		X			X	
Ceanothus fresnensis	Fresno ceanothus			X			

Scientific Name	Common Name	Lack of Serpentine (S) or Alkaline (A) Soils	Lack of Other Edaphic Requirements	Outside Elevation Range for Species	Specific Habitat Type Not Present on Site	Habitat on Site too degraded to Support Species	Outside range of species
Chloropyron palmatum	Palmate-bracted bird's-beak				X		
Chorizanthe ventricosa	potbellied spineflower	X					
Clarkia breweri	Brewer's clarkia			X			
Claytonia palustris	marsh claytonia			X			
Claytonia parviflora ssp. grandiflora	streambank spring beauty			X			
Convolvulus simulans	small-flowered morning-glory	X					
Cordylanthus tenuis ssp. barbatus	Fresno County bird's-beak			X			
Cryptantha glomeriflora	clustered-flower cryptantha			X			
Cryptantha rattanii	Rattan's cryptantha			X			
Cypripedium montanum	mountain lady's-slipper			X			
Delphinium inopinum	unexpected larkspur			X			
Delphinium recurvatum	Recurved larkspur	X	X		X		
Dicentra nevadensis	Tulare County bleeding heart			X			
Epilobium howellii	subalpine fireweed			X			
Eriogonum gossypinum	Cottony buckwheat						X
Eriogonum heermannii var. occidentale	western Heermann's buckwheat			X			
Eriogonum nudum var. indictum	Protruding buckwheat						X
Eriogonum polypodum	Tulare County buckwheat			X			
Eriogonum prattenianum var. avium	Kettle Dome buckwheat			X			
Eriogonum vestitum	Idria buckwheat			X			
Eriophorum gracile	slender cottongrass			X			
Eriophyllum lanatum var. obovatum	southern Sierra woolly sunflower			X			
Eschscholzia hypecoides	San Benito poppy			X			
Fritillaria pinetorum	pine fritillary			X			
Fritillaria agrestis	stinkbells	X					
Galium andrewsii ssp. gatense	phlox-leaf serpentine bedstraw	X					

Scientific Name	Common Name	Lack of Serpentine (S) or Alkaline (A) Soils	Lack of Other Edaphic Requirements	Outside Elevation Range for Species	Specific Habitat Type Not Present on Site	Habitat on Site too degraded to Support Species	Outside range of species
Ivesia unguiculata	Yosemite ivesia			X			
Jamesia americana var. rosea	rosy-petalled cliffbush			X			
Lasthenia ferrisiae	Ferris' goldfields				X		
Leptosiphon grandiflorus	Large flowered leptosiphon						X
Leptosiphon oblanceolatus	Sierra Nevada leptosiphon			X			
Lilium humboldtii sp. humboldtii	Humboldt lily						X
Meesia triquetra	three-ranked hump moss			X			
Mimulus acutidens	Kings River Monkeyflower			X			
Mimulus grayi	Gray's monkeyflower			X			
Mimulus inconspicuus	small-flowered monkeyflower			X			
Mimulus laciniatus	cut-leaved monkeyflower			X			
Mimulus subsecundus	one-sided monkeyflower			X			
Minuartia obtusiloba	alpine sandwort			X			
Mitellastra caulescens	Leafy-stemmed miterwort				X		X
Moneses uniflora	woodnymph				X		
Nemacladus gracilis	Slender nemacladus						X
Nemophila parviflora var. quercifolia	oak-leaved nemophila			X			
Perideridia bacigalupii	Bacigalupi's yampah			X			
Phacelia orogenes	mountain phacelia			X			
Piperia colemanii	Coleman's rein orchid			X			
Piperia leptopetala	narrow-petaled rein orchid			X			
Pityopus californica	California pinefoot				X		
Plagiobothrys myosotoides	forget-me-not popcorn-flower			X			
Solidago guiradonis	Guirado's goldenrod			X			
Sparganium natans	small bur-reed			X			
Streptanthus farnsworthianus	Farnsworth's jewel-flower			X			

Scientific Name	Common Name	Lack of Serpentine (S) or Alkaline (A) Soils	Lack of Other Edaphic Requirements	Outside Elevation Range for Species	Specific Habitat Type Not Present on Site	Habitat on Site too degraded to Support Species	Outside range of species
Tonestus peirsonii	Peirson's tonestus			X			
Utricularia minor	lesser bladderwort			X			
Veronica cusickii	Cusick's speedwell			X			
Wyethia elata	Hall's wyethia			X			

APPENDIX E.3 SPECIAL-STATUS SPECIES DETERMINED TO BE ABSENT FROM THE PLAN AREA

Name	Status*	Habitat	Potential for Occurrence in Plan Area
Federal or State Endangered or Threatened Species			
Succulent's owl's-clover (*Castilleja campestris* ssp. *succulent*)	FT, SE CNPS 1B.2	Moist places in vernal pools and valley and foothill grassland, often in acidic soils.	Absent. Vernal pools are not known to occur within the Plan Area. However, suitable habitat may be present immediately adjacent if vernal pools occur on the bluffs above the river corridor. The nearest recorded occurrence of this species is located approximately 0.1 mi east of the Plan Area, about 0.25-mi east of Friant Road, and 0.5 mi south of Little/ Dry Creek (CNDDB, 2015). Designated critical habitat is located within the Plan Area on the west side of the river.
Boggs Lake hedge-hyssop (*Gratiola heterosepala*)	SE CNPS 1B.2	Vernal pools and freshwater marshes and swamps on clay soils, sometimes on lake margins.	Absent. Suitable habitat for the Boggs Lake hedgy-hyssop is not present in the Plan Area. Although the species may be present on the bluffs above the river corridor and on the margins of Millerton Lake, the Project would not affect occurrences of this species in those areas.
San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*)	FT, SE CNPS 1B.1	Vernal pools.	Absent. Suitable habitat is not present in the Plan Area but may be present immediately adjacent (i.e., on the bluffs above the river corridor).
Hairy Orcutt grass (*Orcuttia pilosa*)	FE, SE CNPS 1B.1	Vernal pools.	Absent. Suitable habitat is not present in the Plan Area but may be present immediately adjacent (i.e., on the bluffs above the river corridor).Designated critical habitat is located to the west of the river, encompassing a portion of the Plan Area.
Hartweg's golden sunburst (*Pseudobahia bahiifolia*)	FE, SE CNPS 1B.1	Clay soils, predominantly on northern slopes of knolls, also along shady creeds or near vernal pools in valley and foothill grassland and cismontane woodland.	Absent. Suitable habitat is not present in the Plan Area but may be present immediately adjacent (i.e., in the grasslands on the bluffs above the river corridor where clay soils are present). The nearest recorded occurrence of this species is located approximately 0.2 mi east of the Plan Area near the eastern terminus of North Fork Road (CNDDB, 2015).
San Joaquin adobe sunburst (*Pseudobahia peirsonii*)	FT, SE CNPS 1B.1	Grassy valley floors and rolling foothills in heavy clay soils in valley and foothill grassland and cismontane woodland.	Absent. Suitable habitat is not present in the Plan Area but may be present immediately adjacent (i.e., grasslands on the bluffs may provide suitable undisturbed heavy adobe clay soils).
Green's tuctoria (*Tuctoria greenei*)	FE, SR CNPS 1B.1	Dry bottoms of vernal pools in open valley and foothill grassland.	Absent. Suitable habitat is not present in the Plan Area but may be present immediately adjacent (i.e., on the bluffs above the river corridor).

APPENDIX E.3 SPECIAL-STATUS SPECIES DETERMINED TO BE ABSENT FROM THE PLAN AREA

Name	Status*	Habitat	Potential for Occurrence in Plan Area
Vernal pool fairy shrimp (*Branchinecta lynchi*)	FT	Grass or mud-bottomed swales, earth slump or basalt-flow depression pools in grasslands.	Absent. Suitable habitat is not present in the Plan Area but may be present immediately adjacent (i.e., if vernal pools are present on the bluffs above the river corridor). There are CNDDB records of this species within 0.3 mi of the Plan Area. Critical habitat has been designated near the Plan Area on the east side of Friant Road north of Little Dry Creek.
Vernal pool tadpole shrimp (*Lepidurus packardi*)	FE	Grass or mud-bottomed swales in grasslands on old alluvial soils underlain by hardpan.	Absent. Suitable habitat is not present in the Plan Area but may be present immediately adjacent (i.e., if vernal pools are present on the bluffs above the river corridor). However, there are no records of the species within or adjacent to the Plan Area, despite numerous surveys in potentially suitable habitat (as evidenced by the many records of vernal pool fairy shrimp in the Plan vicinity) (CNDDB, 2015). The nearest extant record is located approximately 3.5 mi to the northeast (CNDDB, 2015). Thus, although the potential presence of the species within the Plan Area cannot be ruled out, it is considered unlikely.
Blunt-nosed leopard lizard (*Gambelia sila*)	FE, SE, FP	Open, sparsely vegetated areas within non-native grassland, valley sink scrub, valley needlegrass grassland, and alkali playa communities on the floor of the San Joaquin Valley.	Absent. Suitable habitat is not present in the Plan Area.
Giant garter snake (*Thamnophis gigas*)	FT, ST	Freshwater marshes and low gradient streams with emergent vegetation; adapted to drainage canals and irrigation ditches with mud substrate.	Absent. The Plan Area is not within the species' known range.
San Joaquin kit fox (*Vulpes macrotis mutica*)	FE, ST	Open, dry grasslands, shrub-steppe and alkali shrublands; also in agricultural landscapes including orchards, fields and sometimes near adjacent developed areas.	Absent. Suitable habitat is absent from the Plan Area. The two CNDDB (2015) records adjacent to the Plan Area are from the early 1990s and are the result of drive-by vehicle sightings that were not confirmed. No modern, confirmed records are present near the Plan Area.
California Species of Special Concern			

APPENDIX E.3 SPECIAL-STATUS SPECIES DETERMINED TO BE ABSENT FROM THE PLAN AREA

Name	Status*	Habitat	Potential for Occurrence in Plan Area
Hardhead (*Mylopharodon conocephalus*)	CSSC	Sacramento-San Joaquin and Russian River drainages.	Absent. Sampled in very low numbers in 1981, though now thought to be absent from the Valley reaches of the San Joaquin River (Moyle, 2002).
Northern harrier (*Circus cyaneus*)	CSSC (nesting)	Forages in marshes, grasslands, and ruderal habitats; nests in extensive marshes and wet fields.	Absent as Breeder. Northern harriers have been confirmed in the winter though nesting has never been confirmed.
Yellow warbler (*Setophaga petechia*)	CSSC (nesting)	Breeds in riparian woodlands, particularly those dominated by willows and cottonwoods.	Absent as Breeder. The quality of the riparian habitat and more importantly the prevalence of brown-headed cowbirds in the Plan Area eliminate yellow warblers as potential nesters, though they are quite common in spring and fall migrations.
Yellow-breasted chat (*Icteria virens*)	CSSC (nesting)	Breeds in riparian habitats having dense understory vegetation, such as willow and blackberry.	Absent as Breeder. The quality of the riparian habitat and, more importantly, the prevalence of brown-headed cowbirds (*Molothrus ater*) in the Plan Area eliminate yellow warblers as potential nesters, though they are quite common during spring and fall migrations.
State Protected Species, CEQA Rare Species, and CNPS Species			
Vernal pool smallscale (*Atriplex persistens*)	CNPS 1B.2	Alkaline soils in vernal pools.	Absent. Suitable habitat is not present in the Plan Area but may be present immediately adjacent (i.e., on the bluffs above the river corridor).
Dwarf downingia (*Downingia pusilla*)	CNPS 2.2	Vernal lake and pool margins (mesic sites) in valley and foothill grassland.	Absent. Suitable habitat is not present in the Plan Area but may be present immediately adjacent (i.e., on the bluffs above the river corridor).
Spiny-sepaled button-celery (*Eryngium spinosepalum*)	CNPS 1B.2	Vernal pools within valley and foothill grassland some sites on granitic clay soils.	Absent. Suitable habitat is not present in the Plan Area but may be present immediately adjacent (i.e., on the bluffs above the river corridor).
Golden goodmania (*Goodmania luteola*)	CNPS 4.2	Mojavean desert scrub, meadows and seeps, playas, and valley and foothill grassland on alkaline or clay soils.	Absent. Suitable habitat is not present in the Plan Area.
Madera leptosiphon (*Leptosiphon serrulatus*)	CNPS 1B.2	Dry slopes, often on decomposed granite in cismontane woodland and lower montane coniferous forest.	Absent Suitable habitat is not present in the Plan Area but may be present within the larger Plan Area adjacent to Millerton Lake.

APPENDIX E.3 SPECIAL-STATUS SPECIES DETERMINED TO BE ABSENT FROM THE PLAN AREA

Name	Status*	Habitat	Potential for Occurrence in Plan Area
Orange lupine (*Lupinus citrinus* var. *citrinus*)	CNPS 1B.2	Rocky, decomposed granitic outcrops, usually open areas, on flat to rolling terrain in chaparral, cismontane woodland, and lower montane coniferous forest.	Absent. Suitable granitic habitat is not present in the Plan Area but may be present in the larger Plan Area along the eastern edge of Millerton Lake.
Sierra monardella (*Monardella candicans*)	CNPS 4.3	Sandy or gravelly soils in chaparral, cismontane woodland, and lower montane coniferous forest.	Absent. Suitable habitat is not present in the Plan Area.
Sierra sweet bay (*Myrica hartwegii*)	CRPR 4.3	Usually on streamsides in cismontane woodland, lower montane coniferous forest, and riparian forest.	Absent. Suitable habitat is not present in the Plan Area.
Fragile pentachaeta (*Pentachaeta fragilis*)	CRPR 4.3	Often in openings in chaparral and lower montane coniferous forests with sandy soils.	Absent. Suitable habitat is not present in the Plan Area.
Michael's rein orchid (*Piperia michaelii*)	CRPR 4.2	Generally dry sites on mudstone and humus in coastal bluff scrub, closed-cone coniferous forest, chaparral, cismontane woodland, coastal scrub, and lower montane coniferous forest.	Absent. Suitable habitat is not present in the Plan Area.
Caper-fruited tropidocarpum (*Tropidocarpum capparideum*)	CNPS 1B.1	Alkaline clay in valley and foothill grassland.	Absent. Suitable habitat is not present in the Plan Area. Further, the grasslands on the bluffs above the river corridor are unlikely to contain appropriate alkaline clay soils.

Appendix E.4 Detailed Descriptions of Special-status Species Potentially Occurring in the Plan Area

Federal or State Threatened or Endangered Species

Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*). Federal Status: Threatened; State Status: None. The USFWS formally listed the valley elderberry longhorn beetle (beetle) as threatened, and designated critical habitat, on 8 August 1980 (USFWS, 1980). On 14 February 2007, the USFWS completed a five-year review that recommended the species be delisted (USFWS, 2007) based upon the number of sightings throughout the Central Valley and the reduction of the primary threats to the species (primarily riparian habitat loss). A delisting proposal has not yet been released.

At the time of its listing in 1980, the beetle was known from less than 10 locations on the American River, Putah Creek, and Merced River. Now it is known to occur from southern Shasta County to Fresno County (USFWS, 2009). Adults have been collected at elevations ranging from 30 ft on the Central Valley floor to about 2200 ft in the Sierra Nevada, and exit holes have been observed up to 2940 ft (Barr, 1991). The USFWS considers the Central Valley and surrounding foothills (below 3000 ft in elevation) from Redding south through Kern County as within the range of the threatened subspecies (USFWS, 1996).

The beetle's life cycle is intimately connected to its habitat, elderberry (*Sambucus mexicana* or *Sambucus racemosa* var. *microbotrys*) (USFWS, 1980, 1984). Following mating, the female lays her eggs in crevices in the elderberry bark, and after hatching approximately 10 days later, the larvae bore into the pith of the elderberry and feed inside stems for 1–2 years until they mature. They emerge as adults during the spring via exit holes chewed through the bark. Exit holes are slightly oval and are approximately 0.3–0.4 inches in diameter (Barr, 1991). Adult beetles feed on the elderberry foliage until they mate, completing the cycle. Adults are active from March to June (USFWS, 1984; Barr, 1991; USFWS, 2009).

The elderberry shrubs used by this species occur in riparian forests throughout the Central Valley. Although they occasionally occur outside of riparian areas, those shrubs supporting the greatest beetle densities are located in areas where the shrubs are abundant and interspersed among dense riparian forest (Barr, 1991; Collinge et al. 2001). Isolated elderberry shrubs separated from contiguous habitat by extensive development are not typically considered high-quality habitat for valley elderberry longhorn beetles, as they appear to be poor dispersers (Barr, 1991; Collinge et al., 2001).

There are two records of the valley elderberry longhorn beetle within the Plan Area (CNDDB, 2015). Although there are only two records, elderberry shrubs occur throughout the Plan Area and this beetle could be present anywhere elderberry shrubs occur.

Central Valley Spring-run Chinook salmon (*Oncorhynchus tshawytscha*). Federal Listing Status: Threatened; State Listing Status: None. The Central Valley spring-run evolutionarily significant unit (ESU) includes all naturally spawned populations of spring-run Chinook salmon in the Sacramento River and its tributaries in California, including the Feather River, as well as the Feather River Hatchery spring-run Chinook

program. The Central Valley spring run Chinook salmon is an anadromous species. Adults migrate from the ocean to spawning streams beginning in late January to early February, with upstream migration peaking in May (CDFG, 1998). They begin spawning in beds of coarse river gravels from mid-August through October. Adults die after spawning. After the eggs hatch, some juvenile salmon migrate downstream to the bay or ocean within a few months, while others may remain in freshwater rearing areas for up to a year in some systems. Younger fish remain in the ocean for several years before returning to freshwater streams and rivers to spawn. Like steelhead rainbow trout, Chinook salmon generally spawn in cool waters providing incubation temperatures no warmer than 55 °F. Compared to steelhead, Chinook salmon are more likely to spawn in coarse gravels.

Central Valley spring-run Chinook salmon have been extirpated from the San Joaquin River upstream from the Stanislaus River (Moyle, 2002). However, the species is being reintroduced to the San Joaquin River as a non-essential experimental population under Section 10(j) of FESA and will likely become established in the Plan Area in the near future (SJRRP, 2011).

Central Valley steelhead (*Oncorhynchus mykiss*). Federal Listing Status: Threatened; State Listing Status: None. The NMFS has categorized steelhead into distinct population segments (DPS). The Central Valley DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco and San Pablo Bays and their tributaries, as well as two artificial propagation programs: the Coleman National Fish Hatchery, and Feather River Hatchery steelhead hatchery programs. The steelhead is an anadromous form of rainbow trout that migrates upstream from the ocean to spawn in late fall or early winter, when flows are sufficient to allow it to reach suitable habitat in far upstream areas. Steelhead typically spawn in gravel substrates located in clear, cool, perennial sections of relatively undisturbed streams, with dense canopy cover that provides shade, woody debris, and organic matter. Steelhead usually cannot survive long in pools or streams with water temperatures above 70 °F; however, they can use warmer habitats if adequate food is available.

Central Valley steelhead have been extirpated from the San Joaquin River upstream from the Stanislaus River (Moyle, 2002). Although there are currently no plans to reintroduce this species to the San Joaquin River, the species may occur in the Plan Area in the future as a result of restoration activities that will occur as part of the Central Valley spring-run Chinook salmon reintroduction project.

California tiger salamander (*Ambystoma californiense*). Federal Listing Status: Threatened (Central Population); State Listing Status: Threatened. The USFWS listed the California tiger salamander as threatened throughout its range in 2004 (USFWS, 2004). The California tiger salamander was listed as threatened under the CESA in 2010. Critical habitat for the species was designated in 2005 (USFWS, 2005), and encompasses a portion of the Plan Area to the west of the San Joaquin River, north of Highway 41 (USFWS, 2005) (Figure 5).

The range of the California tiger salamander is restricted to the Central Valley and the South Coast Range of California from Butte County south to Santa Barbara County. Tiger salamanders have disappeared from a significant portion of their range due to habitat loss from agriculture and urbanization and the introduction of non-native aquatic predators. The California tiger salamander's preferred breeding habitat consists of temporary (minimum of 3–4 months), ponded environments (e.g., vernal pool, ephemeral pool, or human-made ponds) surrounded by uplands that support small mammal burrows. California tiger salamanders will also utilize permanent ponds provided aquatic, vertebrate predators are not present. Such ponds provide breeding and larval

habitat, while burrows of small mammals such as California ground squirrels and valley pocket gophers in upland habitats provide refugia for juvenile and adult salamanders during the dry season.

According to the Final Rule for listing the central population of the California tiger salamander as threatened under the FESA (USFWS, 2004), "Adult California tiger salamander have been observed up to 1.3 mi from breeding ponds (S. Sweet, University of California, Santa Barbara, in litt. 1998), which may be vernal pools, stock ponds, or other seasonal or perennial water bodies."

Most studies of upland habitat use by California tiger salamanders suggest that most individuals do not travel far from breeding ponds. Trenham and Shaffer (2005) estimated that 50, 90, and 95 percent of adult California tiger salamanders were within 492, 1608, and 2034 ft of their study pond, respectively, and that 95 percent of juvenile California tiger salamanders were within 2067 ft of the pond, with 85 percent concentrated between 656 and 1969 ft, but none were found at 2625 ft. Trenham et al. (2001) observed a high probability of adult California tiger salamanders dispersing between pools up to 2198 ft apart but did not observe dispersal events longer than 2297 ft. However, Austin and Shaffer (1992) reported dispersal distances by California tiger salamanders of at least 1.0 mi, and Orloff (2007) reported longer-distance dispersal by a few individuals in a population in Pittsburgh, Contra Costa County. Orloff's results suggested that some individuals might travel up to 1.3 mi or more from aquatic breeding habitat to upland aestivation habitat. Collectively, these studies suggest that dispersal distances may vary among populations and/or sites; that California tiger salamander abundance likely decreases with increasing distance from a breeding pond; and that a few individuals may disperse 1 mi or more from breeding areas.

Multiple extant and extirpated records of California tiger salamanders exist near the Plan Area; the nearest extant record is located approximately 0.2 mi east of the Plan Area, east of Hwy 41 and north of Avenue 12 (CNDDB, 2015). Some of the grassland habitats in the Plan Area upstream of Highway 41 may provide suitable habitat for this species if vernal pools or suitable stockponds are present.

Bald eagle (*Haliaeetus leucocephalus*). Federal Listing Status: None; State Listing Status: Endangered, Fully Protected. Bald eagle populations exhibited precipitous declines in the early part of the twentieth century, primarily because of pesticide poisoning that severely affected reproductive rates. DDT was the most debilitating of these chemicals, and ever since its use was banned in the United States in 1972, eagle populations have recovered rapidly (Buehler, 2000). The bald eagle was removed from the federal endangered species list in 2008 (USFWS, 2008) but remains listed as both endangered and fully protected by California (CDFG, 2008b).

Currently, bald eagles are found throughout North America, along waterways and coasts (Buehler, 2000). In California, bald eagle populations remain low, although their numbers are increasing steadily (Peeters and Peeters, 2005). Bald eagles can be found nesting in a number of locations in the Sierra Nevada range and southern California, and they nest in a few scattered locations in central California as well (Buehler, 2000; CDFG, 2008b).

Ideal habitat for bald eagles is comprised of remote, forested landscape with old-growth or mature trees and easy access to an extensive and diverse prey base. Bald eagles forage in fresh and salt water where their prey species (fish) are abundant and diverse. They build nests in tall, sturdy trees at sites that are in relatively close proximity to aquatic foraging areas and isolated from human activities. The eagle breeding season extends from January through August (Buehler, 2000).

Bald eagles are not known to breed in the Plan Area; however, they winter in the area. They are most common in areas where waterfowl congregate on open water, for example, on the larger gravel ponds in the Plan Area.

Bald eagles are known to congregate at winter roosts at Millerton Lake (Rhodehamel, 1991) and they disperse to surrounding areas, including the Plan Area, during the day. In the Plan Area, bald eagles are most likely to be found near the largest ponds where waterfowl, especially American coots, congregate. The nearest known nest to the Plan Area is located approximately 12 mi to the northwest at Hensley Lake (CNDDB, 2015).

Swainson's hawk (*Buteo swainsoni*). Federal Status: None; State Status: Threatened. The Swainson's hawk was listed as threatened by California in 1983 because of population declines likely precipitated by significant losses of riparian habitat and conversion of open foraging habitats to developed lands (England et al., 1997; Woodbridge, 1998). Swainson's hawks are distributed throughout western North America during the breeding season, but in California they are primarily limited to the Central Valley and the southeastern Great Basin region (Woodbridge, 1998). Swainson's hawks in California are strongly associated with riparian habitats, although they also are found in oak woodlands and other open habitats (Smallwood, 1995; England et al., 1997; Woodbridge, 1998). They build sturdy stick nests in low willows, box elders, oaks, or other trees, breeding from early March through July (England et al., 1997). Prime breeding habitat for Swainson's hawk encompasses riparian draws or clumps of trees surrounded by open grassland or oak savannah for foraging (England et al., 1997; Woodbridge, 1998).

Swainson's hawks require large amounts of foraging habitat, preferably grassland or pasture habitats. Their preferred prey items are voles (*Microtus* spp.), gophers (*Thomomys* spp.), birds, and insects such as grasshoppers (Estep, 1989). They have adapted to the use of some croplands, particularly alfalfa, but also hay, grain, tomatoes, beets and other row crops (Estep, 1989). Crops such as cotton, corn, rice, orchards, and vineyards are not suitable because either they lack suitable prey, or the prey is unavailable to the Swainson's hawks due to the crop structures.

Swainson's hawks are summer residents in Fresno and Madera counties, and are known to nest in several locations in the riparian corridor along the San Joaquin River starting approximately 15 mi west of the Plan Area where alfalfa and other row crops are more common than vineyards and orchards (CNDDB, 2015). Swainson's hawks are less common in the eastern part of Madera County, though there is a 2011 record of a nesting pair within 5 mi of the Plan Area to the northwest, near the intersection of Highway 41 and Road 208 (CNDDB, 2015).

Tricolored blackbird (*Agelaius tricolor*). Federal Status: None; State Status: Candidate. As of September 18, 2015, the species' federal status is under review after a 90 day finding that formal listing on the Endangered Species Act may be warranted. On December 10, 2015 the California Fish and Game Commission voted to advance the Tricolored Blackbird to candidacy for listing under the California Endangered Species Act. The Commission will determine whether listing is warranted in December 2016, after a one-year status review. In the meantime, as with all candidates for listing under CESA, the Tricolored Blackbird will receive all the protections and be subject to all the take prohibitions of species that are listed under CESA. The tricolored blackbird is highly colonial in its nesting habits and forms dense breeding colonies of up to tens of thousands of pairs. This species typically nests primarily in tall, dense stands of cattails or tules, but also nests in blackberry (*Rubus* spp.), wild rose bushes (*Rosa* spp.), and tall herbs. Nesting colonies are typically located near standing or flowing freshwater. Tricolored blackbirds form large, often multi-species, flocks during the non-breeding period and range more widely than during the reproductive season. They forage on the ground in croplands, grasslands, along the edges

of ponds, and flooded land. Tricolored blackbirds have been confirmed nesting in the Plan Area near Spano Park in 2009 (J. Seay, pers. obs.) and in cattail habitat in ponds on a gravel operation property in 2012 (John Buada, pers. comm).

San Joaquin kit fox (*Vulpes macrotis mutica*). Federal Status: Endangered; State Status: Threatened.
The kit fox is the smallest canid species in North America and the San Joaquin kit fox is the largest subspecies. The San Joaquin kit fox was listed as endangered by the USFWS in 1967 and by the State of California in 1971. Critical habitat has not been designated for the San Joaquin kit fox.

The San Joaquin kit fox is primarily nocturnal and typically occurs in annual grassland or mixed shrub/grassland habitats throughout low, rolling hills and in the valleys. The diet of kit foxes varies geographically, seasonally, and annually, but throughout most of its range the diet consists primarily of kangaroo rats (*Dipodomys* spp.), pocket mice (*Perognathus* spp.), white-footed mice (*Peromyscus* spp.), San Joaquin antelope squirrels (*Ammospermophilus nelsoni*), California ground squirrels, rabbits (*Sylvilagus* spp.), black-tailed hares (*Lepus californicus*), ground nesting birds, and insects, (Morrell, 1972; Orloff et al. 1986; Scrivner et al., 1987; Cypher and Spencer, 1998).

The kit fox requires underground dens for temperature regulation, shelter, reproduction, and predator avoidance (Golightly and Ohmart, 1984). Kit foxes commonly modify and use dens constructed by other animals and structures made by humans (USFWS, 1998). Dens are usually located on loose-textured soils on slopes less than 40 degrees (O'Farrell et al., 1980), but the characteristic of San Joaquin kit fox dens varies across the fox's geographic range in regard to the number of openings, shape, and the slope of the ground on which they occur (USFWS, 1998). Natal or maternal dens tend to be found on slopes of less than six degrees (O'Farrell and McCue, 1981). Kit foxes change dens often, using numerous dens each year.

Interspecific competition occurs between kit foxes and non-native red foxes, coyotes, and domestic dogs (Ralls and White, 1995). Coyotes are highly adaptable to disturbed environments and may out-compete kit foxes for available resources as well as kill them opportunistically (White and Garrott, 1997; Cypher and Spencer, 1998). Predation by large carnivores may account for the majority of the annual adult mortality rate observed among San Joaquin kit foxes in some areas (Berry et al., 1987). The non-native red fox may be a greater threat to kit fox than the coyote in some areas, as they are known to directly prey upon kit foxes and displace kit foxes upon invasion of their habitat (Ralls and White, 1995).

The herbaceous and other open habitats of the Plan Area provide only marginal habitat for San Joaquin kit fox due to the highly fragmented nature of grasslands on the site as well as the ever-present human disturbance. However, the mosaic of habitats adjacent to human disturbance does provide good habitat for the introduced red fox, which as noted above, is a threat to the kit fox. There are two CNDDB (2015) records of kit fox sightings in the Project vicinity. Both of these records, one on Highway 99 south of Herndon from 1993 and one located at an unspecified location in Friant and described as occurring "sometime in the early 90s", resulted from drive-by vehicle sightings that were not confirmed. In addition to habitat concerns, the Plan Area is separated from occupied kit fox by both the City of Fresno and over 20 mi of intensely cultivated farmland. For these reasons, the San Joaquin kit fox is determined to be absent from the Plan Area.

California Species of Special Concern

Kern Brook lamprey (*Lampetra hubbsi*). Federal Status: Species of Special Concern; State Status: Species of Special Concern. This small lamprey was first discovered in the Friant-Kern Canal and has since been found in the Merced, Kaweah, Kings, and San Joaquin rivers. The amnocoetes, the larval form of lampreys, of this species have been collected both above and below Friant Dam (Moyle, 2002). The amnocoetes inhabit sandy-bottomed backwaters and willow river edges and pools with low water velocity. The adults seek out riffles with gravel for breeding and rubble for cover. Very little is known about Kern brook lampreys, but the collection of amnocoetes below Friant dam indicates there is a strong likelihood that they could breed in the Plan Area.

San Joaquin roach (*Lavinia symmetricus* ssp.). Federal Status: Species of Special Concern; State Status: Species of Special Concern. The San Joaquin roach is a small fish in the minnow family (Cyprinidae) that is usually less than 3.9 inches in length. They are generally found in small, warm intermittent streams, and dense populations are frequently found in isolated pools and are most abundant in mid-elevation streams in the Sierra foothills (Moyle et al., 1995). The San Joaquin roach is known from tributaries to the San Joaquin River above Friant Dam, and could potentially occur below the dam. It is unlikely, though, to be a regular part of the fish community in the Plan Area given the number of introduced fish predators such as largemouth bass.

Western spadefoot (*Spea hammondii*). Federal Status: Species of Special Concern; State Status: Species of Special Concern. The western spadefoot is a toad that inhabits grassland habitats of central California and the southern California coast. It requires temporary pools of water lacking predators such as fish, bullfrogs, or crayfish, for egg laying (Jennings and Hayes, 1994). A keratinous "spade" is present on each hind foot that aids in burrowing. Much of their life cycle is spent burrowed underground. As described above for California tiger salamanders, some of the grassland habitats in the Plan Area upstream of Highway 41 may provide suitable habitat for this species if vernal pools or suitable stockponds are present.

Silvery legless lizard (*Anniella pulchra pulchra*). Federal Status: None; State Status: Species of Special Concern. This unusual lizard is found in sandy or loose loamy soils under the sparse vegetation of beaches, chaparral, pine-oak woodland, or under sycamores, cottonwoods, or oaks that grow on stream terraces. Legless lizards forage for insects and spiders underneath leaf litter or underneath sandy soil, usually at the base of shrubs or other vegetation (Jennings and Hayes, 1994). Their adaptation for burrowing, which requires soils with a high sand fraction, makes legless lizards vulnerable to ground disturbing activities such as agriculture. Though there are no records of the silvery legless lizard within the Plan Area (CNDDB, 2015), this lizard is quite difficult to detect, and records are present in riparian habitats along the San Joaquin River downstream from the Plan Area. Thus, this species may occur in the Plan Area.

Western pond turtle (*Actinemys marmorata*). Federal Status: Species of Concern; State Status: Species of Special Concern. The western pond turtle occurs in ponds, streams, and other wetland habitats west of the Sacramento-San Joaquin Delta, and south to northern Baja, except in desert areas. Ponds or slack-water pools with suitable basking sites (such as logs) are an important habitat component for this species, and western pond turtles do not occur commonly along high-gradient streams. Females lay eggs in upland habitats, in clay or silty soils in unshaded (often south-facing) areas up to 0.25 mi from aquatic habitat (Jennings and Hayes, 1994). Juveniles feed and grow in willow aquatic habitats (often creeks) with emergent vegetation and ample invertebrate prey. Nesting habitat is typically found within 600 ft of aquatic habitat (Jennings and Hayes, 1994), but if no suitable nesting

habitat can be found close by, adults may travel overland considerable distances to nest. Juvenile and adult turtles are commonly seen basking in the sun at appropriate sites, although they are extremely wary and often dive into the water at any perception of danger. H. T. Harvey & Associates biologists have observed western pond turtles in the Plan Area on numerous occasions

Burrowing owl (*Athene cunicularia*). Federal listing status: None; State listing status: Species of Special Concern. The burrowing owl is a small, terrestrial owl of open country. These owls prefer annual and perennial grasslands, typically with sparse or non-existent tree or shrub canopies. In California, burrowing owls are found in close association with California ground squirrels; owls use the abandoned burrows of ground squirrels for shelter and nesting. The nesting season as recognized by the CDFG (2012) runs from 1 February through 31 August. After nesting is completed, adult owls may remain in their nesting burrows or in nearby burrows, or they may migrate (Rosenberg et al., 2007); young birds disperse across the landscape from 0.1 mi to 35 mi from their natal burrows (Rosier et al., 2006). Burrowing owls also exhibit strong site fidelity, and may return to a nesting site and attempt to nest even after the site has been developed. Many of the open agricultural, ruderal, and grassland habitats of the Plan Area provide suitable habitat for burrowing owls.

Long-eared owl (*Asio otus*). Federal listing status: None; State listing status; Species of Special Concern. The long-eared owl is an uncommon, year-long resident throughout much of California. It frequents dense riparian and live oak thickets near meadow edges, and nearby woodland and forest habitats, but also may be found in dense conifer stands at higher elevations. This species forages over open areas, where it hunts for rodents and small birds. It breeds from valley foothill hardwood up to ponderosa pine habitats from early March to late July. This species is considered a California species of special concern only when breeding. Long-eared owls have been observed in the Plan Area near Lost Lake during the winter (J. Seay, pers. obs.), and there is some possibility that they could nest there as well.

Loggerhead shrike (*Lanius ludovicianus*). Federal listing status: None; State listing status; Species of Special Concern. This predatory songbird inhabits much of the lower 48 states. Loggerhead shrikes prefer open habitats interspersed with shrubs, trees, poles, fences, or other perches from which they can hunt. Loggerhead shrikes are primarily monogamous and are territorial throughout the year. Nests are built in densely vegetated shrubs or trees, often containing thorns, which offer protection from predators and upon which prey items are impaled. They breed between early February and late March with the peak of breeding between mid-March and late June. Loggerhead shrikes are fairly common in the Plan Area in winter and have been recorded nesting on the Ball Ranch property (J. Seay, pers. obs.).

Yellow-headed blackbird (*Xanthocephalus xanthocephalus*). Federal Status: None; State Status: Species of Special Concern. Yellow-headed blackbirds breed almost exclusively in marshes with tall emergent vegetation, such as cattails or tules, in open areas over fairly deep water (Orians and Willson, 1964). They nest singly or in loose colonies and males will pair with as many as six females. This kind of emergent vegetation was likely not present in the Plan Area historically, but restoration efforts within reclaimed gravel mines have created suitable nesting habitat for yellow-headed blackbirds and they have been confirmed nesting on gravel operation property in the Plan Area (John Buada, pers. comm.).

Grasshopper sparrow (*Ammodramus savannarum*). Federal Status: None; State Status: Species of Special Concern. Grasshopper sparrows are widely distributed in grassland habitats across North America. The

subspecies that breeds in California, (*A. s. perpallidus*) has declined on the west coast, but remains common in the Great Plains (Shuford and Gardali, 2008). They are patchily distributed in Central California, occurring mostly in the foothills and edges of the Valley and they seem to prefer moderately tall, open grasslands with scattered shrubs (Grinnell and Miller, 1944), though they occasionally occur in other types of grassland and have been recorded in alfalfa fields (Shuford and Gardali, 2008). Much of the herbaceous habitats in the Plan Area are marginally suitable for grasshopper sparrows, and it is possible, though not likely, that they could occur in the Plan Area.

Pallid bat (*Antrozous pallidus*). Federal status: None; State status: Species of Special Concern. The pallid bat occurs throughout California with the exception of the northwest corner of the state and the high Sierra Nevada (Hall, 1981; Zeiner et al., 1990a). It is a colonial species with colonies ranging in size from a few individuals to over a hundred, but usually consisting of at least 20 individuals (Wilson and Ruff, 1999, Sherwin and Rambaldini, 2005). Pallid bats are most commonly found in oak savannah and in open dry habitats with rocky areas, trees, buildings, or bridge structures that are used for roosting (Zeiner et al., 1990a; Ferguson and Azerrad, 2004). Typically, pallid bats use separate day and night roosts (Hermanson and O'Shea, 1983). In general, day roosts are more enclosed, protected spaces than are night roosts, which often occur in open buildings, porches, garages, highway bridges, and mines. Roosts generally have unobstructed entrances/exits, and are high above the ground, warm, and inaccessible to terrestrial predators (Sherwin and Rambaldini, 2005). After mating during the late fall and winter, females and males share a common wintering roost, usually along a canyon bottom where temperatures are relatively stable and cool, and then females leave the common winter roost in early spring to form maternity colonies, often on ridge tops or other warmer locales (Johnston et al., 2006). Maternity colonies in California may be active from May to October (Gannon, 2003). Pallid bats forage on a variety of insects, including beetles, centipedes, cicadas, crickets, grasshoppers, moths, and others, both gleaned from surfaces and taken aerially (Johnston and Fenton, 2001). Their roosts are very susceptible to human disturbance, and urban development has been cited as the most significant factor contributing to their regional decline (Miner and Stokes, 2005). There is suitable foraging habitat for pallid bats throughout the Plan Area, though roosting habitat appears to be limited. Pallid bats most likely forage on the site, though it is uncertain if they roost there.

Western red bat (*Lasiurus blossevillii*). Federal listing status: None; State listing status: Species of Special Concern. The western red bat is an orange to reddish-colored, moderately small-sized bat that occurs throughout much of California. This species is often found in forest or woodlands, especially in or adjacent to riparian habitat (Wilson and Ruff, 1999). It is solitary and prefers roosting in foliage of trees or tall shrubs, and it has been observed roosting under leaf piles during winter months in the Central Valley of California. Breeding western red bats in California are usually associated with low-elevation (<3280 ft) cottonwood, sycamore, or oak-dominated riparian habitat, but have also been detected in fruit orchards (Pierson et al., 2006). Suitable roosting and foraging habitat is found throughout the Plan Area. Though there are no published records of western red bats in the Plan Area, this bat is difficult to detect and is likely to occur there.

Spotted bat (*Euderma maculatum*). Federal status: None; State status: Species of Special Concern. In California, the spotted bat has a patchy distribution throughout the western portion of the state due to its dependence on rock-faced cliffs for roosting habitat. Roosts are found in small cracks in cliffs and rocky outcrops. The spotted bat forages over a variety of habitats, primarily for large moths, and is often attracted to dam faces. There is a record of a rabid individual being collected just below the dam at the fish hatchery in 1970 (CNDDB, 2015). Thus, although suitable breeding and roosting habitat is not present in the Plan Area, spotted bats may occasionally forage in the Plan Area, especially if spillways on the dam are large enough to be used as roosts.

Townsend's big-eared bat (*Corynorhinus townsendii*). Federal status: None; State status: Species of Special Concern. The Townsend's big-eared bat is associated with a variety of different habitat types including coniferous forests, deserts, native prairies, riparian communities, active agricultural areas, and coastal habitats (Sherwin and Piaggio, 2005). Although it is usually a cave dwelling species, known roost sites include limestone caves, lava tubes, and hollow trees, as well as anthropogenic structures such as the attics of buildings or old abandoned mines (Williams, 1986; Sherwin and Piaggio, 2005).

The Townsend's big-eared bat is a colonial species, with females aggregating in the spring at maternity colonies to begin their breeding season. Maternity colonies in California may be active from March to September (Pierson and Rainey, 1998). Females typically give birth to one young, and both females and young show a high fidelity to their group and their specific roost site (Pearson et al., 1952). The Townsend's big-eared bat is easily disturbed while roosting in buildings, and females are known to abandon their young when disturbed (Humphrey and Kunz, 1976). They forage primarily upon small moths, and feeds both in-flight and by gleaning insects from foliage (Zeiner et al., 1990a). There is potential for Townsend's big-eared bat to occur in the Plan Area because there is suitable foraging habitat throughout and there is marginally suitable roosting sites in some abandoned dwellings and other buildings.

Western mastiff bat (*Eumops perotis*). Federal listing status: None; State listing status: Species of Special Concern. This species forages up to 2300 ft above ground level and typically forages for about 7 hours per night and has been observed 15 mi from the nearest roost (Vaughn, 1954). This species roosts primarily in cliffs or high buildings where there is a minimum of 9.8 ft of vertical drop at the entrance to roosts. This species is found in central and south coastal California, the San Joaquin Valley, the southern half of the Sierra foothills, and throughout the desert regions. The western mastiff bat may use bridges, rocks, or buildings as night roosts, day roosts, or maternity roosts. The nearest record of western mastiff bats is from the northern face of Little Table Mountain approximately 2.5 mi northwest of the Plan Area. It is likely that bats roosting there would forage over the Plan Area, though quality roost sites appear to be lacking.

American badger (*Taxidea taxus*). Federal Listing Status: None; State Listing Status: Species of Special Concern. American badgers are highly specialized fossorial (adapted for burrowing or digging) mammals that occur in grassland habitats throughout California, except in the northwestern corner of the state (Zeiner et al., 1990a). They have territories of up to 21,000 ac, with territory size varying by sex and season. In central California, American badgers typically occur in annual grasslands, oak woodland savannas, semi-arid shrub/scrublands, and any habitats with friable soils and stable prey populations (e.g., ground squirrels, gophers, kangaroo rats, and chipmunks; Zeiner et al., 1990a). They occur to a lesser extent in agricultural areas, where intensive cultivation inhibits den establishment and reduces prey abundance. Some of the herbaceous habitats of the Plan Area provide suitable habitat for badgers, especially those between Highway 41 and the dam that connect to larger areas of grassland habitat west of the Plan Area in Madera County.

CRPR Species

California satintail (*Imperata brevifolia*). Federal Listing Status: None; State Listing Status: None; CRPR 2.1. California satintail is a perennial rhizomatous herb belonging to the grass family (Poaceae) that blooms from September to May. This plant occurs in coastal scrub, chaparral, riparian scrub, Mojavean scrub, and

meadows and sinks on mesic, often alkaline soils, at elevations between 0 and 1640 ft. This species is found in Butte, Fresno, Imperial, Inyo, Kern, Los Angeles, Orange, Riverside, San Bernardino, Tehama, Tulare, and Ventura counties, and ranges into Arizona, Baja California, New Mexico (where it is possibly extirpated), Nevada, Texas, and Utah (CNPS, 2015). California satintail is presumed extirpated from Lake County (CNPS, 2015). The Butte, Tehama, and Lake county records may represent escaped ornamentals.

The nearest records for the species are a vague location from an 1893 collection mapped around Fresno, immediately south of the Plan Area, and an occurrence about 18 mi southeast of the Plan Area (CNDDB, 2015). The riparian scrub in the Plan Area may provide suitable habitat for the species.

Forked hare-leaf (*Lagophylla dichotoma*). Federal Listing Status: None; State Listing Status: None; CRPR 1B.1. Forked hare-leaf is an annual herb belonging to the sunflower family (Asteraceae) that blooms from April to September. This plant occurs on gravelly roadsides, loam, and dry clay soils in openings in cismontane woodland and valley and foothill grassland, at elevations between 164 and 2493 ft. This California endemic is found in Calaveras, Fresno, Monterey, San Benito, and Stanislaus counties, and is presumed extirpated from Butte and Merced counties (CNPS, 2015).

The nearest record for the species is about 14 mi southeast of the Plan Area (CNDDB, 2015). The oak woodland and grasslands within the Plan Area may provide suitable habitat for the species.

Sanford's arrowhead (*Sagittaria sanfordii*). Federal Listing Status: None; State Listing Status: None; CRPR 1B.2. Sanford's arrowhead is an emergent perennial rhizomatous herb belonging to the water plantain family (Alismataceae) that blooms from May to October. This plant occurs in standing or slow-moving freshwater ponds, marshes, and ditches at elevations between 0 and 2133 ft. This species has been reported from Butte, Del Norte, El Dorado, Fresno, Merced, Mariposa, Placer, Sacramento, Shasta, San Joaquin, and Tehama counties (CNPS, 2015). Sanford's arrowhead is extirpated from southern California (Orange and Ventura counties) and is mostly extirpated from its historical range in the Central Valley (CNPS, 2015).

The nearest records for the species are located about 0.2 mi south of the Plan Area along Herndon and Brawley Avenues, and 0.4 mi southeast along Friant Road south of Shepherd Avenue (CNDDB, 2015). Wetland habitats in the Plan Area provide suitable habitat for this species.

Fully Protected Species

White-tailed kite (*Elanus leucurus*). Federal Status: None; State Status: Fully Protected Species. In California, white-tailed kites are found in the Central Valley and along the coast, in grasslands, agricultural fields, cismontane woodlands, and other open habitats (Zeiner et al., 1990b; Dunk, 1995, Erichsen et al., 1996). White-tailed kites are year-round residents of the state, establishing breeding territories that encompass open areas with healthy prey populations, and snags, shrubs, trees, or other nesting substrates (Dunk, 1995). Non-breeding birds typically remain in the same area over the winter, although some movements do occur (Polite, 1990). The presence of white-tailed kites is closely tied to the presence of prey species, particularly voles, and prey base may be the most important factor in determining habitat quality for white-tailed kites (Dunk and Cooper, 1994; Skonieczny and Dunk, 1997). Although the species recovered after population declines during the early 20th century, its

populations may be exhibiting new declines because of recent increases in habitat loss and disturbance (Dunk, 1995; Erichsen et al., 1996).

Many of the open agricultural, ruderal, and grassland habitats of the Plan Area provide potential breeding and foraging habitat for this species. White-tailed kites are common in the Plan Area where herbaceous habitat is fairly expansive.

Golden eagle (*Aquila chrysaetos*). Federal listing status: None; State listing status: Fully Protected. In California, the golden eagle is an uncommon permanent resident and migrant throughout the state. The species' breeding range within California excludes only the Central Valley, the immediate coast in the far north, and the southeastern corner of the state (Zeiner et al., 1990b). Recent declines of golden eagle populations have occurred in several western states in North America, including California, primarily because of loss of habitat and mortalities resulting from human activities (Kochert et al., 2002; Good et al., 2007). Further declines in eagle populations are expected to occur as long as habitat loss and anthropogenic landscape alteration continue (Good et al., 2007).

Golden eagles breed in a range of open habitats, including desert scrub, foothill cismontane woodlands, and annual or perennial grasslands (Zeiner et al., 1990b; Kochert et al., 2002). Golden eagle nesting habitat is characterized by large, remote patches of grassland or open woodland; a hilly topography that generates lift; an abundance of small mammal prey; and tall structures that serve as nest platforms and hunting perches (Kochert et al., 2002). Once a breeding pair establishes a territory, they may build a number of nests in tall structures such as tall trees or snags, cliffs, or utility towers (Zeiner et al., 1990b; Kochert et al., 2002), only one of which is used in any given year (Kochert et al., 2002). The eagle breeding season begins in late January and continues through August (CDFG, 2008c). Following the nesting period, adult eagles usually remain in or near their breeding territory (Zeiner et al., 1990b). Young birds in California tend to be sedentary, remaining in or near their parental home ranges (Kochert et al., 2002).

Though some of the valley oak, cottonwood, and eucalyptus trees in the Plan Area are large enough to support golden eagle nests, there is not enough open foraging habitat nearby to support nesting golden eagles. However, golden eagles may occasionally be seen flying over the Plan Area, especially in winter.

American peregrine falcon (*Falco peregrinus anatum*). Federal Status: Delisted; State Status: Fully Protected. The American peregrine falcon occurs throughout much of the world and is known as one of the fastest flying birds of prey. Peregrine falcons prey almost entirely on birds, which they kill while in flight. These falcons nest on ledges and caves on steep cliffs, as well as on human-made structures such as buildings, bridges, and electrical transmission towers. In California, they are known to nest along the entire coastline, the northern Coast, and the Cascade Ranges and Sierra Nevada.

A severe decline in populations of the widespread North American subspecies *anatum* began in the late 1940s. This decline was attributed to the accumulation of DDE, a metabolite of the organochlorine pesticide DDT, in aquatic food chains. When concentrated in the bodies of predatory birds such as the peregrine falcon, this contaminant led to reproductive effects, such as the thinning of eggshells. The American peregrine falcon was listed as endangered by the USFWS in 1970 (USFWS, 1970) and by California in 1971. Recovery efforts included the banning of DDT in North America and captive breeding programs to help bolster populations. The USFWS

removed the American peregrine falcon from the endangered species list in 1999 (USFWS, 1999a), and the State of California removed it from its endangered list in 2009 (California Fish and Game Commission, 2009).

Appropriate breeding habitat for the peregrine falcon, especially the steep cliffs they require, is absent from the Plan Area. Migrants and wintering birds occasionally passing through the area is likely the extent of peregrine falcon use of the Plan Area.

Ringtail (*Bassariscus astutus*). Federal listing status: None; State listing status: Fully Protected. The ringtail is a smaller relative of the raccoon and inhabits brushy and woody habitats, especially along stream courses in the middle elevations. This species nests in rock recesses, hollow trees, logs, snags, abandoned burrows, or woodrat nests. The wooded habitats of the Plan Area are suitable habitat for ringtail, though it is more likely to be found upstream of the Plan area.

Appendix E.5 Detailed Descriptions of Invasive Species Occurring in the Plan Area

Plant pests are defined by law, regulation, and technical organizations, and are regulated by the California Department of Food and Agriculture (CDFA) and the United States Department of Agriculture (USDA). The rating assigned to a pest by the CDFA (2012) does not necessarily mean that one with a low rating is not a problem; rather the rating system is meant to prioritize response by the CDFA and county agricultural commissioners. The following CDFA designations reflect the importance of the pest:

A – A pest of known economic or environmental detriment and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment.

B – A pest of known economic or environmental detriment and, if present in California, it is of limited distribution.

C – A pest of known economic or environmental detriment and, if present in California it is usually widespread.

The California Invasive Plant Council (Cal-IPC, 2012) has developed a list of plant pests specific to California wildlands, based on information submitted by land managers, botanists, and researchers throughout the state and on published sources. The Cal-IPC (2012) ranks invasive plants based on the level of ecological impact in California as follows:

Limited – Species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score.

Moderate – Species have substantial and apparent ecological impacts on physical processes, plant and animal communities, and vegetation structure.

High – Species has severe ecological impacts on physical processes, plant and animal communities, and vegetation structure.

Red Sesbania: Cal-IPC Category – High, Red Alert; CDFA Rating

Red sesbania is a woody shrub or small tree native to Argentina, Brazil, Paraguay, and Uruguay that grows up to 15 feet tall (DiTomaso and Healy, 2007). It produces clusters of bright red flowers in late spring through fall and forms distinctive winged seed pods. Red sesbania is found low in the riparian zone on channel banks, bars, and islands where it is inundated by spring floods, and has some degree of shade tolerance. The species is rapidly spreading among Central Valley waterways, where it forms dense thickets (Hunter and Platenkamp, 2003). Red sesbania produces seed pods that fall from the branches throughout winter and spring and are distributed by river flows. The pods contain spongy tissue that floats for up to 10 days. The seeds persist in the seed bank, and germinate when abraded. Early sprouting sesbania plants may produce seed pods within one year. .

Red sesbania is an especially aggressive invader that has the potential to significantly affect habitat restoration success. This species is displacing native plants that provide essential food and shelter for a wide variety of wildlife species. The plant contains saponin, a chemical that is poisonous to both livestock, humans, invertebrates and fish Red sesbania is a major threat to the biodiversity of native plants in riparian habitats (Hunter and Platenkamp, 2003).

Salt Cedar: Cal-IPC Category – High; CDFA Rating – B

Salt cedar is a deciduous shrub or small tree native to eastern Asia that grows up to 12 to 15 feet tall (DiTomaso and Healy, 2007). The species prefers silty soils and willow water tables. However, this long-lived species is tolerant of an extensive range of ecological settings and is capable of surviving without access to water once established (Carpenter, 1998).

Salt cedar produces numerous flowers that release tiny, tufted seeds dispersed by either wind or water (Plant Conservation Alliance, 2005). The seeds germinate immediately and only remain viable for about five weeks, precluding the species from forming a seed bank (Carpenter, 1998; DiTomaso and Healy, 2007). Seedlings develop slowly and cannot tolerate drying or disturbance (DiTomaso and Healy, 2007). Buried and submerged stems as well as stem fragments have the ability to produce roots and shoots (DiTomaso and Healy, 2007; Plant Conservation Alliance, 2005). The species is highly adapted to fire and flooding and resprouts vigorously after disturbance by these events. The seedlings are slow growers and may be outcompeted by the rapidly growing native riparian species. Mature specimens are extremely vulnerable to shading (Carpenter, 1998).

As with most invasive, non-native species, salt cedar displaces valuable native riparian plant species such as willow and cottonwood, especially in disturbed landscapes. The replacement of riparian vegetation may lead to the reduction of wildlife habitat value. Salt cedar dominated communities have lower bird density and diversity than areas with native vegetation (Carpenter, 1998). However, some birds have been documented nesting in the salt cedar shrubs, including blue grosbeak (*Passerina caerulea*) and yellow-billed cuckoo (*Coccyzus americanus*) (Riparian Habitat Joint Venture, 2004). Salt cedar also affects the natural flood and fire regime in some areas, increasing the frequency and intensity of fires and floods (Plant Conservation Alliance, 2005). Other adverse effects associated with the species include increased topsoil salinity, lowered water tables, widened flood plains, increased sediment deposition, incised stream channels, and loss of mycorrhizal fungi (i.e., fungi that form a beneficial association with the root systems of higher plants) for native plant species (Carpenter, 1998, DiTomaso and Healy, 2007).

Giant Reed: Cal-IPC Category – High; CDFA Rating – B

Giant reed is an herbaceous perennial plant resembling bamboo that grows up to 30 feet tall (DiTomaso and Healy, 2007). Giant reed is native to the Mediterranean region and tropical Asia. In California, the species is often found growing alongside waterways, including lakes, streams, and ditches in all types of soils. After establishing at the water's edge, giant reed quickly moves up the riparian profile and begins establishing in the drier upland surroundings (Bell, 1998).

Giant reed's primary means of reproduction is vegetative, horizontally growing stems lying beneath the soil surface produce roots and shoots. In addition, during floods, plant fragments may be carried downstream to new sites

where they take root. Further, throughout spring and into fall, the canes produce large plumed inflorescences; however, germination of seeds is rare in California (DiTomaso and Healy, 2007; Dudley, 2000).

Giant reed is able to aggressively outcompete native species and shift the succession of riparian plant communities (Bell, 1998). If conditions are right, infestations quickly develop into tall, crowded monocultures as toxic compounds produced within various plant parts help to prevent the growth of other plant species (Bell, 1998). As giant reed replaces native riparian vegetation, it reduces habitat and the food supply, particularly insects, needed by riparian birds (Dudley, 2000).

Large stands of giant reed can obstruct high flows and undermine the integrity of adjacent structures, such as dams and bridges. The occurrence of Giant reed may promote bank erosion because its willow root system is easily undercut and bank collapse may follow (Dudley, 2000). By densely growing in the low-flow channel and throughout streambanks, giant reed is capable of causing excessive roughness in the channel, not only by its own biomass, but also by the accretion of sediment and stabilization of gravel and sediment bars. Channel constriction reduces flood capacity and contributes to flooding and subsequent lateral erosion.

Chinese Tallow: Cal-IPC Category – Moderate

Chinese tallow is a fast growing deciduous tree native to subtropical eastern Asia that invades disturbed and undisturbed terrestrial, wetland, and riparian habitats with and a wide range of soil conditions (Bogler, 2000; DiTomaso and Healy, 2007). Chinese tallow begins reproduction when young (after only 3 years), produces abundant viable seed, and is also capable of reproducing from cuttings. Additionally, Chinese tallow can become widely established following natural disturbances that eliminate or damage the canopy layer (Smith et al., 1997). Seeds are spread by birds and may float for great distances (Bogler, 2000).

Chinese tallow can rapidly replace natural communities with nearly monospecific stands, which may significantly alter natural soil nutrient conditions, creating an inhospitable environment for many native plant species (Bogler, 2000). Chinese tallow litter decomposes rapidly and increases nitrogen, phosphorus, potassium, and other mineral nutrients, along with decreasing magnesium and sodium levels (Cameron and Spencer, 1989; DiTomaso and Healy, 2007). Further, the presence of Chinese tallow seems to favor non-native arthropods (Miller and Cameron, 1983) that may also negatively affect the native ecosystem by outcompeting native species.

Tree-of-Heaven: Cal-IPC Category – Moderate; CDFA Rating – C

Tree-of-heaven is a fast growing, medium-sized deciduous tree native to China that reaches heights of up to 80 feet (DiTomaso and Healy, 2007). It frequently invades open, disturbed sites and is common in urban settings and along roadsides. Tree-of-heaven has a high tolerance for poor soils, atmospheric pollution, and drought and can reproduce both sexually and asexually. The numerous seeds produced in fall may remain on the tree through the winter. Once released, the wind-dispersed seeds will travel long distances from the parent plant. These seeds have a high germination rate (Hunter, 2000). Established trees sprout numerous suckers from the roots and re-sprout vigorously from cut stumps and root fragments.

Tree-of-heaven often aggressively outcompetes native species once established. One tree is capable of producing more than a half a million seeds each year. The seedlings grow rapidly and develop a taproot within three months.

With their quick growth rate, the trees rapidly occupy the habitat of native species. Additionally, the tree-of-heaven leaves and bark produce toxins that remain in the soil and impede the establishment of other plant species (Hunter, 2000).

Blue Gum: Cal-IPC Category – High

Blue gum is a fast growing evergreen tree species native to southeastern Australia and Tasmania that grows up to 180 ft tall. Often found growing in disturbed habitats, blue gum flourishes along roadways and property lines where it is used as windscreens, shelterbelts, sound barriers, or ornamentals (Esser, 1993). Blue gum reproduces both sexually and asexually. The woody fruits release small seeds that are dispersed by wind and water (Esser, 1993). Seeds germinate within a couple of weeks following dispersal if conditions are favorable or remain in the seed bank for several years (Boyd, 2000; DiTomaso and Healy, 2007). Vegetative reproduction includes sprouting from the trunk, stumps, and roots. Branches are known to root when in contact with soil (Esser, 1993). Blue gum often forms large monocultures; as the leaves release compounds into the soil litter layer that inhibit the growth of other species.

The flower nectar attracts insects, and the birds feeding on these insects or the flower nectar may be covered in a tar-like substance secreted from the flower, eventually causing the birds to suffocate (DiTomaso and Healy, 2007). However, mature trees do provide canopy cover and perching and nesting sites for raptors and other birds when native riparian trees are absent. Blue gum branches and litter decompose very slowly and contain flammable compounds, resulting in stands posing a great fire risk. This extremely flammable species ignites spot fires when burning litter and strips of bark are transported on the wind (Boyd, 2000; DiTomaso and Healy, 2007).

Water Hyacinth: Cal-IPC Category – High; CDFA Rating – C

Water hyacinth, native to tropical and subtropical South America, is a free-floating aquatic plant that forms dense, interconnected drifting mats, with thick, waxy green leaves held upright above the water surface on bulbous, air-filled stalks. The species is found in ponds, lakes, wetlands, slow-moving waters such as rivers and streams, ditches, irrigation canals, and wastewater treatment facilities (Batcher, 2000; Ramey, 2001). It tolerates fluctuating water levels and flow velocities, extremes in nutrient concentration, pH, temperatures, and toxic compounds (Batcher, 2000). Occasionally it is found growing in water-logged soils adjacent to water bodies (Godfrey, 2000a).

Water hyacinth is considered one of the most productive plants on earth. In early spring, the plants produce daughter plants by runners that grow horizontally. New plants can be produced every 6 to 18 days (Ramey, 2001), and one plant is capable of producing enough daughter plants to cover 6500 square ft in 1 year (Godfrey, 2000a). Each flower produces from 3 to 450 seeds per fruit, and seeds remain viable for up to 20 years (Batcher, 2000). The seeds mainly sink to the bottom of the water and remain dormant until a drought (Ramey, 2001). The seeds may also be dispersed by flowing water and migratory waterfowl. Both intentional and unintentional dispersal (e.g., as a result of moving contaminated boats between water bodies) by humans is also common. Many infestations are the result of deliberate introduction or the disposal of excess plants from someone's water garden (Godfrey, 2000a).

By clogging waterways and displacing native aquatic species, water hyacinth disrupts many natural settings and causes serious ecological and economic damage. Waterfowl and other wildlife habitat may be critically altered by

these infestations because they displace native aquatic plant communities and obscure water sources. Potential problems include reduced oxygen and light availability, altered invertebrate and vertebrate communities, increased nutrient concentrations, increased temperatures, impeded water flow, clogged intake pumps, decreased power generation, and reduced recreational access (Batcher, 2000). Mats of hyacinth are also ideal breeding grounds for mosquitoes and other insects that act as vectors for disease (Ramey, 2001). Water hyacinth mats can significantly increase the loss of water in lakes and rivers because of the high rate of evaporation from their leaves (Godfrey, 2000a).

Water Milfoil: Cal-IPC Category – High; CDFA Rating – C; and Parrot's Feather: Cal-IPC Category – High, Red Alert

Water milfoil is native to Eurasia, while parrot's feather is native to South America. Parrot's feather and water milfoil are both submerged aquatic plants with whorled feathery leaves that form dense mats of vegetation that take root along the water's substrate and then branch profusely once they are near the water's surface (Bossard et al., 2000; Godfrey, 2000b). Both of these species are found growing in slow-moving to still waters at lower elevations. They also have the ability to establish on dry ground and then grow into the water source. They prefer silty, inorganic soils, but may persist on many types of substrates (Washington Water Quality Program, 2002). Water milfoil and parrot's feather are often found on disturbed water surfaces in areas with high nutrient runoff (Bossard et al., 2000; Godfrey, 2000b).

Both species rely on vegetative reproduction for spreading and dispersal. While water milfoil does produce viable seed, it is not thought that sexual reproduction is a major factor in the spread of this species (Washington Water Quality Program, 2002). Parrot's feather is incapable of producing seed outside its native range (Godfrey, 2000b). Sometime during the growing season, the colonies go through autofragmentation, when the plant produces roots at the leaf nodes and then becomes brittle and breaks apart (Washington Water Quality Program, 2002). Therefore, one small piece is capable of resulting in a new colony. Both species die back during winter, but will over-winter in warmer climates (i.e., in waters where temperatures do not drop below 50 degrees) (Bossard et al., 2000; Aiken et al. 1979 as cited in Bossard et al. 2000; Godfrey, 2000b).

Water milfoil is considered more of a pest, but both species have similar effects on the habitats they occupy. The species choke out waterways, shade out native aquatic species, reduce wildlife habitat values, interfere with recreational opportunities (i.e., boating, fishing, swimming), create stagnant waters perfect for mosquito reproduction, and increase water temperatures (Washington Water Quality Program, 2002; Bossard et al., 2000; Godfrey, 2000b). Water milfoil has been reported to increase phosphorus and nitrogen levels in waters when it is decomposing, and it can raise the pH and decrease available oxygen. Other threats include increased flooding problems and obstruction of irrigation pumps and water intakes (Bossard et al., 2000; Godfrey, 2000b).

Curly-Leaf Pondweed: Cal-IPC Category – Moderate

Curly-leaf pondweed is a submersed, rhizomatous, perennial aquatic plant native to Eurasia. The plant produces a flattened branching stem up to 3 ft long. The species tolerates a wide range of climatic conditions, including very low water temperatures and low light intensities. It prefers silt or clay but also occurs in gravel or sand substrates (Minnesota Department of Natural Resources, 2005).

Curly-leaf pondweed reproduces by seeds and turions from late June to August depending on water temperature. Turions are thick fleshy shoots that develop in early spring from axillary buds along the stem and tend to drop off by early summer. A single plant may produce more than 900 turions in one year. Curly-leaf pondweed actively grows during the winter and dies back in mid-summer. Approximately 960 seeds can be produced from a single plant during one growing season, but germination rarely occurs (Minnesota Department of Natural Resources, 2005).

Curly leaf pondweed often grows in dense stands, covering large areas of the water surface. The ability of the plant to quickly develop by spring or early summer may result in a reduction of water flow through irrigation canals, cause a restriction of water-based recreation activities, and a nuisance in fisheries. Curly leaf pondweed displaces native plant communities by rapidly growing above native aquatic species, thus impeding and reducing desirable plant production. Plants usually die back in late summer, which results in rafts of dying plants piling up on shorelines, and often is followed by an increase in phosphorus, a nutrient, and undesirable algal blooms (Minnesota Natural Resources Department, 2005).

Spongeplant: CDFA Rating – Q

Spongeplant is an aquatic perennial plant native to South America that grows in dense floating mats or roots in mud on wetland edges. It is found in the slow-moving water of streams, sloughs, and lakes, or stranded along shore and in marshes.

Spongeplant reproduces rapidly by both seed and stolons. Seeds are shed above water but germinate when submerged, and the seedlings float to the surface where they grow rapidly. Individual seeds are covered with small spines and the seeds, when shed, are contained in a gelatinous mass; both readily attach to watercraft and if they should become established in navigable waterways are likely to spread rapidly and widely (Hrusa, 2008). Waterfowl and other wildlife species may also distribute seeds (Wisconsin Department of Natural Resources, 2012). Spongeplant negatively affects water quality, fish, and wildlife habitat, and may hinder navigation and recreational use (Wisconsin Department of Natural Resources, 2012).