7.7 Threatened, Endangered, and Fully Protected Species

7.7.1 Overview

This section provides 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 Pre-Application Document (PAD) was prepared, are listed as threatened or endangered under either the federal Endangered Species Act (ESA), the California Endangered Species Act (CESA) or both, or are fully protected under California law.[1] For the purpose of this PAD, 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 FP (fully protected under State of California law). Other species designated as special-status by a federal or a State of California agency (e.g., Forest Service Sensitive, ESA and/or CESA candidate, or California Species of Special Concern) are addressed in Sections 7.3 (Aquatic Resources), 7.4 (Wildlife Resources), and 7.5 (Botanical Resources).

This subsection is followed by four additional subsections. Section 7.7.2 identifies species listed as threatened or endangered under the ESA. Section 7.7.3 identifies species listed as threatened or endangered under the CESA or that are 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 readily 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 described 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 February 24, 2010, Licensee generated an official list of candidate and ESA-listed species for the Project Vicinity, which includes eight 7.5-minute United States Department of Interior (USDOI) United States Geological Survey (USGS) topographic quadrangles (quads), Challenge, Camptonville, French Corral, Smartville[3], Clipper Mills, Strawberry Valley, Pike, and Oregon House, by using the on-line request service available at USDOI, Sacramento Fish and Wildlife

[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" (FP). Such protection for fishes is 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. FP designations for amphibians and reptiles are authorized under §5050 of the California Fish and Game Code.

[2] For the purposes of this document, Project Vicinity is defined as the area surrounding the Project on the order of a 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' in the middle of the name However, the USGS gage refers to the former spelling of the community name. Therefore in this document, the community is referred to as such.

Service (USFWS) website (http://www.fws.gov/sacramento/es/spp_lists/auto_list_form.cfm). The list included 10 species, distinct population segments (DPS), and evolutionarily significant units (ESU): one plant; two invertebrates; one amphibian; one reptile; and four fishes (one of which has two listed forms).

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. Therefore, seven species on USFWS's February 24, 2010, list could potentially be affected by continued Project operation and maintenance (O&M). Seven of the species are listed as 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 DPS, Critical Habitat[4]
  - Chinook salmon (*Oncorhynchus tshawytscha*) spring-run ESU, Critical Habitat[5,6]
  - North American green sturgeon (*Acipenser medirostrus*), Southern DPS

Licensee searched several sources to compile the following for each of the ESA-listed species: 1) a description of the species' 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), Tahoe National Forests (TNF) species occurrence database (USFS 2009), and USFWS' online database and Recovery Plans. Attachment 7.4A to the Wildlife Resources section contains the results of the CNDDB query for all wildlife species. For plants, the sources were the CNDDB as well as the United States Department of Agriculture's (USDA) PLANTS database. Based on these searches, three additional species that could potentially be affected by continued Project O&M were located. All of these species are listed as endangered under the ESA.

[4] Critical Habitat for Steelhead in the Yuba River extends from the confluence with 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 confluence with 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 as from the 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, [where] 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 for the Project Vicinity plus an additional buffer of one quadrangle. 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 and 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.	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 2009b).	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 2009b).	Unknown in Project Vicinity.	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 (*Sambucus mexicana*).	Reported on the USFWS species list for Project Vicinity quads and counties (USFWS 2009). Seven occurrences found on CNDDB near Project Vicinity; all occurrences within Browns Valley quad (CDFG 2009b).	FT	Recovery Plan USFWS 1984

Table 7.7.2-1. (continued)

Common Name (Scientific Name)	Suitable Habitat Type	Known Occurrence in Project Vicinity	Status[a]	Status Reports and Recovery Plans Relevant to Project Vicinity
INVERTEBRATES (continued)				
Vernal pool fairy shrimp (*Branchinecta lynchi*)	Endemic to grasslands of the Central Valley, Central Coast Mountains, and South Coast Mountains, in rain-filled pools (CDFG 2009b).	Reported on the USFWS species list for Project Vicinity quads and counties (USFWS 2009). One occurrence found on CNDDB in the Project Vicinity within Browns Valley quad in Beale Air Force Base (CDFG 2009b).	FT	Recovery Plan USFWS 2005
Vernal pool tadpole shrimp (*Lepidurus packardi*)	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water (CDFG 2009b).	Four occurrences found on CNDDB near Project Vicinity; all occurrences within Browns Valley quad (CDFG 2009b). Three occurrences at Beale Air Force Base and one occurrence at Western Aggregates Gravel Mine on Hammonton Road in Yuba County.	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 2009b).	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 nearby records in CNDDB.	FT	Status Report Busby et al. 1996; Good et al. 2005; NMFS 1997b; NMFS 1998 Restoration and Management Plan CDFG 1991; CDFG 1993; CDFG 1996b Recovery Plan NMFS 2009 (Draft)
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 2009b).	FT, ST	Status Report CDFG 1996; CDFG 1998b; Good et al. 2005; Myers et al. 1998; NMFS 1999 Restoration and Management Plan CDFG 1991; CDFG 1993 Recovery Plan NMFS 2009 (Draft)

Table 7.7.2-1. (continued)

Common Name (Scientific Name)	Suitable Habitat Type	Known Occurrence in Project Vicinity	Status[a]	Status Reports and Recovery Plans Relevant to Project Vicinity
FISH (continued)				
North American green sturgeon, southern DPS (*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 (YCWA 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	Status Report Adams et al. 2002; NMFS 2005
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 2009b). 274 TNF observations within Project Vicinity (TNF 2009). TNF observations are shown in Attachment 7.4C, in Wildlife Resources section.	SE, FP	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 2009b).	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 2009b).	ST, FP	None
Swainson's hawk (*Buteo swainsoni*)	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs and agricultural or ranch (CDFG 2009b).	Two occurrences found on CNDDB near Project Vicinity within Browns Valley and Yuba City quads (CDFG 2009b).	ST	None
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	Riparian forest nester, along the broad, lower flood-bottoms of larger river systems (CDFG 2009b).	Two occurrences found on CNDDB near Project Vicinity within Olivehurst and Yuba City quads (CDFG 2009b).	SE	None
Bank swallow (*Riparia riparia*)	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert (CDFG 2009b).	Four occurrences found on CNDDB near Project Vicinity; three occurrences within Yuba City quad and one within Yuba City and Sutter quads (CDFG 2009b).	ST	None
Great gray owl (*Strix nebulosa*)	Found in or near meadows surrounded by forest with high density of large diameter snags and high canopy closure.	Forest Service reported occurrence within 1 mile of Log Cabin Diversion Dam (M. Tierney, pers. Comm., 2010)	SE	Status Report CDFG 2005
American peregrine falcon (*Falco peregrinus anatum*)	Various open habitats from tundra, moorlands, steppe, and seacoasts, especially where there are suitable nesting cliffs, to mountains, open forested regions, and human population centers.	Potentially occur within suitable habitat, identified as having potential to occur within the Yuba Accord Proposed Project (YCWA and USBR 2007).	FP	Status Report CDFG 2000 Species Profile USFWS 1999
Golden eagle (*Aquila chrysaetos*)	Generally open country, in prairies, arctic and alpine tundra, open wooded country, and barren areas, especially in hilly or mountainous regions.	Two TNF observations within Project Vicinity (TNF 2009). USFS observations are shown in Attachment 7.4C, in Wildlife Resources section.	FP	None

Table 7.7.2-1. (continued)

Common Name (Scientific Name)	Suitable Habitat Type	Known Occurrence in Project Vicinity	Status[a]	Status Reports and Recovery Plans Relevant to Project Vicinity
BIRDS (continued)				
Greater sandhill crane (*Grus canadensis tabida*)	Breeds in open grasslands, marshes, marshy edges of lakes and ponds, and river banks. Roosts at night along river channels, on alluvial islands of braided rivers, or natural basin wetlands.	Potentially occur within suitable habitat, identified as having potential to occur within the Yuba Accord Proposed Project (YCWA and USBR 2007).	ST, FP	Status Report CDFG 2000
White-tailed kite (*Elanus leucurus*)	Savanna, open woodland, marshes, partially cleared lands and cultivated fields, mostly in lowland situations.	Potentially occur within suitable habitat, identified as having potential to occur within the Yuba Accord Proposed Project (YCWA and USBR 2007).	FP	
MAMMALS				
Ring-tailed cat (*Bassariscus astutus*)	Typically in rocky areas with cliffs or crevices for daytime shelter; desert scrub, chaparral, pine-oak and conifer woodland. Usually within 0.5 miles of water. Dens usually in rock shelter; also in tree hollow, under tree roots, in burrow dug by other animal, in remote building, under brush pile. Changes den often.	Potentially occur within suitable habitat, identified as having potential to occur within the Yuba Accord Proposed Project (YCWA and USBR 2007).	FP	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.
FP California State listed as Fully Protected.

As shown in Table 7.7.2-1, three of the federal 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 FP species with a potential to occur in the Project Vicinity, Licensee reviewed CDFG's January 2010 list of *State and Federally Listed Endangered and Threatened Animals of California* (CDFG 2010a). The list includes 156 fish and wildlife species, of which 52 are listed under both the ESA and CESA, 74 are listed only under the ESA, and 30 are listed only under the CESA. Licensee also reviewed CDFG's *List of State Fully Protected Animals* (CDFG 2010b). 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 2009a). 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 as well as information provided by the Forest Service, Licensee considers 14 species, consisting of 2 plants, 1 fish, 10 birds, and 1 mammal currently listed under the CESA, or Fully Protected under California law, to be potentially affected by continued Project operations 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*)
  - Great gray owl (*Strix nebulosa*)
- 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*)
  - Greater sandhill crane (*Grus canadensis tabida*)
- State Fully Protected Species:
  - Bald eagle (*Haliaeetus leucocephalus*)
  - California black rail (*Laterallus jamaicensis coturniculus*)
  - American peregrine falcon (*Falco peregrinus anatum*)
  - Golden eagle (*Aquila chrysaetos*)
  - Greater sandhill crane (*Grus canadensis tabida*)
  - White-tailed kite (*Elanus leucurus*)
  - Ring-tail cat (*Bassariscus astutus*)

Table 7.7.2-1 (above) describes, for each of these species, general habitat requirements, any known occurrences within the Project Vicinity, and references to any recovery plans or status reports.

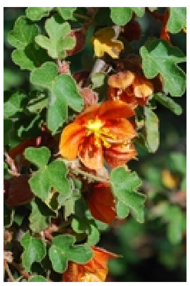
As shown in Table 7.7.2-1, three of the nine CESA-listed species are also listed under the ESA: Stebbins' morning-glory (FE), Hartweg's golden sunburst (FE) and Chinook salmon Central Valley spring-run ESU (FT).

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

A general life history of each threatened, endangered, candidate, and Fully Protected species with a potential to occur in the Project Vicinity is provided below. The species descriptions also include any known occurrences within, or adjacent to the Project Vicinity.

7.7.4.1 ESA and CESA Listed Species

7.7.4.1.1 Pine Hill flannelbush (FE)[7]



Pine Hill flannelbush (*Fremontodendron decumbens*) occurs on scattered rocky outcrops in chaparral on and in the vicinity of Pine Hill and in the black oak woodland on Pine Hill (USFWS 2002a). 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 known only 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 in some small scattered populations in Yuba and 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 (CDFG 2009b). 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 (CDFG 1998a). 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 (USFWS 2002a).

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

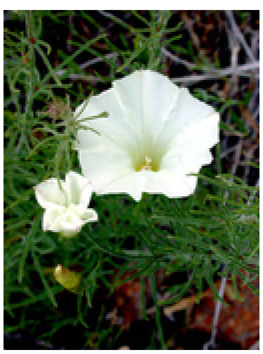
[7] Photo found at: http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi/Home

7.7.4.1.2 Layne's ragwort (FT)[8]

Layne's ragwort (*Packera layneae*) 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 coarse-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 2002a).

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

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



Stebbins' morning-glory (*Calystegia stebbinsii*) is a leafy herbaceous perennial 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 that 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. *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 is in Nevada County.

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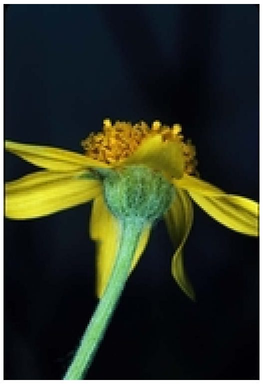
8 Photo found at: http://www.fws.gov/sacramento/es/plant_spp_accts/laynes_butterweed.htm.
9 Photo found at: http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi/Home.

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



Hartweg's golden sunburst (*Pseudobahia bahiifolia*) occurs in open grasslands and grasslands at the margins of blue oak woodland, primarily on shallow, well-drained, fine-textured soils, and nearly always on the north or northeast facing side 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. This 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 2001b).

This plant was not found within the Project Vicinity in the CNDDB search (CDFG 2009b).

7.7.4.1.5 Valley elderberry longhorn beetle (FT)[11]

The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) historically ranged 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 1984), 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 affected 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 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.

[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.

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

7.7.4.1.6 Vernal pool fairy shrimp (FT)[12]

The vernal pool fairy shrimp (*Branchinecta lynchi*) occupies a variety of different vernal pool habitats, from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools (Helm 1998; USFWS 2005). 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 (USFWS 2005), 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. 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 conditions 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 near the Project Vicinity during the CNDDB search. This occurrence was found in the Browns Valley quadrangle at Beale Air Force Base (CDFG 2009b). Beale Air Force Base is within the Project Vicinity but outside of the Project Area.[13] Although Beale Air Force Base is known for its vernal pools, USFWS has excluded it from a critical habitat designation (CalTrans 2003).

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

[13] For the purposes of this document, the Project Area is defined as the area within the FERC Project Boundary and the land immediately surrounding the FERC Project Boundary (i.e., within about 0.25 mile of the FERC Project Boundary) and includes Project-affected reaches between facilities and downstream to the next major water controlling feature or structure.

7.7.4.1.7 Vernal pool tadpole shrimp (FE)[14]

The vernal pool tadpole shrimp (*Lepidurus packardi*) 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 County. They have also been documented 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

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

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 near the Project Vicinity during the CNDDB search. All occurrences were found within the Browns Valley quadrangle (CDFG 2009b). Three occurrences were found at Beale Air Force Base and one occurrence was found at Western Aggregates Gravel Mine on Hammonton Road in Yuba County, near Beale Air Force Base. Beale Air Force Base is within the Project Vicinity but outside of the Project Area. Although Beale Air Force Base is known for its vernal pools, USFWS has excluded it from a critical habitat designation (CalTrans 2003).

7.7.4.1.8 California red-legged frog (FT)[15]

The historical range of the California red-legged frog (*Rana draytonii*) 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 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).

The California red-legged frog 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 the California red-legged frog 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.

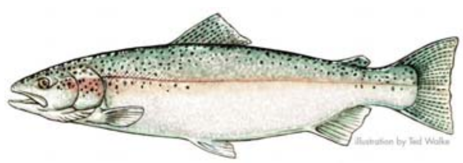
Breeding occurs from late November to late April in ponds or in backwater pools of creeks. Egg masses are attached to emergent vegetation such as cattails and bulrushes. Larvae remain in these aquatic habitats until metamorphosis. Increased siltation during the breeding season can cause asphyxiation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

[15] Photo found at: http://www.fws.gov/sacramento.

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 (CDFG 2009b) reports the occurrence of the California red-legged frog 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 fire in 1999 (California red-legged frogs were discovered at the site in 2000). USFWS (2006) has designated critical habitat for this species (habitat unit YUB-1) associated with this occurrence.

7.7.4.1.9 Steelhead, California Central Valley DPS (FT)[16]



On March 19, 1998 (63 FR 13347) NMFS listed the Central Valley Distinct Population Segment (DPS) of steelhead as a "threatened" species, concluding that the risks to Central Valley steelhead had diminished since the completion of the 1996 status review based on a review of existing and recently implemented State conservation efforts and Federal management programs (e.g., CVPIA AFRP, CALFED) that address key factors for the decline of this species. On January 5, 2006 NMFS reaffirmed the threatened status of the Central Valley steelhead DPS (71 FR 834) and applied the DPS policy to the species because the resident and anadromous life forms of steelhead remain "markedly separated" as a consequence of physical, ecological and behavioral factors, and may therefore warrant delineation as a separate DPS (71 FR 834). The DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco and San Pablo Bays and their tributaries (63 FR 13347). Two artificial propagation programs are considered to be part of the DPS - the Coleman National Fish Hatchery, and Feather River Hatchery steelhead hatchery programs. NMFS determined that these artificially propagated stocks are no more divergent relative to the local natural population(s) than what would be expected between closely related natural populations within the DPS (71 FR 834).

On February 16, 2000 (65 FR 7764), NMFS published a final rule designating critical habitat for Central Valley steelhead. Critical habitat was designated to include all river reaches accessible to listed steelhead in the Sacramento and San Joaquin rivers and their tributaries in California, including the lower Yuba River upstream to Englebright Dam. NMFS proposed new Critical Habitat for spring-run Chinook salmon and Central Valley steelhead on December 10, 2004 (69 FR 71880) and published a final rule designating critical habitat for these species on September

[16] Photo found at: http://www.fish.state.pa.us/pafish/steelhdm.jpg.

2, 2005 including the lower Yuba River (70 FR 52488) extending from the confluence with the lower Feather River upstream to USACE's Englebright Dam.

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.

"Steelhead" is the name commonly applied to the anadromous form of the biological species *Oncorhynchus mykiss*. The physical appearance of *O. mykiss* adults and the presence of seasonal runs and year-round residents indicate that both anadromous (steelhead) and resident rainbow trout exist in the lower Yuba River downstream of Englebright Dam, although no definitive visual characteristics have been identified to distinguish young steelhead from resident trout (SWRI et al. 2000). Zimmerman et al. (2009) analyzed otolith strontium:calcium (Sr:Ca) ratios to determine maternal origin and migratory history (anadromous vs. non-anadromous) of *O. mykiss* collected in Central Valley rivers between 2001 and 2007, including the lower Yuba River. The proportion of steelhead progeny in the lower Yuba River (about 13%) was intermediate to the other rivers examined (Sacramento, Deer Creek, Calaveras, Stanislaus, Tuolumne, and Merced), which ranged from 4% in the Merced River to 74% in Deer Creek (Zimmerman et al. 2009). Results from Mitchell (2010) indicate *O. mykiss* in the lower Yuba River are exhibiting a predominately residential life history pattern. He found that 14 percent of scale samples gathered from 71 *O. Mykiss* moving upstream and trapped in the fish ladder at DPD from November 1, 2000, through March 28, 2001, exhibited an anadromous life history. Thus, it is recognized that both anadromous and resident lifehistory strategies of *O. mykiss* have been and continue to be present in the lower Yuba River.

Steelhead historically ranged throughout accessible tributaries and headwaters of the Sacramento and San Joaquin Rivers prior to major dam construction, water development, and other watershed disturbances. In the Yuba River, definitive historic population estimates do not exist for steelhead, but it is likely that the river supported large steelhead runs in the 1800s (USFWS 1995). CDFG (1996a) reported that the Yuba River historically supported the largest, naturally-reproducing, persistent population of steelhead in the Central Valley.

Prior to construction of Englebright Dam in 1941, 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). After construction of Englebright Dam in 1941, CDFG estimated that only approximately 200 steelhead spawned in the lower Yuba River annually before New Bullards Bar Reservoir was completed in 1969. From 1970 to 1979, CDFG annually stocked 27,270–217,378 fingerlings, yearlings, and sub-catchables from Coleman National Fish Hatchery into the lower Yuba River (CDFG 1991). CDFG stopped stocking steelhead into the lower Yuba River in 1979. Based on angling data, CDFG estimated a run size of 2,000 steelhead in the lower Yuba River in 1975 (CDFG 1991). McEwan and Jackson (1996) reported that, as of 1996, the status of the lower Yuba River steelhead population was unknown, but it appeared to be stable and able to support a significant sport fishery. CDFG currently manages the river to protect natural steelhead through strict "catch-and release" fishing regulations.

More recent information on the abundance of steelhead in the lower Yuba River was reported by NMFS (2007). They reported preliminary data obtained by operation of a Vaki Riverwatcher infrared and videographic sampling system on both ladders at Daguerre Point Dam since 2003. 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 lower Yuba River, only those infrared images that were backed up by photographic images clearly showing that the fish was a steelhead were included in the counts presented by NMFS (2007). These limitations also pertain to a recent update on steelhead passing Daguerre Point Dam over the period extending from March 2007 through February 2008 (Massa et al. 2010). Therefore, it is likely that the actual numbers of steelhead passing Daguerre Point Dam are higher than those reported by NMFS (2007) and Massa et al. (2010). Table 7.7.2-2 presents the data as reported by NMFS (2007) for the period extending from June 2003 through February 2007, and data from Massa et al. (2010) extending from March 2007 through February 2008. However, the relatively short time period encompassed by the reported results, the preliminary nature of the data not including further estimation addressing periods of inoperation, and in consideration that steelhead may have returned to the lower Yuba River but remained and spawned in the river downstream of Daguerre Point Dam, currently render problematic the determination of abundance trends in the lower Yuba River steelhead population.

Table 7.7.2-2. Preliminary data representing counts of *O. mykiss* ascending Daguerre Point Dam.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2003	--	--	--	--	--	9	7	0	64	63	19	8	--
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	61	164	106	182	18	30	3	11	14	33	637
2008	11	65	--	--	--	--	--	--	--	--	--	--	--

The immigration of adult steelhead in the lower Yuba River has been reported to occur from August through March, with peak immigration from October through February (CALFED and YCWA 2005; McEwan and Jackson 1996). CDFG (1984) report that during the drought years of 1976-1977, two steelhead immigration peaks were observed – one in October and one in February. CDFG (1991) reported that steelhead enter the lower Yuba River as early as August, migration peaks in October through February, and may extend through March. In addition, they report that a run of “half-pounder” steelhead reported occurred from late-June through the winter months.

Observations reported in other studies indicate that adult steelhead immigrate into Central Valley rivers from August through March (McEwan 2001; NMFS 2004), and peak during January and February (Moyle 2002). Baseline data for steelhead gathered from trapping studies conducted by Hallock (1989) in the Sacramento River above the Feather River confluence described migratory periods occurring from July through March, with peak occurrence during mid- to late-September. Trapping at Red Bluff Diversion Dam from 1969-1982 found that adult steelhead immigration began in July and extended into May (Hallock 1989). Data from the lower Feather River identified adult steelhead trout immigration from November to April, with peak immigration occurring from November through January (McEwan and Jackson 1996).

Examination of the preliminary data presented in Table 7.7.2-2 demonstrates variable annual timing of *O. mykiss* ascending Daguerre Point Dam since the Vaki Riverwatcher infrared and videographic sampling system has been operated beginning in 2003. For example, Massa et al. (2010) state that peak passage of steelhead at USACE's Daguerre Point Dam occurred from April through June during 2007. They also suggest that the apparent disparity between the preliminary data and other reports of steelhead adult immigration periodicity may be explained by the previously reported (Zimmerman et al. 2009; Mitchell 2010) relatively high proportion of resident (vs. anadromous) *O. mykiss* occurring in the lower Yuba River, because the Vaki Riverwatcher system did document larger (> 40.6 cm) *O. mykiss* ascending Daguerre Point Dam during the winter months (December through February). The observed timing of larger *O. mykiss* ascending Daguerre Point Dam more closely corresponds with previously reported adult steelhead immigration periodicities.

Steelhead spawning has been reported to generally extend from January through April in the lower Yuba River (CALFED and YCWA 2005; CDFG 1991; YCWA et al. 2007). The Yuba Accord RMT conducted a pilot redd survey from September 2008 through April 2009 (Yuba Accord RMT 2010). Surveys were not conducted during March, which is a known time for steelhead spawning in other Central Valley rivers, due to high flows and turbidity. An extensive area redd survey was conducted by kayaking from the downstream end of the Narrows pool to the Simpson Lane Bridge. During the extensive area redd survey, redds categorized as steelhead based on redd size criterion were observed from October through April, with peaks in spawning activity occurring during fall (October) and spring (February and April). However, those redds categorized as steelhead, particularly during October, may actually have been small Chinook salmon redds because the size criterion used to identify steelhead redds was found to be 53 percent accurate for identifying steelhead redds in the Feather River (USFWS 2008), although one adult steelhead was observed on a redd in October.

Steelhead spawning has been reported to primarily occur in the lower Yuba River upstream of Daguerre Point Dam (SWRI et al. 2000; YCWA et al. 2007). Kozlowski (2004) states that field observations during winter and spring 2000 (YCWA unpublished data) indicated that the majority of steelhead spawning in the lower Yuba River occurred from Long Bar upstream to The Narrows, with the highest concentration of redds observed upstream of the Highway 20 Bridge. USFWS (2007) data were collected on *O. mykiss* redds in the lower Yuba River during 2002, 2003, and 2004, with approximately 98 percent of the redds located upstream of Daguerre Point Dam. During the pilot redd survey conducted from the fall of 2008 through spring of 2009, the Yuba Accord RMT (2010) report that most (65%) of the steelhead redds were observed upstream of Daguerre Point Dam.

Female steelhead construct redds within a range of depths and velocities in suitable gravels, oftentimes in pool tailouts and heads of riffles. In the lower Yuba River, steelhead also have been observed to spawn in side channel areas (YCWA unpublished data).

Steelhead eggs incubate in redds for 3 to 14 weeks prior to hatching, depending on water temperatures (Shapovalov and Taft 1954; Barnhart 1991). After hatching, alevins remain in the gravel for an additional 2 to 5 weeks while absorbing their yolk sacs prior to emergence (Barnhart 1991). The entire egg incubation life stage encompasses the time adult steelhead select a spawning site through the time when emergent fry exit the gravel (CALFED and YCWA 2005). In the lower Yuba River, steelhead embryo incubation generally occurs from January through May (CALFED and YCWA 2005; SWRI 2002).

Some age-0 *O. mykiss* disperse downstream soon after emerging, beginning in July and August, and continue throughout the year (Kozlowski 2004). Thus, the steelhead fry (individuals less than about 45mm) lifestage generally extends from the time of initial emergence (based upon consideration of accumulated thermal units from the time of egg deposition through hatching and alevin incubation) until three months following the end of the spawning period. Thus, the fry rearing lifestage generally extends from mid-March through July, whereas the juvenile rearing lifestage extends year-round.

Juvenile steelhead have been reported to rear in the lower Yuba River for up to 1 year or more (SWRI 2002). CDFG (1991) reported that juvenile steelhead rear throughout the year in the lower Yuba River, and may spend from 1 to 3 years rearing in the river. Scale analysis conducted by Mitchell (2010) indicates the presence of at least four age categories for *O. mykiss* in the lower Yuba River that spent 1, 2, or 3 years in freshwater and 1 year at sea before returning to the lower Yuba River to spawn.

Based on the combined results from electrofishing and snorkeling surveys conducted during the late 1980s, CDFG (1991) reported that juvenile steelhead were observed in all river reaches downstream of the Englebright Dam and, in addition to Chinook salmon, were the only fish species observed in the Narrows Reach. They also indicated that most juvenile steelhead rearing occurred above Daguerre Point Dam.

The SWRI et al. (2000) document summarized data collection in the lower Yuba River obtained from 1992 through 2000. Since 1992, Jones and Stokes Associates (JSA) biologists conducted fish population surveys in the lower Yuba River using snorkel surveys to determine annual and seasonal patterns of abundance and distribution of juvenile *O. mykiss* (and Chinook salmon) during the spring and summer rearing periods. The primary rearing habitat for juvenile *O. mykiss* is upstream of Daguerre Point Dam. In 1993 and 1994, snorkeling surveys indicated that the population densities and overall abundance of juvenile *O. mykiss* (age 0 and 1+) were substantially higher upstream of Daguerre Point Dam, with decreasing abundance downstream of Daguerre Point Dam.

Similarly, Kozlowski (2004) found higher abundances of juvenile *O. mykiss* above USACE's Daguerre Point Dam, relative to downstream of Daguerre Point Dam. Kozlowski (2004) observed age-0 *O. mykiss* throughout the entire study area, with highest densities in upstream habitats and declining densities with increasing distance from the Narrows. Approximately 82 percent of juvenile *O. mykiss* were observed upstream of Daguerre Point Dam. Kozlowski (2004) suggested that the distribution of age-0 *O. mykiss* appeared to be related to the distribution of spawning adults.

In general, it has been reported that 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, juvenile steelhead have been reported to 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 have been reported to 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 prefers 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).

CDFG (1991) report that juvenile *O. mykiss* densities were highest in fast water habitats (i.e., riffle and run/glide) in the lower Yuba River.

The SWRI et al. (2000) document, which summarized data collection in the lower Yuba River obtained from 1992 through 2000, suggested that higher abundances of juvenile *O. mykiss* above Daguerre Point Dam may have been 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 were restricted to areas below Daguerre Point Dam.

In the lower Yuba River, Kozlowski (2004) reports that juvenile *O. mykiss* were observed in greater numbers in pool habitats than in run habitats. He suggests that results of his study indicated a relatively higher degree of habitat complexity, suitable for various life stages, in the reaches just below the Narrows compared to farther downstream, including greater occurrence of pool-type microhabitat suitable for juvenile *O. mykiss* rearing, as well as small boulders and cobbles preferred by the age-0 emerging life stage (Kozlowski 2004).

Juvenile *O. mykiss* apparently demonstrate a proclivity for near-bank areas in the lower Yuba River, rather than open-channel habitats. USFWS (2008) reports 258 observations of juvenile *O. mykiss* and 244 observations of juvenile Chinook salmon, all but 8 of them made near the river banks in the lower Yuba River.

A broad range of *O. mykiss* size classes have been observed in the lower Yuba River during spring and summer snorkeling, electrofishing, and angling surveys (SWRI et al. 2000). Juvenile *O. mykiss* ranging in size from 40-150 mm were commonly observed upstream of Daguerre Point Dam. Numerous larger juveniles and resident trout up to 18 inches long were also commonly observed in the mainstem upstream and downstream of Daguerre Point Dam (SWRI et al. 2000). Age 0 (young-of-the-year) *O. mykiss* were clearly shown by the distinct mode in lengths of fish caught by electrofishing (40-100 mm fork length). A preliminary examination of scales indicated that most yearling (age 1+) and older *O. mykiss* were represented by fish greater than 110 mm long, including most if not all of the fish caught by hook and line. The sizes of age 0 and 1+ *O. mykiss* indicated substantial annual growth of *O. mykiss* in the lower Yuba River.

Seasonal growth of age 0 *O. mykiss* was evident from repeated sampling in 1992 and 1999, but actual growth rates could not be estimated because of continued recruitment of fry (newly-emerged juveniles) or insufficient sample sizes.

Mitchell (2010) reports that analysis of scale growth patterns of juvenile *O. mykiss* in the lower Yuba River indicates a period of accelerated growth during the spring peaking during the summer months, followed by decelerated growth during the fall and winter. Following the second winter, juvenile *O. mykiss* in the lower Yuba River exhibit reduced annual growth in length with continued growth in mass until reaching reproductive age. Additionally, more rapid juvenile and adult *O. mykiss* growth occurred in the lower Yuba River compared to the lower Sacramento River and Klamath River *O. mykiss*, with comparable growth rates to *O. mykiss* in the upper Sacramento River (Mitchell 2010).

CDFG (1991) reports that juvenile steelhead in the lower Yuba River rear throughout the year, and may spend from one to three years in the river before emigrating primarily from March to June. Salvage data at the Hallwood-Cordua fish screen suggest that most juvenile fish initiated their downstream movements immediately preceding and following a new moon, indicating the presence of lunar periodicity in the timing or outmigration patterns in the lower Yuba River (Kozlowski 2004).

Some age-0 *O.mykiss* disperse downstream soon after emerging, beginning in July and August, and continue throughout the year (Kozlowski 2004). Kozlowski (2004) states that flow and temperature did not appear to cause age-0 steelhead/rainbow trout to initiate these downstream movements, because these factors varied little or not at all during the duration of the summer. Similarly, he states that water temperatures remained within the range preferred by *O. mykiss* throughout the study area and did not vary substantially among reaches.

In the lower Yuba River, some young-of-year (YOY) *O. mykiss* are captured in Rotary Screw Traps (RSTs) located downstream of Daguerre Point Dam during late-spring and summer, indicating movement downstream. However, at least some of this downstream movement may be associated with the pattern of flows in the river. Water transfer monitoring in 2001, 2002, and 2004 (YCWA and SWRCB 2001; YCWA 2003; YCWA 2005), generally from about mid-June through September, indicated that the character of the initiation of the water transfers could potentially affect juvenile *O. mykiss* downstream movement. Based upon the substantial differences in juvenile *O. mykiss* downstream movements (RST catch data) noted between the 2001 study, and the 2002 and 2004 studies, it was apparent that the increases in juvenile *O. mykiss* downstream movement associated with the initiation of the 2001 water transfers were avoided due to a more gradual ramping-up of flows that occurred in 2002 and 2004 (YCWA et al. 2007).

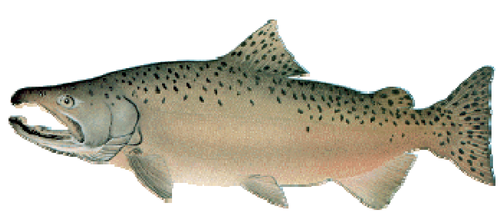
The steelhead smolt emigration period in the lower Yuba River has been reported to extend from October through May (CALFED and YCWA 2005; SWRI 2002; YCWA et al. 2007). River flow may be important in facilitating downstream movement of steelhead smolts (YCWA et al 2007). Smolt emigration is prompted by factors (e.g., photoperiod, instream flow, and water temperature), that induce the fish to emigrate once a physiological state of readiness has been achieved (Groot and Margolis 1991). River flows may be an important factor influencing the rate at which steelhead smolts migrate downstream, although factors influencing the actual speed of migration remain poorly understood (YCWA et al. 2007).

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. Individuals that survive spawning 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. In a lower Yuba river, Mitchell (2010) reports that, based on scale analysis, two of the 10 wild steelhead were on their second spawning migration at the time of capture, as indicated by a spawning check between the first and second ocean growth zones.

According to NMFS (2009), historical declines in steelhead abundance have been attributed largely to dams that eliminated access to most of their historic spawning and rearing habitat and restricted steelhead to unsuitable habitat below the dams. Other factors that have contributed to the decline of steelhead and other salmonids include habitat modification, over-fishing, disease and predation, inadequate regulatory mechanisms, climate variation, and artificial propagation (NMFS 1996). In recent past years, prior to implementation of the Yuba Accord, major factors (directly flow-related) influencing the status of naturally-spawning steelhead in the lower Yuba River include: 1) restricted flow-dependent habitat availability; 2) limited habitat complexity and diversity; 3) elevated water temperatures; and 4) flow fluctuations (YCWA et al. 2007; CALFED and YCWA 2005).

The NMFS (2009) Public Draft Recovery Plan states that the lower Yuba River presently supports a persistent population of steelhead, and that the lower Yuba River has a high potential to support a viable population, primarily because: 1) flow and water temperature conditions are generally suitable to support all life stage requirements; 2) the river does not have a hatchery on it (and the genetic integrity of the population may be largely uncompromised by hatchery influence); 3) spawning habitat availability does not appear to be limiting; and 4) there is high habitat restoration potential. NMFS (2009) further states that many of the processes and conditions that are necessary to support a viable population can be improved with provision of appropriate flow regimes, water temperatures and habitat availability, and that "*Continued implementation of the Yuba Accord is expected to address these factors and considerably improve conditions in the lower Yuba River"*.

7.7.4.1.10 Chinook salmon, Central Valley spring-run ESU (FT, ST)[17]



On September 16, 1999, NMFS listed the Central Valley Evolutionarily Significant Unit (ESU) of spring-run Chinook salmon (*Oncorhynchus tshawytscha)* as a "threatened" species (64 FR 50394). On June 14, 2004, following a five-year species status review, NMFS proposed that the Central Valley

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

spring-run Chinook salmon remain a threatened species based on the Biological Review Team strong majority opinion that the Central Valley spring-run Chinook ESU is ‘‘likely to become endangered within the foreseeable future’’ due to the greatly reduced distribution of Central Valley spring-run Chinook salmon and hatchery influences on the natural population. On June 28, 2005, NMFS reaffirmed the threatened status of the Central Valley spring-run Chinook salmon ESU, and included the Feather River Hatchery spring-run Chinook salmon population as part of the Central Valley spring-run Chinook salmon ESU (70 FR 37160). Critical habitat was designated for the Central Valley spring-run Chinook salmon ESU on September 2, 2005 (70 FR 52488) including the Yuba River extending from the confluence with the Feather River upstream to Englebright Dam.

Section 305(b)(2) of the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (16 USC 1801 et seq.) requires the identification of Essential Fish Habitat (EFH) for federally managed fishery species and the implementation of measures to conserve and enhance this habitat. In the Mid-Pacific Region, the Pacific Fisheries Management Council designates EFH and NMFS approves the designation. EFH includes specifically identified waters and substrate necessary for fish spawning, breeding, feeding, or growth to maturity and covers a species’ full life cycle (16 USC 1802(10)). EFH only applies to commercial fisheries. Chinook salmon habitat in the Yuba River (USGS Hydrologic Unit 18020107) has been identified as part of the Pacific salmon freshwater EFH. For the lower Yuba River downstream of Englebright Dam, EFH is applied to all runs (spring-run and fall/late fall-run) of Chinook salmon.

In addition to federal regulations, the California Endangered Species Act (CESA, Fish and Game Code Sections 2050 to 2089) establishes various requirements and protections regarding species listed as threatened or endangered under state law. California’s Fish and Game Commission is responsible for maintaining lists of threatened and endangered species under CESA. Spring-run Chinook salmon in the Sacramento River Drainage, including the Yuba River, was listed as a threatened species under CESA on February 2, 1999.

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. 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, 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.

Although the lower Yuba River continues to support a persistent population of spring-run Chinook salmon that spawn downstream of Englebright Dam, the genetic integrity of the fish expressing the phenotypic characteristics of spring-run Chinook salmon is presently uncertain. CDFG (1998) suggests that spring-run Chinook salmon populations may be hybridized to some degree with fall-run Chinook salmon due to lack of spatial separation of spawning habitat. Also, the observation of adipose fin clips on some of these fish indicates that they are hatchery strays, most likely from the Feather River Hatchery (NMFS 2009).

There is limited information on the population size of spring-run Chinook salmon in the Yuba River. Historical accounts indicate that "large numbers" of Chinook salmon may have been present as far upstream as Downieville on the North Fork Yuba River (Yoshiyama et al. 1996). Due to their presence high in the watershed, Yoshiyama et al. (1996) concluded that these fish were spring-run Chinook salmon.

In the Middle Fork Yuba River, Yoshiyama et al. (2001) conclude that direct information was lacking on historic abundance and distribution of salmon, and they conservatively considered the 10-foot falls located 1.5 miles above the mouth of the Middle Fork Yuba River as the effective upstream limit of salmon distribution.

Yoshiyama et al. (2001) report that little is known of the original distribution of salmon in the South Fork Yuba River where the Chinook salmon population was severely depressed and upstream access was obstructed by dams when CDFG began surveys in the 1930s. Yoshiyama et al. (2001) consider the cascade, with at least a 12-foot drop, located 0.5 mile below the juncture of Humbug Creek as essentially the historical upstream limit of salmon during most years of natural streamflows.

CDFG (1991) reports that a small spring-run Chinook salmon population historically occurred in the lower Yuba River but the run virtually disappeared by 1959. As of 1991, a remnant spring-run Chinook salmon population reportedly persisted in the lower Yuba River downstream of Englebright Dam maintained by fish produced in the lower Yuba River, fish straying from the Feather River, or fish previously and infrequently stocked from the Feather River Hatchery (CDFG 1991).

In the 1990s, relatively small numbers of Chinook salmon that exhibit spring-run phenotypic characteristics have been observed in the lower Yuba River (CDFG 1998). Although precise escapement estimates are not available, the USFWS testified at the 1992 SWRCB lower Yuba River hearing that "*…a population of about 1,000 adult spring-run Chinook salmon now exists in the lower Yuba River*" (San Francisco Bay RWQCB 2006).

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 Daguerre Point Dam, there was almost no specific information on the run timing and size of the population in the lower Yuba River. In the 2001 CDFG study, which involved limited sampling of fish ascending the north ladder at Daguerre Point Dam, a total of 108 adult Chinook salmon were estimated to have passed the dam between March 1, 2001, and July 31, 2001 (CDFG 2002).

More recent information on the abundance of spring-run Chinook salmon in the lower Yuba River was reported by NMFS (2007). They reported preliminary data obtained by operation of a Vaki Riverwatcher infrared and videographic sampling system on both ladders at Daguerre Point Dam since 2003. 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. These limitations also pertain to a recent update on Chinook salmon passing Daguerre Point Dam over the period extending from March 2007 through February 2008 (Massa et al. 2010). Therefore, it is likely that the actual numbers of Chinook salmon passing Daguerre Point Dam are higher than those reported by NMFS (2007) and Massa et al. (2010). Table 7.7.2-3 presents the data as reported by NMFS (2007) for the period extending from June 2003 through February 2007, updated with data from Massa et al. (2010) collected from March 2007 through February 2008. NMFS (2007) considered Chinook salmon ascending Daguerre Point Dam during the period extending from March through June each year to be indicative of the run-timing associated with spring-run Chinook salmon. Data from Massa et al. (2010) for these months are included in Table 7.7.2-3 for consistency of presentation. These data indicate that minimum estimates of phenotypically consistent spring-run Chinook salmon migrating into the lower Yuba River in recent years range from several hundred to over 1,200 fish. However, as with steelhead, the relatively short time period encompassed by the reported results, and the preliminary nature of the data not including further estimation addressing periods of inoperation, currently render problematic the determination of abundance trends in the lower Yuba River spring-run Chinook salmon population.

Table 7.7.2-3. Preliminary data representing counts of adult spring-run Chinook salmon ascending Daguerre Point Dam.

	March	April	May	June	Total
2003	--	--	--	1,250	1,250
2004	--	2	53	376	431
2005	6	3	113	897	1,019
2006	3	0	2	212	217
2007	8	2	153	79	242

The primary characteristic distinguishing spring-run Chinook salmon from the other runs of Chinook salmon is that adult spring-run Chinook salmon enter their natal streams during the spring, and hold in areas downstream of spawning grounds during the summer months until their eggs fully develop and become ready for spawning. Adult spring-run Chinook salmon immigration and holding in California's Central Valley has been reported to occur from mid-February through September (CDFG 1998; Lindley et al. 2004).

In the lower Yuba River, adult spring-run Chinook salmon immigration and holding has previously been reported to primarily occur in the Yuba River from March through October (Vogel and Marine 1991; YCWA et al. 2007), with upstream migration generally peaking in May (SWRI 2002). Recently, the Yuba Accord RMT (RMT) developed representative temporal distributions for specific spring-run Chinook salmon lifestages through review of previously conducted studies, as well as recent and currently ongoing data collection activities of the Yuba Accord M&E Program. The resultant lifestage periodicities encompass the majority of activity for a particular lifestage, and are not intended to be inclusive of every individual in the population. The RMT identified the spring-run Chinook salmon adult immigration and holding period as primarily extending from April through August.

Spring-run Chinook salmon in the lower Yuba River have been 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 and USBR 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 (M. Tucker, NMFS personal observation, September 2003; S. Onken, YCWA, pers. comm., 2004). While it is difficult 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).

At the Yuba River Symposium held on June 29, 2010, L. Albers (PSMFC) presented preliminary results obtained by the Yuba Accord RMT (http://www.yubaaccordrmt.com). Thirty adult Chinook salmon collected between May 12 and May 26, 2009, in the lower Yuba River downstream from Daguerre Point Dam were affixed with acoustic tags and tracked through the fall. These fish demonstrated variable patterns of upstream migration and holding, with some fish remaining for several weeks below Daguerre Point Dam, and others holding and/or moving among various locations above and below the dam, prior to moving into upstream areas to spawn during early fall.

Spring-run Chinook salmon reportedly spawn in the lower Yuba River, the lower Feather River and, to some extent, the mainstem Sacramento River. In the Central Valley, spawning has been reported to primarily occur from September to November, with spawning peaking in mid-September (CDWR 2004; Moyle 2002; Vogel and Marine 1991).

In the lower Yuba River, the spring-run Chinook salmon spawning period has been reported to extend from September through November (CDFG 1991; YCWA et a. 2007). Limited reconnaissance-level redd surveys conducted by CDFG since 2000 during late August and September 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 RMT recently identified the spring-run Chinook salmon spawning period as extending from September through mid-November.

The earliest spawning (presumed to be spring-run Chinook salmon) generally occurs in the upper reaches of the highest quality spawning habitat (i.e., below the Narrows pool) and progressively moves downstream throughout the fall-run Chinook salmon spawning season (NMFS 2007). Spring-run Chinook salmon spawning in the lower Yuba River is believed to occur upstream of Daguerre Point Dam. USFWS (2007) collected data from 168 Chinook salmon redds in the lower Yuba River on September 16-17, 2002 and September 23-26, 2002, considered to be spring-run Chinook salmon redds. The redds were all located above Daguerre Point Dam. During the pilot redd survey conducted from the fall of 2008 through spring of 2009, the Yuba Accord RMT (2010) report that the vast majority (96%) of fresh Chinook salmon redds constructed by the first week of October 2008, potentially representing spring-run Chinook salmon, were observed upstream of Daguerre Point Dam.

In general, Central Valley spring-run Chinook salmon have been reported to spawn at the tails of holding pools (Moyle 2002; NMFS 2007). Redd sites are apparently chosen in part by the presence of subsurface flow. Chinook salmon usually seek a mixture of gravel and small cobbles with low silt content to build their redds.

The length of time for spring-run Chinook salmon embryos to develop depends largely on water temperatures. In Butte and Big Chico creeks, emergence occurs from November through January, and in the colder waters of Mill and Deer creeks, emergence typically occurs from January through as late as May (Moyle 2002). For maximum embryo survival, water temperatures reportedly must be between 41ºF and 55.4ºF and oxygen levels must be close to saturation (Moyle 2002). Under those conditions, embryos hatch in 40 to 60 days and remain in the gravel as alevins for another 4 to 6 weeks, usually after the yolk sac is fully absorbed (NMFS 2009).

After emerging, Chinook salmon fry tend to seek shallow, nearshore habitat with slow water velocities and move to progressively deeper, faster water as they grow. However, fry may disperse downstream, especially if high-flow events correspond with emergence (Moyle 2002).

Spring-run juveniles may emigrate as fry soon after emergence, rear in their natal streams for several months prior to emigration as young-of-the-year, or remain in their natal streams for extended periods and emigrate as yearlings. Information regarding the duration of rearing and timing of emigration of spring-run Chinook salmon in the Central Valley is summarized in NMFS (2009), much of which is presented herein. Upon emergence from the gravel, juvenile spring-run Chinook salmon may reside in freshwater for 12 to 16 months, but some migrate to the ocean as young-of-the-year in the winter or spring months within eight months of hatching (CALFED 2000). The average size of fry migrants (approximately 40 mm between December and April in Mill, Butte and Deer creeks) reflects a prolonged emergence of fry from the gravel (Lindley et al. 2004). Studies in Butte Creek (Ward et al. 2003) found the majority of spring-run migrants to be fry moving downstream primarily during December, January and February, and that these movements appeared to be influenced by flow. Small numbers of spring-run juveniles remained in Butte Creek to rear and migrate later in the spring. 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). Juvenile emigration patterns in Mill and Deer creeks are very similar to patterns observed in Butte Creek, with the exception that Mill and Deer creek juveniles typically exhibit a later young-of-the-year migration and an earlier yearling migration (Lindley et al. 2004). In contrast, data collected on the Feather River suggests that the bulk of juvenile emigration occurs during November and December (CDWR and Reclamation 1999; Painter et al. 1977). Seesholtz et al. (2003) speculate that because juvenile rearing habitat in the Low Flow Channel of the Feather River is limited, juveniles may be forced to emigrate from the area early due to competition for resources.

CDFG has conducted juvenile salmonid outmigration monitoring by operating rotary screw traps (RSTs) in the lower Yuba River near Hallwood Boulevard, located approximately 6 river miles (RM) upstream from the city of Marysville. CDFG's RST monitoring efforts generally extended from fall (October or November) through winter, and either into spring (June) or through the summer (September) annually from 1999 to 2006. The Yuba Accord RMT conducted additional RST sampling from 2006 to 2009. Data from CDFG RST monitoring are available from 1999 to 2005, and a Yuba Accord RMT report (Campos and Massa 2010) has been prepared for the sampling period extending from October 1, 2007 to September 30, 2008.

Analyses of CDFG RST data indicate that most Chinook salmon juveniles move downstream past the Hallwood Boulevard location prior to May of each year. For the 5 years of data included in the analyses, 97.5 to 99.2 percent of the total numbers of juvenile Chinook salmon were captured by May 1 of each year. The percentage of the total juvenile Chinook salmon catch moving downstream past the Hallwood Boulevard location each year ranged from 0.4 to 1.3 percent during May, and 0 to 1.2 percent during June (YCWA et al. 2007). During the 2007/2008 sampling period, 95 percent of all juvenile Chinook salmon were captured by June 2, 2008 (Campos and Massa 2010).

Overall, most (about 84%) of the juvenile Chinook salmon were captured at the Hallwood Boulevard RSTs soon after emergence from November through February, with relatively small numbers continuing to be captured through June. Although not numerous, captures of (over-summer) holdover juvenile Chinook salmon ranging from about 70 to 140 mm FL, primarily occurred from October through January with a few individuals captured into March (Massa 2005; Massa and McKibbin 2006). These fish likely reared in the river over the previous summer, representing an extended juvenile rearing strategy characteristic of spring-run Chinook salmon. During the 2007/2008 sampling period, 33 Chinook salmon that met this criterion were observed at the Hallwood Boulevard RST site from mid-December through January. Juvenile Chinook salmon captured during the fall and early winter (October-January) larger than 70 mm are likely exhibiting an extended rearing strategy in the lower Yuba River (Campos and Massa 2010).

For the sampling periods extending from 2001 to 2005, CDFG identified specific runs based on sub-samples of lengths of all juvenile Chinook salmon captured in the RSTs by using the length-at-time tables developed by Fisher (1992), as modified by S. Green (CDWR). Although the veracity of utilization of the length-at-time tables in the Yuba River has not been ascertained, based on the examination of run-specific determinations, in the lower Yuba River 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 was captured during April, 0.1 percent during May, and none were captured during June (YCWA et al. 2007). The above summary of juvenile Chinook salmon emigration monitoring studies in the Yuba River is most consistent with the temporal trends of spring-run Chinook salmon outmigration reported for Butte and Big Chico creeks (YCWA et al. 2007).

Based upon review of available information, the Yuba Accord RMT recently identified the spring-run Chinook salmon fry rearing period to extend from mid-November through March, the juvenile rearing period year-round, the YOY emigration period from November through mid-July, and the yearling + outmigration period from November through mid-May.

The NMFS (2009) Public Draft Recovery Plan states that the lower Yuba River presently supports a persistent population of spring-run Chinook salmon, and that the lower Yuba River has a high potential to support a viable population. NMFS (2009) further states that many of the processes and conditions that are necessary to support a viable population can be improved with provision of appropriate flow regimes, water temperatures and habitat availability, and that "*Continued implementation of the Yuba Accord is expected to address these factors and considerably improve conditions in the lower Yuba River*".

7.7.4.1.11 North American Green Sturgeon, Southern DPS (FT)[18]

The Southern DPS of the North American green sturgeon (*Acipenser medirostrus*) was listed as a federally threatened species on April 7, 2006 (71 FR 17757) and includes the North American green sturgeon population spawning in the Sacramento River and utilizing the Sacramento-San Joaquin River Delta, and San Francisco Estuary. NMFS (2009b) *Draft Environmental Assessment for the Proposed Application of Protective Regulations Under Section 4(D) of the Endangered Species Act for the Threatened Southern Distinct Population Segment of North American Green Sturgeon* indicated that the Southern DPS of North American green sturgeon faces several threats to their survival including the loss of spawning habitat in the upper Sacramento River, and potentially in the Feather and Yuba rivers, due to migration barriers and instream alterations.

On October 9, 2009, NMFS (74 FR 52300) designated critical habitat for North American green sturgeon, which includes the Sacramento River, lower Feather River, lower Yuba River, the Sacramento-San Joaquin River Delta, and San Francisco Estuary. NMFS (74 FR 52300) defined specific habitat areas in the Sacramento, Feather, and Yuba rivers in California to include riverine habitat from the river mouth upstream, to and including the furthest known site of historic and/or current sighting or capture of North American green sturgeon, as long as the site is still accessible. NMFS (74 FR 52300) designated critical habitat in the lower Yuba River to extend from the confluence with the lower Feather River upstream to Daguerre Point Dam.

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 of green sturgeon has been confirmed in only three rivers - the Rogue River in Oregon, and the Klamath and Sacramento rivers in California (74 FR 52300).

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

Historical accounts of sturgeon in the Yuba River have been reported by anglers, but these accounts do not specify whether the fish were white or green sturgeon (Beamesderfer et al. 2004). Since the 1970s, numerous surveys of the Yuba River downstream of Englebright Dam have been conducted including annual salmon carcass surveys, snorkel surveys, beach seining, electrofishing, rotary screw trapping, redd surveys, and other monitoring and evaluation activities. Over the many years of these surveys and monitoring of the lower Yuba River, only one confirmed observation of an adult North American green sturgeon has occurred. The NMFS September 2008 *Draft Biological Report, Proposed Designation of Critical Habitat for the Southern Distinct Population Segment of North American Green Sturgeon* (NMFS 2008a) states that of the three adult or sub-adult sturgeon observed in the Yuba River below Daguerre Point Dam during 2006, only one was confirmed to be a North American green sturgeon, and that *"Spawning is possible in the river, but has not been confirmed and is less likely to occur in the Yuba River than in the Feather River. No green sturgeon juveniles, larvae, or eggs have been observed in the lower Yuba River to date."*

No occurrences of North American green sturgeon 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 (YCWA and USBR 2007).

In the lower Feather River, North American green sturgeon have intermittently been observed (Beamesderfer et al. 2007), although spawning has not been documented (NMFS 2008b). NMFS (2008b) states that the presence of adult, and possibly subadult, North American green sturgeon within the lower Feather River has been confirmed by photographs, anglers' descriptions of fish catches (P. Foley, pers. comm. cited in CDFG 2002b), incidental sightings (CDWR 2005), and occasional catches of North American green sturgeon reported by fishing guides (Beamesderfer et al. 2004).

Although adult North American green sturgeon occurrence in the Feather River has been previously documented, larval and juvenile North American green sturgeon have not been collected despite attempts to collect larval and juvenile sturgeon during early spring through summer using rotary screw traps, artificial substrates, and larval nets deployed at multiple locations (Seesholtz 2003). Moreover, unspecific past reports of green sturgeon spawning (Wang 1986; USFWS 1995; CDFG 2002b) have not been corroborated by observations of young fish or significant numbers of adults in focused sampling efforts (Schaffter and Kohlhorst 2002; Niggemyer and Duster 2003; Seesholz 2003; Beamesderfer et al. 2004). Based on these results, in 2006 NMFS concluded that an effective population of spawning North American green sturgeon did not exist in the lower Feather River (71 FR 17757).

Limited information regarding green sturgeon distribution, movement and behavioral patterns, as well as lifestage-specific habitat utilization preferences, is available for the Sacramento and Feather rivers. North American green sturgeon in the Sacramento River have been documented and studied more widely than the Feather River.

North American green sturgeon adults in the Sacramento River are reported to begin their upstream spawning migrations into freshwater during late February, prior to spawning between March and July, with peak spawning believed to occur between April and June (Adams et al. 2002). NMFS (2009c) reports that based on recent data gathered from acoustically tagged adult

North American green sturgeon, they migrate upstream during May as far as the mouth of Cow Creek, near Bend Bridge on the Sacramento River.

Prior to studies conducted by the University of California at Davis (UC Davis), there were few empirical observations of North American green sturgeon movement in the Sacramento River (Heublein et al. 2009). The study by Heublein et al. (2009) is reportedly the first to describe the characteristics of the adult North American green sturgeon migration in the Sacramento River, and to identify putative regions of spawning habitat, based on the recorded movements of free-swimming adults.

Heublein et al. (2009) observed that North American green sturgeon enter San Francisco Bay in March and April and migrate rapidly up the Sacramento River to the region between GCID to Cow Creek. The fish lingered at these regions at the apex of their migration for 14–51 days, presumably engaged in spawning behavior, before moving back downriver (Heublein et al. 2009).

Lindley (2006) presents preliminary results of large-scale North American green sturgeon migration studies. His analysis verified past population structure delineations based on genetic work and found frequent large-scale migrations of North American green sturgeon along the Pacific Coast. It appears that the Southern DPS North American green sturgeon migrateconsiderable distances up the Pacific Coast into other estuaries, particularly the Columbia River Estuary. This information also agrees with the results of North American green sturgeon tagging studies completed by CDFG where they tagged a total of 233 North American 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 2002b). 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).

Information about the biology of the North American green sturgeon was presented at the symposium titled ‘‘*The Green Sturgeon and Its Environment*’’ held during the 39th Annual Meeting of the California-Nevada Chapter of the American Fisheries Society during 2005 (Klimley et al. 2007). Kelly et al. (2007) provided the first fine-scale description of daily North American green sturgeon estuarine movements and habitat use. Several presentations also addressed the use of acoustic telemetry, which can be used both to follow the fish directly (Kelly et al. 2007) as they move within a region and to automatically monitor long-term and large-scale movements as in the studies presented by Benson et al. (2007).

Adult North American 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 2002b). Spawning is thought to occur in deep turbulent pools (Adams et al. 2002), andpreferred spawning substrate is likely large cobble but can range from clean sand to bedrock (Moyle 2002). Brown (2007) suggested that spawning in the Sacramento River may occur from April to June, and that the potential spawning period may extend from late April through July as indicated by the rotary screw trap data at the RBDD from 1994 to 2000.

To investigate adult immigration, spawning or juvenile nursery habits of North American green sturgeon in the upper Sacramento River, Brown (2007) developed a study to identify North American green sturgeon spawning locations and dates in the upper Sacramento River. Using a depth finder, study sites were selected at locations upstream of deeper holes in higher velocity water in the Sacramento River (Brown 2007). The study was originally designed in 1997 using the prevalent methodology at the time (e.g., artificial substrate mats) for the capture of eggs and larvae of white sturgeon. Brown (2007) reports that later findings from artificial spawning and larval rearing of North American green sturgeon (Van Eenennaam et al. 2001) indicate that North American green sturgeon eggs may be less adhesive than eggs from other acipenserids, possibly reducing the effectiveness of artificial substrate sampling.

The apex detections of individual fish indicate reaches and dates when spawning might have occurred during the study conducted by Heublein et al. (2009). They reported that spawning may have occurred between May and July, and that high water velocities and extensive bedrock habitat were found in all of the apex detection reaches. Furthermore, water temperatures did not exceed 62.6°F (17°C) in these reaches during this study, which would have permitted normal North American green sturgeon larval development (Van Eenennaam et al. 2005 as cited in Heublein et al. 2009).

The habitat requirements of North American green sturgeon are not well known. Eggs are likely broadcast and externally fertilized in relatively fast water and probably in depths greater than 3 meters (Moyle 2002). Water temperatures above 68°F (20°C) are reportedly lethal to North American green sturgeon embryos (Cech et al. 2000; Beamesderfer and Webb 2002).

In the Sacramento River, NMFS (2009a) reports that adult North American green sturgeon prefer deep holes (≥ 5 meters depth) at the mouths of tributary streams, where they spawn and rest on the bottom. After spawning, the adults hold over in the upper Sacramento River between Red Bluff Diversion Dam (RBDD) and Glenn Colusa Irrigation District (GCID) until November (Klimley 2007). Heublein et al. (2006, 2009) reported the presence of adults in the Sacramento River during the spring through the fall into the early winter months, holding in upstream locations prior to their emigration from the system later in the year. North American green sturgeon downstream migration appears to be triggered by increased flows, decreasing water temperatures, and occurs rapidly once initiated (NMFS 2009c). Some adult North American green sturgeon rapidly leave the system following their suspected spawning activity and re-enter the ocean in early summer (Heublein et al. 2006). NMFS (2009d) states that North American green sturgeon larvae and juveniles are routinely observed in rotary screw traps at RBDD and GCID, indicating spawning occurs upstream of both these sites.

The Sacramento River adjacent to the GCID pumping plant routinely holds a large aggregation of North American green sturgeon during summer and fall months, although the GCID aggregation site is atypical of oversummering habitats in other systems, being an area of high water velocity (Heublein et al. 2009). The GCID site is over 5 meters deep with structural current refuges and eddy formations. It is possible that North American green sturgeon occupy lower-velocity subsections of the site, although observations of North American green sturgeon capture, and manual tracking estimates, indicate that North American green sturgeon are found in, or in very close proximity to, high velocity areas (Heublein et al. 2009).

Heublein et al. (2009) stated that in contrast to the behavior of North American green sturgeon observed during 2004–2005, the majority of out-migrants detected in 2006 displayed an entirely different movement strategy. Nine of the ten tagged fish detected that year exited the system with no extended hold-over period and with no apparent relation to flow increases, eight leaving before 4 July and the last on 22 August. Heublein et al. (2009) suggested that the rapid out-migration of North American green sturgeon in 2006, and the reduced aggregation period at the GCID site could be a result of consistently higher flows and lower temperatures than previous study years. Alternatively, this could be an unusual behavior, related to unknown cues, that has not been documented in North American green sturgeon prior to this study (Heublein et al. 2009).

Newly hatched North American green sturgeon are approximately 12.5 to 14.5 mm in length. After approximately 10 days, larvae begin feeding and growing rapidly. North American 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, North American 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 North American green sturgeon continue 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.

7.7.4.2 CESA-Listed/Fully Protected Species

7.7.4.2.1 Bald eagle (SE, FP)[19]

The bald eagle (*Halieetus leucocephalus*) was listed by the USFWS as an endangered species in 1978, primarily due to population declines related to habitat loss and contamination of prey species by past use of organochlorine pesticides, such as DDT and dieldrin (USFS 2007). On August 11, 1995, the bald eagle's federal status was changed to "threatened" 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

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

met and USFWS has de-listed the species and removed protections afforded by the ESA (64 FR 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.

The bald eagle breeds and 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 2007). Data from statewide breeding surveys conducted since 1973 indicate that the number of breeding pairs in the State continues to increase on an annual basis (CDFG 2000). The breeding range in California expanded from portions of 8 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.

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 2007).

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 does diurnal habitat.

The results of the CNDDB search of Project Vicinity quads indicate that this species occurs within the Camptonville quad (CDFG 2009b). The TNF (2009) reported 274 observations within the Project Area.

7.7.4.2.2 California black rail (ST, FP)[20]

The California black rail (*Laterallus jamaicensis coturniculus*) 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 as cited by NatureServe 2009). In coastal and estuarine salt marshes, favored areas are dominated by pickleweed, bulrush, matted salt grass, and other marsh vegetation. (Biosystems Analysis 1989 as cited by NatureServe 2009). 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 as cited by NatureServe 2009).

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 nest on damp ground; however, it is more common for the California black rail to nest on the mat of the previous year's dead grasses (Terres 1980 as cited by NatureServe 2009). There is a chance high tides may destroy the nests (Evens and Page 1986 as cited by NatureServe 2009).

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 1990b). 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 in western Arizona (Evens et al. 1991 as cited by NatureServe 2009). Near the Salton Sea, southern California, California black rails occur in the Whitewater River delta and near Salt Creek (Biosystems Analysis 1989 as cited by NatureServe 2009).
This species was found within the Project Vicinity during the CNDDB search. The occurrences were found within the Smartville and Oregon House quads (CDFG 2009b).

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

7.7.4.2.3 Swainson's hawk (ST)[21]

Swainson's hawk (*Buteo swainsonii*) 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 1981as cited by CDFG 2009c). 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 as cited by CDFG 2009c) estimated 110 nesting pairs, and a total population of 375 pairs, in California. They were formerly abundant in California with wider breeding ranges (Grinnell and Miller 1944; Bloom 1980; Garrett and Dunn 1981 as cited by CDFG 2009c). Declines have resulted in part from loss of nesting habitat.

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

7.7.4.2.4 Western yellow-billed cuckoo (SE)[22]

The western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) 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 as cited by NatureServe 2009). 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; Garrett and Dunn 1981 as cited by CDFG 2009c; Gaines 1974 as cited by NatureServe 2009). Current population estimations show about 50 pairs existing in California (Hughes 1999 as cited by NatureServe 2009).

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

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[21] Photo found at: http://www.allaboutbirds.org/guide/Swainsons_Hawk/id.
[22] Photo found at: http://www.allaboutbirds.org/guide/Yellow-billed_Cuckoo/id.

7.7.4.2.5 Bank swallow (ST)[23]

The bank swallow (*Riparia riparia*) is 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 near the Project Vicinity during the CNDDB search. The occurrences were found within the Yuba City and Sutter quads (CDFG 2009b).

7.7.4.2.6 Great gray owl (SE)[24]

Great gray owls (*Strix nebulosa*) in California utilize pine and fir forests adjacent to meadows between 2,450 and 7,400 feet (CDFG 2009c). Availability of nesting structures and prey limit their use of habitat. Foraging habitat in the Sierra Nevada is generally open meadows and grasslands in forested areas, and trees along the forest edge are used for hunting perches. Openings caused by fires or timber harvest serves as foraging habitat when the vegetation is in early successional stages (Hayward 1994, Greene 1995 as cited by USFS 2004). Greene (1995 as cited by USFS 2004) found that owls preferentially occupied sites with greater plant cover, vegetation height, and soil moisture that sites not occupied by owls. Canopy closure was the only variable of three variables measured (canopy closure, number of snags greater than 24 inches diameter at breast height, and number of snags less than 24 inches diameter at breast height) that was significantly larger in occupied sites than in unoccupied sites.

The diet of the great gray owl may vary locally but consists primarily of small mammals, predominantly rodents. All available literature indicates that great gray owls in the western United States overwhelmingly select only two prey taxa: voles (*Microtus* spp.) and pocket gophers (*Thomomys* spp.). Voles prefer meadows with dense herbaceous vegetative cover

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

(CDFG 2005). A four-inch stubble height at the end of the growing season is thought to provide suitable cover for voles (Beck 1985 as cited by USFS 2004), although other studies suggest herbaceous heights of 12" are preferred (Greene 1995 as cited by USFS 2004). Gophers are predominantly subterranean but they also appear to have herbaceous cover preferences (Ibid). Great gray owls catch these mammals by breaking through their tunnels. Compaction of meadow soils may reduce the suitability of areas for gophers. During the winter, great gray owls have been observed plunging through the snow to capture prey.

The TNF reports that the great grey owl has been observed and occupied nesting activity recorded within one mile upslope of the Project's Log Cabin Diversion Dam (M. Tierney, pers. Comm., 2010)

7.7.4.2.7 American peregrine falcon (SE, FP)[25]

The peregrine falcon breeds in many terrestrial biomes in the Americas; none seems to be preferred, although perhaps they occur in greater densities in tundra and coastal areas (BNA 2006). The most commonly occupied habitats contain cliffs, for nesting, with open gulfs of air (rather than in confined areas) and generally open landscapes for foraging. In addition to natural habitats, this falcon now uses many artificial habitats (urban, human-built environments such as towers, buildings, etc.). Peregrine falcons use a broad array of habitats during fall and spring migration, including urban habitats. In winter, there is extreme habitat variability because of the enormous geographical range. Other than resident populations, which occupy breeding habitats, this falcon uses open-relief habitat devoid of cliffs, man-grove, coastal, or wetland areas, major river valleys and lake shores, pasture lands, featureless terrain devoid of cover and containing waterbirds or pigeons and doves, and especially urban areas (BNA 2006).

The American peregrine falcon was removed from the federal list of threatened and endangered species in 1999, due to the success of recovery efforts throughout its range. However, the peregrine will continue to be protected under the Migratory Bird Treaty Act. Peregrine falcons nest on steep and inaccessible cliffs that offer protection from predators. They prey almost exclusively on birds captured in flight (FERC 2004).

American peregrine falcons were identified as having the potential to occur within the Yuba Accord Proposed Project (YCWA and USBR 2007).

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

7.7.4.2.8 Golden eagle (FP)[26]

Golden eagles (*Aquila chrysaetos*) are uncommon permanent residents and migrants throughout California, except in the center of the Central Valley. Golden eagles are perhaps more common in southern California than in northern California. Their range is from sea level up to 3833 m (0-11,500 ft) (Grinnell and Miller 1944 as cited by CDFG 2009c). Habitat typically consists of rolling foothills, mountain areas, sage-juniper flats, and desert.

Golden eagles nest on cliffs of all heights and in large trees in open areas. Alternative nest sites are maintained, and old nests are reused. Golden eagles build large platform nests, often 3 m (10 ft) across and 1 m (3 ft) high, of sticks, twigs, and greenery. Rugged, open habitats with canyons and escarpments are used most frequently for nesting.

Two observations of golden eagle were reported by the TNF within the Project Area (TNF 2009).

7.7.4.2.9 Greater sandhill crane (ST, FP)[27]

Greater sandhill cranes are the largest of the six subspecies of sandhill cranes. Average adult males weigh 10.5 pounds while females average 8.4 pounds. Except for these size differences, sexes are similar in appearance. Greater sandhill cranes eat a variety of foods but are primarily vegetarians. Historically, greater sandhill cranes nested in eastern Siskiyou County and northeastern Shasta County southward to Honey Lake in Lassen County. Presently, greater sandhill cranes nest in Lassen, Modoc, Plumas, Shasta, Sierra, and Siskiyou counties.

In California, greater sandhill cranes establish territories in wet meadows that are often interspersed with emergent marsh. California birds tend to nest in rather open habitat; however, in certain areas, they nest in association with a dense cover of bulrush and burreed. The last statewide breeding population study in California was conducted in 1988, and the breeding population in this state was estimated to be 276 pairs. Favorable roost sites and an abundance of cereal grain crops characterize the cranes' Central Valley wintering ground. Rice is used extensively by cranes near the Butte Sink area of Butte County, and corn is the principal food source at most other Central Valley wintering areas, particularly in the Sacramento-San Joaquin Delta near Lodi, San Joaquin County. Irrigated pastures are chosen for resting sites throughout

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

the wintering ground. A communal roost site consisting of an open expanse of shallow water is a key feature of wintering habitat. Currently, the estimate for greater sandhill cranes within their Pacific Flyway range is between 5,000 and 6,000 individuals. This species continues to experience threats on both wintering and breeding grounds by agricultural and residential conversion of habitat, predation, human disturbance, and collisions with power lines (CDFG 2000).

Greater sandhill cranes were identified as having the potential to occur within the Yuba Accord Proposed Project (YCWA and USBR 2007).

7.7.4.2.10 White-tailed kite (FP)[28]

White-tailed kites (*Elanus leucurus*) are common to uncommon, yearlong residents in coastal and valley lowlands. They are rarely found away from agricultural areas. White-tailed kites inhabit herbaceous and open stages of most habitats mostly in cismontane California. They have extended their range and increased their numbers in recent decades.

White-tailed kites make a nest of loosely piled sticks and twigs and line it with grass, straw, or rootlets. Nests are placed near the top of dense oak, willow, or other tree stands; usually 6-20 m (20-100 ft) above ground (Dixon et al. 1957 as cited by CDFG 2009c). Nests are located near open foraging areas.

White-tailed kites were identified as having the potential to occur within the Yuba Accord Proposed Project (YCWA and USBR 2007).

fisher inhabits forested areas from sea level along the California and Oregon coast and between 1,970 and 8,530 feet in the Sierra Nevada. Fisher populations have declined primarily due to loss of habitat from timber harvest activities and trapping (USFWS 2010).

No occurrences were found within the Project Vicinity during the CNDDB query. The USFWS query showed that Pacific fisher can potentially be found within Project Vicinity quads.

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

7.7.4.2.12 Ring-tailed cat (FP)[29]

Ring-tailed cats (*Bassariscus astutus*) are widely distributed, common to uncommon permanent residents. They occur in various riparian habitats, and in brush stands of most forest and shrub habitats, at low to middle elevations. Little information is available on their distribution and relative abundance among habitats (Grinnell et al. 1937, Schempf and White 1977 as cited by CDFG 2009c).

Ring-tailed cats are primarily carnivorous, eating mainly rodents (woodrats and mice) and rabbits. They also take substantial amounts of birds and eggs, reptiles, invertebrates, fruits, nuts, and some carrion (Taylor 1954, Trapp 1978 as cited by CDFG 2009c). Ring-tailed cats forage on the ground, among rocks, in trees; and usually near water. They nest in rock recesses, hollow trees, logs, snags, abandoned burrows, or woodrat nests.

Ring-tailed cats were identified as having the potential to occur within the Yuba Accord Proposed Project (YCWA and USBR 2007).

7.7.5 List of Attachments

None.

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[29] Photo found at: bss.sfsu.edu/.../Fall02%20projects/Ringtail.htm