

	<p><b>Appendix 9B</b></p> <p><b>Vegetation and Wetland Methods and Information</b></p>
	<p>This document has not yet been reviewed by the Authority or Reclamation and does not represent the agencies input, positions, or policies. All content is subject to change.</p>

# Appendix 9B. Vegetation and Wetland Methods and Information

This appendix includes details of the land cover types in the study area, as defined in Appendix 9A, *Special-Status Plant Species*, including natural communities, wetlands, non-wetland waters, and unvegetated land cover types. Sources and methods used for preparing this information are also included. This appendix also includes a list of invasive plant species that are known to occur or are potentially present in the study area.

## 9B.1 Natural Communities and Other Land Cover Types

A total of 28 land cover types were mapped in the study area, as listed in Table 9B-1, which provides acreage estimates for each type (Figure 9B-1). Land cover in the study area is predominantly natural communities, and the most extensive natural community is annual grassland, with areas of savanna and blue oak woodlands becoming abundant to the west as elevations rise. Riparian vegetation and wetlands are present along parts of the major creeks including Antelope Creek, Funks Creek, Grapevine Creek, and Stone Corral Creek. Open water features in the study area include ephemeral, intermittent, and perennial streams; Funks Reservoir; GCID Main Canal; TC Canal; Salt Pond; unnamed canals and ditches; and ponds. Seasonal wetlands are located in annual grassland and in topographic lows where clay soils are present. To the east, agricultural areas containing rice and orchards are the most abundant land cover type.

### 9B.1.1. Sources of Information

The following sources were researched and used in preparation of the information presented in this appendix.

- 2017 Public Draft Environmental Impact Report/Environmental Impact Statement for the Sites Reservoir Project (2017 Draft EIR/EIS) (Sites Project Authority and U.S. Bureau of Reclamation 2017)
- Environmental Systems Research Institute (ESRI) World Imagery (Environmental Systems Research Institute 2019)
- California Natural Diversity Database (CNDDDB) (California Department of Fish and Wildlife 2021a)
- California Native Plant Society, Rare Plant Program (California Native Plant Society 2020)
- Climate and precipitation data (Natural Resources Conservation Service 2020a, 2020b)
- Google Earth Pro aerial imagery from 1998–2018 (Google Earth 2021) and Street View images

- National Hydrography Dataset (U.S. Geological Survey 2016)
- National Wetlands Inventory Map (U.S. Fish and Wildlife Service 2020)
- North-of-Delta Offstream Storage Investigation Progress Report, Botanical Report (California Department of Water Resources 2000a)
- North-of-Delta Offstream Storage Investigation Progress Report, Appendix B: Wetland Delineation and Field Studies Report (California Department of Water Resources 2000b)
- Soil Survey Geographic Database mapping and soil map unit descriptions for Glenn and Colusa Counties (Natural Resources Conservation Service 2020c, 2020d)
- U.S. Geological Survey 7.5-minute topographic quadrangles that occur in the study area (U.S. Geological Survey 2020)
- Vernal Pool Distribution – California's Great Valley Dataset (Witham et al. 2014)

### **9B.1.2. Botanical Survey and Land Cover Mapping Methods**

Botanical surveys were conducted in parts of the study area in 1998–1999 (California Department of Water Resources 2000a) and 2002–2003 (Sites Project Authority and U.S. Bureau of Reclamation 2017). Mapping of vegetation communities and other land cover types for the 2000–2001 surveys included the reservoir inundation area, survey corridors 500 feet wide for road relocation routes and 1,000 feet wide or more for conveyance route areas. For the 2002–2003 surveys, corridors were 1,500 feet wide for all features. These botanical surveys were conducted according to guidelines and protocols available at the time of the surveys from California Department of Fish and Game (Sites Project Authority and U.S. Bureau of Reclamation 2017).

ICF botanists/wetland specialists experienced in interpreting aerial imagery signatures of land cover and vegetation communities conducted the mapping of the study area evaluated in the RDEIR/SDEIS. The mapping entailed interpretation of high-resolution aerial imagery and review of other data sources, as listed above. The aerial images reviewed covered a range of dates (approximately 1998–2020), but use of recent imagery was emphasized, which allowed for interpretation of typical site conditions. Soil survey maps and supporting information were used to identify the soils' geomorphic setting, hydric status, and drainage characteristics.

All land cover types are described using California Wildlife Habitat Relationships (WHR) systems (California Department of Fish and Wildlife 2021b). The land cover type naming conventions previously developed for the 2017 Draft EIR/EIS were modified slightly for the RDEIR/SDEIS (Sites Project Authority and U.S. Bureau of Reclamation 2017).

Using ESRI ArcGIS 10.7 software, botanists/wetland specialists interpreted the most recent ortho-rectified imagery available (Environmental Systems Research Institute 2019), Google Earth aerial imagery from 1998 to 2020 (Google Earth 2021), and soil survey data to generate detailed land cover and preliminary wetland and non-wetland water mapping (Natural Resources Conservation Service 2020a). In general, a mapping scale of 1 inch = 100 feet (1:1,200) and an

approximate minimum mapping unit of 0.10 acre was used for aquatic resource features; refined mapping was achieved where detailed and discernable imagery was available.

### **9B.1.3. Land Cover Types Mapped in the Study Area**

A total of 28 land cover types were mapped in the study area: 17 upland plant communities or land cover types and 11 wetland or non-wetland water types. Table 9B-1 below lists the acreages for all of these land cover types. Descriptions of the upland land cover types are provided in the following sections, and descriptions of the wetland/non-wetland water land cover types are presented in Section 9B.2.

**Table 9B-1. Land Cover Types Mapped in the Study Area**

<b>Land Cover Type</b>	<b>Area (acres)</b>
Annual Grassland	18,240.2
Barren	0.2
Blue Oak Woodland	1,046.0
Canal <sup>a</sup>	109.8
Chamise Chaparral	381.0
Developed	303.1
Disturbed	356.9
Ditch <sup>a</sup>	32.8
Ephemeral Stream <sup>a</sup>	38.3
Foothill Pine <sup>b</sup>	221.0
Forested Wetland <sup>a</sup>	14.1
Freshwater Marsh <sup>a</sup>	62.2
Hayfield	891.1
Intermittent Stream <sup>a</sup>	252.9
Managed Wetland <sup>a</sup>	48.2
Mixed Chaparral	44.7
Oak Savanna	1,543.3
Orchard	553.2
Ornamental Woodland	38.8
Perennial Stream <sup>a</sup>	44.1
Pond <sup>a</sup>	70.2
Reservoir <sup>a</sup>	223.4
Rice	1,256.7
Row Crops	192.0
Ruderal	233.6
Scrub-Shrub Wetland <sup>a</sup>	19.8
Seasonal Wetland <sup>a</sup>	509.3
Upland Riparian	157.3
Vineyard	3.1
<b>Total<sup>c</sup></b>	<b>26,877.3</b>

<sup>a</sup> Wetland and non-wetland water types.

<sup>b</sup> Foothill pine occurs only in the Alternative 2 study area. All other types occur in all alternative study areas.

<sup>c</sup> Acreage totals may differ slightly due to rounding

### **9B.1.3.1. Upland Land Cover Types**

#### **Annual Grassland**

The annual grassland community is the dominant land cover type in the study area. It is typically dominated by introduced (nonnative) annual grass species, such as bromes (*Bromus* spp.), wild oats (*Avena* spp.), barleys (*Hordeum* spp.), and ryegrasses (*Festuca* spp.), with a small proportion (less than 15% relative cover) of native perennial species. This vegetation community also supports areas of native herbaceous spring annuals, and native perennial bunchgrasses, such as hook three awn (*Aristida ternipes* ssp. *hamulosa*) or needlegrasses (*Stipa* spp.). Trees comprise less than 10% total cover, with occasional small groupings or individuals of valley oaks (*Quercus lobata*) or blue oaks (*Quercus douglasii*). Areas dominated by noxious weeds, such as yellow star thistle (*Centaurea solstitialis*), are common. The annual grassland vegetation community dominates valley bottomlands and rolling hills immediately adjacent to the valleys. It can make a slow transition into adjacent wooded areas by forming a mosaic, occurring as understory in oak savanna, or can transition abruptly to woodland. Seasonal wetlands and swales occurring over clay hardpans, or vernal moist saline or alkaline soils in annual grasslands on the valley floor, may support native floras that sometimes include special-status plant species (Sites Project Authority and U.S. Bureau of Reclamation 2017).

Annual grassland best fits with the description for the Annual Grassland (AGS) WHR habitat type (California Department of Fish and Wildlife 2021b).

#### **Barren**

The barren land cover type is characterized by an area where vegetation cannot grow. Barren was mapped in one location in the study area in a landslide on a hillslope where vegetation was not present. This area was associated with sharp changes in topography.

Barren best fits with the description for the Barren (BAR) WHR habitat type (California Department of Fish and Wildlife 2021b).

#### **Blue Oak Woodland**

The blue oak woodland vegetation community, dominated by blue oak, is the most common vegetation in the low foothills of the western portion of the study area. These woodlands vary from open grassy stands of blue oaks on south facing slopes and ridge tops to moderately to very dense stands of small blue oak trees mixed with interior live oak (*Quercus wislizeni*) on north facing slopes. In the low foothills, the woodlands can also include some chaparral species and/or an open overstory of sparsely scattered foothill pines (*Pinus sabiniana*). Special-status plant species are sometimes found in clay or crumbly shale soils where grasslands transition into woodlands, or where chaparral shrubs are present as a woodland understory. Weedy areas often contain localized infestations of Italian thistle (*Carduus pycnocephalus*) (Sites Project Authority and U.S. Bureau of Reclamation 2017).

Blue oak woodland best fits with the description for the Blue Oak Woodland (BOW) WHR habitat type (California Department of Fish and Wildlife 2021b).

### **Chamise Chaparral**

The chamise chaparral community is uncommon in the study area and is concentrated along the South Road in the western portion where it is the dominant vegetation. This shrub community is dominated by chamise (*Adenostoma fasciculatum*) and in the study area, it appears to form a monotypic stand from aerial imagery views (Google Earth 2021). Oaks or foothill pines may be present in a sparse to open overstory, while the chamise usually forms a continuous canopy in a nearly pure stand (Sites Project Authority and U.S. Bureau of Reclamation 2017). The chamise may also mix with other native shrubs such as poison oak (*Toxicodendron diversilobum*) and manzanitas (*Arctostaphylos* spp.), and the herbaceous layer of this community is sparse and confined to patch margins (Sites Project Authority and U.S. Bureau of Reclamation 2017). The chamise chaparral occurs on hilltops and steep slopes at elevations from 1,400–1,800 feet.

Chamise chaparral best fits with the description for the Chamise-Redshank Chaparral (CRC) WHR habitat type (California Department of Fish and Wildlife 2021b).

### **Developed and Disturbed**

Most of the study area is undeveloped and vegetated; however, there are some areas that are developed or disturbed. Developed areas are generally paved or covered with an impermeable substrate (i.e., asphalt, concrete). Paved roads make up a substantial portion of the developed land cover type in the study area. The main paved roads include Huffmaster Road, Sites Lodoga Road, Maxwell Sites Road, Road 69, and Road 68, which are all two-lane roads.

Disturbed areas are regularly compacted but still have a permeable surface. Smaller agricultural roads are present to the east and are mapped as developed when paved and as disturbed when unpaved. Other areas mapped as developed or disturbed include homesteads with associated outbuildings, canal banks, and buildings and structures associated with existing Project facilities.

Developed and disturbed land cover types best fit with the descriptions for the Urban (URB) or Barren (BAR) WHR habitat types (California Department of Fish and Wildlife 2021b).

### **Foothill Pine**

Foothill pine occurs only in the western part of the study area along the South Road alignment. The overstory of this community is predominantly foothill pine, also known as gray pine. Understory layers appear to include mixed chaparral species (described below), and annual grassland. Blue oak is usually a co-dominant species with foothill pine, and occurs occasionally in the overstory, but is mostly absent from the woodlands mapped as foothill pine in the study area. Stands of foothill pine that were associated with intermittent streams (within 50 feet of the stream edge) were mapped as upland riparian, because these areas of woodland functioned as riparian habitat with respect to stream qualities and wildlife habitat. There are two areas on the north side of the South Road alignment that may qualify as a foothill pine-herbaceous community, which is a provisional sensitive natural community (California Department of Fish and Wildlife 2020).

Foothill pine best fits with the description for the Blue Oak-Foothill Pine (BOP) WHR habitat type (California Department of Fish and Wildlife 2021b).

### **Hayfield**

The largest areas of hayfields in the study area are located on the Antelope Valley floor. Other smaller hayfields are located to the east in the Central Valley. The hayfields in the Antelope Valley are irrigated by a stream diversion system and they occur on poorly drained soil. In the absence of active cultivation, the hayfields would most likely revert to a seasonal wetland-ruderal complex. Alfalfa fields are included with this land cover type.

Hayfield best fits with the descriptions for the Irrigated Hayfield (IRH) or Dryland Grain & Seed Crops WHR habitat types (California Department of Fish and Wildlife 2021b).

### **Mixed Chaparral**

No single shrub species dominates this mixed-shrub community, although manzanita can make up a substantial part of the species mix, along with wedgeleaf ceanothus (*Ceanothus cuneatus*), scrub oak (*Quercus berberidifolia*), poison oak, chamise, mountain mahogany (*Cercocarpus betuloides*), toyon (*Heteromeles arbutifolia*), and California juniper (*Juniperus californica*) (Sites Project Authority and U.S. Bureau of Reclamation 2017). Blue oaks and/or foothill pines can form a sparse to open canopy above a dense understory of mixed chaparral. Mixed chaparral is generally found in the western and southern portions of the study area at elevations ranging from 800–1,800 feet.

Mixed chaparral best fits with the description for the Mixed Chaparral (MCH) WHR habitat type (California Department of Fish and Wildlife 2021b).

### **Oak Savanna**

Oak savanna in the study area is dominated by valley oak and blue oak and is characterized by large open canopies and a grassland understory. This land cover type can be found on gently sloping hills and occasionally on terraces and valley floors. Some of the oak savanna appears to be very disturbed by livestock and ranching activities that cause compacted soil and invasive weeds to populate. Weedy areas in oak savanna include localized patches of milk thistle (*Silybum marianum*), bull thistle (*Cirsium vulgare*), Italian thistle, or star thistles (*Centaurea* spp.) (Sites Project Authority and U.S. Bureau of Reclamation 2017). Oak savanna also includes small areas with only a single or a few trees.

Oak savanna best fits with the descriptions for the Valley Oak Woodland (VOW) or Blue Oak Woodland (BOW) WHR habitat types (California Department of Fish and Wildlife 2021b).

### **Orchard**

Orchards in the study area are located east of Funks Reservoir on the Central Valley floor. Several of the orchards appear to have been planted in the past few years. The orchards are deciduous and appear to be almonds grown on a variety of clayey to loose alluvium derived soils.

Orchard best fits with the descriptions for the Deciduous Orchard (DOR) or Orchard-Vineyard WHR habitat types (California Department of Fish and Wildlife 2021b).



### **Ornamental Woodland**

Ornamental woodlands in the study area are stands of nonnative trees that have been planted around buildings or agricultural lands. The largest area of ornamental woodland is in the portion of the study area that intersects with the city limits of Willows. Many of the trees in ornamental woodlands appear to be eucalyptus (*Eucalyptus* spp.).

Ornamental woodland best fits with the descriptions for the Eucalyptus (EUC) or Urban (URB) WHR habitat types (California Department of Fish and Wildlife 2021b).

### **Rice**

Rice is the most dominant agricultural type in the easternmost portion of the study area. Rice is grown on flat terrain that has been leveled and contoured to accommodate flooding. Much of the rice grown in the region has been in production for over 20 years.

Rice best fits with the description for the Rice (RIC) WHR habitat type (California Department of Fish and Wildlife 2021b).

### **Row Crops**

Row crops in the study area are present throughout the developed areas at lower elevations. Row crops are typically in rotation with other crops or fallow for part of the year and all appear to be irrigated.

Row crop best fits with the descriptions for the Irrigated Row and Field Crops (IRF) or Cropland WHR habitat types (California Department of Fish and Wildlife 2021b).

### **Ruderal**

Ruderal refers to weedy or disturbed conditions including areas surrounding residences, out-buildings, and stockyards. These areas may also include nonnative, ornamental varieties of plants.

Ruderal best fits with the description for the Annual Grassland (AGS) WHR habitat type (California Department of Fish and Wildlife 2021b).

### **Upland Riparian**

Upland riparian was mapped in the study area where the riparian trees appeared to be rooted above the ordinary high-water mark (OHWM) of streams, in contrast to the forested wetland type, which was mapped below the OHWM. Areas mapped as upland riparian comprise several different types of riparian communities, including valley foothill riparian (where no single species is dominant), Fremont cottonwood riparian, valley oak riparian, and willow riparian (Sites Project Authority and U.S. Bureau of Reclamation 2017). These riparian types can also support other native riparian tree, shrub, and vine species, such as naturalized black walnut (*Juglans hindsii*), mule fat (*Baccharis salicifolia*), and wild grape (*Vitis californica*). On the basis of available data and information, these communities were combined as upland riparian. Areas of primarily foothill pine and blue oak woodland were included as upland riparian where the trees in these woodlands occur within 50 feet of a perennial or intermittent stream.

Riparian vegetation in the study area is associated with intermittent and perennial stream corridors and floodplain terraces, although most of the riparian areas are narrow and degraded by cattle use. Many of the larger trees along the disturbed segments of creeks are nonnative, including walnut (*Juglans* spp.), fig (*Ficus carica*), and tree-of-heaven (*Ailanthus altissima*). Small stands of Fremont's cottonwood (*Populus fremontii*), valley oak, and willows (*Salix* spp.) occur as isolated patches throughout the study area (California Department of Water Resources 2000b). Elderberry shrubs (*Sambucus* spp.) also occur in stands that were not mapped as distinct vegetation communities (California Department of Water Resources 2000a). Well-developed, native riparian vegetation occurs in small remnant patches along foothill portions of the larger creeks in the study area. The largest concentration of riparian habitat is in the southern portion of the inundation area along Antelope Creek. Large stands of upland riparian also occur at the outlet of Funks Reservoir on Funks Creek and along the Sacramento River at the end of the Dunnigan Pipeline alignment.

Upland riparian best fits with the description for the Valley-Foothill Riparian (VFR) WHR habitat type (California Department of Fish and Wildlife 2021b).

### **Vineyard**

Small portions of two individual vineyards are present in the study area. They are located to the north on the outer edges of the city of Willows, and to the south along the Dunnigan Pipeline alignment.

Vineyard best fits with the descriptions for the Vineyard (VIN) or Orchard-Vineyard WHR habitat types (California Department of Fish and Wildlife 2021b).

#### **9B.1.4. Sensitive Natural Communities**

Sensitive natural communities and natural communities of special concern are habitats considered sensitive because of their high species diversity, high productivity, unusual nature, limited distribution, or declining status. Local, state, and federal agencies consider these habitats important, and compensation for loss of sensitive natural communities is generally required by agencies. The CNDDDB contains a list of rare natural communities throughout the state (California Department of Fish and Wildlife 2020). USFWS considers certain habitats, such as riparian communities, important to wildlife. The U.S. Army Corps of Engineers (USACE), U.S. Environmental Protection Agency (USEPA), and State Water Resources Control Board (State Water Board) regulate wetlands and non-wetland waters; therefore, these communities and land cover types are considered sensitive.

The designation of sensitive natural communities in CNDDDB is based on the vegetation classification system in *A Manual of California Vegetation* (California manual) (California Native Plant Society 2021; California Native Plant Society 2020). The California manual classifies vegetation by Alliances, which are based on the dominant plant species present in a distinctive assemblage of plants (a plant community). The current land cover mapping was performed using aerial imagery interpretation, with consideration of the earlier field work conducted and discussed in previous reports (California Department of Water Resources 2000; Sites Project Authority and U.S. Bureau of Reclamation 2017). Field verification of current conditions in previously surveyed areas and unsurveyed parts of the study area would be required to confirm the existing natural communities and species compositions, which would allow

further identification of the correct alliances, and/or the more specific associations within alliances, as defined in the California manual. Table 9B-2 below provides a crosswalk between the mapped cover types and potential sensitive community types that could be associated with them. Natural communities with state and/or federal ranks of 1–3 are considered sensitive by California Department of Fish and Wildlife, and Table 9B-2 includes the rarity ranks of the sensitive community types with potential to occur in the study area. Table 9B-2 is not an exhaustive list of potential sensitive community types but includes the ones most likely to occur in the Project region.

**Table 9B-2. Crosswalk of Land Cover Types and Potential Sensitive Natural Communities in the Study Area**

Land Cover Type	Potential Sensitive Natural Communities <sup>a</sup>	Rarity Rank <sup>b</sup>
Annual grassland	California brome – blue wildrye prairie	G3 S3
	Gum plant patches	
	Needlegrass – melic grass grassland	G2, G3 S2, S3 G3 S3
	White-tip clover swales	G3? S3?
Foothill Pine	Foothill pine/herbaceous Association	Provisional Alliance
Forested Wetland	Fremont cottonwood forest and woodland	G4 S3
	Valley oak woodland and forest	G3 S3
	Goodding’s willow – red willow riparian woodland and forest	G4 S3
Freshwater Marsh	Common spikerush and beaked spikerush marshes	GNR S2,S3
	Iris-leaf rush seeps	G2? S2?
	American bulrush marsh	G5 S3
Managed Wetland	Common spikerush and beaked spikerush marshes	GNR S2,S3
	Iris-leaf rush seeps	G2? S2?
	American bulrush marsh	G5 S3
Oak Savanna	Valley Oak Woodland and Forest	G3, S3
Scrub-Shrub Wetland	Button willow thickets	G5 S2
	Iris-leaf rush seeps	G2? S2?

Land Cover Type	Potential Sensitive Natural Communities <sup>a</sup>	Rarity Rank <sup>b</sup>
Seasonal Wetland	Alkali weed – salt grass playas and sinks	G2 S2
	Common spikerush and beaked spikerush marshes	GNR S2,S3
	Alkali heath marsh	G4 S3
	Iris-leaf rush seeps	G2? S2?
	Fremont’s goldfields – salt grass alkaline vernal pools	G2 S2
	Fremont’s goldfields – Downingia vernal pools	G2 S2
	Smooth goldfields vernal pool bottoms	G2 S2
	Fremont’s tidy-tips – blow wives vernal pools	G3 S3
	White-tip clover swales	G3? S3?
	Upland Riparian	Fremont cottonwood forest and woodland
Goodding’s willow – red willow riparian woodland and forest		G4 S3
California rose briar patches		G3 S3

<sup>a</sup> California Department of Fish and Wildlife 2020

<sup>b</sup> Rarity Ranks (G = full natural ranges within and outside California; S = within California)

G2: Imperiled – At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

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.

GNR: not rated

S2: Imperiled – Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.

S3: Vulnerable – vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

Provisional: types for which there are fewer than 10 stands sampled, but which are expected to prove to be more widespread.

? - inexact numeric rank because of insufficient samples over the full expected range of the type, but existing information points to this rank.

## 9B.2 Wetlands and Non-Wetland Waters

The wetlands and non-wetland waters in the study area that are described in this section are features potentially subject to federal and state regulations. These features were identified and mapped using the sources of information and methods discussed below, and their preliminary

acreages are presented in Section 9B.2.3. The Cowardin classification (Cowardin et al. 1979) is provided for wetland and non-wetland water land cover types.

### **9B.2.1. Sources of Information**

Mapping of wetlands and non-wetland waters in parts of the study area was prepared for an earlier project (North-of-Delta Offstream Storage Investigation [NODOS]). Wetlands and non-wetland waters were evaluated in the inundation area in 1998 and 1999 (California Department of Water Resources 2000b) and in Project facility locations such as the recreation areas, road relocations, and Funks Reservoir in 2001 and 2002 (Sites Project Authority and U.S. Bureau of Reclamation 2017). The results of these mapping efforts and the resources listed in Section 9B.1 were reviewed as part of the delineation mapping process to obtain information on wetlands and non-wetland water features in the study area.

### **9B.2.2. Methods**

All mapping of the delineation of aquatic resources was conducted through the interpretation of high-resolution aerial imagery and other data sources (i.e., desktop delineation). Additional refining of the mapping may be developed in coordination with agencies during the permitting process. The aquatic resources map and delineation report information would be submitted as part of the applications to the USACE and State Water Board for Project permits.

#### **9B.2.2.1. Wetland Delineation Methods**

As part of the land cover mapping, ICF botanists/wetland specialists performed a desktop delineation of wetlands using the information and data sources listed in Section 9B.1. In particular, the Google Earth aerial images were inspected for signatures that could be indicative of soil saturation, flooding or ponding, or relative wetness and shifts in vegetation type and cover. Where available, the Street View images of areas having the above characteristics were viewed to identify microtopographic and vegetative characteristics of a given area. Soil survey data was reviewed to identify locations of soil map units that contain a subsurface restrictive layer, are subject to frequent, prolonged flooding or ponding, or have a shallow, seasonal high-water table. Wetlands that occur entirely within natural watercourse features and that support persistent hydrophytic vegetation with a cover of 30% or more were mapped within the OHWM.

#### **9B.2.2.2. Non-Wetland Water Delineation Methods**

ICF botanists/wetland specialists performed a desktop delineation of non-wetland waters by using the information and data sources in Section 9B.1. In particular, the Google Earth aerial images were used to identify where water lines or flow patterns end and vegetation begins. Channel incision and abrupt breaks in slope (sometimes indicated by shadows and seen in the elevation profile of a channel in Google Earth) were also used as a basis for identifying the OHWM. Where available, Google Earth Street View images were used to help determine the OHWM line on banks, as viewed from bridges. Culverts hydrologically connecting non-wetland waters were mapped where visible from aerial or street-view images. However, non-wetland waters were mapped as continuous features where the water feature flows under bridges. Non-wetland waters that have a consistent width were mapped as line features and attributed with their average width. Non-wetland waters wider than 40 feet, or those with an irregular boundary,

were mapped as polygons. Upland riparian and forested wetland boundaries along non-wetland waters were mapped to the landward drip line of the tree canopy.

### 9B.2.3. Wetlands and Non-Wetland Waters Mapped in the Study Area

The five wetland types (forested wetland, freshwater marsh, managed wetland, scrub-shrub wetland, and seasonal wetland) and six non-wetland waters types (canal/ditch, pond, reservoir, ephemeral stream, intermittent stream, and perennial stream) identified in the study area are described below. The acreages for each of these types, presented in Tables 9B-3 and 9B-4, are preliminary and may be overestimates, particularly for seasonal wetlands, as the delineation of wetlands and non-wetland waters has not been reviewed with field surveys or subjected to jurisdictional review by the applicable federal and state regulatory agencies. These acreages will likely be adjusted in the future when the study area can be accessed and when the permitting process is underway.

**Table 9B-3. Wetlands Mapped in the Study Area**

Wetland Type	Acreage
Forested wetland	14.13
Freshwater marsh	62.20
Managed wetland	48.16
Scrub-shrub wetland	19.79
Seasonal wetland	509.24
<b>Total Wetlands</b>	<b>653.52</b>

**Table 9B-4. Non-Wetland Waters Mapped in the Study Area**

Non-Wetland Water Type	Acreage
Canal	109.8
Ditch	32.8
Pond	70.15
Reservoir	223.37
Ephemeral stream	39.95
Intermittent stream	193.58
Perennial stream (Riverine)	100.38
<b>Total Non-Wetland Waters</b>	<b>769.92</b>

#### 9B.2.3.1. Wetland Types

##### Forested Wetland

Forested wetlands are vegetation communities of trees that grow below the typical flood level of a stream (the OHWM), which would provide the community with wetland hydrology. Forested wetlands were mapped within one segment of Willow Creek (northeast of Willows) and segments of Antelope Creek, Stone Corral Creek, Grapevine Creek, Funks Creek, unnamed

intermittent streams that are tributary to these creeks, as well as at the edge of a pond southwest of Funks Reservoir. Tree species in forested wetlands may include riparian trees, such as Fremont's cottonwood and species of willows (*Salix* spp.), associated with herbaceous species, such as cattails (*Typha* spp.), bulrushes (*Schoenoplectus* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), and other marsh and herbaceous wetland species. Areas in streams that appeared to support low-growing and shrubby vegetation were mapped as scrub-shrub wetlands (described below). Forested wetlands are assumed to have hydric soil due to their location within watercourses.

Forested wetland best fits with the description for the Valley Foothill Riparian (VFR) WHR habitat type (California Department of Fish and Wildlife 2021b) and the Forested, Lotic, Riparian Cowardin types (Cowardin et al. 1979).

### **Freshwater Marsh**

Freshwater marsh occurs at the saturated edges of riparian vegetation, ponds (including Salt Pond), seasonal wetlands, Funks Reservoir, Stone Corral Creek, the GCID Main Canal near the Sacramento River at the Red Bluff Pumping Plant, and unnamed intermittent streams.

Freshwater marsh can also occur within unmaintained irrigation ditches and agricultural field edges; however, most of these areas are regularly maintained and marsh was, therefore, not mapped in most ditches. Freshwater marsh in the study area supports emergent wetland species, such as hard-stemmed tule (*Schoenoplectus acutus*), California bulrush (*S. californicus*) and narrowleaf cattail (*Typha angustifolia*) (California Department of Water Resources 2000b), sedges (*Carex* spp.), spikerushes (*Eleocharis* spp.), and patchy willow shrubs (*Salix* spp.), which are wetland species (Sites Project Authority and U.S. Bureau of Reclamation 2017). Wetland hydrology and hydric (wetland) soils are present in these freshwater marshes because of the proximity to a perennial to semi-perennial watercourse.

Freshwater marsh best fits with the description for the Fresh Emergent Wetland (FEW) WHR habitat type (California Department of Fish and Wildlife 2021b) and the Emergent, Palustrine Cowardin type (Cowardin et al. 1979).

### **Managed Wetland**

Managed wetlands in the study area include created wetlands in a mitigation area on the west side of the Colusa Basin Drain. These areas may support emergent wetland vegetation, with species similar to that of freshwater marsh or seasonal wetland communities.

Managed wetland best fits with the descriptions for the Fresh Emergent Wetland (FEW) and Lacustrine (LAC) WHR habitat types (California Department of Fish and Wildlife 2021b) and the Lacustrine or Emergent, Palustrine Cowardin types (Cowardin et al. 1979).

### **Scrub-Shrub Wetland**

Similar to the mapping described above for forested wetland, scrub-shrub wetland was mapped in the study area where stands of small trees and shrubs occurred below the OHWM of unnamed intermittent streams; Willow Creek and Grapevine Creek (intermittent streams); perennial streams, including Sacramento River, Stone Corral Creek, Antelope Creek, and Funks Creek; Funks Reservoir; edges of ponds; and irrigation and drainage ditches with enough water supply to support woody vegetation. Scrub-shrub wetlands support low-growing woody species,

including riparian tree saplings, willows, and may support freshwater marsh species in the understory.

Scrub-shrub wetland best fits with the description for the Valley Foothill Riparian (VFR) WHR habitat type (California Department of Fish and Wildlife 2021b) and the Scrub-Shrub, Lotic, Riparian (for streams) or Scrub-Shrub, Lentic, Riparian (for ponds and reservoir) Cowardin types (Cowardin et al. 1979).

### **Seasonal Wetland**

Seasonal wetlands occur throughout the study area and account for most of the potentially jurisdictional wetlands identified in the inundation area. These wetlands occur in isolated depressions in annual grassland, as well as in association with other wetlands and non-wetland waters, such as freshwater marsh, ponds, and streams. Seasonal wetlands are inundated by surface water or saturated by groundwater during the winter and spring months, becoming dry by early summer and are strongly associated with low-lying areas of clay or clay loam soils, in particular the soils with seasonally fluctuating water tables and that are poorly drained with slow permeability. Dominant plant species include spikerush (*Eleocharis macrostachya*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), and dock (*Rumex* spp). (California Department of Water Resources 2000b).

Some of the seasonal wetlands mapped in the study area would be considered vernal pools, because they have higher species diversity and support native or obligate-wetland species, such as coyote thistle (*Eryngium castrense*), popcorn flower (*Plagiobothrys* ssp.), and hyssop loosestrife (*Lythrum hyssopifolium*). The pools along the northeastern edge of the inundation area tended to be larger in size and higher in plant species diversity. (California Department of Water Resources 2000b)

Some seasonal wetlands northwest of Funks Reservoir are alkali wetlands. Alkaline soils are present in this area. Alkali wetlands support many of the same species as those in freshwater marsh or seasonal wetlands (e.g., spikerushes, rushes), but also support alkali- and saline-tolerant species, dominated by saltgrass (*Distichlis spicata*), with associated species such as sickle grass (*Parapholis incurva*), alkali heath (*Frankenia salina*), alkali weed (*Cressa truxillensis*), and alkali bulrush (*Bolboschoenus maritimus*). (California Department of Water Resources 2000b).

Seasonal wetland best fits with the description for the Lacustrine (LAC) WHR habitat type (California Department of Fish and Wildlife 2021b) and the Emergent, Palustrine Cowardin type (Cowardin et al. 1979).

### **9B.2.3.2. Non-Wetland Waters Types**

#### **Canal and Ditch**

Canals and ditches occur throughout the lower elevation parts of the study area in agricultural areas. There are three large named canals in the study area that transport water throughout the agricultural areas west of the Sacramento River: TC Canal, GCID Main Canal, and CBD.

For the purposes of mapping land cover in the study area, canals were defined as earth- or concrete-lined constructed channels more than 15 feet wide that are used for irrigation. Ditches



were defined as earth-lined, constructed channels less than 15 feet wide that are used for irrigation or drainage, including roadside drainage. In general, the mapped canals and ditches are relatively permanent features subject to ongoing maintenance, including vegetation removal. However, a few vegetated segments of ditches that support scrub-shrub wetland species were mapped separately as scrub-shrub wetland because the vegetation did not appear to be maintained.

Canal and ditch land cover types best fit with the description for the Riverine (RIV) WHR habitat type (California Department of Fish and Wildlife 2021b) and the Perennial, Riverine or Intermittent, Riverine Cowardin type, although vegetated areas could be classified as Emergent, Palustrine (Cowardin et al. 1979).

### **Ephemeral Stream**

Ephemeral streams occur throughout the Antelope Valley and the surrounding hills. These unnamed features only convey flows from rainfall events. They may dry out between rainfall events, and generally remain dry during summer and early fall. Most of the ephemeral streams in the study area are 1–3 feet wide at the OHWM; however, several are between 4–12 feet wide. These streams are unvegetated or may support non-wetland vegetation. Trees growing at the edges of ephemeral streams were not mapped as riparian because they are not dependent on the streamflow as a water supply.

Ephemeral stream best fits with the description for the Riverine (RIV) WHR habitat type (California Department of Fish and Wildlife 2021b) and the description for the Intermittent, Riverine Cowardin type (Cowardin et al. 1979).

### **Intermittent Stream**

There are numerous intermittent streams in the study area, including Willow Creek, Stone Corral Creek, Lurline Creek, Grapevine Creek, Wilson Creek, tributaries to these creeks, and many unnamed streams. Segments of Hunters Creek, Funks Creek, and Antelope Creek also have intermittent flows. Intermittent streams are features that receive flow from precipitation and other surface and subsurface sources. They have the most water flow during the wet season and may contain pools that remain inundated into late summer. Intermittent streams are generally wider than the ephemeral streams in the study area, and most of them are 6–15 feet wide. A few have broader floodplains within the OHWM and are up to 24 feet wide. Intermittent streams may flow into or out of ponds created by impoundments in streams. While most of the intermittent stream segments in the study area are unvegetated, some areas support wetland types mapped in the study area, including forested wetland, freshwater marsh, scrub-shrub wetland, and seasonal wetland. Upland riparian communities are also mapped along intermittent streams. Additional information on the intermittent streams is provided in Chapter 5, *Surface Water Resources*.

Intermittent stream best fits with the description for the Riverine (RIV) WHR habitat type (California Department of Fish and Wildlife 2021b) and the description for the Intermittent, Riverine Cowardin type (Cowardin et al. 1979).

### **Perennial Stream**

Several streams in the study area carry water year-round and are considered perennial streams, including Sacramento River at the Red Bluff Pumping Plant and the end of the Dunnigan

Pipeline; Hunters Creek, including a realigned segment and several tributaries that carry water from the GCID Main Canal through areas of rice fields; Stone Corral Creek, downstream of the confluence with Antelope Creek; most of Antelope Creek; and most of Funks Creek. Part of the perennial stream mapped at the Red Bluff Pumping Plant includes a fish ladder that connects to the Sacramento River. With the exception of the Sacramento River, the widths of the perennial streams in the study area range from 6 feet up to 170 feet wide at the OHWM. The parts of the Sacramento River in the study area include only the west bank, not the entire width of the river. Perennial streams support limited stands of forested wetland and scrub-shrub wetland. Riparian uplands communities are also associated with perennial streams. Additional details of study area perennial streams are provided in Chapter 5, *Surface Water Resources*.

Perennial stream best fits with the description for the Riverine (RIV) WHR habitat type (California Department of Fish and Wildlife 2021b) and the description for the Upper Perennial, Riverine and Lower Perennial, Riverine Cowardin types (Cowardin et al. 1979).

### **Pond**

Numerous ponds occur in the study area in the inundation area and in the surrounding hills, as well as one detention basin in the Dunnigan Pipeline alignment. Ponds are generally open-water features, including stock ponds created by small dams on ephemeral or intermittent streams or by stream diversions into basins. Ponds may also be naturally formed at the head or confluence of streams and in isolated depressions. The mapped pond boundaries were based on the location of the high-water line observable in aerial imagery. Some ponds are inundated only during the rainy season and dry during summer months. Although the areas mapped as ponds are unvegetated, they sometimes support a fringe of freshwater marsh along the margins or abut larger patches of freshwater marsh, riparian vegetation, and/or seasonal wetlands. Salt Pond is a pond that supports seasonal alkali wetlands formed by warm salt springs that occur upslope of the pond (Sites Project Authority and U.S. Bureau of Reclamation 2017).

Pond best fits with the description for the Lacustrine (LAC) WHR habitat type (California Department of Fish and Wildlife 2021b) and the description for the Palustrine Cowardin type (Cowardin et al. 1979).

### **Reservoir**

The study area includes this landcover type only at Funks Reservoir. The reservoir is created by a dam on Funks Creek but is filled mainly from the TC Canal. Funks Creek is the primary stream upstream and downstream of the reservoir; however, several ephemeral streams and an unnamed intermittent stream also drain to the west side of the reservoir. The reservoir is surrounded by a fringe of freshwater marsh, small areas of scrub-shrub wetland, and seasonal wetlands associated with the streams that flow into the reservoir. The area outside of the reservoir and abutting wetlands is annual grassland.

Reservoir best fits with the Lacustrine (LAC) WHR habitat type (California Department of Fish and Wildlife 2021b) and the description for the Lacustrine Cowardin type (Cowardin et al. 1979).

### 9B.3 Invasive Plant Species

Table 9B-5 lists the invasive plant species that have been observed in the study area or are documented from Glenn or Colusa Counties and occur in land cover types similar to those in the study area (California Invasive Plant Council 2021, California Department of Food and Agriculture 2021).

**Table 9B-5. Invasive Plant Species Known or Likely to Occur in the Study Area**

<b>Common Name Scientific Name</b>	<b>CDFA List<sup>a</sup></b>	<b>Cal-IPC Rating<sup>b</sup></b>	<b>Habitat</b>
<i>Acroptilon repens</i> Russian knapweed	B	Moderate	Disturbed areas; Elevation: <1,900 m
<i>Aegilops cylindrica</i> <sup>c</sup> Jointed goatgrass	B	Watch	Disturbed dry sites, cultivated fields; Elevation: <1,500 m
<i>Aegilops triuncialis</i> <sup>c</sup> Barbed goatgrass	B	High	Disturbed sites, cultivated fields, roadsides; Elevation: <1,000 m
<i>Agrostis avenacea</i> Pacific bentgrass	–	Limited	Open, often disturbed places; Elevation: <300 m
<i>Ailanthus altissima</i> <sup>c</sup> Tree of heaven	C	Moderate	Disturbed urban areas, waste places, riparian areas, grasslands; Elevation: <1,250 m
<i>Arundo donax</i> <sup>c</sup> Giant reed	B	High	Moist places, seeps, ditch banks; Elevation: <500 m
<i>Atriplex semibaccata</i> Australian saltbush	–	Moderate	Disturbed areas, scrub, woodland; Elevation: <1,000 m
<i>Avena fatua</i> <sup>c</sup> Wild oats	–	Moderate	Disturbed sites; Elevation: <2,400 m
<i>Bassia hyssopifolia</i> Fivehorn smotherweed	–	Limited	Disturbed sites, fields, roadsides; Elevation: <1,200 m
<i>Bellardia trixago</i> Mediterranean lineseed	–	Limited	Disturbed grassland; Elevation: 710 m
<i>Brassica nigra</i> <sup>c</sup> Black mustard	–	Moderate	Disturbed areas, fields; Elevation: <1,500 m
<i>Bromus diandrus</i> <sup>c</sup> Ripgut brome	–	Moderate	Open, disturbed areas; Elevation: < 2170 m
<i>Bromus hordeaceus</i> <sup>c</sup> Soft chess	–	Limited	Fields, disturbed areas; Elevation: <1,000 (2,560) m
<i>Bromus madritensis ssp. rubens</i> <sup>c</sup> Red brome	–	High	Open, disturbed places; Elevation:<2,200 m
<i>Carduus acanthoides</i> Spiny plumeless thistle	A	Limited	Disturbed areas, roadsides; Elevation: <3,050 m

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<b>Common Name Scientific Name</b>	<b>CDFA List<sup>a</sup></b>	<b>Cal-IPC Rating<sup>b</sup></b>	<b>Habitat</b>
<i>Carduus pycnocephalus</i> <sup>c</sup> Italian thistle	C	Moderate	Roadsides, pastures, waste areas; Elevation: <1,200 m
<i>Cenchrus longispinus</i> Mat sandbur	B	Watch	Disturbed areas; Elevation: <1,500 m
<i>Centaurea calcitrapa</i> <sup>c</sup> Purple star thistle	B	Moderate	Pastures, disturbed places; Elevation: generally <1,000 m
<i>Centaurea diffusa</i> Diffuse knapweed	A	Moderate	Fields, roadsides, open woodland; Elevation: <2,300 m
<i>Centaurea melitensis</i> <sup>c</sup> Tocalote	C	Moderate	Disturbed fields, open woods; Elevation: <2,200 m
<i>Centaurea solstitialis</i> <sup>c</sup> Yellow star-thistle	C	High	Pastures, roadsides, disturbed grassland or woodland; Elevation: <1,300 m
<i>Centaurea stoebe</i> ssp. <i>micranthos</i> Spotted knapweed	A	High	Disturbed areas; Elevation: <2,600 m
<i>Cirsium vulgare</i> <sup>c</sup> Bull thistle	C	Moderate	Disturbed places; Elevation: <2,300 m
<i>Conium maculatum</i> Poison hemlock	–	Moderate	Moist, disturbed places; Elevation: <1,000 m
<i>Cotula coronopifolia</i> <sup>c</sup> Brass buttons	–	Limited	Saline and freshwater marshes, mud flats; Elevation: <1,200 m
<i>Cynara cardunculus</i> Cardoon	B	Moderate	Not available
<i>Cynodon dactylon</i> <sup>c</sup> Bermuda grass	D	Moderate	Disturbed sites; Elevation: <900 m
<i>Cynosurus echinatus</i> <sup>c</sup> Hedgehog dogtail grass	–	Moderate	Open, disturbed sites; Elevation < 1000 m
<i>Dipsacus fullonum</i> Wild teasel	–	Moderate	Roadsides, pastures, fields, sometimes moist sites; Elevation: <1,700 m
<i>Dittrichia graveolens</i> Stinkwort	B	Moderate	Disturbed areas; Elevation: <700 m
<i>Elymus caput-medusae</i> <sup>c</sup> Medusahead	C	High	Disturbed areas; Elevation: <2,000 m
<i>Erodium cicutarium</i> <sup>c</sup> Coastal heron's bill	–	Limited	Open, disturbed sites, grassland, scrub; Elevation: <2,000 m
<i>Festuca myuros</i> <sup>c</sup> Rattail sixweeks grass	–	Moderate	Generally open places, sandy soils; Elevation: <2,000 m
<i>Festuca perennis</i> <sup>c</sup> Italian rye grass	–	Moderate	Dry to moist disturbed sites, abandoned fields; Elevation: <1,000 m

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<b>Common Name Scientific Name</b>	<b>CDFA List<sup>a</sup></b>	<b>Cal-IPC Rating<sup>b</sup></b>	<b>Habitat</b>
<i>Geranium dissectum</i> <sup>c</sup> Cutleaf geranium	–	Limited	Open, disturbed sites; Elevation: <1,300 m
<i>Helminthotheca echioides</i> <sup>c</sup> Bristly ox-tongue	–	Limited	Disturbed areas; Elevation: <1,050 m
<i>Hordeum murinum</i> <sup>c</sup> Wall barley	–	Moderate	Moist, generally disturbed sites Elevation: - 60—1,900 m
<i>Hypochaeris radicata</i> <sup>c</sup> Rough cat's-ear	–	Moderate	Disturbed areas; Elevation: <500 m
<i>Isatis tinctoria</i> Dyers woad	B	Moderate	Disturbed areas, pastures; Elevation: 100— 2,200 m.
<i>Lepidium appelianum</i> Hairy whitetop	–	Limited	Saline soils, fields; Elevation: 400—2,400 m
<i>Lepidium chalepense</i> Lens-podded hoary cress	B	Moderate	Disturbed areas, pastures, fields, riverbanks; Elevation: 300—4,200 m
<i>Lepidium latifolium</i> Broad-leaved peppergrass	–	High	Pastures, disturbed areas, fields, grassland, saline meadows, streambanks, sagebrush scrub, pinyon/juniper woodland, edge of marshes; Elevation: <2,500 m
<i>Ludwigia hexapetala</i> Six petal water primrose	C	High	Lake margins, wetlands; Elevation: <300 m.
<i>Lythrum hyssopifolia</i> <sup>c</sup> Hyssop loosestrife	–	Moderate	Marshes, drying pond margins, disturbed ground; Elevation: <1,600 m
<i>Medicago polymorpha</i> <sup>c</sup> California bur-clover	–	Limited	Disturbed grasslands; Elevation: <1,500 m
<i>Mentha pulegium</i> Pennyroyal	–	Moderate	Moist areas, ditches; Elevation: <1,000 m
<i>Mesembryanthemum nodiflorum</i> Small flowered iceplant	–	Limited	Coastal bluffs, margins of saline wetlands; Elevation: <100 m
<i>Myriophyllum spicatum</i> Water milfoil	C	High	Ditches, lake margins; Elevation: <2,080 m
<i>Nicotiana glauca</i> <sup>c</sup> Tree tobacco	–	Moderate	Open disturbed sites; Elevation: <1,100 m
<i>Olea europaea</i> Olive	–	Limited	Disturbed areas, developed;
<i>Phalaris aquatica</i> Harding grass	–	Moderate	Disturbed areas, roadsides; Elevation: <1,700 m
<i>Plantago lanceolata</i> <sup>c</sup> Ribwort	–	Limited	Disturbed areas; Elevation: <1,600 m; Elevation:

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<b>Common Name Scientific Name</b>	<b>CDFA List<sup>a</sup></b>	<b>Cal-IPC Rating<sup>b</sup></b>	<b>Habitat</b>
<i>Polypogon monspeliensis</i> <sup>c</sup> Annual beard grass	–	Limited	Moist places, along streams; Elevation: <2100 m
<i>Potamogeton crispus</i> <sup>c</sup> Crispate-leaved pondweed	–	Moderate	Shallow water, ponds, reservoirs, streams; Elevation: <2,100 m
<i>Rubus armeniacus</i> <sup>c</sup> Himalayan blackberry	–	High	Disturbed moist areas, roadsides; Elevation: <1,600 m
<i>Rumex crispus</i> <sup>c</sup> Curly dock	–	Limited	Disturbed places; Elevation: <2,700 m
<i>Salsola tragus</i> Russian thistle	C	Limited	Disturbed places; Elevation: <2,800 m
<i>Silybum marianum</i> <sup>c</sup> Milk thistle	–	Limited	Roadsides, ditches, pastures, disturbed places; Elevation: <500 m
<i>Tamarix parviflora</i> Tamarisk	B	High	Washes, streambanks, ditches; Elevation: <800 m
<i>Tamarix ramosissima</i> Salt Cedar	B	High	Washes, streambanks, ditches; Elevation: <800 m
<i>Tribulus terrestris</i> Puncturevine	C	Limited	Roadsides, railways, vacant lots, dry, disturbed areas; Elevation: <100 m
<i>Verbena bonariensis</i> <sup>c</sup> Purple top vervain	–	Watch	Disturbed, often wet places, fields; Elevation: <200 m

<sup>a</sup> California Department of Food and Agriculture List of Noxious Weeds (California Department of Food and Agriculture 2021):

- List A - Most invasive wildland pest plants - eradication, containment, or other holding action at the State-county level
- List B - Includes species less widespread and more difficult to contain - eradication, containment, control, or other holding action at the discretion of the Commissioner
- List C - Weeds that are so widespread that the agency does not endorse State- or county-funded eradication except in nurseries

<sup>b</sup> California Invasive Plant Council (California Invasive Plant Council 2021) California Invasive Plant Inventory:

- H = High: invasive species with most severe wildland ecological impacts, widespread
- M = Moderate: invasive species with substantial wildland impacts; local to widespread
- L = Low: invasive species with minor wildland ecological impacts; limited distribution, although may be locally problematic
- D = Evaluated, but not listed, due to low ecological impacts

<sup>c</sup> Observed during surveys in the study area.

Note: m = meter(s)

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