NATURAL RESOURCES

ANIMAL LIFE

Folsom Lake State Recreation Area

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by

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ANIMAL LIFE

Introduction

This section describes and maps wildlife resources within Folsom Lake State Recreation Area (the Unit). Preparation of this section entailed three major tasks by the LSA study team: (1) initial information gathering, (2) field assessments, and (3) data analysis and recommendations. For the first task, LSA reviewed existing reports for the Unit area such as earlier resource management plans, resource inventories, and impact assessment studies associated with proposed reservoir improvements (California Department of Parks and Recreation - CDPR , 1978a,b; 1979; Quinn et al, 1991; Rhodes and Bowcutt, 1994; Surface Water Resources, 2001). Many of these documents also provided information on the special status wildlife species and their habitats in and around the Unit.

LSA also obtained special status species information from the U.S. Fish and Wildlife Service (USFWS 2002), from the California Department of Fish and Game (CDFG) website (CDFG 2003), and from the California Natural Diversity Data Base (CDFG - CNDDB 2002). Individuals having knowledge and expertise on wildlife in the Folsom Lake area were contacted and their information was used to augment LSA staff experience in the area. Individuals contacted were: Dennis Lee, CDFG Fisheries Biologist; Kyle Murphy, CDFG; Terry West, CDFG Nimbus Hatchery manager; Mike Healy, CDFG District Fisheries Biologist; Brian Deason, U.S. Bureau of Reclamation (BOR); Jim Micheaels, Sally Walters and Rodi Lee, Gold Fields District, California Department of Parks and Recreation (CDPR).

LSA used various literature sources to help assess the potential for various animal species to occur in the Unit's habitats, including Grinnell and Miller (1944), Ingles (1965), Moyle (1976), Burt and Grossenheider (1976), Cogswell (1977), Powell and Hogue (1979), Verner and Boss (1980), Williams (1986), Jameson and Peeters (1988), Thorp and Leong (1996), Stebbins (1954), Mayer and Laudenslayer (1988), Zeiner *et al.* (1988), Zeiner *et al.* (1990a; 1990b).

The description of Unit fisheries was developed from interviews with local fisheries experts with the CDFG and the BOR, and from a review of environmental documents involving Folsom Lake and/or the Lower American River below Nimbus Dam. Mike Healy and Dennis Lee of CDFG were key sources for fisheries information. Environmental documents used for source data included: Army Corps of Engineers – ACOE (2001a, 2001b); Placer County Water Agency - PCWA (2002); and Surface Water Resources, Inc - SWRI (2001).

Field assessments were conducted by the LSA study team during their vegetation and habitat mapping field visits conducted on July 16, 17, 18, 19, August 20, 21, September 9, October 17, 2002, and January 22, 2003. During these assessments observations on habitat conditions and wildlife utilization were made by an LSA wildlife biologist and botanist. All wildlife species and habitats observed during these visits were recorded. Although no formal surveys were conducted, habitat areas suitable for special status wildlife species were examined for evidence of their presence. Observed special status wildlife and their potential habitats were mapped and their locations were recorded using a Global Positioning System (GPS) receiver.

Terrestrial Habitats

Terrestrial habitats are environments located outside of waterbodies such as creeks, rivers, ponds, lakes and oceans. Wildlife species that have adapted to life in terrestrial habitats possess life histories for which water is not a primary component (*i.e.* water is necessary for drinking or only minor portions of their life histories). This is in contrast to animals such as waterfowl and frogs that require water for major components of their life histories, such as feeding or reproduction (Hickman *et al.* 1990).

The Unit supports six major terrestrial vegetation communities that are typical of the lower foothills of California's Central Valley. These vegetation communities are chamise chaparral, interior live oak woodland, blue oak woodland and savanna, annual grassland, and cottonwood/willow riparian. The Plant Life section of this Resource Inventory describes each of these vegetation communities in detail and categorizes them in accordance with the Sawyer and Keeler-Wolf (1995) vegetation classification system, under which each community is classified as one or more vegetation series.

Based on the Sawyer/Keeler-Wolf classification system, the Unit's wildlife habitats consist of the following vegetation series:

- *Grassland and oak savanna habitat* - consisting of California annual grassland series and blue oak/annual grass association (Sawyer and Keeler-Wolf 1995).
- *Chaparral habitat* – consisting of the chamise series (Sawyer and Keeler-Wolf 1995).
- *Oak woodland habitat* - consisting of interior live oak series and blue oak series, except in those locations where the blue oak series can be further classified as blue oak/annual grass association (Sawyer/Keeler-Wolf 1995).
- *Riparian woodland* – consisting of Fremont cottonwood series and mixed willow series (Sawyer/Keeler-Wolf 1995).

Plant series within each habitat type tend to share structural and biological characteristics that allow them to support similar groups of animal species. For example, California annual grassland and blue oak/annual grass association are both dry, open communities with widespread forage availability. Both series possess extensive stands of grasses that provide very similar habitat values. These habitat values are exploited by grassland adapted species.

Table AL-1 provides a matrix listing all observed or potentially occurring wildlife species by habitat type in the Unit. The following sections summarize habitat characteristics and typical wildlife species in each of the four terrestrial habitats at the Unit.

Grassland and Oak Savanna

General Description: Within the Unit, this habitat type is composed of the California annual grassland series and blue oak/annual grass association (see Plant Life section). Both vegetation series are typically composed of a dense cover of annual grasses and broad-leaved plants (forbs) growing up to three feet in height. Grasslands typically have little or no canopy cover. However in some grassland locations blue oak trees (*Quercus douglasii*) can provide a canopy cover of up to 10 percent. Oak savannas typically have between 10 and 30

percent canopy cover by blue oaks (Barbour and Major 1990). The difference in canopy cover between the two series is not significant from a wildlife utilization standpoint (Mayer and Laudenslayer, 1988). Both are open, dry communities with little cover and extensive production of forage during the winter, spring and early summer. The two plant series types often intergrade with one another with no clear boundary between the two.

Although grassland/savanna habitat is found throughout the Unit, the majority of this habitat type occurs in the southern and eastern portions of the Unit, particularly in the Mormon Island Wetland Preserve and around much of eastern side of Lake Natoma. See Figures AL-1a and AL-1b for the locations of grassland and savanna habitat in the Unit.

Wildlife Composition and Habitat Characteristics: Grassland/savanna habitat provides valuable forage for a large number of herbivorous species. Insects are common grassland/savanna herbivores and include grasshoppers (*Melanoplus devastator*), Jerusalem cricket (*Stenopelmatus fuscus*), and caterpillars. Rodent species such as deer mouse (*Peromyscus maniculatus*), California vole (*Microtus californicus*) and California ground squirrel (*Spermophilis beechyii*) are also common herbivores in this habitat. Other species, such as song sparrows (*Melospiza melodia*), dark-eyed junco (*Junco hyemalis*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus auduboni*) and mule deer (*Odocoileus hemionus*), prefer the cover provided by the denser vegetation in adjacent woodland and chaparral habitats, but nevertheless frequently move into grassland and savanna habitats to forage.

While many herbivores are able to locate food year-round, grasslands and savannas provide the bulk of their available forage during the late winter, spring and early fall. The warmth and moisture of this period promotes the growth of the annual grasses in this habitat. As the summer progresses, grasses begin to seed and die, providing a less suitable food source for grazers. The older, dying grasses tend to be less palatable to many grazers (Barbour and Major 1990).

The large number of herbivores foraging in grasslands and savannas provide a substantial prey base for many predatory species. In particular, an extensive insect prey base supports a large number of insectivorous predators that occupy several different niches in grassland habitats. Western kingbird (*Tyrannus verticalis*), western flycatcher (*Empidonax difficilis*), dragonflies (Odonata), and bats (*Myotis* sp.) feed on flying insects from the air. Yellow-billed magpie (*Pica nuttalli*) and loggerhead shrike (*Lanius ludovicianus*) feed on large insects such as butterflys and grasshoppers within the grasses and on the ground. California mantid (*Stagmomantis californica*), western toad (*Bufo boreas*), Gilbert's skink (*Eumeces gilberti*), southern alligator lizard (*Elgaria multicarinata*), and shrews (*Sorex* spp.) capture ground dwelling insects in the grasses and under surface objects.

Larger predators, such as common king snake (*Lampropeltis getula*), red-tailed hawk (*Buteo jamaicensis*), and coyotes (*Canis latrans*) commonly prey on rodents and insectivorous animals in grasslands and savannas. Raptors, including red tailed hawk (*Buteo jamaicensis*), white-tailed kite (*Elanus leucurus*), and golden eagle (*Aquila chrysaetos*) will typically forage in these habitats and will sometimes nest in nearby trees.

Animal species in the grassland/savanna habitat of the Unit survive the hot arid summers by limiting activity to nighttime hours and/or by living underground to avoid daytime heat and desiccation. Grasslands and savannas are often riddled with the tunnels of burrowing

rodents particularly California ground squirrel and pocket gopher (*Thomomys bottae*). When these burrows are abandoned, the tunnels are often used by wildlife species, such as western toad, gopher snake (*Pituophis catenifer*) and California vole. Other species, such as coyote will modify abandoned burrows for their own use.

Associated Special Status Animal Species: Seven special status wildlife species are associated with grassland/oak savanna habitat and are known to occur or have the potential occur in the vicinity of the Unit (CDPR 1978b, Quinn *et al.* 1991, USFWS 2002, CNDDB 2003). These species are the following:

- Valley elderberry longhorn beetle (*Desmocercus californicus dimorphus*) - FT[1] - Elderberry beetles may live in elderberry shrubs growing within grasslands or along the edges of grasslands near stream courses.

- Western spadefoot toad (*Spea hammondii*) - CSC[2] - This toad species will occupy abandoned rodent burrows in grasslands associated with ephemeral pools and drainages.

- California horned lizard (*Phrynosoma coronatum frontale*) - CSC - The horned lizard can be observed in open, sparsely vegetated grassland areas, usually areas with sandy soils.

- Northern harrier (*Circus cyaneus*) nesting - CSC - Harriers hide their nests on the ground in tall grass areas of open habitats.

- Sharp-shinned hawk (*Accipiter striatus*) nesting - CSC - Sharp-shinned hawks occasionally nest in blue oak trees, usually in areas with extensive canopies.

- White-tailed kite - FP[3] - This kite species will nest in trees and tall shrubs located in and adjacent to open habitats.

- Short-eared owl (*Asio flammeus*) nesting - CSC - Like harriers, short-eared owls hide their nests on the ground in tall grass areas of open habitats.

- Burrowing owl (*Athene cunicularia*) - CSC - This owl will nest in abandoned ground squirrel burrows in open habitats. They will occasionally use pipes, small culverts and rubble or debris piles in these same habitats.

- Loggerhead shrike - nesting - CSC - The loggerhead shrike prefers to nest in trees and tall shrubs located in and adjacent to open habitats.

The Special Status Wildlife section – page AL-30 provides a more detailed discussion of all special status wildlife species that occur or could potentially occur in grassland/woodland habitat. Table AL-2 lists all potentially occurring special status species and their listing status, describes their habitat requirements and provides their nearest known occurrences to the Unit.

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[1] FT = listed as Threatened under the federal Endangered Species Act.
[2] CSC = California Species of Special Concern.
[3] FP = California Fully Protected Species.

Introduced Species: Several non-native species of wildlife are known to use annual grasslands and blue oak savanna. These include the introduced honey bee (*Apis mellifera),* Argentine ants (*Lipepithema humile*), starling (*Sternus vulgaris*), rock dove (*Columba livia*), wild turkey (*Meleagris gallopavo*), and Virginia opossum (*Didelphis virginiana*).

Chaparral

General Description: Within the Unit, this habitat consists of the chamise series (see Plant Life Section). Chamise series is a scrub community, dominated by chamise (*Adenostema fasciculatum*), with little understory or upper canopy. Chaparral habitats are typically associated with rocky soils and are most often observed on the slopes of hills and mountains. Chamise is 3-8 feet tall at maturity and forms dense interwoven thickets that are difficult to traverse. Chaparral habitat occurs mainly along the South Fork of the American River on the east side of Folsom Lake (See Figures AL-1a and AL-1b).

The high density of the scrub vegetation in chaparral habitats prevents the growth of grasses and other herbaceous understory vegetation. As a result, chaparral consists mainly of woody plant species with little palatability for herbivorous animals (Barbour and Major 1990, Mayer and Laudenslayer, 1988). However, the dense stands of chamise and other woody shrubs in this habitat provide cover for species that forage in adjacent habitats where food resources are more readily available (Mayer and Laudenslayer, 1988). Additionally, foothill pines that occur within chaparral provide important roosting and nesting sites for raptors.

Historically, chaparral in the Unit probably provided better habitat for herbivorous species than it does today due to the changed fire regime. In the past, fires were more common in chaparral which contains plant species that are highly adapted to fires, often requiring fire for seed germination (Barbour and Major 1990). Because fire occurred more frequently, the amount of woody plant material was kept in check, leaving sparsely vegetated openings in the dense growth of chaparral habitats. These openings were likely important to chaparral inhabiting animals because they allowed sun penetration and provided new growth that could be used as forage (Barbour and Major 1990, Mayer and Laudenslayer, 1988).

With the suppression of firs during the last century, openings in chaparral habitats have become filled with woody vegetation and the scrub canopy has become dense and impenetrable, preventing palatable new growth and resulting in large amounts of woody material. This material provides fuel, making occasional fires burn hotter than they would have historically. Hotter fires are considered more devastating to the plants and wildlife occurring in these habitats (Barbour and Major 1990).

Wildlife Composition and Characteristics: Much of the fauna occurring in the chaparral habitat consists of species similar to those of grasslands and woodlands. The majority of these animal species rely on its dense vegetation to provide cover, but are more likely to forage in nearby woodlands and grasslands, where palatable plant species and prey are more common and accessible (Mayer and Laudenslayer, 1988). These species include California quail (*Callipepla californica*), white-crowned sparrow (*Zonotrichia leucophrys*), mule deer, striped skunk (*Mephitis mephitis*) and spotted skunk (*Spilogale gracilis*). Several bird species also rely on the dense vegetation in chaparral to hide their nesting sites. Typical nest-hiding species include California quail, spotted towhee (*Pipilo erythrophthalmus*), rufous-crowned sparrows (*Aimophila ruficeps*), Bewick's wren (*Thryomanes bewickii*), wrentit (*Chamaea fasciata*), and Anna's hummingbird (*Calypte anna*). A few animal species, such

as the California thrasher (*Toxostoma redivivum*) and California whipsnake (*Masticophis lateralis*), rely strictly on the food and cover resources available in the chaparral habitat.

Chaparral is a habitat that was historically little utilized by humans until the development pressures of the past several decades. As adjacent grasslands and savannas became increasingly developed, several animal species that were once common in these habitats found refuge in chaparral areas. California horned lizard, greater roadrunner (*Geococcyx californianus*), and spotted skunk (*Spilogale gracilis*) are species that are nowadays generally associated with chaparral, although historical accountings associate them with the grassland and savanna foothills of Central California (Grinnell and Miller 1944; Stebbins 1954). With the significant alteration of California grasslands and savannas, many species from these habitats may now be limited to chaparral habitats.

Associated Special Status Animal Species: Five special status wildlife species are associated with chaparral habitat and are known to occur or have the potential to occur in the vicinity of the Unit (CDPR 1978b, Quinn *et al.* 1991, USFWS 2002, CNDDB 2003). These species are the following:

- California horned lizard - CSC - Horned lizards can be observed in open, sparsely vegetated openings in chaparral and along the edges of these habitats, usually in areas with sandy soils.

- Peregrine falcon (*Falco peregrinus anatum*) nesting - CSC - Falcons nest on cliff ledges. Chaparral vegetation often grows above and/or below steep rocky faces where ledges can be found.

- Prairie falcon (*Falco mexicana*) nesting - CSC - Falcons nest on cliff ledges. Chaparral vegetation often grows above and/or below steep rocky faces where ledges can be found.

- Bell's sage sparrow (*Amphispiza belli belli*) – CSC - This species is a summertime visitor or occasionally rear-round resident in chaparral habitat. It breeds in dense chaparral.

The Special Status Wildlife section – page AL-30 provides a more detailed discussion of all special status wildlife species that occur or could potentially occur in chaparral habitat. Table AL-2 lists all potentially occurring special status species and their listing status, describes their habitat requirements and provides their nearest known occurrences to the Unit.

Non-native Species: Non-native wildlife species likely to use chaparral habitats include most of the species listed for the grasslands/savanna habitat, but are most likely to include wild turkey and Virginia opossum.

Oak Woodland

General Description: Oak woodland habitat includes both blue oak series and interior live oak series (see Plant Life section). It does not include those areas of the blue oak series that can be classified as blue oak/annual grass association (Sawyer and Keeler-Wolf 1995).

The structural diversity and plant species composition of both oak woodland series results in a wide variety of food, cover, shelter and nesting habitats that support many wildlife species (Barbour and Major 1990, Mayer and Laudenslayer, 1988). In both woodland types, tree canopies can vary considerably, ranging from a relatively open canopy structure to a nearly continuous canopy. However, in general, woodland canopy covers at least 30 percent of the area (Sawyer/Keeler-Wolf, 1995). Where the upper canopy is dense, shrubs are often present and form a dense understory that prevents the development of anything more than a sparse ground cover. Where the upper canopy is more open, shrubs are less common and grasses dominate the groundcover. Scattered foothill pines (*Pinus sabiniana*) extend above the oak canopy in both open and closed woodlands. Figures AL-1a and AL-1b show the locations of oak woodland in the Unit.

Wildlife Composition and Characteristics: The trees in oak woodlands, combined with the shrub and herbaceous understory layers, produce a structurally diverse habitat, attractive to a larger suite of resident species than found in other terrestrial habitats in the Unit. The woodland vegetation provides extensive forage for herbivorous species, which, in turn, permits the development of an extensive and complicated food chain (Barbour and Major 1990).

Several wildlife species depend on woodland trees and shrubs for much of their habitat requirements. Some insect species, such as longhorn beetles (Cerambycids) bore into tree trunks to feed on pith and other interior tree parts. Other insect species, like underwing moths (*Catocala* sp.), hide in bark cavities. Several woodland and forest insectivores have specialized behaviors to locate insects in trees. Acorn woodpeckers (*Melanerpes formicivorus*) consume insects on and under the bark of trees, as do Nuttall's woodpecker (*Picoides nuttallii*). Western fence lizards, (*Sceloporus occidentalis*), brown creepers (*Certhia americana*) and white-breasted nuthatch (*Sitta carolinensis*) climb tree trunks searching for insects hidden in the bark.

Foothill pines are an important component of the oak woodland habitat for wildlife. Bald eagles and golden eagles us foothill pines as roosting sites. Herons and egrets use foothill pines as nesting sites in locations where oak woodlands occur in the vicinity of Folsom Lake and Lake Natoma.

Many insects, such as caterpillars and aphids, feed on the leaves, buds, and fluids of trees and shrubs. These herbivorous insects are, in turn, eaten by predacious insects such as lady bugs (*Hippodamia* sp.) and mantids. Birds that glean insects from foliage and branches include Hutton's vireo (*Vireo huttoni*), yellow-rumped warbler (*Dendroica coronata*), black-throated gray warbler (*Dendroica nigrescens*), and oak titmouse (*Baeolophus inornatus*). Western bluebird (*Sialia mexicana*) and American robin (*Turdus migratorius*) also forage for insects in woodland habitats during the nesting season.

The trees in the Unit's woodlands provide numerous nesting locations and perching sites for birds. Ash-throated flycatcher (*Myiarchus cinerascens*) and western scrub-jay (*Aphelocoma californica*) commonly use oak woodlands for perches, food, and nesting. Large trees provide nesting sites for golden eagle and red-tailed hawk, which require the height of tall trees to protect their nests. Holes and other openings in trees provide nest locations for cavity nesters such as western bluebird, American kestrel (*Falco sparverius*) and screech owl (*Otus kennicottii*). Acorn woodpeckers nest within cavities in the dead wood of live or dead trees (Zeiner *et al.* 1990a).

Oak mast (acorns) is an important food source for many wildlife species including acorn woodpecker and band-tailed pigeon (*Columba fasciata*). Acorn woodpeckers use live and dead trees for granaries. Common woodland seed eating birds include California towhee (*Pipilo crissalis*), spotted towhee (*Pipilo maculatus*), and house finch (*Carpodacus mexicanus*). Western gray squirrel (*Sciurus griseus*) and mule deer also consume oak mast in large quantities.

The tree and shrub canopies of oak woodlands slow the rate of evaporation by protecting soil moisture from the effects of the sun (Barbour and Major 1990). This permits wildlife species with higher moisture demands to survive in otherwise xeric conditions. For example, several salamander species that occur in the Unit, such as ensatina (*Ensatina eschscholtzii*), California newt (*Taricha torosa*) and slender salamander (*Batrachoseps attenuatus*), require the cooler, shaded conditions available in woodlands and forests.

The dense vegetation in oak woodlands provides concealment for predators. Large predators such as mountain lion (*Felis concolor*) and bobcat (*Felis rufus*) are able to conceal themselves behind trees or in the shadows of vegetation as they hunt. Raptors such as Cooper's hawk, red-tailed hawk, and western screech owl fly over and forage in woodland habitat, and nest in woodland trees. Great horned owl (*Bubo virginianus*) will make low, rapid flights from tree perches to capture rabbits, rodents and other prey that inhabit the woodland habitat (Zeiner *et al.* 1990a).

Associated Special Status Animal Species: Five special status wildlife species are associated with woodland habitat and are known to occur or have the potential to occur in the vicinity of the Unit (CDPR 1978b, Quinn *et al.* 1991, USFWS 2002, CNDDB 2003). These species are the following:

- Valley elderberry longhorn beetle - FT - This beetle may live in elderberry shrubs growing within oak woodlands or at the edges of woodlands along stream courses.

- Golden eagle - nesting - CSC - Golden eagles will build large stick nest platforms in very tall woodland trees.

- Bald eagle (*Haliaeetus leucocephalus*) – FT/FPD,[4] SE[5] - Bald eagles will perch and occasionally nest in tall woodland trees located near large waterbodies.

- Sharp-shinned hawk - nesting - CSC - Sharp shinned hawks will nest in woodland trees.

- Cooper's hawk (*Accipiter cooperii*) nesting - CSC - Cooper's hawks will nest in trees located in dense woodland vegetation.

- Long-eared owl (*Asio otus*) nesting - CSC – Long-eared owls have been observed in the fall and winter in dense woodlands in the vicinity of Avery's Pond and in the Peninsula.

The Special Status Wildlife section – page AL-30 provides a more detailed discussion of all special status wildlife species that occur or could potentially occur in oak woodland habitat.

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[4] FPD = Proposed for federal de-listing.
[5] SE = Species listed as endangered by the State of California.

Table AL-2 lists all potentially occurring special status species and their listing status, describes their habitat requirements and provides their nearest known occurrences to the Unit.

Non-native Species: A few introduced animal species are observed in woodlands. Non-native animals frequently observed in oak woodlands include the wild turkey and the Virginia opossum.

Riparian Woodlands

General Description: Within the Unit, riparian woodland habitat consists of Fremont cottonwood series and mixed willow series (see Plant Life section). Riparian woodlands occur along river, stream, and creek courses where the presence of water keeps soils moist for longer period than in the adjacent grassland, woodland or savanna habitats. The moist soils and the presence of a higher ground water table support plant and tree species different from those in the adjacent drier habitats. Riparian trees and shrubs are more tolerant of, or require, the longer periods of saturated soil conditions that occur along perennial or intermittent water features, and often have the ability to extend their roots for several feet downward to reach the dry season water table (Warner and Hendrix, 1984).

Within the Unit, the general appearance of riparian vegetation is in many ways similar to dense oak woodlands. Both vegetation types have extensive tree canopies and zones of dense understory growth. However, the plant composition of these two woodlands is different. Willow riparian habitat is dominated by dense patches of willow trees (*Salix* sp.) less than 30 feet (10 meters) in height. It supports a dense understory in locations where the smaller willow trees form dense thickets, and a sparse understory where more mature willow trees are found. In contrast, cottonwood riparian woodland is characterized by cottonwood trees that are up to 90 feet (30 meters) high and more widely spaced, forming an understory that can be dense or open underneath. Figures AL-1a and AL-1b show the location of riparian woodland in the Unit.

Many of the riparian habitat areas in the Unit have been disturbed and fragmented by roads and other infrastructure. This disturbance has facilitated the introduction of invasive exotic plant species, particularly Himalayan berry (*Rubus discolor*) which out-compete native species and form very dense thickets in the understory. These dense thickets may alter the riparian habitat in ways that affect its associated animal species. In particular, these thickets may inhibit or prevent access to water by larger animals (Warner and Hendrix, 1984).

Wildlife Composition and Characteristics: The structural diversity of riparian tree canopy, understory and groundstory and the availability of forage support wildlife assemblages similar to those of woodlands and forests (Mayer and Laudenslayer, 1988). Both habitat types provide similar food, shelter, cover, and nesting opportunities. However, an important difference between the oak woodlands and the riparian woodlands is the composition of insects. The softer cottonwoods and willows support different herbivorous and tree dependent insect species than the drier oak woodlands (Warner and Hendrix, 1984). Insect diversity, the moderately dense understory vegetation and the presence of a relatively mature canopy provide cover, roosting, foraging, and nesting for a variety of resident and migratory avifauna.

Insectivorous migratory birds take advantage of riparian feeding and nesting opportunities in the spring and fall. Species such as western kingbird, common yellowthroat (*Geothypis trichas*), blue-gray gnatcatcher (*Polioptila caerulea*) and tree swallow (*Tachycineta bicolor*) nest in riparian woodlands. The riparian woodland habitat also provides numerous feeding opportunities for birds that glean insects from foliage and branches. Bird species include Hutton's vireo (*Vireo huttoni*), yellow-rumped warbler (*Dendroica coronata*), and black-throated gray warbler (*Dendroica nigrescens*). Many common seed and insect-eating bird species are likely to use the riparian area on a year-round basis, including species such as lark sparrow (*Chondestes grammacus*), song sparrow, California towhee, spotted towhee, and house finch.

Several animal species, such as the red-shouldered hawk (*Buteo lineatus*) and the dusky-footed woodrat (*Neotoma fuscipes*), are adapted to live in the denser canopies and willow thickets of the riparian habitat. Yellow-breasted chat (*Icteria virens*) nests and feeds in dense riparian thickets. Within the Unit, they particularly frequent riparian areas with dense stands of Himalyan blackberry (Rodi Lee *pers. com*.). In locations where riparian woodlands pass through grassland or savanna habitats, the dense vegetation and taller riparian trees provide the only suitable retreat habitat for species such as mule deer and gray fox (*Urocyon cinereoargenteus*).

Raptors will forage over and in riparian woodland habitat. Common raptor species found in riparian woodlands include red-tailed hawk, Cooper's hawk and sharp-shinned hawk. Red-tailed hawk and red-shouldered hawk commonly nest in riparian habitat (Zeiner *et al.* 1990a).

Associated Special Status Animal Species: Nine special status wildlife species are associated with riparian habitat and are known to occur or have the potential to occur in the vicinity of the Unit (CDPR 1978b, Quinn *et al.* 1991, USFWS 2002, CNDDB 2003). These species are the following:

- Valley elderberry longhorn beetle - FT - This beetle may live in elderberry shrubs that are a common component of riparian woodlands.

- California red-legged frog (*Rana aurora draytonii*) - FT, CSC - Red-legged frogs use perennial and intermittent water features. They will also use riparian woodlands areas adjacent to such features for dispersal and movement.

- Western pond turtle (*Clemmys marmorata*) - CSC - Pond turtles reside in perennial and intermittent water features using adjacent riparian woodlands for nesting.

- Golden eagle - nesting - CSC - Golden eagles will build large stick nest platforms in very tall trees in riparian woodlands.

- Bald eagle - FPD, SE - Bald eagles will perch and occasionally nest in tall riparian woodland trees near located near large waterbodies.

- Sharp-shinned hawk - nesting - CSC - Sharp shinned hawks will nest in riparian woodland trees.

- Cooper's hawk - nesting - CSC - Cooper's hawks will nest in trees located in dense riparian woodland vegetation.

- Willow flycatcher (*Empidonax traillii*) nesting – FE, SE - This species migrates through the area in the spring and fall and has been observed in riparian habitats in the Unit (J. Webb *pers. com*.). The State of California lists all subspecies of willow flycatcher as endangered (E. *traillii brewsteri*, E. *traillii extimus*). The Federal listing is only for Southwestern willow flycatcher subspecies (E. *traillii extimus)*.

- Yellow warbler (*Dendroica petechia*) nesting - CSC - Yellow warbler will forage and nest in willow thickets and dense riparian brush.

- Yellow-breasted chat (*Icteria virens*) nesting - CSC - Yellow-breasted chats forage and nest in willow thickets and dense riparian brush, particularly where stands of Himalayan blackberry are found.

The Special Status Wildlife section – page AL-30 provides a more detailed discussion of all special status wildlife species that occur or could potentially occur in riparian woodland habitat. Table AL-2 lists all potentially occurring special status species and their listing status, describes their habitat requirements and provides their nearest known occurrences to the Unit.

Non-native Species: Introduced animal species observed in riparian woodlands are similar to those observed in oak woodlands. These species include bullfrog (*Rana catesbeiana*), wild turkey, and the Virginia opossum.

Lake Shoreline Drawdown Zone and Ruderal/Barren Habitat

General Description: As described in the Plant Life section, ruderal (disturbed, weedy) and barren areas are common in the Unit. Ruderal and barren habitat is most prominent along the Folsom Lake shoreline in the lake drawdown zone situated between ordinary high water elevation (466 feet NGVD) and annual mean low water. Following the recession of lake waters, the shoreline zone is seasonally vegetated with a mix of ruderal and grassland species, and has occasional patches of seasonal wetland and woody riparian vegetation, as well as large areas that remain mostly barren. Figures AL-1a and AL-1b depict the locations of ruderal and barren habitat in the Unit.

Ruderal/barren areas also occur along roadsides and boat-launch aprons, in camping and picnic areas, and other areas where human activity has compacted the soil or otherwise heavily impacted the vegetation. Areas of the Unit that have been converted to turf and lawn are also considered a part of this habitat (*e.g*., irrigated and mowed turf at Beal's Point, Negro Bar and Nimbus Flat).

Ruderal areas associated with park facilities and other terrestrial zones of disturbance are dominated by a mix of annual grassland and weedy plant species that often include extensive stands of invasive exotic plants such as yellow starthistle (*Centaurea solstitialis*), Italian thistle (*Carduus pycnocephalus*) and white sweet clover (*Melilotus albus*).

Wildlife Composition and Characteristics: Animals that use ruderal and barren areas are species associated with open habitats, such as grasslands and oak savannas. Several species of birds, such as rock wren (*Salpinctes obsoletus*) and rufous-crowned sparrow (*Aimophila*

ruficeps) are commonly seen foraging in these areas. Ground squirrels will commonly burrow into exposed soils of ruderal/barren areas. Shorebirds such as western sandpiper (*Calidris mauri*), spotted sandpiper (*Actitis macularia*) and killdeer (*Charadrius vociferus*) will forage in the shallow water along the barren shoreline. Rock wren (*Salpinctes obsoletus*) and killdeer nest in the drawdown zones around Folsom Lake (Sally Walters *pers. com.*). Canada geese (*Branta canadaensis*) commonly forage within areas of turf and lawn.

Larger mammals such as mule deer, mountain lion and black bear (*Ursus americanus*) have been observed using ruderal and barren habitat as movement corridors (Sally Walters *pers. com*). The Folsom Lake shoreline zone is the most significant example of this corridor function in the Unit. Along the western, southern and southeastern sides of the lake, shoreline movement corridors interconnect several oak woodland, grassland and riparian woodland habitats that are separated from one another by residential subdivisions (see Figures AL-2a and AL-2b). When lake waters are at or above ordinary high water elevation (usually late-winter until mid-late-spring), terrestrial connections between these habitats are few or none. The habitat areas remain isolated until Folsom Lake water levels recede, allowing for wildlife to resume movement along the exposed lake shoreline zones. (See the Wildlife Corridor section below for further discussion).

Associated Special Status Animal Species: In general, ruderal and barren areas are unlikely to provide habitat used by any of the special status species considered in the Unit area (CDPR 1978b, Quinn *et al.* 1991, USFWS 2002, CNDDB 2003). However, occasional elderberry shrubs are found at the landward limits of the shoreline in some locations. These provide potential habitat for Valley elderberry longhorn beetle, a federal Threatened species.

Non-native Species: Virginia opossum are likely to use barren and ruderal habitats.

Animal Life Associated with Existing Structures

General Description: Various buildings, dams, water control facilities, bridges and related facilities have been constructed within the boundaries of the Unit, both prior to and after the impoundment of the lakes. The lands surrounding these structures were often heavily disturbed during construction. After construction, surrounding lands have been actively maintained through continued maintenance and landscaping, or abandoned, allowing weedy vegetation to grow. These surrounding areas function as ruderal/disturbed habitats, as described above. The structures themselves may provide refuge for animal species that have adapted to survival in man-made landscapes and/or require the dark, cave-like recesses of bridges and abandoned buildings. In particular, attics, basements, undersides of eaves and bridges, and wall seams of buildings and other structures provide such habitat.

Wildlife Composition and Characteristics: Some wildlife species use man-made structures during the day to hide from detection. In heavily developed areas, these include species such as striped skunk, raccoon (*Procyon lotor*) and rock dove (*Columba livia*) that forage on human associated refuse, usually after dark when human disturbance is at a minimum. Other species, such as Brazilian free-tailed bats (*Tadarida brasilensis*), myotis bats (*Myotis* spp.), cliff swallows (*Petrochelidon pyrrhonota*), and deer mice, use man-made structures as refugia only when these structures are located well away from human activity for at least part

of the day. The historic Folsom Powerhouse and surrounding structures are known to provide such habitat.

Associated Special Status Animal Species: The following special status wildlife species are associated with man-made structures in the Unit (S. Walters *pers. com.*):

- Pallid bat (*Antrozous pallidus*) - CSC - Pallid bats will roost under bridges, in attic spaces, and within abandoned buildings as well as in other structures, and in tree hollows. It may be one of the bat species using the Folsom Powerhouse.

- Townsend's Western Big-eared Bat (*Corynorhinus townsendii*) - CSC - This bat species roosts in caves, buildings and other structures and may be found in the Folsom Powerhouse.

Non-native Species: Non-native species that are frequently associated with structures include Argentine ants (*Lipepithema humile*), starling (*Sternus vulgaris*), rock dove (*Columba livia*) and Virginia opossum.

Aquatic Habitats

Animal species occurring in aquatic habitats are usually dependent on water for all their life processes or for significant portions of their life histories (Hickman *et al.* 1990). These include fully aquatic species such as fish and crustaceans, as well as terrestrial animal species, such as pond turtles and waterfowl that require water for major portions of their life histories, such as feeding and refuge. Aquatic habitats are categorized into five major habitat types based on hydrology and vegetation, as summarized below:

- *Lake Habitat* – An artificially derived aquatic habitat resulting from impoundments of the American River to form Folsom Lake and Lake Natoma. This habitat is fully aquatic and has no related terrestrial vegetation community.

- *Pond Habitat* – An artificially derived aquatic habitat resulting from the impoundment of small creeks or drainages, and/or from mining activities. This habitat is also largely aquatic but may have freshwater marsh vegetation in its shallow shoreline littoral zone.

- *Creek and Stream Habitat* – A natural aquatic habitat that flows ephemerally, intermittently or perennially within a defined channel having a bed and bank. This habitat is largely aquatic but may have seasonal wetlands, freshwater marsh and/or riparian woodland vegetation types growing within or along its bed and banks.

- *Freshwater Marsh Habitat* – An aquatic habitat that occurs naturally along the margins of water features such as ponds and creeks. This habitat consists of the freshwater marsh vegetation community type described in the Plant Life section.

- *Seasonal Wetland Habitat* – A natural aquatic habitat consisting of the seasonal wetland, claypan vernal pool and northern hardpan vernal pool vegetation communities types described in the Plant Life section.

The following subsections summarize habitat characteristics and typical wildlife species in each of the five aquatic habitats in the Unit. Fish species are also discussed for all aquatic habitat types except the two lakes. A separate Fisheries Section, provided later in this document, deals with fish in Lake Natoma, Folsom Lake and the lower American River. Additionally, Table AL-1 provides a matrix listing all observed or potentially occurring wildlife species by habitat type in the Unit.

Lakes

General Description: Lake Natoma and Folsom Lake are artificial impoundments formed by the placement of dams across the American River. The resulting reservoirs consist of large expanses of open water habitat with aquatic and emergent vegetation and riparian woodland habitat growing along their edges in some shallow locations. Folsom Lake and Lake Natoma are large aquatic ecosystems that annually produce large numbers of aquatic insects and micro-invertebrates. This productivity supports an extensive aquatic fishery as well as large seasonal congregations of migratory water birds.

Wildlife Composition and Characteristics: The open water provides habitat for a number of waterfowl and shorebirds. Flocks containing hundreds or even thousands of ducks and geese, such as pintail (*Anas acuta*), canvasback (*Aythya valisineria*), and green-winged teal (*Anas crecca*) travelling along the Pacific flyway during spring and fall migrations will rest and feed on the lakes. Several species will over winter on the lakes. While thousands of Canada geese (*Branta canadensis*) and mallards (*Anas platyrhynchos*) stopover on the lakes during migration a few individuals will stay to reside on the lakes all year. The lakes also serve as habitat for oceanic species that move inland, such as white pelican (*Pelecanus erythrorhynchos*) and lesser scaup (*Aythya affinis*), and provide temporary refuge for accidental species such as black scoter (*Melanitta nigra*) and common tern (*Sterna hirundo*) (Audubon Society, 2003).

Audubon Society Christmas bird count data between the period 1990-2000 indicate the importance of the Unit to waterfowl along the Pacific flyway (Table AL-3). For example, a yearly average of 2,221 Canada geese, 1,085 mallards, and 686 northern pintails were observed in the Unit or in its vicinity during this period. Similarly, large numbers of shorebirds are observed in the vicinity of the two lakes. Christmas bird count data between 1990-2000 show an average of 4,892 California gulls (with as many as 27,000 gulls observed in a single year - 1996) and 854 herring gulls. Between 60,000 and 100,000 water birds have been observed roosting on Folsom Lake at night (Bruce Webb *pers. com.*).

Associated Special Status Animal Species: Three special status wildlife species are associated with the open water habitat of lakes and are known to occur or have the potential to occur in the vicinity of Lake Natoma and Folsom Lake (CDPR 1978b, Quinn *et al.* 1991, USFWS 2002, CNDDB 2003). These species are the following:

- Western pond turtle - CSC - Pond turtles reside in perennial and intermittent water features using adjacent upland areas for nesting. They may move into the lakes' shallower water areas particularly adjacent to creeks and ponds.

- Bald eagle - FPD, SE - Bald eagles will perch in tall trees located near large waterbodies such as lakes and will forage over the waterbodies.

- Osprey (*Pandion haliaetus*) nesting - CSC - Ospreys will nest in snags and trees near located near or in large waterbodies such as lakes and will forage over the waterbodies.

- Greater sandhill crane (*Grus canadensis*) winering, nesting - ST – Sandill cranes have been observed flying over Folsom Lake in the spring and fall (S. Walters *pers. com.*)

The Special Status Wildlife section – page AL_30 provides a more detailed discussion of all special status wildlife species that occur or could potentially occur in lake habitat. Table AL-2 lists all potentially occurring special status species and their listing status, describes their habitat requirements and provides their nearest known occurrences to the Unit.

Non-native Species: Many of the fish in the lakes, such as sunfish (*Lepomis* spp.), bass (*Micropterus* spp.) and catfish (*Ictalurus* spp.), are introduced species (see Fisheries Section). Other introduced animal species in the lake include red-swamp crayfish (*Procambarus clarkii*), bullfrog, red-eared slider (*Trachemys scripta*), and muskrat (*Ondatra zibethicus*).

Creeks and Streams

General Description: Creeks and streams consist of naturally-occurring water courses that are direct and/or indirect tributaries of Folsom Lake and Lake Natoma. They are characterized by having discernable beds and banks that have been formed by the flow of surface waters. Various reaches of creeks and streams in the Unit are associated with one of more of the following vegetation community types described in the Plant Life section: riparian woodland, freshwater marsh and seasonal wetlands.

As shown in Figures AL-1a and AL-1b, eight perennial creeks and 22 intermittent/ephemeral streams flow into Folsom Lake.[6] Three additional perennial/intermittent creeks enter Lake Natoma. An unknown number of small ephemeral streams (widths of 1-2 feet between the tops of banks) are likely tributaries to the mapped creeks and streams.

Intermittent streams provide zones of seasonally wet habitat (*i.e.*, "seasonal hydration habitat") that can provide water, forage, cover and movement corridors for both terrestrial and aquatic species. Intermittent streams typically begin drying toward the end of each year's rainy season and are usually dry by early/mid-summer. Along some intermittent stream reaches, zones of extended soil saturation and/or seasonal pools are found. These zones support freshwater marsh and/or seasonal wetland habitat types (see discussions below).

Ephemeral streams typically commence drying following the end of each storm event and do not contain seasonal pools. Therefore, they do not provide appreciable habitat for aquatic animals.

Perennial creeks contain water throughout the year. The presence of water in these features results in the development of wholly aquatic communities that support sparse to dense cover of aquatic and wetland plant species. Additionally, most perennial creeks systems support

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[6] Perennial creeks or streams flow year-round. Intermittent streams flow seasonally and may be supported by both surface runoff and ground water inflows. Ephemeral streams flow only for brief periods (a few days to a few weeks) following storms and are supported only by surface runoff.

riparian woodland habitat along their banks and occasionally emergent plant species such as cattail (*Typha* sp.) growing along their edges.

The construction of the Folsom and Nimbus Dams dramatically altered creek and stream habitat. Prior to the impoundment of the American River by Folsom Dam, creeks and streams were tributaries of the free-flowing American River. Aquatic species associated with the natural river system (*e.g*., native ranid frogs, California red-legged frog and foothill yellow-legged frog - *Rana boylii*) could also readily utilize the tributary creeks and streams. Similarly, creek and stream fauna could migrate through the river to other creek and stream habitat up- and downstream. Numerous native fish species, such as California roach (*Lavinia symmetricus*) and hardhead (M*ylopharodon conocephalu*s), likely occurred in the interconnected riverine and creek/stream systems. Anadramous fish, such as steelhead (*Oncorhynchus mykiss*), were able to move from the river into the creeks to spawn.

The two dams have eliminated or greatly reduced this habitat interconnectivity by replacing the free flowing riverine system with an artificial lake system containing major movement barriers. Many of the native animal species that were adapted to the free flowing river system are not adapted to the conditions caused by the impoundments. The dams act as movement barriers by preventing animals from moving up- and downstream. The lakes also act as movement barriers by preventing aquatic animals in the now isolated creeks behind the dams from reaching other creeks. The dams prevent movement of anadromous fish returning from the ocean to spawn. The artificial lakes also provide habitat for numerous introduced species such as bullfrogs and sunfish that will feed on the native creek and river fauna. Populations of native aquatic species remaining in the Unit's creeks are now likely isolated from each other and faunal movement is restricted by the lack of a riverine connection.

Wildlife Composition and Characteristics: Aquatic animals naturally occurring in the Unit's creeks and streams are species that can survive extreme fluctuations in water levels and currents during the year. The wet winter/dry summer cycle creates a situation of heavy high water flows during the winter and minimal to no flows during the summer and early fall, leaving drying isolated pools in many streambeds.

Creeks and stream pools in the Unit support an extensive aquatic invertebrate fauna that includes the aquatic life stages of both insects and amphibians. Numerous microscopic species serve as food for microscopic predators such as copepods (subclass C*opepoda*) and rotifers (phylum *Rotifera*), which form the food base for aquatic insects, such as water boatman (family *Corixidae*) and damselfly larvae (family *Coenagrionidae*). Aquatic insects, as well as nematodes (phylum *Nematoda*) and annelid worms (phylum *Annelida*) are, in turn, the prey base for frogs, turtles, and fish.

Many native fish species, such as California roach and Sacramento sucker (*Catostoma occidentalis*), that occur in the Unit's creeks can also survive in the small pools of intermittent streams. As the intermittent stream dry, the fish manage to survive the dry season by living in residual pools and then reproducing explosively during the spring. Non-native fish, such as sunfish (*Lepomis* sp.) and golden shinner (*Notemigonus crysoleucas*), introduced into the reservoirs, will occasionally move up creeks where they compete with native fish for insects and crustaceans. Native frogs (*e.g*., California red-legged frog and foothill yellow-legged frog) that are unlikely to occur in Folsom Lake and Lake Natoma, still occur in creeks and streams where they are able to successfully compete with non-native

species. Species such as the western pond turtle, have adapted to small residual pools during the dry months and can survive without any surface water for some time.

Creeks are also important to terrestrial species, providing a source of drinkable water throughout the year. This role as a reliable drinking water source played a more important function historically before the impoundment of ponds and lakes.

Native fish appear to be rare or absent in the perennial creeks of the Unit, while introduced fish such as sunfish, bass and catfish now predominate. Based on observations by LSA biologists, native ranid frogs also appear to have been extirpated and replaced in some creeks by the non-native bullfrog. During LSA site visits, only two creeks, Pilot Creek and Hancock Creek, appear to be dominated by native fish species. Nimbus Dam prevents the upstream movement of anadramous fish such as steelhead trout and Chinook salmon (*Oncorhynchus tshawytscha*) returning from the ocean to spawn.

Associated Special Status Animal Species: Three special status wildlife species are associated with creek and stream habitat and are known to occur or have the potential to occur in the vicinity of the Unit (CDPR 1978b, Quinn *et al.* 1991, USFWS 2002, CNDDB 2003). These species are the following:

- California red-legged frog – FT, CSC – Red-legged frogs use perennial and intermittent water features for breeding, rearing, foraging and cover.

- Foothill yellow-legged frog – CSC – Foothill yellow-legged frogs occur in long lived intermittent and perennial creeks and rivers with cobble and gravel bars.

- Western pond turtle – CSC – Pond turtles reside perennial and intermittent water features and use adjacent upland areas for nesting.

The Special Status Wildlife section – page AL-30 provides a more detailed discussion of all special status wildlife species that occur or could potentially occur in creek and stream habitat. Table AL-2 lists all potentially occurring special status species and their listing status, describes their habitat requirements and provides their nearest known occurrences to the Unit.

Non-native Species: Introduced animal species observed in creeks include red-swamp crayfish (*Procambaris clarki*), sunfish, (*Lepomis* sp.), bass (*Macropteris* sp.), catfish (*Ictalurus* sp.), bullfrog, red-eared slider, and muskrat. Muskrats are native to the lower Colorado River and the northeastern parts of California but were introduced by humans to areas west of the Sierra (Verner and Boss 1980).

Ponds

General Description: Ponds are small impoundments of water that are deep enough to provide open-water aquatic habitat. The edges of ponds may support the freshwater marsh vegetation type, as described in the Plant Life section. No naturally occurring ponds exist in the Unit. However, numerous small ponds have been constructed at Mississipi Bar for dredge tailing purposes. Avery's Pond is an approximate 2-3 acre pond adjacent to the northwest shoreline of Folsom Lake that may have been constructed as part of an unfinished canal in association with a PG& E Powerplant (B. Deason *pers. com.*). An additional small

pond is located just outside the Unit boundary at the end of the Los Lagos Trail. Figures AL-1a and AL-1b show the locations of ponds in the Unit.

The ponds in the Unit are all under ten feet in depth and most support an extensive growth of aquatic vegetation such as yellow pondweed (*Ludwigia peploides*), waterweed (*Elodea* sp.), and smartweed (*Polygonum* sp.). These aquatic plants provide cover, nesting and foraging habitat for the aquatic fauna occurring in ponds.

Wildlife Composition and Characteristics: Animal species currently residing in and along ponds are largely introduced species and aquatic natives that historically occurred in slack water conditions of creeks and freshwater marshes. Aquatic insects and their larvae feed on micro-invertebrates and vegetation and provide a food base for the other animals occurring in and along ponds.

Avery's Pond, located at Rattlesnake Bar, has been stocked with catfish, sunfish, and bass, all of which are non-native species. Other non-native species introduced into ponds include the red swamp crayfish, bullfrog, and mosquito fish (*Gambusia affinis*). Native species, including western pond turtles and waterfowl such as mallards, will move from creek systems into Unit ponds. Terrestrial birds and mammals will come to open water areas to drink.

Associated Special Status Animal Species: Two special status wildlife species are associated with pond habitat and are known to occur or have the potential to occur in the vicinity of the Unit (CDPR 1978b, Quinn *et al.* 1991, USFWS 2002, CNDDB 2003). These species are the following:

- California red-legged frog – FT, CSC – Red-legged frogs use ponds for breeding, rearing, foraging and cover and will also use the upland areas adjacent to such features.

- Western pond turtle – CSC – Pond turtles reside in ponds and use the adjacent upland areas for nesting. This species is regularly observed in Avery's Pond (David Muth *pers. obs.*).

The Special Status Wildlife section – page AL-30 provides a more detailed discussion of special status wildlife species that occur or could potentially occur in pond habitat. Table AL-2 lists all potentially occurring special status species and their listing status, describes their habitat requirements and provides their nearest known occurrences to the Unit.

Non-native Species: Introduced animal species observed in ponds include red-swamp crayfish, mosquito fish, sunfish, bass, catfish, bullfrog, red-eared slider, and muskrat.

Freshwater Marsh

General Description: Within the Unit, this habitat type is composed of the freshwater marsh vegetation community type, as described in the Plant Life section. Freshwater marsh habitat can be found in the Mormon Island Wetland Preserve, along the edges of Avery's Pond, in tailings ponds in Mississippi Bar and along the edges of various creeks (see Figures AL-1a and AL-1b). Freshwater marsh forms in locations where water is shallow enough to support stands of perennial, emergent marsh vegetation such as cattail and bulrush (*Scirpus* spp.). Along its edges, dense stands of shorter-statured marsh plants are found, while the interiors

may be broken by zones of open water that are often choked with smartweed and floating pond weeds.

Wildlife Composition and Characteristics: With the unique combination of land, shallow water, and dense vegetation, freshwater marsh provides habitat for many species of wildlife. The water in marsh habitats supports the micro-invertebrates that serve as the food base for most aquatic food chains while the presence of extensive vegetation supports many of the herbivorous species that begin the terrestrial food chain. The dense marsh vegetation provides cover and nesting habitat.

Most species that utilize freshwater marshes require water for part of their life cycles. Dragonflies and damselflies lay their eggs in water so their nymphs can feed on aquatic invertebrates until they are ready to metamorphose into aerial predators. Frogs such as Pacific treefrogs (*Pseudacris [= Hyla] regilla*) and western toad (*Bufo boreas*) lay eggs in water so their larvae can feed on micro-invertebrates and algae. These larvae become terrestrial predators after metamorphosis. Most ducks are terrestrial species that spend a majority of their life on or in the water where they find cover and food. Puddle or "dabbling" ducks (*e.g*. gadwall, northern pintail, green- and blue-winged teal, wigeon, and northern shoveler, mallard) feed largely on aquatic invertebrates and aquatic plants. Common garter snakes (*Thamnophis sirtalis*) crawl unnoticed through downed emergent vegetation feeding on frogs and fish.

Several species of birds, including American bittern (*Botaurus lentiginosus*) marsh wren (*Cistothorus palustris*), and red-winged blackbird (*Agelaius phoeniceus*), nest only in the dense vegetation of emergent marsh.

Associated Special Status Animal Species: Five special status wildlife species are associated with marsh habitat and are known to occur or have the potential to occur in the vicinity of the Unit (CDPR 1978b, Quinn *et al.* 1991, USFWS 2002, CNDDB 2003). These species are the following:

- California red-legged frog – FT, CSC – Red-legged frogs use marsh habitat for breeding, rearing, foraging and cover. They will also use the upland areas adjacent to such features.

- Western pond turtle – CSC – Pond turtles occur in marsh habitats, using adjacent upland areas for nesting.

- Tricolor blackbird (*Agelaius tricolor*)– CSC – Tricolor blackbird will nest and forage in the dense emergent vegetation of freshwater marshes.

- Northern harrier - nesting - CSC - Harriers will often nest at the edges of marshes and will forage over marsh habitats.

- White-tailed kite - FP - This kite species will nest in trees and tall shrubs at the edges of marsh habitat and will forage over the marsh.

The Special Status Wildlife section – page AL-30 provides a more detailed discussion of special status wildlife species that occur or could potentially occur in freshwater marsh habitat. Table AL-2 lists all potentially occurring special status species and their listing

status, describes their habitat requirements and provides their nearest known occurrences to the Unit.

Non-native Species: Introduced animal species observed in freshwater marshes include red-swamp crayfish, bullfrog, red-eared slider, muskrat and Virginia opossum.

Seasonal Wetlands and Vernal Pools

General Description: This habitat includes the seasonal wetlands and vernal pools vegetation community types described in the Plant Life section. These wetland features accumulate surface water during the rainy season, but are typically dry most of the year. In the Unit, they occur along various intermittent streams and in various other locations, such as the Mormon Island Wetland Preserve and the Snipes Pershing Preserve, where soil and topographic conditions allow water to seasonally accumulate (Figures AL-1a and AL-1b).

Seasonal wetlands provide limited habitat for most fauna (Bouder *et al.* 1998). When seasonal wetlands are hydrated (several months), they provide forage for terrestrial fauna. During the briefer periods that seasonal wetland have surface waters (usually 1-3 months), they provide a water source for wildlife and limited habitat for aquatic invertebrates. Seasonal wetlands that persist into the early summer can be particularly valuable habitat features, providing green forage in the midst of a surrounding desiccated landscape. Some species of invertebrates and amphibians have become well-adapted to these seasonal extremes, and are typically associated with vernal pool habitats. Most species of terrestrial animal use seasonal wetlands as watering sites. Grazing herbivores may feed on the vegetation in vernal pools in late spring as the upland vegetation dries up.

Wildlife Composition and Characteristics: Because seasonal wetlands typically do not contain fish, several amphibians, such as western spadefoot and Pacific treefrog, as well as several insect species with aquatic larval stages such as predaceous diving beetles (Dyticid), use vernal pools for egg laying and larval habitat. Herbivores, such as mule deer and California vole that feed on grassland forage will take advantage of the greener vegetation growing in seasonal wetlands as the grass and other forage in upland areas dries and becomes less palatable.

A few species of crustacean such as fairy shrimp (Order *Anostraca*) and the copepod *Diaptomis* spp. have become specialized to survive the extreme conditions in seasonal wetland habitat, primarily vernal pools. These species have an accelerated life cycle that is completed within the short period of time water persists in the pools. These vernal pool endemics lay encysted eggs that can survive the hot, dry summer by lying in the dried clay soil at the bottoms of vernal pools. Several species of solitary bees, such as *Diandrena blennospermatis*, that excavate burrows along the edge of vernal pools, are specialized to pollinate only vernal pool flowers during their blooming periods.

Associated Special Status Animal Species: Two special status wildlife species are associated with seasonal wetland habitat are known to occur or have the potential to occur in the vicinity of the Unit (CDPR 1978b, Quinn *et al.* 1991, USFWS 2002, CNDDB 2003). These species are the following:

- Vernal pool fairy shrimp (*Branchinecta lynchi*) - FT - This shrimp species usually occurs in vernal pools for the first six to eight weeks after the pools fill.

- Western spadefoot toad - CSC - This species will breed in vernal pools and other seasonal water features. The adults live in the surrounding grasslands.

Non-native Species: The same non-native species that use freshwater marsh may use seasonal wetland habitat during the periods when surface water is present.

Historical Influences on Animal Life

Human activities have significantly modified California's native ecosystems over the past 150 years (Wilson, 1988; Ricklefs and Schluter, 1993). Land-altering activities such as farming, grazing, mining, drainage, damming rivers, road building, introductions of non-native biota, residential development and urbanization have fundamentally changed the state's native landscape. The history of human activities in and around the Unit mirrors the greater California experience (see *Cultural Resources* Section). All of the land-altering activities mentioned above have taken place in or around the Unit and have almost certainly caused fundamental changes to the Units's native ecosystems. The specific effects of these changes on the wildlife species in the Unit have not been documented. Nevertheless, the probable impacts can be reasonably conjectured based on the greater California experience and general pattern of such changes on the types of habitat present in the Unit (Wilson, 1988; Ricklefs and Schluter, 1993).

Humans have caused significant changes to the structure and composition of vegetation communities in the Unit. These changes have also significantly altered the habitat characteristic of these communities (Barbour and Major 1977; Wagner 1989). For example, changes in the fire regime of chaparral areas in the Unit have reduced their utility as foraging habitat (see discussion in Plant Life section). Similarly, long-term changes in the composition and structure of native grasslands have fundamentally altered the grassland food chain. Introduction of livestock to California was accompanied by the introduction of European annual grasses and forbs, resulting in a rapid conversion of native perennial grasslands and oak savanna understory to mostly annual grasses and forbs of European origin (Heady *et. al.* 1991; Edwards 1992, Kinney 1996). Disturbance associated with livestock aided the invasion and helped maintain suitable conditions for persistence of the non-native opportunist plants (McClintock 1987). These changes made grasslands, such as those in the Unit, less suitable foraging habitat for native fauna such as deer and rodents (Lidisker 1989, Wagner 1989).

Changes to grassland probably depleted or altered populations of native foragers and native plant pollinators (Wagner 1989, Murphy and Ehrlich 1989). For example, populations of native wildflowers such as tarplant (*Hemizonia fichii*) and buttercups (*Ranunculus* spp.) have been reduced to small isolated patches in the Unit. These small patches probably provide sufficient forage and pollen to support only a fraction of the historic numbers of native bees, butterflies, and beetles that are dependent on these plants. Declines in these insect species populations may have had consequences further up the food chain. For example, many insectivorous species in the Unit, such as black phoebe (*Sayornis nigricans*) or tree swallow, have probably adjusted to these changes in prey species diversity by moving to other prey species, such as the introduced honey bee (*Apis mellifera*). What effect such shifts in prey have had on insectivorous species in the Unit is unknown.

Confounding the change in the natural ecosystems in the Unit has been the introduction of non-native species, such as wild turkey, feral cats and Virginia opossum. Wild pigs have appeared outside the Unit in the Auburn vicinity but were removed (R. Lee *pers. com.*). Additionally, some common native species, like raccoon, coyote, striped skunk, and raven (*Corvus corax*), may have increased in number due to their ability to adapt to alterations caused by humans. Many of these exotic and native species may have significantly altered the population structures of other native species because they out-compete or disproportionately prey upon certain wildlife species (Wilson, 1988; Ricklefs and Schluter, 1993). Feral cats can cause significant impacts to native bird populations, particularly where the cats are fed by people (Hawkins 1998). This problem may be occurring in the Lake Natoma vicinity of the Unit where feral cats are being fed.

The impoundment of the American River is a good example of how California's natural creek and river systems have been fundamentally altered, which has in turn changed the habitat characteristic of these systems. The historic natural water system consisted of heavy flows of cold water during the winter rains and spring snow melt followed by a steady decrease in water flows, that became warmer, during the summer. The animal species that naturally occurred in California's river systems were adapted to these normal seasonal changes in water flow and temperature for their life cycles (Moyle 1976).

Since the influx of Europeans into California, these systems have been diverted, impounded, and channelized. Winter flows are now reduced. Cold water at the bottom of impoundments is slowly released all year, never warming, and water levels rise and fall abruptly based on societal needs (ACOE 2001b). These alterations in the environment have resulted in damage to the populations of native aquatic species, particularly fish and amphibians (Moyle *et al.* 1996). In the Unit, this damage is illustrated by the current status of steelhead. Historically, steelhead moved up the American River to spawn in the numerous creek systems throughout the watershed. This species can no longer travel past Nimbus Dam. The species survives in the system largely due to the presence of a CDFG hatchery below Lake Natoma (see Fisheries Section – pages AL-26 to AL-30).

Native aquatic plant populations have been altered and/or replaced by non-natives. Native herbivorous fish and aquatic insect populations have respnded to changes in aquatic plant life and these changes continue up the food chain. Numerous non-native fish and invertebrates, such as carp, bass, catfish, crayfish, and clams have also been introduced into aquatic systems. Other introductions into Unit waterways are the bullfrog and a species of watersnake (*Nerodia* sp.). These introduced species out-compete and unnaturally prey upon natives. For example red-legged frog were once common in the Sierra foothills. The introduced bullfrog feeds on tadpoles and young frogs, is larger and able to eat more food. Today, California red-legged frog is considered all but extirpated in the Sierra Nevada, while bullfrog is considered common (USFWS 1996).

Runoff from urban and agricultural land uses has probably changed the hydrology of many streams that flow to Folsom Lake and Lake Natoma. Streams that were once intermittent may now be perennial due to year-round runoff from irrigation, car washing and other water use activities (RWQCB 1998). These changes to stream hydrology often favor non-native species such as bullfrogs and introduced fish in aquatic systems (USFWS 2000). Urban and agricultural runoff is often polluted with chemicals, nutrients, and sediments. Changes to water quality, particularly decreases in clarity and enrichment from nutrients, often favor

non-native species in aquatic systems (Lee 1998). This process is likely to continue in the Unit as urban development continues to encroach upon the watershed.

Wildlife Corridors

The ability of wildlife to move between habitat areas within semi-urbanized areas like the Unit, is dependent, in part, on the existence of suitable corridors (Beier and Noss 1998). The extent of connectivity provided by such corridors play an important role in the ability of partially or fully isolated patches of habitat to support wildlife populations. Species that have low vagility (*i.e.* the ability of an animal to move about and disperse within its environment), such as most reptiles, amphibians and small mammals, are negatively impacted by the presence of few widely spaced corridors.

As shown in Figures AL-2a and AL-2b, most of the developed land adjacent to the Unit fails to provide any suitable corridor for wildlife passage. Wildlife movement is generally restricted to the remaining corridors of undeveloped land between developed parcels. The continued development of private lands in and around the Unit will further restrict the ability for wildlife located in natural areas to move into, out of, or across the Unit. These corridor restrictions will have particular impact on mammals that require large areas for foraging and hunting prey such as mountain lion, black bear and bobcat.

Wildlife movement corridors within the Unit are also limited. In several locations along Folsom Lake, park facilities or adjacent development lie in close proximity to the ordinary high water line of the lake (466 feet NGVD). Examples of these areas include South of Iron Mountain, Granite Bay, Mooney Ridge, and the dam area (Figures AL-2a and AL-2b). The ability for larger mammals to move between habitats in these locations is largely limited to the lake shoreline corridors. Movement by wildlife in these corridors becomes restricted when the lake waters are at or above 466 feet. Even when the water level is below 466 feet, wildlife movement in these areas is limited to narrow corridors of barren or poorly vegetated ground, less than 100 feet wide, and often heavily used by humans for recreation. These corridors become wider as the lake draws down, but the barren or sparsely vegetated zones that remain have little value as wildlife corridors because they provide poor cover for animals moving between more suitable habitat areas.

The Unit connects the open space along the American River Parkway to undeveloped lands upstream of Folsom Lake. However, the private lands on either side of the American River corridor and to the south, east and west of the Unit are very heavily developed and the habitat value of these open space areas is marginal. For example the community of Granite Bay now separates the Unit from open space areas in Miners Ravine that are, at least for now, contiguous with undeveloped lands to the west.

Nuisance Wildlife

Activities in the Unit sometimes bring people into close proximity with wildlife and the habitats they inhabit. In some of these situations, the animals residing in human use areas often become a nuisance to Unit users (S. Walters *pers. com.*). In these cases, there are

increased risks associated with interactions between people and animals. For example, the ground squirrels in the Beals Point campground and picnic areas regularly multiply in such large numbers that they pose a health risk to the campers using the area (J. Micheaels *pers. com.*). The squirrels actively move among people seeking food remnants and handouts. Some users exacerbate the problem by feeding the squirrels. Squirrels that are used to being fed become aggressive and will readily approach people, increasing the potential for people to be bitten or scratched. Squirrels in campgrounds have been known to chew through tents, backpacks and styrafoam coolers to get to food (S. Walters pers. com.).

The presence and behavior of wildlife in close association with people can result in harmful interactions in several ways. Yellow jackets (*Vespula* sp.) will attempt to forage among the food stuffs of day visitors in picnic areas. Raccoons and skunks become accustomed to the presence of people and can carry rabies. Bears will raid campgrounds and can injure campers. In situations where wildlife becomes an interference to human use of the Unit and its resources, it may be necessary to determine methods to control the nuisance species.

Fisheries

Folsom Lake

Completed in 1955, Folsom Lake has a maximum depth of 266 feet and inundates portions of both the North and South Forks of the American River. The maximum depth occurs near Folsom Dam. Because most of the reservoir is relatively shallow, the lake has a mean depth of 66 feet. The lake surface area is approximately 12,000 acres and has a total shoreline length of approximately 85 miles (CDPR 1979).

Thermal stratification of Folsom Lake allows it to support a "two-story fishery" of both warm water and cold water fish species. The lake begins thermally stratifying in April and the stratification holds through November when winter rains and high inflows mix the waters. Thermal stratification during the summer results in an upper layer of warm water, a narrow zone of rapid temperature transition called the "thermocline," and a lower layer of cold water.

Warm water sport fishes present in the lake include: largemouth bass (*Micropterus salmoides*), smallmouth bass (M. *dolomieui*), spotted bass (M. *punctulatus*), bluegill (*Lepomis macrochirus*), red-ear sunfish (L. *microlophus*), green sunfish (L. *cyanellus*), black and white crappie (*Promoxis nigromaculatus* and P. *annularis*), threadfin shad (Dorosoma pretenense), white catfish (*Ictalurus catus*), channel catfish (I. *punctatus*), and brown bullhead (I. nebulosus), all of which are non-native fishes. Native fishes present in the warmer waters of the lake are limited to Sacramento pikeminnow (*Ptychocheilus grandis*), hardhead (*Mylopharadon conocephalus*), California roach (*Hesperoleucus symmetricus*), and Sacramento sucker (*Catostomus occidentalis*).

The cold water sport fish species include rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), and chinook salmon (O. *tshawytscha*) (ACOE 2001a & b). Of these four cold water fishes, only the rainbow trout and the chinook salmon are native species. Since 1989, the cold waters of Folsom Lake have also contained wakasagi smelt, a Japanese subspecies of the native Delta smelt (*Hypomesus transpacificus*). It is believed that they originated from

Sly Park Reservoir and entered the Folsom Lake/South Fork American River drainage during a drought year inter-basin transfer of water from Sly Park Reservoir (Aasen *et al.* 1998; Dennis Lee, CDFG *pers. com.*). A list of all fish species known to occur in the Unit is provided in Table AL-4.

The California Department of Fish and Game (CDFG) stocks multiple sizes of rainbow trout into Folsom Lake, including fingerlings, catchable size (two fish/pound), and trophy fish. The annual stocking of catchable size rainbow trout is typically 14,000 fish (Mike Healy, CDFG *pers. com.*). They also stock chinook salmon as part of the CDFG's Inland Chinook Salmon Program (ACOE 2001a). The chinook salmon stocked into Folsom Lake originate from the Nimbus Hatchery where they are screened for disease prior to release (Terry West, CDFG *pers. com.*). During most years, 100,000 fingerling chinook salmon are released to Folsom Lake during the spring. Occasionally, 40,000 to 50,000 yearling salmon are released in the fall. These fish are first caught by anglers when 12-14 inches in length and continue to be caught up to 3 years of age when they are 3.5 to 4 pounds in size. The return to anglers has been determined by CDFG to be 20 percent of the number stocked (Dennis Lee, CDFG *pers. com.*).

In the past, Kokanee salmon (*Oncorhynchus nerka*) have been stocked as fingerlings but this practice has since been discontinued (Mike Healy, CDFG *pers. com.*). Folsom Lake's pond smelt population has replaced the kokanee salmon through competition for the same forage (zooplankton), and there appears to be no Kokanee salmon remaining in the lake (Kyle Murphy, CDFG *pers. com.*). Brown trout (*Salmo trutta*) are also no longer stocked in the lake but reproduce in the tributaries. Natural reproduction of rainbow trout also occur in the north and south forks of the American River, but it is rare for CDFG to see a non-hatchery rainbow trout in its Folsom Lake creel census (Dennis Lee CDFG *pers. com.*).

Although there have been no quantitative studies on spawning success for Folsom Lake's inland chinook salmon population, CDFG manages the Inland Chinook Salmon Program on the assumption that there will be no significant recruitment contribution from these salmon spawning in the tributaries to Folsom Lake. Creel census data for Folsom Lake indicates that all inland chinook salmon occurring in Folsom Lake are products of the hatchery (Dennis Lee, CDFG *pers. com.*). These inland salmon ascend tributaries and spawn, but none of their progeny have been found in the lake by CDFG. Reasons for this may be the lack of suitable spawning substrates in the tributaries, predation of young by stream and reservoir fishes, and stress mortality when the smolts are unable to enter salt water (Dennis Lee, CDFG *pers. com.*).

The substantial reduction in in water surface elveation that begins in late spring affects the reproduction of a number of Folsom Lake's warm water sport fishes. Both egg and juvenile survival of bass, sunfish, and catfish are affected by the water level fluctuations. Dropping water levels can lead to nest abandonment as bass spawning occurs primarily in April and May, and sunfish and catfish spawning generally occurs in late-May and June (ACOE 2001a). For average warm water fish populations in California reservoirs, a nest survival rate of at least 20 percent is necessary to maintain long-term population levels (PCWA 2002). The Folsom Lake bass fishery falls below the state reservoir average in both size and catch rate. Of the three black bass species present, spotted bass dominate the catch (Dennis Lee, CDFG *pers. com.*).

The management of the cold water pool in Folsom Lake is also critical to the populations of fall-run chinook salmon and steelhead in the Lower American River below Nimbus Dam. Summer releases of cold water from Folsom Lake are needed to maintain juvenile steelhead rearing habitat in the Lower American River. October and November releases of cold water are needed for adult chinook salmon immigration, spawning, and egg incubation (M. Healy, *pers. com*).

The Unit includes the lower reaches of several small tributary streams that drain into Folsom Lake. It also includes a small amount of riverine habitat where the North and South Forks of the American River enter the reservoir's inundation zone. Avery's Pond, located adjacent to the north side of the upper North Fork of the American River, is generally less than 5 feet deep and is reported to contain bluegill and other non-native sunfishes. No water quality data is presently available for this small pond.

Lake Natoma

Located immediately downstream of Folsom Lake, Lake Natoma serves as a regulating afterbay to stabilize flow releases to the Lower American River. Flows entering Lake Natoma from Folsom Lake can fluctuate widely as Folsom Dam responds to power generation needs. However, daily water surface elevations in Lake Natoma typically fluctuate between four and seven feet (ACOE 2001a). During summer months, water released from Folsom Lake may increase in temperature by 3 to 7 degrees F as it travels through Lake Natoma, depending on flow rate and air temperature.

Lake Natoma was created by Nimbus Dam, an 87-foot high concrete structure. In addition to its role as a regulating facility for Folsom Dam releases, it also is the point of diversion for waters into the Folsom South Canal. The completed portion of the Folsom South Canal extends from Nimbus Dam 27 miles south. It was the main conveyance of water to the Rancho Secho Nuclear Power Plant when it was in operation, but is presently unused.

Lake Natoma generally provides a very mediocre fishery due to the rapid turnover of water associated with its function as a regulating afterbay (Dennis Lee, CDFG *pers. com.*). Fish species occurring in Lake Natoma are generally the same as those found in Folsom Lake. Although the CDFG annually stocks 1,500 catchable size rainbow trout into Lake Natoma, the lake's water temperatures favor warm water fishes.

Several additional waters that support fish populations are found in the vicinity of Lake Natoma and within the Unit boundaries. Small tailings ponds on the former Teichert property portion of Mississipi Bar are reported to contain bass, bluegill, green sunfish, and catfish (Mike Healy *pers. com.*). Nimbus Shoals, a 0.7-mile reach of the Lower American River immediately below Nimbus Dam seasonally contains adult and juvenile steelhead, chinook salmon, American shad, and Pacific lamprey, all of which are anadromous fishes. Alder Pond is the inundated portion of Alder Creek located on the south side of Hwy 50. Based on observations by LSA biologists, Alder Pond is typically choked each summer with aquatic weeds and algae that likely result in low levels of dissolved oxygen. For this reason, the most prevalent fish species occurring in Lake Natoma during the summer months are warmwater fish species common to Lake Natoma and tolerant of low oxygen conditions (*e.g.* catfish and carp). The lower several hundred feet of Willow Creek upstream of its confluence with Lake Natoma is surrounded by an auto mall. It is likely to contain limited numbers of many of the warm water fish species found in Lake Natoma. An October 1996

sampling of Willow Creek about 450 feet upstream of its mouth found the most common fish species to be Sacramento squawfish, prickly sculpin, and mosquito fish. Other species captured during this sampling included smallmouth bass, rainbow trout, and Sacramento sucker (Davis, 1996).

Nimbus Hatchery, located approximately 0.25 miles downstream of Lake Natoma, is operated and maintained by CDFG and funded by the BOR. The hatchery spawns and rears both chinook salmon and steelhead. The BOR designed and built Nimbus Hatchery to mitigate for the impacts of Folsom Dam that eliminated approximately 100 miles of upstream spawning and rearing habitat for chinook salmon and steelhead. Nimbus Hatchery draws its water supply from Lake Natoma through a 60-inch pipe in Nimbus Dam. While hatchery water temperatures of less than 55 degrees F (13 degrees C) are desirable for spawning chinook salmon, temperatures this low are often not available from Lake Natoma in September and October. The hatchery will not open its gates to allow upstream migrating chinook salmon into the hatchery for spawning until its water supply from Lake Natoma maintains a water temperature of of 60 degree F (15.5 degrees C) for five consecutive days (Terry West, Nimbus Hatchery Manager *pers. com.*).

Lower American River

Flow releases from Folsom Lake and Lake Natoma are critical to the anadromous salmonid fisheries found in the Lower American River. The construction of Folsom and Nimbus dams obstructed the historic migrations of chinook salmon and steelhead to over 100 miles of upstream spawning and rearing habitat. Based on counts of the salmon run in the American River made since 1944, approximately 72.5 percent of the annual run of 26,000 chinook salmon originally spawned upstream of Nimbus Dam (CDFG 2002). These two native anadromous fish species are now limited to the 23 miles of the Lower American River between Nimbus Dam and the Sacramento River. Only 0.7 miles of the Lower American River below Nimbus Dam lies within the Unit.

The Lower American River is designated as Essential Fish Habitat for Chinook salmon by the Pacific Fishery Management Council in Amendment 14 to the Pacific Coast Salmon Plan (ACOE 2001b). Adult fall-run chinook salmon may enter the Lower American River between August and January, with peak migration occurring October through December. Since 1995, at least 50,000 adult fall-run chinook salmon return to the Lower American River annually (ACOE 2001a), with 80 percent of these fish spawning naturally in the river. Peak spawning activity occurs in November and early December, and 98 percent of spawning occurs in the river upstream of Watt Avenue (PCWA 2002). Within a few months after hatching, the juvenile chinook salmon migrate downstream (April through June) (ACOE 2001b).

Adult steelhead migrate up the Lower American River from January through April. The majority of these fish return to the Nimbus fish hatchery located approximately a mile downstream of Nimbus Dam. Juvenile steelhead spend at least a year rearing in the river before migrating downstream during spring high flows. The adult steelhead usually return after 2 years in the ocean.

At certain times of the year, high water temperatures seriously limit the reproduction, growth, and survival of anadromous salmonids in the Lower American River. An adequate regime of flows and water temperatures from Folsom Lake and Lake Natoma is essential to creating

favorable conditions for downstream populations of chinook salmon and steelhead. Various government agencies have formed working groups to set goals for preferred flow and temperature conditions in the Lower American River. Some of these working groups meet monthly to determine how best to meet these goals given the constraints of available water and the demands for power generation and water supply deliveries. The following goals have been established by the FISH Working Group for the management and restoration of water temperature to the river below Nimbus Dam (ACOE 2001b):

- *Goal #1*. Reduce water temperature in the Lower American River during critical stages in the life cycles of Sacramento River fall/late fall-run Chinook salmon and Central Valley steelhead so as to increase the number of these fish spawning naturally in the river.
- *Goal #2*. To the greatest extent possible, reach those temperatures recommended by the CDFG for Central Valley steelhead and Sacramento River fall/late fall-run chinook salmon (i.e. 56 degrees F between October 1 and June 30 and between 56 and 60 degrees F for July 1-September 30). Temperatures are measured at Watt Avenue (River Mile 9.5).
- *Goal #3*. Significantly increase the Central Valley steelhead and Sacramento River fall/late fall-run chinook salmon natural production fish populations in the Lower American River.

In addition to the chinook salmon and steelhead, American shad (*Alosa sapidissima*) and Pacific lamprey (*Lampetra tridentata*) are two other anadromous fish species that migrate up the Lower American River to within the Unit at Nimbus Shoals. A native species, the adult Pacific lamprey moves into its spawning streams between April and late July, builds a rock nest in the river gravels, and then dies after spawning (Moyle 1976). The larval young are known as ammocoetes. They move downstream to burrow into mud or sand and live as filter feeders for 3 to 7 years before migrating to the ocean to begin the predatory phase of their lives.

American shad are an introduced sport fish whose spawning run peaks in late May and June. Most shad die after spawning but a few do survive to return to the ocean and spawn again the following year (Moyle 1976). Shad eggs are broadcast spawned and drift suspended in the current. Hatching takes place 3 to 6 days after spawning and the young fish move gradually down through the Delta and out to sea.

Adult striped bass (Morones saxitilis), a non-native sport fish, occur in the Lower American River year-round. Striped bass spawning appears not to occur in the Lower American River (SWRI 2001). Striped bass do not inhabit the upstream reaches of the river within the Unit at Nimbus Shoals (Mike Healy, CDFG *pers. com.*).

Sacramento splittail *(Pogonichthys macrolepidotus)*, a native minnow with federal status as threatened, has potential spawning habitat in the lowermost 5 miles of the Lower American River. This habitat would be available during particularly wet years of high spring flows. Splittail are not found in the upper reaches of the Lower American River near Nimbus Shoals (SWRI 2001).

Special Status Fish Species

While no special status fish species are known to occur in Folsom Lake or Lake Natoma, the flow releases from these reservoirs are critical to creating favorable flow and temperature conditions for two special status anadramous salmonids that are found in the Lower American River below Nimbus Dam. These two fishes, fall/late fall-run chinook salmon (Federal Candidate Species) and Central Valley steelhead (Federal Threatened), both occur seasonally throughout the length of the Lower American River including Nimbus Shoals, a 0.7-mile reach that lies within the Unit (Table AL-2). The cold water flow releases from Folsom Lake are managed to meet temperature goals suitable for these species in the Lower American River as measured at Watt Avenue.

In addition to the Central Valley steelhead and chinook salmon, the lower end of the 23-mile Lower American River below Nimbus Dam provides spawning habitat to the Federally listed (threatened) Sacramento splittail. Low numbers of this native minnow have been found spawning within the lowermost 6.5 miles of the Lower American River. Even though this special status species does not occur within the boundaries of the Unit, it can nevertheless be affected by water released from Folsom Lake and Nimbus Dam.

Central Valley Spring-Run Steelhead

The Central Valley spring-run steelhead Evolutionary Significant Unit or "ESU" (*Oncorhynchus mykiss irideus*) has been Federally listed as threatened since 1998. The ESU for this species occurs in the Sacramento and San Joaquin Rivers and their tributaries. The Lower American River has been designated as part of its critical habitat.

The Central Valley spring-run steelhead once occurred in great numbers throughout the Sacramento and San Joaquin drainages, however, the construction of dams associated with large water supply and hydroelectric projects has eliminated hundreds of miles of steelhead spawning and rearing habitat. High temperatures and habitat degradation from reduced flows and habitat loss from excessive sedimentation in remaining accessible stream reaches, has steadily reduced the numbers of steelhead produced naturally. Because steelhead young spend a year or two rearing in stream of origin before migrating to the ocean, adequate water temperatures and flows during the hot months of summer and early fall are critical to their survival.

The release of cold water from the deeper portions of Folsom Lake is managed to maintain 56 to 60 degree F water temperatures in the Lower American River as measured at Watt Avenue during the period of July 1 through September 30. This temperature goal is primarily to provide favorable conditions for juvenile steelhead rearing in the Lower American River.

The majority of steelhead in the Lower American River are produced in the Nimbus Hatchery located about a mile below Nimbus Dam. Steelhead habitat within the boundaries of the Unit is limited to Nimbus Shoals, an approximately 0.7 mile reach of the Lower American River below Nimbus Dam.

Sacramento Fall/Late Fall-Run Chinook Salmon

The fall-run chinook salmon (*Oncorhynchus tshawytscha)* was proposed and evaluated for Federal listing as threatened. A listing as threatened was determined to be unwarranted. However, the fall/late fall-run chinook salmon remains a candidate species for listing under the Federal Endangered Species Act (ESA).

The runs of chinook salmon in California are differentiated by the maturity of fish entering fresh water, time of spawning migrations, spawning areas, incubation times and temperatures, and migration of juveniles. The great majority of the Sacramento late-fall run chinook salmon appear to spawn in the mainstem of the Sacramento River. These fish range in age from 2 to 5 years, with the majority being 3 and 4 year old fish. Fall-run chinook salmon spawning in the Lower American River occurs primarily in November and early December, with eggs being laid in a depression (redd) hollowed out in gravel beds. The embryos hatch after 3 to 4 months of incubation. The alevins (sac-fry) remain in the gravel for another 2 to 3 weeks. Although downstream movement may occur within a few weeks of emergence, juvenile chinook salmon rear in the Lower American River only a few months until they leave the river with the spring high flows.

The majority of Sacramento late-fall run salmon are found in the Sacramento River. The run of fall-run chinook salmon in the Lower American River extends up to Nimbus Dam and includes Nimbus Shoals. The principle causes of the decline of the late fall-run chinook salmon appear to be: 1) inability to pass over dams, 2) loss of habitat, 3) introgression with other runs, and 4) other factors such as disease and pollutants. In the Lower American River, water temperatures can be sufficiently warm to impede upstream migration of adults and to stress juvenile fish. For this reason, the cold water releases from Folsom Lake are managed for Lower American River chinook salmon to provide river temperatures at Watt Avenue of 56 degrees F from October 1 through June 30.

Sacramento Splittail

The Sacramento splittail (*Pogonichthys macrolepidotus*) was Federally listed as threatened in March 1999 and is a native minnow historically distributed throughout the lakes and rivers of the Central Valley. This fish is now confined to the Delta and the lower reaches of the Sacramento River. Splittail numbers declined as dams, diversions and development eliminated or drastically altered much of the lowland habitat once used by this species for spawning and rearing.

From February through April, adult splittail migrate upstream from brackish water to fresh water to spawn. Spawning occurs on submerged vegetation in temporarily flooded upland and riparian habitat. Lower reaches of rivers, bypasses used for flood management, dead-end sloughs, and some of the larger sloughs are favored for spawning. The larval splittail remain in the shallow weedy inshore areas near the spawning sites and move into deeper waters as they mature. Low numbers of splittail are known to use the lowermost 6.5 miles of the Lower American River for spawning (ACOE 2001a).

Special Status Wildlife Species

Special status wildlife and fish species are defined here as follows:

- Species that are listed, formally proposed or designated as candidates for listing as threatened or endangered under the Federal Endangered Species Act.

- Species that are listed, or designated as candidates for listing, as rare, threatened, or endangered under the California Endangered Species Act.

- Wildlife species listed by the California Department of Fish and Game (CDFG) as species of special concern, or as fully protected species.

- Species that meet the definition of rare, threatened, or endangered under the *California Environmental Quality Act* (CEQA). (Under Section 15380 of the *CEQA Guidelines,* a species not included on any formal list "shall nevertheless be considered to be endangered, rare or threatened if the species can be shown to meet the criteria for listing.")

Thirty-five special status wildlife species reported from the Folsom area will use habitat types that occur in the Unit (USFWS 2002, CNDDB 2003). Table AL-2 lists these special status wildlife species and summarizes their preferred habitats. Four of the species on the list, have ranges that do not extend into the Unit. These species are included on the Folsom list because they are included on the special status species list provided by the USFWS (USFWS 2002).

The following sections provide brief descriptions of special status animal species known to occur in the Unit or for which the presumed range includes the Unit. Key management and protection concerns are also summarized for each species.

Vernal Pool Fairy Shrimp

The USFWS listed vernal pool fairy shrimp as a threatened species in 1994. Vernal pool fairy shrimp is a small crustacean that lives in the vernal pools of California's Central Valley. Fairy shrimp hatch out of encysted eggs soon after vernal pools fill with winter rainfall. They reach maturity, breed and begin to lay eggs within two to four weeks. Vernal pool fairy shrimp die within three months of hatching, leaving their encysted eggs to survive the hot dry season in the soil at the bottom of dried seasonal wetlands. The vernal pool habitats of the vernal pool fairy shrimp in the Central Valley have been severely reduced in number by agriculture and development (Eriksen and Belk, 1999).

Vernal pool fairy shrimp have been observed in pools located on the Empire Ranch development site immediately (less than one mile) south of the Mormon Island Wetland Preserve (David Muth *pers. obs.*). Vernal pool fairy shrimp could occur in the vernal pools in the Mormon Island Wetland Preserve. Based on observations by LSA Biologists, the remaining vernal pools and seasonal wetlands in the Unit probably contain less water than is

typical of seasonal wetlands that support this species of fairy shrimp. However, the presence of vernal pool fairy shrimp in these features cannot be ruled out (see Figure AL-2).

Valley Elderberry Longhorn Beetle

The valley elderberry longhorn beetle is listed as a federally threatened species. The species is found in the Central Valley of California and lower elevations of the Sierran foothills and is only associated with blue elderberry (*Sambucus mexicana*), which is the obligate host for the larvae of the valley elderberry longhorn beetle. Adult beetles can be found on or flying between elderberry plants. The flight season for the beetle is between mid-March and early June (USFWS, 1999).

The USFWS determined that a threatened listing was warranted due to the extensive historical conversion of riparian habitats that supported large numbers of elderberry plants, for agriculture and development. The USFWS considers any elderberry plants within the presumed range of the valley elderberry longhorn beetle to support the species (USFWS 1999).

Blue elderberry can be found in a variety of habitats occurring in the Unit including grasslands, chaparral, and woodlands. The locations of elderberries in the Unit have been mapped (Jones and Stokes, 2001). The valley elderberry longhorn beetle should be presumed present at each of these locations. (see wildlife map). Surveys for valley elderberry longhorn beetle can be conducted year round and consist of searching the stems of each clump for the presence of exit holes of elderberry beetle larvae (USFWS, 1999).

California Red-legged Frog

The California red-legged frog is listed as a threatened species by the federal government, and as a species of special concern by the State of California. Historically, California red-legged frogs occurred in and along perennial and intermittent water features throughout most of California. The species is considered extirpated from California's Central Valley, and all but extirpated from the Sierra Nevada (USFWS 1996). Three known populations remain in the Sierra Foothills. One of these is a population in the Weber Creek drainage near Camino in El Dorado County, over 15 miles east of the Unit. Isolated individuals are also occasionally observed in the Sierra and a single female was observed in the American River drainage in 2001. The frog was observed where the Middle Fork of the American River and the Rubicon River intersect, approximately 15 miles upstream of Folsom Lake (David Muth, LSA *pers. obs*.).

Loss of habitat, fragmentation of habitat, and the presence of introduced fish and crayfish species, that prey on frog larvae and eggs, are considered the primary threats to the California red-legged frog. The presence of the introduced bullfrog (*Rana catesbeiana*) that may feed on larvae and adults and interfere with breeding is also important. In locations where red-legged frogs have been extirpated, such as in the Central Valley and Sierra foothills, bullfrog are present and may prevent red-legged frog reestablishment (USFWS 2000).

As California red-legged frogs are all but extirpated from most of the Sierra foothills, they are very unlikely to occupy any potential habitat areas available in the Unit. However, ponds, such as Avery's Pond, and the perennial and intermittent creeks feeding into the lakes, provide marginally suitable habitat that could support this species.

Foothill Yellow-legged Frog

The foothill yellow-legged frog is a California Species of Special Concern. Foothill yellow-legged frogs occur along permanent streams and creeks in the Coast Ranges from Oregon to San Luis Obispo County and along the western foothills of the Sierra Nevada above the valley floor (Stebbins 1985). The species is found in association with flowing perennial waterways such as streams, creeks, and smaller rivers with cobble and gravel bars. Foothill yellow-legged frogs occur in the American River just above the City of Auburn, approximately 6 miles upstream of Folsom Lake.

Foothill yellow-legged frogs are threatened by degradation of stream channels due to incision of channels, mining, and dam construction. The frogs are also susceptible to predation by introduced fish, bullfrogs, and crayfish.

Foothill yellow-legged frogs are likely to have been extirpated from the Unit. The flooding of the American River by Folsom Lake inundated most of the foothill yellow-legged frog habitat in the Unit and the bullfrogs that now occur in the lake are likely to prevent re-establishment of a population. The perennial and intermittent creeks that feed into Folsom Lake provide potential habitat, but appear to be too small to sustain a viable population.

Western Spadefoot

The western spadefoot is a California Species of Special Concern occurring in grasslands and alkali plains, where they breed in ephemeral pools, stockponds, and slow moving ephemeral streams. The species has been found from the central Sacramento Valley south through the San Joaquin Valley and west to Santa Barbara County. In California's Central Valley the species is typically found on the valley floor and at the base of the Sierra foothills. Adult western spadefoot toads are terrestrial and spend the majority of their life below ground in rodent burrows, natural crevices, or buried in dried mud. Spadefoot toads have been observed in Roseville near Fiddyment Road, and in Sacramento near the intersection of Grantline and Douglas Roads (CNDDB 2003). Both locations are about 10 miles from the Unit.

Western spadefoot is considered threatened by the conversion of grasslands and prairies into agricultural fields and development lands. Breeding locations are also being lost to agricultural practices and channelization of drainages.

While most of the grassland/savanna communities in the Unit appear suitable for adult western spadefoot toad, there is little suitable aquatic habitat for reproduction. Most of the seasonal wetlands in the Unit are too small to hold water long enough for spadefoot larvae to reach metamorphosis.

Western Pond Turtle

The western pond turtle is a California Species of Special Concern. Western pond turtles occur in perennial and intermittent lakes, ponds, rivers, and creeks throughout the State of California, except for desert habitats and the Sierra Nevada above 3,000 feet elevation. The species can often be observed basking on logs, banks, and downed emergent vegetation during the spring and early summer. Western pond turtles have been regularly observed in the Unit at Avery's Pond since the late 1970s (David Muth *pers. obs.*).

The loss and degradation of riparian and wetland habitats, as well as the loss of upland nesting sites are considered the primary threats to the western pond turtle. Hatchlings are also susceptible to predation by introduced fish and bullfrogs.

Most of the creeks, ponds, and lake backwaters in the Units are suitable for, and likely occupied by, western pond turtles. Western pond turtles have been regularly observed in Avery's Pond since the 1970s (David Muth *pers. obs.*) where they now occur with the introduced red-eared slider. The effects of the introduced turtle population on western pond turtles in the Unit are unknown, however, the population of red-eared sliders appears to have increased since the late 1980s (David Muth *pers. obs.*).

California Horned Lizard

The California horned lizard is a California Species of Special Concern. The California horned lizard inhabits open, sparsely vegetated areas in a variety of habitats, including scrubland, grassland, and woodlands. Horned lizards are often associated with areas containing loose sand and soil, where it feeds mainly on native ants such as *Pogonmyrmex*. Records indicate the species occurred in the Sierra Foothills and at the edge of the Central Valley from about Butte County to Los Angles County. The species was observed near Pilot Hill, less than 3 miles from the Unit, during the 1970s (David Muth *pers. obs.*). Recent observations have been made on Pine Hill, 4 miles east of the Unit.

The California horned lizard has been little studied and data on population trends is based mainly on conjecture. At present, the species is seldom observed in the Sierra foothills (David Muth *pers. obs.*). While the exact causes of the disappearance of the California horned lizard are unknown, the conversion of sparse native bunchgrass grassland to dense non-native grassland, development, or agriculture is suspected (CDFG 2003). The invasion of California by the introduced Argentine ant, which is inedible to horned lizards, is also considered a serious threat (Jennings and Hayes, 1994).

California horned lizards have been observed in Pilot Hill and on Pine Hill within the last 20 years (CNDDB 2002). Habitats similar to those used by California horned lizard occur in the vicinity of Folsom Lake on the east side of the Unit. This species may still occur in the sparsely vegetated grassland and chaparral habitats of the site.

Bald Eagle and Golden Eagle

The bald eagle was formerly listed by the federal government as threatened but is currently proposed for de-listing. A decision on whether to de-list will occur within the next few years. The State of California designated the bald eagle as an endangered species. Golden eagle are considered a State of California Species of Special Concern. Both eagle species are protected under the federal Bald Eagle Protection Act of 1940. Bald eagles winter and occasionally nest in the vicinity of large bodies of water such as Folsom Lake and Lake Natoma, throughout California. Golden eagles will nest on stick platforms built in tall trees adjacent to open space areas. Audubon Society Christmas bird count data show an average of 6 bald eagles and 2 golden eagles observed in the Unit vicinity each year (Audubon Society 2003). No confirmed records of nesting eagles exist from any locations within 15 miles of the Unit. One bald eagle record indicates possible nesting at Bass Lake, four miles east of the Unit (CNDDB 2003).

The bald eagle was protected after it was discovered that the pesticide DDT contaminated the fish upon which it fed. The DDT contamination resulted in thin eggshells and prevented successful reproduction in this species. Both birds were also protected because of indiscriminate historic hunting to control predators of livestock. Golden and bald eagles are reported from the Unit area during Audubon Society sponsored Christmas bird counts each year (Audubon Society, 2003). Both species could nest in tall trees located within the Unit. The tallest trees in the Unit are mature foothill pines.

Peregrine Falcon and Prairie Falcon

The peregrine falcon is a California state endangered species but was de-listed by the federal government from endangered status. Prairie falcon is a protected Species of Special Concern by the State of California. Both species occur throughout the State of California nesting on the ledges of rocky cliffs and tall structures. No records of nesting by these species exist from any locations within 15 miles of the Unit. However, Audubon Society Christmas bird count data shows an average of one peregrine falcon and four prairie falcons observed in the Unit vicinity each year (Audubon Society 2003)

Peregrine falcons were protected after it was discovered that the pesticide DDT passed through the food chain to the birds upon which falcons feed. The DDT contamination resulted in thin eggshells and prevented successful reproduction in this species. Both falcons were also protected because of indiscriminate historical hunting to control predators. Very few peregrine falcons have been reported within the Unit (Audubon Society, 2003). Rocky ledges located adjacent to the Unit may provide suitable nesting locations for these birds.

Burrowing Owl

The burrowing owl is a California Species of Special Concern that nests in abandoned rodent burrows of open grasslands and arid areas. Burrowing owls occur in the Central Valley of California from Redding to the base of the Tehachapi's and in the desert regions to the east and south of the Sierra Nevada. In California, burrowing owls are typically associated with ground squirrel burrow complexes although other type of burrows and abandoned pipes may be used (CDFG 2003). The closest records are from the vicinity of Keifer and Grant Line Roads in Sacramento, 7 miles south of the Unit and burrowing owl are regularly observed during the Audubon Society Christmas bird counts (Audubon Society 2003).

Burrowing owls are of concern due to the extensive loss of grasslands in California to agriculture and urban development (CDFG 2003). In grazed lands, ground squirrels are often considered a pest and heavily managed. Ground squirrel management has a direct impact on animals such as burrowing owl that use ground squirrel burrows. Burrowing owls nested in the Unit at Nimbus Flat 20-25 years age (R. Lee *pers. com.*). However, suitable habitat exists and burrowing owls could take up residence in grasslands or ruderal habitats of the Unit where suitable burrows are present.

Other Raptors

In addition to the raptor species discussed above, a number of other raptors with suitable habitat in the Unit are designated as California Species of Concern if they are nesting. These species are: osprey, northern harrier, sharp-shinned hawk, Cooper's hawk, ferruginous hawk,

merlin (*Falco columbarius*), long-eared owl, and short-eared owl. Nesting white-tailed kite is listed by California as a Fully Protected Species.

Many of these raptor species forage over a wide variety of habitats including those in the Unit. Nesting is usually restricted to high perches although the northern harrier and the short-eared owl nest on the ground in high grasses (Zeiner *et al.* 1988). There are nesting records of white-tailed kite in Snipes-Perishing Ravine less than one mile from the Unit and Cooper's hawk nesting on Mississippi Bar (CNDDB, 2002). Long-eared owl are known to winter in the vicinity of Avery's Pond and the Peninsula (S. Walters and R. Lee *pers. com.*). With the exception of long-eared and short-eared owl, all of the raptor species mentioned above are routinely observed in the Unit area during Audubon Society Christmas bird counts (Audubon Society 2003).

There has been as general loss of potential nesting sites for these raptor species. Tall trees and snags have historically been removed for fire wood and lumber while grasslands are typically grazed to a short height. Protecting nesting sites is expected to encourage recovery of these species. Any of the tall trees and snags in the Unit could potentially serve as nesting locations for many species of nesting raptor. Grassland habitats with stands of tall grass could also provide nesting locations for short-eared owls and northern harriers.

Loggerhead Shrike

Nesting locations of the loggerhead shrike are designated as California Species of Special Concern. Shrikes are associated with grassland habitats in California's Central Valley, although they nest in shrubs and small trees. CDPR staff report that they have not observed loggerhead shrike anywhere within the Unit boundaries in recent years (R. Lee *pers. com.*). However, suitable nesting habitat is located in and along the grassland habitats on the site and the species could take up nesting in these locations. Additionally, Audubon Society Christmas bird counts recorded an average of 6 loggerhead shrikes in the Unit vicinity between 1990 and 2000 (Audubon Society 2003).

Tricolor blackbird

Tricolor blackbird nesting colonies are designated as California Species of Special Concern. Tricolor blackbirds range throughout the Central Valley of California nesting in dense marsh vegetation along creeks, pond, and lakes. The species typically nests in colonies of up to several hundred birds. Nesting colonies have been observed in numerous locations within one mile of the Unit (CNDDB 2002).

The species is of concern due to the loss of suitable breeding habitat areas resulting from the conversion of the Central Valley to agriculture (CDFG 2003). Suitable nesting locations for tricolor blackbird are located in the dense emergent marsh vegetation located in the Mormon Island Wetland Preserve and possibly in other dense marsh stands such as those at the mouth of Alder Creek. Any densely vegetated marsh areas should be searched for the presence of this species during the spring and early summer breeding season.

Yellow-breasted Chat and Yellow Warbler

The nesting locations of yellow-breasted chat (*Ictaria virens*) and yellow warbler (*Dendroica petechia*) are designated as California Species of Special Concern. These two species nest in

riparian thickets and dense patches of willow usually adjacent to a creek or stream. CDPR staff report yellow-breasted chat nesting in Himalayan berry (*Rubus discolor*) thickets just outside of the Unit boundaries along Sweetwater Creek (R. Lee and S. Walters *pers. com.*).

The nesting locations of yellow-breasted chat and yellow warbler are declining because of the extensive historic loss of riparian habitat in California. As riparian habitats disappeared, so did the potential breeding locations for riparian bird species. Both yellow-breasted chat and yellow warbler are known to occur in the Unit and suitable nesting habitat occurs in the riparian corridors along creeks and adjacent to the river.

Greater Sandhill Crane

Nesting and wintering greater sandhill crane are designated as Threatened by the State of California because of habitat loss due to agricultural and residential habitat conversion (CDFG 2003). Sandhill cranes establish territories in wet meadows that are often interspersed with emergent marsh. Cranes will typically feed in rice and corn field and will use irrigated pastures as resting sites. They are known to breed in marshes in Northeastern California. Sandhill cranes are unlikely to use the Unit for feeding or resting habitat but have been observed flying over Folsom Lake in the spring and fall (S. Walters *pers. com.*), and could occasionally rest along the lake shoreline or in marsh areas.

Willow Flycatcher

The willow flycatcher was historically a common summer resident throughout California and bred wherever extensive willow thickets occurred. The species has now been eliminated as a breeding bird from most of its former range in California. Willow flycatcher populations have declined primarily due to loss and degradation of riparian habitat (CDFG 2003). Livestock grazing impacts and nest parasitism by brown-headed cowbirds have also caused population declines (Zeiner 1990a). Only the southwestern willow flycatcher subspecies, which has a range that does not include the Unit, is federally listed as Endangered. However the State of California lists both subspecies of willow flycatcher as Endangered.

This species is a summer migrant to wet meadows and montane riparian forests in the Sierra Nevada. During the spring and fall it can be found in lower elevation riparian areas in the eastern Central Valley where it feeds on flying insects by making brief flights from exposed patched of willow thickets (Zeiner 1990a). It has been observed in willow riparian habitats in the Unit (J. Webb *pers. com*.).

Purple Martin

Purple martin is an uncommon to rare summer resident in low elevation woodlands, riparian habitats and coniferous forests in California. Nesting locations are designated as California Species of Special Concern. These occur primarily in abandoned woodpecker cavities in old, tall, isolated trees or occasionally underneath human-made structures such as bridges (Zeiner 1990a). During its spring and fall migration periods, the species may be found in open habitats near water such as wet meadows and grasslands. Purple martin populations have declined due to loss of riparian habitat, loss of snags and competition for nest cavities from European starlings and house sparrows (Zeiner 1990a). Purple martins may be rarely observed within woodlands and riparian habitats in the Unit.

Bats

Three species of bat, pallid bat (*Androzous pallidus*), Townsends big-eared bat (*Corynorhinus townsendii*) and California mastiff bat (*Eumops perotis californicus*), and their roosting sites, are protected by the State of California as Species of Special Concern. Pallid bats and Townsend's bats roost in a wide variety of locations including bridges, tree hollows, buildings, caves, and mines, while mastiff bats tend to roost in rock outcroppings and rocky ledges. Both species range widely throughout California. Two colonies of bats that do not have special status, including the Brazilian or Mexican free-tailed bat (*Tadarida brazilensis)* and a species of myotis (*Myotis* sp.) have a maternity colony in the Folsom Powerhouse and gates (S. Walters *pers. com.*). Additionally the western red bat (*Lasiurus blossevillii*), also a non-special status species, has been observed in the general vicinity of the Unit (D. Schmoldt *pers. com.*).

Bats have been the subject of intentional destruction. Because they have a low fecundity rate and frequently refuse to re-use disturbed roosting sites their numbers appear to be significantly decreasing. Bats may roost in Unit buildings as well as in trees and rock crevices in many of the habitats throughout the park.

Recommendations

Management of Invertebrates, Amphibians and Reptiles

Vernal Pool Fairy Shrimp; Western Spadefoot Toad

Vernal pool fairy shrimp and western spadefoot toad habitat can best be promoted by protecting all Unit vernal pools from direct and indirect impacts. In particular, the remaining watershed areas of vernal pools should not have any further intrusions such as filling, grading or infrastructure that would reduce or alter the quantity or quality of runoff into the pools. More specific vernal pool protection measures are discussed earlier in this document under "Vegetation Management Recommendations." (Plant Life section pg.) Surveys for fairy shrimp involve dipnetting of pools in accordance with USFES protocols (USFWS, 1996). Surveys for spadefoot toad include listening for calling males during the winter and searching for larvae with nets during the spring (Heyer, et al, 1994).

Valley Elderberry Longhorn Beetle

A unit-wide management protocol should be enacted for any future infrastructure, operational or management plans that could occur in the vicinity of elderberry plants. These protocols need to include: (1) site specific mapping and counts of individual elderberries clumps or shrubs, as well as analysis for exit holes; (2) protection of elderberry stands and associated riparian vegetation with suitable buffer zones of at least 20-25 feet from the edge of driplines; and (3) identification of one or more suitable mitigation areas within which elderberries can be relocated or planted as compensation for unavoidable impacts where elderberries cannot be adequately protected (USFWS, 1999). CDPR should attempt to conduct informal consultation with U.S. Fish and Wildlife Service as part of the protocol development process with an ultimate goal of enacting a unit-wide Habitat Conservation Plan (HCP).

California Red-legged Frog; Foothill Yellow-legged Frog

Potential red-legged frog and foothill yellow-legged frog habitat areas should be adequately protected. Any proposed park infrastructure improvements in the vicinity of the Unit's ponds and various perennial and intermittent creeks should take into account the potential presence of these frog species. Prior to design of such improvements, surveys for the presence of the species should be conducted in accordance with USFWS and CDFG protocols. If the surveys establish the presence or potential presence of red-legged or yellow-legged frogs, every effort should be made to avoid impacting the habitat and to establish an adequate buffer zone (usually 300 feet). Habitat mitigation would likely be required for any unavoidable direct or indirect impacts. Such mitigation could include habitat enhancement through such measures as bullfrog control and habitat creation in suitable areas of the Unit. Informal consultation with the USFWS would also be required as part of this process if red-legged frogs are present (USFWS 1996). The CDFG should be consulted with respect to foothill yellow-legged frogs.

Western Pond Turtle

Potential habitat areas for western pond turtle should be protected in essentially the same manner as discussed above for red-legged frog. Surveys for pond turtles should include searching banks, shorelines, and surface objects, such as rocks and logs, with binoculars for basking turtles. The water surface should also be searched for turtles coming to surface for air (Holland, 1991).

California Horned Lizard

Remaining populations of California horned lizard in the Unit should be located and protected. Habitat where this species still resides should be managed to encourage sparse vegetation and to promote the life history of native ants. Areas most likely to support horned lizards occur on the Peninsula. Surveys for this species usually include searches for active lizards during spring and summer mornings. The presence of these lizards can also be determined by the presence of their scat in the form of oval shaped pellets consisting of ants.

Management of Birds

Heron and Egret Rookeries

Great egrets (*Ardea alba*) and great blue herons (*Ardea herodias*) feed in the wet meadows, marshes, lake margins (draw-down zones), creeks and ponds of the Unit. These birds typically nest in large trees adjacent to larger bodies of water. In the Unit, nesting occurs on Anderson Island and at Mississippi Bar in mature foothill pines and in cottonwoods near Folsom State Prison. The Mississippi Bar rookery formerly occurred on the eastside of Lake Natoma at the Willow Creek area (S. Lee, *pers. comm.*) (CDPR 1978a, 1979). The Mississippi Bar rookery has been established within the last 25 years. Additional rookeries could be located in other isolated locations within the Unit, where large trees are present.

Active or potential rookery locations should be protected from disturbance during the nesting season. Tall mature foothill pines adjacent to or near open water should also be considered potential roosting and/or nesting sites.

Any proposed park infrastructure improvements in the vicinity of roosting or nesting sites should take into account the potential presence of nesting egrets, herons and/or cormorants. Double-crested cormorants (*Phalacrocorax auritus*) nested with the Mississippi Bar rookery in 2003 (S. Waters, *pers. comm.*). Sacramento County Audubon mapped these locations in the late 70's and early 80's and submitted them to the California Natural Diversity Database. If active rookeries are found, improvement plans should be designed to avoid these sites until the young have fledged. Any construction work in the vicinity should be done outside of the breeding season. The Unit should consider establishing exclusion zones around potential rookery sites for watercraft and other active recreational uses during the nesting season.

Burrowing Owl

There are no known occupied burrows in the Unit and foraging habitat is limited due to the surrounding urban development that has occurred consistently around the Unit. Nevertheless, there is the potential for habitat to occur or to be re-established. Any proposed park

infrastructure improvements in the vicinity of grasslands should take into account the potential presence of burrowing owls, which will require that surveys be conducted for burrow sites. Surveys for burrowing owl require searching the entrance of suitable burrows and pipes for evidence of burrowing owl use, such as feathers, white-wash, and/or scat. Surveys should be conducted for both winter residents and during the breeding season. If evidence of burrowing owls is found, improvement plans should be designed to avoid the burrow areas to the extent feasible. If impacts are unavoidable, then passive relocation protocols should be implemented, as established by CDFG. All relocation efforts must be coordinated with CDFG. If occupied habitat cannot be feasibly avoided, then mitigation for loss of habitat will be required.

Loggerhead Shrike

Loggerhead shrike is believed extirpated from the Mormon Island Wetland preserve, which was the only habitat known to be occupied in the Unit (R. Lee *pers. com.*). Nevertheless, there is the potential for species to occur in the Unit. Any proposed park infrastructure improvements in the vicinity of grasslands or shrubs near open areas should take into account the potential presence of nesting loggerhead shrike. Surveys should be conducted for active nesting sites in the vicinity of proposed improvements. No construction work should be conducted in the vicinity of nesting sites during the nesting season, which will require that surveys be conducted to detect active nests during the nesting season. If active nests are found, improvement plans should be designed to avoid these locations until the young have fledged. Surveys for these species should include searching grassland areas for nesting birds during the nesting season in spring and early summer.

Tri-colored Blackbird

There is no known occupied habitat in the Unit. However, areas such as cattail marshes need to be adequately protected. Unit infrastructure improvement should avoid occupied vegetation to the greatest extent feasible. If impacts are unavoidable, then mitigation measures to establish new marsh habitat will need to be designed and implemented.

Yellow-breasted Chat; Yellow Warbler

The primary concern regarding yellow-breasted chat and yellow warbler in the Unit is to locate and protect active nesting locations from disturbance during the nesting season. Any proposed park infrastructure improvements in the vicinity of riparian habitats should take into account the potential presence of nesting yellow-breasted chat and yellow warbler, which will require that surveys be conducted to detect active nests during the nesting season. Yellow-breasted chat territories have been observed near the Beal's Point campground by the sewage treatment plant (B. Webb, *pers. comm.)* and in the Unit near Sweetwater Creek. If active nests are found, improvement plans should be timed to avoid these locations until after the breeding season. Surveys should include searching willow thickets and dense riparian vegetation, including areas with dense stands of Himalayan blackberry, for nesting birds during the nesting season (spring and early summer).

Any areas proposed for Himalayan blackberry management should first be surveyed for nesting activity. No such management work should be conducted until the nesting season is completed, all young have been fledged and the nests have been abandoned.

Fisheries Management

Central Valley Spring-run Steelhead; Fall-run Chinook Salmon; Sacramento Splittail

CDPR should seek to continue coordination of actions and policies relating to these species with the Lower American River FISH working group, the BOR and other stakeholders.

Avery Pond Fishery Enhancement

Avery Pond has the potential to be deepened and managed as one of three possible options relating to fisheries. One option is to remove all existing fish from the pond and to manage it for native warmwater fishes. The long-term difficulty with this approach is that eventually someone will introduce non-native sunfish and bass into the pond from the adjacent Folsom Lake. A second option is to establish a bass and bluegill, or bass and redear sunfish fishery in the pond to provide anglers with a warmwater sport fishery. A third option is to put only mosquitofish in the pond for vector control and manage the pond for non-angling beneficial uses.

To properly evaluate Avery Pond's restoration options and determine the fish species best suited to the pond, it will first be necessary to collect monthly water quality data for the pond. Water temperature and dissolved oxygen profiles, specific electrical conductivity, total alkalinity, pH, and turbidity data should be collected monthly for one year to characterize water quality conditions in Avery Pond. At a minimum, water temperature and dissolved oxygen profiles in the pond should be determined for the months of April through November. A depth profile of the pond should also be developed across its length and width.

Management of Mammals

Bats

The primary bat management concerns for the Unit are to locate and protect roost sites from disturbance, and to keep roost sites separate from people. Any proposed infrastructure improvements in the vicinity of barns, buildings, bridges, caves, rock outcrops or ledges, and hollow trees should take into account the potential presence of roosting bats, which will require that surveys be conducted to detect any roosting locations and to determine whether the site is used as a day roost, night roost, or nursery roost. Foraging areas may also need to be identified and protected. If day/ night or nursery roosts are found, improvement plans should be designed to avoid these sites. If impacts are unavoidable, night roosts should be altered to discourage use and nursery roosts avoided until the young have matured enough to fly, then altered to discourage use. Suitable alternative roosts may be necessary. Consultation with CDFG will be necessary.

Enhancement of Forage

Restoration of a more natural fire regime to chaparral would probably improve its habitat value for foraging animals. This effort should be integrated into prescribed fire plans to be developed under the Unit-wide Burn Plan. Where extensive stands of yellow star thistle have invaded grassland habitat, the vegetation management recommendations in the Plant Life section should ultimately improve forage in these area as well.

Control of Nuisance Wildlife

A nuisance wildlife management plan should be developed in close consultation with the California Department of Fish and Game. Management actions should address such issues as: (1) controlling California ground squirrels within picnic areas and campgrounds in order to reduce the heath and safety risks to park users, and (2) preventing the feeding of geese and ducks at Nimbus Flat in order to reduce bacteriological contamination. Management actions should take into account the effects on other interdependent organisms at higher or lower trophic levels. For example, wild turkey, a non-native species, is preyed upon by coyotes in the Unit. Control of wild turkeys could encourage coyotes to shift to greater predation upon ground squirrels. However it could also increase predation on native mammals such as cottontail rabbits (Wilson, 1988; Ricklefs and Schluter, 1993).

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