United States Department of the Interior

FISH AND WILDLIFE SERVICE
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IN REPLY REFER TO:
1-1-99-F-0015

December 7, 1998

Memorandum

To: Project Manager, Bureau of Reclamation, Mid-Pacific Regional Office, Sacramento, California

From: Field Supervisor, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Biological Opinion on Conveyance of Refuge Water Supply Project, West and East Sacramento Valley, California

This is in response to your request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the Conveyance of Refuge Water Supply Project (Conveyance Project), West and East Sacramento Valley, California. Your request was dated and received in our office November 4, 1998. This document represents the Service's biological opinion on the effects of the action on the giant garter snake (*Thamnophis gigas)*, in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act).

This biological opinion is based on information provided in: (1) the October 1998 Biological Assessment for Conveyance of Refuge Water Supply Project, West Sacramento Valley Study Area and East Sacramento Valley Study Area; (2) the December 1997 Environmental Assessment for Conveyance of Refuge Water Supply Project West Sacramento Valley Study Area (USBR); (3) the December 1997 Environmental Assessment for Conveyance of Refuge Water Supply Project East Sacramento Valley Study Area; (4) Project Description Amendment for RWS Biological Opinion (memo from Kathy Freas to Ellen Berryman, dated December 3, 1998); (5) field investigations, and other sources of information. A complete administrative record of this consultation is on file in the Sacramento Fish and Wildlife Office (SFWO).

Background/Consultation History

The primary purpose of the Conveyance Project is to provide or upgrade facilities to accomodate "Level 4" refuge water supply (defined below) as required under the Central Valley Project Improvement Act (CVPIA). The Bureau of Reclamation (Reclamation), in cooperation with the Service and the California Department of Fish and Game (Department), is responsible for implementing Section 3406 (d)(5) of the CVPIA, which requires that reliable Level 4 water supplies be delivered to the National Wildlife Refuges (NWRs) and state Wildlife Management Areas (WMAs) specifically included in the CVPIA. Two primary water supply levels, Level 2 and Level 4, have been identified under the CVPIA refuge water supply program. Level 2 water supplies are defined as existing average annual water deliveries, while Level 4 water supplies are defined as those quantities of water required for full habitat development for each of the refuge areas. The CVPIA requires Level 4 water supplies to be provided as firm, reliable, long-term entitlements for each of the refuges.

Because of capacity constraints and/or maintenance requirements in existing delivery systems, existing conveyance facilities need to be modified to provide Level 4 water supplies to Sacramento Valley Refuges. Currently, water supplies are conveyed on an as-available basis, which is not consistent with refuge needs. In most cases, existing facilities were not designed to convey peak refuge requirements in addition to existing agricultural demands, or are dewatered for maintenance purposes and, therefore, do not have year-round delivery capability. Facilities must be modified to support scheduled maximum Level 4 peak flows.

Surveys of the project area were conducted during the fall of 1995 and 1996 to determine whether the project may affect any federally listed or proposed species. A special focus was given to searching for habitats that might support federally listed or proposed species which are known to occur in the vicinity, including the giant garter snake, the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), palmate-bracted bird's beak (*Cordylanthus palmatus*), and vernal pool species such as vernal pool fairy shrimp (*Branchinecta lynchii*), vernal pool tadpole shrimp (*Lepidurus packardi*), Hoover's spurge (*Chamaesyce hooveri*), hairy Orcutt grass (*Orcuttia pilosa*), Colusa grass (*Neostaphia clusana*), and Greene's tuctoria (*Tuctoria greenei*).

No elderberry bushes were found in the area to be impacted by the structural modifications, therefore it was determined that the Conveyance Project is not likely to affect the valley elderberry longhorn beetle. Similarly, vernal pool species are not expected to be affected by the project because no vernal pool habitat was found in the impact area. Habitat for palmate-bracted bird's beak (valley sink scrub and alkali meadow) is not present in the impact area, hence this species is not expected to be affected by the project.

The Sacramento splittail (*Apogonichthys macrolepidotus*) is known from the project area. This species was federally proposed for listing as threatened on January 6, 1994 (59 **FR** 862). Sacramento splittail occur in the Sutter Bypass, in the vicinity of a proposed siphon installation that would be necessary for water conveyance to Sutter NWR. However, the siphon would be installed just upstream of an existing weir that precludes passage of Sacramento splittail from this part of the bypass, so this species would not be affected by the siphon installation.

Sacramento splittail have also been collected every year from 1993 to 1996 at the Hamilton City Pumping Plant, where the GCID Main Canal is diverted from the Sacramento River (USFWS 1997). A fish screen is currently present at this diversion point, preventing adult splittail from entering the GCID Main Canal, but eggs, larvae, and juvenile splittail would be able to pass through the screen. Project construction will primarily be limited to the period when the Main Canal is dry, between December 1 and mid-March, and construction to occur when the Main Canal is wet will primarily be limited to a period after August 1 of each calender year, when eggs, larvae, and juveniles are not likely to be present. Temporary diversion of the GCID Main Canal for construction purposes will need to occur at Bondurant Slough in June, when splittail eggs and young could be present, but measures have been incorporated into the project description to minimize any adverse effects to splittail that could result from the short-term water turbidity. The take of Sacramento splittail eggs and juveniles entrained in the GCID Main Canal was already addressed in a separate Biological Opinion for the GCID Fish Screen (Service File #1-1-97-0115). Therefore, this species will not be further addressed in this document.

During meetings on September 3, September 22, and October 8, 1998, Ellen Berryman of the Service and Kathy Freas of CH2M Hill (representing Reclamation) developed a strategy for addressing the numerous activities to be authorized for take under this biological opinion. The Conveyance Project involves 83 minor structural modifications along the Glenn-Colusa Irrigation District (GCID) Main Canal, disturbing less than 0.5 acre of land each, and 29 major structural modifications which generally disturb over 0.5 acre of land each. Only four of the 29 major structural modifications have been designed (at 50% design level): the locations and types of activities to be undertaken for the remaining 25 have been determined (see Appendix A) but no site-specific design has been completed. It was therefore determined that a programmatic approach should be used for these undesigned major modifications, such that: (1) the biological opinion use gross impact estimates to generate "sideboards" for the maximum amount of total habitat to be disturbed for each structure; (2) more precise impact quantification be provided as designs are completed for each structure, and compared to the sideboard estimates to determine compliance with the biological opinion; (3) take be authorized, in the form of a letter appended to the programmatic opinion, for construction at each site once it has been confirmed that the construction would be consistent with the programmatic opinion.

Four of the 29 major modifications are at 50% design level, therefore a more accurate estimate of impact acreage can be made for these sites than for the other 25 sites. During informal consultation, the Service and Reclamation decided that take could be authorized at these four sites through this biological opinion, without the need to append these activities to the opinion, provided more precise impact acreages are reported once construction has occurred.

In early October 1998, Reclamation asked the Service whether the proposed minor modifications along the Glen-Colusa Irrigation District (GCID) Main Canal could be included in a "not likely to adversely affect" letter, because of the relatively small amount of disturbance associated with these modifications to existing structures. On October 22, 1998, Ellen Berryman of the Service, Ben Pennock of GCID, and Kathy Freas of CH2M Hill visited examples of the five general types of minor modifications (delivery setbacks, rip-rap of bridges, extension of wing walls, flapgate removal/siphon installation, and structure demolishing and removal) along the GCID Main Canal. During this site visit, the Service noted the presence of rodent holes and small cracks in the levee along the canal that potentially could be occupied by giant garter snake during the period of inactivity from October 1 through May 1. Because most of the minor modifications would occur between December 1 and February 15, when the Main Canal is largely dry, the Service determined that excavation of the levee could cause mortality in snakes hibernating there. Additionally, limited amounts of aquatic habitat in return and toe drains, and to a lesser extent in the Main Canal, would be permanently affected by the minor modifications. As a result, it was determined that the Minor Structures would be included in the biological assessment and the biological opinion, rather than addressed in a "not likely to affect" letter. Because the impact acreage for each minor modification is only an estimate, it was decided that these estimates would serve as maximum allowable impact acreages, and the actual impact acreages would be determined and reported to the Service after each minor modification has been completed. The minor modification could be authorized for take without the need to be appended to the biological opinion (only the 25 currently undesigned major modifications would need to be appended to this opinion).

Reclamation initiated formal consultation on the Conveyance Project in a letter dated November 4, 1998, and delivered to the Service that same day. This letter requested the Service to address effects on the giant garter snake that could result from structural modification of the East and West Sacramento conveyance facilities.

To provide Level 4 water supplies in compliance with the CVPIA, Reclamation must undertake a number of interrelated actions that will be addressed in separate biological opinions. The Conveyance Project consultation only addresses the effects of improvements to water conveyance facilities that are necessary to deliver Level 4 water to the refuge boundaries, and does not address potential effects to listed species that could result from: (1) use of that water on the refuges; (2) improvements to conveyance facilities on the refuge; or (3) potential effects of water acquisition for the program. The

effects of taking water from the source where the water is acquired for refuges is being addressed in the programmatic biological opinion for the CVPIA. Additionally, refuge activities that are expected to result from the availability of additional refuge water supply are to be addressed in separate biological opinions on refuge long-term maintenance and operations and refuge conveyance facilities.

Programmatic Consultation Guidelines

The proposed construction activities for the Conveyance Project include 25 major structural modifications, listed in Appendix A of this biological opinion and Table 5 of the Biological Assessment, that have not yet been designed. This consultation takes a programmatic approach for authorizing take that would result from these currently undesigned modifications. For take of giant garter snake to be authorized under this programmatic opinion, the following criteria must be met for each major structural modification.

1. Habitat loss at each site will not exceed the amount specified for that site in Appendix A of this biological opinion (Table 5 of the Biological Assessment).

2. The total cumulative amount of permanent giant garter snake habitat loss for all projects listed in Appendix A has not exceeded 24.5 acres of upland habitat or 29.5 acres of aquatic habitat.

3. The activity has been designed to minimize impacts to giant garter snakes and their habitat to the maximum extent practicable, through consultation between design engineers and a Service-approved biologist familiar with giant garter snake habitat needs.

4. The activity will comply with the terms and conditions of this biological opinion.

Implementing Procedure

Four Major Modifications at 50% Design Level and 83 Minor Modifications: This biological opinion authorizes take for the four major modifications that are currently at 50% design level, and for the 83 minor modifications. These activities do not require a letter from the Service to append them to this biological opinion, provided they are consistent with the project description in this biological opinion and the Biological Assessment, and they comply with the terms and conditions in this biological opinion.

25 Undesigned Major Modifications: This biological opinion can authorize take for the 25 currently undesigned major modifications only after these activities have been appended to this opinion. The following procedure will be used to authorize take for each of these 25

major structural modifications, using a programmatic approach under the biological opinion:

1. Reclamation will submit a letter requesting that the proposed activity be appended to this programmatic biological opinion and provide the Service with the following:

   a. A 1"=20' site plan with an overlay showing habitat types at the site (open water, marsh, rice field, disturbed upland, etc.), and differentiating areas to be temporarily and permanently impacted.

   b. Information on the number of acres of habitat to be temporarily and permanently impacted for each habitat type.

   c. A project description, including details related to the types of disturbance, project timing, and a discussion as to how impacts are minimized to the maximum extent practicable relative to the Service's *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake Habitat* (Appendix B).

2. The Service will review the information provided to determine whether the activity meets the criteria for being appended to this biological opinion, or whether a separate biological opinion is necessary.

3. If the Service determines that the activity is appropriate for inclusion under this opinion, the Service will provide a letter appending the activity to this opinion.

BIOLOGICAL OPINION

Description of the Proposed Action

The proposed project involves structural modification of water conveyence facilities in Sacramento Valley for additional water conveyance to Sacramento Valley NWRs and Graylodge WMA. The Conveyance Project includes 29 major structural modifications to water conveyance facilities in the Sacramento Valley in the vicinity of the Sacramento, Delevan, Colusa and Sutter NWRs, as well as Gray Lodge WMA, and 83 minor structural modifications along approximately 60 miles of the GCID Main Canal. The locations for the major and minor modifications are shown on Figures 1 through 3 of the October 1998 Biological Assessment. The following summarizes the activities that will be involved for the major and minor modifications, the anticipated impacts to giant garter snakes, and the proposed measures for mitigating these impacts.

1. Major Modifications at 50% Design Level:

Although no design has been completed for 25 of the major structural modifications for the Conveyance Project, four of the major structural modifications are currently at 50% design: Bondurant Slough Siphon, Willows South Drain, Hunter's Creek Siphon, and Lateral 41-1 Extension. These structures will be used to convey water to refuges in the West Sacramento Valley area (Sacramento, Delevan, and Colusa, NWRs).

Under current conditions, the GCID Main Canal carries irrigation water from about mid- March through December 1 and is dry in the winter. The refuge water supply project will allow water to flow through the GCID Main Canal year-round, which necessitates the four major structural modifications.

All four structures currently are scheduled for construction to begin May 1, 1999. Willows South Drain, Hunter's Creek Siphon, and Lateral 41-1 Extension are scheduled to be completed by September 30 1999, while Bondurant Slough Siphon is scheduled to be completed by March 1, 2000. The four major structures at 50% design are described briefly below, and are described at a greater level of detail in the October 1998 BA.

a. Bondurant Slough: Bondurant Slough is currently siphoned under the GCID Main Canal when water is present in the Main Canal, mid-February through the end of November. The Conveyance Project will allow water to flow through the GCID Main Canal year-round. An empty GCID Main Canal can easily accept flood flows from Bondurant Slough when winter rains start, but a full canal cannot accept flood flows from a 25-year storm event. The existing small siphon cannot manage these flows, thus a new, larger siphon structure must be installed to accept these flows.

Installation of a larger siphon at Bondurant Slough requires the construction of a bypass channel into which water from the GCID Main Canal will be diverted during the construction period. The construction of the bypass channel will begin approximately May 1 1999. When the bypass channel is complete, the levee between the Main Canal and the bypass channel will be breached to redirect Main Canal flow into the bypass channel. Breaching is expected to occur in early June 1999, and would create some short-term water turbidity in the bypass channel and downstream in the GCID Main Canal. Turbidity will be minimized through the following measures:

(1) The bypass channel will be fully constructed per design and specification requirements prior to breaching the GCID Main Canal levee.

(2) The bypass channel will be filled by pumping and/or siphoning flow from the GCID Main Canal. One-fourth to one-eighth inch barrel screening will be used to keep the fish clear of the pump intake, thus out of the bypass, while filling. After pumping, colloids will be allowed to settle for 1-2 days.

(3) Prior to breaching the Main Canal levee, the Main Canal water surface elevation will be checked up to, or slightly higher than, the water surface elevation of the bypass channel.

(4) Prior to breaching the downstream levee between the Main Canal and the bypass channel, the upstream levee will be breached, 1-2 additional days of settling time will be allowed, and the Main Canal will be checked to the maximum operating water surface elevation at the next downstream structure to lower the velocity in the GCID Main Canal.

(5) When the downstream levee between the bypass channel and GCID canal has been breached, flow will be allowed in both the GCID Main Canal and the bypass channel for 1-2 days. (By allowing flow through the Main Canal during this period, velocities will be lower than normally experienced in the Main Canal. This will minimize colloidal transport from the bypass channel during the most vulnerable initial conveyance period.)

(6) When constucting the sheet piling isolation of the Bondurant Siphon work site, the downstream sheet pile wall will be constructed first.

Upland habitat loss and temporary disturbance will occur on the Main Canal levee road and roads bordering the slough upstream of the Main Canal, and in a disturbed area (ruderal vegetation) along the GCID Canal on the downstream side. The upland habitat along the slough banks support some ruderal vegetation that could provide cover for snakes, and a number of ground squirrel burrows that would be suitable for occupation by snakes during their dormant period. Expansion of the siphon capacity for Bondurant Slough will result in permanent loss of 0.1 acre of upland habitat. Construction will also result in temporary disturbance to 1.4 acres of upland habitat and 2.0 acres of aquatic habitat.

b. South Willows Drain: Currently, runoff from south Willows flows into the GCID Main Canal, when it is dry in winter. Once the Main Canal is filled year-round, it will no longer be able to accept water from south Willows.

The Conveyance Project will therefore involve rerouting runoff water from south Willows under the Main Canal land, to a drainage canal that currently adjoins the rice fields.

The project will require widening the drainage canal from 6-12 feet wide to approximately 26 feet wide. The existing canal is currently occupied by cattails (*Typha* sp.), which will be temporarily removed during project construction but will be allowed to re-establish since this drainage canal will not be maintained following construction. Adjacent crop land that is currently used for rice production will be removed to widen the canal, thereby converting aquatic rice field habitat to aquatic cattail marsh habitat. The total amount of temporary disturbance to aquatic giant garter snake habitat for the canal widening, including both the temporary removal of cattail marsh and the conversion of rice field to cattail marsh, is 11.4 acres. As existing dirt road along the canal will displace 3.1 acres of upland habitat along the roadway, but the road will be reconstructed along the new canal, therefore the upland habitat will be able to re-establish.

c. Hunter's Creek Siphon: Hunter's Creek is currently siphoned under the GCID Main Canal, but the existing siphon threatens the levee structure along the Main Canal, and the siphon must be enlarged to comply with requirements for the increased water supply within the Main Canal. The siphon enlargement will involve dredging and widening a portion of Hunter's Creek upstream from the Main Canal, with rip rap installed along one side of the creek. A "dead end" of Hunter's Creek that abuts the Main Canal (and is weakening it) will be filled with soil and edged with rip rap.

Approximately 0.2 acre of aquatic habitat will be permanently lost as a result of filling the "dead end" of Hunter's Creek. Approximately 0.1 acre of riparian habitat (treated as upland habitat for the giant garter snake) will be permanently lost to enlarge the siphon. The creek dredging and widening will also result in temporary disturbance to 0.9 acre of aquatic habitat and 0.8 acre upland habitat.

d. Lateral 41-1 Extension: The 41-1 Lateral Canal will be extended to provide winter water supply to Delevan NWR. This will involve construction of approximately 10,000 feet of new conveyance canals. The canals will involve permanent removal of rice fields that currently support good quality aquatic habitat for giant garter snakes, with abundant emergent wetland vegetation and rice in summer. The new facilities will be maintained after construction, therefore, habitat is not expected to establish in the new canals. The Lateral 41-1 Extension is expected in result in permanent loss of up to 5.2 acres of aquatic habitat and 2.2 acres of upland habitat in the form

of levee banks and roads. Temporary upland and aquatic habitat disturbance during construction is estimated at 1.4 and 6.0 acres, respectively. For these four GCID major structures, no new excavation will take place during the giant garter snake's dormant period, October 1 through May 1.

2. Major Structural Modifications, Currently Undesigned

There is currently no planned schedule for constructing 25 of the 29 major structural modifications under the Conveyance Project, and no site-specific design has been initiated for these modifications. Therefore, this biological opinion takes a programmatic approach to authorize these construction activities for take. Major structure construction activities for the Conveyance Project can be appended to this biological opinion if they meet the criteria listed under the Programmatic Consultation Guidelines for this biological opinion (page 4).

When the site-specific design for each major structure has been completed, information will be provided to the Service regarding the nature and extent of anticipated impacts. The construction activity can be authorized for take once the Service has finalized a letter stating that the activity meets the criteria specified above and can be appended to this biological opinion. Permanent loss of up to 24.5 acres of giant garter snake upland habitat and 29.5 acres of aquatic habitat can be authorized for these 25 modifications under this opinion.

3. Minor Structural Modifications

The proposed minor structural modifications for the GCID Main Canal are necessary for conveyance of refuge water supply to the three refuges in the West Sacramento Valley area: Sacramento, Delevan, and Colusa NWRs. Each GCID minor modification can be classified into one of four types of construction, as briefly described below and described in greater detail in the October 1998 Biological Assessment.

a. Set Back Deliveries. Numerous delivery structures, such as gates and pipes, are present along the GCID Main Canal to convey water from the canal to adjacent fields. The canal has been widened since these delivery structures were put in place, but could not be widened where the these structures obstructued such widening. Therefore, the canal is typically narrower at these delivery structure locations. To accomodate the increased water capacity in the GCID Main Canal, these narrow areas must be widened at 41 locations and the structures must be set back to align with adjacent Main Canal slopes. In most cases, this will require all of the existing structure to be demolished and pipes to be replaced, requiring levee excavation.

Each delivery setback is expected to impact no more than 0.05 acre of giant garter snake habitat, including 0.01 acre of aquatic habitat in the return drain and 0.04 acre of upland habitat along the levy. With 41 delivery setbacks, the total impact is not expected to exceed 2.05 acres, including 1.64 acres of upland habitat and 0.41 acre of aquatic habitat. Each delivery setback will result in creation of approximately 0.02 acre of Main Canal aquatic habitat, for a total increase of 0.82 acre of aquatic habitat, as the canal will be widened at these locations. However, the aquatic habitat along the Main Canal is expected to provide lower quality giant garter snake habitat than what is present in the toe drains, because the Main Canal will be maintained and very little emergent vegetation will grow there.

b. Flapgate Removal and Siphon Replacement. Drainages that carry winter run-off water cross the GCID Main Canal at 23 locations. These cross drainages typically carry water when the Main Canal is empty, during the winter months. At each of the 23 locations, water crosses the canal by passing into the canal through a gate on the up-slope side and out of the canal through a gravity-drainage on the down-slope side. With year-round water supply through the Main Canal, drainages will no longer be able to cross the canal in this manner. The gates and gravity-structures will therefore need to be removed and replaced with Reinforced Concrete Pipe that siphons under the canal. Each flapgate removal and siphon replacement is expected to result in temporary disturbance of 0.04 acre upland habitat and 0.23 acre return drain aquatic habitat. With 23 sites planned for flapgate removal and siphon replacement, the total amount of temporary disturbance is not expected to exceed 0.92 acre of upland habitat and 5.29 acres of aquatic habitat.

c. Demolish and Remove. Five minor structures, including old bridges, check structures and pipelines, are scheduled to be removed from the Main Canal banks and replaced with soil conforming to the existing canal slopes. Where the structures are removed, the space will be filled with soil. No aquatic habitat in the GCID Main Canal will be disturbed because this construction will be during winter when the canal is dry. Each demolishment and removal is expected to result in a temporary upland habitat disturbance of no more than 0.2 acre. Demolishment and removal of structures at five sites is expected to result in a total temporary loss of 1.0 acre of upland habitat.

d. Rip Rap Bridges and Extend Wing Walls. Wing walls are the angular walls that extend into canal banks from any given structure. Most wing wall extensions are at bridges, where rip rap will also be placed to prevent erosion. The extension wing walls involves clearing soil from around

existing wing walls, then forming, placing rebar and pouring concrete to extend them for better erosion control. Each wing wall extension is expected to disturb a maximum upland habitat area of approximately 15 feet by 60 feet, or 0.02 acres. With eight sites planned for extension of wing walls, the total upland area to be permanently impacted is approximately 0.16 acre.

Rip rap, used to control erosion requires placing 12 + inch diameter rock on the upstream and downstream side of the structure. The rock will extend a maximum of 100 feet on either side of the structure and cover an area on the canal bank up to 15 feet wide, or 0.07 acre. With eight sites planned for placement of rip-rap, the total area of existing upland to be covered with rip rap is 0.56 acres.

The approximate total habitat disturbance for all 83 GCID Minor Structures is as follows:

- Maximum permanent upland habitat, 1.8 acres
- Maximum temporary upland habitat disturbance, 2.48 acres
- Maximum permanent toe/return drain aquatic habitat loss, 0.41 acres
- Maximum temporary toe/return drain aquatic habitat loss, 5.29 acres

The exact amount of habitat affected by construction of each minor structure will not be determined until the construction is completed. A qualified biologist will monitor the actual amount and type of habitat that is being affected as construction proceeds at each site. Maximum estimates provided in this document will be used to set an upper limit of habitat disturbance provided for in the biological opinion against which actual disturbance can be measured.

The minor modifications on the GCID Main Canal are expected to begin December 1, 1998. Approximately half of these modifications are expected to be completed from December 1, 1998, to February 15, 1999, with the remaining minor modifications to be completed from December 1, 1999, to February 15, 2000.

For GCID minor structural modifications, giant garter snake upland habitat on the Main Canal levees will need to be excavated when the canal is dry, which is during the dormant period for this species. To help prevent injury or mortality to snakes that may occupy burrows in the levees, a qualified, Service-approved biologist will be present during all excavation activities. Should a dormant giant garter snake be encountered within the construction zone, construction will be halted until the Service is contacted and advises GCID on how and when to proceed. Additionally, Service approved environmental awareness training will be provided to work crews at project sites.

4. Proposed Mitigation.

A mitigation site supporting giant garter snake habitat would be secured prior to initiation of GCID major structural modifications. This site will include a sufficient amount of giant garter snake habitat to mitigate the loss of habitat associated with the following: (1) all GCID minor structural modifications that have been completed at the time the mitigation land is secured; and (2) all 29 GCID major structural modifications. Prior to ground-breaking at each subsequent minor modification site, a sufficient acreage of mitigation land would be secured. For all major and minor structural modifications, mitigation would consist of habitat preservation at a ratio of three acres preserved for each acre impacted. The mitigation area would support both upland and aquatic habitat components, at a ratio of two upland acres for each aquatic acre. All restoration, replacement, and monitoring guidelines included in the Mitigation Criteria for Restoration and/or Replacement of Giant Garter Snake Habitat (Appendix C) would be followed.

Status of the Species/Environmental Baseline

The giant garter snake was federally listed as threatened on October 20, 1993. Please refer to the *Federal Register* notice (58 FR 54053-54066) on federal listing of the giant garter snake for detailed information on the species' biology and ecology, and associated threats to its survival.

Essential habitat components - 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 and rice fields, and the adjacent uplands. Giant garter snakes feed on small fish, tadpoles, and frogs (Fitch 1941, Hansen 1980, Hansen 1988). Essential habitat components consist of: (1) 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 cover and refuge from flood waters during the snake's dormant season in the winter (Hansen 1980). Riparian woodlands do not typically provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations (Hansen 1980).

Foraging ecology - Giant garter snakes are active foragers, feeding primarily on aquatic prey such as fish and amphibians. Historically, prey likely consisted of Sacramento blackfish (*Orthodon microlepidotus*), thick-tailed chub (*Gila crassicauda*), and red-legged frog (*Rana aurora*). Because these species are no longer available (thick-tailed chub are extinct, red-legged frog extirpated from the Central Valley, and blackfish declining/in low numbers), the predominant food items are now Pacific treefrogs (*Hyla regilla*) and

introduced species such as carp (*Cyprinus carpio*), mosquito-fish (*Gambusia affinis*), and bullfrogs (*Rana catesbiana*)
(Fitch 1941).

Reproductive ecology - The breeding season extends through March and April, and females give birth to live young from late July through early September (Hansen and Hansen 1990). Brood size is variable, ranging from 10 to 46 young, with a mean of 23 (Hansen and Hansen 1990). Young immediately scatter into dense cover and absorb their yolk sacs, after which they begin feeding on their own, and reach sexual maturity at about three years of age for males and five years for females.

Movements and habitat use - The giant garter snake inhabits small mammal burrows and other soil crevices above prevailing flood elevations throughout its winter dormancy period (i.e., November to mid-March). Giant garter snakes typically select burrows with sunny exposure along south and west facing slopes. Giant garter snakes also use burrows as refuge from extreme heat during their active period. The Biological Resources Division (BRD) of the USGS (Wylie et al. 1997) has documented giant garter snakes using burrows in the summer as much as 165 feet (50 meters) away from the marsh edge. Overwintering snakes have been documented using burrows as far as 820 feet (250 meters) from the edge of marsh habitat.

During radio-telemetry studies conducted by the BRD, giant garter snakes typically moved little from day to day. However, total activity varied widely between individuals. Snakes have been documented moving up to 5 miles (8 kilometers) over the period of a few days (Wylie et al. 1997). In agricultural areas, giant garter snakes were documented using rice fields during 19 to 20 percent of the observations, marsh habitat during 20 to 23 percent of observations, and canal and agricultural waterway habitats during 50 to 56 percent of the observations (Wylie et al. 1997). Within canal and agricultural waterway habitats, giant garter snakes are likely to prefer drainage rather than delivery canals, because drainage canals are often less heavily maintained and are allowed to become vegetated.

Historic and Current Distribution: Fitch (1940) described the historical range of the species as extending from the vicinity of Sacramento and Contra Costa Counties southward to Buena Vista Lake, near Bakersfield, in Kern County. Prior to 1970, the giant garter snake was recorded historically from 17 localities (Hansen and Brode 1980). Five of these localities were clustered in and around Los Banos in Merced County, and the paucity of information makes it difficult to determine precisely the species' former range. Nonetheless, these records coincide with the historical distribution of large flood basins, fresh water marshes, and tributary streams. Reclamation of wetlands for agriculture and other purposes apparently extirpated the species from the southern one-third of its range by the 1940's to 1950's, including the former Buena Vista Lake and Kern Lake in Kern County, and the historic Tulare Lake and other wetlands in Kings and Tulare Counties

(Hansen and Brode 1980, Hansen 1980). Surveys over the last two decades have located the giant garter snake as far north as the Butte Basin in the Sacramento Valley.

As recently as the 1970's, the range of the giant garter snake extended from near Burrel, Fresno County (Hansen and Brode 1980), northward to the vicinity of Chico, Butte County (Rossman and Stewart 1987). California Department of Fish and Game (CDFG) studies (Hansen 1988) indicate that giant garter snake populations currently are distributed in portions of the rice production zones of Sacramento, Sutter, Butte, Colusa, and Glenn Counties; along the western border of the Yolo Bypass in Yolo County; and along the eastern fringes of the Sacramento-San Joaquin River delta from the Laguna Creek-Elk Grove region of central Sacramento County southward to the Stockton area of San Joaquin County. This distribution largely corresponds with agricultural land uses throughout the Central Valley.

Current baseline of the species - Surveys over the last two decades have located the giant garter snake as far north as the Butte Basin in the Sacramento Valley. Currently, the Service recognizes 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records (58 FR 54053). The 13 extant populational clusters largely coincide with historical riverine flood basins and tributary streams throughout the Central Valley (Hansen 1980, Brode and Hansen 1992): (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, (10) East Stockton--Diverting Canal and Duck Creek, (11) North and South Grasslands, (12) Mendota, and (13) Burrel/Lanare. These populations span the Central Valley from just southwest of Fresno (i.e., Burrel-Lanare) north to Chico (i.e., Hamilton Slough). The 11 counties where the giant garter snake is still presumed to occur are: Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo.

Based on current BRD studies (Wylie et.al 1997), the four largest populations of giant garter snake are the American Basin, the Colusa Basin, the Sutter Basin, and the Badger Creek-Willow Creek area. With the exception of the American Basin, these populations are largely protected from many of the threats to the species. The remaining nine population clusters identified in the final rule are distributed discontinuously in small isolated patches and are vulnerable to extirpation by stochastic environmental, demographic, and genetic processes. All 13 population clusters are isolated from each other with no protected dispersal corridors. Opportunities for recolonization of small populations which may become extirpated are unlikely given the isolation from larger populations and lack of dispersal corridors between them.

Reasons for Decline and Threats to Survival: The current distribution and abundance of the giant garter snake is much reduced from former times. Agricultural and flood control activities have extirpated the giant garter snake from the southern one third of its range in

former wetlands associated with the historic Buena Vista, Tulare, and Kern lakebeds. These lakebeds once supported vast expanses of ideal giant garter snake habitat, consisting of cattail and bulrush dominated marshes. Immense tracts of bulrush and cattail floodplain habitat also typified much of the Sacramento Valley historically (Hinds 1952). Prior to reclamation activities beginning in the mid to late 1800's, about 60 percent of the Sacramento Valley was subject to seasonal overflow flooding in broad, shallow flood basins that provided expansive areas of giant garter snake habitat (ibid.). These broad flood basins have since been lost and only a small percentage of extant wetlands currently provide habitat suitable for the giant garter snake. The remaining valley floor wetlands are subject to the cumulative effects of upstream watershed modifications, water storage and diversion projects, as well as urban and agricultural development.

A number of land use practices currently threaten the survival of the giant garter snake throughout the remainder of its range. Ongoing flood control and agricultural practices eliminate or prevent the establishment of habitat characteristics required by giant garter snakes and can fragment and isolate available habitat, prevent dispersal of snakes among habitat units, and adversely affect the availability of the garter snake's food items (Hansen 1988, Brode and Hansen 1992). Livestock grazing along the edges of water sources degrades habitat quality in a number of ways: (1) eating and trampling of aquatic and riparian vegetation needed for cover from predators, (2) changes in plant species composition, (3) trampling of snakes, (4) water pollution, (5) and reduction or elimination of fish and amphibian prey populations.

In many areas, the restriction of suitable habitat to water canals bordered by roadways and levee tops renders giant garter snakes vulnerable to vehicular mortality. Fluctuation in rice and agricultural production affects stability and availability of habitat. Recreational activities, such as fishing, may disturb snakes and disrupt basking and foraging activities. Non-native predators, including introduced predatory gamefish, bullfrogs, and domestic cats also threaten giant garter snake populations. While large areas of seemingly suitable giant garter snake habitat exist in the form of duck clubs and waterfowl management areas, water management of these areas typically does not provide summer water needed by giant garter snakes. Although giant garter snakes on NWRs are relatively protected from many of the threats to the species, water quality continues to be a threat to the species both on and off refuges. Because the range of the giant garter snake occurs entirely within the Central Valley of California, this species is at risk of exposure to numerous contaminants due to run-off from agricultural, urban, and industrial/mining projects which are prevalent throughout the area.

Although some giant garter snake populations have persisted at low levels in artificial wetlands associated with agricultural and flood control activities, many of these altered wetlands are now threatened with urban development. Cities within the current range of the giant garter snake that are rapidly expanding include: (1) Chico, (2) Yuba City, (3) Sacramento, (4) Galt, (5) Stockton, (6) Gustine, and (7) Los Banos.

Giant garter snakes seek refuge in habitat at higher elevations where they retreat during the winter dormancy period. Commercial development, agricultural conversion, and levee maintenance along the edges of wetlands have eliminated much of the retreat habitat, forcing giant garter snakes to overwinter in flood-prone (streamside) levee slopes. Most of all giant garter snake populations are vulnerable to adverse affects from flooding. A 100-year flood event represents a threat that could extirpate all remaining populations. Many areas, such as in the rice production districts of the Sacramento Valley, flood more frequently, even during winters with normal levels of rainfall. These flooding events may account, at least in part, for the apparent absence of the giant garter snake in many rice production districts.

The Conveyance Project construction sites include both aquatic and low elevation upland areas on levees that will be temporarily or permanently disturbed. Surveys for the giant garter snake have not been conducted at the project sites. However, site visits by CH2M HILL biologists were conducted in the summer of 1998. Suitable habitat of varying quality for the species exists at all sites. Information on the type and estimated amounts of giant garter snake habitat is included in the Description of the Proposed Action and Project Footprint sections in the Biological Assessment. This biological opinion assumes that the giant garter snake is present in suitable habitat within areas affected by project construction.

All construction site locations provide aquatic habitat that could be occupied by the species during its active period from May 1 through October 1, as well as low to higher elevation upland habitat that could be occupied by the snake during its dormancy period from October 2 through April 30.

Known populations of giant garter snake occur throughout the project area. Giant garter snake populations currently are known to occur at the Sacramento and Colusa NWRs, and sightings have occurred on the Delevan NWR and the Gray Lodge WMA. Snakes also could occupy existing conveyance facilities that provide water to these locations. The GCID Main Canal falls within the Colusa Basin subpopulation of giant garter snake, while conveyance facilities for Gray Lodge WMA are within the Butte Basin subpopulation, and conveyance facilities for Sutter NWR are within the Sutter Buttes subpopulation.

Effects of the Proposed Action

The permanent loss and temporary disturbance of giant garter snake habitat expected to result from the Conveyance Project are quantified in Table 2 on the following page. Construction activities may remove vegetative cover and basking sites necessary for thermoregulation, fill or crush burrows or crevices, and remove prey base. Because giant garter snakes use small mammal burrows and crevices as retreat sites, snakes may be crushed, buried, or otherwise injured from construction activities. Snakes may be run over by construction equipment or other vehicles accessing the construction sites. The

disturbance from construction activities may also cause giant garter snakes to move into areas of unsuitable habitat where they will experience greater risk of predation or other sources of mortality. Silting, fill, or spill of oil or other chemicals could cause loss of prey items on or downstream of the project sites.

For the major structural modifications, effects will be minimized by limiting construction to the period between October 2 and April 30, when snakes are active and better able to avoid areas of habitat disturbance. In addition, work crews will receive environmental awareness training. For the minor structural modifications, which must disturb potential habitat for dormant snakes during their dormant period, effects will be minimized by having all excavation monitored by a qualified Service-approved biologist who can halt construction if a snake is encountered.

All habitat to be temporarily impacted through the Conveyance Project will be restored, and permanent impacts will be offset through habitat preservation, in accordance with the *Mitigation Criteria for Restoration and/or Replacement of Giant Garter Snake Habitat* (attached).

Table 2. Maximum Impact to Giant Garter Snake Habitat for the Conveyance Project[1]

	Permanent upland loss	Temporary upland loss	Permanent aquatic loss	Temporary aquatic loss
delivery setbacks (41 sites)	41 x 0.04 = 1.64 acres	0	41 x 0.01 = 0.41 acre	0
Flapgate removal, siphon (23 sites)	0	23 x 0.04 = 0.92 acre	0	23 x 0.23 = 5.29 acres
Demolish and remove (5 sites)	0	5 x 0.20 = 1.0 acre	0	0
Rip-rap, wing-wall extn. (8 sites)	8 x 0.02 = 0.16 acre	8 x 0.07 = 0.56 acre	0	0
TOTAL MINOR MODIFICATIONS	1.80 acres	2.48 acres	0.41 acre	5.29 acres
Bondurant Slough	0.10 acre	1.4 acres	0	2.0 acres

[1]These numbers could overestimate the amount of disturbance by as much as 100% and will be refined as design proceeds and provided to the Service in Appendage Letters prior to construction.

Willows South Drain	0.0	3.1 acres	0	11.4 acres [2]
Hunter's Ck Siphon	0.10 acre	0.80 acre	0.2 acre	0.90 acre
Lateral 41-1 Extension	2.2 acres	1.4 acres	5.2 acres	6.0 acres
other 25 major modifications	24.5 acres	0	29.5 acres	0
TOTAL MAJOR MODIFICATIONS	26.9 acres	6.7 acres	34.9 acres	20.0 acres
TOTAL	28.7 acres	9.18 acres	35.31 acres	25.29 acres

Growth-inducing impacts of the project were addressed in the Environmental Assessment (CH2M Hill 1997 a and b) and include impacts by which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Construction activities associated with the project would result in some economic activity in the form of temporary demand for building materials, temporary demand for labor and a limited degree of temporary lodging. This short-term economic activity will not result in growth-inducing impacts or associated indirect effects.

A number of ongoing actions could result in interrelated and interdependent effects with conveyance of refuge water supply. In particular, the effects of taking water from the source from which it is acquired water for refuges is being addressed in the programmatic biological opinion for the Central Valley Project Improvement Act. Additionally, refuge activities that are expected to result from the availability of additional refuge water supply are to be addressed in separate biological opinions on refuge long-term maintenance and operations and refuge conveyance facilities.

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 action 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 permitting processes and may alter the habitat or increase incidental take of giant garter snakes, and are, therefore, cumulative to the proposed project. These additional cumulative effects include: unpredictable fluctuations in aquatic

[2] A portion of this impact would involve temporary removal of cattail marsh, while the remainder would involve conversion of rice fields (treated as aquatic habitat) to cattail marsh.

habitat due to water management; dredging and clearing vegetation from irrigation canals; discing or mowing upland habitat; increased vehicular traffic on access roads adjacent to aquatic habitat; use of burrow fumigants on levees and other potential upland refugia; and human intrusion into habitat. Specific cumulative effects related to the proposed action include canal maintenance activities, which degrade or destroy habitat or cause unpredictable fluctuations in habitat, and market-driven fluctuations in acres of rice cultivation that may reduce available habitat for giant garter snake.

Conclusion

After reviewing the current status of the giant garter snake, the environmental baseline for the action area, the effects of the proposed Conveyance Project and the cumulative effects, it is the Service's biological opinion that the Conveyance Project, as proposed, is not likely to jeopardize the continued existence of the giant garter snake, and is not likely to destroy or adversely modify designated critical habitat. No critical habitat has been designated for this species, therefore, none will be affected.

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.

The measures described below for the giant garter snake are non-discretionary, and must be implemented by Reclamation 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. Reclamation has a continuing duty to regulate the activity covered by this incidental take statement. If Reclamation (1) fails to adhere to the terms and conditions of the incidental take statement, 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

The Service anticipates that incidental take of giant garter snakes will occur. Giant garter snakes are secretive, and individual snakes are difficult to detect unless they are observed at a distance, undisturbed. Close-range observations are usually chance encounters, and are difficult to predict. It is therefore difficult to accurately estimate the number of snakes that will be harassed, harmed, or killed during construction activities. In instances where take is difficult to detect, the Service estimates take in terms of the amount of habitat lost as a result of the action. The Service anticipates that the number of snakes occupying up to 64.01 acres of permanently lost habitat (28.7 acres upland and 35.31 acres aquatic), and the number that occupy up to 34.47 acres of temporarily disturbed habitat (9.18 acres upland and 25.29 acres aquatic), may harassed, harmed, or killed during construction in that habitat.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize incidental take of giant garter snakes.

1. Take of giant garter snakes during construction activities shall be minimized (refer also to the attached *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake Habitat.*)

2. Temporary and permanent loss of giant garter snake habitat shall be minimized. Temporarily disturbed habitat shall be restored to a level of quality that is equal to, or greater than, the pre-project condition. Permanent loss shall be compensated through habitat preservation at a 3:1 replacement ratio.

Terms and Conditions

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

1. The following terms and conditions implement reasonable and prudent measure number one, to minimize take of giant garter snakes during construction activities:

a. For the major structural modification, all construction activity within giant garter snake habitat shall be conducted between May 1 and October 1. This is the active period for giant garter snakes and direct impacts are lessened, because snakes are actively moving and avoiding danger. More danger is posed to snakes during their inactive period, because they are occupying underground burrows or crevices and are more susceptible to direct effects, especially during excavation. Between October 2 and April 30, contact the SFWO to determine if additional measures are necessary to minimize and avoid take. The minor structural modifications can take place between October 2 and April 30, when necessary, if a Service-approved biologist is present on-site to detect any snakes within the impact area and, if giant garter snakes are encountered, to stop construction until the Service is contacted and advises Reclamation on how to proceed.

b. Any dewatered habitat must remain dry for at least 15 consecutive days prior to excavating or filling of the dewatered habitat.

c. Construction personnel shall participate in a Service-approved worker environmental awareness program. Under this program, workers shall be informed about the presence of giant garter snakes and habitat associated with the species and that unlawful take of the animal or destruction of its habitat is a violation of the Act. Prior to construction activities, a qualified biologist approved by the Service shall instruct all construction personnel about (1) the life history of the giant garter snake; (2) the importance of irrigation canals, marshes/wetlands, and seasonally flooded areas, such as rice fields, to the giant garter snake; (3) the terms and conditions of the biological opinion. Proof of this instruction shall be submitted to the SFWO within two weeks after construction has commenced at each site.

d. Within 24 hours prior to commencement of construction activities, the site shall be inspected by a qualified biologist who is approved by the Service's SFWO. The biologist shall provide the Service with a field report form documenting the monitoring efforts within 24 hours of commencement of construction activities. The monitoring biologist must be available thereafter during construction; if a snake is encountered during construction activities, the monitoring biologist shall have the authority to stop construction activities until appropriate corrective measures have been completed or it is determined that the snake will not be harmed. Giant garter snakes encountered during construction activities should be allowed to move away from construction activities on their own. Capture and relocation of trapped or injured individuals can only be pursuant to section 10(a)1(A) of the Act. The biologist shall be required to report any incidental take to the Service immediately be telephone at (916) 979-2125 and by written letter addressed to the Chief, Endangered Species Division,

within one working day. The project area shall be re-inspected whenever a lapse in construction activity of two weeks or greater has occurred.

e. Movement of heavy equipment to and from each construction site shall be restricted to established roadways to minimize habitat disturbance.

f. Clearing of wetland vegetation will be confined to the minimal area necessary to excavate toe of bank for riprap or fill placement. Any channel excavation in toe drains shall be accomplished by using equipment located on and operated from the top of the bank, with the least interference practical for emergent vegetation.

2. The following terms and conditions implement reasonable and prudent measure number two, to (a) minimize temporary giant garter snake habitat loss; (b) restore habitat to a level of quality that is equal to, or greater than, the pre-project condition; and (c) offset permanent habitat loss through habitat preservation at a 3:1 ratio.

a. Habitat disturbance shall be confined to the minimal area necessary for completing each activity associated with the Conveyance Project. When construction has been completed at each site, the exact acreage of temporary and permanent habitat loss shall be quantified and reported to the Service at the SFWO.

b. After completion of construction activities, any temporary fill and construction debris shall be removed and any temporarily disturbed areas shall be restored in a manner consistent with the attached *Mitigation Criteria for Restoration and/or Replacement of Giant Garter Snake Habitat*.

c. Permanent habitat loss shall be compensated at a 3:1 ratio and meet the criteria listed in the attached *Mitigation Criteria for Restoration and/or Replacement of Giant Garter Snake Habitat*. The preserved habitat shall include both upland and aquatic habitat components, at a ratio of 2 acres upland habitat to each acre of aquatic habitat. The site to be preserved for mitigation shall be subject to Service approval. On-site habitat creation can be counted toward the mitigation requirement, at the Service's discretion, if it can be demonstrated that the habitat will be successfully created, will have long-term value for the giant garter snake, and will be preserved in perpetuity.

d. All aquatic and upland mitigation areas provided for the giant garter snake shall be protected in perpetuity by a Service-approved conservation easement or similarly protective covenants in the deed. The conservation

easement shall be recorded at the county recording office prior to any ground breaking for major modifications. The minor structural modifications may proceed prior to recordation of a conservation easement, but the entire preservation acreage for mitigation of all minor and major structural modifications must be in place, with recorded conservation easement, prior to any ground breaking associated with any of the 29 major structural modifications. The easement/deed shall be provided to the Service within 30 days after recordation. Standard examples of deed restrictions and conservation easements are available from the Service upon request.

Reporting Requirements

The Service-approved monitoring biologist shall notify the Service immediately if giant garter snakes are found on site as detailed in term and condition 1D, and will submit a report including date(s), location(s), habitat description, and any corrective measures taken to protect the snake(s) found. The Service-approved biologist shall submit locality information to CDFG, using completed California Native Species Field Survey Forms or their equivalent, no more than 90 calendar days after completing the last field visit of the project site. Each form shall have an accompanying map of the site such as a photocopy of a portion of the appropriate 7.5 minute U.S. Geological Survey map and shall provide at least the following information: township, range, and quarter section; name of the 7.5' or 15' quadrangle, dates (day, month, year) of field work; number of individuals and life stage (where appropriate) encountered; and a description of the habitat by community-vegetation type.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of ESA 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. As a Recovery Plan for the giant garter snake is developed, the Reclamation should assist the Service in its implementation.

2. Reclamation should incorporate into bidding documents the attached *Standard Avoidance and Minimization Measures for Construction Activities in Giant Garter Snake Habitat* when appropriate.

3. Reclamation, in partnership with the Service, should develop maintenance guidelines for Reclamation projects that will reduce adverse effects of routine maintenance on giant garter snakes and their habitat. Such actions may contribute to the delisting and recovery of the giant garter snake by preventing degradation of existing habitat and increasing the amount and stability of suitable habitat.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting 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 action(s) outlined in the (request or reinitiation request). 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.

If you have any questions regarding this biological opinion, please contact Ellen Berryman or Jan Knight of my staff at (916) 979-2120.

Sincerely,

for Wayne S. White
Field Supervisor

Attachments

cc: BOR, Mona Jefferies-Soniea
CDFG, Region 2, Rancho Cordova, Jerry Mensch
CH2M Hill, Kathy Freas

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Table 5
Estimates of Permanent Upland and Aquatic Habitat Loss and Creation for 25 Other West and East Sacramento Valley Areas Project Site Without Design Documents

Site Description and Location (Figure and Site Number)	Refuge or WMA Served/ USGS Quad	Existing Habitat for Giant Garter Snake	Maximum Acreage Permanent Loss Upland/Aquatic	Maximum Acreage Permanent Created Upland/Aquatic
Install flow measurement device. Fig. 1, No.5	Sacramento NWR/Logandale	Moderate quality aquatic and upland	0.5/0.5	0.0/0.0
Install new turnout. Fig. 1, No. 6	Sacramento NWR/Logandale	Good quality aquatic and upland. Known snake population present.	0.5/0.5	0.0/0.0
Install flow measurement device. Fig.1, No.7	Delevan NWR/Moulton Weir	Good quality aquatic and upland. Known snake population present in this NWR	0.5/0.5	0.0/0.0
Install flow measurement device. Fig. 1, No. 8	Colusa NWR/Colusa	Moderate quality aquatic (no water present in August 98) and upland. Known snake population present in this NWR.	0.5/0.5	0.0/0.0
Enlarge culvert under Ware Rd. Fig. 1, No. 9	Colusa NWR/Arbuckle	Moderate quality aquatic and upland. Known snake population present in this NWR.	0.05/0.05	0.0/0.0
Enlarge Nugent Flume. Fig. 2, No.1	Gray Lodge WMA/Biggs	Low to moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge Garcia Siphon. Fig. 2, No. 2	Gray Lodge WMA/Biggs	Low to moderate quality aquatic and upland	0.5/0.5	0.0/0.0
Enlarge Razorback Siphon. Fig. 2, No. 3	Gray Lodge WMA/ Biggs	Low to moderate quality aquatic and upland	0.5/0.5	0.0/0.0
Enlarge Colusa Hwy Culvert Fig. 2, No. 4	Gray Lodge WMA/Gridley	Low to moderate quality aquatic and upland	0.5/0.5	0.0/0.0
Replace Schwind Pump Station. Fig. 2, No. 5	Gray Lodge WMA/ Pennington	Low to moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Install/enlarge water delivery point. Fig 2., No. 6	Gray Lodge WMA/ Pennington	Low to moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Install/enlarge water delivery point on Cassidy Lateral. Fig.2, No. 7	Gray Lodge WMA/ Pennington	Moderate to good quality aquatic and upland	0.5/0.5	0.0/0.0
Install/enlarge water delivery point on Jakey Lateral. Fig. 2, No. 8	Gray Lodge WMA/ Pennington	Moderate to good quality aquatic and upland	0.5/0.5	0.0/0.0

Table 5

Estimates of Permanent Upland and Aquatic Habitat Loss and Creation for 25 Other West and East Sacramento Valley Areas Project Site Without Design Documents

Site Description and Location (Figure and Site Number)	Refuge or WMA Served/ USGS Quad	Existing Habitat for Giant Garter Snake	Maximum Acreage Permanent Loss Upland/Aquatic	Maximum Acreage Permanent Created Upland/Aquatic
Increase Sunset Pumping Station Capacity. Fig 3. No. 9	Sutter NWR/ Sutter	Low to moderate quality aquatic and upland	0.5/0.5	0.0/0.0
Enlarge Sanders Road culvert. Fig. 3, No. 10	Sutter NWR/ Sutter	Moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Install Sand Creek Siphon. Fig. 3, No. 11	Sutter NWR/ Sutter	Moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge Butte House Road siphon. Fig. 3, No. 12	Sutter NWR/ Sutter	Moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge siphon at Humphrey and South Butte. Fig.3, No. 13	Sutter NWR/ Sutter	Moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge siphon at abandoned RR. Fig. 3, No. 14	Sutter NWR/ Sutter	Moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge Hwy 20 siphon. Fig 3, No. 15	Sutter NWR/ Sutter	Low to moderate quality aquatic and upland	2.0/2.0	0.0/0.0
Enlarge Humphrey Road siphon D/S of Hwy 20 culvert. Fig. 3, No.16	Sutter NWR/ Sutter	Moderate to good quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge Franklin Clements siphon. Fig 3. No. 17	Sutter NWR/ Sutter	Low to moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge Lincoln Road siphon. Fig 3. No. 18	Sutter NWR/ Gilsizer Slough	Moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Install refuge supply pipeline along McClatchy Road to Sutter Bypass. Fig. 3, No. 19	Sutter NWR/ Tisdale Weir	Moderate to good quality aquatic and upland. Dense *Ludwigia* present along approx 150 feet of existing drain	4.0/9.0 including approx. 0.09 acres *Ludwigia*	0.0/0.0
Install siphon to Sutter NWR	Sutter NWR/ Tisdale Weir	Low to moderate quality aquatic and upland	2.0/2.0	0.0/0.0
Install toe drains along Farrington Lateral Sutter. Figure 3, shaded labeled area	Sutter NWR/ aquatic and upland	Moderate quality	0.0/0.0	0.0/2.5
Total			24.5/29.5	0.0/2.5

APPENDIX B

Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake Habitat

GIANT GARTER SNAKE
(*Thamnophis gigas*)

HABITAT TYPE:

Marshes, sloughs, ponds, small lakes, low gradient streams, irrigation and drainage canals, and rice fields. Permanent aquatic habitat, or seasonally flooded during the snake's active season (early-spring through mid-fall), with herbaceous wetland vegetation, such as cattails and bulrushes, grassy banks (often salt grass), and uplands for cover and retreat sites during the snake's active season and for refuge from flood waters during the dormant season (winter). Giant garter snakes are typically absent from larger rivers and other water bodies that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates. Riparian woodlands typically do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of giant garter snake prey.

AVOIDANCE AND MINIMIZATION MEASURES:

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.

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.

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.

Construction personnel should receive Service-approved worker environmental awareness training. This training instructs workers to recognize giant garter snakes and their habitat(s).

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) 979-2725.

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.

After completion of construction activities, remove any temporary fill and construction debris and, wherever feasible, restore disturbed areas to pre-project conditions. Restoration work may include such activities as replanting species removed from banks or replanting emergent vegetation in the active channel.

Compensate loss and disturbance of giant garter snake habitat according to Table 1. Mitigation ratios are based on the acreage and on the duration of disturbance.

TABLE 1 - SUMMARY OF GIANT GARTER SNAKE PROGRAMMATIC MITIGATION LEVELS

	IMPACTS: DURATION	IMPACTS: ACRES	MITIGATION: COMPENSATION
LEVEL 1	1 season	Less than 20 and temporary	Restoration
LEVEL 2	2 seasons	Less than 20 and temporary	Restoration plus 1:1 replacement
LEVEL 3	More than 2 seasons and temporary Permanent loss	Less than 20 and temporary Less than 3 acres total giant garter snake habitat AND Less than 1 acre aquatic habitat; OR Less than 218 linear feet bank habitat	3:1 Replacement (or restoration plus 2:1 replacement) 3:1 Replacement

Giant garter snake habitat includes 2.0 acres of surrounding upland habitat for every 1.0 acre of aquatic habitat. The 2.0 acres of upland habitat also may be defined as 218 linear feet of bankside habitat which incorporates adjacent uplands to a width of 200

feet from the edge of each bank. Each acre of created aquatic habitat should be supported by two acres of surrounding upland habitat. Compensation may include creating upland refuges and hibernacula for the giant garter snake that are above the 100-year flood plain.

A season is defined as the calendar year period between May 1 and October 1, the active period for giant garter snake when mortality is less likely to occur.

Information to Include in a Project Monitoring Report for Giant Garter Snake

1. Date

2. Surveyor

3. Project information (should include the following):
    a. Project name
    b. Location
    c. Project impacts and acres impacted

4. Survey information (should include the following):
    a. Time of day
    b. Temperature at start and end of survey. Include ambient temperature, temperature at ground level, and at approximately 3 inches above ground level.
    c. Weather conditions (include wind conditions and cloud cover)
    d. Acres/area surveyed

5. Site description (may include the following):
    a. Habitat types present, substrate/soils, etc.
    b. Topography/elevation
    c. Surrounding land-use/activity
    d. Description of project features

6. Habitat characteristics:
    a. Burrows/potential hibernacula present? (Y/N)
    b. Amount and type of cover present, including upland and emergent vegetation
    c. Prey species present? (Y/N)
    d. Distance to nearest available habitat
    e. Other species observed

7. Giant garter snakes present? (Y/N) If observed provide the following information:
    a. Number of individuals, and if possible to determine, whether juveniles or adults
    b. Location(s)
    c. Describe behavior and activity
    d. Describe protective measures implemented

8. Describe on site mitigation and avoidance measures implemented (fencing, dewatering, worker awareness training, etc.). Include any difficulties implementing measures and corrective measures taken.

Report all sightings to the US Fish and Wildlife Service, Sacramento Fish and Wildlife Office at (916) 979-2725, and to the California Department of Fish and Game (CDFG). The monitoring biologist must submit all sightings to CDFG Natural Diversity Data Base (NDDB) using a California Native Species Field Survey Form and provide copies to CDFG and the Service.

APPENDIX C

Mitigation Recommendations for Restoration and/or Replacement of Giant Garter Snake Habitat

Replacement and Restoration Guidelines are provided together, as the two types of mitigation 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 mitigation 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) 979-2725.

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 the levee slopes should be hydroseeded to prevent erosion. The Service recommends a mix of 20-40 percent native grass seeds [such as annual fescue (*Vulpia* spp.), California brome (*Bromus carinatus*), wild rye (*Elymus glaucus*), and needle grass (*Nasella* spp.)], 2-10 percent native forb seeds, five percent rose clover (*Trifolium hirtum*), and 5percent 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* ssp.), 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. One-hundred percent native grass and forb mixes may also be used.

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 *Ameirus* 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 of mitigation areas

Habitat restoration

Restoration of habitat should be monitored for one year from implementation of restoration. 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 from implementation of mitigation. Hydrology of the mitigation area 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 the mitigation implementation should be submitted to the Service: (1) upon completion of wetland creation; (2) yearly for the first two years of monitoring; (3) 5 years from implementation of mitigation. 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 mitigation area should be 90 percent of cover measured on the reference site.

2. At completion of monitoring, the species composition measured on the mitigation area should be 90 percent of that measured on the reference site.

3. At completion of monitoring, wetlands created on the mitigation 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 prefered 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 uplands, orchards on uplands, OHV use, and combining with riparian mitigation sites which require dense cover or SRA habitat.