

ORIGINAL



United States Department of the Interior



FISH AND WILDLIFE SERVICE
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In reply refer to:
1-1-07-F-0049

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Ms. Magalie Salas
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington DC, 20426

Subject: Biological Opinion for the Oroville Facilities Relicensing Project (FERC File Number 2100), Butte County, California

Dear Ms. Salas:

This letter is in response to your October 24, 2006, letter requesting formal consultation, pursuant to section 7(a) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), on the proposed Oroville Facilities Relicensing project (proposed project) in Butte County, California. At issue are the potential effects of the proposed project on the federally-threatened vernal pool fairy shrimp (*Branchinecta lynchi*), the endangered Conservancy fairy shrimp (*Branchinecta conservatio*), the endangered vernal pool tadpole shrimp (*Lepidurus packardii*) (vernal pool crustaceans), the threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle), the threatened Delta smelt (*Hypomesus transpacificus*), the threatened California red-legged frog (*Rana aurora draytoni*), the threatened giant garter snake (*Thamnophis gigas*) (snake), the threatened bald eagle (*Haliaeetus leucocephalus*), the endangered Butte County meadowfoam (*Limnanthes floccosa ssp. californica*), the threatened slender Orcutt grass (*Orcuttia tenuis*), the endangered hairy Orcutt grass (*Orcuttia pilos*), the threatened Greene's tuctoria (*Tuctoria greenei*), the endangered Hartweg's golden sunburst (*Pseudobahia bahifolia*), the endangered Hoover's spurge (*Chamaesyce hooveri*) and the threatened Layne's ragwort (*Senecio layneae*). The proposed project is not located within critical habitat for any federally-listed species under the jurisdiction of the Service; therefore, critical habitat for federally-listed species under the jurisdiction of the Service will not be affected by the proposed project. This response is in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

This consultation is based on: (1) the January 2005, *Before the Federal Energy Regulatory Commission, Application for New License, Oroville Facilities, FERC Project No. 2100, Preliminary Draft Environmental Assessment* (Volumes I, II, III, and IV) (Note: The Biological



Assessment is included as Appendix E, in Volume IV, of the *Preliminary Draft Environmental Assessment*); (2) the March 2006, *Settlement Agreement for Licensing of the Oroville Facilities, FERC Project No. 2100*; (3) the September 29, 2006, *Draft Environmental Impact Statement for relicensing of the Oroville Facilities Project No. 2100-134* (DEIS); (4) the February 2007, *Draft Vernal Pool Land Management Plan and Vernal Pool Assessment, Oroville Facilities, FERC Project No. 2100*; (5) multiple electronic mail correspondences, telephone conversations, and letters between the California Department of Water Resources (DWR) and Service staff from 2003 to 2007; and (6) other information available to the Service.

The Commission's October 24, 2006, letter requests consultation on the proposed relicensing of the Oroville Facilities, presumably based upon the Commission's Staff Alternative as described in the DEIS which consists of the Applicant DWRs' Proposal (including the Settlement Agreement) with Staff Modifications. We have thus consulted upon both the Applicant DWR's proposal, and the proposal as modified by the Staff Alternative. The Commission's letter does not indicate the proposed term of the new license for which consultation is requested. Further, the DEIS indicates that the recommended alternative does not analyze the proposed 50-year license term because the Commission will address the license term in any order issued for the project. Because the Service must determine the full effects of the proposed project on federally-listed species, we have analyzed project effects based upon a 50-year license term, which is the term recommended by the license parties in the Settlement Agreement. In addition, because the Settlement Agreement and ongoing operations require actions during the period prior to license issuance, we have further analyzed activities that may occur over a 5-year interim period, between issuance of the biological opinion and license issuance (see paragraph below). Given the agreement of the parties that DWR begin implementing some environmentally protective measures immediately and continue implementing those measures with ongoing operations into the term of the new license, we have included in the biological opinion analysis of the incidental take that may result from these actions that may begin prior to license issuance.

FERC has not yet issued the new 50-year license for the proposed action, and is currently issuing a license annually to DWR. FERC will issue the license, likely for a period of 50-years, at an unspecified date in the future. Therefore, there is an unspecified interim period that will occur from the date of issuance of this biological opinion to the date that FERC issues the new license to DWR, in which DWR will be conducting maintenance activities and certain actions specified in the Settlement Agreement that would benefit environmental resources. This biological opinion authorizes incidental take, as specified below, for the two vernal pool crustaceans, the valley elderberry longhorn beetle, the giant garter snake, and the bald eagle for the proposed action; i.e., issuance of a new license for a likely term of 50 years, and further authorizes incidental take to cover the activities as identified in the Settlement Agreement and referenced herein during an interim period of up to 5 years from the date of issuance of this biological opinion. This biological opinion analyzes take limits proposed by DWR for both the 5-year interim period and the likely 50-year license period. The Service believes that it is appropriate to authorize take during the interim period because the resource actions and maintenance actions analyzed by the Service in this biological opinion for the 50-year license period would be inclusive of all actions that would occur during the 5-year interim period and the Service has

concluded that the proposed actions will not result in jeopardy to any of the federally-listed species.

The Service has determined that the proposed project is likely to adversely affect the following species: (1) the vernal pool fairy shrimp; (2) the vernal pool tadpole shrimp; (3) the giant garter snake; (4) the valley elderberry longhorn beetle; and (5) the bald eagle. Protocol-level surveys have not been performed to determine presence of federally-listed vernal pool crustacean species; however, suitable habitat for the vernal pool fairy shrimp and the vernal pool tadpole shrimp are present in the form of vernal pool wetlands within the proposed action area. Suitable habitat for the giant garter snake is present in the form of wetlands and adjacent upland habitat. Suitable habitat for the valley elderberry longhorn beetle is present in the form of elderberry shrubs (*Sambucus* sp.). Suitable habitat for the bald eagle is present in the form of large water bodies for foraging, and trees and snags for nesting, roosting, and hunting. Current operations and maintenance activities and potential future activities associated with resource actions may adversely affect these five listed-species. A description of these potential effects is described in the *Effects* section of this biological opinion.

The Service has determined that the proposed project is not likely to adversely affect the Conservancy fairy shrimp. Typically, Conservancy fairy shrimp are found in large, turbid playa pools (Service 2004), which do not occur within the proposed project site. If suitable habitat becomes present over the 50-year FERC license period or during the 5-year interim period, or Conservancy fairy shrimp are detected in areas within the same project region (i.e., northeast vernal pool region as described in the 2005 Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon) that were not determined to be suitable Conservancy fairy shrimp habitat at the time of issuance of this biological opinion, DWR will request that FERC reinitiate section 7 consultation with the Service.

The Service has determined that the proposed project is not likely to adversely affect the following federally-listed plant species: (1) Butte County meadowfoam; (2) slender Orcutt grass; (3) hairy Orcutt grass; (4) Greene's tuctoria; (5) Hartweg's golden sunburst; (6) Hoover's spurge; (7) and Layne's ragwort. The California Department of Water Resources (DWR) conducted botanical surveys during 2002, 2003, and 2004. Surveys were conducted during the time of year when the target species were identifiable. Field investigations were conducted in a manner that emphasized all potential habitats for the target threatened and endangered plant species (i.e., vernal pools/valley grasslands, and serpentine/gabbro soils). Areas surveyed included valley grasslands around Thermalito afterbay and Thermalito forebay, serpentine soils along the West Branch and Upper North Fork Arms, and gabbro soils along the South Fork Arm. No federally-listed plant species were found within the study area during the 2002, 2003, and 2004 surveys. Although no federally-listed plant species were found within the study area, potentially suitable habitat does exist for all of the seven listed species. DWR has proposed to survey habitat that has the potential to support federally-listed plant species to determine presence/absence prior to conducting activities that may adversely affect federally-listed plants. If federally-listed plants are detected, DWR will request that FERC reinitiate section 7 consultation with the Service.

The Service has determined that the proposed project is not likely to adversely affect Delta smelt for the following reasons: There are no expected cumulative impacts to surface water quantity that would result from continued operation of the Oroville Facilities under any of the alternatives. Although the proposed project includes increases of minimum flows and potential increases in flows for water temperature management in the low flow channel to benefit anadromous salmonids, it would not increase net facility releases. The only changes to net facility releases are in response to timing or future changes to allocations that would apply equally to the no-project, proposed project, and FERC Staff Alternative.

In July 2004, the Service issued a biological opinion for the coordinated operations of the Central Valley Project (CVP), the State Water Project (SWP), and the Operations Criteria and Plan (OCAP) on the federally-threatened Delta smelt (Service file number 1-1-05-F-0055). Because Delta smelt are not present in the Feather River and because the CVP, SWP, and OCAP are not likely to jeopardize the continued existence of delta smelt, no specific operational terms and conditions were provided by the Service for the Oroville Facilities in the OCAP opinion. Likewise, none of the actions associated with Settlement are likely to affect delta smelt or their habitat.

The Service has determined that the proposed project is not likely to adversely affect the California red-legged frog. Suitable habitat is present within the proposed project area for this species. DWR has mapped all suitable California red-legged frog habitat within the proposed project area and this information is provided in Chapter 6.0, Species Accounts and Status in the Action Area of the Biological Assessment). Although suitable habitat for California red-legged frogs exists within the proposed project area, this species is not currently known to occur within the project boundary. However, the largest remaining population within the Sierra Nevada range is within 1.0 mile of the proposed project boundary in the North Fork drainage, upstream of the Oroville Dam. Portions of the action area are within the Feather River Core Recovery Area for this species, as described in the Service's 2002 *Recovery Plan for the California Red-legged Frog*. Because portions of the action area are within a core recovery area, DWR has proposed to conduct focused surveys for California red-legged frog within suitable habitat upstream of Oroville Dam prior to conducting any activities that could result in adverse effects to suitable habitat for this species. If California red-legged frogs are detected during future surveys, DWR will request that FERC reinitiate section 7 consultation with the Service prior to continuing the planning process for the proposed activity.

CONSULTATION HISTORY

Service staff met and informally consulted with DWR on seven dates between November 13, 2003, and April 14, 2004, to discuss the section 7 consultation process. Issues specifically addressed included scope, species covered, species-specific conservation measures, Biological Assessment format, and cumulative effects analysis.

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October 24, 2006: FERC initiated formal section 7 consultation with the Service.

January 4, 2007: The Service requested additional information regarding the proposed project in a letter to FERC on (Service file number 1-1-07-I-0376).

January 16, 2007: Service staff met with DWR staff on to discuss informational needs to complete the biological opinion.

January 30, 2007: Service staff met with DWR staff on to discuss informational needs to complete the biological opinion.

February 14, 2007: Service staff met with DWR staff on to discuss informational needs to complete the biological opinion.

February 21, 2007: The Service provided a draft biological opinion to DWR.

March 9, 2007: DWR provided comments on the draft biological opinion to the Service.

April 5, 2007: The Service provided a draft biological opinion to DWR.

April 9, 2007: DWR requested that the Service finalize the biological opinion.

BIOLOGICAL OPINION

Description of the Proposed Action

The Oroville Facilities are located on the Feather River in Butte County, California, approximately 70 miles north of the City of Sacramento. Oroville Dam, Lake Oroville and related facilities occupy 41,100 acres in the foothills of the Sierra Nevada Mountains. DWR operates and maintains the Oroville Facilities under the terms and conditions of a FERC license dated February 11, 1957. This license expired on January 31, 2007, and FERC has issued an annual license. The Proposed Action addressed in this biological opinion includes: the continued operation and maintenance of the Oroville Facilities for electric power generation and other public purposes; future resource actions; implementation of avoidance, minimization, and conservation measures that have been developed in coordination with the Service; and the terms and conditions of the new FERC license and settlement agreement, developed through the collaborative process.

Project Facilities

The Oroville Facilities were developed as part of the SWP, a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. The main purpose of the SWP is to store and distribute water to supplement the needs of urban and agricultural water users in northern California, the San Francisco Bay area, the San Joaquin Valley, and southern California. The Oroville Facilities are also operated for flood management and power

generation, and to improve water quality in the Delta, provide recreation, and enhance fish and wildlife. The proposed project includes the Oroville Dam and Reservoir, three power plants (Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Power Plant, and Thermalito Pumping-Generating Plant), Thermalito Diversion Dam, the Feather River Fish Hatchery and Fish Barrier Dam, Thermalito Power Canal, Oroville Wildlife Area (OWA), Thermalito Forebay and Forebay Dam, Thermalito Afterbay and Afterbay Dam, and transmission lines, as well as a number of recreational facilities. The Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5-million acre-feet (af) capacity storage reservoir with a surface area of 15,810 acres at its normal maximum operating level. A more detailed description of project facilities is available in the Biological Assessment (Section 5.0) and the in the DEIS (Section 3.0).

The Oroville Facilities support a wide variety of recreational areas. These include: boating, fishing, fully developed and primitive camping (including boat-in and floating sites), picnicking, swimming, horseback riding, hiking, off-road bicycle riding, wildlife watching, hunting, and visitor information sites with cultural and informational displays about the developed facilities and the natural environment. There are major recreation facilities at Loafer Creek, Bidwell Canyon, the Spillway, North and South Thermalito Forebay, and Lime Saddle. Lake Oroville has two full-service marinas, five car-top boat launch ramps, ten floating campsites, and seven dispersed floating toilets. There are also recreation facilities at the Visitor Center and the OWA.

The OWA comprises approximately 11,000-acres west of Oroville that is managed for wildlife habitat and recreational activities. It includes the Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the Feather River. The 5,000-acre area straddles 12 miles of the Feather River, which includes willow and cottonwood lined ponds, islands, and channels. Dispersed recreation (hunting, fishing, and bird watching) occurs throughout the OWA. Developed recreation sites, include the Monument Hill day use area, model airplane grounds, three boat launches on the Afterbay and two on the river, and two primitive camping areas. The California Department of Fish and Game's (CDFG) habitat enhancement program includes installation and maintenance of wood duck nest-boxes and dry land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a number of locations.

Current Operations

Operation of the Oroville Facilities varies seasonally, weekly and hourly, depending on hydrology and the objectives DWR is trying to meet. Typically, releases to the Feather River are managed to conserve water while meeting a variety of water delivery requirements, including flow, temperature, fisheries, recreation, diversion and water quality. Lake Oroville stores winter and spring runoff for release to the Feather River as necessary for project purposes. Meeting the water supply objectives of the SWP has always been the primary consideration for determining Oroville Facilities operation (within the regulatory constraints specified for flood control, in-stream fisheries, and downstream uses). Power production is scheduled within the boundaries specified by the water operations criteria noted above. A more

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detailed discussion of current operations is available in the Biological Assessment (Section 5) and the DEIS (Section 3.0). The Biological Assessment and the DEIS provide a detailed analysis of instream flow requirements, temperature requirements, water diversions, water quality, and flood management.

Current Maintenance Activities

Maintenance activities for the Oroville facilities are implemented by several land management agencies including DWR, CDFG, and the California Department of Parks and Recreation (DPR). Gravel harvest, both on a commercial basis and at a more limited scale by project land management agencies for maintenance activities, also occurs in the OWA. Major maintenance activities conducted throughout the Oroville Facilities are ongoing and occur at the following facilities: (1) roads (paved, gravel and dirt roads and roads associated with trails and levees); (2) recreation facilities such as boat ramps, marinas, cartop boat launch sites and associated parking lots; (3) recreation campgrounds and parking lots; (4) designated recreation day use areas and parking lots; (5) bridges; (6) levees; (7) diversion structures; and (8) transmission line corridors and associated facilities. Facilities affected by maintenance activities cover about 6,249.4 acres. Current maintenance activities are anticipated to continue throughout the life of the new FERC license. Descriptions of various maintenance activities are included below.

Road Maintenance

Approximately 870 acres of roads and 90 acres of trails occur in the FERC Project Boundary. Maintenance activities associated with roads and parking areas vary by type of surface material (dirt, gravel, paved). In general, road maintenance consists of maintaining the road surface, controlling vegetation along roadsides, and cleaning ditches and culverts to ensure drainage. Dirt and gravel road surfaces are maintained primarily by grading in spring and in fall/winter. However, herbicide treatments are infrequently used to supplement grading in some locations. Paved road surfaces are repaved on approximately 10-year intervals. The amount of roadside vegetation treatment varies by type of road and use standards. Along high-speed roads, mowing or herbicides are used on an annual basis to control herbaceous vegetation on the shoulders and woody vegetation is often mechanically removed to improve sight distances and public safety. Mowing and herbicides are also used to control vegetation along high use trails.

Maintenance activities at recreation areas within the FERC Project Boundary occur regularly and year round and focus on campgrounds, day use areas, entrance areas and parking lots and trails. Maintenance activities include pesticide/herbicide use to control undesirable rodents, insects, and vegetation at campgrounds, boat ramps and other recreation sites around Lake Oroville as well as fuels management and to improve visibility for facilities inspection. Other activities include building maintenance including maintaining parking lot surfaces and drainage controls.

Bridge Maintenance

A wide variety of bridge types occur within the FERC Project Boundary, ranging from small

wooden structures associated with trails to state highway bridges spanning Lake Oroville. Maintenance activities associated with bridges, includes safety inspections, repainting, and redecking. Maintenance activities, such as sandblasting and repainting, are scheduled to avoid the raptor-nesting season. In cases where it is not possible to avoid work during the breeding season, the work area is screened to limit disturbance to raptors nesting nearby. Pre-project surveys are conducted in the vicinity of the bridges scheduled for maintenance to determine locations of sensitive raptor nests, responses to disturbance, and to better define the breeding period (March to August) for birds at that particular site. This information is provided to maintenance staff for project planning and prior to maintenance or inspection activities.

Dams and Levee Maintenance

Pesticides and herbicides are used to control undesirable rodents, insects, and vegetation along the Thermalito Forebay Dam, Thermalito Afterbay Dam, and OWA levees. Ground squirrels are controlled by DWR along the Thermalito Forebay and Thermalito Afterbay levees using bait stations to limit non-target and secondary species poisoning. DWR, CDFG and DPR utilize herbicides to control vegetation at specific locations for specific purposes including the following: fuels management, noxious weed control, public safety, and to improve visibility for facilities inspection.

The Thermalito Afterbay Dam and Thermalito Forebay Dam are sprayed on an annual basis to facilitate structural integrity inspections. DPR spot treats noxious weeds along the wetland edge of the Thermalito Forebay, and CDFG has used aerial spraying to control purple loosestrife along portions of the Thermalito Afterbay margin. DWR, CDFG and DPR have license pesticide applicators that fully comply with safety application criteria and reporting requirements. Neither DPR nor CDFG use chemicals on a regular basis in the FERC Project Boundary for vertebrate pest control. The Butte County Mosquito Abatement Department and the City of Oroville annually treat substantial areas within the FERC Project Boundary for mosquito abatement including the Thermalito Afterbay and OWA.

Transmission Line Rights-of-Way Maintenance

Approximately 11.3 miles of overhead transmission lines are included in the project license. The rights-of-way for these lines require regular trimming of trees to maintain vegetation clearances and to reduce danger of fire. These transmission lines, which are located in the same transmission line corridor to the Hyatt Power plant Switchyard, include the following: The BUS line, a 230-kV overhead transmission line extending 9 miles from the Hyatt Power plant Switchyard to Pacific Gas and Electric Company's Table Mountain/substation and a 230-kV overhead transmission line that extends approximately 2.3 miles from the Thermalito Switchyard to PG&E's Table Mountain Substation.

OWA Gravel Harvest

Gravel harvest currently occurs within the portion of the OWA, which straddles the Feather River. Piles of barren gravel/cobble, called dredger piles, are remnants of hydraulic mining

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from the 1800s and provide a large source of gravel for maintenance activities. These dredger piles cover approximately 615 acres within the OWA. Large scale, commercial gravel harvest activities are not under the jurisdiction of DWR. While this commercial gravel lease is administered by DWR, it evolved from a land transfer between CDFG and local commercial gravel interests. DWR maintains leases with two companies for the mining and use of gravel within the OWA. These areas are all located within the floodplain of the Feather River and provide significant gravel resources for projects through the surrounding area and throughout Butte County.

Settlement Agreement

DWR reached Settlement with the majority of Relicensing stakeholders including the U.S. Department of the Interior. Proposed license articles that were submitted to the Commission and included in the DEIS as the proposed action includes the following:

- A100 Ecological Committee
- A101 Lower Feather River Habitat Improvement Plan
- A102 Gravel Supplementation and Improvement Program
- A103 Channel Improvement Program
- A104 Structural Habitat Supplementation and Improvement Program Plan
- A105 Fish Weir Program
- A106 Riparian and Floodplain Improvement Program
- A107 Feather River Fish Hatchery Improvement Program
- A108 Flow/Temperature to Support Anadromous Fish
- A109 Reservation of Section 18 Authority
- A110 Lake Oroville Warm Water Fisheries Habitat Improvement Program
- A111 Lake Oroville Cold Water Fisheries Improvement Program
- A112 Comprehensive Water Quality Monitoring Program
- A113 Monitoring of Bacteria Levels and Public Education
- A114 Public Education Regarding Risks of Fish Consumption
- A115 Oroville Wildlife Area Management Plan
- A116 Oroville Wildlife Area Access
- A117 Protection of Vernal Pools
- A118 Minimization of Disturbance to Nesting Bald Eagles
- A119 Protection of Giant Garter Snake
- A120 Protection of Valley Elderberry Longhorn Beetle
- A121 Protection of Red-Legged Frog
- A122 Construction and Recharge of Brood Ponds
- A123 Provision of Upland Food for Nesting Waterfowl
- A124 Provision of Nest Cover for Upland Waterfowl
- A125 Installation of Wildlife Nest Boxes
- A126 Invasive Plant Management
- A127 Recreation Management Plan
- A128 Historic Properties Management Plan
- A129 Improve and Redirect Recreation Usage To Specific Areas at Foreman Creek

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A130 Flood Control
A131 Early Warning System
A132 Screening of Material Storage Areas
A133 Project Boundary Modifications
A134 Expenditures
A135 Procedural Requirements

The provisions of these resource actions are found in the Settlement Agreement and in the DEIS, and are hereby incorporated by reference as the proposed action for consultation.

Description of Activities Associated with Settlement Agreement Resource Actions

The Oroville Facilities will be operated according to the terms and conditions included in the new FERC License, which the settlement parties have requested be based on the terms and conditions of the settlement. These terms and conditions will include a number of Resource Actions designed to mitigate and enhance environmental resources within the FERC Project Boundary and downstream to the confluence of the Feather and the Sacramento rivers. Each Resource Action includes one or more activities that DWR will implement in the Action Area during the life of the license. The anticipated activities associated with Settlement Agreement Resource Actions as well as ongoing operations and maintenance are briefly described below. The resource agencies included applicable Resource Actions from the Settlement Agreement in their terms and conditions, recommendations and fishway prescriptions submitted pursuant to their Federal Power Act authorities.

Land Based Construction

Land based construction may be required for new buildings, fish habitat improvement structures, boat ramps, parking lots, campgrounds, marinas, other recreational improvements, hatchery ponds, other environmental habitat improvement measures, small or other facilities needed for project operations and maintenance. These construction activities would all result in a one-time, permanent loss of terrestrial habitat and would also involve ground disturbance and vegetation removal. Earthmoving and excavation associated with this type of construction may involve soil disturbance greater than 6-inches in depth.

A number of maintenance activities and protective Resource Actions may also result in some minor construction, as well as associated ground disturbance and vegetation removal. Examples include: vehicle barrier construction and placement (wire and chain link fencing, K-rails, bollard fences, gravel piles and log booms); relocation of project facilities for resource protection; construction and maintenance of trails and roads (grading, graveling, paving, drainage control); installation of drainage and erosion controls to prevent sedimentation; lake and river bank modifications to place rock or large woody debris; and engineering and maintenance activities to prevent sediment discharge from project facilities, areas of abandonment or restoration; drainage control and installation of sediment traps. In addition, explosives could be required for some construction related activities.

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Equipment Access

Disturbance from construction related equipment access would be short term involving vegetation damage with some vegetation removal and minor soil disturbances.

Access Improvements

Activities associated with Resource Actions related to access improvements would consist of minor and short-term construction and could potentially require ground disturbance, vegetation removal, and grading.

Irrigation System Development

Activities associated with Resource Actions that involve revegetation of disturbed areas or the establishment of forage plots for wildlife may result in minor localized disturbance from installation of irrigation system components (pipes, hoses, pumps, drip systems, water tanks), excluding well and ditch development and construction.

In-water Construction

A number of Resource Actions may involve in water construction. In-water construction activities include all in-channel and in-lake soil or vegetation disturbing activities, such as gravel placement, bed ripping, side channel creation and maintenance, and dam/levee construction. These activities will typically involve heavy equipment use and may involve dewatering.

Bank Modification

If Resource Actions require placement of rock or large woody debris on the lake edges or riverbanks, heavy equipment would be needed for placement of the structures. Vegetation may be damaged through crushing or removed for equipment access.

Road and Trail Construction and Maintenance

Construction of new roads or trails would require vegetative removal and soil disturbance including earthmoving activities. Maintenance activities for existing roads and trails may include grading, paving, placement of gravel, drainage control activities or herbicide use.

Herbicide and Pesticide Use

Localized use of herbicides and/or pesticides required implementing resource actions directed at controlling pest species or reducing fire hazards will be in accordance with applicable regulations.

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Fertilizer Use

Resource Actions associated with waterfowl habitat enhancements could require applying commercial fertilizer to uplands, either by ground or aerial methods.

Seasonal Closure of Recreation Areas

Seasonal closure of recreation areas or land areas to certain types of public use may be required for resource protection. Types of public use that may be affected include camping, boating, dog training, hiking, and shoreline moorage.

Signage and Fencing

Some Resource Actions may require signage to warn and/or educate the public, and fencing to restrict access. Both activities would involve minor ground disturbance for installation of signs or fences. Fencing that could be installed would be either standard wire or chain link.

Native and Non-Native Species Reintroduction

Resource Actions may include introduction or re-introduction of fish (native and nonnative) into waters within the FERC Project Boundary for recreation or mosquito abatement purposes. Landscaping around some project facilities may require the use of non-native plants. Both small scale and large scale planting activities may be needed to revegetate certain areas. Revegetation would include minor soil disturbance, such as fencing, irrigation and herbicide/pesticide use, and fertilization. Vegetation type conversion would require changing one type of vegetation to another and would be generally associated with landscaping, waterfowl habitat improvement projects, and certain types of herbicide applications.

Vegetation Removal

Short-term removal of vegetation may be associated with a number of Resource Actions. This activity could include pruning, mowing, herbicide treatment, grading, tree felling, brush cutting, and earth fill activities.

Soil Disturbance

Short-term and long-term soil disturbance may be required to implement many Resource Actions. This activity would include major and minor levels of soil disturbance related to grading, disking, excavation, planting and earthmoving.

Human Disturbance and Activity

Major and minor increases in localized human activity may be needed to implement most of the Resource Actions. This activity could be either short-term or long-term. Further, recreation Resource Actions may lead to increased long-term human activity. Patrol and enforcement, as

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well as resource monitoring, would include minor human/vehicle related activities for resource protection, project security, law enforcement or facility inspection.

Sediment Control Activities

Engineering and maintenance activities would be required to prevent sediment discharge from project facilities in association with some Resource Actions. These activities would include soil disturbance such as road grading, placement of gravel, abandonment and restoration actions, drainage control and installation of sediment traps.

Administrative Activities

Planning, adaptive management or monitoring activities would be required to implement some Resource Actions. These activities would not involve physical or biological changes to the environment. An administrative change in ownership or management responsibility such as addition or removal of lands from the FERC Project Boundary may be an activity associated with Resource Actions.

Flow Changes in the Feather River and Water Level Changes in Project Reservoirs

Flow changes in the Feather River may occur with changes in project operations. These changes would occur if there were a substantial alteration of project releases. Resource Actions that modify reservoir water levels would be seasonal changes outside of the range of historical operations.

Proposed Conservation Measures

The conservation measures as proposed below are considered part of the proposed actions evaluated by the Service in this biological opinion. Any change in these plans or their implementation that might adversely affect listed species, either directly or indirectly, requires reinitiation of consultation with the Service, as set forth in the final paragraphs of this letter.

These measures have been proposed by DWR in the May 30, 2003, Biological Assessment to ensure that habitat and potential habitat for federally-listed species under the Act are not permanently adversely affected in size or quality at any time over the life of the new FERC license (excluding catastrophic events or natural processes including those processes induced by floodplain restoration projects that may result in the loss of habitat for federally-listed species). Implementation of these measures is specifically directed to avoid loss of: (1) individual elderberry plants or elderberry plant vigor; (2) aerial extent and/or linear feet of habitat; (3) habitat connectivity or patchiness; and (4) habitat quality due to incompatible uses including high-impact human recreational activity.

General Conservation Measures

DWR will operate and manage, to the extent feasible, Wildlife Management Areas (WMA) within the FERC Project Boundary in a fish and wildlife friendly manner, with the needs of fish and wildlife balanced with compatible recreational needs or other competing actions. This will not apply to portions of the WMA that are withdrawn from DWR jurisdiction and/or FERC-designated boundaries. In order to implement the avoidance, minimization and conservation measures described below and ensure compliance with the terms and conditions of the new FERC License and this biological opinion, a listed-Species Coordinator will be designated by DWR. The responsibilities of the listed-Species Coordinator are described below, and will be implemented during both the interim period and the 50-year term of license:

1. Ensure that DWR, CDFG, DPR, and California Department of Boating and Waterways (DB & W) personnel who operate or manage programs and activities on project area lands are apprised of minimization and conservation measures and their obligations and requirements as well as obligation and requirements of this biological opinion issued to FERC for the relicensing;
2. Employ best efforts to ensure that DWR does not adversely affect federally-listed species or their habitats within the FERC Project Boundary and at facilities or engage in any take of a federally-listed species beyond what is authorized by the Service under this biological opinion or any future biological opinions;
3. Report any material breach of these conservation measures to the Service;
4. Plan, conduct, and chair an annual meeting for all involved agencies, Service and others, to discuss progress and problems with appropriate adaptive management changes in implementing minimization and conservation measures, and requirements of this biological opinion; and,
5. Provide a written report annually to the Service by March 1, detailing the annual meeting and related issues involving implementation of conservation measures and the biological opinion for the relicensing.

Valley Elderberry Longhorn Beetle

Habitat for the valley elderberry longhorn beetle occurs throughout the proposed project area. Minimization and conservation measures to be implemented for this species include the following:

- i. To the extent feasible, the same amount and quality of valley elderberry longhorn beetle habitat that now exists within the proposed project area (based upon DWR's 2004 habitat mapping provided in chapter 6 of the Biological Assessment) will be maintained. Elderberry shrubs are the sole host plant for this species. Currently 95 acres of elderberry shrub canopy occurs within the proposed project area.

2. Future direct and indirect adverse effects to all elderberry shrubs will be avoided to the maximum extent practical throughout the life of the FERC license. If adverse direct or indirect effects are necessary, the following compensation will be implemented:
 - a. Direct and indirect effects may not exceed a total of 12 acres of elderberry shrub canopy area over the life of the 50-year FERC license period and the 5-year interim period (55 years total). The 12-acre total canopy area limitation will not affect projects that would have short-term effects to the valley elderberry longhorn beetle but long-term conservation benefit (i.e., projects that involve floodplain restoration or non-native vegetation removal). Compensation for the loss of beetle habitat will follow the Service's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle*, which is provided as Appendix A of this biological opinion. These conservation guidelines require compensation for the loss of elderberry shrubs based on stem diameters at ground level.
 - b. Effects to the beetle resulting from road-grading activities currently conducted on FERC Project Boundary land will be minimized by using water trucks to moisten grading areas during any grading activity conducted in the vicinity of elderberry shrubs. In addition, grading will be limited to less than 80 miles of roads graded once annually.
 - c. DWR may choose to meet its compensation requirements for valley elderberry beetle and elderberry habitat through either: (1) purchasing credits from a Service-approved conservation bank; or (2) onsite preservation of beetle habitat. Onsite habitat utilized for compensation will require a Service-approved management plan that specifies management activities for the benefit of the beetle throughout the 55-year duration of the project. Refer to the terms and conditions of this biological opinion for a more detailed description of requirements of the management plan.

Vernal Pool Plants

Suitable habitat exists within the proposed project area for the following federally-listed plant species: (1) Butte County meadowfoam; (2) slender Orcutt grass; (3) hairy Orcutt grass; (4) Greene's tuctoria; (5) Hartweg's golden sunburst; (6) Hoover's spurge; and (7) Layne's ragwort. DWR performed surveys for these seven federally-listed plant species in 2002, 2003, and 2004, and no federally-listed plant species were detected. However, the proposed project involves maintenance and operation activities and resource actions that will continue for 50 years from the date of issuance of the FERC license and it is possible that federally-listed plant species could become established within the project area at some time during the 50-year license period or the 5-year interim period. DWR will survey suitable habitat for federally-listed plant species prior to any actions that may directly or indirectly affect vernal pool habitat to ensure that federally-listed plant species have not expanded into these areas. This information will be submitted to the Service along with the listed-Species Coordinator's annual report.

Vernal Pool Invertebrates

Vernal pools within the project area are limited primarily to the vicinity of the Thermalito Afterbay and the Thermalito Forebay. Minimization and conservation measures for vernal pools and associated wildlife species will be implemented in these areas and include the following:

1. To the extent feasible, the same amount and quality (including hydrologic connectivity) of existing vernal pool habitat presently existing within the FERC Project Boundary will be maintained. This baseline is 645 individual vernal pools or vernal swales totaling 72.3 acres, as specified in the February 2007, *Vernal Pool Assessment Report*. DWR will apprise others involved in management activities near vernal pools of this requirement, at least annually and in writing.
2. Direct and indirect effects to vernal pool habitat will not exceed 9.5 acres over the 50-year FERC license period and the 5-year interim period (55 year total). Direct and indirect effects will be compensated for by a combination of habitat creation/restoration and habitat preservation.

For direct and indirect effects to vernal pool habitat, DWR will compensate by preserving vernal pool habitat at a 2:1 preservation ratio (2 acres preserved for every 1 acre directly or indirectly affected).

For direct effects to vernal pool habitat, DWR will compensate by creating/restoring vernal pool habitat through one of the following: (1) 1:1 creation for direct effects if the creation precedes by 6 months or more the adverse effect; or (2) 2:1 creation if the creation is done later than 6 months before the adverse effect occurs.

DWR will fulfill these preservation and creation/restoration obligations by either: (1) purchasing the appropriate amount of preservation and creation/restoration credits from a Service-approved conservation bank; or (2) preserving and creating/restoring vernal pool crustacean habitat onsite. Onsite habitat utilized for preservation and/or creation restoration compensation will require a Service-approved management plan that specifies management activities solely for the benefit of vernal pool species throughout the 55-year duration of the project. Refer to the terms and conditions of this biological opinion for a more detailed description of requirements of the management plan.

3. If vernal pool creation/restoration activities occur onsite, DWR will restore former vernal pool habitats, as determined by historical project-area mapping, and only after these former habitats are fully used or are infeasible for vernal pool creation, will other non-former vernal pool habitats be used (upon approval by the Service). Vernal pool creation/restoration activities will not adversely affect existing vernal pools. If it is determined that a vernal pool wetland will be directly affected as a result of resource actions or operations and maintenance activities, the top layer of soil will be collected for inoculating newly created pools. Soil stockpiled for onsite creation will be shielded from rain with a water-proof cover to ensure that it remains completely dry.

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4. Indirect effects are defined as any substantive effects within 200 feet of a vernal pool. Indirect effects will be considered direct effects if the hydrology of the vernal pool is altered in any way, regardless of the distance to the affected vernal pool.
5. All vernal pools identified during DWR habitat mapping (specified in the February 2007, Vernal Pool Assessment Report) will be surveyed annually in the spring of each year for the first 5 years from the date of issuance of this biological opinion, and then in the spring of every other year thereafter over the 50-year life of the FERC license. Surveys will be timed just as the vernal pools are drying. The primary objective of the surveys will be to detect and record any adverse effects which may threaten vernal pool habitat including off-road vehicle (ORV) use, broken or cut fences allowing unauthorized access, missing signs, sedimentation, or other factors. Another objective will be to evaluate the implementation of each of the vernal pool minimization and conservation measures. Results of the surveys and the effectiveness of the minimization and conservation measures in preventing disturbance to these habitats will be summarized in a sub-report that will be approved and signed by DWR's Oroville Field Division Chief. This approved sub-report will be included in the annual overall listed-species report.
6. All fences protecting vernal pool from vehicular access or other adverse uses will be inspected at least monthly. Any damaged, vandalized, or degraded fences will be promptly repaired within 30 working days. DWR will apprise others in writing annually of this requirement.
7. Regular patrols and enforcement of existing restrictions by DWR security staff, DPR rangers or CDFG wardens will be encouraged and promoted to reduce recreational-use effects to vernal pools and associated habitat.
8. Signage indicating restricted vehicular access (e.g., Sensitive or Closed Area-No Vehicular Access-Violators will be Cited) will be maintained by DWR or others near vernal pools access points and maintained to reduce recreational-use impacts to vernal pool habitat. Installation of new signage will focus on locations of historical or new problem areas where vehicular access has occurred.
9. Gravel coverings will be applied to all seepage-pump access roads located along the south and west edges of the Thermalito Afterbay by December 2008. Roads causing siltation into vernal pool habitat will be addressed first if this work must be implemented in phases due to budgetary or other constraints.
10. A sediment-trapping program will be implemented using various measures (e.g., gravel, rock, silt fencing, silt-screening, hay bales, wattles, or coconut coir mats) to reduce and/or prevent sedimentation into vernal pool habitat. Through adaptive management over time, the Best Management Practices will then be selected and at least annually checked and repaired, as necessary, over the life of the FERC license and the 5-year interim period.

11. Earth-moving activities will be conducted in a manner that does not in any way alter the hydrology to the vernal pools and swales located within the proposed project area. Discing for any purpose, including for fire-breaks and general fish and wildlife enhancements will not be conducted any closer than 100 feet from vernal pool edges. DWR will apprise others in writing, at least annually, of this requirement. If these types of activities will result in indirect effects to vernal pool habitat (i.e., within 200 feet), DWR will request that FERC reinitiate section 7 consultation with the Service if it is anticipated that effects from these activities will surpass the acreage amounts described in item 2 of the vernal pool conservation measures (page 15).
12. Use of any herbicide for weed control and/or fuel control within 200 feet of vernal pools will be avoided to the extent practical. If herbicides must be used as a last resort, acetolactate synthase-inhibiting herbicides will be avoided in favor of glysohphate-based products, such as Roundup ®. Surfactants and emulsifiers, which can be hazardous to vernal pool species, will be limited to the extent practicable and feasible. DWR will advise others in writing of the above requirements at least annually.

Giant Garter Snake

Habitat for the giant garter snake primarily occurs in the Thermalito Forebay and Thermalito Afterbay and the Oroville Wildlife Area (OWA). Minimization and conservation measures directed toward the giant garter snake are described below for these general areas.

1. To the extent feasible, the same amount and quality of giant garter snake habitat (including connectivity of existing giant garter snake wetlands habitat) will be maintained along the north and south margins of the Thermalito Forebay, Thermalito Afterbay (including existing waterfowl brood ponds), and within the OWA as identified in DWR's baseline habitat mapping (Chapter 6.0, Species Accounts and Status in the Action Area of the Biological Assessment). Current baseline for suitable giant garter snake habitat is reported at 4,280 acres. DWR will at least annually in writing apprise others involved in activities in the Thermalito Forebay, Thermalito Afterbay and OWA of this requirement.

DWR will not exceed a total of 450 acres of direct effects to giant garter snake habitat (upland and aquatic) over the 50-year term of license and the 5-year interim period (55 years total). Adverse effects to giant garter snake habitat will be offset by compensation as identified in the Service's 1997 *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat*, which is provided as Appendix B of this biological opinion.

DWR will fulfill this preservation component by either: (1) purchasing the appropriate amount of preservation credits from a Service-approved conservation bank; or (2) preserving giant garter snake habitat onsite. Onsite habitat utilized for preservation compensation will require a Service-approved management plan that specifies management activities solely for the benefit of giant garter snake throughout the 55-year duration of the project (50-year term of license and up to a 5-year interim period). Refer to the terms and conditions of this biological opinion for a more detailed description of

requirements of the management plan.

2. DWR proposes to conduct invasive plant control activities within giant garter snake habitat at the Thermalito Forebay, Afterbay, and within the OWA. Control of purple loosestrife, scarlet wisteria, and aquatic primrose is considered beneficial to giant garter snake. Removal of these non-native plants will be implemented in a manner that minimizes adverse effects to non-target plant species.
3. Targeted non-native or noxious weeds, trees or shrubs that colonize any giant garter snake wetlands habitat, or associated upland habitat within 200 feet of the wetlands habitat will be removed in a manner that minimizes adverse effects to non-target plant species. Broad spectrum or large-scale chemical or mechanical means that might otherwise adversely affect more extensive areas of the giant garter snake habitat will be prohibited (except as described in item 2). Non-native or noxious weed removal operations conducted in this restricted manner are considered beneficial to the giant garter snake provided that there are no other obvious direct or indirect adverse effects to the species or its habitat. DWR will at least annually in writing apprise others involved in noxious weed control of this requirement.

Compensation will not be implemented for short-term, non-permanent effects associated with management activities implemented for general fish and wildlife enhancement (i.e., crossing uplands with large equipment to install osprey nesting platforms, or with All Terrain Vehicles to access sites for noxious weed and plant control operations).

4. DWR will minimize adverse effects to giant garter snake habitat (as defined in Chapter 6.0, Species Accounts and Status in the Action Area of the Biological Assessment) at the Thermalito Forebay, Thermalito Afterbay (including existing waterfowl brood ponds) and within the OWA. Further, all excavation within 200 feet of giant garter snake aquatic habitat will be restricted to the snake's active period (May 1 to October 1).
5. Rodent control activities of any kind will not be conducted by DWR or others in designated giant garter snake wetlands habitat, or within 200 feet of the habitat, except as may be necessary to insure structural integrity of dams and levees or for public safety in high visitor use areas including in the immediate vicinities of public swimming lagoons, boat-launching ramps, beach areas, restrooms, picnic areas and related day-use facilities and designated campgrounds. Burrow fumigants will not be used by DWR or others. DWR will at least annually apprise others involved in rodent control activities within the action area in writing of this requirement.
6. Structural components of giant garter snake habitat (i.e., large woody debris [LWD]), that accrue or move through natural processes will not be removed, moved or otherwise altered, except as may be necessary for operation of the project or public safety in the high-visitor-use areas including in the immediate vicinities of the public swimming lagoons, boat-launching ramps, beach areas, restrooms, picnic area and related day-use facilities and designated campgrounds. Since no giant garter snake habitat occurs

upstream of Oroville Dam this restriction will not apply in this upstream area. DWR will at least annually, and in writing, apprise others involved in LWD maintenance and removal activities of this requirement.

7. Dog-training field exercises in the Thermalito Afterbay area will be restricted to reduce current and potential impacts to giant garter snake from disturbance and displacement in wetlands and associated uplands habitats. Dog training activity will be limited to a maximum of one-third annually of the aerial extent of the better giant garter snake wetlands habitats and associated uplands that exists around the Thermalito Afterbay. This restriction will apply during the giant garter snake's active periods of the year, May 1 to October 1. The dog training activities can occur during the giant garter snake's inactive periods from November through March, unless any evidence of the need for further minimization of effects is documented. DWR will at least annually in writing apprise others involved in managing dog training/trial activities in the Thermalito Afterbay of this requirement.
8. In order to minimize adverse effects to giant garter snake habitat resulting from waterfowl management activities within waterfowl brood ponds, DWR proposes the following measures:

- a. All brood ponds occurring at the time of DWR's 2004 habitat mapping will be maintained to ensure the same quality, acreage and connectivity to nearby habitat and associated uplands.
- b. Four new brood ponds totaling 24 acres will be constructed in the Thermalito Afterbay within the first four years of the new FERC license to compensate and offset potential adverse effects to giant garter snake from Afterbay water-level fluctuations. If creation of these waterfowl brood ponds will result in short-term adverse effects to giant garter snake habitat, DWR will request that FERC reinitiate section 7 consultation with the Service if effects from these activities are expected to surpass the acreage amount of authorized take specified in this biological opinion.

DWR may construct additional waterfowl brood ponds above the 24 acres to be used as compensation to offset future, unspecified adverse effects to the giant garter snake or its habitat that may occur in the project area. Onsite habitat utilized for compensation will require a Service-approved management plan that specifies management activities solely for the benefit of giant garter snakes throughout the duration of the project (i.e., 55 years) (see terms and conditions of this biological opinion for a more detailed description of requirements for the management plan).

- c. Semi-permanent wetlands will be maintained in the brood ponds areas by operating the Thermalito Afterbay or by other methods to achieve a water surface elevation of at least 133.5 feet for at least 12 consecutive hours at least once per

- month annually during the giant garter snake active period (May 1 through October 1), except when an individual pond is being drained for management/maintenance actions. This will ensure that the brood ponds have sufficient water in them throughout the active season of the snake.
- d. Management regimes designed to improve/enhance waterfowl habitat in the waterfowl brood ponds will be conducted that do not affect (1) more than 25 percent of each pond, if only portions of ponds are being drained annually, or (2) 25 percent of all ponds, if whole ponds are being drained annually. DWR will request that FERC reinitiate section 7 consultation with the Service if effects from these activities are expected to surpass the acreage amount of authorized take specified in this biological opinion.
 - e. DWR will remove as many large (> 6 inches) predatory fish as practical from each waterfowl brood pond at least once every 2 years.
 - f. Plant control within the waterfowl brood ponds will be limited to using only shallow-disking in dry areas, except that deep disking may be done during the giant garter snake's active period (May 1 through October 1). Shallow and deep-disking in upland habitat within 200 feet of aquatic giant garter snake habitat may result in take of the snake. DWR will request that FERC reinitiate section 7 consultation with the Service if effects from these activities are expected to surpass the acreage amount of authorized take specified in this biological opinion.
 - g. *Burning of vegetation in the brood ponds for waterfowl habitat management* will be limited to closely controlled burns only during the giant garter snake's inactive period (October 2 through April 30) and limited to a maximum of two brood ponds and associated uplands every 2 weeks during the giant garter snake's active period (April through October). Burning of vegetation in the waterfowl brood ponds and within 200 feet of aquatic giant garter snake habitat may result in take of the snake (i.e., the loss of giant garter snake habitat or harassment and/or harm to this species). DWR will request that FERC reinitiate section 7 consultation with the Service if effects from these activities are expected to surpass the acreage amount of authorized take specified in this biological opinion.
 - h. *Burning of wetland margins and/or disking of unvegetated portions of the Thermalito Afterbay drawdown zone* will be restricted to the inactive period of the giant garter snake (October 2 through April 30). DWR will at least annually in writing apprise others involved in such activities in the Thermalito Afterbay of this requirement.
 - i. State agencies will cultivate wildlife food and cover plants grown on uplands around the Thermalito Afterbay in a manner that minimizes potential adverse effects to giant garter snake and apprise others in writing, of the following: To the extent practicable, limit necessary disking, planting, and cultivation in

uplands to periods of giant garter snake activity May 1 through October 1. This limitation will be particularly important when soil penetration associated with planting is to be relatively deep. When these agricultural activities must be performed during the giant garter snake's inactive period, upland areas within 200 feet of potential giant garter snake wetlands habitat with potential giant garter snake burrowing places will be flagged and avoided to the extent practicable. Shallow and deep-discing in upland habitat within 200 feet of aquatic giant garter snake habitat may result in take of the snake.

- j. Planting of forage-and cover- crops in uplands within 200 feet of giant garter snake aquatic habitat will be limited to less than 26 percent annually of all such available habitat around the Thermalito Afterbay edges. DWR will request that FERC reinitiate section 7 consultation with the Service if effects from these activities are expected to surpass the acreage amount of authorized take specified in this biological opinion.
9. DWR will encourage the State's gravel-mining lessees operating on land within the FERC Project Boundary and within 200 feet of giant garter snake habitat to implement habitat improvements such as reducing steep-edged pond banks, adding cover and structure such as large woody debris, creating benches, increasing edges and irregularities and installing vegetation plantings. DWR will provide to the lessees copies of this biological opinion, the Biological Assessment and DWR's habitat maps. DWR will provide copies or written reference to these documents to the lessees at least every 5 years.
 10. DWR will encourage road-maintenance agencies, including California Department of Transportation and the Butte County Department of Roads and Highways, irrigation districts and private landowners, who maintain culverts, ditches, canals and other wetlands-related structures along and under State Highway 99 along the westerly edge of the Thermalito Afterbay, to avoid altering or degrading giant garter snake habitat. DWR will encourage these entities to improve, if possible, these structures for use as giant garter snake connectivity habitat. DWR will provide at least once every 5 years to these entities copies of this biological opinion, the Biological Assessment, and habitat maps.
 11. Erosion control matting in which coconut, straw or other absorbent fibers are wrapped in one or two layers of small-size ($3/4 \times 3/4$-inch mesh) plastic mesh or nylon netting material will be avoided because these materials are known to entrap and kill snakes. Netting of $3/4 \times 3/4$ -inch or larger, which is unlikely to entangle and entrap snakes, may continue to be used.

California Red-legged Frog

General minimization and conservation measures that DWR will implement for the California red-legged frog includes the following:

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1. Measures described for the giant garter snake will be implemented to protect and conserve potential California red-legged frog habitat for the possible future reintroduction or natural recolonization of this species in habitat within the FERC Project Boundary.
2. Prior to initiation of any formal planning of future proposed action on lands within the FERC Project Boundary upstream of Oroville Dam that would or could affect California red-legged frog habitat, DWR will conduct protocol-level surveys (per Service guidelines in effect at the time). If California red-legged frogs are detected during these surveys, DWR will request that FERC reinitiate section 7 consultation with the Service prior to continuing the planning process for the proposed activity.

Bald Eagle

1. Site specific bald eagle management plans have been prepared and will be implemented for all of the known active bald eagle nesting territories located within the proposed project boundary, in coordination with CDFG and the Service.
2. Discovery of new nesting territories will be disclosed by telephone and in writing to both CDFG and the Service within 10 working days. DWR will develop draft site-specific management plans within 30 days for the new territories unless there is an extension based upon consultations with CDFG and the Service.
3. Foraging conditions around each active bald eagle nesting territory will be enhanced by installing a fish habitat structure in the reservoir within identified foraging areas, as defined by the management plan for the nesting territory. Enhancement will include at least one fishery structural/cover element installed annually. The fishery structure/cover element is defined in the Relicensing Settlement Agreement Article A110 Lake Oroville Warm Water fishery Habitat Improvement Program.
4. DWR will conduct a survey at least every 2 years as part of the State Midwinter Bald Eagle Count. The focus of the surveys will be the identification of potential management issues on FERC Project Boundary lands relative to wintering bald eagles.

Status of the Species

Valley Elderberry Longhorn Beetle – Status of the Species

The beetle was listed as a threatened species under the Act and critical habitat for the species was designated on August 8, 1980 (Service 1980). Two areas along the American River in the Sacramento metropolitan area have been designated as critical habitat for the beetle. Critical habitat for this species has been designated along the lower American River at Goethe and Ancil Hoffman parks (American River Parkway Zone) and at the Sacramento Zone, an area about a half mile from the American River downstream from the American River Parkway Zone. In addition, an area along Putah Creek, Solano County, and the area west of Nimbus Dam along the American River Parkway, Sacramento County, are considered essential habitat, according to the

Valley Elderberry Longhorn Beetle Recovery Plan (Service 1984). These critical habitat and essential habitat areas within the American River parkway and Putah Creek support large numbers of mature elderberry shrubs with extensive evidence of use by the beetle.

Valley elderberry longhorn beetle is a medium sized (0.8 inch long) beetle that is endemic to the Central Valley of California. The beetle is found only in association with its host plant, elderberry shrubs. Adult beetles are sexually dimorphic with females having a dark metallic green to black elytra with a bright red boarder and males having predominantly red elytra with four dark oblong spots. Adults feed on the foliage and perhaps flowers and are present from March through early June. During this period the beetles mate, and females lay eggs on living elderberry plants. The first instar larvae bore to the center of elderberry stems where they develop for one to two years feeding on pith. Prior to forming their pupae, the elderberry wood boring larvae chew through the bark (Halstead and Oldham 1990) and then plug the holes with wood shavings. The larvae crawl back to their pupal chamber which they pack with frass (Barr 1991). In the pupal chamber, the larvae metamorphose into their pupae and then into adults where upon they emerge between mid-March through June (Barr 1991).

Population densities of the beetle are probably naturally low (Service 1984). It has been suggested, based on the spatial distribution of occupied shrubs (Barr 1991), that the beetle is a poor disperser (Collinge *et al.* 2001). Low density and limited dispersal capability cause the beetle to be vulnerable to the negative effects of the isolation of small subpopulations due to habitat fragmentation.

At the time of its listing in 1980, the beetle was known from less than 10 locations on the American River, Putah Creek and the Merced River in the Central Valley of California (Service 1980). The beetle currently inhabits the Central Valley from southern Shasta County south to Fresno County in the San Joaquin Valley (Barr 1991). There are 191 records of the beetle (largely based on exit holes) in the Central Valley (CNDDDB 2006). Although records exist for Kern County (CNDDDB 2006), no specimens or observations of living beetles exist that support the assertion that the species is found there (Talley *et al.* 2006).

Since the time of listing, the number of sites from which the beetle is known has increased from less than 10 to approximately 190 (CNDDDB 2006), primarily due to an increased effort to look for the beetle. It should be noted that the number of records does not indicate the number of known populations. In many cases, there are multiple records from within close proximity to one another within the same watershed or river. For example, 24 records are known from within two miles of the American River (CNDDDB 2006).

There is little information regarding range-wide population trends for the beetle. Collinge *et al.* (2001) provides the only long-term data set for the species. They surveyed for beetles at most of the sites that had previously been surveyed by Barr (1991). Both studies observed evidence of the beetle (i.e., recent exit holes) at approximately 20% of the sites examined, and 25% of the total number of elderberry groups examined at those sites (more than one elderberry group was examined at some sites). Collinge *et al.* (2001) found that while the proportions of occupancy

were similar, the number of sites examined containing elderberry and the density of elderberry at sites had decreased since Barr (1991), resulting in fewer occupied sites and groups.

There are eleven occurrences of the beetle within five miles of the proposed project, as reported in the California Natural Diversity Database (CNDDDB 2006). The nearest known occurrence is approximately 1.1 miles south of the proposed project area. The action area contains elderberry shrubs, which are the sole host plant for this species and is utilized for feeding, resting, mating, and other essential behaviors. Therefore, the Service believes that the valley elderberry longhorn beetle is reasonably certain to occur within the action area because of the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the action area, as well as the close proximity of known occurrences.

Vernal pool fairy shrimp- Status of the Species

A final rule was published on September 19, 1994 (Service 1994), to list the vernal pool fairy shrimp as threatened under the Act. The final rule to designate critical habitat for 15 vernal pool species, including the vernal pool fairy shrimp, was published on August 6, 2003 (Service 2003). The most recent final rule was published again on February 10, 2006 (Service 2006). Further information on the life history and ecology of the vernal pool fairy shrimp may be found in the final listing rule, the final rule to designate critical habitat, Eng *et al.* (1990), Helm (1998), and Simovich *et al.* (1992).

Vernal pool fairy shrimp inhabit alkaline pools, ephemeral drainages, rock outcrop pools, vernal pools, and vernal swales (Eriksen and Belk 1999; Helm 1998). Occupied habitats range in size from rock outcrop pools as small as one square meter to large vernal pools up to 12 acres; the potential ponding depth of occupied habitat ranges from 1.2 inches to 48 inches. The adults of the vernal pool fairy shrimp have been collected from early December to early May.

Vernal pool fairy shrimp have delicate elongate bodies; large, stalked, compound eyes; no hard shell (i.e., no carapace); and 11 pairs of swimming legs. Typically less than 1.0 inch long, they swim or glide gracefully upside-down by means of complex, wavelike beating movements. This species feeds on algae, bacteria, protozoa, rotifers, and detritus. Female vernal pool fairy shrimp carry eggs in a pear-shaped, ventral brood sac until the eggs are either dropped or sink to the pool bottom with the female when she dies. Eggs which remain after pools dry are known as cysts and are able to withstand heat, cold, and prolonged desiccation. When pools refill in the same or subsequent seasons, some, but not all, of the cysts hatch, resulting in a cyst bank in the soil that may include cysts from several breeding seasons (Donald 1983). Vernal pool fairy shrimp develop rapidly and may become sexually mature within two weeks after hatching (Gallagher 1996; Helm 1998). Such quick maturation permits fairy shrimp populations to persist in short-lived, shallow bodies of water (Simovich *et al.* 1992).

All known occurrences of vernal pool fairy shrimp occur in California or southern Oregon. The geographic range of this species encompasses most of the Central Valley from Shasta County to Tulare County and the central coast range from northern Solano County to Santa Barbara County, California; additional disjunct occurrences have been identified in western Riverside County,

California, and in Jackson County, Oregon near the city of Medford (CNDDDB 2006; Helm 1998; Eriksen and Belk 1999; Service 1994, 2003).

The primary historic dispersal method for the vernal pool fairy shrimp was likely large scale flooding resulting from winter and spring rains which allowed colonization of different individual vernal pools and other vernal pool complexes. This dispersal is adversely affected by the construction of dams, levees, and other flood control measures, and widespread urbanization within significant portions of the range of this species. Waterfowl and shorebirds likely are now the primary dispersal agents for the vernal pool fairy shrimp (Simovich *et al.* 1992). The eggs of these crustaceans are either ingested (Krapu 1974; Ahl 1991) and/or adhere to the legs and feathers upon which they are transported to new habitats.

There are two known occurrence of vernal pool fairy shrimp within one mile of the proposed project area reported in the *California Natural Diversity Database (CNDDDB 2006)*. The nearest of these two known occurrences is approximately 0.2 mile northwest of the Thermalito Afterbay. The action area contains essential habitat components, including vernal pools with sufficient ponding duration, which can be used by the vernal pool fairy shrimp for feeding, resting, mating, and other essential behaviors. Therefore, the Service believes that the vernal pool fairy shrimp is reasonably certain to occur within the action area because of the biology and ecology of the species, the presence of suitable habitat in and adjacent to the action area, as well as the recent observations of this listed species within one mile of the proposed project site.

Vernal Pool Tadpole Shrimp- Status of the Species

A final rule was published on September 19, 1994 (Service 1994), to list the vernal pool tadpole shrimp as endangered under the Act. The final rule to designate critical habitat for 15 vernal pool species, including the vernal pool tadpole shrimp, was published on August 6, 2003 (Service 2003). The most recent final rule was published again on February 10, 2006 (Service 2006). Further information on the life history and ecology of the vernal pool tadpole shrimp may be found in the final listing rule, the final rule to designate critical habitat, Eng *et al.* (1990), Helm (1998), Simovich *et al.* (1992), and Vollmar (2002).

Vernal pool tadpole shrimp inhabit alkaline pools, clay flats, vernal lakes, vernal pools, vernal swales, and other seasonal wetlands (Helm 1998). Occupied habitats range in size from vernal pools as small as two square meters to large vernal lakes up to 89 acres; the potential ponding depth of occupied habitat ranges from 1.5 inches to 59 inches. Vernal pool tadpole shrimp have large, shield-like carapaces approximately 1.0 inch long that covers most of their body; dorsal, compound eyes; and a pair of long cercopods, one on each side of a flat caudal plate, at the end of their last abdominal segment. Vernal pool tadpole shrimp are primarily bottom-dwelling animals that move with legs down while feeding on detritus and living organisms, including fairy shrimp and other invertebrates (Pennak 1989). Females deposit cysts (partially developed embryos encased in an egg-like structure) which settle on the pool bottom. Although some cysts may hatch quickly, others remain dormant to hatch during later rainy seasons (Ahl 1991). When winter rains refill inhabited wetlands, tadpole shrimp hatch from dormant cysts and may become sexually mature within three to four weeks after hatching (Ahl 1991; Helm 1998).

Reproductively mature adults may be present in pools until the habitats dry up in the spring (Ahl 1991; Gallagher 1996; Simovich *et al.* 1992).

The vernal pool tadpole shrimp ranges from east of Redding in Shasta County south to Fresno County, and from a single vernal pool complex located on the San Francisco Bay National Wildlife Refuge in Alameda County. The species inhabits vernal pools containing clear to highly turbid water, ranging in size from 54 square feet in the Mather Air Force Base area of Sacramento County, to the 89-acre Olcott Lake at Jepson Prairie in Solano County. Vernal pools at Jepson Prairie (Solano County) and Vina Plains (Tehama County) have a neutral pH, and very low conductivity, total dissolved solids, and alkalinity (Eng *et al.* 1990). These pools are located most commonly in grass-bottomed swales of grasslands in old alluvial soils underlain by hardpan or in mud-bottomed claypan pools containing highly turbid water.

The primary historic dispersal method for the vernal pool tadpole shrimp was likely large scale flooding resulting from winter and spring rains which allowed colonization of different individual vernal pools and other vernal pool complexes. This dispersal is adversely affected by the construction of dams, levees, and other flood control measures, and widespread urbanization within significant portions of the range of this species. Waterfowl and shorebirds likely are now the primary dispersal agents for vernal pool tadpole shrimp (Simovich 1992). The eggs of the vernal pool tadpole shrimp are either ingested (Krapu 1974; Ahl 1991) and/or adhere to the legs and feathers upon which they are transported to new habitats.

There are two known occurrences of vernal pool tadpole shrimp within five miles of the proposed project area (CNDDDB 2006). The nearest known occurrence is 1.3 miles north of the Thermalito Forebay. The action area contains essential habitat components including vernal pools with sufficient ponding durations, which can be used by the listed vernal pool crustaceans for feeding, resting, mating, and other essential behaviors. Therefore, the Service believes that this federally-listed species is reasonably certain to occur within the action area because of the biology and ecology of the species, the presence of suitable habitat in and adjacent to the action area, as well as the recent observations of this listed species within five miles of the project site.

Giant Garter Snake – Status of the Species

The Service published a proposal to list the giant garter snake as an endangered species on December 27, 1991 (Service 1991). The Service reevaluated the status of the snake before adopting the final rule, which listed as a threatened species on October 20, 1993 (Service 1993).

The giant garter snake is one of the largest garter snakes species reaching a total length of approximately 64 inches. Females tend to be slightly longer and proportionately heavier than males. Generally, the snakes have a dark dorsal background color with pale dorsal and lateral stripes, although coloration and pattern prominence are geographically and individually variable (Hansen 1980; Rossman *et al.* 1996).

Giant garter snakes formerly occurred throughout the wetlands that were extensive and widely distributed in the Sacramento and San Joaquin Valley floors of California (Fitch 1940; Hansen

and Brode 1980; Rossman and Stewart 1987). The historical range of the snake is thought to have extended from the vicinity of Chico, Butte County, southward to Buena Vista Lake, near Bakersfield, in Kern County (Fitch 1940; Fox 1948; Hansen and Brode 1980; Rossman and Stewart 1987). Early collecting localities of the giant garter snake coincide with the distribution of large flood basins, particularly riparian marsh or slough habitats and associated tributary streams (Hansen and Brode 1980). Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lake beds (Hansen 1980; Hansen and Brode 1980).

Upon Federal listing in 1993, the Service identified 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records (Service 1993). The 13 populations largely coincide with historical flood basins and tributary streams throughout the Central Valley: (1) Butte Basin, (2) Colusa Basin, (3) Sutter Basin, (4) American Basin, (5) Yolo Basin/Willow Slough, (6) Yolo Basin/Liberty Farms, (7) Sacramento Basin, (8) Badger Creek/Willow Creek, (9) Caldoni Marsh/White Slough, (10) East Stockton--Diverting Canal & Duck Creek, (11) North and South Grasslands, (12) Mendota, and (13) Burrel/Lanare.

The known range of the giant garter snake has changed little since the time of listing. In 2005, giant garter snakes were observed at the City of Chico's wastewater treatment facility, approximately ten miles north of what was previously believed to be the northernmost extent of the species' range. The southernmost known occurrence is at the Mendota Wildlife Area in Fresno County. No sightings of giant garter snakes south of Mendota Wildlife Area within the historic range of the species have been made since the time of listing (Hansen 2002).

Endemic to wetlands in the Sacramento and San Joaquin valleys, the giant garter snake inhabits marshes, sloughs, ponds, small lakes, low gradient streams, and other waterways and agricultural wetlands, such as irrigation and drainage canals, rice fields and the adjacent uplands (Service 1999). Essential habitat components consist of: (1) wetlands with adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) upland habitat with grassy banks and openings in waterside vegetation for basking; and (4) higher elevation uplands for over-wintering habitat with escape cover (vegetation, burrows) and underground refugia (crevices and small mammal burrows) (Hansen 1988). Snakes are typically absent from larger rivers and other bodies of water that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates (Hansen 1988; Hansen and Brode 1980; Rossman and Stewart 1987). Riparian woodlands do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations (Hansen 1988).

Rice fields have become important habitat for giant garter snakes, particularly associated canals and their banks for both spring and summer active behavior and winter hibernation (Hansen 2004; Wylie 1998b). While within the rice fields, snakes forage in the shallow water for prey, utilizing rice plants and vegetated berms dividing rice checks for shelter and basking sites (Hansen and Brode 1993). In the Natomas Basin, habitat used consisted almost entirely of

irrigation ditches and established rice fields (Wylie 1998a; Wylie *et al.* 2004b), while in the Colusa NWR, snakes were regularly found on or near edges of wetlands and ditches with vegetative cover (Wylie *et al.* 2003a). Telemetry studies also indicate that active snakes use uplands extensively, particularly where vegetative cover exceeds 50 percent in the area Wylie 1998b).

The current distribution and abundance of the giant garter snake is much reduced from former times (Service 1999). Prior to reclamation activities beginning in the mid- to late-1800s, about 60 percent of the Sacramento Valley was subject to seasonal overflow flooding providing expansive areas of snake habitat (Hinds 1952). Now, less than 10 percent, or approximately 319,000 acres, of the historic 4.5 million acres of Central Valley wetlands remain (U.S. Department of Interior 1994), of which very little provides habitat suitable for the giant garter snake. Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one-third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lakebeds (Hansen 1980; Hansen and Brode 1980).

Ongoing maintenance of aquatic habitats for water supply, flood control and agricultural purposes eliminates or prevents the establishment of habitat characteristics required by snakes (Hansen 1988). Such practices can fragment and isolate available habitat, prevent dispersal of snakes among habitat units, and adversely affect the availability of the snake's food items (Hansen 1988; Brode and Hansen 1992). For example, tilling, grading, harvesting and mowing may kill or injure giant garter snakes (Service 2003; Wylie *et al.* 1997). Biocides applied to control aquatic vegetation reduce cover for the snake and may harm prey species (Wylie *et al.* 1995). Rodent control threatens the snake's upland estivation habitat (Wylie *et al.* 1995; Wylie *et al.* 2004a). Restriction of suitable habitat to water canals bordered by roadways and levee tops renders snakes vulnerable to vehicular mortality (Wylie *et al.* 1997). Rolled erosion control products, which are frequently used as temporary berms to control and collect soil eroding from constriction sites, can entangle and kill snakes (Stuart *et al.* 2001; Barton and Kinkead 2005). Livestock grazing along the edges of water sources degrades water quality and can contribute to the elimination and reduction of available quality snake habitat (Hansen 1988), and giant garter snakes have been observed to avoid areas that are grazed (Hansen 2003). Fluctuation in rice and agricultural production affects stability and availability of habitat (Paquine *et al.* 2006; Wylie and Casazza 2001; Wylie *et al.* 2003b, 2004b).

There are 28 known occurrences of giant garter snake within five miles of the proposed project area (CNDDDB 2006). The nearest known occurrence is 0.6 miles west of the Thermalito Afterbay. The action area contains essential habitat components including wetlands with sufficient ponding durations, and upland habitat which can be used by the snake for feeding, resting, mating, hibernating, and other essential behaviors. Therefore, the Service believes that this federally-listed species is reasonably certain to occur within the action area because of the biology and ecology of the species, the presence of suitable habitat in and adjacent to the action area, as well as the recent observations of this listed species within five miles of the project site.

Bald Eagle – Status of the Species

Concern for the bald eagle led Congress to pass the Bald Eagle Protection Act of 1940, as amended (16 U.S.C. §§668-668d) (BEPA). The bald eagle was listed as endangered on February 14, 1978. The Pacific Bald Eagle Recovery Plan was released in 1986, for the recovery and maintenance of bald eagle populations in the 7-state Pacific recovery region (Idaho, Nevada, California, Oregon, Washington, Montana, and Wyoming) (Service 1986). The bald eagle was downlisted from endangered to threatened on July 12, 1995, throughout the lower 48 states (Service 1995). A proposed rule to remove the species from the list of endangered and threatened wildlife was made on July 6, 1999 (Service 1999) but this rule has not been finalized. Critical habitat has not been designated for this species. In addition to the Act and the BEPA, the bald eagle is protected under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§703-712).

The bald eagle continues to be found throughout much of North America and breeds or winters throughout California, except in the desert areas (Zeiner *et al.* 1990; DeGraaf *et al.* 1991). California's breeding population is resident year-long in most areas as the climate is relatively mild (Jurek 1988). Between mid-October and December, migratory bald eagles arrive in California from areas north and northeast of the state. The wintering populations remain in California through March or early April.

The bald eagle is a generalist and opportunistic predator and scavenger adapted to aquatic ecosystems. It frequents estuaries, large lakes, reservoirs, major rivers, and some coastal habitats. Its primary food sources include: fish (taken both alive and as carrion), waterfowl, mammalian carrion, and small birds and mammals. Bald eagles frequently hunt from perches that provide a good view of the surrounding area (Stalmaster 1976; Service 1986). They are also known to hunt by coursing low over the ground or water. In general, foraging habitat consists of large bodies of water or free-flowing rivers with abundant fish and adjacent snags and other perches (Zeiner *et al.* 1990).

Breeding generally occurs February to July (Zeiner *et al.* 1990) but breeding can be initiated as early as January 1 via courtship, pair bonding, and territory establishment. One to three eggs are laid in a stick platform nest 50 to 200 feet above the ground and usually below the tree crown (Zeiner *et al.* 1990). Incubation may begin in late February to mid-March, with the nestling period extending to as late as the end of June. Chicks typically fledge in June up to late July and for the first several weeks of flight, fledglings are still receive parental care, primarily through feeding. The breeding season normally ends approximately August 31 when the fledglings have begun to disperse from the immediate nest site.

Nesting territories are normally associated with lakes, reservoirs, rivers, or large streams and are usually within two miles from water bodies that support an adequate food supply (Lehman 1979; Service 1986). Some of the California's breeding birds winter near their nesting territories. Most nesting territories in California occur from 1,000 to 6,000 feet elevation, but nesting can occur from near sea level to over 7,000 feet (Jurek 1988). Most nests in California are located in

ponderosa pine and mixed-conifer stands and nest trees are most often ponderosa pine (*Pinus ponderosa*) (Jurek 1988).

Wintering habitat is associated with open bodies of water, with some of the largest wintering bald eagle populations in the Klamath Basin (Detrich 1981, 1982). Smaller concentrations of wintering birds are found at most of the larger lakes and man-made reservoirs in the mountainous interior of the north half of California and at scattered reservoirs in central and southwestern California. Communal roosts utilized during the winter are usually near a rich food resource (Service 1986). Most communal winter roosts used by bald eagles throughout the recovery areas offer considerably more protection from the weather than diurnal habitat (Service 1986).

Isolation from disturbances is an important feature of bald eagle wintering habitat. Excessive human activity may be the reason why some suitable wintering habitat is not used by bald eagles (Service 1986). Human activity near wintering bald eagles can adversely affect bald eagle distribution and behavior (Stalmaster and Newman 1978). Bald eagles are susceptible to disturbance by human activity during the breeding season, especially during egg laying and incubation. This includes recreational activities, fluctuating fish populations and availability of roost trees as a result of reservoir level fluctuations, risk of wildfire, fragmentation of habitat, home sites, campgrounds, mines, timber harvest, and roads. Such disturbances can lead to nest desertion or disruption of breeding attempts. Individual pairs of nesting bald eagles exhibit varying level of tolerance to disturbance throughout the breeding season and during periods of foraging.

There are currently four active bald eagle nests along Lake Oroville or other water features within the proposed project area, which include: (1) Palm Avenue; (2) Crystal Hill; (3) Bloomer Cove; and (4) the Diversion Pool near Oroville Dam. Primary foraging areas documented during surveys conducted by DWR include Potter Ravine, Spillway Cove, Foreman Creek, Oroville Lake within 1.0 mile of the dam, the Oroville Diversion Pool, Middle Fork Arm, McCabe Creek on the South Fork Arm, Sycamore Creek, Kennedy Ravine, Bloomer Cove, One Mile Pond, and the lower Feather River. In addition, a communal bald eagle roost was observed in 2007, with approximately 60 bald eagles on the North Fork Feather Arm of Lake Oroville, near Berry Creek.

Environmental Baseline

Environmental Baseline for the Valley Elderberry Longhorn Beetle

Loss of riparian habitat between 1900 and 1990 in the Central Valley was about 96% in the southern portion of the Valley (Kern County to Fresno County) (16,000 acres remaining), 84% in the middle Valley (Merced County to San Joaquin County) (21,000 acres remaining) and 80% in the northern Valley (Sacramento and Solano counties to Shasta County) (96,000 acres remaining). Between 1960 and 1990, loss rates had slowed somewhat but were still high with 59% loss in the south, 65% loss in the middle, and 35% loss in the northern Central Valley (Geographic Information Center 2003).

While loss of riparian habitat has been extensive, it is unclear how much of that riparian habitat contained elderberry shrubs or was occupied by the beetle. Quantifying the loss of elderberry shrubs as a result of the agricultural and urban development over the past 200 years is near impossible. Lang *et al.* (1989) observed fewer numbers of elderberry shrubs in the lower reach (i.e., between Sacramento and Colusa) of the Sacramento River than the northern reach (i.e., Chico to Red Bluff). They attributed this difference to the loss of elderberry shrubs and riparian habitat in the southern reach of the Sacramento River as a result of extensive flood control activities such as the construction and maintenance of levees.

Over the past 25 years, the rate of riparian habitat loss has slowed significantly due to limitations in the amount of riparian habitat remaining, protections provided under the Act for the beetle (as well as other species), other regulatory protections (as discussed below), and restoration efforts. A review of the Section 7 consultations done for valley elderberry longhorn beetle provides some estimate of the amount of elderberry habitat lost since the beetles listing in 1980. During this period, the Service had authorized incidental take in the amount of 10,000 to 20,000 acres of beetle habitat, primarily for projects associated with urbanization, transportation, water management, and flood control. A number of HCPs are in development to allow for urbanization projects in the Sacramento Valley (Talley *et al.* 2006).

At the time of listing, habitat destruction was identified as one of the most significant threats to the beetle based on the 90% loss of riparian habitat in the Central Valley (Barr 1991). Riparian habitat loss has resulted in fragmented and isolated remnants of valley elderberry beetle habitat. Sub-populations of the animal confined to small habitat areas are likely vulnerable to extirpation from random, unpredictable environmental, genetic, and demographic events (Schonewald-Cox *et al.* 1983). The distances between subpopulations and the beetles limited dispersal ability could make recolonization difficult if extirpation occurred (Collinge *et al.* 2001; Talley 2005). Development projects and transportation projects within Butte County have reduced the amount of riparian habitat within the area. Many of these projects will result in both direct and indirect effects to valley elderberry longhorn beetle occurrences, as well as suitable, but currently unoccupied, habitat for this species. Although the decline of beetle populations has not been quantified, the acreage of lost habitat continues to grow. Despite these impacts, city and county governments and state agencies continue to implement development projects within the area.

Environmental Baseline for the vernal pool fairy shrimp and vernal pool tadpole shrimp

The vernal pool fairy shrimp and vernal pool tadpole shrimp are imperiled by a variety of human-caused activities, primarily urban development, water supply/flood control projects, and land conversion for agricultural use. Habitat loss occurs from direct destruction and modification of vernal pools due to filling, grading, disking, leveling, and other activities, as well as modification of surrounding uplands which alters vernal pool watersheds. Other activities which adversely affect these species include off-road vehicle use, certain mosquito abatement measures, and pesticide/herbicide use.

In addition to direct habitat loss, the vernal pool habitat for these listed species has been, and continues to be, highly fragmented throughout their ranges due to conversion of natural habitat

for urban and agricultural uses. This fragmentation results in small isolated vernal pool fairy shrimp and vernal pool tadpole shrimp populations. Such populations may be highly susceptible to extirpation due to chance events, inbreeding depression, or additional environmental disturbance (Gilpin and Soule 1986; Goodman 1987a, 1987b). *If an extirpation event occurs in a population that has been fragmented, the opportunities for recolonization would be greatly reduced due to geographical isolation from other source populations.*

Holland (1978) estimated that between 67 and 88 percent of the area within the Central Valley of California which once supported vernal pools had been destroyed by 1973. In the ensuing years, threats to this habitat type have continued and resulted in a substantial amount of vernal pool habitat being converted for human uses in spite of federal regulations implemented to protect wetlands. Rapid urbanization and agricultural conversion throughout the range of these species continues to pose the most severe threat to the continued existence of the vernal pool tadpole shrimp, vernal pool fairy shrimp, and slender Orcutt grass.

Development and transportation projects within Butte County have reduced the number of vernal pool complexes within the area. These developments and others within the region, have resulted in both direct and indirect effects to vernal pools, and have contributed to the decline in vernal pool fairy shrimp and vernal pool tadpole shrimp. Although the decline of federally-listed vernal pool crustaceans has not been quantified, the acreage of lost habitat continues to grow. Despite these impacts, city and county governments continue to implement development projects within the area.

Environmental Baseline for the Giant Garter Snake

The proposed project occurs within the southern portion of the Butte Basin snake population. The Butte Basin represents the northernmost snake population. This population unit is subject to the effects of a number of projects. Numerous development projects have been constructed in or near snake habitat in this rapidly urbanizing area. Any remaining populations in this unit are *vulnerable to secondary effects of urbanization, such as increased predation by house cats and increased vehicular mortality.* Most documented occurrences of the species have been adversely affected by development, including freeway construction, flood control projects, and commercial development. Several known populations are known to have been lost and/or depleted to the extent that continued viability of the population is in question (Brode and Hansen 1992). The scarcity of remaining suitable habitat, flooding, stochastic processes, and continued threats of habitat loss pose a severe threat to this population unit.

A number of State, local, private, and unrelated Federal actions have occurred within the action area and adjacent region affecting the environmental baseline of the species. Some of these projects have been subject to prior section 7 consultation. These actions have resulted in both direct and indirect effects to snake habitat within the region. Agricultural and flood control activities may decrease and degrade the remaining habitat throughout the snake's extant range. Flood control programs are administered by the U.S. Army Corps of Engineers (Corps), and the Corps typically has consulted on previous projects and is expected to continue to do so on future

projects. The ongoing nature of these activities and the administration under various programs, however, makes it difficult to determine the continuing and cumulative effects of these activities.

On-going agricultural activities affect the environmental baseline for the snake, and are largely not subject to section 7 consultation. Some agriculture, such as rice farming, can provide valuable seasonal foraging and upland habitat for the snake. Although rice fields and agricultural waterways can provide habitat for the snake, agricultural activities such as waterway maintenance, weed abatement, rodent control, and discharge of contaminants into wetlands and waterways can degrade snake habitat and increase the risk of snake mortality (Service 1999). On-going maintenance of agricultural waterways can also eliminate or prevent establishment of snake habitat, eliminate food resources for the snake, and fragment existing habitat and prevent dispersal of snakes (Service 1999). Flood control and maintenance activities which can result in snake mortality and degradation of habitat include levee construction, stream channelization, and the rip-rapping of streams and canals (Service 1999).

In addition, projects affecting the environment in the Butte Basin include transportation projects with Federal, county or local involvement. The Federal Highway Administration and the Corps have consulted with the Service on the issuance of wetland fill permits for several transportation-related projects within the Butte Basin that affected snake habitat. The direct effect of these projects is often small and localized, but the indirect effects related to transportation projects that improve access and facilitate further development of habitat in the area, and thereby increase snake mortality via vehicles, are not quantifiable.

Environmental Baseline for the Bald Eagle

Prior to the arrival of Europeans, the bald eagle population in the lower 48 contiguous states is estimated to have been 250,000 to 500,000 birds (Gerrard and Bortolotti 1998). The first declines in bald eagle populations began in the mid to late 1800's and continued until the mid-1940s, with the shooting of eagles for feathers and trophies, various forms of predator control, and loss and conversion of habitats (Service 1999). In the late 1940's, the species started experiencing population declines throughout most of its range, including California, due primarily to environmental contamination with the use of the pesticide dichloro-diphenyl-trichloroethane (DDT).

In recent years, the status of bald eagle populations has improved throughout the United States. The observed increase in population is believed to be the result of a number of protective measures enacted throughout the range of the species since the early 1970s including the banning of DDT in 1972, and the listing of the bald eagle which requires stringent protection of nest sites and protection from shooting. In addition, reservoir construction and the stocking of fish in reservoirs in the west have provided bald eagles with habitat for population expansion (Detrich 1981; Service 1986).

The California bald eagle nesting population has increased in recent years from under 30 occupied territories in 1977, to greater than 200 occupied territories in 2006. Based upon annual wintering and breeding bird survey data, it is estimated that between 100-300 bald eagles winter

on national forests in the Sierra Nevada, and at least 151-180 pairs remain year-round to breed (USFS 2001). Most of the breeding population is found in the northern 1/3 of California, primarily on public lands. Seventy percent of nests surveyed in 1979 were located near reservoirs (Lehman 1979) and this trend has continued, with population increases occurring at several reservoirs since the time of that study.

The Oroville FERC Project Boundary is in the Sacramento Valley and Foothills Management Zone (Zone 27), as described in the Bald Eagle Recovery Plan. In 1985, there were four known territories in Zone 27, including one in the Lake Oroville area. The target recovery goal for Zone 27 was 15 nesting territories, including 4 in the Lake Oroville area (Service 1986). There are currently four active bald eagle nests along Lake Oroville or other water features within the proposed project area, which include: (1) Palm Avenue; (2) Crystal Hill; (3) Bloomer Cove; and (4) the Diversion Pool near Oroville Dam.

Effects to Federally-listed Species from the Proposed Action

Effects to the Valley Elderberry Longhorn Beetle

The proposed project has the potential to result in direct and indirect effects to 12 acres of elderberry shrub canopy over the 50 year Term of License, and up to a 5-year interim period (55-year total).

Direct Effects

Current operation and maintenance activities have the potential to adversely affect valley elderberry longhorn beetle habitat through (1) maintenance and recreation use activities that disturb soil and vegetation and damage or remove elderberry plants; (2) road run-off and ORV traffic that damage elderberry shrubs; (3) activities that isolate valley elderberry longhorn beetle populations by fragmenting habitat; and (4) use of herbicides and pesticides that result in environmental contaminants and/or kills the beetles or their host plant.

Settlement Agreement Resource Actions that will be implemented that have the greatest probability of affecting valley elderberry longhorn beetle include: A102 Gravel Supplementation and Improvement Program, A103 Channel Improvement Program, A104 Structural Habitat Supplementation and Improvement Program Plan, A105 Fish Weir Program, A106 Riparian and Floodplain Improvement Program, A120 Protection of Valley Elderberry Longhorn Beetle, A126 Invasive Plant Management, A127 Recreation Management Plan, and A128 Historic Properties Management Plan. The proposed project involves some resource actions that will restore riparian habitat within the proposed project area. The restoration of riparian habitat would have long-term benefits for this species.

Indirect Effects

Indirect effects on the valley elderberry longhorn beetle from activities associated with operation and maintenance activities may occur through herbicide or pesticide applications (that occur

outside the 100-foot buffer) that drift into the buffer area and affect elderberry shrubs by either killing the shrubs or reducing vigor and health. Removal of riparian canopy around an elderberry shrub could also affect the shrub habitat causing it to be a less suitable habitat for the beetle.

Indirect effects on the valley elderberry longhorn beetle from activities associated with Resource Actions include A106 Riparian and Floodplain Improvement Program, A120 Protection of Valley Elderberry Longhorn Beetle, and A126 Invasive Plant Management.

Effects to Vernal Pool Crustaceans

Ongoing operation and maintenance activities and implementation of the FERC License conditions could potentially directly and indirectly affect 9.5 acres over the 50 year term of license and up to a 5-year interim period (55-year total).

Direct Effects

Current Project operation and maintenance activities may affect potential vernal pool invertebrate species habitat through routine periodic use of chemicals such as herbicides and/or pesticides. For example, pesticides and herbicides are used to control undesirable rodents, insects, and vegetation on the Thermalito Forebay Dam and Thermalito Afterbay Dam. These chemicals may be toxic to vernal pool invertebrates, resulting in direct mortality or reduced reproductive success; food sources may also be affected and decline. Sedimentation or siltation may result from inadequate drainage of unsurfaced roadways and road enhancements, such as grading. Sedimentation may affect pools by increasing water turbidity or by filling so that water no longer ponds. Sedimentation can also cause direct mortality by suffocating invertebrates. Maintenance practices that involve earth moving may directly affect the hydrology of vernal pools, degrading or destroying this habitat in some locations. Altered hydrology may result from filling the pool entirely with soil or increasing drainage so that the pool does not hold water. Altered hydrology may result in direct mortality to vernal pool invertebrates, reduced carrying capacity, or decreased breeding success. All of these outcomes would be expected to reduce vernal pool invertebrate populations within the Action Area.

Current upland habitat enhancement projects that include soil discing (for waterfowl and upland game bird enhancements) may directly affect the hydrology of vernal pools by disrupting the impermeable hardpan soil layer. These activities would potentially result in increased drainage, effectively destroying vernal pool wetlands. Soil discing may also affect surface flows by leveling the terrain surrounding pools so that overland flows are not adequate to fill pools. Vernal pool invertebrates would be directly impacted, as they would likely be unable to hatch or reproduce. Recreation in the area of vernal pools (e.g., ORV use) may have an adverse effect on vernal pool crustaceans by increasing sedimentation and introducing non-native plant species into vernal pools. ORV use or other forms of recreation, (e.g., biking) may also compact soils. Soil compaction may directly alter overland flow patterns, degrade habitat suitability for some vernal pool plant species, or encourage algae growth, thus directly affecting the suitability of the vernal pool to sustain a viable invertebrate population. ORV use may also result in physically crushing or directly damaging adults and cysts within a vernal pool.

Settlement Agreement Resource Actions with the potential for direct affects to vernal pool crustaceans include: A117 Protection of Vernal Pools, A122 Construction and Recharge of Brood Ponds, A123 Provision of Upland Food for Nesting Waterfowl, A124 Provision of Nest Cover for Upland Waterfowl, A126 Invasive Plant Management, A127 Recreation Management Plan, and A128 Historic Properties Management Plan.

Indirect Effects

Maintenance activities may inadvertently cause siltation of vernal pools at some point in the future due to sudden heavy rain events. Additionally, unintentional drift of chemicals used in accordance with the conservation measures may affect vernal pools and would be considered indirect effects. Increased future recreation (e.g., ORVs) associated with proposed Resource Actions in the vicinity of vernal pools may have adverse indirect effects on vernal pools, which would be similar to those described above for direct effects.

A more detailed description of potential indirect effects follows.

Erosion - The ground disturbing activities in the watershed of vernal pools associated with the proposed project action area are expected to result in siltation when pools fill during the wet season following construction. Siltation in pools supporting listed crustaceans may result in decreased cyst viability, decreased hatching success, and decreased survivorship among early life history stages, thereby reducing the number of mature adults in future wet seasons. The proposed project construction activities could result in increased sedimentation transport into vernal pool crustacean habitats during periods of heavy rains.

Changes in hydrology - The biota of vernal pools and swales can change when the hydrologic regime is altered (Bauder 1986, 1987). Survival of aquatic organisms like the vernal pool fairy shrimp and vernal pool tadpole shrimp are directly linked to the water regime of their habitat. Therefore, construction near vernal pool areas will, at times, result in the decline of local sub-populations of vernal pool organisms, including fairy shrimp and tadpole shrimp.

Introduction of non-natives - There is an increased risk of introducing weedy, non-native plants into the vernal pools both during and after project construction due to the soil disturbance from clearing and grubbing operations, and general vegetation disturbance associated with the use of heavy equipment.

Chemical contamination - The runoff from chemical contamination can kill listed species by poisoning. Oils and other hazardous materials associated with construction equipment could be conveyed into the vernal pool crustacean habitats by overland runoff during the rainy season, thereby adversely affecting water quality. Many of these chemical compounds are thought to have adverse affects on the listed vernal pool crustaceans and/or their cysts. Individuals may be killed directly or suffer reduced fitness through physiological stress or a reduction in their food base due to the presence of these chemicals.

Settlement Agreement Resource Actions with the potential for indirect affects to vernal pool crustaceans include: A117 Protection of Vernal Pools, A122 Construction and Recharge of Brood Ponds, A123 Provision of Upland Food for Nesting Waterfowl, A124 Provision of Nest Cover for Upland Waterfowl, A126 Invasive Plant Management, and A127 Recreation Management Plan.

Effects to the Giant Garter Snake

The proposed project has the potential to directly affect 450 acres of giant garter snake habitat over the 50 year term of license and up to a 5-year interim period (55-year total).

Direct effects

Potential effects of current operation and management activities on the giant garter snake include (1) degradation of habitat due to water level fluctuations; (2) trampling and removal of vegetation incidental to maintenance and recreation; (3) direct mortality from ground disturbing maintenance activities, vehicular traffic, and purposeful killing by recreationists; (5) reduction in food resources due to alteration of habitat or application of herbicides and pesticides; (6) toxicity from environmental contaminants; (7) disturbance/displacement through recreational activity; (8) high water velocities; (9) possible entrainment; (10) conversion of upland habitat to cover crops for waterfowl species; and (11) colder water temperatures.

Direct mortality of the giant garter snake from ground disturbing activities is most likely to occur between 1 October and 1 May when snakes are generally less active. Use of herbicides and pesticides for operation and maintenance activities could adversely affect the quality and quantity of habitat for the garter snake if herbicides and pesticides are not carefully selected and applied. These chemicals could adversely affect habitat structure and extent by altering vegetation growth and could affect food supply by killing prey. Exposure to the chemicals through either the water or digestion of prey can result in direct effects to this species, including mortality. The presence of predatory, nonnative bullfrogs in the Action Area impoundments will also continue to be a source of potential mortality of giant garter snake.

Settlement Agreement Resource Actions with the potential to directly affect giant garter snake include: A102 Gravel Supplementation and Improvement Program, A103 Channel Improvement Program, A104 Structural Habitat Supplementation and Improvement Program Plan, A106 Riparian and Floodplain Improvement Program, A119 Protection of Giant Garter Snake, A122 Construction and Recharge of Brood Ponds, A123 Provision of Upland Food for Nesting Waterfowl, A124 Provision of Nest Cover for Upland Waterfowl, A126 Invasive Plant Management, A127 Recreation Management Plan, and A128 Historic Properties Management Plan.

Indirect Effects

Project O&M activities along or near the Feather River and in the Thermalito Complex that allow non-native noxious weeds to establish may indirectly alter habitat for giant garter snake.

Long-term use of chemicals to retard or kill vegetation and control rodents or other pests that may affect human health conditions could indirectly affect food, water quality and habitat structure for this species.

Indirect effects of Resource Action activities on giant garter snakes may result from changes in water quality, gradual loss of important habitat elements such as structures or open areas for basking, changes in availability of food sources and/or supply, disruption and/or displacement of individuals and behavioral patterns. Future increases in land-based recreation may cause additional loss of habitat, disturbance, and direct mortality from vehicular traffic, harassment, and collection/killing. Several Resource Actions (e.g., such as creation of waterfowl brood pond habitat) have the potential to be created in a manner that may also benefit giant garter snake.

Settlement Agreement Resource Actions with the potential to indirectly affect giant garter snake include: A106 Riparian and Floodplain Improvement Program, A119 Protection of Giant Garter Snake, A123 Provision of Upland Food for Nesting Waterfowl, A124 Provision of Nest Cover for Upland Waterfowl, A126 Invasive Plant Management, and A127 Recreation Management Plan.

Effects to the Bald Eagle

It is not known how many bald eagles will nest in the proposed project area over the 50 year Term of License or the 5-year interim period. Currently, there are four known nesting pairs of bald eagle within the proposed action area. All four of these nesting pairs have successfully fledged offspring and at this time do not appear to be adversely affected by ongoing operation and maintenance activities or resource actions. However, DWR has requested that the Service assume that one nest (containing up to two offspring) may be harassed, harmed, or killed (as a result of nest abandonment), due to project related operation and maintenance activities or resource actions over the 50 year Term of License and up to a 5-year interim period (55 year total).

Direct Effects

Potential effects on bald eagles resulting from current operation and maintenance activities include (1) altered prey availability due to water management, (2) reduced or degraded nesting and perching habitat from hazardous tree removal, (3) temporary disturbance from human presence, and (4) collision with or electrocution by power lines. Effects from operation and maintenance activities are greatest near the Oroville Project facilities, roads, transmission lines, and existing recreation sites and trails.

Potential direct effects on bald eagles may occur as a result of implementation of Settlement Agreement Resource Actions include: A102 Gravel Supplementation and Improvement Program, A103 Channel Improvement Program, A104 Structural Habitat Supplementation and Improvement Program Plan, A105 Fish Weir Program, A106 Riparian and Floodplain Improvement Program, A110 Lake Oroville Warm Water Fisheries Habitat Improvement Program, A111 Lake Oroville Cold Water Fisheries Improvement Program, A118 Minimization

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of Disturbance to Nesting Bald Eagles, A126 Invasive Plant Management, A127 Recreation Management Plan, and A128 Historic Properties Management Plan. These potential affects include both habitat modifications and disturbance displacement of wintering, foraging, or nesting bald eagles.

Indirect Effects

Activities associated with Resource Actions that may cause any indirect adverse effects are similar to habitat modification and disturbances discussed above in the *Direct Effects* section for bald eagles. If recreational activity significantly increases on Lake Oroville, it is possible that additional adverse indirect effects to the four nesting pairs (and any additional pairs that may become resident in the future) could occur due to increased disturbances.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act. An undetermined number of future land use conversions and routine agricultural practices are not subject to Federal authorization or funding and may alter the habitat or increase incidental take of the valley elderberry longhorn beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, giant garter snake, and bald eagle, and are, therefore, cumulative to the proposed project.

The Service is aware of other projects currently under review by the State, county, and local authorities where biological surveys have documented the occurrence of federally- listed species in Butte County. These projects include such actions as urban expansion, water transfer projects that may not have a Federal nexus, and continued agricultural development. The cumulative effects of these known actions pose a significant threat to the eventual recovery of the valley elderberry longhorn beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, giant garter snake, and bald eagle. Additionally, an undetermined number of future land use conversions and routine agricultural practices are not subject to Federal permitting processes and may alter the habitat or increase incidental take of vernal pool species, and are, therefore, cumulative to the proposed project.

Conclusion

After reviewing the current status of the valley elderberry longhorn beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, giant garter snake, and bald eagle, as well as the proposed conservation measures, environmental baselines for the action area, the effects of the proposed action, the cumulative effects, and upon implementation of the proposed conservation measures, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of these five federally-listed species.

The proposed project is not located within critical habitat for any federally-listed species under the jurisdiction of the Service. Therefore, the proposed project would not result in the adverse modification of critical habitat for the valley elderberry longhorn beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, giant garter snake, bald eagle, or any other federally-listed species under the jurisdiction of the Service.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

Sections 7(4) and 7(o)(2) of the Act, which refer to terms and conditions and exemptions on taking listed fish and wildlife species, do not apply to listed plant species. However, section 9(a)(2) of the Act prohibits removal, reduction to possession, and malicious damage or destruction of listed plant species on lands under Federal jurisdiction and the removal, cutting, digging up, or damaging or destroying such species in a knowing violation of any State law or regulation, including State criminal trespass law. Actions funded, authorized or implemented by a Federal agency that could incidentally result in the damage or destruction of such species on Federal lands are not a violation of the Act, provided the Service determines in a biological opinion that the actions are unlikely to jeopardize the continued existence of the species. The California Native Plant Protection Act prohibits the take of State-listed plants.

The measures described below are non-discretionary, and must be implemented by FERC so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. FERC has a continuing duty to regulate the activity covered by this incidental take statement. If FERC (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

If, during the implementation of the proposed project, this level of incidental take is exceeded, such incidental take represents new information requiring review of the reasonable and prudent measures provided. FERC must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Valley Elderberry Longhorn Beetle

The Service anticipates incidental take of the beetle will be difficult to measure because it is difficult to determine the number of beetle larvae and pupae contained within each elderberry plant. For the purposes of this biological opinion, the Service and DWR have quantified the amount of incidental take of the beetle in terms of the acreage amount of elderberry shrub habitat that would be lost. The Service anticipates that all beetles inhabiting 12 acres of elderberry shrub canopy will be harmed, harassed, or killed, as a result of the proposed action. This amount of incidental take associated with the proposed action on the beetle is hereby exempted from prohibitions of take under section 9 of the Act.

Vernal Pool Crustaceans

The Service anticipates incidental take of the vernal pool fairy shrimp and vernal pool tadpole shrimp would be difficult to detect or quantify. The cryptic nature of these species and their relatively small body size make the finding of a dead specimen unlikely. The species occur in habitats that make them difficult to detect. Due to the difficulty in quantifying the number of individuals that would be taken as a result of the proposed action, the Service is quantifying take incidental to the proposed project as the number of acres of vernal pools/ponded depressions (vernal pool habitat) that would become unsuitable for vernal pool crustaceans due to the proposed action. Therefore, the Service estimates that all vernal pool fairy shrimp and vernal pool tadpole shrimp inhabiting 9.5 acres of vernal pool habitat would be harassed, harmed, injured, or killed, as a result of the proposed action. This amount of incidental take associated with the proposed action on vernal pool fairy shrimp and vernal pool tadpole shrimp is hereby exempted from prohibitions of take under section 9 of the Act.

Giant Garter Snake

The Service expects that incidental take of the giant garter snake will be difficult to detect or quantify for the following reasons: the aquatic nature of the organisms make the finding of a dead specimen unlikely, the secretive nature of the species, losses may be masked by seasonal fluctuations in numbers or other causes, and the species occur in habitat that makes them difficult to detect. Due to the difficulty in quantifying the number of giant garter snakes that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of acres of habitat that will become unsuitable for the species as a result of the action. Therefore, the Service estimates that 450 acres of giant garter snake habitat will be temporarily or permanently unsuitable as a result of the proposed action is hereby exempted. This amount of

incidental take associated with the proposed action on the giant garter snake is hereby exempted from prohibitions of take under section 9 of the Act.

Bald Eagle

The Service anticipates that bald eagles may be incidentally taken as a result of implementing the proposed project. The Service does not anticipate that incidental take of the bald eagle will occur in the form of habitat loss or modification, but rather, in the form of harassment, which may lead to nest abandonment, and mortality of offspring. This biological opinion authorizes harassment of one nesting pair of eagles that leads to the abandonment of up to two offspring during the implementation of the proposed project. This amount of incidental take associated with the proposed action on the bald eagle is hereby exempted from prohibitions of take under section 9 of the Act.

This incidental take statement does not include exemption for incidental take of any birds that are protected under the Migratory Bird Treaty Act of 1918 (as amended), but not protected under the Endangered Species Act of 1973 (as amended).

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the valley elderberry longhorn beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, giant garter snake, or bald eagle.

Upon implementation of the following reasonable and prudent measures incidental take associated with the proposed project on these acres in the form of harm or harassment of valley elderberry longhorn beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, giant garter snake, and bald eagle from habitat loss, or disturbance will become exempt from the prohibitions described under section 9 of the Act.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the effect of take on the vernal pool fairy shrimp and the vernal pool tadpole shrimp:

1. Take in the form of harm, harassment, and mortality of the valley elderberry longhorn beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, giant garter snake, and bald eagle during proposed project activities and/or activities associated with implementing the project shall be minimized.
2. The effects to the valley elderberry longhorn beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, giant garter snake, and bald eagle resulting from habitat modification and temporary and/or permanent losses and degradation of habitat shall be minimized.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, FERC must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

The following terms and conditions implement reasonable and prudent measure numbers one (1) and two (2):

1. DWR shall adhere to the conservation measures described in the *Biological Assessment* (Appendix E of Volume IV of the January 2005, *Before the Federal Energy Regulatory Commission, Application for New License, Oroville Facilities, FERC Project No. 2100, Preliminary Draft Environmental Assessment*). These measures shall be implemented during the interim period prior to issuance of the FERC license, and during the 50-year term of license.
2. DWR shall adhere to the conservation measures described in the *Project Description* and the *Conservation Measures* section of this biological opinion (pages 13 to 23).
3. If habitat compensation credits are purchased from a Service-approved bank, DWR shall provide proof of purchase (i.e., payment receipts) to the Service prior to the commencement of ground-disturbing activities.
4. If habitat compensation is fulfilled within the proposed project area, DWR shall provide to the Service, for approval, a habitat management plan for the compensation area(s). Item 5, below, summarizes information that shall be included in these habitat management plans (hereinafter referred to as Plans).
5. All Plans for onsite preserves shall include the following information:
 - a. All Plans shall include, but not be limited to, the following components: *discussions of the management and maintenance of habitat for federally-listed species within the onsite preserve area(s) for the 55-year project duration (50-year term of license and 5-year interim period); discussions of runoff control and maintenance of hydrology of the aquatic habitat; provisions for management and maintenance of upland habitat within the preserve(s); discussion of alien species control; discussion of sedimentation and erosion control; provisions for creating a position for a preserve manager that would undertake the duties of implementing the management plan; provisions for a monitoring program to be set up and implemented by the preserve manager, with a monitoring report that addresses the ecological functions of the preserve(s) including whether the preserve is adversely affected by adjacent activities, and if the maintenance/management plan is successful.*

- b. The habitat management plan shall include a list of prohibited activities that are inconsistent with the maintenance of the suitability of the federally-listed species habitat, including, but not limited to: (1) a restriction that no vehicles (unless authorized by the Service) will be allowed or operated on the preserve(s) by owners, renters, or lessees, (2) alteration of existing topography or any other alteration or uses for any purposes, including the exploration for, or development of mineral extraction; (3) placement of any structures in the preserve(s), (4) dumping and/or burning of rubbish, garbage, or any other wastes or fill materials; (5) building of any roads or trails; (6) killing, removal, alteration, or replacement of any existing native vegetation; (7) placement of storm water drains or other diversion or alteration of water that would disturb the existing hydrologic characteristics of the preserve(s) and associated watersheds; (8) fire protection activities not required to protect existing structures; and (9) use of pesticides, rodenticides, and herbicides within the preserve (unless authorized by the Service).
6. FERC shall adhere to the Reinitiation – Closing Statement of this biological opinion (page 46).
7. FERC shall ensure that DWR adheres to the reporting requirements as described below in this biological opinion.

Reporting Requirements

The Sacramento Fish and Wildlife Office is to be notified within one (1) working day of the finding of any dead federally-listed species or any unanticipated harm to the species addressed in this biological opinion. The Service contact person for this is the Chief, Endangered Species Division at (916) 414-6620 and the Resident Agent-in-Charge of the Service's Law Enforcement Division at (916) 414-6660.

FERC must require DWR to report to the Service immediately any information about take or suspected take of federally-listed species not authorized in this biological opinion. FERC must notify the Service within one (1) working day of receiving such information. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. The Service contact is the Resident Agent-in-Charge of the Service's Law Enforcement Division at (916) 414-6660.

Any contractor or employee, who during routine operations and maintenance activities, inadvertently kills or injures a State-listed species must immediately report the incident to their representative. This representative must contact the California Department of Fish and Game immediately in the case of a dead or injured listed species. The California Department of Fish and Game contact for immediate assistance is State Dispatch at (916) 445-0045.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

1. FERC should encourage DWR to work with Butte County, BCAG, the Service, city governments, and other stakeholders to implement a multi-species HCP in Butte County to further the conservation of special-status species.
2. FERC should continue to encourage license applicants to implement resource actions that benefit federally-listed species and their habitats to aid in the recovery of federally-listed species.
3. Any transmission lines constructed as part of the Oroville facilities should be constructed in a manner to prevent electrocution to raptor species. Previously existing transmission lines should be modified in a manner to prevent electrocution to raptor species. Methods may include proper spacing between energized surfaces to prevent flesh-to-flesh contact of all raptors that may potentially be present onsite, insulating energized surfaces, the use of raptor perches, or other methods recommended in the Avian Power Line Interaction Committee's *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (APLIC 2006).

In order for the Service to be kept informed of actions that conserve listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation on the Oroville Facilities FRP Relicensing Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or, (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

This biological opinion addresses and evaluates the provisions of the Settlement Agreement as they have been incorporated into the Commission's proposed action, the FERC Staff Alternative, the applicant's Biological Assessment, and the conservation measures proposed therein. In the

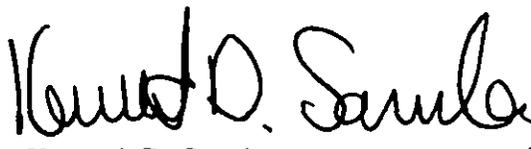
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Service's view, the reasonable and prudent measures and accompanying terms and conditions of this biological opinion are consistent with the Settlement Agreement.

Please contact Rick Kuyper, staff biologist, or Holly Herod, the Sacramento Valley Branch Chief, at (916) 414-6600, if you have any questions regarding this biological opinion for the Oroville Facilities FRP Relicensing Project.

Sincerely,

A handwritten signature in black ink that reads "Kenneth D. Sanchez". The signature is written in a cursive style with a large, prominent "K" and "S".

Kenneth D. Sanchez
Acting Field Supervisor

cc:
Service List

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Appendix A

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

Conservation Guidelines for the
Valley Elderberry Longhorn Beetle
9 July 1999

The following guidelines have been issued by the U.S. Fish and Wildlife Service (Service) to assist Federal agencies and non-federal project applicants needing incidental take authorization through a section 7 consultation or a section 10(a)(1)(B) permit in developing measures to avoid and minimize adverse effects on the valley elderberry longhorn beetle. The Service will revise these guidelines as needed in the future. The most recently issued version of these guidelines should be used in developing all projects and habitat restoration plans. The survey and monitoring procedures described below are designed to avoid any adverse effects to the valley elderberry longhorn beetle. Thus a recovery permit is not needed to survey for the beetle or its habitat or to monitor conservation areas. If you are interested in a recovery permit for research purposes please call the Service's Regional Office at (503) 231-2063.

Background Information

The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), was listed as a threatened species on August 8, 1980 (Federal Register 45: 52803-52807). This animal is fully protected under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). The valley elderberry longhorn beetle (beetle) is completely dependent on its host plant, elderberry (*Sambucus* species), which is a common component of the remaining riparian forests and adjacent upland habitats of California's Central Valley. Use of the elderberry by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the elderberry's use by the beetle is an exit hole created by the larva just prior to the pupal stage. The life cycle takes one or two years to complete. The animal spends most of its life in the larval stage, living within the stems of an elderberry plant. Adult emergence is from late March through June, about the same time the elderberry produces flowers. The adult stage is short-lived. Further information on the life history, ecology, behavior, and distribution of the beetle can be found in a report by Barr (1991) and the recovery plan for the beetle (USFWS 1984).

Conservation Guidelines for the Valley Elderberry Longhorn Beetle

Surveys

Proposed project sites within the range of the valley elderberry longhorn beetle should be surveyed for the presence of the beetle and its elderberry host plant by a qualified biologist. The beetle's range extends throughout California's Central Valley and associated foothills from about the 3,000-foot elevation contour on the east and the watershed of the Central Valley on the west (Figure 1). All or portions of 31 counties are included: Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Madera, Mariposa, Merced, Napa, Nevada, Placer, Sacramento, San Benito, San Joaquin, San Luis Obispo, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba.

If elderberry plants with one or more stems measuring 1.0 inch or greater in diameter at ground level occur on or adjacent to the proposed project site, or are otherwise located where they may be directly or indirectly affected by the proposed action, minimization measures which include planting replacement habitat (conservation planting) are required (Table 1).

All elderberry shrubs with one or more stems measuring 1.0 inch or greater in diameter at ground level that occur on or adjacent to a proposed project site must be thoroughly searched for beetle exit holes (external evidence of beetle presence). In addition, all elderberry stems one inch or greater in diameter at ground level must be tallied by diameter size class (Table 1). As outlined in Table 1, the numbers of elderberry seedlings/cuttings and associated riparian native trees/shrubs to be planted as replacement habitat are determined by stem size class of affected elderberry shrubs, presence or absence of exit holes, and whether a proposed project lies in a riparian or non-riparian area.

Elderberry plants with no stems measuring 1.0 inch or greater in diameter at ground level are unlikely to be habitat for the beetle because of their small size and/or immaturity. Therefore, no minimization measures are required for removal of elderberry plants with no stems measuring 1.0 inch or greater in diameter at ground level with no exit holes. Surveys are valid for a period of two years.

Avoid and Protect Habitat Whenever Possible

Project sites that do not contain beetle habitat are preferred. If suitable habitat for the beetle occurs on the project site, or within close proximity where beetles will be affected by the project, these areas must be designated as avoidance areas and must be protected from disturbance during the construction and operation of the project. When possible, projects should be designed such that avoidance areas are connected with adjacent habitat to prevent fragmentation and isolation of beetle populations. Any beetle habitat that cannot be avoided as described below should be considered impacted and appropriate minimization measures should be proposed as described below.

Conservation Guidelines for the Valley Elderberry Longhorn Beetle

Avoidance: Establishment and Maintenance of a Buffer Zone

Complete avoidance (i.e., no adverse effects) may be assumed when a 100-foot (or wider) buffer is established and maintained around elderberry plants containing stems measuring 1.0 inch or greater in diameter at ground level. Firebreaks may not be included in the buffer zone. In buffer areas construction-related disturbance should be minimized, and any damaged area should be promptly restored following construction. The Service must be consulted before any disturbances within the buffer area are considered. In addition, the Service must be provided with a map identifying the avoidance area and written details describing avoidance measures.

Protective Measures

1. Fence and flag all areas to be avoided during construction activities. In areas where encroachment on the 100-foot buffer has been approved by the Service, provide a minimum setback of at least 20 feet from the dripline of each elderberry plant.
2. Brief contractors on the need to avoid damaging the elderberry plants and the possible penalties for not complying with these requirements.
3. Erect signs every 50 feet along the edge of the avoidance area with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be clearly readable from a distance of 20 feet, and must be maintained for the duration of construction.
4. Instruct work crews about the status of the beetle and the need to protect its elderberry host plant.

Restoration and Maintenance

1. Restore any damage done to the buffer area (area within 100 feet of elderberry plants) during construction. Provide erosion control and re-vegetate with appropriate native plants.
2. Buffer areas must continue to be protected after construction from adverse effects of the project. Measures such as fencing, signs, weeding, and trash removal are usually appropriate.
3. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant should be used in the buffer areas, or within 100 feet of any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level.

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4. The applicant must provide a written description of how the buffer areas are to be restored, protected, and maintained after construction is completed.
5. Mowing of grasses/ground cover may occur from July through April to reduce fire hazard. No mowing should occur within five (5) feet of elderberry plant stems. Mowing must be done in a manner that avoids damaging plants (e.g., stripping away bark through careless use of mowing/trimming equipment).

Transplant Elderberry Plants That Cannot Be Avoided

Elderberry plants must be transplanted if they can not be avoided by the proposed project. All elderberry plants with one or more stems measuring 1.0 inch or greater in diameter at ground level must be transplanted to a conservation area (see below). At the Service's discretion, a plant that is unlikely to survive transplantation because of poor condition or location, or a plant that would be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible the minimization ratios in Table 1 may be increased to offset the additional habitat loss.

Trimming of elderberry plants (e.g., pruning along roadways, bike paths, or trails) with one or more stems 1.0 inch or greater in diameter at ground level, may result in take of beetles. Therefore, trimming is subject to appropriate minimization measures as outlined in Table 1.

1. **Monitor.** A qualified biologist (monitor) must be on-site for the duration of the transplanting of the elderberry plants to insure that no unauthorized take of the valley elderberry longhorn beetle occurs. If unauthorized take occurs, the monitor must have the authority to stop work until corrective measures have been completed. The monitor must immediately report any unauthorized take of the beetle or its habitat to the Service and to the California Department of Fish and Game.
2. **Timing.** Transplant elderberry plants when the plants are dormant, approximately November through the first two weeks in February, after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the plant and increase transplantation success.
3. **Transplanting Procedure.**
 - a. Cut the plant back 3 to 6 feet from the ground or to 50 percent of its height (whichever is taller) by removing branches and stems above this height. The trunk and all stems measuring 1.0 inch or greater in diameter at ground level should be replanted. Any leaves remaining on the plant should be removed.

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- b. Excavate a hole of adequate size to receive the transplant.
- c. Excavate the plant using a Vermeer spade, backhoe, front end loader, or other suitable equipment, taking as much of the root ball as possible, and replant immediately at the conservation area. Move the plant only by the root ball. If the plant is to be moved and transplanted off site, secure the root ball with wire and wrap it with burlap. Dampen the burlap with water, as necessary, to keep the root ball wet. Do not let the roots dry out. Care should be taken to ensure that the soil is not dislodged from around the roots of the transplant. If the site receiving the transplant does not have adequate soil moisture, pre-wet the soil a day or two before transplantation.
- d. The planting area must be at least 1,800 square feet for each elderberry transplant. The root ball should be planted so that its top is level with the existing ground. Compact the soil sufficiently so that settlement does not occur. As many as five (5) additional elderberry plantings (cuttings or seedlings) and up to five (5) associated native species plantings (see below) may also be planted within the 1,800 square foot area with the transplant. The transplant and each new planting should have its own watering basin measuring at least three (3) feet in diameter. Watering basins should have a continuous berm measuring approximately eight (8) inches wide at the base and six (6) inches high.
- e. Saturate the soil with water. Do not use fertilizers or other supplements or paint the tips of stems with pruning substances, as the effects of these compounds on the beetle are unknown.
- f. Monitor to ascertain if additional watering is necessary. If the soil is sandy and well-drained, plants may need to be watered weekly or twice monthly. If the soil is clayey and poorly-drained, it may not be necessary to water after the initial saturation. However, most transplants require watering through the first summer. A drip watering system and timer is ideal. However, in situations where this is not possible, a water truck or other apparatus may be used.

Plant Additional Seedlings or Cuttings

Each elderberry stem measuring 1.0 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted or destroyed) must be replaced, in the conservation area, with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). Minimization ratios are listed and explained in Table 1. Stock of either seedlings or cuttings should be obtained from local sources. Cuttings may be obtained from the plants to be transplanted if the project site is in the vicinity of the conservation area. If the Service determines that the elderberry plants on the proposed project site are unsuitable candidates for

Conservation Guidelines for the Valley Elderberry Longhorn Beetle

transplanting, the Service may allow the applicant to plant seedlings or cuttings at higher than the stated ratios in Table 1 for each elderberry plant that cannot be transplanted.

Plant Associated Native Species

Studies have found that the beetle is more abundant in dense native plant communities with a mature overstory and a mixed understory. Therefore, a mix of native plants associated with the elderberry plants at the project site or similar sites will be planted at ratios ranging from 1:1 to 2:1 [native tree/plant species to each elderberry seedling or cutting (see Table 1)]. These native plantings must be monitored with the same survival criteria used for the elderberry seedlings (see below). Stock of saplings, cuttings, and seedlings should be obtained from local sources. If the parent stock is obtained from a distance greater than one mile from the conservation area, approval by the Service of the native plant donor sites must be obtained prior to initiation of the revegetation work. Planting or seeding the conservation area with native herbaceous species is encouraged. Establishing native grasses and forbs may discourage unwanted non-native species from becoming established or persisting at the conservation area. Only stock from local sources should be used.

Examples

Example 1

The project will adversely affect beetle habitat on a vacant lot on the land side of a river levee. This levee now separates beetle habitat on the vacant lot from extant Great Valley Mixed Riparian Forest (Holland 1986) adjacent to the river. However, it is clear that the beetle habitat located on the vacant lot was part of a more extensive mixed riparian forest ecosystem extending farther from the river's edge prior to agricultural development and levee construction. Therefore, the beetle habitat on site is considered riparian. A total of two elderberry plants with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The two plants have a total of 15 stems measuring over 1.0 inch. No exit holes were found on either plant. Ten of the stems are between 1.0 and 3.0 inches in diameter and five of the stems are greater than 5.0 inches in diameter. The conservation area is suited for riparian forest habitat. Associated natives adjacent to the conservation area are box elder (*Acer negundo californica*), walnut (*Juglans californica* var. *hindsii*), sycamore (*Platanus racemosa*), cottonwood (*Populus fremontii*), willow (*Salix gooddingii* and *S. laevigata*), white alder (*Alnus rhombifolia*), ash (*Fraxinus latifolia*), button willow (*Cephalanthus occidentalis*), and wild grape (*Vitis californica*).

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Minimization (based on ratios in Table 1):

- Transplant the two elderberry plants that will be affected to the conservation area.
- Plant 40 elderberry rooted cuttings (10 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)
- Plant 40 associated native species (ratio of associated natives to elderberry plantings is 1:1 in areas with no exit holes):
 - 5 saplings each of box elder, sycamore, and cottonwood
 - 5 willow seedlings
 - 5 white alder seedlings
 - 5 saplings each of walnut and ash
 - 3 California button willow
 - 2 wild grape vines
 - Total: 40 associated native species
- Total area required is a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. Since, a total of 80 plants must be planted (40 elderberries and 40 associated natives), a total of 0.33 acre (14,400 square feet) will be required for conservation plantings. The conservation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period.

Example 2

The project will adversely affect beetle habitat in Blue Oak Woodland (Holland 1986). One elderberry plant with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The plant has a total of 10 stems measuring over 1.0 inch. Exit holes were found on the plant. Five of the stems are between 1.0 and 3.0 inches in diameter and five of the stems are between 3.0 and 5.0 inches in diameter. The conservation area is suited for elderberry savanna (non-riparian habitat). Associated natives adjacent to the conservation area are willow (*Salix* species), blue oak (*Quercus douglasii*), interior live oak (*Q. wislizenii*), sycamore, poison oak (*Toxicodendron diversilobum*), and wild grape.

Minimization (based on ratios in Table 1):

- Transplant the one elderberry plant that will be affected to the conservation area.
- Plant 30 elderberry seedlings (5 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)

Conservation Guidelines for the Valley Elderberry Longhorn Beetle

- Plant 60 associated native species (ratio of associated natives to elderberry plantings is 2:1 in areas with exit holes):

20 saplings of blue oak, 20 saplings of sycamore, and 20 saplings of willow, and seed and plant with a mixture of native grasses and forbs

- Total area required is a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. Since, a total of 90 plants must be planted (30 elderberries and 60 associated natives), a total of 0.37 acre (16,200 square feet) will be required for conservation plantings. The conservation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period.

Conservation Area—Provide Habitat for the Beetle in Perpetuity

The conservation area is distinct from the avoidance area (though the two may adjoin), and serves to receive and protect the transplanted elderberry plants and the elderberry and other native plantings. The Service may accept proposals for off-site conservation areas where appropriate.

1. **Size.** The conservation area must provide at least 1,800 square feet for each transplanted elderberry plant. As many as 10 conservation plantings (i.e., elderberry cuttings or seedlings and/or associated native plants) may be planted within the 1800 square foot area with each transplanted elderberry. An additional 1,800 square feet shall be provided for every additional 10 conservation plants. Each planting should have its own watering basin measuring approximately three feet in diameter. Watering basins should be constructed with a continuous berm measuring approximately eight inches wide at the base and six inches high.

The planting density specified above is primarily for riparian forest habitats or other habitats with naturally dense cover. If the conservation area is an open habitat (i.e., elderberry savanna, oak woodland) more area may be needed for the required plantings. Contact the Service for assistance if the above planting recommendations are not appropriate for the proposed conservation area.

No area to be maintained as a firebreak may be counted as conservation area. Like the avoidance area, the conservation area should connect with adjacent habitat wherever possible, to prevent isolation of beetle populations.

Depending on adjacent land use, a buffer area may also be needed between the conservation area and the adjacent lands. For example, herbicides and pesticides are

Conservation Guidelines for the Valley Elderberry Longhorn Beetle

often used on orchards or vineyards. These chemicals may drift or runoff onto the conservation area if an adequate buffer area is not provided.

- 2. Long-Term Protection.** The conservation area must be protected in perpetuity as habitat for the valley elderberry longhorn beetle. A conservation easement or deed restrictions to protect the conservation area must be arranged. Conservation areas may be transferred to a resource agency or appropriate private organization for long-term management. The Service must be provided with a map and written details identifying the conservation area; and the applicant must receive approval from the Service that the conservation area is acceptable prior to initiating the conservation program. A true, recorded copy of the deed transfer, conservation easement, or deed restrictions protecting the conservation area in perpetuity must be provided to the Service before project implementation.

Adequate funds must be provided to ensure that the conservation area is managed in perpetuity. The applicant must dedicate an endowment fund for this purpose, and designate the party or entity that will be responsible for long-term management of the conservation area. The Service must be provided with written documentation that funding and management of the conservation area (items 3-8 above) will be provided in perpetuity.

- 3. Weed Control.** Weeds and other plants that are not native to the conservation area must be removed at least once a year, or at the discretion of the Service and the California Department of Fish and Game. Mechanical means should be used; herbicides are prohibited unless approved by the Service.
- 4. Pesticide and Toxicant Control.** Measures must be taken to insure that no pesticides, herbicides, fertilizers, or other chemical agents enter the conservation area. No spraying of these agents must be done within one 100 feet of the area, or if they have the potential to drift, flow, or be washed into the area in the opinion of biologists or law enforcement personnel from the Service or the California Department of Fish and Game.
- 5. Litter Control.** No dumping of trash or other material may occur within the conservation area. Any trash or other foreign material found deposited within the conservation area must be removed within 10 working days of discovery.
- 6. Fencing.** Permanent fencing must be placed completely around the conservation area to prevent unauthorized entry by off-road vehicles, equestrians, and other parties that might damage or destroy the habitat of the beetle, unless approved by the Service. The applicant must receive written approval from the Service that the fencing is acceptable prior to initiation of the conservation program. The fence must be maintained in perpetuity, and must be repaired/replaced within 10 working days if it is found to be damaged. Some conservation areas may be made available to the public for appropriate recreational and educational opportunities with written approval from the Service. In

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these cases appropriate fencing and signs informing the public of the beetle's threatened status and its natural history and ecology should be used and maintained in perpetuity.

7. **Signs.** A minimum of two prominent signs must be placed and maintained in perpetuity at the conservation area, unless otherwise approved by the Service. The signs should note that the site is habitat of the federally threatened valley elderberry longhorn beetle and, if appropriate, include information on the beetle's natural history and ecology. The signs must be approved by the Service. The signs must be repaired or replaced within 10 working days if they are found to be damaged or destroyed.

Monitoring

The population of valley elderberry longhorn beetles, the general condition of the conservation area, and the condition of the elderberry and associated native plantings in the conservation area must be monitored over a period of either ten (10) consecutive years or for seven (7) years over a 15-year period. The applicant may elect either 10 years of monitoring, with surveys and reports every year; or 15 years of monitoring, with surveys and reports on years 1, 2, 3, 5, 7, 10, and 15. The conservation plan provided by the applicant must state which monitoring schedule will be followed. No change in monitoring schedule will be accepted after the project is initiated. If conservation planting is done in stages (i.e., not all planting is implemented in the same time period), each stage of conservation planting will have a different start date for the required monitoring time.

Surveys. In any survey year, a minimum of two site visits between February 14 and June 30 of each year must be made by a qualified biologist. Surveys must include:

1. A population census of the adult beetles, including the number of beetles observed, their condition, behavior, and their precise locations. Visual counts must be used; mark-recapture or other methods involving handling or harassment must not be used.
2. A census of beetle exit holes in elderberry stems, noting their precise locations and estimated ages.
3. An evaluation of the elderberry plants and associated native plants on the site, and on the conservation area, if disjunct, including the number of plants, their size and condition.
4. An evaluation of the adequacy of the fencing, signs, and weed control efforts in the avoidance and conservation areas.

5. A general assessment of the habitat, including any real or potential threats to the beetle and its host plants, such as erosion, fire, excessive grazing, off-road vehicle use, vandalism, excessive weed growth, etc.

The materials and methods to be used in the monitoring studies must be reviewed and approved by the Service. All appropriate Federal permits must be obtained prior to initiating the field studies.

Reports. A written report, presenting and analyzing the data from the project monitoring, must be prepared by a qualified biologist in each of the years in which a monitoring survey is required. Copies of the report must be submitted by December 31 of the same year to the Service (Chief of Endangered Species, Sacramento Fish and Wildlife Office), and the Department of Fish and Game (Supervisor, Environmental Services, Department of Fish and Game, 1416 Ninth Street, Sacramento, California 95814; and Staff Zoologist, California Natural Diversity Data Base, Department of Fish and Game, 1220 S Street, Sacramento, California 95814). The report must explicitly address the status and progress of the transplanted and planted elderberry and associated native plants and trees, as well as any failings of the conservation plan and the steps taken to correct them. Any observations of beetles or fresh exit holes must be noted. Copies of original field notes, raw data, and photographs of the conservation area must be included with the report. A vicinity map of the site and maps showing where the individual adult beetles and exit holes were observed must be included. For the elderberry and associated native plants, the survival rate, condition, and size of the plants must be analyzed. Real and likely future threats must be addressed along with suggested remedies and preventative measures (e.g. limiting public access, more frequent removal of invasive non-native vegetation, etc.).

A copy of each monitoring report, along with the original field notes, photographs, correspondence, and all other pertinent material, should be deposited at the California Academy of Sciences (Librarian, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118) by December 31 of the year that monitoring is done and the report is prepared. The Service's Sacramento Fish and Wildlife Office should be provided with a copy of the receipt from the Academy library acknowledging receipt of the material, or the library catalog number assigned to it.

Access. Biologists and law enforcement personnel from the California Department of Fish and Game and the Service must be given complete access to the project site to monitor transplanting activities. Personnel from both these agencies must be given complete access to the project and the conservation area to monitor the beetle and its habitat in perpetuity.

Success Criteria

A minimum survival rate of at least 60 percent of the elderberry plants and 60 percent of the associated native plants must be maintained throughout the monitoring period. Within one year of discovery that survival has dropped below 60 percent, the applicant must replace failed plantings to bring survival above this level. The Service will make any determination as to the

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applicant's replacement responsibilities arising from circumstances beyond its control, such as plants damaged or killed as a result of severe flooding or vandalism.

Service Contact

These guidelines were prepared by the Endangered Species Division of the Service's Sacramento Fish and Wildlife Office. If you have questions regarding these guidelines or to request a copy of the most recent guidelines, telephone (916) 414-6600, or write to:

**U.S. Fish and Wildlife Service
Ecological Services
2800 Cottage Way, W-2605
Sacramento, CA 95825**

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Figure 1: Range of the Valley Elderberry Longhorn Beetle

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Conservation Guidelines for the Valley Elderberry Longhorn Beetle

Table 1: Minimization ratios based on location (riparian vs. non-riparian), stem diameter of affected elderberry plants at ground level, and presence or absence of exit holes.

Location	Stems (maximum diameter at ground level)	Exit Holes on Shrub Y/N (quantify) ¹	Elderberry Seedling Ratio ²	Associated Native Plant Ratio ³
non-riparian	stems >= 1" & < 3"	No:	1:1	1:1
		Yes:	2:1	2:1
non-riparian	stems > 3" & < 5"	No:	2:1	1:1
		Yes:	4:1	2:1
non-riparian	stems >= 5"	No:	3:1	1:1
		Yes:	6:1	2:1
riparian	stems >= 1" & < 3"	No:	2:1	1:1
		Yes:	4:1	2:1
riparian	stems > 3" & < 5"	No:	3:1	1:1
		Yes:	6:1	2:1
riparian	stems >= 5"	No:	4:1	1:1
		Yes:	8:1	2:1

¹ All stems measuring one inch or greater in diameter at ground level on a single shrub are considered occupied when exit holes are present anywhere on the shrub.

² Ratios in the *Elderberry Seedling Ratio* column correspond to the number of cuttings or seedlings to be planted per elderberry stem (one inch or greater in diameter at ground level) affected by a project.

³ Ratios in the *Associated Native Plant Ratio* column correspond to the number of associated native species to be planted per elderberry (seedling or cutting) planted.

Appendix B

Programmatic Consultation with the U.S. Army Corps of Engineers
404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake
within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano,
Stanislaus, Sutter and Yolo Counties, California

Appendix A
Guidelines for Restoration and/or
Replacement of Giant Garter Snake Habitat

Replacement and Restoration Guidelines are provided together, as the two conservation measures may not be mutually exclusive. Replacement of habitat may also require restoration of some areas. Preserved habitat may additionally be improved for giant garter snake by using some of the restoration guidelines.

Reference sites

A nearby reference site should be chosen both for restoration of giant garter snake habitat and for creation of replacement habitat. The reference site will be used to determine the success of conservation efforts. For restoration of habitat, the pre-project condition may be used as a reference site if adequate documentation exists. For creation of replacement habitat or for restoration where pre-project conditions are not documented, the reference site should be nearby or adjacent and should represent high quality giant garter snake habitat.

Restoration of giant garter snake habitat

Restoration may include incorporating some of the Replacement guidelines to enhance habitat value for giant garter snake. Restoration should follow the guidelines outlined below:

1. Restoring giant garter snake habitat includes minimizing impacts of project activities to the existing habitat, including using silt fencing, designating environmentally sensitive areas, using protective mats, preventing runoff, and providing worker awareness training. Measures to minimize impacts include:
 - a. Avoid construction activities within 200 feet from the banks of giant garter snake aquatic habitat. Confine movement of heavy equipment to existing roadways to minimize habitat disturbance.
 - b. Construction activity within habitat should be conducted between May 1 and October 1. This is the active period for giant garter snakes and direct mortality is lessened, because snakes are expected to actively move and avoid danger. Between October 2 and April 30 contact the Service's Sacramento Fish and Wildlife Office to determine if additional measures are necessary to minimize and avoid take.
 - c. Confine clearing to the minimal area necessary to facilitate construction activities. Flag and designate avoided giant garter snake habitat within or adjacent to the project area as Environmentally Sensitive Areas. This area should be avoided by all construction personnel.
 - d. Construction personnel should receive Service-approved worker environmental awareness training. This training instructs workers to recognize giant garter snakes and its habitat(s).

- e. 24-hours prior to construction activities, the project area should be surveyed for giant garter snakes. Survey of the project area should be repeated if a lapse in construction activity of two weeks or greater has occurred. If a snake is encountered during construction, activities shall cease until appropriate corrective measures have been completed or it has been determined that the snake will not be harmed. Report any sightings and any incidental take to the Service immediately by telephone at (916) 414-6600.
 - f. Any dewatered habitat should remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.
2. Remove all construction debris and stockpiled materials.
 3. Regrade area to preexisting contour, or a contour that would improve restoration potential of the site.
 4. Replant and hydroseed the restoration area. Recommended plantings consist of a) wetland emergents, b) low-growing cover on or adjacent to banks, and c) upland plantings/hydroseeding mix to encourage use by other wildlife. Riparian plantings are not appropriate because shading may result in lack of basking sites. Native plantings are encouraged except where non-natives will provide additional values to wildlife habitat and will not become invasive in native communities. The applicant should obtain cuttings, plantings, plugs, or seeds, from local sources wherever possible. The applicant should attempt to restore conditions similar to that of adjacent or nearby habitats.
 - a. Emergent wetland plants recommended for giant garter snake habitat are California bulrush (*Scirpus californicus*), cattail (*Typha* spp.), and water primrose (*Ludwigia peploides*). Additional wetland plantings may include common tule (*Scirpus acutus*), Baltic rush (*Juncus balticus*), or duckweed (*Lemna* spp.).
 - b. Cover species on or adjacent to the bank may include California blackberry (*Rubus vitifolius*) or wild grape (*Vitis californica*), along with the hydroseeding mix recommended below.
 - c. Upland plantings/hydroseeding mix: Disturbed soil surfaces such as levee slopes should be hydroseeded to prevent erosion. The Service recommends a mix of at least 20-40 percent native grass seeds [such as annual fescue (*Vulpia* spp.), California brome (*Bromus carinatus*), blue wildrye (*Elymus glaucus*), and needle grass (*Nassella* spp.)], 2-10 percent native forb seeds, five percent rose clover (*Trifolium hirtum*), and five percent alfalfa (*Medicago sativa*). Approximately 40-68 percent of the mixture may be non-aggressive European annual grasses [such as wild oats (*Avena sativa*), wheat (*Triticum* spp.), and barley (*Hordeum vulgare*)]. The Corps will not include aggressive non-native grasses, such as perennial ryegrass (*Lolium perenne*), cheatgrass (*Bromus tectorum*), fescue (*Festuca* spp.), giant reed (*Arundo donax*), medusa-head (*Taeniatherum caput-medusae*), or Pampas grass (*Cortaderia selloana*) in the hydroseed mix. The Corps will not include endophyte-infected grasses in the mix. Mixes of one-hundred percent native grasses and forbs may also be used, and are encouraged.

Replacement of giant garter snake habitat

Location

Replacement location should be within the same population cluster boundaries (population clusters are defined in 58 FR 54053) as the habitat lost. For example: The boundaries of the Sacramento Basin population cluster are approximately, Highway 16 to the north, Sacramento River to the west, Twin Cities Road to the south, and the Folsom Aqueduct to the east. Habitat lost within this area must also be replaced within this area.

Habitat components

Giant Garter Snake Habitat. The giant garter snake inhabits marshes, sloughs, ponds, small lakes, low gradient streams, other waterways and agricultural wetlands such as irrigation and drainage canals and rice fields, and the adjacent uplands. Essential habitat components consist of (1) adequate water during the snake's active period, (early spring through mid-fall) to provide a prey base and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat; (3) upland habitat for basking, cover, and retreat sites; and (4) higher elevation uplands for cover and refuge from flood waters. For the purposes of this programmatic opinion, a basic giant garter snake habitat unit will incorporate 2.00 acres (0.81 hectares) of surrounding upland for every 1.00 acre (0.40 hectare) of aquatic habitat. The 2.00 acres (0.81 hectares) of upland also may be defined as 218 linear feet (66 meters) of bankside habitat which incorporates adjacent uplands to a width of 200 feet (61 meters) from the edge of the bank.

Replacement habitat must provide the above mentioned essential habitat components and include the following:

1. All replacement habitat must include both upland and aquatic habitat components. Upland and aquatic habitat components must be included in the replacement habitat at a ratio of 2:1 upland acres to aquatic acres
2. A semi-permanent or permanent aquatic habitat which provides water during the active period for giant garter snakes (April through October) with suitable vegetative cover present. Linear or meandering channels with slow flowing water over mud or silt substrate are preferred.
3. Upland basking and retreat sites with low growing vegetation cover adjacent to aquatic habitat, and upland retreats and flood refugia with partially buried broken concrete or animal burrows.
4. Small fish and amphibian larvae for foraging, but predatory "gamefish" (bass, *Micropterus* spp.; sunfish, *Lepomis* spp.; catfish, *Ictalurus* spp. and *Ameiurus* spp.) absent or controlled.
5. An adequate buffer (at least 200 feet) from roadways to reduce vehicular mortality.
6. Follow planting recommendation provided above under restoration guidelines.

Monitoring

Habitat restoration

Restoration of habitat should be monitored for one year following implementation. Monitoring reports documenting the restoration effort should be submitted to the Service: (1) upon completion of the restoration implementation; and (2) one year from restoration implementation.

Monitoring reports should include photodocumentation, when restoration was completed, what materials were used, plantings (if specified) and justification of any substitutions to the Service recommended guidelines. Monitoring reports should also include recommendations for remedial actions and approval from the Service, if necessary, and justification from release of any further monitoring, if requested.

Creation of replacement habitat

Replacement habitat should be monitored for 5 years following implementation. Hydrology should be monitored for the first two years after creation of wetlands. The monitoring effort should continue for three additional years to ensure success criteria are met. Monitoring reports documenting implementation of conservation measures should be submitted to the Service: (1) upon completion of wetland creation; (2) yearly for the first two years of monitoring; and (3) 5 years from implementation. Monitoring reports should include photodocumentation, when restoration was completed, what materials were used, plantings (if specified) and justification of any substitutions to the Service recommended guidelines. Monitoring reports should also include recommendations for remedial actions and approval from the Service, if necessary, and justification from release of any further monitoring, if requested.

Success criteria for replacement habitat:

1. At completion of monitoring, the cover measured on the habitat area should be 90 percent of cover measured on the reference site.
2. At completion of monitoring, the species composition measured on the habitat area should be 90 percent of that measured on the reference site.
3. At completion of monitoring, wetlands created on the site should meet Corps jurisdictional criteria.

Maintenance and management of replacement giant garter snake habitat

1. A final management plan of replacement habitat must be approved by the Service.
2. All maintenance activities should follow Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake Habitat.
3. Additional guidance includes:
 - a. Canal Maintenance - Hand clearing of canals is preferred for removal of excessive vegetation or debris. Any equipment should be operated from the bank top. Excavate from only one side of the canal during a given year. Avoid excavating the banks above the high water level. Preferably, one side of the canal should be left undisturbed indefinitely (the preferred side would be the west or north side) so that emergent vegetation and bank side cover is left in place.
 - b. Place the spoils from canal clearing in a designated location, rather than along bank tops. This will prevent burying or crushing snakes basking on the banks, or trapping snakes taking cover in burrows or bank-top soil crevices.
 - c. Vegetation control - Uplands should not be disced. Leave vegetation on levees and canal sides wherever possible. Mowing to control vegetation should take place July through September and mower blades should be raised at least six inches to avoid injuring snakes and to leave some grassy cover.

- d. Traffic - Control vehicle access to avoid vehicular mortality of giant garter snakes.
4. Use a water maintenance regime that will maintain some open water to provide vegetated edge for giant garter snake to forage along.
 5. Eradicate/control non-natives and invasive exotics.

Compatible uses of giant garter snake replacement habitat:

Rice farming is a compatible land use for adjacent properties.

Uses of giant garter snake replacement habitat that are incompatible with the habitat of giant garter snake, or represent threats to giant garter snakes include row cropping on uplands, orchards on uplands, OHV (off-highway vehicle) use, and combining with riparian habitat creation which requires dense cover or SRA (shaded riverine aquatic) habitat.

Endangered Species Div., Sacramento Fish & Wildlife Office, U.S. Fish & Wildlife Service