



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In reply refer to:
81420-2008-F-0868-4

SEP 23 2009

Mr. Stephen Tuggle
Western Area Power Administration
Sierra Nevada Customer Service Region
114 Parkshore Drive
Folsom, California 95630-4710

Subject: Biological Opinion on the Sacramento Area Voltage Support Project, Sutter,
Sacramento, and Placer Counties, California

Dear Mr. Tuggle:

This letter acknowledges the U.S. Fish and Wildlife Service's (Service) receipt of Western Area Power Administration's (Western) January 22, 2009, letter requesting initiation of formal section 7 consultation under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act) for the Sacramento Area Voltage Support Project (proposed project) in Sutter, Sacramento, and Placer counties. Your request was received by the Service on January 26, 2009. The consultation concerns the possible effects of the proposed project on the federally-listed as endangered vernal pool tadpole shrimp (*Lepidurus packardii*), the threatened vernal pool fairy shrimp (*Branchinecta lynchi*) (collectively referred to as vernal pool crustaceans), the threatened giant garter snake (*Thamnophis gigas*) (snake), the threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle), the threatened California tiger salamander (*Ambystoma californiense*) (salamander), the threatened California red-legged frog (*Rana aurora draytonii*) (frog), and the threatened delta smelt (*Hypomesus transpacificus*). You requested concurrence with no effect for the frog and the delta smelt, not likely to adversely affect for the beetle and the salamander, and likely to adversely effect for the vernal pool crustaceans and the snake. Critical habitat has been designated for the vernal pool crustaceans, the beetle, the salamander, the frog, and the delta smelt. However, no critical habitat has been designated within the action area for the proposed project; therefore, none will be affected.

Below is our response to each of your concerns in your September 8, 2009, comments on the draft biological opinion for the proposed project:

TAKE PRIDE
IN AMERICA 

1. The timeline of the project has been updated.
2. The timeline of the project has been updated.
3. This issue has been addressed with U.S. Army Corps of Engineers. This biological opinion satisfies the Corps' requirements under the section 7 of the Act, however, incidental take is being issued to Western and is not extended to the Corps.
4. For work within the Natomas Basin Habitat Conservation Plan (NBHCP) permit area, the biological opinion requires that Western be in compliance with the NBHCP, but does not specify where compensation is to occur.
5. The acreages of effects to giant garter snake habitat have not been changed from the draft biological opinion. Western may compensate for the additional acreage with the NBHCP, but incidental take coverage is only for the areas specified in this biological opinion.
6. These acreages have been updated.
7. The length of the project has been corrected.
8. This clarification has been made.
9. The length of the project has been corrected.
10. Number four Term and Condition is related to incidental take due to the project. The third paragraph of the Reporting Requirements is related to take not covered by this biological opinion. Reports of two types of take are reported to different people.
11. The fourth paragraph of the Reporting Requirements has been removed because this consultation does not cover routine operations and maintenance activities.
12. The Service confirms that compensation in excess of what is necessary for the project may be applied to future projects. A note has been added to the administrative record for this project.

The findings and recommendations in this consultation are based on: (1) the January 22, 2009, *Biological Assessment for Western Area Power Administration's Sacramento Voltage Support Project*, submitted by Western; (2) the April 6, 2009, updated and resubmitted biological assessment; (3) various meetings, phone conversations, e-mails, and a site visit to the proposed project site; and (4) other information available to the Service.

The Service concurs that the proposed project will have no effect on the frog and the delta smelt based on the project site being outside of the current range of these species. The Service concurs that the proposed project is not likely to adversely affect the salamander and the beetle based on the proposed measures outlined below under conservation measures.

The Service concurs that the proposed project is likely to adversely affect the vernal pool crustaceans and the snake; therefore, this document represents the Service's biological opinion on the effects of the proposed project on the vernal pool crustaceans and the snake, in accordance with the Act.

Consultation History

June 27, 2006	Western notified the Service of the project and requested a list of endangered, threatened, proposed, and candidate species and designated critical habitat.
January 3, 2008	Western accessed the Service's website to verify the list of species and critical habitat for consultation.
February 28, 2008	The Service, Western, California Department of Fish and Game (CDFG) met to discuss the project and clarify responsibilities.
July 8, 2008	Western submitted a draft biological assessment to the Service.
August 28, 2008	The Service emailed comments to Western regarding the first draft of the biological assessment.
October 28, 2008	The Service and Western met to discuss the comments and compensation.
December 1, 2008	Western emailed a second draft of the biological assessment to the Service.
December 11, 2008	The Service, Western, CDFG, Westervelt, Wildlands, and The Natomas Basin Conservancy (TNBC) met to discuss project impacts.
January 26, 2009	Western submitted the biological assessment and requested formal consultation.
February 6, 2009	The Service sent an additional information request to Western.
February 19, 2009	The Service and Western met to discuss the additional information request.
March 12, 2009	The Service and Western met to finalize the approach on how to assess impacts to giant garter snake.
March 17, 2009	The Service and Western visited the site including the mitigation banks, Natomas Basin, and other sites along the proposed line.
April 7, 2009	The Service received a revised biological assessment for the project from Western.
April 16, 2009	The Service requested additional information and clarification on the project description, the amount of effects, and avoidance and minimization measures.

- May 18, 2009 Western submitted revised effects and avoidance and minimization measures to the Service.
- May 27, 2009 The Service requested clarification on the amount of effects and compensation.
- May 29, 2009 Western provided additional information on the amount of effects and compensation.
- June 1, 2009 The Service request clarification on the amount of effects to banks.
- June 8, 2009 Western clarified the location and amount of effects to banks.

BIOLOGICAL OPINION

Description of the Proposed Action

Western's Sierra Nevada Customer Service Region, in collaboration and coordination with the Sacramento Municipal Utility District (SMUD), and the City of Roseville, proposes to build a new 230-kilovolt (kV) transmission line from its O'Banion Substation in Sutter County, California to SMUD's Natomas Substation in Sacramento County, California. This transmission line will increase the reliability of high-power transmission in the Sacramento area.

A 2001-2002 transmission system study concluded that the system's existing transmission lines were reaching their maximum power transfer limits; therefore, transmission system additions and upgrades are necessary to maintain power system voltage, reliability, and security. The proposed transmission line will extend from Western's O'Banion Substation, pass through SMUD's Elverta Substation, and terminate at SMUD's Natomas Substation. The project will take place in Sutter, Sacramento, and Placer counties. The project has three phases:

- Phase 1 runs between SMUD's Elverta and Natomas Substations. This phase includes installation of fiber-optic ground wire on existing towers in the Natomas Basin on SMUD's existing Elverta to Natomas line. The timeline for Phase 1 is approximately 88 days starting in late October 2009 and ending in January 2010.
- Phase 2 is work at Western's O'Banion Substation including installation of two new terminal bays, six new 230-kV circuit breakers, associated revenue metering, and telecommunications additions. Electrical reconfiguration would also take place, changing from a ring-bus to a breaker and a ½ configuration, which will result in improved reliability and operability of the transmission lines. All work will be done within the existing substation footprint and will require approximately 176 days to complete, starting in November 2009 and ending in August 2010.

- Phase 3 extends between Western's O'Banion Substation and SMUD's Natomas Substation. This phase consists of one row of double-circuit monopoles starting from the O'Banion Substation, through SMUD's Elverta Substation, where one circuit terminates while the other circuit continues south to SMUD's Natomas Substation. This phase requires approximately 25 miles of new, double-circuit, 230-kV transmission line on single steel poles between Western's O'Banion Substation and an area 1.5 miles north of SMUD's Elverta Substation. New right of way (ROW) will need to be acquired for the O'Banion to Elverta segment. The 1.5-mile portion north of Elverta currently has two rows of steel lattice structures, within an existing ROW, that will be removed and replaced with two rows of monopoles. Additionally, this phase requires the construction of an approximately 7-mile double-circuit 230-kV transmission line on single steel pole structures starting from 1.5 miles north of Elverta to Natomas. The remainder of the line from Elverta to Natomas currently has one row of steel lattice structures, which will be removed and replaced with one row of monopoles. The fiber-optic ground wire installed on the existing line during Phase 1 will then be transferred over to the new towers during Phase 3 and the existing towers will be removed. Phase 3 is expected to take 240 days to complete, starting on December 2009 and ending in December 2010.

Construction of the proposed transmission line will involve the following steps:

1. Temporary or permanent access. Western will acquire access from land owners or managers for the proposed project route. Western will install 4 new culverts in order to stabilize roads and allow for continuous access through some areas.
2. Route survey. Western will stake the centerline of the transmission line, the property lines, and the corners, in order to provide accurate ground profiles along the centerline and establish the proposed locations of structures. Existing roads, which may require some improvements, will be used for access to the project site and will also be surveyed. Any work to access roads will be limited to the current prism of the road. An engineer and the construction manager will review the proposed structure locations to ensure the site is a suitable location for a structure and that the structure can be installed at that location. In addition, Western will analyze the proposed design to verify that the line will be structurally sound.
3. Clearing of ROW. Western will clear the ROW for the transmission line, which may require removing trees and shrubs. Clearing is needed to allow appropriate space to erect structures; prepare for safe, efficient installation and tensioning of conductors to provide for the required electrical clearance for energized lines; and to provide safe working conditions for these tasks. Conductor clearance is important to prevent outages that could impact the power grid in a large region, and to prevent the line from being an ignition source for fires. To the extent possible, Western will leave understory plants, shrubs and low-growing bushes or trees in place to reduce erosion and visual impacts, and to preserve habitat. ROW clearing will remove enough vegetation so that return visits to maintain conductor clearances would be required only about every five years.

Western is negotiating with land owners who typically plant rice, for the land owners to berm the areas and not plant rice where poles will be installed to allow for construction within rice fields. The amount of area that will be bermed is unknown at this time, as well as how much rice will be fallowed and when the berms will be removed.

4. Developing staging areas. Staging areas, about 0.25 acre in size, will be located near the route at 2–4 mile intervals. The contractor, rather than Western, will determine the specific location of these so the locations are unknown at this time.
5. Structure assembly and erection. Western will assemble the single pole structures (monopole) at staging areas and deliver them to the location in one or more pieces for erection. A 7- to 10-foot wide, approximately 25-foot deep hole would be augured for the footing. The soil from the holes would be stockpiled nearby. A reinforcing-bar (re-bar) cage will be placed in the hole, concrete would be poured into the hole and bolts would be added. The base of the structure would be bolted to the top of the concrete footing. The stockpiled soil will be placed back in the hole and compacted. Excess dirt would be spread around the base of the structure or hauled to an approved site. The 18 towers that are along the Pleasant Grove Creek Canal will require fill in order for a flat ground surface to be built up around the towers.

Conductors, insulator bells, tensioner, puller, and related equipment and material will be assembled at staging areas. Material and equipment will be delivered by truck from the staging areas. Equipment that will be used for stringing generally includes one rubber-tired 50-ton crane, two 1-ton line trucks, two ¾-ton pickups, two bucket trucks (manlifts) and three tractor trailer rigs (tensioner, puller, and wire truck). A crew of four to six people will be at each structure for clipping. There would be two line trucks and two ¾-ton pickup trucks at the splicing sites.

6. Stringing the lines. A traveler (pulley) will be attached to the bottom of the insulator string and a heavy rope (p-line) would be run through the pulley. The other end of the rope will be attached to the hard-line and the hard-line would be attached to the conductor. The p-line would be run through several miles of structures, attached to a winch that pulls the p-line, hard line, and conductors through the pulleys. Each phase (an alternating current transmission line has three conductors each representing a phase) will be pulled through separately, but all to the same truck. Tensioning is used to keep the conductors from sagging enough to touch the ground or objects underneath the transmission line and at the same time to keep them from being so tight that when they cool, they stress the towers or insulator strings. After pulling and tensioning, Western will lift the conductors out of the pulleys and clip them to the insulators.

Pulling and tensioning sites are required every 2 ½ to 3 miles as well as at most structures having a turn angle of 30 degrees or greater. All pulling and tensioning sites would be aligned with the transmission line in both directions so that the pulling will not be at an angle to the transmission line. Due to this, turning structures may require temporary right-of-entry

from the landowner for an area of 400 feet x 100 feet that would be outside of the ROW. However, if work outside of the ROW is not possible, the pulling and tensioning site could be sited on the opposite side of the tower within the ROW.

The contractor, rather than Western, will determine the specific location of the pulling and tensioning. Although the exact locations are unknown at this time, Western has estimated the locations of the sites and their effects. Western estimates that there will be approximately 19 of these sites throughout the project area, with about 6 of the sites requiring work outside of the ROW for turning structures, including some with effects to listed species.

7. Removal of existing towers. Western will remove the existing towers, which will require the deconstruction of the steel lattice and then the removal of tower footings no greater than 5 feet below the soil. Removal of tower footings involves removing soils up to a 5-foot radius around each footing using a backhoe, breaking up the concrete footing using a backhoe-mounted jackhammer, manual removal of re-bar caging (if present) using a hand-held blowtorch, removal and proper disposal of all debris, backfilling of the holes using the excavated soil, and restoration of the site.
8. Cleanup and restoration of construction areas. Clean-up work will consist of:
 - Western will remove packing crates, reels, shipping material, and all other construction debris and dispose at an approved landfill site;
 - Western will backfill any holes or ruts in access roads, install water bars, and do final grading;
 - Western will restore to pre-construction conditions any work sites, pole sites, staging areas, and other areas of temporary disturbance by removing ruts, leveling, disking, preparing areas for seeding or revegetation, etc. Western will work with the landowner or land managing agency to verify that the restoration work is completed in an acceptable manner. All restoration work will be completed immediately after construction in any one area. Restoration in giant garter snake habitat will occur prior to October 1 when possible;
 - Western will repair gates and fences to their original condition or better;
 - Western will ground fences to prevent electric shock; and
 - Western will contact property owners and process any claims for settlement.

The majority of the project occurs on private property; however, portions of the proposed project will cross three conservation sites for the snake during Phase 3; one owned by Westervelt (the Sutter Basin Conservation Bank) and two owned by Wildlands (the Gilsizer Slough Giant Garter Snake Preserve and the Gilsizer Slough South Giant Garter Snake Conservation Bank). All three conservation sites provide habitat for giant garter snakes that will be affected by this project. Additionally, the proposed project will have effects within the Natomas Basin Habitat Conservation Plan (NBHCP) non-permitted and permitted area to giant garter snakes and vernal pool crustaceans. Take of the vernal pool crustaceans and the snake as a result of impacts in the NBHCP permitted and non-permitted areas is included in this biological opinion. Western will abide by all terms and conditions of the NBHCP and coordinate with the permittees (the City of

Sacramento and Sutter County) to assure appropriate compensation is provided for effects within the permit area.

The U.S. Army Corps of Engineers has jurisdiction over the portion of the project that involves wetlands and Waters of the United States for the purposes of permitting under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act. This biological opinion addresses the incidental take of federally-listed species that will result from this project, and therefore, satisfies the Corps' requirement to consult with the Service under section 7 of the Act for their issuance of a permit.

Conservation Measures

The conservation measures as proposed below are considered part of the proposed action 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 re-initiation of consultation with the Service, as set forth in the final paragraphs of this biological opinion.

Western has proposed the following compensation to minimize effects to vernal pool crustaceans and the snake. The compensation is based on the amount of vernal pool crustacean habitat (13.181 acres) and snake habitat (199.606 acres) that will be affected, how the habitat will be affected, and when the habitat will be affected, as determined by the Service and Western during consultation. This does not include the vernal pool crustacean habitat (0.243 acres indirectly) and snake habitat (1.64 acres temporarily for one season and 0.027 acre permanently) that will be affected within the permitted areas of the NBHCP because Western will compensate for these effects through the NBHCP. Overall, the project will affect 13.424 acres (direct effects to 1.218 acres and indirect effects to 12.206 acres) of vernal pool crustacean habitat and 201.273 acres (temporary loss of 182.70 acres, temporary loss for one active and one inactive season of 17.0936 acres, permanent loss of 0.0414 acres in the active season, and permanent loss in the inactive season of 1.438 acres) of snake habitat.

To offset effects of habitat loss or degradation on vernal pool crustaceans, Western has proposed to purchase preservation and creation credits at a Service-approved vernal pool conservation bank, which includes the project area within its service area, as outlined in Table 1.

Table 1: Compensation proposed for adverse effects to listed vernal pool crustaceans from the proposed project. Impacts of 0.243 acre within the NBHCP permit area are not included in this table because Western will compensate for it through the NBHCP. A total of 13.424 acres of vernal pool crustacean habitat will be affected by this project, 13.181 acres of which are addressed in this table.

Type of Compensation	Direct effects to 1.218 acres	Indirect effects to 11.963* acres	Total compensation (acres)
Creation (1:1 ratio)	1.218	NA	1.218
Preservation (2:1 ratio)	2.436	23.926	26.362

* includes 0.207 acres of indirect effects with the non-permitted NBHCP area

To offset effects of habitat loss or degradation to giant garter snakes outside of the Natomas Basin, Western has proposed to purchase credits at a Service-approved giant garter snake conservation bank, which includes the project area within its service area, as outlined in Table 2.

Activities that will span a time greater than the active period, either prior to or following the active period (berm construction and deconstruction, access routes, work area around towers, and pulling and tensioning sites), increase the risk of direct mortality of snakes. To account for this increased risk, compensation ratios proposed are double that of compensation ratios for effects during just the active period. For the effects in the non-permitted NBHCP area, Western has proposed to compensate through The Natomas Basin Conservancy (TNBC).

Table 2: Compensation proposed for adverse effects to the giant garter snake from the proposed project. Impacts of 1.667 acres within the NBHCP permit area are not included in this table because Western will compensate for it through the NBHCP. A total of 201.273 acres of snake habitat will be affected by this project, 199.606 of which are addressed in this table.

Type of Compensation	Temporary effects for one season, 181.06 acres*	Temporary effects for 1 active and 1 inactive season, 17.0936 acres**	Permanent effects in the active season, 0.0144 acre***	Permanent effects in the inactive season, 1.438 acres****	Total compensation (acres)
Restoration	181.06	17.0936			NA
Preservation (2:1 ratio)		34.1872			42.8584
Preservation (3:1 ratio)			0.0432		
Preservation (6:1 ratio)				8.628	

* includes 4.5677 acres within the non-permitted NBHCP area, 1.2 acres at Sutter Basin Conservation Bank, 0.85 acre at Gilsizer Slough Preserve, and 2.1 acres at Gilsizer Slough South Conservation Bank

** includes 0.913 acre at Sutter Basin Conservation Bank, 0 acres at Gilsizer Slough Preserve, and 1.141 acres at Gilsizer Slough South Conservation Bank

*** includes 0.0144 acre within the non-permitted NBHCP area

**** includes 0.0072 acre at Sutter Basin Conservation Bank, 0.0054 acre at Gilsizer Slough Preserve, and 0.0144 acre at Gilsizer Slough South Conservation Bank

In order to minimize potential effects to special-status species and their habitats, Western proposes to implement the following avoidance and minimization measures throughout the project site:

1. A Service-approved biological monitor will be on-site during construction.
2. The biological monitor will be knowledgeable of the ecology of the giant garter snake, vernal pool crustaceans, and other protected species that may be encountered in the project area, including migratory birds, and the laws and regulations protecting them.
3. The biological monitor will inspect areas identified for ground clearing and leveling for active bird nests between March and July prior to the start of project activities. During construction, no actions would be taken that would result in "take" of migratory birds, their nests, or nest contents.
4. The biological monitor will develop a training program that will be attended by all project personnel prior to entering the project area. The training program will include:

- An overview of the project area, an explanation of the issues and concerns for project activities and sensitive environmental resources.
 - Identification of and procedures for dealing with sensitive biological resources including the protocol of entering and movement within the project area in relation to sensitive species.
 - A training sign-in sheet to record the name of each individual trained.
 - Each trained individual would be given evidence indicating they have received this training and would keep that evidence with them at all times they are in the construction area. This would allow anyone from Western or any resource management agency to assure they have attended training.
5. The biological monitor will notify the construction manager to halt operations that may adversely affect a federally-listed species.
 6. The biological monitor will prepare a report of the "take" of any sensitive species that have been found in the project area and notify Western's Regional Environmental Manager within 2 hours of any such finding. The report would contain the time and location and result of the "take". The Service will be notified within 24 hours.
 7. The biological monitor will prepare a weekly report of the activities of construction including any activities that affected or may affect any species of concern, and the location and result of those activities.
 8. Western will span all water courses and wetlands to the extent practical to minimize loss of riparian habitat.
 9. Western will cut vegetation providing shade to water bodies only to the extent necessary and shall not be removed unless it presents a specific safety and/or reliability concern. Trees that must be removed will be felled to avoid damaging riparian habitat. They will be felled out of and away from the Stream Maintenance Zone and riparian habitat, including springs, seeps, bogs, and any other wet or saturated areas. Trees will not be felled into streams in a way that would obstruct or impair the flow of water, unless instructed otherwise. Vegetation removal methods that could cause stream bank erosion or result in increased water temperatures will not be conducted in and around streams. Tree removal in riparian or wetland areas will be done only by hand.
 10. Western will mark the overhead ground wires at river crossings and communication flyways (areas used by birds moving to and from feeding and loafing areas) using the best currently available technology to reduce the risk of bird collisions with the transmission lines.
 11. Western will install standard erosion control devices (e.g., silt fence) for all ground-disturbing activities within 300 feet of any watercourse.
 12. Western will not permit refueling of equipment or construction vehicles within 300 feet of a riparian zone or permanent or semi-permanent water courses and wetlands.
 13. Western will clean up all spills of fuel or hydraulic fluid immediately according to Western's guidelines for hazardous material handling.
 14. Western will cover or fill in any augured holes during hours that construction stops (nights and weekends) to decrease the chances of entrapment of an animal in the open holes. Western will verify that holes did not entrap animals before placing poles or backfilling.

15. Western will keep construction equipment (e.g., chainsaws, trucks, graders) in good operating condition to reduce exhaust emissions or fuel and oil leaks for all machinery or vehicles.
16. Western will keep equipment logs and set schedules for preventative maintenance.
17. Western will periodically replace older equipment with equipment meeting more recent stringent California emission standards.
18. Western will shut down equipment not in active use.
19. Western will avoid major operations on days when the local Air Quality Index is expected to exceed 150.
20. Western will restrict all vehicle traffic to established access roads and will implement a speed limit of 15 miles per hour for all vehicles on non-public access roads in order to limit the potential for vehicles striking any protected species.
21. No pets would be allowed anywhere on the project site.
22. Western will leave vegetation in place whenever possible and original contours will be maintained in an undisturbed condition.
23. Western will limit any work on access roads to the current prism of the road.
24. Western will include all minimization measures in the construction contract and will include maps, where necessary.
25. Western will implement erosion control Best Management Practices as needed, including but not limited to: grading during the dry season, dust control, compaction of berms and upland spoils, and seeding of exposed upland soil. Western will not permit any fill or runoff to enter wetland areas or waterways. Western will not stockpile or deposit excavated material where it could be washed away by high water or storm run-off, or could significantly impact the water course. Western will, at the end of construction, reseed or plant seedlings on slopes with erosion problems and/or take other erosion control measures as necessary.

Proposed avoidance and minimization measures specific to vernal pool species (the vernal pool crustaceans and the salamander) and their habitat:

26. For vernal pools to be avoided by 250 feet, Western will install exclusionary silt fencing at a distance no less than 250 feet from the outer edge of any vernal pool crustacean habitat, and inspect and maintain the exclusionary silt fencing on a regular basis throughout the project. Pedestrian and vehicular traffic into habitat delineated by the fencing shall be prohibited during construction.
27. Western will conduct site activities when the vernal pools are dry (typically, after May 1 and before October 31). No work will occur during any storm event or within 48 hours of any storm event. This minimization measure is necessary within 250 feet of all vernal pools and listed vernal pool crustacean habitat that is not considered affected by the project.
28. For pools being indirectly affected that Western is compensating for, Western will mark the maximum buffer possible, but no less than 50 feet from the pool's edge, with exclusionary silt fencing. To the maximum extent practical, site activities would be conducted in the vicinity of these pools when the vernal pools are dry. Western will focus on these areas during the dry season, especially with major ground-disturbing activities, but may be required to complete some work during the rainy season.

29. Western will prohibit the following: dumping, burning or burying garbage; replacement of existing native vegetation with non-native plants; placement of storm water drains; and use of pesticides or other toxic chemicals.
30. Western will locate all staging areas a minimum of 250 feet from existing habitat for vernal pool crustaceans.

Proposed avoidance and minimization measures specific to the giant garter snake:

31. Western will conduct pre-construction surveys for giant garter snake within 24 hours of the start of construction. The survey of the project area will be repeated if a lapse in construction activity of two weeks or greater has occurred.
32. Western will flag any giant garter snake habitat within or adjacent to the project area that can be avoided by a 200 foot buffer. These areas will be avoided by all construction vehicle and foot traffic.
33. If a live giant garter snake is encountered during construction activities, the monitor will be immediately notified and the Service will be contacted within 24 hours. The monitor will have the authority to stop construction in the vicinity of the snake, monitor the snake, and allow it to leave on its own. The monitor shall remain in the area for the remainder of the work day to make sure the snake is not harmed or if it leaves the site, does not return. Escape routes for snakes will be determined in advance of construction and snakes will be allowed to leave on their own. If a snake does not leave on its own within one working day, further consultation with the Service will take place.
34. Western will allow any dewatered habitat to remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.
35. Western will enter into an agreement, when possible, with the landowner to not plant the portion of the field the ROW would be in or, if necessary, the entire field for one season during the construction. When entering this type of agreement, Western would verify that no net loss of giant garter snake habitat would result and that the effect of fallowing that particular field, or portion of field, would have no greater impact than normal crop rotation.
36. Prior to beginning construction, Western will install species-specific exclusionary fencing around all constructed berms in order to minimize the potential for giant garter snakes to use the construction site as habitat or the berms for over-wintering habitat.
37. Western will complete ground-disturbing activities within the Natomas Basin during the snake's active period (May 1 to October 1) and, to the maximum extent practical, complete ground-disturbing activities in all other snake habitats within the snake's active period. Western will focus on these areas during the snake's active period, especially with major ground-disturbing activities, but may be required to complete some work (only acceptable for areas outside of the Natomas Basin) during the inactive season.
38. Within the Natomas Basin, Western will limit the construction activities that must occur outside of the active period to non-ground disturbing work only and will limit heavy equipment access to existing access roads in order to avoid ground compaction. To the maximum extent practical, Western will limit the construction activities that must occur outside of the active period in all other snake habitats to non-ground disturbing work only and to limit heavy equipment access to existing access roads. Western will focus on these areas during the snake's active period, but due to timing constraints and logistics of various

construction activities, not all work will be able to be completed within the snake's active period. Western will not perform ground-disturbing work in the Natomas Basin outside of the active period, but may be required to complete ground-disturbing work or drive off of existing roads during the inactive period in other snake habitats outside of the Natomas Basin.

39. After completion of construction activities, Western will 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.

Proposed avoidance and minimization measures specific to the valley elderberry longhorn beetle:

40. Western will conduct pre-construction surveys for elderberries no sooner than one month prior to the start of construction.
41. Western will fence or flag all areas to be avoided during construction activities, including a buffer of at least 100 feet from the dripline of any elderberry.
42. If, during the pre-construction surveys, an elderberry with stems greater than 1 inch in diameter at ground level is found that would not be possible to avoid by 100 feet or greater during construction, Western will reinitiate consultation with the Service as set forth in the final paragraphs of this letter.

Action Area

The action area is defined in 50 CFR §402.02, as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." For the proposed action, the Service considers the action area to be the footprint for construction of the Sacramento Area Voltage Support Project. Additionally, all vernal pool habitat within 250 feet of the project footprint and the upland and aquatic habitat within 200 feet of the project footprint for giant garter snake are included in the action area because they will be subjected to indirect effects, mainly due to ground disturbance and dewatering. Ground disturbance activities within 250 feet of vernal pools may indirectly affect pools by changes in hydrology and increased sedimentation. Dewatering may indirectly affect snakes by temporarily displacing snakes and by reducing available prey.

Analytical Framework for the Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the vernal pool crustaceans' and snake's range-wide condition, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the vernal pool crustaceans and snake in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the vernal pool crustaceans and snake; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed federal action and the effects of any interrelated or interdependent activities on the

vernal pool crustaceans and snake; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-federal activities in the action area on the vernal pool crustaceans and snake.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed federal action in the context of the vernal pool crustaceans' and snake's current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the vernal pool crustaceans and snake in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the vernal pool crustaceans and snake and the role of the action area in the survival and recovery of the vernal pool crustaceans and the snake as the context for evaluating the significance of the effects of the proposed federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Status of the Species

Vernal pool fairy shrimp

Species Description - The vernal pool fairy shrimp (*B. lynchi*) was listed as threatened in 1994 (Service 1994) (59 FR 48153). Further details on the life history and ecology of the vernal pool fairy shrimp may be found in the final listing rule, Eng *et al.* (1990), Helm (1998), Simovich *et al.* (1992), and Volmar (2002).

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 one inch long, they swim or glide upside-down using complex, beating movements of the legs. They are restricted to vernal pools (and swales), an ephemeral freshwater habitat that forms in areas with Mediterranean climates where slight depressions become seasonally saturated or inundated following fall and winter rains. 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 (in southern California).

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 (CNDDB 2008; Helm 1998; Eriksen and Belk 1999; Volmar 2002; Service 1994, 2003). The vernal pool fairy shrimp are currently known from 32 presumed populations. The number of recorded sightings of individuals has increased from 178 to over 550, (CNDDB 2008). Records include old museum records and site duplication, so the number of occurrences that are currently extant is unknown. The distribution of the shrimp remains essentially unchanged since listing. Known

records suggest that in most locations the shrimp is frequently present only in low numbers or only present in a small percentage of the pools at a site.

Due to local topography and geology, vernal pools are usually clustered into pool complexes (Holland and Jain 1988). The genetic characteristics of the species, as well as ecological conditions, such as watershed continuity, indicate that populations of these animals are defined by pool complexes rather than by individual vernal pools (Fugate 1992). Therefore, the most accurate indication of the distribution and abundance of these species is the number of inhabited vernal pool complexes. The pools and, in some cases, pool complexes supporting these species are usually small.

Life History - Female vernal pool fairy shrimp carry eggs in a pear-shaped, ventral brood sac. The eggs are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks. The "resting" or "summer" eggs are capable of withstanding heat, cold, and prolonged desiccation. When the pools fill in the same or subsequent seasons, some, but not all, of the eggs may hatch. The egg bank in the soil may consist of eggs from several years of breeding (Donald 1983). The eggs hatch when the vernal pools fill with rainwater. Vernal pool fairy shrimp develop rapidly, feeding on algae, bacteria, protozoa, rotifers, and bits of detritus, and may become sexually mature within two weeks after hatching (Gallagher 1996; Helm 1998). The adults of the vernal pool fairy shrimp have been collected from early December to early May, depending on annual weather conditions. However, these non-dormant populations often disappear early in the season long before the vernal pools dry up. Such quick maturation permits vernal pool fairy shrimp populations to persist in relatively short-lived, shallow bodies of water (Simovich *et al.* 1992).

Vernal pool fairy shrimp have passive dispersal. Large-scale flooding resulting from winter and spring rains may have played an important role in dispersal of the species, allowing the animals to colonize different individual vernal pools and other vernal pool complexes within a watershed. This dispersal means has been altered due to 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 fairy shrimp (Simovich *et al.* 1992) even at a relatively local scale, and likely have always been important to long-distance dispersal. The eggs of the crustaceans are either ingested (Krapu 1974, Swanson *et al.* 1974, Driver 1981, Ahl 1991) and/or adhere to the legs and feathers where they are transported to new habitats.

Vernal Pool Tadpole Shrimp

Species Description - A final rule was published on September 19, 1994 (Service 1994), to list the vernal pool tadpole shrimp as endangered under the Act. Further information on the life history and ecology of the vernal pool tadpole shrimp may be found in Eng *et al.* (1990), Helm (1998), Simovich *et al.* (1992), and Volmar (2002).

Vernal pool tadpole shrimp have large, shield-like carapaces approximately one 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. Like vernal pool fairy shrimp, vernal pool tadpole shrimp are restricted to vernal pools (and swales), an ephemeral freshwater habitat that forms in areas with Mediterranean climates where slight depressions become seasonally saturated or inundated following fall and winter rains. They have been found in vernal pools containing clear to highly turbid water, ranging in size from 5 square meters (54 square feet) in the Mather Air Force Base area of Sacramento County, to the 36-hectare (89-acre) Olcott Lake at Jepson Prairie in Solano County; the potential ponding depth of occupied habitat ranges from 1.5 inches to 59 inches. Vernal pools at Jepson Prairie and Vina Plains (Tehama Co.) have a neutral pH, and very low conductivity, total dissolved solids, and alkalinity (Barclay and Knight 1984, 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. As with vernal pool fairy shrimp, the most accurate indication of the distribution and abundance of these species is the number of inhabited vernal pool complexes.

The vernal pool tadpole shrimp is known from 19 populations in the Central Valley, ranging 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.

Life History - 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). Tadpole shrimp 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). 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). Vernal pool tadpole shrimp have similar dispersal methods as discussed above for vernal pool fairy shrimp.

Status and Distribution of the Vernal Pool Crustaceans – Both vernal pool crustaceans 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 (e.g., to the hydrology) of 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, alterations of vernal pool hydrology, fertilizer and pesticide contamination, activity, invasions of aggressive non-native plants, gravel mining, and contaminated stormwater runoff.

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. However, an analysis of this report by the Service revealed apparent arithmetic errors which resulted in a determination that a historic loss between 60 and 85 percent may be more accurate. Coe (1988) estimated that within 20 years, 60 to 70 percent of the habitat would be destroyed by human activities. The rate of loss of vernal pool habitat in the state has been estimated at 2 to 3 percent per year

(Holland and Jain 1988). Current rapid urbanization and agricultural conversion throughout the ranges of the species continue to pose the most severe threats to the continued existence of the vernal pool crustaceans.

In addition to direct habitat loss, vernal pool habitat has been and continues to be highly fragmented due to conversion of natural habitat for urban and agricultural uses. This fragmentation results in small isolated populations. Ecological theory predicts that such populations will be highly susceptible to extirpation due to chance events, inbreeding depression, or additional environmental disturbance (Gilpin and Soule 1986, Goodman 1987a, b). Should an extirpation event occur in a population that has been fragmented, the opportunities for re-colonization would be greatly reduced due to physical (geographical) isolation from other (source) populations. Only a small proportion of the habitat of these species is protected from these threats.

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (U.S. Fish and Wildlife Service, 2005) provides a recovery strategy for 20 federally-listed species: 10 endangered plants, 5 threatened plants, 3 endangered animals, and 2 threatened animals. The vernal pool fairy shrimp and the vernal pool tadpole shrimp are included in the plan. The recovery plan presents an ecosystem-level strategy for recovery and conservation focused on habitat protection and management. As a basis, the plan uses the 17 vernal pool regions in the State of California as defined by CDFG in the California Vernal Pool Assessment Preliminary Report (Keeler-Wolf *et al.* 1998). Approximately half of the action area is located in the Southeastern Sacramento Vernal Pool Region. The Southeastern Sacramento Valley Vernal Pool Region contains almost 15 percent of the remaining vernal pool grasslands in the State of California, and supports 35 percent of the known occurrences of the vernal pool fairy shrimp and 74 percent of the known occurrences of the vernal pool tadpole shrimp documented in the California Natural Diversity Database (CNDDDB 2007).

Giant Garter Snake

Species Description - The Service published a proposal to list the giant garter snake as an endangered species on December 27, 1991 (56 FR 67046). The Service reevaluated the status of the giant garter snake before adopting the final rule, which listed the giant garter snake as a threatened species on October 20, 1993 (58 FR 54053).

The giant garter snake is one of the largest garter snake species, reaching a total length of approximately 64 inches (162 centimeters). Females tend to be slightly longer and proportionately heavier than males. Generally, giant garter 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).

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). The Biological Resources Division (BRD) has conducted

studies at Gilsizer Slough, surrounding lands, and associated irrigation canals (Wylie *et al.* 1995; Wylie *et al.* 1997). Giant garter snakes were shown to use canal, marsh, and rice habitat (Wylie *et al.* 1995; Wylie *et al.* 1997). Giant garter snakes were particularly associated with irrigated canals that had thickly vegetated slopes. Rice fields and associated canals and their banks have become increasingly important habitat for giant garter snakes (E. Hansen 2004; Wylie 1998a). Fifty-five percent of telemetered giant garter snakes used rice fields at some time (Wylie *et al.* 1997).

Essential habitat components consist of: (1) wetlands with adequate water during the giant garter 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) (G. Hansen 1988). Giant garter 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 (G. Hansen 1988; G. 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 (G. Hansen 1988).

Giant garter snakes formerly occurred throughout the wetlands that were extensive and widely distributed in the Sacramento Valley and San Joaquin Valley floors of California (Fitch 1940; Hansen and Brode 1980; Rossman and Stewart 1987). The historical range of the giant garter 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). 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 giant garter snake habitat (Hinds 1952). Now, less than 10 percent, or approximately 319,000 acres (129,000 hectares), of the historic 4.5 million acres (1.8 million hectares) of Central Valley wetlands remain (U.S. Department of Interior 1994), of which very little provides habitat suitable for the giant garter snake.

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 (D. Kelly pers. comm. 2006; E. Hansen pers. comm. 2006). The southernmost known occurrence is at the Mendota Wildlife Area in Fresno County.

Life History - The giant garter snake breeding season starts in March and extends through April. Females give birth to live young from late July through early September (R. Hansen and G. Hansen 1990). Although growth rates are variable, young typically more than double in size by one year of age, and sexual maturity averages three years in males and five years for females (Service 1993).

Giant garter snakes are the most aquatic garter snake species and are active foragers, feeding primarily on aquatic prey such as fish and amphibians (Fitch 1941). Because the giant garter snake's historic prey species are either declining, extirpated, or extinct, the predominant food items are now introduced species such as carp (*Cyprinus carpio*), mosquito-fish (*Gambusia affinis*), larval and sub-adult bullfrogs (*Rana catesbiana*), and Pacific chorus frogs (*Pseudacris regilla*) (Fitch 1941; G. Hansen 1988; G. Hansen and Brode 1980, 1993; Rossman et al. 1996).

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 (E. Hansen 2004; Wylie 1998a). While within the rice fields, giant garter snakes forage in the shallow water for prey, utilizing rice plants and vegetated berms dividing rice checks for shelter and basking sites (G. 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. 2004), while in the Colusa NWR, giant garter snakes were regularly found on or near edges of wetlands and ditches with vegetative cover (Wylie et al. 2003c). Telemetry studies also indicate that active giant garter snakes use uplands extensively, particularly where vegetative cover exceeds 50 percent in the area (Wylie 1998a). Recent studies have indicated that presence of the snake in canals and ditches is significantly lower where those features are not adjacent to wetland features (native marshes, created marshes, and/or active rice agriculture) (Hansen 2008).

The giant garter snake is highly aquatic but also occupies a terrestrial niche (Service 1999; Wylie et al. 2003c). The giant garter snake typically inhabits small mammal burrows and other soil and/or rock crevices during the colder months of winter (i.e., October to April) (G. Hansen and Brode 1993; Wylie et al. 1995; Wylie et al. 2002), and also uses burrows as refuge from extreme heat during its active period (Wylie et al. 1997; Wylie et al. 2003b). While individuals usually remain in close proximity to wetland habitats, the Biological Resource Division of the U.S. Geological Survey (BRD) has documented giant garter snakes using burrows as much as 165 feet (50 meters) away from the marsh edge to escape extreme heat, and as far as 820 feet (250 meters) from the edge of marsh habitat for over-wintering habitat (Wylie et al. 1997). Giant garter snakes have been observed tens to hundreds of meters distant from any water body in various types of habitat. Upland habitat is essential for snakes because it provides overwintering hibernacula and areas in which snakes may thermoregulate (regulate their body temperature), and small mammal burrows which are used by snakes for ecdysis (shedding of the skin). Upland habitat may be particularly important for neonates (newly born) giant garter snakes, which may use the uplands more frequently than adults, possibly seeking terrestrial prey, such as earthworms or other insects.

In studies of marked giant garter snakes in the Natomas Basin, giant garter snakes moved about 0.25 to 0.5 miles (0.4 to 0.8 kilometers) per day (G. Hansen and Brode 1993). Total activity, however, varies widely between individuals; individual giant garter snakes have been documented to move up to 5 miles (8 kilometers) over a few days in response to dewatering of habitat (Wylie et al. 1997) and to use up to more than 8 miles (12.9 kilometers) of linear aquatic habitat over the course of a few months. Home range (area of daily activity) averages about 0.1 mile² (25 hectares) in both the Natomas Basin and the Colusa National Wildlife Refuge (NWR)

(Wylie 1998a; Wylie *et al.* 2002), yet can be as large as 14.5 miles² (3744 hectares) (Wylie and Martin 2004).

Giant garter snakes are killed and/or eaten by a variety of predators, including raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis virginiana*), bull frogs (*Rana catesbiana*), hawks (*Buteo* sp.), egrets (*Casmerodius albus*, *Egretta thula*), river otters (*Ludra canadensis*), and great blue herons (*Ardea herodias*) (Dickert 2003; Wylie *et al.* 2003a; G. Wylie pers. comm. 2006). Many areas supporting giant garter snakes have been documented to have abundant predators; however, predation does not seem to be a limiting factor in areas that provide abundant cover, high concentrations of prey items, and connectivity to a permanent water source (G. Hansen and Brode 1993; Wylie *et al.* 1995).

Status and Distribution - 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 giant garter 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).

Valley flood wetlands are now subject to cumulative effects of upstream watershed modifications, water storage and diversion projects, as well as urban and agricultural development. The Central Valley Project (CVP), the largest water management system in California, created an ecosystem altered to such an extent that remaining wetlands depend on highly managed water regimes (U.S. Department of Interior 1994). Further, the implementation of CVP has resulted in conversion of native habitats to agriculture, and has facilitated urban development throughout the Central Valley (Service 1999). For instance, residential and commercial growth within the Central Valley is consuming an estimated 15,000 acres of farmland each year (American Farmland Trust 1999), with a projected loss of more than one million acres by the year 2040 (USGS 2003). Environmental impacts associated with urbanization include loss of biodiversity and habitat, alteration of natural fire regimes, fragmentation of habitat from road construction, and degradation due to pollutants. Further, encroaching urbanization can inhibit rice cultivation (J. Roberts pers. comm. 2006). Rapidly expanding cities within the giant garter snake's range include Chico, Yuba City, the Sacramento area, Galt, Stockton, Gustine, and Los Banos.

Ongoing maintenance of aquatic habitats for flood control and agricultural purposes can eliminate or prevent the establishment of habitat characteristics required by giant garter snakes (G. Hansen 1988). Such practices can fragment and isolate available habitat, prevent dispersal of giant garter snakes among habitat units, and adversely affect the availability of the giant garter snake's food items (G. Hansen 1988; Brode and G. Hansen 1992). For example, tilling, grading, harvesting and mowing may kill or injure giant garter snakes (Wylie *et al.* 1997). Biocides applied to control aquatic vegetation reduce cover for the giant garter snake and may harm prey species (Wylie *et al.* 1995). Rodent control threatens the giant garter snake's upland aestivation habitat (Wylie *et al.* 1995). Restriction of suitable habitat to water canals bordered by roadways and levee tops renders giant garter 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 construction sites, can entangle and kill giant garter 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 giant garter snake habitat (G. Hansen 1988; E. Hansen, pers. comm., 2006), and giant garter snakes have been observed to avoid areas that are grazed (E. Hansen 2003). Fluctuation in rice and agricultural production affects stability and availability of habitat (Paquin *et al.* 2006; Wylie and Casazza 2001; Wylie *et al.* 2003b, 2004).

Other land use practices also currently threaten the survival of the giant garter snake. Recreational activities, such as fishing, may disturb giant garter snakes and disrupt thermoregulation and foraging activities (E. Hansen pers. comm., 2006). 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 the summer water needed by the species (Beam and Menges 1997; Dickert 2005; Paquin *et al.* 2006).

The draft recovery plan for the giant garter snake subdivides its range into four proposed recovery units (Service 1999): (1) Sacramento Valley Recovery Unit; (2) Mid-Valley Recovery Unit; (3) San Joaquin Valley Recovery Unit; and (4) South Valley Recovery Unit. The proposed project is in the American Basin sub-population which is part of the Mid-Valley Recovery Unit. Additionally, the Mid-Valley Unit includes sub-populations in the Yolo and Delta Basins (Service 1999; Service 2006). The status of sub-populations of Mid-Valley Recovery Unit are very uncertain; each is small, highly fragmented, and located on isolated patches of limited quality habitat that is increasingly threatened by urbanization (E. Hansen 2002, 2004; Service 1993; Wylie *et al.* 2003b, 2004; G. Wylie pers. comm. 2006).

The American Basin sub-population, although threatened by urban development, receives protection from the Metro Air Park and Natomas Basin Habitat Conservation Plans, which share a regional strategy to maintain a viable giant garter snake sub-population in the basin. Since 1995, BRD has studied giant garter snake sub-populations in the Natomas Basin within the American Basin (E. Hansen 2003, 2004; Wylie 1998b, 2003; Wylie *et al.* 1995; Wylie *et al.* 2002, 2003c; Wylie *et al.* 2003b, 2004). This area contain one the largest extant giant garter snake sub-populations. Outside of protected areas, however, giant garter snakes are still subject to all threats identified in the final rule. Seventy-nine CNDDDB (2008) records are known from the American Basin. These records include the Natomas Basin, Gilsizer Slough, the Middle-American Basin just north of the Natomas Cross Canal, Rio Oso, and associated tributaries, as well as other locations within the Basin.

Density estimates in the Natomas Basin range from 6 to 64 giant garter snakes per mile 4 to 40 giant garter snakes per kilometer) depending on the trapping location (Wylie *et al.* 2004). Wylie *et al.* (2003b) suggest that TNBC properties have the potential to provide habitat to sustain giant garter snake populations in the Natomas Basin. Fallowing of land appears to reduce or eliminate giant garter snake capture success in adjacent canals (Wylie *et al.* 2004). If land fallowed increases in the Basin, the habitat managed by TNBC becomes all the more important for protecting giant garter snake sub-populations (Wylie *et al.* 2004).

The overall status of the giant garter snake has not improved since its listing. The American Basin is one of the larger and more protected giant garter snake sub-populations. Nonetheless, this sub-population is subject to the effects of a number of projects. Numerous development projects have been constructed in or near giant garter snake habitat in this rapidly urbanizing area. American Basin giant garter snakes are highly vulnerable to secondary effects of urbanization, such as increased predation by house cats, water pollution in the form of urban run-off, and increased vehicular mortality. Most documented localities have been adversely impacted by development, including freeway construction, and flood control projects (Wylie *et al.* 2004). Several former localities are known to have been lost and/or depleted to the extent that continued viability 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 sub-population (Goodman 1987b).

Environmental Baseline

Regulations implementing the Act (50 CFR §402.02) define the environmental baseline as the past and present impacts of all federal, state, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated effects of all proposed federal projects in the action area that have undergone section 7 consultation and the effects of state and private actions that are contemporaneous with the consultation in progress.

Vernal pool fairy shrimp and vernal pool tadpole shrimp

Status of the species within the action area - Approximately half of the action area is located in the Southeastern Sacramento Vernal Pool Region, one of 17 vernal pool regions in the State of California defined by CDFG in the California Vernal Pool Assessment Preliminary Report (Keeler-Wolf *et al.* 1998). The Southeastern Sacramento Valley Vernal Pool Region contains almost 15 percent of the remaining vernal pool grasslands in the State of California, and supports 35 percent of the known occurrences of the vernal pool fairy shrimp and 74 percent of the known occurrences of the vernal pool tadpole shrimp documented in the California Natural Diversity Database (CNDDDB 2007).

Within the action area, many land uses preclude the presence of vernal pool crustaceans due to lack of habitat (e.g., rice field). However, there are 3.968 acres of habitat within the ROW and 11.926 acres of habitat within the 250 feet of the project footprint (total of 15.894 acres), plus the supporting uplands, in the southern portion of the action area. The habitat is mostly associated with grazed pastures and receives regular disturbance from livestock. Some features are isolated from other features and are associated with access roads to the ROW, within private yards, or along public roads.

Although guideline-level surveys have not been conducted at the project site, occurrences are known from vernal pools within the action area. There are currently 11 occurrences of listed vernal pool crustaceans reported in the California Natural Diversity Database within five miles of the proposed project area (CNDDDB 2009).

Factors Affecting the Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Within the Action Area - The majority of the proposed project area where vernal pools are located is largely private property. Much of the land is grazed and receives disturbance from livestock. Some of the vernal pool habitat remaining on private lands or along roads has been altered by agricultural run-off that has lengthened the wetted period beyond that characteristic of vernal pools; however, the acreage of pools affected has not been quantified. These actions have resulted in both direct and indirect effects to vernal pool habitat within the action area.

Part of the action area is within both the permitted and non-permitted areas of the NBHCP. The NBHCP applies to the 53,537-acre area interior to the toes of the levees surrounding the Natomas Basin, located in the northern portion of Sacramento County and the southern portion of Sutter County. On June 27, 2003, the Service issued incidental take permits to the City of Sacramento, Sutter County, and the Natomas Basin Conservancy for activities associated with the implementation of the Final NBHCP.

Giant Garter Snake

Status of the species within the action area – The proposed project is located within the American Basin giant garter snake population, in the Mid-Valley Recovery Unit (Service 1999). Seventy-nine CNDDDB (2008) records are known from the American Basin, over 50 of which are within 5 miles of the action area. Much of the action area has been converted to rice fields, which provide habitat for the snake. In addition to rice fields, other areas considered habitat for the snake occur within the action area, such as Pleasant Grove Creek Canal and three conservation sites. The three conservation sites are the Sutter Basin Conservation Bank, the Gilsizer Slough Giant Garter Snake Preserve, and the Gilsizer Slough South Giant Garter Snake Conservation Bank. All three conservation sites provide habitat for giant garter snake and play an important role in the recovery of the snake by protecting habitat in perpetuity.

Factors Affecting the Giant Garter Snake in the Action Area - The majority of the proposed project area where snake habitat is located is private property. The rotation or fallowing of rice fields by farmers causes variation in the amount and location of habitat available to the snake. These actions have resulted in both direct and indirect effects to giant garter snake habitat within the region.

Part of the action area is within both the permitted and non-permitted areas of the NBHCP,. The NBHCP applies to the 53,537-acre area interior to the toes of the levees surrounding the Natomas Basin, located in the northern portion of Sacramento County and the southern portion of Sutter County. On June 27, 2003, the Service issued incidental take permits to the City of Sacramento, Sutter County, and the Natomas Basin Conservancy for activities associated with the implementation of the Final NBHCP.

Effects of the ActionVernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

The proposed project will affect a total of 13.424 acres of vernal pool crustacean habitat. It will have direct effects on 1.218 acres (all outside of the Natomas Basin) and indirect effects on 12.206 acres (11.756 acres outside of the Natomas Basin, 0.207 acre in the non-permitted area of the NBHCP, and 0.243 acre within the permitted NBHCP area) of vernal pool crustacean habitat. Direct effects of this project are due to culvert installation and placing a pull site within a pool. During the installation of two culverts and establishment of the pull sites, cysts may be crushed, buried due to placement of fill, or removed from the feature, which may reduce survival and hatching. Additionally, a portion of the habitat will be replaced with the culvert.

Habitat indirectly affected includes all vernal pools supported by destroyed or modified upland areas, and all habitat otherwise damaged by changes to the watershed, human intrusion, and disturbance that will be caused by the project. Some of the poles will be installed within 50 feet of vernal pool crustacean habitat. Ground disturbing activities in the watershed of vernal pools 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. The hydrologic regime (e.g., change in rates of surface flow, reducing subsurface volumes) of the pools may be altered due to disturbance of the hardpan or changing the slope or groundcover of the surrounding landscape. The biota of vernal pools and swales can change when the hydrologic regime is altered (Bauder 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 (Zelder 1987). Therefore, construction near vernal pool areas is likely to result in the decline of local sub-populations of vernal pool organisms, including the vernal pool crustaceans. Additionally, Western may perform some construction activities during the wet season, which could amplify these effects.

The proposed project will indirectly affect 0.207 acre of habitat in the non-permitted area of the NBHCP. The Service has determined that the loss of habitat from construction of the transmission line will not negatively and/or irreparably impact the NBHCP's Operating Conservation Program (OCP) because the affected habitat is small and spread out over a large area.

The direct effects on 1.218 acres and indirect effects on 12.206 acres of vernal pool crustacean habitat are spread throughout the approximately 32-mile transmission line and are, therefore, not expected to have the same effect as if an entire vernal pool complex were being affected. Western has proposed many avoidance and minimization measures, starting on page 9 of this biological opinion, which are expected to greatly reduce the effects. Additionally, Western has proposed to minimize these effects by purchasing preservation and creation credits at a

conservation bank and participating in the NBHCP. Contributing to the long-term preservation and management of the vernal pool habitat is critical for the species' survival and recovery.

As described in the Project Description of this biological opinion, the locations of staging areas for the proposed project are not currently known and will be determined at a later time. Therefore, any effects to vernal pool crustaceans from staging areas have not been analyzed in this biological opinion. Effects resulting from the estimated location of the pulling and tensioning sites have been considered in this biological opinion, but changes in their estimated locations may change the effects to the vernal pool crustaceans as a result of the project. As required in the "Reinitiation-Closing Statement" at the end of this biological opinion, effects not considered in this biological opinion that occur as a result of the proposed project will necessitate reinitiation of formal consultation by Western.

Giant Garter Snake

The proposed project will affect a total of 201.273 acres of giant garter snake habitat. It will result in the permanent loss of 1.4794 acres (1.438 acres outside of the Natomas Basin, 0.0144 acres in the non-permit area of the NBHCP, and 0.027 acre within the permitted NBHCP) of habitat primarily due to the placement of the poles and culverts. The loss of 1.438 acres outside of the Natomas Basin may occur during the inactive season for the snake which will increase the chance of direct mortality in addition to the permanent loss of habitat. In addition, 17.0936 acres of habitat (all outside of the Natomas Basin) will be temporarily affected from activities (berm construction and deconstruction, access routes, work area around towers, and pulling and tensioning sites) that will span a time greater than the active period, either prior to or following the active period; therefore the chance of direct mortality will increase in these areas. Additionally, 182.70 acres of habitat (176.4923 acres outside of the Natomas Basin, 4.5677 acres in the non-permitted area of the NBHCP, and 1.64 acres within the permitted NBHCP) will be temporarily affected for one season due to fallowing of rice, removal of existing towers, and general construction activity.

A portion of the proposed project will cross three conservation sites for the snake during Phase 3; one owned by Westervelt (the Sutter Basin Conservation Bank) and two owned by Wildlands (the Gilsizer Slough Giant Garter Snake Preserve and the Gilsizer Slough South Giant Garter Snake Conservation Bank). All three conservation sites provide habitat for giant garter snake that will be affected by this project. Cumulatively, about 2.95 miles of the line will cross the three conservation sites and will affect 6.231 acres of snake habitat. Approximately 2.1202 acres of snake habitat at Sutter Basin Conservation Bank will be affected: 1.2 acres of temporary habitat loss for one season, 0.913 acre of temporary habitat loss for one active and one inactive season, and 0.0072 acre of permanent habitat loss. Approximately 0.8554 acre of snake habitat at Gilsizer Slough Preserve will be affected: 0.85 acres of temporary habitat loss for one season and 0.0054 acre of permanent of habitat loss. Approximately 3.2554 acres of snake habitat at Gilsizer Slough South Conservation Bank will be affected: 2.1 acres of temporary habitat loss for one season, 1.141 acres of temporary habitat loss for one active and one inactive season, and 0.0144 acre of permanent habitat loss.

Construction activities associated with the project occurring in snake upland habitat may harm, harass, injure, or kill snakes. The proposed project will have activities associated with the construction of the transmission line within snake habitat during both the snake's active (May 1 – October 1) and inactive period (October 2 – April 30). The Service believes that after October 1, snakes are more likely to be dispersing into the uplands in search of overwintering hibernacula and terrestrial prey, and could be subject to higher rates of mortality from project construction during the inactive period. As described in the "Status of the Species" section of this biological opinion, snakes have been observed traveling greater than 200 feet from aquatic habitat into the uplands; therefore construction of the transmission line, which will occur within and adjacent to areas of rice agriculture, could result in direct effects to this species. The construction will remove vegetation cover and basking sites, fill or crush burrows or crevices, obstruct snake movement, and decrease the prey base; and may result in the direct disturbance, displacement, injury, and/or mortality of snakes. Snakes may disperse across or may bask on existing paved and unpaved roadways, and thus may be killed or injured by construction equipment or other vehicles accessing the project alignment. Disturbance during construction activities may also cause snakes to move into or across areas of unsuitable habitat where they may be prone to higher rates of mortality from vehicles and predation.

The proposed project will temporarily affect 4.5677 acres of habitat and permanently affect 0.0144 acre of habitat in the non-permitted area of the NBHCP. The Service has determined that the loss of habitat from construction of the transmission line will not negatively and/or irreparably impact the NBHCP's OCP because most habitat loss is temporary and is spread out over a large area. To further assure that the OCP will not be negatively impacted, Western proposes to restore temporary impacts and to compensate at a 3:1 ratio for permanent impacts by purchasing 0.0432 acres of snake habitat within the Natomas Basin through TBNC to be permanently preserved and managed for the benefit of the snake.

Western has proposed many avoidance and minimization measures, starting on page 9 of this biological opinion, which are expected to greatly reduce the effects. This includes removal of temporary fill and construction debris and, wherever feasible, restoring disturbed areas to pre-project conditions. Additionally, Western has proposed to minimize these effects by purchasing preservation and creation credits at a conservation bank, by conserving habitat in the Natomas Basin, and participating in the NBHCP. Contributing to the long-term preservation and management of the snake is critical for the species' survival and recovery. Effects that occur within the Natomas Basin will be compensated within the Natomas Basin through TNBC, which will ultimately benefit the local populations of the snake. In addition to permanent loss of habitat at the three conservation sites, Western's Lands Department is purchasing the ROW. Because the purchase of the ROW will effectively remove these lands from conservation, Western will also pay the value of the credits that are being lost at these conservation sites.

As described in the Project Description of this biological opinion, the locations of staging areas for the proposed project are not currently known and will be determined at a later time. Therefore, any effects to the snake from staging areas have not been analyzed in this biological opinion. Effects resulting from the estimated location of the pulling and tensioning sites have been considered in this biological opinion, but changes in their estimated locations that may

change the effects to the snake as a result of the project. As required in the "Reinitiation-Closing Statement" at the end of this biological opinion, effects not considered in this biological opinion that occur as a result of the proposed project will necessitate reinitiation of formal consultation by Western.

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 are 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.

The majority of the proposed project where vernal pools and snake habitat are located is largely private property. Grazing and disturbance from livestock is expected to continue into the future and result in additional direct and indirect effects to vernal pool habitat within the action area. The rotation or fallowing of rice fields by farmers is expected to continue into the future, which will cause variation in the amount, location, and potentially quality of habitat available to the snake. Although these activities are reasonably certain to occur, the exact location and timing is not predictable. The NBHCP's efficacy in maintaining a viable population of GGS in the Basin depends, in significant part, on the retention of a sufficient amount of undeveloped acreage throughout the Basin, to support GGS.¹ The NBHCP operates under the assumption that agricultural land in the Basin would continuously rotate between crop types, and, therefore, all land provides habitat for all 22 of the NBHCP covered species, including the giant garter snake.

Conclusion

After reviewing the current status of the listed vernal pool crustaceans and the giant garter snake, the environmental baseline for the action area, the effects of the proposed actions and the cumulative effects, it is the Service's biological opinion that the proposed actions are not likely to jeopardize the continued existence of the vernal pool fairy shrimp, the vernal pool tadpole shrimp, or the giant garter snake. The Service reached this conclusion because the project-related direct and indirect effects to these species, when added to the environmental baseline and analyzed in consideration of anticipate cumulative effects, would not rise to the level of precluding recovery of the species or reducing the likelihood of survival of the species. Effects to all species are spread over the approximately 32-mile transmission line.

The effects to vernal pool crustaceans are mostly at isolated features associated with grazed pastures, along access roads to the ROW, within private yards, or along public roads. However, the proposed project will contribute to a local and range-wide trend of habitat loss and degradation, the principal reasons that the vernal pool fairy shrimp and vernal pool tadpole

¹ In *NWF v. Norton*, 2005 U.S. Dist LEXIS 33768, Judge Levi upheld the NBHCP and its strategy to protect the GGS in the Natomas Basin. However, in footnote 13 of the opinion, he cautioned that, "the Service and those seeking an ITP in the future will face an uphill battle if they attempt to argue that additional development in the basin beyond the 17,500 acres will not result in jeopardy" to the snake.

shrimp population numbers have declined. The proposed project will contribute to the fragmentation and reduction of the acreage of the remaining listed vernal pool crustacean habitat located in Sutter, Sacramento, and Placer counties and throughout the range of these two listed vernal pool crustaceans.

The snake habitat lost is mostly temporary and the permanently lost habitat is spread out over the length of the transmission line. The project will contribute to the conservation of these species by preserving habitat at conservation banks and within the Natomas Basin that will manage large contiguous sections of habitat for the benefit of the species.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species 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 are non-discretionary, and must be implemented by Western so that they become binding conditions of any contract, as appropriate, in order for the exemption in section 7(o)(2) to apply. Western has a continuing duty to regulate the activity covered by this incidental take statement. If Western (1) fails to require the contractor 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

The Service anticipates incidental take of the listed vernal pool crustaceans will be difficult to detect for the following reasons: (1) these species have small body size, therefore finding a dead or injured specimen is unlikely; (2) these species occur in habitats that makes detection difficult; and (3) losses may be masked by seasonal and annual fluctuations in numbers, chance events, changes in water regime, or additional environmental disturbance. Due to the difficulties in quantifying the number of individuals that will be taken as a result of the proposed action, the Service is quantifying take incidental to this project as the number of acres of suitable habitat for the listed crustacean species that will become unsuitable for this species as a result of the action. The Service estimates that all vernal pool fairy shrimp and vernal pool tadpole shrimp inhabiting

13.181 acres (1.218 acres direct and 11.963 acres indirect) of vernal pool habitat will be harmed, injured, or killed, as a result of the proposed action. The Service estimates that all vernal pool fairy shrimp and vernal pool tadpole shrimp inhabiting 0.243 acres (indirectly affected) of vernal pool habitat within the permitted areas of the NBHCP will be harmed, injured, or killed, as a result of the proposed action. The affected acreage within the permitted areas of the NBHCP shall be included in the City of Sacramento accounting of take as part of the required reporting of implementation of the NBHCP. The 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.

The Service anticipates incidental take of the snake will be difficult to detect or quantify. The cryptic nature of the species and its highly aquatic nature make the finding of an injured or dead specimen unlikely. The species occurs in habitats that make it difficult to detect. Due to the difficulty in quantifying the number of snakes that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as harassment of all snakes inhabiting or otherwise utilizing the 181.06 acres of habitat that will be temporarily lost for one season due to the proposed project. The Service is quantifying take incidental to the project as harm or harassment of all snakes inhabiting or otherwise utilizing the 17.0936 acres that will be temporarily lost for one active and one inactive season due to the creation of berms, access routes, work around towers, and pulling and tensioning sites. The Service is quantifying take incidental to the project as harm and harassment of all snakes inhabiting or otherwise utilizing the 1.438 acres that will be permanently lost in the inactive season and the 0.0144 acre that will be permanently lost in the active season due to the proposed project. The Service is quantifying take incidental to the project as harassment of all snakes inhabiting or otherwise utilizing the 1.64 acres of habitat within the permitted areas of the NBHCP that will be temporarily lost for one season due to the proposed project. The Service is quantifying take incidental to the project as harm and harassment of all snakes inhabiting or otherwise utilizing the 0.027 acre of habitat within the permitted areas of the NBHCP that will be permanently lost in the active season due to the proposed project. The affected acreage within the permitted areas of the NBHCP shall be included in the City of Sacramento accounting of take as part of the required reporting of implementation of the NBHCP. The 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.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the listed wildlife species in this opinion.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impact of taking vernal pool crustaceans and the snake:

1. All the conservation measures as described in the project description, and as restated here in this biological opinion, must be fully implemented and adhered to.

2. The permanent and temporary loss and degradation of giant garter snake habitat and habitat for vernal pool crustaceans shall be confined to the proposed project site, and minimized and restored to the greatest extent practicable.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, Western must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary:

- 1) Western will minimize the potential for harm or harassment of the vernal pool crustaceans and the snake resulting from project-related activities by implementation of the conservation measures as described in the project description of this biological opinion. In addition:
 - a) Prior to the start of construction, Western shall send a copy of the fully executed credit sales agreement, bill of sale, and payment receipt to the Service for vernal pool preservation and creation credits as outlined in Table 1 and giant garter snake credits as outlined in Table 2. The credits shall be purchased and the purchase agreements finalized and approved by the Service prior to commencement of any ground-breaking activities at the proposed project site. Vernal pool credits may be split equally between banks that have credits for vernal pool fairy shrimp and vernal pool tadpole shrimp.
 - b) For compensation for the snake within the non-permitted area of the NBHCP, Western shall send a copy of the agreement with TNBC to the Service prior to commencement of any ground-breaking activities at the proposed project site.
 - c) Additional impacts to habitat within the permit area of the NBHCP will be compensated for in compliance with the NBHCP and all terms of the NBHCP will be followed by Western.
- 2) Western shall provide a copy of this biological opinion and any subsequent amendments to the primary contractor and sub-contractors. Western shall clearly notify the primary contractor that he/she is responsible for implementing all requirements and obligations included within the biological opinion, and for educating and informing all other contractors involved in the project as to the requirements of the biological opinion. Western shall provide the Deputy Assistant Field Supervisor of the Endangered Species Division at the Sacramento Fish and Wildlife Office with a hardcopy of the contract(s) for this project at least ten (10) working days before it is accepted or awarded. If the contract has been awarded previous to the completion of the biological opinion, Western will provide the Service a copy of the contract and any revisions before beginning construction activities.
- 3) At least 30 calendar days prior to initiating construction activities, Western shall request approval of the biological monitors and submit the names and curriculum vitae of the biological monitor(s) for the proposed project.
- 4) Within 24-hours prior to the commencement of construction activities, the site shall be inspected by a Service-approved biologist. The biologist will provide the Service with a

written report that adequately documents the monitoring efforts within 24-hours of commencement of construction activities. The monitoring biologist shall be available thereafter; the monitoring biologist shall have the authority to stop construction activities if a snake is encountered during construction until appropriate corrective measures have been completed or until the snake is determined to be unharmed. Snakes encountered during construction activities shall be allowed to move away from the area on their own volition. The biologist shall notify the Service immediately if any listed species are found on-site, and will submit a report, including date(s), location(s), habitat description, and any corrective measures taken to protect the species found.

The biologist shall be required to report any take to the Service immediately by telephone at (916) 414-6600 and by electronic mail or written letter addressed to the Deputy Assistant Field Supervisor at the Sacramento Fish and Wildlife Office, within one (1) working day of the incident.

- 5) The project area shall be re-inspected by the monitoring biologist whenever a lapse in construction activity of two weeks or greater has occurred.
- 6) A Service-approved biologist shall inspect all construction-related activities that occur within 250 feet of vernal pool crustacean habitat. The Service-approved biologist shall inspect the project site at least twice a week to assure that Conservation Measures and BMPs are correctly implemented to minimize or avoid effects to vernal pool crustacean habitat, including critical habitat elements. If the biologist exercises this authority, the Deputy Assistant Field Supervisor at the Sacramento Fish and Wildlife Office shall be notified by telephone and letter within one (1) working day.
- 7) Western will provide written documentation of attendees of the Worker Environmental Awareness Training Program to the Sacramento Fish and Wildlife Office within 30 days of the completion of training. As needed, training shall be conducted in Spanish for Spanish language speakers.
- 8) Prior to groundbreaking, high-visibility fencing that is at least 4 feet tall shall be placed along the boundaries of the construction zone to clearly mark this zone and to prevent encroachment of construction vehicles or personnel into areas containing vernal pool or seasonal wetland habitat, or into snake habitat that is adjacent to the project area. Placement of fencing and barriers to protect sensitive habitat will be directed and inspected by the Service-approved biologist. The Service-approved biologist will inspect the fencing at least two times per week. The fence will be maintained in good condition, and may be removed only when the construction of the project is completed.
- 9) During construction operations, the number of access routes, number and size of staging areas, and the total area of the proposed project activity will be limited to the minimum necessary. Routes and boundaries will be clearly demarcated. Movement of heavy equipment to and from the project site will be restricted to established roadways to minimize habitat disturbance. Stockpiling of construction materials, portable equipment, vehicles, fuel,

and supplies will be restricted to the designated construction staging areas and exclusive of the wetland and snake avoidance areas. All fueling, cleaning, and maintenance of vehicles and other equipment will occur only within areas designated by the biologist within the project footprint, and at least 300 feet away from vernal pool and seasonal wetland features. In sections of the project alignment that are not adjacent to vernal pool habitat, on-site fueling, cleaning, maintenance, and storage of heavy equipment will occur within the center 20 feet of the project footprint. Western will ensure contamination of habitat (e.g., runoff from dust control, oil, and other chemicals used in construction activities) does not occur during such operations. All workers will be informed of the importance of preventing spills and appropriate measures to take should a spill occur. Any spills or hazardous materials will be cleaned up immediately. Such spills will be reported in the post-construction compliance reports.

- 10) Erosion control structures will be installed concurrently with road construction. Tightly woven fiber netting (mesh size less than 0.25 inch) or similar material shall be used for erosion control or other purposes at the project site to ensure giant garter snakes are not trapped by the erosion control material. This limitation shall be included in the Contractor's NPDES Storm Water Pollution Prevention Plan. Coconut coir matting is an acceptable erosion control material. No plastic mono-filament matting shall be used for erosion control. The edge of the material shall be buried in the ground to prevent giant garter snakes and other reptiles and amphibians from crawling underneath the material.
- 11) If requested, before, during, or upon completion of ground-breaking and construction activities, Western shall allow access by the Service and/or California Department of Fish and Game personnel to the project site to review project effects to vernal pool crustaceans or the snake.
- 12) To minimize pollution effects on vernal pool crustacean and their habitat, and to avoid attracting snake predators, garbage shall be removed from the construction area daily and disposed of at an appropriate site. All litter, debris, and unused materials, equipment, or supplies must be removed from the construction staging areas at the end of each day during project construction.
- 13) After completion of construction activities, any temporary fill and construction debris shall be removed. Western will restore all temporary ground disturbance areas, including storage and staging areas and temporary roads, to pre-project conditions. These areas shall be re-contoured and re-vegetated, if appropriate, with appropriate plant species. An area subject to "temporary" disturbance includes any area that is disturbed during the project, but that, after project completion, will not be subject to further disturbance and has the potential to be re-vegetated. Western, in consultation with the Service and CDFG, will determine the appropriate site-specific methods and plant species used to re-vegetate appropriate areas. Restoration work may include replanting emergent vegetation. Refer to the Service's *Guidelines for the Restoration and/or Replacement of Giant Garter Snake Habitat*.
- 14) Western will maintain and monitor the project site for one (1) year following the completion

of construction and restoration activities. Monitoring reports documenting the restoration effort should be submitted to the Service upon the completion of the restoration implementation and one (1) year after the restoration implementation. Monitoring reports should include photo-documentation, when restoration was completed, what materials were used, specified plantings, and justifications of any substitutions to the Service-recommended guidelines.

Reporting Requirements

Western will provide a restoration and monitoring report to the Service, as described above in Term and Condition 14.

The Sacramento Fish and Wildlife Office is to be notified within 24 hours days of the finding of any dead listed wildlife species or any unanticipated harm to the species addressed in this biological opinion. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. The Service contact persons are the Division Chief of the Endangered Species Program, at (916) 414-6600 and the Resident Agent-in-Charge of the Service's Law Enforcement Division at (916) 414-6660.

CONSERVATION RECOMMENDATIONS

Conservation recommendations are suggestions of the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of new information. These measures may serve to further minimize or avoid the adverse effects of a proposed action on listed, proposed, or candidate species, or on designated critical habitat. They may also serve as suggestions on how action agencies can assist species conservation in furtherance of their responsibilities under section 7(a)(1) of the Act, or recommend studies improving an understanding of a species' biology or ecology. Wherever possible, conservation recommendations should be tied to tasks identified in recovery plans. The Service is providing you with the following conservation recommendation:

- Western should work with the Service to implement the recovery criteria of the Recovery Plan for Vernal Pool Ecosystems of California and Southern California and assist in the recovery of the giant garter snake by implementing the draft giant garter snake recovery plan, and when finished, the final giant garter snake recovery plan.

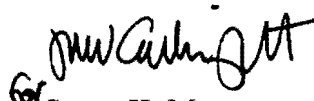
In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of this recommendation.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation on the proposed Sacramento Area Voltage Support 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.

If you have any questions or concerns about the consultation process, please feel free to call Lisa Ellis, Staff Biologist, or Jana Affonso, Sacramento Valley Branch Chief, at (916) 414-6645.

Sincerely,


for Susan K. Moore
Field Supervisor

cc:

Nancy Haley, U.S. Army Corps of Engineers
John Roberts, The Natomas Basin Conservancy
Scot Mende, City of Sacramento
Patrick Moeszinger, California Department of Fish and Game
Julie Newman, California Department of Fish and Game
Ami Goerd, Western Area Power Administration

LITERATURE CITED

- Ahl, J. S. B. 1991. Factors affecting contributions of the tadpole shrimp, *Lepidurus packardi*, to its overwintering egg reserves. *Hydrobiologia* 212:137-143.
- American Farmland Trust. 1999. California's Central Valley Urban Sprawl 2040 Zone of Conflict. Farmland Information Library. Available: <http://farm.fic.niu.edu/fic/ft/cv.html>
- Barclay, W. R. and A. W. Knight. 1984. Physiochemical processes affecting production in a turbid vernal pond. Department of Land, Air, and Water Resources, University of California, Davis. Unpublished manuscript, Davis, California.
- Barton, C. and K. Kinkead. 2005. Do Erosion Control and Snakes Mesh? *Journal of Soil and Water Conservation* 60(2):33A-35A.
- Bauder, E. T. 1987. Threats to San Diego vernal pools and a case study in altered pool hydrology. Pages 151-160 in T. S. Elias (ed). Conservation and management of rare and endangered plants. California Native Plant Society, Sacramento, California.
- Beam, J. A. and T. M. Menges. 1997. Evaluation of management practices on state-owned wildlife Areas and private duck clubs in the Grasslands Basin of the San Joaquin Valley relative to the giant garter snake (*Thamnophis gigas*). Unpublished report. California Department of Fish and Game, Los Banos, California. 9 pp.
- Brode, J., and G. Hansen. 1992. Status and future management of the giant garter snake (*Thamnophis gigas*) within the southern American Basin, Sacramento and Sutter Counties, California. Unpublished report for the California Department of Fish and Game.
- California Natural Diversity Data Base (CNDDB). 2008. Rarefind. Natural Heritage Division, California Fish and Game, Sacramento, California.
- Coe, T. 1988. The application of Section 404 of the Clean Water Act to Vernal Pools. Pages 356-358 in J. A. Kusler, S. Daly, and G. Brooks (eds.). Urban Wetlands. Proceedings of the National Wetland Symposium. Oakland, California.
- Dickert, C. 2003. Progress report for the San Joaquin Valley giant garter snake conservation project—2003. Unpublished report. California Department of Fish and Game, Los Banos Wildlife Complex, Los Banos, California. 37 pp.
- _____. 2005. Giant garter snake surveys at some areas of historic occupation in the Grassland Ecological Area, Merced County and Mendota Wildlife Area, Fresno County, California. *California Department of Fish and Game* 91(4):255-269.

- Donald, D. B. 1983. Erratic occurrence of anostracans in a temporary pond: colonization and extinction or adaptation to variations in annual weather? *Can. J. of Zoology* 61:1492-1498.
- Driver, E. A. 1981. Caloric value of pond invertebrates eaten by ducks. *Freshwater Biology* 11:579-581.
- Eng, L. L., D. Belk, and C. H. Erickson. 1990. California Anostraca: Distribution, habitat, and status. *Journal of Crustacean Biology* 10(2):247-277.
- Eriksen, C. H. and D. Belk. 1999. Fairy shrimps of California's puddles, pools, and playas. Mad River Press, Eureka, California. 196 pages.
- Fitch, H. S. 1940. A biogeographical study of the *ordinoides* Artenkreis of garter snakes (genus *Thamnophis*). *University of California Publications in Zoology* 44:1-150.
- _____. 1941. The feeding habits of California garter snakes. *Department of Fish and Game* 27(2):2-32.
- Fox, W. 1948. The relationships of the garter snakes of the garter snake *Thamnophis ordinoides*. *Copeia* 1948:113-120.
- Fugate, M. 1992. Speciation in the fairy shrimp genus *Branchinecta* (Crustacea: Anostraca) from North America. Ph.D. Dissertation. University of California, Riverside.
- Gallagher, S. P. 1996. Seasonal occurrence and habitat characteristics of some vernal pool branchiopoda in Northern California, U.S.A. *Journal of Crustacean Biology* 16: 323-329.
- Gilpin, M. E. and M. E. Soulé. 1986. Minimum viable populations: processes of species extinction. Pages 18 - 34 in M. E. Soulé (ed.). *Conservation biology: the science of scarcity and diversity*. Sinauer Associates, Inc. Sunderland, Massachusetts.
- Goodman, D. 1987a. The demography of chance extinction. Pages. 11-19 in M. E. Soulé (ed.). *Conservation biology: the science of scarcity and diversity*. Sinauer Associates, Inc. Sunderland, Massachusetts.
- _____. 1987b. How do any species persist? Lessons for conservation biology. *Conservation Biology* 1: 59-62.
- Hansen, E. C. 2002. Year 2001 Investigations of the Giant Garter Snake (*Thamnophis gigas*) in the Greater American Basin: Sutter County. Prepared for Sacramento Area Flood Control Agency. January 30. 18 pp plus appendices.
- _____. 2003. Year 2002 investigations of the giant garter snake (*Thamnophis gigas*) in the Middle American Basin: Sutter County, California. Unpublished report prepared for the

- Sacramento Area Flood Control Agency, Sacramento, California. February 14, 2003. 33 pp.
- _____. 2004. Year 2003 investigations of the giant garter snake (*Thamnophis gigas*) in the Middle American Basin: Sutter County, California. Unpublished report prepared for Sacramento Area Flood Control Agency, Sacramento, California. March 10, 2004. 40 pp.
- _____. 2008. Implementation of priority 1, priority 2, and priority 3 recovery tasks for giant garter snake (*Thamnophis gigas*) – continuing surveys in Merced County, California, with an expansion to northern Fresno County. Report for the U.S. Fish and Wildlife Service, Sacramento Field Office, Sacramento, CA under agreement 802707G112. April 15, 2008
- Hansen, G. E. 1986. Status of the giant garter snake *Thamnophis couchi gigas* (Fitch) in the Southern San Joaquin Valley During 1986. Unpublished (final) report for California Department of Fish and Game, Standard Agreement No. C-1433. 31 pp.
- _____. 1988. Review of the status of the giant garter snake (*Thamnophis couchi gigas*) and its supporting habitat during 1986-1987. Unpublished (final) report for California Department of Fish and Game, Contract C-2060. Rancho Cordova, California. 31 pp.
- Hansen, G. and J. M. Brode. 1980. Status of the giant garter snake, *Thamnophis couchi gigas* (Fitch). California Department of Fish and Game, Inland Fisheries Endangered Species Program Special Publication Report. 80-5:1-14.
- _____. 1993. Results of relocating canal habitat of the giant garter snake (*Thamnophis gigas*) during widening of State Route 99/70 in Sacramento and Sutter counties, California. Unpublished (final) report for Caltrans Interagency Agreement 03E325 (FG7550) (FY 87/88-91-92). Rancho Cordova, California. March 3, 1993. 36 pp.
- Hansen, R. W. 1980. Western aquatic garter snakes in central California: an ecological and evolutionary perspective. Unpublished masters thesis, Department of Biology, California State University, Fresno. 78 pp.
- Hansen, R.W. and G. E. Hansen. 1990. *Thamnophis gigas*: Reproduction. *Herpetological Review* 21(4):93-94.
- Hinds, N. E. A. 1952. Evolution of the California landscape. California Division of Mines Bulletin No. 158. 240 pp.
- Helm, B. 1998. Biogeography of eight large branchiopods endemic to California. Pages 124 - 139 in: C. W. Witham, E.T. Bauder, D. Belk, W.R. Ferren, Jr., and R. Ornduff (eds.). Ecology, conservation, and management of vernal pool ecosystems - proceedings from a 1996 conference, California Native Plant Society, Sacramento, California. 285 pages.

- Holland, R. F. 1978. The geographic and edaphic distribution of vernal pools in the Great Central Valley, California. California Native Plant Society, Special Publ. 4:1-12.
- Holland, R. F. and S. Jain. 1988. Vernal Pools. Pages 515-533 in M. E. Barbour and J. Major, (eds.). Terrestrial Vegetation of California. California Native Plant Society. Sacramento, California.
- Krapu, G. L. 1974. Foods of breeding pintails in North Dakota. J. Wild. Manag. 38(3):408-417.
- Paquin, M. M., G. D. Wylie, and E. J. Routman. 2006. Population structure of the giant garter snake, *Thamnophis gigas*. *Conservation Genetics* 7:25-36.
- Pennak, R. W. 1989. Freshwater invertebrates of the United States. Wiley & Sons. New York, New York.
- Rossman, D. A. and G. R. Stewart. 1987. Taxonomic reevaluation of *Thamnophis couchii* (Serpentes: Colubridae). Occasional Papers of the Museum of Zoology, Louisiana State University 63:1-25.
- Rossman, D.A., N.B. Ford, and R.A. Seigel. 1996. The Garter Snakes: Evolution and Ecology. University of Oklahoma Press, Norman. 331 pp.
- Simovich, M. A., R. C. Brusca and J. L. King. 1992. Invertebrate survey, PGT-PG&E/Bechtel Pipeline Expansion Project. University of San Diego, Asan Diego California.
- Stitt, E.W., P.S. Balfour, T. Lucklau, and T.E. Edwards. 2005. The southern watersnake (*Nerodia fasciata*) in Folsom, California: History, population attributes, and relation to other introduced watersnakes in North America. Final report to the U.S. Fish and Wildlife Service, Cooperative Agreement No. 11420-1933-CM02. ECORP Consulting, Inc., Roseville, California. 72 pp. + Appendices.
- Stuart, J.N., M.L. Watson, T.L. Brown, and C. Eustice. 2001. Plastic netting: An entanglement hazard to snakes and other wildlife. *Herpetological Review* 32(3): 162-164.
- Swanson, G. A., M. I. Meyer and J. R. Serie. 1974. Feeding ecology of breeding blue-winged teals. J. Wild. Mang. 38:396-407.
- U.S. Department of the Interior. 1994. The Impact of Federal Programs on Wetlands, Vol. II, A Report to Congress by the Secretary of the Interior, Washington, D.C., March, 1994. Access: <http://www.doi.gov/oepec/wetlands2/>
- U.S. Fish and Wildlife Service. 1993. Endangered and threatened wildlife and plants; determination of threatened status for the giant garter snake; final rule. *Federal Register* 58(201):54053-54066.

- _____. 1994. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, and Vernal Pool Tadpole Shrimp; and Threatened Status for the Vernal Pool Fairy Shrimp. Federal Register 59: 48136-48153.
- _____. 1999. Draft Recovery Plan for the Giant Garter Snake (*Thamnophis gigas*). U.S. Fish and Wildlife Service, Portland, Oregon. x + 192 pp.
- _____. 2003. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Four Endangered Vernal Pool Crustaceans and Eleven Vernal Pool Plants in California and Oregon. Federal Register 68: 46684-46857.
- _____. 2006. Giant Garter Snake (*Thamnophis gigas*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California. 46 pp.
- U.S. Geological Survey [Internet] Preliminary Assessment of Urban Growth in California's Central Valley [cited April 15, 2003]. Available: <http://ceres.ca.gov/calsip/cv/project.html>
- Volmar, J. 2002. Wildlife and Rare Plant Ecology of Eastern Merced County's Vernal Pool Grasslands. Vollmar Consulting. Berkeley, California. 446 pp.
- Williams, T. and V. Wunderlich. 2003. Progress report: 2003 San Joaquin Valley giant garter snake conservation project. Unpublished report. U.S. Fish and Wildlife Service, San Luis National Wildlife Refuge Complex, Los Banos, California. 12 pp.
- Wylie, G. D. 1998a. Giant garter snake project: 1998 progress report. Unpublished (preliminary) report. U. S. Geological Survey, Biological Resources Division, Dixon Field Station, Dixon, California. 4 pp. + Figures.
- _____. 1998b. Results of the 1998 survey for giant garter snakes in and around the Grasslands Area of the San Joaquin Valley. Unpublished report. U. S. Geological Survey, Biological Resources Division, Dixon Field Station, Dixon, California. 9 pp.
- Wylie, G. D., M. L. Casazza, and J. K. Daugherty. 1997. 1996 progress report for the giant garter snake study. Unpublished (preliminary) report. U.S. Geological Survey, Biological Resources Division, Dixon Field Station, Dixon, California. May 1, 1997. 6 pp. + Figures.
- Wylie, G. D. and M. L. Casazza. 2001. Investigations of giant garter snakes in the Natomas Basin: 2001 field season. Unpublished report. U.S. Geological Survey, Biological Resources Division, Dixon Field Station, Dixon, California. December 20, 2001. 9 pp

- Wylie, G. D., M. L. Casazza, and N. M. Carpenter. 2002. Monitoring giant garter snakes at Colusa National Wildlife Refuge: 2001 progress report. Unpublished report. U.S. Geological Survey, Biological Resources Division, Dixon Field Station, Dixon, California. April 2002. 10 pp.
- Wylie, G. D., M. L. Casazza, and N. M. Carpenter. 2003a. Diet of bullfrogs in relation to predation on giant garter snakes at Colusa National Wildlife Refuge. *California Fish and Game* 89(3):139-145.
- Wylie, G. D., M. L. Casazza, and L. L. Martin. 2003b. Giant garter snake surveys in the Natomas Basin: 2000-2002. Unpublished report. U.S. Geological Survey, Biological Resources Division, Dixon Field Station, Dixon, California. September 2003. 20 pp.
- Wylie, G. D., M. L. Casazza, L. L. Martin, and N. M. Carpenter. 2003c. Monitoring giant garter snakes at Colusa National Wildlife Refuge: 2003 progress report. Unpublished report. U.S. Geological Survey, Biological Resources Division, Dixon Field Station, Dixon, California. 17 pp.
- Wylie, G. D., M. L. Casazza, and L. L. Martin. 2004. Giant garter snake surveys in the Natomas Basin: 2003 Results. Unpublished report. U.S. Geological Survey, Biological Resources Division, Dixon Field Station, Dixon, California. January 2004. 75 pp.
- Wylie, G. D., T. Graham, M. L. Casazza, M. M. Paquin, and J. Daugherty. 1995. National Biological Service giant garter snake study progress report for the 1995 field season. Unpublished (preliminary) report. U. S. Geological Survey, Biological Resources Division, Dixon Field Station, Dixon, California. 6 pp. + Figures.
- Wylie, G. D. and L. L. Martin. 2004. Results of 2004 monitoring for giant garter snakes (*Thamnophis gigas*) for the bank protection project on the left bank of the Colusa Basin Drainage Canal in Reclamation District 108, Sacramento River bank river protection project, phase II. Unpublished report prepared for U.S. Army Corps of Engineers, Environmental Planning Section, Sacramento, California. November 2004. 18 pp.

Personal Communications

- Hansen, Eric. 2006. Consulting Environmental Biologist. Provided information on population trends, threats, and recommendations for future actions. May 8, 2006, and August 22, 2006.
- Kelly, David. 2006. U.S. Fish and Wildlife Service, Sacramento, California.
- Roberts, John. 2006. The Natomas Basin Conservancy, Executive Director. Provided information on population trends, threats, and recommendations for future actions. May 8, 2006, and August 22, 2006.

Wylie, Glenn. 2006. USGS-BRD, Western Ecological Research Center, Dixon Field Station. Provided information on population trends, threats, and recommendations for future actions to benefit the giant garter snake. May 9, 2006.