7.7 Threatened, Endangered and Fully Protected Species

7.7.1 Overview

This section provides existing, relevant and reasonably available information regarding plant, aquatic, and wildlife species that could be affected by Yuba County Water Agency's (YCWA or Licensee) Yuba River Development Project (Project) and that, at the time this Preliminary Information Package is prepared, are listed as threatened or endangered species under either the federal Endangered Species Act (ESA), the California Endangered Species Act (CESA),[1] or both, or are fully protected under California law. For the purpose of this Preliminary Information Package, the status of each of these species is indicated as FE (endangered under the ESA), FT (threatened under the ESA), SE (endangered under the CESA), ST (threatened under the CESA) or SFP (fully protected under State of California law). Species that may be proposed or candidates for listing under the ESA or CESA and species afforded other special protection by a federal or a State of California agency are referred to as "special-status species" in this Preliminary Information Package and are addressed in Sections 7.3 (Aquatic Resources), 7.4 (Wildlife Resources) and 7.5 (Botanical Resources).

This section is divided into three subsections. Section 7.7.2 discusses species listed as threatened or endangered under the ESA. Section 7.7.3 discusses species listed as threatened or endangered under the CESA or fully protected under state law. Section 7.7.4 provides a general life history for each of the threatened, endangered, or fully protected species identified in Sections 7.7.2 and 7.7.3.

Sections 7.7.3, 7.7.4, and 7.7.5 also contain specific existing, relevant and reasonably available information regarding the distribution, abundance, and condition of threatened, endangered, and fully protected species in the Project Vicinity.[2]

The ESA and CESA are discussed in detail in Sections 4.1.2 and 4.2.1, respectively.

7.7.2 Federal Endangered Species Act

7.7.2.1 Listed Plants and Animals

On April 9, 2009, Licensee generated an official list of ESA-listed species for the 7.5 minute United States Department of Interior (USDOI) United States Geological Survey (USGS) topographic quadrangles (quads) (*i.e.,* Challenge, Camptonville, French Corral, Smartville[3],

[1] In addition to the California Endangered Species Act (CESA), the California Department of Fish and Game (CDFG) affords special protection to some fish and wildlife species, referring to them as "fully protected" (SFP). Fishes are authorized under the California Fish and Game Code § 5515 and California Code of Regulations (CFR), Title 14, Division 1, Chapter 2, Article 4, Section 5.93. SFP designations for amphibians and reptiles are authorized under §5050 of the California Fish and Game Code.

[2] For the purposes of this document, the Project Vicinity is defined as the area surrounding the Project on the order of a United States Department of Interior (USDOI) United States Geological Survey (USGS) 1:24,000 topographic quadrangle.

[3] In 2008, the people of this community petitioned to have the name changed to "Smartsville," with an 's'. However, the USGS gage refers to the former spelling of the community name. Therefore in this document, the community is referred to as such.

Clipper Mills, Strawberry Valley, Nevada City, Pike, Browns Valley, and Yuba City), which include the Project Vicinity, by using a the on-line request service available at USDOI, Fish and Wildlife Service (USFWS). The list included ten species, distinct population segments and evolutionarily significant units: 1 plant; 2 invertebrates; 1 amphibian; 1 reptile; and 5 fishes.

Licensee eliminated from further consideration the Delta smelt (Hypomesus transpacificus), winter-run Chinook salmon (Oncorhynchus tschawytscha), and giant garter snake (Thamnophis gigas) because these species do not occur in the Project Vicinity.

Based on this, seven species on USFWS's April 9, 2009 list could potentially be affected by continued Project operation and maintenance (O&M). All seven of the species are threatened species under the ESA. These are:

- ESA Threatened Species:
  - Layne's ragwort (*Packera layneae*)
  - Vernal pool fairy shrimp (*Branchinecta lynchi*)
  - Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)
  - California red-legged frog (*Rana draytonii*), Critical Habitat
  - Steelhead (*Oncorhynchus mykiss irideus)*, California Central Valley Distinct Population Segment (DPS), Critical Habitat[4]
  - Chinook salmon (*Oncorhynchus tshawytscha*), spring-run Evolutionarily Significant Unit (ESU), Critical Habitat[5,6]
  - North American green sturgeon (*Acipenser medirostrus*), Southern DPS

Licensee searched several sources to compile for each of the ESA-listed species: 1) a description of the species's habitat requirements; 2) any known occurrences of the species within the Project Vicinity; and 3) references to any recovery plans or status reports pertaining to that species. For fish and wildlife, the information sources included California Department of Fish and Game's (CDFG) California Natural Diversity Data Base (CNDDB), and USFWS' online database and Recovery Plans. For plants, the sources were CNDDB as well as the United States Department of Agriculture's (USDA) PLANTS database. Based on these searches, an additional three species that could potentially be affected by continued Project O&M were located. Each of these species is an endangered species under the ESA. They are listed here.

[4] Critical Habitat for Steelhead in the Yuba River extends from the Feather River upstream to the United States Army Corps of Engineers' (USACE) Englebright Dam.

[5] Critical Habitat for spring-run Chinook salmon in the Yuba River extends from the Feather River upstream to the USACE's Englebright Dam.

[6] Under the Magnuson-Stevens Fishery Conservation and Management Act, the United States Department of Commerce (USDOC), National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS) has identified Essential Fish Habitat (EFH) for Chinook salmon in the Yuba River basin from confluence with the Feather River upstream to: "Salmon Creek, near Sierra City" in the North Yuba River; "The lower river, near where the North Fork joins" in the Middle Yuba River; "1-2 miles upstream, perhaps spring run accessed the present town of Washington" in the South Yuba River" and "~5 to 6 miles upstream" on Dry Creek, a tributary to the mainstem. This EFH includes all water bodies occupied or historically accessible to Chinook salmon within the USGS HUC 18020125.

- ESA Endangered Species:
  - Stebbins' morning-glory (*Calystegia stebbinsii)*
  - Hartweg's golden sunburst (*Pseudobahia bahiifolia*)
  - Vernal pool tadpole shrimp (*Lepidurus packardi*)

The California Native Plant Society (CNPS) database was also used to query the Project Vicinity quadrangle maps as well as a one-quadrangle surrounding perimeter. Based on this search, the following additional FE species that could potentially be affected by continued Project O&M was identified:

- ESA Endangered Species:
  - Pine Hill flannelbush (*Fremontodendron decumbens*)

The results of Licensee's search are shown in Table 7.7.2-1.

Table 7.7.2-1. Federally and State of California threatened or endangered species, and State Fully Protected species occurring or potentially occurring in the Project Vicinity.

Common Name (Scientific Name)	Suitable Habitat Type	Known Occurrence in Project Vicinity	Status[a]	Status Reports, Recovery Plans Relevant to Project Vicinity
PLANTS				
Pine Hill flannelbush (*Fremontodendron decumbens)*	Chaparral, Cismontane woodland/gabbroic or serpentinite, rocky (CNPS 2009).	Unknown in Project Vicinity, present in Grass Valley	FE	Recovery Plan USFWS 2002a
Layne's ragwort *(Packera layneae)*	Chaparral, cismontane woodland, gabbro, serpentine (CNPS 2009).	Four occurrences found on CNDDB in Project Vicinity; two occurrences were found within Challenge quad and other two occurrences were found within Clipper Mills quad (CDFG 2009f).	FT	Recovery Plan USFWS 2002a
Stebbins' morning-glory *(Calystegia stebbinsii)*	Chaparral, cismontane woodland (CNPS 2009).	Not known in Project Vicinity, occurs within Nevada county (CNPS 2009).	FE, SE	Recovery Plan USFWS 2002a
Hartweg's golden sunburst *(Pseudobahia bahiifolia)*	Valley and foothill grassland, cismontane woodland (CDFG 2009f).	One occurrence found on CNDDB in Project Vicinity: within Olivehurst and Yuba City quads (CDFG 2009f).	FE, SE	None
INVERTEBRATES				
Valley elderberry longhorn beetle *(Desmocerus californicus dimorphus)*	Occurs only in the Central Valley and adjacent foothills up to 3,000 feet elevation in association with Blue elderberry.	Reported on the USFWS species list for Project Vicinity quads and counties (USFWS 2009). Seven occurrences found on CNDDB; all occurrences within Browns Valley quad (CDFG 2009f).	FT	Recovery Plan USFWS 1984
Vernal pool fairy shrimp *(Branchinecta lynchi)*	Endemic to grasslands of the Central Valley, Central Coast Mountains, and South Coast Mountains, in astatic rain-filled pools (CDFG 2009f).	Reported on the USFWS species list for Project Vicinity quads and counties (USFWS 2009). One occurrence found on CNDDB within Browns Valley quad in Beale Air Force Base (CDFG 2009f).	FT	Recovery Plan USFWS 2005

Table 7.7.2-1. (continued)

Common Name (Scientific Name)	Suitable Habitat Type	Known Occurrence in Project Vicinity	Status[a]	Status Reports, Recovery Plans Relevant to Project Vicinity
INVERTEBRATES (continued)				
Vernal pool tadpole shrimp *(Lepidurus packardi)*	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water (CDFG 2009f).	Four occurrences found on CNDDB in Project Vicinity; all occurrences within Browns Valley quad (CDFG 2009f).	FE	Recovery Plan USFWS 2005
AMPHIBIANS				
California red-legged frog *(Rana draytonii)*	Suitable habitat is located in deep (> 0.7 m), still or slow-moving water within dense, shrubby riparian and upland habitats (Jennings and Hayes, 1994).	Reported on the USFWS species list for Project Vicinity quads and counties (USFWS 2009). One occurrence found on CNDDB within Challenge quad (CDFG 2009f).	FT	Recovery Plan USFWS 2002b
FISH				
Steelhead, California Central Valley DPS *(Oncorhynchus mykiss irideus)*	Spawning occurs within the Sacramento and San Joaquin rivers and their tributaries (NatureServe 2009). Naturally-spawning populations that support anadromy have been found in the Yuba River below USACE's Englebright Dam (McEwan 2001).	Reported on the USFWS species list for Project Vicinity quads and counties (USFWS 2009). No records in CNDDB.	FT	Restoration and Management Plan CDFG 1996; Good *et al.* 2005
Chinook salmon, Central Valley spring-run ESU *(Oncorhynchus tshawytscha)*	Spawning occurs within the Sacramento River and its tributaries. Naturally-spawning anadromous Chinook salmon expressing the phenotypic characteristics of spring-run have been observed in the lower Yuba River below USACE's Englebright Dam.	Reported on the USFWS species list for Project Vicinity quads and counties (USFWS 2009). One occurrence found on CNDDB within Smartville quad; Yuba River from Highway 20 Bridge upstream to USACE's Englebright Dam (CDFG 2009f).	FT, ST	Restoration and Enhancement Plan CDFG 1990; CDFG 1998; 2002; Good *et al.* 2005
North American green sturgeon (*Acipenser medirostris*)	In the Sacramento river system, spawning occurs predominantly in the upper Sacramento River, above Hamilton City and perhaps as far upstream as Keswick Dam (NatureServe 2009).	Only known spawning habitat near the Project Vicinity is on the Sacramento River (SWRI 2007). No occurrences found on CNDDB or USFWS queries. One confirmed occurrence of green sturgeon below USACE's Daguerre Point Dam in the lower Yuba River (NMFS 2008a).	FT	Adams *et al.* 2002
BIRDS				
Bald eagle *(Haliaeetus leucocephalus)*	Breeding habitat usually includes areas close to coastal areas, bays, rivers, lakes, or other bodies of water that reflect the general availability of primary food sources. Preferentially roosts in conifers or other sheltered sites in winter in some areas (NatureServe 2009).	One occurrence found on CNDDB in Project Vicinity - within Camptonville quad (CDFG 2009f).	SE, SFP	Status Report CDFG 2005
California black rail *(Laterallus jamaicensis coturniculus)*	Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering larger bays (CDFG 2009f).	17 occurrences found on CNDDB in Project Vicinity; all occurred within Smartville quad; two of the 17 occurrences also occurred within Oregon House quad (CDFG 2009f).	ST, SFP	None

Table 7.7.2-1. (continued)

Common Name (Scientific Name)	Suitable Habitat Type	Known Occurrence in Project Vicinity	Status[a]	Status Reports, Recovery Plans Relevant to Project Vicinity
BIRDS (continued)				
Swainson's hawk *(Buteo swainsoni)*	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs and agricultural or ranch (CDFG 2009f).	Two occurrences found on CNDDB in Project Vicinity: within Browns Valley and Yuba City quads (CDFG 2009f).	ST	None
Western yellow-billed cuckoo *(Coccyzus americanus occidental)s*	Riparian forest nester, along the broad, lower flood-bottoms of larger river systems (CDFG 2009f).	Two occurrences found on CNDDB in Project Vicinity: within Olivehurst and Yuba City quads (CDFG 2009f).	SE	None
Bank swallow *(Riparia riparia)*	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert (CDFG 2009f).	Four occurrences found on CNDDB in Project Vicinity; three occurrences within Yuba City quad and one within Yuba City and Sutter quads (CDFG 2009f).	ST	None

[a] Status Codes:
FE: - Endangered: Any species that is in danger of extinction throughout all or a significant portion of its range.
FT: - Threatened: Any species likely to become endangered within the near future.
SE: - Endangered: California State listed as Endangered.
ST: - Threatened: California State listed as Threatened.
SFP: - California State listed as Fully Protected.

As shown in Table 7.7.2-1, three of the ESA-listed species are also listed under the CESA: Stebbins' morning-glory (SE), Hartweg's golden sunburst (SE), and Chinook salmon, Central Valley spring-run ESU (ST).

7.7.3 State of California Endangered Species Act Species, and Fully Protected Species

7.7.3.1 Listed Plants and Animals

To prepare a formal list of CESA-listed plants and animals and SFP species with a potential to occur in the Project Vicinity, Licensee reviewed CDFG's February 2009 list of *State and Federally Listed Endangered and Threatened Animals of California*. The list includes 159 fish and wildlife species of which 54 are listed under both the ESA and CESA, 72 are listed only under the ESA, and 33 are listed only under the CESA. Licensee also reviewed CDFG's *List of State Fully Protected Animals*. The list includes 37 fish and wildlife species.

To identify CESA-listed plants, Licensee used the CNPS database and CDFG's *Special Vascular Plants, Bryophytes, and Lichens List* (CDFG 2009e). Licensee then referred to the CNDDB and other appropriate sources described above to determine the potential occurrence of these species in the Project Vicinity.

Based on Licensee's review of the above information, Licensee considers ten species, consisting of 4 plants, 1 fish and 5 birds, protected under the CESA or Fully Protected under California law, to be potentially affected by continued Project operation and maintenance. These species are:

- CESA Endangered Species:
  - Stebbins' morning-glory (*Calystegia stebbinsii)*
  - Hartweg's golden sunburst (*Pseudobahia bahiifolia*)
  - Bald eagle (*Haliaeetus leucocephalus*)
  - Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)
- CESA Threatened Species:
  - Chinook salmon, spring-run ESU (*Oncorhynchus tshawytscha*), Critical Habitat
  - California black rail (*Laterallus jamaicensis coturniculus*)
  - Swainson's hawk (*Buteo swainsoni*)
  - Bank swallow (*Riparia riparia*)
- State Fully Protected Species:
  - Bald eagle (*Haliaeetus leucocephalus*)
  - California black rail (*Laterallus jamaicensis coturniculus*)

Table 7.7.2-1 describes, for each of these species, a general habitat requirement statement, any known occurrences within the Project Vicinity, and references to any recovery plans or status reports pertaining to the species.

As shown in Table 7.7.2-1, three of the eight CESA-listed species are also listed under the ESA: Stebbins' morning-glory (FE), Hartweg's golden sunburst (FE) and Chinook salmon, Central Valley spring-run ESU (FT).

7.7.4 Life Histories of Threatened, Endangered, and Fully Protected Species

A general life history of each threatened, endangered, and Fully Protected species with a potential to occur in the Project Vicinity is provided here.

7.7.4.1 ESA and ESA/CESA Listed Species

Pine Hill flannelbush (FE)[7]

Pine Hill flannelbush occurs on scattered rocky outcrops in chaparral on and in the vicinity of Pine Hill and in the black oak woodland on Pine Hill (L. Eng *in litt*. 1999). Community associates are ponderosa pine (*Pinus ponderosa*), foothill pine (*P. sabiniana*), chamise (*Adenostoma fasciculatum*), toyon (*Heteromeles arbutifolia*), and bigberry manzanita (*Arctostaphylos glauca*) (Kelman 1991; Boyd 1996). It is only known from one localized area near Pine Hill in western El Dorado County, scattered within an area of approximately 5,000 acres. Although there are some reports of Pine Hill flannelbush occurring

[7] Photo found at: http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi/Home

in some small scattered populations in Yuba or Nevada counties, other reports describe these individuals as aberrant California flannelbush (*F. californicum* ssp. *californicum*). Most occurrences of Pine Hill flannelbush are on private land (CNDDB 1998). One occurrence is on public land administered by the USDOI, Bureau of Land Management (BLM), and one occurrence is on CDFG and California Department of Forestry and Fire Protection (CAL FIRE) lands (CNDDB 1998). Presently, the majority of the Pine Hill flannelbush individuals are located on the parcel managed by CAL FIRE on Pine Hill, and on a nearby private parcel (L. Eng *in litt*. 1999).

This plant has not been found within the Project Vicinity. The nearest known population was found in Grass Valley.

Layne's ragwort (FT)[8]

Layne's ragwort grows in open rocky areas of gabbro and serpentine soils within chaparral plant communities. Most known sites are scattered within a 40,000 acre area in western El Dorado County that includes the Pine Hill intrusion and adjacent serpentine. Gabbro soils originate from volcanic rocks (gabbrodiorite) that are mildly acidic, are rich in iron and magnesium, and often contain other heavy metals such as chromium. Gabbro, a large dark course-grained rock, is formed when liquid magma cools slowly underground. A red soil is formed when the rock is exposed and weathers at the earth's surface. These soils are well drained and are underlain by gabbrodiorite rocks at a depth of more than 3 feet. Serpentine-derived soils are formed through a process similar to formation of gabbro soils. Serpentine soils are derived from serpentinite, dunite, and peridotite. They tend to have high concentrations of magnesium, chromium, and nickel, and low concentrations of calcium, nitrogen, potassium, and phosphorus. Most plants do not grow well on gabbro or serpentine soils (USFWS 2008).

This plant was found within the Project Vicinity during the CNDDB search. The occurrences were found within the Challenge and Clipper Mills quads (CDFG 2009f).

Stebbins' morning glory (FE, SE)[9]

Stebbins' morning-glory is a leafy herbaceous perennial (*i.e.*, a plant that persists or lives for several years with a period of growth each year) in the morning-glory family (Convolvulaceae). Its stems, which range up to 3.3 feet in length, generally lie flat on the ground. The leaves are palmately lobed (*i.e.*, lobing radiating from a common point) with the two outermost lobes (*i.e.*, major expansion or bulge) being divided again. The leaf lobes are narrow and lance-shaped. White flowers are on stalks 1 to 5 inches long and bear two leaf-like bracts. The fruit is a slender capsule. Stebbins' morning-glory flowers from May through June. Chaparral false bindweed *(Calystegia occidentalis)* and Pacific false bindweed (*C. purpurata* ssp.

[8] Photo found at: http://www.fws.gov/sacramento/es/plant_spp_accts/laynes_butterweed.htm.
[9] Photo found at: http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi/Home.

saxicola) also occur on gabbro-derived soils in the Pine Hill area (Wilson 1986). Stebbins' morning-glory can be distinguished from other California morning-glories by its distinctively shaped leaves, each having seven to nine narrow lance-shaped lobes. Stebbins' morning-glory occurs in two localized areas. Most occurrences of Stebbins' morning glory are discontinuously scattered within two population centers in the northern and southern portions of the Pine Hill formation.

This plant has not been found within the Project Vicinity. The nearest known population was found in Nevada County.

Hartweg's golden sunburst (FE, SE)[10]

Hartweg's golden sunburst occurs in open grasslands and grasslands at the margins of blue oak woodland, primarily on shallow, well-drained, fine-textured soils, nearly always on the north or northeast facing of Mima mounds. These are mounds of earth roughly 1 to 6 feet high and 10 to 100 feet in diameter at the base, interspersed with basins that may pond water in the rainy season. The species is found only in the Central Valley of California. Historically, the range of the species may have extended from Yuba County south to Fresno County, a range of 200 miles. Within this range, the species was only locally abundant. Today, there are 16 populations on the eastern edge of the San Joaquin Valley. Remaining populations are concentrated in the Friant region of Fresno and Madera counties and the La Grange region in Stanislaus County (USFWS 2001).

This plant was found within the Project Vicinity during the CNDDB search. The occurrence was found within the Olivehurst and Yuba City quads (CDFG 2009f).

Valley elderberry longhorn beetle (FT)[11]

The Valley elderberry longhorn beetle (VELB) ranged historically throughout the Central Valley, extending up river canyons in the Sierra Nevada foothills to an elevation of about 3,000 feet. The beetle is completely dependent upon its host plant, the elderberry, which is a common component of the remaining riparian forests and adjacent uplands. The beetle's use of elderberries is not readily apparent; often the only exterior evidence is an exit hole created by the larva just prior to pupation. The life cycle takes 1 or 2 years to complete with most of that time spent as larva living within the stems of the plant. Adults generally emerge from late March through June, and are short-lived. USFWS has issued conservation guidelines for the beetle (USFWS 1999), which include survey protocols and compensation requirements for elderberries with one or more stems measuring 1.0 inch or greater in diameter at ground level that may be directly or indirectly impacted by construction or operation of a project. Where impacts to plants are anticipated as a result of an action, elderberry plants with stems that meet the 1.0-inch-diameter threshold on or adjacent to the area that may be disturbed, must be thoroughly searched for beetle exit holes and

[10] Photo found at: http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi/Home.
[11] Photo found at: http://essig.berkeley.edu/endins/desmocer.htm.

the number of stems tallied by diameter size class and location (*i.e.*, riparian or upland) for determination of compensation ratios. Elderberry plants lacking stems 1.0 inch or greater in diameter at ground level are considered unsuitable for use by the beetle and are not protected under the guidelines. Surveys are valid for a period of 2 years.

This species was found within the Project Vicinity during the CNDDB search. All occurrences were found within the Browns Valley quad (CDFG 2009f).

Vernal pool fairy shrimp (FT)[12]

The vernal pool fairy shrimp occupies a variety of different vernal pool habitats, from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools (Eng *et al.* 1990; Helm 1998). Although the vernal pool fairy shrimp has been collected from large vernal pools, including one exceeding 25 acres in area (Eriksen and Belk 1999), it tends to occur primarily in smaller pools (Platenkamp 1998), and is most frequently found in pools measuring less than 0.05 acre in area (Gallagher 1996; Helm 1998). The vernal pool fairy shrimp typically occurs at elevations from 30 to 4,000 feet (Eng *et al.* 1990), although two sites in the Los Padres National Forest have been found to contain the species at an elevation of 5,600 feet. The vernal pool fairy shrimp has been collected at water temperatures as low as 40.1 degrees Fahrenheit (°F) (Eriksen and Belk 1999), and has not been found in water temperatures above about 73.4°F (Helm 1998; Eriksen and Belk 1999). The species is typically found in pools with low to moderate amounts of salinity or total dissolved solids (Collie and Lathrop 1976; Keeley 1984; Syrdahl 1993). Vernal pools are mostly rain fed, resulting in low nutrient levels and dramatic daily fluctuations in pH, dissolved oxygen, and carbon dioxide (Keeley and Zedler 1998).

Although there are many observations of the environmental condition where vernal pool fairy shrimp have been found, there have been no experimental studies investigating the specific habitat requirements of this species. Platenkamp (1998) found no significant differences in vernal pool fairy shrimp distribution between four different geomorphic surfaces studied at Beale Air Force Base, California. Vernal pool fairy shrimp are highly adapted to the environmental conditions of their ephemeral habitats. One adaptation is the ability of the vernal pool fairy shrimp eggs, or cysts, to remain dormant in the soil when their vernal pool habitats are dry. Another important adaptation is that the vernal pool fairy shrimp has a relatively short life span, allowing it to hatch, mature to adulthood, and reproduce during the short time period when vernal pools contain water. The vernal pool fairy shrimp can reach sexual maturity in as few as 18 days at optimal conditions of 68°F, and can complete its life cycle in as little as 9 weeks (Gallagher 1996; Helm 1998).

This species was found within the Project Vicinity during the CNDDB search. The occurrence was found within the Browns Valley quad at Beale Air Force Base (CDFG 2009f).

[12] Photo found at: www.fws.gov.

Vernal pool tadpole shrimp (FE)[13]

The vernal pool tadpole shrimp is currently distributed across the Central Valley of California and in the San Francisco Bay area. The species' distribution has been greatly reduced from historical times as a result of widespread destruction and degradation of its vernal pool habitat. Vernal pool habitats in the Central Valley now represent only about 25 percent of their former area, and remaining habitats are considerably more fragmented and isolated than during historical times (Holland 1998). Vernal pool tadpole shrimp are uncommon even where vernal pool habitats occur. Helm (1998) found vernal pool tadpole shrimp in only 17 percent of vernal pools sampled across 27 counties, and Sugnet (1993) found this species at only 11 percent of 3,092 locations. In the Northwestern Sacramento Vernal Pool Region, vernal pool tadpole shrimp are found at the Stillwater Plains and in the vicinity of the City of Redding in Shasta County.

In the Northeastern Sacramento Vernal Pool Region, vernal pool tadpole shrimp have been documented on private land in the vicinity of Chico in Butte counties, in Tehama County at the Vina Plains Preserve, the Dales Lake Ecological Reserve, and on CALTRANS land. The largest concentration of vernal pool tadpole shrimp occurrences are found in the Southeastern Sacramento Vernal Pool Region, where the species occurs on a number of public and private lands in Sacramento County. Vernal pool tadpole shrimp are also known to occur in a few locations in Yuba and Placer counties, including Beale Air Force Base. In the Solano-Colusa Vernal Pool Region, the vernal pool tadpole shrimp occurs in the vicinity of Jepson Prairie, Travis Air Force Base, near Montezuma in Solano County, and in the Sacramento National Wildlife Refuge in Glenn County. In the San Joaquin Vernal Pool Region, vernal pool tadpole shrimp are known to occur in the Grasslands Ecological Area, on private land in Merced County, and in a single location in both Tulare and Kings Counties. In the Southern Sierra Foothills region, the species occurs at the Stone Corral Ecological Preserve in Tulare County, on ranchlands in eastern Merced County, at the Big Table Mountain Preserve in Fresno County, and at a few locations in Stanislaus County. In the Central Coast Vernal Pool Region, the vernal pool tadpole shrimp is found on the San Francisco National Wildlife Refuge and private land in Alameda County.

Although the vernal pool tadpole shrimp is adapted to survive in seasonally available habitat, the species has a relatively long life span compared to other vernal pool crustaceans. Helm (1998) found that the vernal pool tadpole shrimp lived significantly longer than any other species observed under the same conditions except the California fairy shrimp. Vernal pool tadpole shrimp continue growing throughout their lives, periodically molting their shells. These shells can often be found in vernal pools where vernal pool tadpole shrimp occur. Helm (1998) found that vernal pool tadpole shrimp took a minimum of 25 days to mature and the mean age at first reproduction was 54 days.

This species was found within the Project Vicinity during the CNDDB search. All occurrences were found within the Browns Valley quad (CDFG 2009f).

[13] Photo found at: http://www.natureserve.org.

California red-legged frog (FT)[14]

The historical range of the California red-legged frog (CRLF) extends through Pacific slope drainages from Shasta County, California, to Baja California, Mexico, including the Coast Ranges and the west slope of the Sierra Nevada Range at elevations below 4,000 feet. The current range of this species is greatly reduced, with most remaining populations occurring along the coast from Marin County to Ventura County. In the Sierra Nevada region, there are only about six known extant populations, most of which contain few adults (Shaffer *et al.* 2004; USFWS 2006).

CRLF is primarily associated with perennial ponds or pools, and perennial or seasonal streams where water remains long enough for breeding and development of young to occur (*i.e.*, a minimum of 20 weeks) (Jennings and Hayes 1994; USFWS 2006). Habitats with the highest densities of frogs contain dense emergent or shoreline riparian vegetation closely associated with moderately deep (greater than 2.3 feet), still or slow-moving water. The types of vegetation that seem to provide the most suitable structure are willows, cattails, and bulrushes at or close to the water level, which shade a substantial area of the water (Hayes and Jennings 1988). Another key habitat indicator for CRLF is the absence or near-absence of introduced predators such as bullfrogs and predatory fish, particularly centrarchids (*i.e.*, freshwater sunfishes), which feed on the larvae at higher rates than native predatory species (Hayes and Jennings 1988), and mosquitofish. Emergent vegetation, undercut banks, and semi-submerged root wads afford shelter from predators (USFWS 1997b). Freshwater wetlands, plunge pools in intermittent streams, seeps, and springs that are not suitable for breeding may provide habitat for aestivation, shelter, foraging, predator avoidance, and juvenile dispersal.

Breeding occurs from late November to late April in ponds or in backwater pools of creeks. Egg masses are attached to emergent vegetation such as cattails and bulrushes. Larvae remain in these aquatic habitats until metamorphosis. Increased siltation during the breeding season can cause asphyxiation of eggs and small larvae. Larvae typically metamorphose between July and September, and most likely feed on algae (Jennings and Hayes 1994).

Outside of the breeding season, adults may disperse upstream, downstream, or upslope of breeding habitat to forage and seek sheltering habitat. Frogs have been found in small-mammal burrows, leaf litter, and other moist sites in or near (up to 200 feet from) riparian areas (Jennings and Hayes 1994; USFWS 2006). During wet periods, long distance dispersal of up to a mile may occur between aquatic habitats, which may require traversing upland habitats or ephemeral drainages (USFWS 2006). Seeps and springs in open grasslands can function as foraging habitat or refugia for wandering frogs (USFWS 1997b).

CNDDB (2009) reports the occurrence of CRLF at one location in the Project Vicinity: Little Oregon Creek (east of Oregon Hill Road). The site is described as two spring-fed tailings ponds near Little Oregon Creek which were covered by dense blackberry scrub vegetation prior to a

[14] Photo found at: http://www.californiaherps.com/frogs/pages/r.draytonii.html.

fire in 1999 (CRLF were discovered at the site in 2000). USFWS (2006) has designated critical habitat for this species (habitat unit YUB-1) associated with this occurrence.

Steelhead, California Central Valley DPS (FT)

Central Valley steelhead were listed as a threatened species under the ESA on March 19, 1998 (63 FR 13347). This DPS consists of steelhead populations in the Sacramento and San Joaquin River basins in California's Central Valley. The Coleman National Fish Hatchery and Feather River Hatchery steelhead populations are now included in the listed population of steelhead (71 FR 834; these populations were previously included in the DPS but were not deemed essential for conservation and thus not part of the listed steelhead population). Critical habitat was designated for Central Valley steelhead on September 2, 2005 (70 FR 52488). Critical Habitat in the lower Yuba River includes the stream channels to the ordinary high water line extending from the confluence with the Feather River upstream to the USACE's Englebright Dam.

Steelhead is the name commonly applied to the anadromous form of the biological species *Oncorhynchus mykiss*. The present distribution of steelhead extends from Kamchatka in Asia, east to Alaska, and down to southern California (NMFS 1999 as cited by Good *et al*. 2005), although the historical range of steelhead extended at least to the Mexico border (Busby *et al.* 1996 as cited by Good *et al.* 2005).

Steelhead exhibits perhaps the most complex suite of life-history traits of any species of Pacific salmonid. Members of this species can be anadromous or freshwater residents, and, under some circumstances, members of one form can apparently yield offspring of another form. Those that are anadromous can spend up to 7 years in fresh water prior to smoltification, and then spend up to 3 years in salt water prior to first spawning.

Aside from cutthroat trout (*O. clarki)*, steelhead is the only anadromous species of the genus *Oncorhynchus* in which adults can survive spawning and return to fresh water to spawn in subsequent years (*i.e.*, it is iteroparous). Individuals that survive spawning run return to sea between April and June (Mills and Fisher 1994). The frequency of repeat spawning is higher for females than for males (Ward and Slaney 1988; Meehan and Bjornn 1991; Behnke 1992). In the Sacramento River, Hallock (1989) reported that 14 percent of steelhead returned to spawn a second time.

Similar to fall Chinook salmon, female steelhead construct redds in suitable gravels, primarily in pool tailouts and heads of riffles. Steelhead eggs incubate in redds for 3-14 weeks, depending on water temperatures (Shapovalov and Taft 1954, Barnhart 1991). After hatching, alevins remain in the gravel for an additional 2-5 weeks while absorbing their yolk sacs and emerge in spring or early summer (Barnhart 1991).

After emergence, steelhead fry move to shallow-water, low-velocity habitats, such as stream margins and low gradient riffles, and will forage in open areas lacking instream cover (Hartman

1965, Everest *et al.* 1986, Fontaine 1988). As fry increase in size and their swimming abilities improve in late summer and fall, they increasingly use areas with cover and show a preference for higher velocity, deeper mid-channel areas near the thalweg (Hartman 1965, Everest and Chapman 1972, Fontaine 1988).

Juvenile steelhead occupy a wide range of habitats, preferring deep pools as well as higher velocity rapid and cascade habitats (Bisson *et al*. 1982, 1988). During the winter period of inactivity, steelhead prefer low velocity pool habitats with large rocky substrate or woody debris for cover (Hartman 1965; Swales *et al*. 1986; Raleigh *et al.* 1984; Fontaine 1988). During periods of low temperatures and high flows associated with the winter months, juvenile steelhead seek refuge in interstitial spaces in cobble and boulder substrates (Bustard and Narver 1975; Everest *et al*. 1986). Juvenile emigration typically occurs from April through June. Juveniles remain in fresh water for 2 to 4 years before immigrating to the ocean. Most steelhead south of Alaska and British Columbia smolt after a period of 2 years in fresh water and spend 2 years in the ocean before returning to their natal streams to spawn. Populations in Oregon and California, however, have higher frequencies of adults returning after only one year in the ocean (Busby *et al.* 1996).

Water temperature is an important factor affecting steelhead incubation and juvenile rearing success. Temperature directly affects survival, growth rates, and smoltification. Temperature also indirectly affects vulnerability to disease and predation. Myrick and Cech (2001) provide a review of the effects on water temperature on salmon and steelhead incubation, rearing, and smoltification in the Central Valley. The results of this review are summarized below.

Steelhead eggs can survive at water temperatures between 36° F and 59° F, with highest survival rates occurring at temperatures between 45° F and 50° F. The chronic upper lethal temperature for Central Valley steelhead is approximately 77° F, with higher temperatures (*i.e.*, up to 85° F) tolerated for short periods of time. In tests of thermal preferences, hatchery-reared Central Valley steelhead consistently selected temperatures of 64° F to 66° F, while wild steelhead consistently selected temperatures of 63° F. Juvenile steelhead have been reported to grow at temperatures ranging from 44° F to 73° F. Maximum growth rates reported for Central Valley steelhead occurred at 66° F, but higher temperatures have not been tested. While steelhead can rear at temperatures in the range of 66° F, cooler water temperatures are required for successful smoltification. Steelhead can smolt at temperatures ranging from 44° F to 52° F and show little adaptation to seawater at temperatures exceeding 59° F.

There has been little information published on population trends and absolute abundance of steelhead in the lower Yuba River (NMFS 2007). CDFG estimated a spawning population of only about 200 fish annually prior to 1969. Prior to construction of USACE's Englebright Dam, CDFG fisheries biologists stated that they observed large numbers of steelhead spawning in the uppermost reaches of the Yuba River and its tributaries (CDFG 1998; Yoshiyama *et al.* 1996). During the 1970s, CDFG annually stocked hatchery steelhead from Coleman National Fish Hatchery into the lower Yuba River, and by 1975 estimated a run size of about 2,000 fish (CDFG 1991). CDFG stopped stocking steelhead into the lower Yuba River in 1979, and currently manages the river to protect natural steelhead through strict "catch-and release" fishing regulations (NMFS 2007).

Infrared and videographic sampling on both ladders at USACE's Daguerre Point Dam since 2003 has provided estimates of steelhead numbers migrating up the Yuba River (Table 7.7.2-2). However, these estimates should be considered preliminary, minimum numbers, as periodic problems with the sampling equipment have caused periods when fish ascending the ladders were not counted. Additionally, because steelhead can be similar in size to many other species of fish in the Yuba River, only those inferred images that were backed up by photographic images clearly showing that the fish was a steelhead were included in the counts represented in Table 7.7.2-2. Therefore it is likely that the actual numbers of steelhead passing USACE's Daguerre Point Dam are higher than those reported in Table 7.7.2-2 (CDFG unpublished data, as cited in NMFS 2007).

Table 7.7.2-2. Adult steelhead counted ascending USACE's Daguerre Point Dam.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2003	---	---	---	---	---	9	7	0	64	63	19	8	170
2004	1	24	0	52	43	110	59	48	261	134	30	0	762
2005	3	4	4	9	37	84	23	13	115	38	11	15	356
2006	5	3	7	0	15	44	24	22	5	9	7	9	150
2007	8	7	49	135	119	175	18	---	---	---	---	---	511

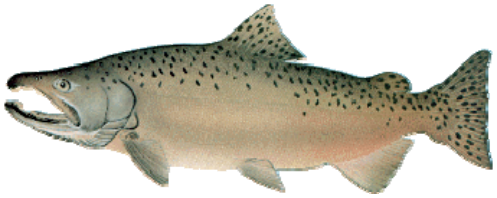
Source: NMFS 2007

The data in Table 7.7.2-2 indicate that 2007 upstream adult steelhead passage at USACE's Daguerre Point Dam through the first half of the month of July was the highest since the device was installed in 2003. However, the short time period in which this device has been in operation, coupled with the two to four year life cycle of steelhead, make it difficult to determine decisive trends in the Yuba River steelhead population (NMFS 2007).

Steelhead adult immigration and holding in the lower Yuba River extends from August through March (YCWA *et al.* 2007). Spawning generally extends from January through April, primarily occurring in reaches upstream of USACE's Daguerre Point Dam. The embryo incubation life stage generally extends from January through May. Juvenile steelhead are believed to rear in the lower Yuba River year-round. The steelhead smolt emigration period is believed to extend from October through May (YCWA *et al.* 2007).

The primary rearing habitat for juvenile steelhead/rainbow trout is upstream of USACE's Daguerre Point Dam. Juvenile trout (age 0 and 1+) abundances were substantially higher upstream of USACE's Daguerre Point Dam, with decreasing abundance downstream of USACE's Daguerre Point Dam. Large juveniles and resident trout up to 18 inches long also have been commonly observed in the lower Yuba River upstream and downstream of USACE's Daguerre Point Dam (SWRI *et al.* 2000).

Chinook salmon, Central Valley spring-run ESU (FT, ST)[15]



Central Valley spring-run Chinook salmon were listed as a threatened species on September 16, 1999 (50 FR 50394). This ESU consists of spring-run Chinook salmon occurring in the Sacramento River basin. The Feather River Hatchery spring-run Chinook salmon population has been included as part of the Central Valley spring-run Chinook salmon ESU as of June 28, 2005 (70 FR 37160). Critical habitat was designated for Central Valley spring run Chinook salmon on September 2, 2005 (70 FR 52488). Critical Habitat in the Yuba River includes the stream channels to the ordinary high water line extending from the confluence with the Feather River upstream to USACE's Englebright Dam.

Four distinct runs of Chinook salmon spawn in the Sacramento-San Joaquin River system, with each run named for the season when the majority of the run enters freshwater as adults. Spring-run Chinook enter the Sacramento River from late March through September. Adults hold in cool water habitats through the summer, and then spawn in the fall from mid-August through early October. Spring-run juveniles migrate soon after emergence as young-of-the-year, or remain in freshwater and migrate as yearlings.

Historically, spring-run Chinook salmon occurred in the headwaters of all major river systems in the Central Valley where natural barriers to migration were absent. Beginning in the 1880s, harvest, water development, construction of dams that prevented access to headwater areas and habitat degradation significantly reduced the number and range of spring-run Chinook salmon in the Central Valley. Presently, Mill, Deer, and Butte creeks in the Sacramento River system support self-sustaining, persistent populations of spring-run Chinook salmon.

The upper Sacramento, Yuba, and Feather rivers also are reported to support spring-run Chinook salmon. However, current documentation of these populations is weak, and these populations may be hybridized to some degree with fall-run Chinook salmon. Spring-run Chinook salmon acquired and maintained genetic integrity through reproductive (spatial-temporal) isolation from other Central Valley Chinook salmon runs. However, construction of dams has prevented access to headwater areas and much of this historical reproductive isolation has been compromised, resulting in intermixed life history traits in many remaining habitats.

Adult spring-run Chinook salmon immigration and holding in California's Central Valley Basin occurs from mid-February through September (CDFG 1998; Lindley *et al.* 2004). Suitable water temperatures for adult upstream migration reportedly range between 57º F and 67º F (NMFS 1997). In addition to suitable water temperatures, adequate flows are required to provide migrating adults with olfactory and other cues needed to locate their spawning reaches (CDFG 1998).

The primary characteristic distinguishing spring-run Chinook salmon from the other runs of Chinook salmon is that adult spring-run Chinook salmon hold in areas downstream of spawning grounds during the summer months until their eggs fully develop and become ready for

[15] Photo found at: http://pictures.thesalmon.com.ar/salmonpicturesChinookSalmon.html.

spawning. NMFS (1997) states, "*Generally, the maximum temperature for adults holding, while eggs are maturing, is about 59-60° F, but adults holding at 55-56° F have substantially better egg viability.*" Spring-run Chinook salmon reportedly spawn in the lower Yuba River, the lower Feather River and, to some extent, the mainstem Sacramento River. Spawning and embryo incubation has been reported to primarily occur during September through mid-February, with spawning peaking in mid-September (DWR 2004; Moyle 2002; Vogel and Marine 1991). Some portion of an annual year-class may emigrate as post-emergent fry (individuals less than 45 mm in length), and some rear in the upper Sacramento river and tributaries during the winter and spring and emigrate as juveniles (individuals greater than 45 mm in length, but not having undergone smoltification) or smolts (silvery colored fingerlings having undergone the smoltification process in preparation for ocean entry). The timing of juvenile emigration from the spawning and rearing grounds varies among the tributaries of origin, and can occur during the period extending from October through April (Vogel and Marine 1991). In the Feather River, data on juvenile spring-run emigration timing and abundance have been collected sporadically since 1955 and suggest that November and December may be key months for spring-run emigration (DWR and Reclamation 1999; Painter *et al.* 1977). In Butte Creek, the bulk of emigration is reported to occur between January and March, with some emigration continuing through April (Lindley *et al.* 2004). Some juveniles continue to rear in Butte Creek through the summer and emigrate as yearlings from October to February, with peak yearling emigration occurring in November and December (CDFG 1998).

Historical accounts indicate that spring-run in the Yuba River may have been present as far upstream as Downieville on the North Yuba River (Yoshiyama *et al.* 1996). Due to their presence high in the watershed, Yoshiyama concluded that these fish were spring-run Chinook salmon (NMFS 2007).

There is limited information on the current population size of spring-run Chinook salmon in the Lower Yuba River. In general, the current data indicate that adult escapement of spring-run Chinook salmon is low relative to historical levels (NMFS 2007). Prior to 2001, when CDFG conducted a study to quantify the number of adult spring-run Chinook salmon immigrating into the Yuba River by trapping fish in the fish ladder at USACE's Daguerre Point Dam, there was almost no specific information on the run timing and size of the population in the Yuba River. In the 2001 CDFG study, which involved limited sampling of fish ascending the north ladder, a total of 108 adult Chinook salmon were estimated to have passed the dam between March 1, 2001, and July 31, 2001 (CDFG 2002).

According to NMFS (2007), infrared and videographic sampling on both ladders at USACE's Daguerre Point Dam since 2003 has provided more robust estimates of spring-run Chinook salmon numbers migrating into the Yuba River (Table 7.7.2-3). However, these numbers should be considered to be preliminary, minimum estimates, as periodic problems with the sampling equipment have resulted in periods when fish ascending the ladders were not counted, so it is likely that the actual numbers are higher than those reported below (CDFG unpublished data, as cited in NMFS 2007). The detection of adipose fin clips on some of these fish indicates that they were hatchery strays, most likely from the Feather River Hatchery. The short time period in which this sampling has been conducted, coupled with the salmon's three to four year life cycle make it difficult to determine decisive trends in the spring-run Chinook salmon population.

While the recent data from 2006 and 2007 indicate a reduction in total abundance, passage in May (the primary spring-run migration month) of 2007 was the highest detected in that month since the sampling has been conducted (NMFS 2007).

Table 7.7.2-3. Adult spring-run Chinook salmon counted ascending USACE's Daguerre Point Dam.

	March	April	May	June	Total
2003	---	---	---	1250	1250
2004	---	2	53	376	431
2005	6	3	113	897	1019
2006	3	0	2	212	217
2007	9	2	153	78	242

Source: NMFS 2007

In the lower Yuba River, spring-run Chinook salmon adult immigration and holding primarily extends from March through October (YCWA *et al.* 2007). Spring-run Chinook salmon are reported to hold over during the summer in the deep pools and cool water downstream of the Narrows I and Narrows II powerhouses, or further downstream in the Narrows Reach (CDFG 1991; SWRCB 2003), where water depths can exceed 40 feet (YCWA *et al.* 2007). Congregations of adult Chinook salmon (approximately 30 to 100 fish) have been observed in the outlet pool at the base of the Narrows II Powerhouse, generally during late August or September when the powerhouse is shut down for maintenance. During this time period the pool becomes clear enough to see the fish (Michael Tucker, NMFS, pers. obs., September, 2003; Steve Onken, YCWA, pers. comm., April, 2004). While it is impossible to visually distinguish spring-run from fall-run Chinook salmon in this situation, the fact that these fish are congregated this far up the river at this time of year indicates that some of them are likely to be spring-run Chinook salmon (NMFS 2007).

The spring-run Chinook salmon spawning period extends from September through November, while the embryo incubation life stage generally extends from September to March (YCWA *et al.* 2007). Limited redd surveys during late August and September conducted by CDFG have detected spawning activities beginning during the first or second week of September. They have not detected a bimodal distribution of spawning activities (*i.e.*, a distinct spring-run spawning period followed by a distinct fall-run Chinook salmon spawning period) but instead have detected a slow build-up of spawning activities starting in early September and transitioning into the main fall-run spawning period. The earliest spawning generally occurs in the upper reaches of the highest quality spawning habitat (*i.e.*, bellow the Narrows pool) and progressively moves downstream throughout the spawning season (NMFS 2007).

Spring-run Chinook salmon juveniles are believed to rear in the lower Yuba River year-round. In general, juvenile Chinook salmon have been observed throughout the lower Yuba River, but with higher abundances above USACE's Daguerre Point Dam. This may be due to larger numbers of spawners, greater amounts of more complex, high-quality cover, and lower densities of predators such as striped bass and American shad, which reportedly are restricted to areas below USACE's Daguerre Point Dam (YCWA *et al.* 2007).

The spring-run Chinook salmon smolt emigration period is believed to extend from November through June, although based on CDFG's run-specific determinations, the vast majority

(approximately 94 percent) of spring-run Chinook salmon were captured as post-emergent fry during November and December, with a relatively small percentage (nearly 6 percent) of individuals remaining in the lower Yuba River and captured as YOY from January through March. Only 0.6 percent of the juvenile Chinook salmon identified as spring-run were captured during April, 0.1 percent during May, and none were captured during June (YCWA *et al.* 2007).

North American Green Sturgeon, Southern DPS (FT)[16]

The Southern DPS of North American green sturgeon was listed as a threatened species on April 7, 2005, (71 FR 17757) and includes the North American green sturgeon population spawning in the Sacramento River and utilizing the Sacramento River, Delta and San Francisco Estuary.

North American green sturgeon are widely distributed along the Pacific Coast, have been documented offshore from Ensenada, Mexico, to the Bering Sea, and are found in rivers from British Columbia to the Sacramento River (Moyle 2002). As is the case for most sturgeon, North American green sturgeon are anadromous; however, they are the most marine-oriented of the sturgeon species (Moyle 2002). In North America, spawning populations of the anadromous green sturgeon are currently found in only three river systems, the Sacramento and Klamath rivers in California and the Rogue River in southern Oregon.

The Southern DPS of the North American green sturgeon life cycle can be broken into four distinct phases based on developmental stage and habitat use: 1) adult females greater than or equal to 13 years of age and males greater than or equal to 9 years of age; 2) larvae and post-larvae less than 10 months of age; 3) juveniles less than or equal to 3 years of age; and 4) coastal migrant females between 3 and 13, and males between 3 and 9 years of age (Nakamoto *et al*. 1995).

Lindley (2006) presents preliminary results of large-scale green sturgeon migration studies. Lindley's analysis verified past population structure delineations based on genetic work and found frequent large-scale migrations of green sturgeon along the Pacific Coast. It appears Southern DPS North American green sturgeon are migrating considerable distances up the Pacific Coast into other estuaries, particularly the Columbia Estuary. This information also agrees with the results of green sturgeon tagging studies completed by CDFG where they tagged a total of 233 green sturgeon in the San Pablo Bay estuary between 1954 and 2001. A total of 17 tagged fish were recovered: 3 in the Sacramento-San Joaquin Estuary, 2 in the Pacific Ocean off of California, and 12 from commercial fisheries off of Oregon and Washington. Eight of the 12 recoveries were in the Columbia River estuary (CDFG 2002). In addition, recent analysis by Israel (2006) indicates a substantial population of Southern DPS North American green sturgeon to be present in the Columbia River estuary (50-80 percent).

[16] Photo found at: http://www.nmfs.noaa.gov/

Adult green sturgeon are believed to feed primarily upon benthic invertebrates such as clams, mysid, grass shrimp, and amphipods (Radtke 1966; Adams *et al*. 2002; Jeffrey Stuart, NMFS, pers. comm. 2006).

Adult green sturgeon are believed to spawn every 3 to 5 years and reach sexual maturity only after several years of growth (*i.e.*, 10 to 15 years based on sympatric white sturgeon sexual maturity) (CDFG 2002). Adult female green sturgeon produce between 60,000 and 140,000 eggs, depending on body size, with a mean egg diameter of 4.3 millimeters (mm) (Moyle *et al.* 1992; Van Eenennaam *et al*. 2001).

Southern DPS of North American green sturgeon adults begin their upstream spawning migrations into freshwater in late February with spawning occurring between March and July. Peak spawning is believed to occur between April and June and is thought to occur in deep turbulent pools (Adams *et al*. 2002). Substrate is likely large cobble but can range from clean sand to bedrock (USFWS 2002).

Newly hatched green sturgeon are approximately 12.5 to 14.5 mm in length. After approximately 10 days, larvae begin feeding and growing rapidly. Green sturgeon larvae do not exhibit the initial pelagic swim-up behavior characteristic of other Acipenseridae. They are strongly oriented to the bottom and exhibit nocturnal activity patterns. Under laboratory conditions, green sturgeon larvae cling to the bottom during the day, and move into the water column at night (Van Eenennaam *et al*. 2001). After 6 days, the larvae exhibit nocturnal swim-up activity (Deng *et al*. 2002) and nocturnal downstream migrational movements (Kynard *et al.* 2005).

Juvenile green sturgeon continues to exhibit nocturnal behavior beyond the metamorphosis from larvae to juvenile stages. Exogenous feeding starts at approximately 14 days (23 to 25 mm) (Van Eenennaam *et al*. 2001). Laboratory studies indicate that juvenile fish continued to migrate downstream at night for the first 6 months of life (Kynard *et al*. 2005). When ambient water temperatures reached 46° F, downstream migrational behavior diminished and holding behavior increased. These data suggest that 9 to 10 month old fish would hold over in their natal rivers during the ensuing winter following hatching, but at a location downstream of their spawning grounds.

No occurrences were found within the Project Vicinity during CNDDB and USFWS queries. The only known spawning habitat for green sturgeon near the Project Vicinity is on the Sacramento River (SWRI 2007). Although spawning of green sturgeon has not been documented on the lower Yuba River, occupation of the lower Yuba River below USACE's Daguerre Point Dam is supported by only one confirmed sighting based upon photographs and expert opinions (NMFS 2008a). Numerous surveys in the lower Yuba River downstream of USACE's Daguerre Point Dam, including carcass surveys, snorkel surveys, beach seining, electrofishing, rotary screw trapping and others, have been conducted since the 1970s. Over the many years of monitoring the lower Yuba River through these surveys, the only one sighting of an adult green sturgeon indicates extremely infrequent utilization of the lower Yuba River by green sturgeon. This is in contrast to the lower Feather River, where Southern DPS green

sturgeon have consistently been observed, although spawning has not been documented (NMFS 2008b).

7.7.4.2 CESA-Listed/Fully Protected Species

Bald eagle (SE, SFP)[17]

The bald eagle was listed by the USFWS as an endangered species in 1978, primarily due to population declines related to habitat loss, combined with contamination of prey species by past use of organochlorine pesticides, such as dichlorodiphenyltrichloroethane (DDT) and dieldrin (USFS 2001). On August 11, 1995, the bald eagle's status was changed to a threatened species in all lower 48 states. Since then, all of the recovery goals set forth in the Recovery Plan for the Bald Eagle Pacific Region have been met and USFWS de-listed the species and removed protections afforded by the ESA (FR Vol. 64(128):36454). However, several factors still pose risks to the species, including disturbances of nest sites by recreationists, fluctuating fish prey populations, and the number of roost trees available due to reservoir level fluctuations, wildfire, and habitat fragmentation.

The bald eagle breeds or winters throughout California, except for the desert areas, and the statewide population is increasing (CDFG 2000). Most breeding in the state occurs in the northern Sierra Nevada, Cascades, and north coast ranges. California's breeding population is resident year-round in most areas, where the climate is relatively mild (Jurek 1988). Between mid-October and December, migratory birds from areas north and northeast of California arrive in the state. Wintering populations remain through March or early April. Based on annual wintering and breeding bird surveys, it is estimated that between 100 and 300 eagles winter on the Sierra Nevada National Forests, and at least 151 to 180 pairs remain year-round to breed (USFS 2001). Data from statewide breeding surveys conducted since 1973 indicate that the number of breeding pairs in the State continue to increase on an annual basis (CDFG 2000). The breeding range in California expanded from portions of eight counties in 1981 to 27 of the State's 58 counties in 2000. Breeding generally occurs from February to July, but can be initiated as early as January via courtship, pair bonding, and territory establishment. The breeding season normally ends around August 31, as the fledglings are no longer attached to their nest area.

The bald eagle typically nests in large, old growth or dominant live trees with open branching, and within 2 miles of a lake, reservoir, or river containing fish. Most nesting territories in California are located in elevations ranging from 1,000 to 6,000 feet; however, nesting can occur from near sea level to over 7,000 feet (Jurek 1988). Nest trees typically provide an unobstructed view of the associated water body and are often prominently located on the topography. The bald eagle often constructs up to five nests within a territory and alternates between them from year to year.

[17] Photo found at: http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/.

The bald eagle is a generalized and opportunistic scavenger and predator. The more common prey items taken are fish, waterfowl, rabbits, and carrion of various animals. In general, foraging habitat consists of large bodies of water or free-flowing rivers with abundant fish and adjacent snags and other perches (USFS 2001).

Wintering habitat is associated with open bodies of water, primarily large lakes and reservoirs. Two characteristics that play a significant role in habitat selection during the winter are diurnal feeding perches and communal night roost areas. Most communal roosts are usually located near an abundant food source and have greater protection from the weather than diurnal habitat.

The results of the CNDDB search of Project Vicinity quads indicate that this species occurs within the Camptonville quad.

California black rail (ST, SFP)[18]

The California black rail is found within various habitats, from high coastal marshes to freshwater marshes along the lower Colorado River. Along the coast, they favor marshland with unrestricted tidal influence (*i.e.*, estuarine, intertidal, emergent, regularly flooded) (Evens *et al.* 1991). In coastal and estuarine salt marshes, favored areas are dominated by pickleweed, bulrush, matted salt grass, and other marsh vegetation. The California black rail also has an affinity for tidal sloughs (Biosystems Analysis 1989). Along the Colorado River, they use areas of shallow water with relatively stable water levels and flat shoreline supporting dense stands of three-square bulrush (Biosystems Analysis 1989).

California black rails prefer to nest in marshes that are close to bay or river water, in sites hidden in marsh grass, with a high proportion of Salicornia. Occasionally the California black rail will build the nest on damp ground; however, it is more common for the California black rail to build the nest on the mat of the previous year's dead grasses (Terres 1980). There is a chance high tides may destroy the nests (Evens and Page 1986).

The historic breeding range of the California black rail is from Tomales and San Francisco bays, including the Sacramento/San Joaquin Delta, continuing south along the coast to northern Baja California, the San Bernardino/Riverside area, the Salton Sea, and along the lower Colorado River north of Yuma in Arizona and California (CDFG 1990). California black rails are probably now absent as a breeder from coastal southern California; status as breeder in Riverside area unknown (CDFG 1990). As of the late 1980s, the bulk of the population was confined to the northern reaches of the San Francisco Bay estuary, especially the tidal marshland of San Pablo Bay and associated rivers; several small, fragment subpopulations still existed at Tomales Bay, Bolinas Lagoon, Morro Bay, in southeastern California, and western Arizona (Evens *et al.* 1991). Near the Salton Sea, southern California, California black rails occur in the Whitewater River delta and near Salt Creek (Biosystems Analysis 1989).

[18] Photo found at: http://www.allaboutbirds.org/guide/black_rail/id.

This species was found within the Project Vicinity during the CNDDB search. The occurrences were found within the Smartville and Oregon House quads (CDFG 2009f).

Swainson's hawk (ST)[19]

Swainson's hawk is an uncommon breeding resident and migrant in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and Mojave Desert. Very limited breeding has been reported from Lanfair Valley, Owens Valley, Fish Lake Valley, and Antelope Valley (Bloom 1980; Garrett and Dunn 1981). Swainson's hawks breed in stands with few trees in juniper-sage flats, riparian areas, and in oak savannah in the Central Valley. They forage in adjacent grasslands or suitable grain or alfalfa fields, or livestock pastures. Bloom (1980) estimated 110 nesting pairs, and a total population of 375 pairs, in California. In southern California, Swainson's hawks are now mostly limited to spring and fall transients. They were formerly abundant in California with wider breeding ranges (Grinnell and Miller 1944; Bloom 1980; Garrett and Dunn 1981). Declines have resulted in part from loss of nesting habitat.

This species was found within the Project Vicinity during the CNDDB search. The occurrences were found within the Browns Valley and Yuba City quads (CDFG 2009f).

Western yellow-billed cuckoo (SE)

The Western yellow-billed cuckoo is an uncommon to rare summer resident of valley foothill and desert riparian habitats in scattered locations in California. Along the Colorado River, a breeding population on the California side was estimated at 180 pairs in 1977 (Gaines 1977). Additional pairs reside in the Sacramento and Owens valleys, along the South Fork of the Kern River in Kern County, along the Santa Ana River in Riverside County, and along the Amargosa River in Inyo and San Bernardino counties. The Western yellow-billed cuckoo may also nest along San Luis Rey River in San Diego County. These birds were formerly much more common and widespread throughout lowland California, but numbers have been drastically reduced by habitat loss (Grinnell and Miller 1944; Gaines 1974; Garrett and Dunn 1981). Current population estimations show about 50 pairs existing in California (Hughes 1999).

This species was found within the Project Vicinity during the CNDDB search. The occurrences were found within the Olivehurst and Yuba City quads (CDFG 2009f).

[19] Photo found at: http://www.allaboutbirds.org/guide/Swainsons_Hawk/id.

Bank swallow (ST)[20]

The bank swallow is likely extirpated from southern California, where it was once common, and is now considered a locally common to uncommon summer resident in northern California. In northern California, nesting birds typically arrive from wintering areas in late April or early May, and vacate nesting colonies by late July. The bank swallow winters in South America. The bank swallow breeds at elevations from sea level to over 6,000 feet, but most colonies are known in valleys and coastal areas. Vegetation associated with breeding habitat is variable, as it depends largely on bank suitability; the bank swallow uses vertical riverbanks or bluffs near water where fine-textured or sandy soils allow for nest burrow excavation. Banks and bluffs selected for nesting are typically at least 3 feet high affording some protection from predators. In reservoirs, boat wakes and fluctuating water levels may erode existing habitat, but also have the potential to create new nesting substrate as banks erode. Bank swallows may dig new burrows each year if the bank face used the previous year has collapsed (FERC 2004).

This species was found within the Project Vicinity during the CNDDB search. The occurrences were found within the Yuba City and Sutter quads (CDFG 2009f).

7.7.5 List of Attachments

None.

[20] Photo found at: http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/.

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