

APPENDIX F.3 - BIOLOGICAL RESOURCES - VEGETATION COMMUNITIES

TABLE OF CONTENTS

Vegetation Communities, Other Cover Types, and Associated Fauna.....	F.3-1
Terrestrial Vegetation and Other Cover Types.....	F.3-1
Grassland.....	F.3-1
Shrubland.....	F.3-3
Forest and Woodland.....	F.3-4
Riparian.....	F.3-5
Developed.....	F.3-7
Aquatic Cover Types.....	F.3-11
Wetlands.....	F.3-11
Open Waterbodies.....	F.3-14
Rivers, Streams, and Other Drainages.....	F.3-15
References.....	F.3-19

VEGETATION COMMUNITIES, OTHER COVER TYPES, AND ASSOCIATED FAUNA

This appendix describes the vegetation communities, other cover types, and associated fauna in the Seasonal Storage Project (SSP) area. Non-native grassland, irrigated hayfield, and ruderal are vegetation communities and cover types used in the SSP EIR and in this appendix, which appeared under different names in the Program EIR (City of Santa Rosa 2003). In the latter document, they were called Annual Grassland, Irrigated Field, and Annual Grassland, respectively. These name changes were made to more precisely describe the vegetation communities and to reduce confusion with potentially overlapping vegetation types. The ruderal cover type in the SSP area is similar to the Annual Grassland type described below but it generally supports less native forbs and a higher abundance of non-native weedy forbs that occur in disturbed areas. Irrigated hayfields in the SSP area are irrigated for the production of hay and are also grazed by livestock. This appendix is divided into terrestrial and aquatic vegetation and other cover types.

TERRESTRIAL VEGETATION AND OTHER COVER TYPES

The five major terrestrial cover types in the SSP area are grassland, shrubland, woodland and forest, riparian, and developed. See Section 4.8, Biological Resource Classification and Mapping, Biological Resources, in the Draft EIR for the methods used to map and classify the vegetation types.

Grassland

Generally grasslands are similar in character; however, their species composition varies considerably depending on the local conditions. Two general types of grassland occur in this area, non-native annual grassland and native perennial grassland. Native grasslands have all but been eliminated in California and only occur in small pockets of undisturbed land.

Grassland Vegetation

The two major grassland vegetation types found in the study area are annual grassland, which is a predominantly non-native association, and native grassland.

Annual Grassland

Annual grasslands are virtually treeless areas dominated by non-native annual grasses. Annual grasslands occur from sea level to about 3,600 feet (Kie 1988). Annual grasslands occur throughout California and have largely replaced the perennial, native grasslands. Annual changes in rainfall and grazing have a profound effect on the species composition of annual grassland during a given year. Plant growth typically starts with the first fall rains. Slow growth is

maintained throughout winter, followed by rapid growth in spring. During years of favorable rainfall and little or no grazing pressure, large amounts of standing dead plant material can be found during the summer months. A light or moderate level of livestock grazing may preserve botanical diversity and may be considered beneficial if it encourages native plant species to flourish (Kie 1988). In the absence of grazing, annual grasslands are often limited in diversity and dominated by tall, dense stands of invasive grasses such as ripgut brome (*Bromus diandrus*) or wild oats (*Avena* sp.), and scattered trees or clumps of trees.

Although the proportion and density of native plant species occurring within annual grassland is typically low, some special-status plant species may be found in this community. These species include Brewer's milk-vetch (*Astragalus breweri*), Clara Hunt's milk-vetch (*Astragalus clarianus*), and Tiburon paintbrush (*Castilleja affinis* ssp. *neglecta*).

Native Grassland

Native grasslands are treeless areas dominated by perennial bunchgrasses and interspersed with native annual herbs and wildflowers. In California, the dominant bunchgrass is purple needlegrass (*Nassella pulchra*). Other native grasses frequently found in these grasslands are rye grasses (*Elymus glaucus* and *Leymus triticoides*). Annual, non-native grasses have replaced most of the native, perennial bunchgrasses that once dominated valley grasslands throughout North America. One of the main factors that shifted the competitive advantage from native to non-native grasses is the inability of native grasses to successfully compete under heavy grazing conditions (Barry 1972). Due to the historic use of grasslands for grazing and agriculture, most stands of native grasses in the region now occur as small, isolated populations. Many of these remnant populations occur on serpentine soils, to which non-native annual grasses are poorly adapted.

Fauna Associated with Grassland

Native grasslands are an important habitat type for many animal species that rely on them for all or part of their life cycle. However, non-native annual grasslands, when they are not severely disturbed also support many of the same animals. Grasslands can be surprisingly diverse; the Wildlife Habitat Relationships database (WHR) lists 75 species that depend on grasslands and many more species that primarily depend on scrub and forest habitats will also use grasslands.

Species that formerly relied on native grasslands for nesting and that now also use annual grasslands include western meadowlark (*Sturnella neglecta*), horned lark (*Eremophila alpestris*), and western burrowing owl (*Athene cunicularia hypugea*). Grasslands produce large numbers of seeds that are a valuable food source for many animal species including American pipit (*Anthus rubescens*), lark sparrow (*Chondestes grammacus*), Savannah sparrow (*Passerculus sandwichensis*), deer mouse (*Peromyscus maniculatus*), California vole (*Microtus californicus*), and California ground squirrel (*Spermophilus beecheyi*). These and other rodents

become the prey base for various resident raptors, such as golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), white-tailed kite (*Elanus leucurus*), and northern harrier (*Circus cyaneus*), that utilize wide, open grasslands as foraging habitat. Prairie falcons also forage in this habitat during the winter months. Coyote (*Canis latrans*), gophersnake (*Pituophis catenifer*), North American racer (*Coluber constrictor*), and western rattlesnake (*Crotalus oreganus*) feed on small rodents in grasslands. Due to its extensive distribution, annual and native grasslands intergrade with all of the different habitat types discussed in this section.

Shrubland

Dense scrub communities are found on dry, well drained soils and often on steep slopes in the hills and lower mountains of California (Hanes 1977, Holland 1986, Shuford and Timossi 1989). These communities are known for being highly adapted to repeated fires. The dominant species are evergreen, woody, summer-dormant shrubs that have small, thick leaves to prevent water loss. The plant species are usually highly adapted to fire and regenerate quickly by stump sprouting. Generally a very dense shrub layer and canopy has only a sparse understory of grasses and herbs.

Shrubland Vegetation

The major shrubland type found in the SSP study area is coyote brush.

Coyote Brush

Coyote brush habitat in the study area is dominated by coyote brush (*Baccharis pilularis*) and generally has very few other associated shrubs. The canopy is generally dense but this habitat also includes more open areas that intergrade with Annual Grassland. The denser coyote brush areas have a very sparse understory and the more open areas have an Annual Grassland understory composition.

Fauna Associated with Chaparral

Coyote brush community addressed in this appendix is not addressed by WHR. Coyote brush rarely provides habitat for amphibians outside of areas characterized by aquatic features because of its xeric conditions (discussed below). Coyote brush does provide suitable shelter, basking sites, and foraging habitat for reptiles like the western rattlesnake, common kingsnake (*Lampropeltis getulus*), gophersnake, striped racer (*Coluber lateralis*), and western fence lizard (*Sceloporus occidentalis*). Bird species that characteristically nest in coyote brush include wrentit (*Chamaea fasciata*), California quail (*Callipepla californica*), and spotted towhee (*Pipilo maculatus*). Small mammals are common in coyote brush. Several predators will use chaparral opportunistically, foraging on the reptiles, birds, and small mammals that occur; these include Cooper's hawk (*Accipiter cooperii*) and sharp-shinned hawk (*Accipiter striatus*), bobcat (*Felis rufus*), and coyote (*Canis latrans*).

Forest and Woodland

Forests and woodlands are dominated by trees, but frequently also support a diverse flora of understory shrubs, forbs, and grasses. The distinction between forests and woodlands is only one of density. Forests are more dense with a completely or mostly closed canopy of trees. Woodlands, on the other hand, are more open, without a closed canopy with grasses typically dominating the understory and areas between trees. Forests and woodlands in this region were once far more abundant. They have been cut down as part of the ongoing urban and agricultural development, as well as timber harvesting operations. The study area contains oak woodland.

Oak Woodland

Oak Woodland Vegetation

Oak dominated forests and woodlands are common vegetation communities in and around the study area. Several species of oaks occur in California and seven of these are found in this region. These seven oak species include coast live oak (*Quercus agrifolia*), canyon live oak (*Q. chrysolepis*), blue oak (*Q. douglasii*), Oregon white oak (*Q. garryana*), California black oak (*Q. kelloggii*), valley oak (*Q. lobata*), and interior live oak. Oak woodlands in the study area vary considerably, from moist, closed canopy woodlands dominated by deciduous oaks to drier, open canopy woodlands and savannah dominated by live oaks. Oak woodlands dominated by live oaks is the most common within the study area.

Oak woodlands typically have an understory that is dominated by grasses with shrubs scattered throughout. Common understory shrubs include manzanita (*Arctostaphylos* spp.), ceanothus (*Ceanothus* spp.), toyon (*Heteromeles arbutifolia*), and poison oak (*Toxicodendron diversilobum*).

Fauna Associated with Oak Woodlands

Oak woodlands provide important nesting, roosting, and foraging habitat for many animal species and are among the most species-rich habitats in California. These woodlands are particularly important for several bird and mammal species that rely on oaks for nesting cavities and that depend on mast crops of acorns as a primary food source.

The WHR lists 87 species of terrestrial vertebrates that depend partially or exclusively on oak woodland habitats in Sonoma County. Amphibian and reptile species that occupy oak woodlands include ensatina (*Ensatina eschscholtzii*), California slender salamander (*Batrachoseps attenuatus*), arboreal salamander (*Aneides lugubris*), ring-necked snake (*Diadophis punctatus*), terrestrial garter snake (*Thamnophis elegans*), western rattlesnake, western fence lizard, and northern and southern alligator lizards' (*Elgaria coeruleus* and *E. multicaerulea*).

The many birds and mammals that rely on acorns as an essential food resource include western gray squirrel (*Sciurus griseus*), dusky-footed woodrat (*Neotoma*

fuscipes), acorn woodpecker (*Melanerpes formicivorus*), band-tailed pigeon (*Columba fasciata*), northern flicker (*Colaptes auratus*), and western scrub-jay (*Aphelocoma californica*). Oaks provide valuable nesting habitat, particularly in the form of cavities used by bird species such as American kestrel (*Falco sparverius*), many woodpeckers, white-breasted nuthatch (*Sitta carolinensis*), and western bluebird (*Sialia mexicana*). The abundant insect life found in the bark and foliage of oaks provide food for bird species such as white-breasted nuthatch, bushtit (*Psaltriparus minimus*), oak titmouse (*Parus inornatus*), and ash-throated flycatcher (*Myiarchus cinerascens*). Avian predators that nest and forage in oak woodlands include great horned owl (*Bubo virginianus*), western screech-owl (*Otus kennicotti*), red-tailed hawk, and red-shouldered hawk (*Buteo lineatus*). Oak woodland is important to neotropical migrant songbirds such as warblers, vireos, and grosbeaks as foraging and nesting habitat.

Oak trees and other hardwoods in this community serve as shelter, shade, and breeding habitat for several mammals, including raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), cottontail (*Sylvilagus audubonii*), and gray fox (*Urocyon cinereoargenteus*).

Riparian

Riparian communities are those that require abundant moisture during all or most of the year and, as a result, occur along perennial and intermittent streams or rivers. The species composition and structure of riparian communities can vary considerably. Riparian scrub and forest are two vegetation communities that occur in the study area that frequently grade into each other. Riparian communities were much more abundant historically in the region. Urban and agricultural development has reduced many of the riparian communities to degraded, narrow corridors along streams.

Riparian communities are treated as terrestrial cover types in this document, even though they are by definition associated with watercourses. The reason is that most riparian corridors in the study area are not jurisdictional under the Clean Water Act. Some riparian corridors or more often their inboard margins exhibit the three parameters that would qualify them to be classified as jurisdictional features under the Clean Water Act; namely, hydric soil, seasonal inundation or saturation, and hydrophytic vegetation. In addition, the fauna characteristic of riparian corridors in the study area usually have more terrestrial affinities than aquatic affinities.

Riparian Vegetation

The two major riparian types in the study area are riparian scrub and riparian forest.

Riparian scrub

Riparian is a widespread community type in California, although it has been estimated that 95 percent has been eliminated in California (Grenfell 1988). The composition of plant species in riparian communities is highly variable and

dependent on geographic location, elevation, substrate, and amount of flow in the watercourse.

In the study area riparian scrub is dominated by any of several willow species that often include red willow (*Salix laevigata*), shining willow (*S. lasiandra*), and arroyo willow (*S. lasiolepis*). Willow riparian usually occurs along the stream bank in recently deposited soils where flooding occurs. Moving away from the stream bank, willow riparian typically grades into riparian forest that occurs on well-aerated, sandy, alluvial soils further from disturbance due to flooding.

Riparian forest

Riparian forests generally have closed canopies dominated by broadleaved, winter-deciduous trees. In the study area, these forests are dominated by white alder (*Alnus rhombifolia*), and big leaf maple (*Acer macrophyllum*). Closer to the coast, white alder is replaced by red alder (*Alnus rubra*). Evergreen hardwoods such as California bay and coast live oak will commonly occur along the edges of riparian corridors.

The number of layers of understory vegetation depends on the age of the community, climate, and surrounding land uses. The density and diversity of the understory is often influenced by cattle grazing. Riparian communities that have been carefully managed or fenced from cattle support a significantly higher number of native species than those areas where cattle are allowed free access. Riparian corridors that are mostly devoid of shrubs and trees (due to cattle grazing) are classified as non-wooded riparian habitats. These corridors occur mostly along intermittent watercourses. In the absence of cattle grazing, it is likely that these corridors will support at least some level of riparian community development.

Riparian scrub and forest grade into adjacent upland communities, including mixed evergreen forest, oak woodland, and grasslands. In this region, the remaining riparian corridors are often adjacent to agricultural operations and the transition from riparian community to vineyard or other crop is often abrupt.

Fauna Associated with Riparian Communities

Riparian forest typically supports more species than any other terrestrial habitat type in the study area (Grenfell 1988). The WHR lists 72 species that depend on riparian communities as habitat. Riparian scrub and forest are structurally very diverse, and they provide abundant food, cover, and breeding sites in close proximity to water. These characteristics are why riparian communities support such a high diversity of animal species.

The frequently abundant water that is available in riparian communities provide breeding habitat for many amphibian species, including California newt (*Taricha torosa*), western toad (*Anaxyrus boreas*), and northern treefrog (*Pseudacris regilla*). Reptiles that depend on or are closely associated with water include

western pond turtle (*Actinemys marmorata*) and aquatic garter snake (*Thamnophis atratus*).

Mourning dove (*Zenaida macroura*), downy woodpecker (*Picoides pubescens*), black phoebe (*Sayornis nigricans*), orange-crowned warbler (*Vermivora celata*), and song sparrow (*Melospiza melodia*) are resident bird species that are commonly found in riparian areas. A number of these species nest or roost in riparian woodland and feed in adjacent habitat types, such as annual grassland and agricultural fields. Riparian woodlands also provide important feeding, resting, and nesting habitat for insectivorous, neotropical migrant songbirds such as warblers, vireos, grosbeaks, and flycatchers.

Mammals found within riparian woodland habitat may include opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), broad-footed mole (*Scapanus latimanus*), woodrats, striped skunk, and gray fox. The abundance of birds and small mammals provides prey items for several raptor species that nest and/or forage in riparian communities, including Cooper's hawk, sharp-shinned hawk, western screech-owl, and red-shouldered hawk.

In addition to providing high value wildlife habitat, riparian corridors provide local movement corridors between fragmented habitat patches. Due to the value and scarcity of riparian communities, on both a state and region-wide scale, they are considered a sensitive habitat type and monitored closely by the CDFG.

Developed

Developed land includes agriculture, ornamental landscapes, and urban development. These different types of development vary in the biological resources they may support, and they are discussed separately in the following discussion. This region has a long agricultural history and much of the land has been and continues to be converted to various crops. In addition, the population continues to grow with housing and commercial development occurring as a result. Because different agricultural practices may vary in their ability to support biological resources, agricultural lands are divided into different types, including cropland, orchard, vineyard, and pasture or irrigated field.

Agriculture

Agriculture Cover Types

The agriculture cover type is comprised primarily of cropland, orchard, vineyard, and pasture and irrigated field in the study area.

Cropland. Croplands are typically located on flat to gently rolling terrain, which is tilled prior to commencement of crop production (Zeiner 1988). Due to the artificially controlled growth and harvesting regime, croplands do not conform to normal seral stages (i.e., growth stage of habitat). These habitats may either be annual or perennial depending upon the crop-rotation system and geographic

location. Crops grown in the study area include hay, wheat, and truck crops. There are no special-status plant species associated with croplands.

Orchard. Orchards are found on valley floors with rich, alluvial soils and on rolling foothills or fairly steep slopes. As a result they can be associated with a number of native communities as well as other agricultural fields. Orchards in California are typically dominated by a single tree species and pruned to be low and bushy with an open canopy. Spacing between trees is typically uniform, and the understory is usually composed of low-growing grasses and other herbaceous plants (Schultze 1988). Apple and peach tree orchards are common in the study area. There are no special-status plant species specifically associated with orchards.

Vineyard. Vineyards are planted on alluvial soils of the valley and in well-drained soils of hillsides. Vineyards in the study area are composed of a single grape species planted in rows and are usually supported on wood and wire trellises. The vines are intertwined in the rows, but there is open space between rows. The understory of the vines may be regularly disked to expose bare soil or they may be planted with grasses or other herbaceous plants to prevent soil erosion. Vineyards are usually long-lived and may persist for over 40 years (Schultze 1988). There are no special-status plant species associated with vineyards.

Pasture and Irrigated Field. Pastures are usually cultivated on flat to gently sloping land and may be irrigated in some manner. Pastures are very similar to annual grasslands, but are distinguished here as areas that are more intensively managed for grazing through seeding, irrigation, and/or disking. The length of a growing season for a particular pasture will depend upon the crop type and climatic influences. Pastures are regularly maintained and are usually composed of a mix of perennial grasses and legumes that provide 100 percent ground cover. Old or poorly drained pastures may also have patches of weedy species (Zeiner 1988). This community is maintained to provide forage for a variety of livestock including cattle, sheep, and horses. In northern California, ryegrass (*Lolium* spp.), tall fescue (*Festuca arundinacea*), Dallisgrass (*Paspalum dilatatum*), Ladino clover (*Trifolium repens*), and trefoils (*Lotus* spp.) are preferred pasture plant species (George et al. 1980, Zeiner 1988). A few special-status plant species are associated with pastures. For example, in the Santa Rosa Plain, special-status species such as Sebastopol meadowfoam (*Limnanthes vinculans*) and Burke's goldfields (*Lasthenia burkei*) are known to occur in seasonal wetlands in lightly grazed pastures, although these plants are most closely associated with pristine vernal pools.

Fauna Associated with Agriculture

Although cropland generally provides low to moderate habitat value for wildlife, low-growing row crops and fallow fields may provide important foraging habitat for resident open-country hawk species such as American kestrel and red-tailed

hawk. Ferruginous hawk (*Buteo regalis*), rough-legged hawk (*Buteo lagopus*), and prairie falcon (*Falco mexicanus*) also forage in fallow fields during the fall and winter months. Migratory waterfowl species such as Canada goose (*Branta canadensis*) may seasonally depend on croplands for foraging habitat. Two special-status species, white-tailed kite and burrowing owl, are known to utilize cropland and fallow fields for foraging. The more intensively managed, in terms of tilling, planting, and irrigation, the lower are a cropland's values as wildlife habitat.

Orchards and vineyards are also of only marginal value as habitat. However, many wildlife species will use these cover types for all or part of their life cycle. Animal species that may use orchard or vineyard communities for cover, foraging, or breeding habitat include widespread species such as mourning dove, northern flicker, western scrub-jay, American crow (*Corvus brachyrhynchos*), northern mockingbird (*Mimus polyglottus*), dark-eyed junco (*Junco hyemalis*), house finch (*Carpodacus mexicanus*), Brewer's blackbird (*Euphagus cyanocephalus*), black-tailed hare (*Lepus californicus*), California ground squirrel, and Botta's pocket gopher (*Thomomys bottae*). The abundance of small birds and mammals provide prey for predators that hunt in orchards and vineyards, including red-tailed hawk, Cooper's hawk, and coyote. As with cropland, orchards and vineyards that are less intensively managed, such as those that are not disked and maintain an understory, have higher value as wildlife habitat.

Pastures may be utilized by a wide variety of wildlife species. However, the use of this cover type is dependent upon the geographic region and availability of adjacent habitat types. Pastures are often similar to annual grasslands that are no longer utilized for grazing and many of the same species use both as nesting or foraging habitat. Waterfowl, the introduced ring-necked pheasant (*Phasianus colchicus*), California quail, western meadowlark, and other ground-nesting birds nest in pastures if adequate vegetation is present at the start of the nesting season. Pastures that pond water naturally (i.e., during the winter) or that are flood-irrigated provide feeding and roosting sites for wetland-associated birds such as shorebirds and waterfowl. Many small rodents may be present and include deer mouse, California vole, and Botta's pocket gopher. These birds and small mammals provide prey for many of the same raptor species that forage in grasslands and other agricultural areas, as well as coyotes. Although there are no special-status animal species that are associated with pastures, overwintering ferruginous hawks and other special-status raptors often use pastures as foraging habitat. Pastures are frequently associated with several other wildlife habitat types including cropland, annual grassland, and orchard-vineyard.

Ornamental Landscape

Ornamental Landscape Cover Types

This section includes descriptions of other tree communities and associations of native and non-native trees that occur in scattered locations within the major

vegetation community types in the study area. The cover types here include those dominated by non-native and native tree species that have been planted for landscaping and/or aesthetic reasons by the community or land owner.

Eucalyptus. Eucalyptus is an example of a non-native plant that has become naturalized in many locations within the study area. Eucalyptus was introduced to California as an ornamental species and to provide lumber and windbreaks (Ornduff 1974). Monotypic (single species) stands of eucalyptus are common, especially where the trees were planted in groves. The groves are usually even aged and have little to no understory because the leaf litter dropped by eucalyptus release compounds that inhibit the growth of other species. The most common species in this community is blue gum (*Eucalyptus globulus*), which reaches heights up to 120 feet and trunk diameters of over 5 feet. Eucalyptus trees tend to replace native riparian habitat when planted along creeks in the region.

Lombardy Poplar. Lombardy poplar is not native to California. Although similar to the native cottonwood or poplar (*Populus fremontii* ssp. *fremontii*), Lombardy poplars have a columnar shape, in contrast to the open, spreading form of the native cottonwood. In the study area, Lombardy poplars are planted in rows in scattered locations as a windbreak along property lines and hedgerows. They have also become established in scattered locations along drainages.

Monterey Cypress. Monterey cypress is a native of California, but is not native to Sonoma County. It has been widely planted outside its natural range on the Monterey Peninsula (Bartel 1993). This species occurs in scattered locations within the study area and are generally planted as hedges, windbreaks, and park trees (McMinn and Maino 1981).

Monterey Pine. Monterey pine is native to only three isolated locations along California's central coast and Cedros Island off of Baja California. This species has also been widely planted throughout coastal California. In the study area, Monterey pines have been planted as hedge rows and wind breaks. These stands have been planted and are not indigenous to Sonoma County.

Fauna Associated with Ornamental Landscapes

The lack of plant species diversity within eucalyptus stands results in a corresponding limited diversity of animal species. Animal species that use eucalyptus groves are mostly generalists that utilize a wide variety of habitat types. Bird species that utilize eucalyptus as nesting or roosting habitat include red-tailed hawk, red-shouldered hawk, great horned owl, American crow, house finch, European starling (*Sturnus vulgaris*), Anna's hummingbird (*Calypte anna*), turkey vulture (*Cathartes aura*), and western scrub-jay. Mammals which may occur in eucalyptus groves include native opossum, raccoon, and striped skunk and non-native house mouse (*Mus musculus*) and Norway rat (*Rattus norvegicus*). Western fence lizard, Pacific slender salamander, gophersnake, and alligator lizard are reptile and amphibian species found in eucalyptus. No special-status

animal species are associated with eucalyptus. However, during migration monarch butterflies may form colonial roosts in large, wind-protected groves of eucalyptus trees.

Lombardy poplar, Monterey cypress, and Monterey pine are limited in distribution within the study area and do not have any characteristics that will attract a unique set of animal species. They are most likely to be used opportunistically by animal species from neighboring vegetation communities.

Urban

Urban Cover Type

Urban areas are characterized by impermeable surfaces such as roads and buildings, as well as a mixture of native and non-native plant species used for landscaping and within golf courses and community or city parks. In addition, artificial bodies of water and remnant segments of streams flow through the urban environment.

Fauna Associated with Urban Areas

Non-native plant species may provide valuable habitat elements such as cover for nesting and roosting, as well as food sources such as nuts or berries. Native and especially introduced animal species that are tolerant of human activities often thrive in urban habitats. These species include western fence lizard, red-shouldered hawk, northern mockingbird, barn swallow (*Hirundo rustica*), raccoon, striped skunk, European starling, house sparrow, house finch, house mouse, Norway rat, and Virginia opossum. Special-status species that nest in less disturbed urban habitats include white-tailed kite, Cooper's hawk, and western burrowing owl.

AQUATIC COVER TYPES

Three main categories of aquatic cover types are identified in the study area: wetlands, open waterbodies, and watercourses. These cover types are usually jurisdictional under the Clean Water Act. See section 4.9, Jurisdictional Wetlands Resources, for the methods used to identify and delineate the aquatic cover types.

Wetlands

Wetland communities are characterized by emergent vegetation. Wetlands may be located along the shoreline of lakes, ponds, and river channels, on river floodplains, or in isolated catchments. Lakes or rivers may also contain islands with wetland communities. Bogs, fens, marshes, prairies, and swamps are all vegetated wetlands.

Freshwater Marsh

Freshwater Marsh Vegetation

Freshwater marsh vegetation is characterized by herbaceous plants adapted to perennially wet conditions and occurs near the edges of rivers and lakes or in basins or depressions that flood periodically. Freshwater marsh habitat may be found in association with perennial streams and around farm ponds. The roots of marsh plants are adapted for anaerobic conditions during periods of inundation. Native perennial plants such as Baltic rush (*Juncus balticus*) and nutsedge (*Cyperus esculentus*) often dominate the upper fringes of marsh habitats, whereas cattails and tules (*Scirpus acutus* var. *occidentalis*) occur in deeper waters. Coastal and valley freshwater marsh is a type of vegetation community that has been identified by CDFG as a sensitive natural community.

Fauna Associated with Freshwater Marsh

Freshwater marsh supports a high diversity of wildlife species. WHR lists 61 species dependent on freshwater marsh. Amphibians such as northern treefrog and California newt rely on marshes for breeding. Several bird species also breed primarily in marshes, including common moorhen (*Gallinula chloropus*), red-winged blackbird (*Agelaius phoeniceus*), and marsh wren (*Cistothorus palustris*). Other birds that frequently use freshwater marsh include belted kingfisher (*Ceryle alcyon*), great blue heron, green heron (*Butorides virescens*), great egret, American coot (*Fulica americana*). Freshwater marshes also provide important feeding and resting habitat for resident waterfowl including mallards and migratory waterfowl. Other animal species associated with marsh communities include western aquatic garter snake, common garter snake (*Thamnophis sirtalis*), muskrat (*Ondatra zibethicus*), raccoon, and shrews.

Depending on marsh size, depth, and other factors, native fishes such as threespine stickleback (*Gasterosteus aculeatus*), California roach (*Hesperoleucus symmetricus*), and Russian River tule perch (*Hysterothorax traski*) may occur in marshes, along with introduced fishes such as western mosquitofish (*Gambusia affinis*), bluegill (*Lepomis macrochirus*), and green sunfish (*Lepomis cyanellus*). Many of the fishes and amphibians found in marshes provide important foods for predators.

Seeps and Springs

Seeps and Springs Cover Type

Seeps and springs occur where the groundwater table is high or, in the case of springs, where underground water reaches the surface. Seeps and springs are common at many locations throughout the study area and may form permanently or temporarily wet conditions. While these features may occur within many different vegetation communities, seepage from underground springs produces an

environment conducive to the growth of hydrophytic grasses, rushes, sedges, and herbaceous vegetation.

Fauna Associated with Seeps and Springs

Freshwater seeps are included as a habitat element within many of the Wildlife Habitat Relationship System (CDFG 2002b) habitat types. Seeps and springs are important hydration habitats for amphibians. Also, many species of reptile, bird, and mammal utilize freshwater seeps as a source of water and cover.

Seasonal Wetland

Seasonal Wetland Cover Type

Seasonal wetlands are a common vegetation community in the study area. Seasonal wetlands occur in shallow depressions, swales, and drainages that fill with precipitation and runoff, and remain saturated or inundated during winter and spring months. Generally, seasonal wetlands are drier than freshwater marshes and wetter than adjacent upland areas.

Fauna Associated with Seasonal Wetlands

Seasonal wetlands support animal species adapted to temporarily wet conditions followed by long periods of desiccation. Seasonally wet vegetation supports many of the same types of species found in vernal pools and freshwater seeps. northern treefrogs use seasonal wetlands as breeding habitat. In addition, these features provide important foraging habitat for migratory waterfowl and shorebirds, and nesting habitat for mallard and cinnamon teal. Seasonal wetlands also often support a high diversity of small aquatic invertebrates, (i.e., zooplankton, mollusks, crustaceans, and aquatic insect larvae).

Vernal Pool

Vernal Pool Cover Type

Vernal pools, a subclass of seasonal wetlands, occur in formed depressions in grasslands and other habitats that are underlain with an impervious soil or bedrock layer. These depressions fill with water in the winter and slowly dry during the spring and summer. Vernal pools are characterized by four different stages. These stages include a filling stage in the fall, a holding stage in the winter, a drying stage in the spring, and a dry stage through the summer (Zedler 1987). Vernal pools are classified according to the substrate on which they occur. These substrates include terrace soils, volcanic mudflows, and hardpan. Northern vernal pool and northern hardpan vernal pool are two types of vernal pools that occur in the study area and have been identified by CDFG as special-status natural communities.

Spectacular spring wildflower displays develop in vernal pools. As water in the vernal pools recedes during the spring, vernal pool annual plants begin to germinate and grow. A concentric display (i.e., rings) of small annual plants develops in the vernal pool basin as different plant species respond to the changing temperatures and hydrology of the drying pool. These concentric rings are unique to vernal pools in California. This ecosystem is therefore relatively easy to identify during the spring, as opposed to the late summer months when surrounding vegetation is often dry and brown.

Fauna Associated with Vernal Pools

Vernal pools are included as a habitat element of the WHR (CDFG 2002b) annual grassland habitat type. Many species are highly adapted to dependent on vernal pools and some are unique to vernal pools. Vernal pools are characterized by a high diversity of aquatic insect larvae and other macroinvertebrates including several endangered or threatened species of vernal pool shrimp. Many amphibian species such as northern treefrogs, California newts, and western toads use vernal pools as breeding habitat. In addition, many other wildlife species including shorebirds, waterfowl, and wading birds utilize vernal pools as foraging during the winter (Harvey et al. 1992). Many of the mammals that generally occur in the surrounding grassland will rely on vernal pools as a source of water. (Harvey et al. 1992).

Open Waterbodies

Although this cover type encompasses ponds and other open water habitats, the main form of this cover type in the study area is ponds. This open water cover type differs from the wetland cover type in that there are no areas of emergent wetland vegetation. Stated differently, the vegetated margins of a stock pond, for instance, would be considered wetland and the rest of the waterbody would be considered in the open water cover type.

Cover Type Description

Freshwater ponds within the study area include human-made impoundments created by the damming of natural drainage channels. These impoundments primarily collect water for agricultural uses including irrigation and livestock watering. Phytoplankton such as algae and diatoms comprise the greatest biomass of plant species in freshwater ponds (Grenfell 1988). The open water of ponds is typically associated with freshwater marsh along its margins.

Fauna Associated with Ponds

Freshwater ponds provide important nesting habitat for resident birds including mallard, pied-billed grebe (*Podilymbus podiceps*), and American coot. In winter, migratory waterfowl, such as northern pintail (*Anas acuta*) and American wigeon (*Anas penelope*), utilize ponds for feeding and resting. Garter snakes, western pond turtles, northern treefrogs, western toads, and American bullfrogs

(*Lithobates catesbeiana*) also frequently occur in ponds, either as permanent residents or during their breeding seasons. Many exotic fish species, especially sunfishes (bluegill, largemouth bass [*Micropterus salmoides*], etc.) and catfishes (*Ictalurus* spp.) are often stocked in human-made freshwater ponds.

Rivers, Streams, and Other Drainages

Fluvial (flowing water) systems with defined beds and banks, such as natural or artificial rivers and streams, are included in this category. The flow regime is characterized as perennial (permanent flow), intermittent (seasonal flow), and ephemeral (flow in direct response to rain events). The term drainage is used generically to mean any flowing water system with a defined bed and bank, including rivers, streams, and constructed channels.

Streams and rivers originate from higher elevation sources (springs and lakes) and flow downward at a rate relative to slope and water volume. Water velocity will normally decline as the stream approaches progressively lower elevations with reduced gradients, while water volume will continue to increase until the flow becomes slow-moving. During this transition from fast-moving to slow-moving water, temperature and turbidity tends to increase, while dissolved oxygen decreases or becomes more variable (Grenfell 1988).

Perennial Drainages

Perennial Drainage Cover Type Description

Perennial streams and rivers can be grouped into two separate categories: lower perennial and upper perennial. Upper perennial streams have steeper gradients and higher current velocities than lower perennial habitats. The substrate of upper perennial streams generally consists of rock, cobble, or gravel, with occasional patches of sand. Shallow, fast-flowing reaches have gravel or boulder substrates and are called riffles. Deep, slow-flowing reaches that have a sand or mud substrate are called pools. Lower perennial streams are characterized by a gentle gradient and are associated with the lower reaches of streams that approach ocean outfall. These streams reach relatively low current velocities and the stream bottom is typically composed of mud or sand. Both upper and lower reaches of perennial streams in the study area frequently have intermittent surface flow during the dry season, especially in dry years, but sub-surface flow continues and maintains relatively cool temperatures within isolated pools.

Fauna Associated with Perennial Drainages

The characteristic species assemblages of upper perennial streams are mostly associated with the rocky substrates of riffles. These include many kinds of invertebrates, especially larvae of insects such as mayflies, stoneflies, black flies, and caddisflies. Few fish species live in these upper perennial streams, and those that do are primarily native species such as prickly sculpin (*Cottus asper*), juvenile steelhead (*Salmo gairdneri*) and coho salmon (*Oncorhynchus kisutch*),

hardhead (*Mylopharodon conocephalus*), Sacramento pikeminnow (*Orthodon microlepidotus*), and larvae of three species of lamprey (*Lampetra* spp.): Pacific lamprey (*Lampetra tridentata*), river lamprey (*L. ayersi*), and western brook lamprey (*L. richardsoni*). The sculpin, steelhead, and coho feed mainly on invertebrates that inhabit the riffles, although the salmonids are most abundant in pools (some of them move into riffles in the evenings and early mornings to feed). Hardhead and pikeminnow, when present, usually occupy pools, as do the larval lamprey, which live in burrows in the substrate.

Characteristic species assemblages found in lower perennial habitats include planktonic organisms such as diatoms, copepods, and green algae, sand or mud bottom-dwelling invertebrates including amphipods, worms, midge larvae, and freshwater clams. Attached algae and emergent plants harbor snails, dragonfly and damselfly nymphs, and other invertebrates.

Native fish species commonly found in lower perennial habitats include Sacramento sucker (*Catostomus occidentalis*), prickly sculpin, California roach, Sacramento pikeminnow, threespine stickleback, and Russian River tule perch. Introduced fishes found in lower perennial habitats include several introduced species of sunfish e.g., largemouth bass, smallmouth bass (*Micropterus dolomieu*), bluegill, green sunfish, and black crappie (*Pomoxis nigromaculatus*); several species of catfish, but especially brown bullhead (*Ameiurus nebulosus*) and black bullhead (*Ameiurus melas*); western mosquitofish; and several minnows, including common carp (*Cyprinus carpio*), fathead minnow (*Pimephales promelas*), goldfish (*Carassius auratus*), and golden shiner (*Notemigonus crysoleucas*).

Many bird species use the open waters of rivers and streams as foraging habitat. Herons will forage for fish along pools in streams. Ospreys and belted kingfishers hunt for fish over open water areas. Waters near shore provide foraging habitat for waterfowl species, including wood ducks (*Aix sponsa*), which nest in tree cavities near rivers and open water where they forage. Many insect-eating birds forage over streams and rivers, including swallows, flycatchers, and swifts. Common mammals found in riverine habitats include striped skunk, raccoon, and muskrat (Grenfell 1988). Bats in the region are also known to forage over streams and rivers, often roosting under bridges that span over drainages.

Intermittent Drainages

Intermittent Drainage Cover Type Description

Intermittent streams contain flowing water for only part of the year. Flow may cease anytime from late spring to early autumn depending on the water source and climate. Standing water may or may not remain as isolated pools within the streambed, but subsurface flow generally ceases during the dry season, allowing daytime temperatures in isolated pools to reach higher levels than in similar pools fed by subsurface flow in perennial streams. Substrate types of intermittent

riverine habitats range from fine sediments to mud to bedrock. Vegetation along intermittent streams (if present) includes spike rush (*Eleocharis* spp.), toad rush (*Juncus bufonius*), spreading rush (*Juncus patens*), prickle-fruited buttercup (*Ranunculus muricatus*), and sedge (*Carex* spp.).

Fauna Associated with Intermittent Drainages

The animal species that commonly utilize intermittent streams include garter snakes, native frogs and toads as well as introduced bullfrogs, salamanders, and some of the native and introduced fishes found in perennial streams. Fish such as threespine stickleback and California roach may move up into intermittent drainages during the wet season, then either move downstream or die as the stream dries up, or spend the dry season in isolated pools. Both of these fishes can tolerate much higher water temperatures than can salmonids, sculpin, or lamprey. Many of the animals in the surrounding habitats will also use intermittent streams as sources of water.

Ephemeral Drainages

Ephemeral drainages typically do not support wetland-associated vegetation or specially adapted animal species. Ephemeral drainages are important for their jurisdictional status (e.g., regulated by the Clean Water Act), but usually do not have vegetation or faunal associations distinctly different from the surrounding upland landscape.

**Table G.6-1
 Special-Status Vegetation Communities found within Corresponding General Vegetation Communities used in the EIR**

General EIR Vegetation Communities	Special-Status Communities
Grassland	California Oatgrass Bunchgrass Grassland Foothill Needlegrass Purple Needlegrass One-sided Bluegrass Idaho Fescue Creeping Ryegrass Grassland Serpentine Bunchgrass Wildflower Field Blue Wildrye Grassland
Chaparral	Coyote brush scrub and dwarf scrub – specific grassland associations only Coyote Brush/Seaside Woolly-sunflower Coyote Brush / Tufted Hairgrass

Table G.6-1

Special-Status Vegetation Communities found within Corresponding General Vegetation Communities used in the EIR

General EIR Vegetation Communities	Special-Status Communities
	Coyote Brush / Creeping Ryegrass Coyote Brush / Sword Fern Coyote Brush / Purple Needlegrass Coyote Brush / California Oatgrass Coyote Brush / Ocean Spray Coyote Brush / Slough Sedge - Common Rush Salal - Black Huckleberry Scrub and Dwarf Scrub Parry Rabbitbrush Dwarf Scrub Mixed Serpentine Chaparral Chamise / Bush Monkeyflower Sensitive Manzanita Scrub [<i>Arctostaphylos nummularia</i>] Leather Oak - Eastwood Manzanita Foothill Ash - Birchleaf Mountain-Mahogany - Scrub Oak Oregon White Oak - Brewer Oak / California Fescue Skunkbush [<i>Rhus trilobata</i>]
Oak Woodland	Black Oak Forests and Woodland – certain associations Black Oak - Madrone - Coast Live Black Oak - Valley Oak Black Oak - Douglas-fir Oregon White Oak Woodland – most associations Valley Oak Forests and Woodlands – most associations Canyon Live Oak - Deerbrush Canyon Live Oak- Oregon White Oak / Goldenback Fern Coast Live Oak - Black Oak Blue Oak – Valley Oak – Coast Live Oak / Grassland

Table G.6-1

Special-Status Vegetation Communities found within Corresponding General Vegetation Communities used in the EIR

General EIR Vegetation Communities	Special-Status Communities
Riparian	North Coast Black Cottonwood Fremont Cottonwood Riparian Forests and Woodlands Arroyo Willow Riparian Forests and Woodlands Pacific Willow Riparian Forests Red Willow Riparian Forests Mixed Willow Riparian Forests and Woodlands Red Alder / Salal Red Alder Riparian Forest Red Alder Forest Red Alder / Arroyo Willow Red Alder / Salmonberry - Blue Elderberry Narrowleaf Willow
Wetlands	Northern Hardpan Vernal Pools Bulrush Marsh Spikerush – Water Pygmy

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