Ms. Alicia Kirchner  
Chief, Planning Division  
U.S. Army Corps of Engineers, Sacramento District  
1325 J Street  
Sacramento, California 95814

Subject: Phase 4b Section 7 Appendage to the Programmatic Biological Opinion for the Natomas Levee Improvement Program, Landside Improvements Project, Sacramento and Sutter Counties, California

Dear Ms. Kirchner:

This is in response to your June 30, 2010, request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the Natomas Levee Improvement Program (NLIP), Landside Improvements Project Phase 4b (proposed project) in Sacramento and Sutter Counties, California. Your request was received on June 30, 2010. A programmatic biological opinion (BO) was completed on October 9, 2008 (File 81420-2008-F-0195-5), amended on May 6, 2009 (File 81420-2008-F-0195-R001), October 2, 2009 (81420-2008-F-0195-R002), February 2, 2010 (81420-2008-F-0195-R003), and August 17, 2010 (81420-2008-F-0195-R004). The programmatic BO analyzed the entire proposed project on the landscape level and because details of the project were only available for Phase 2, provided an incidental take statement for only that phase of the project. A BO for the Phase 3 portion of the project was completed on September 28, 2009, (File 81420-2009-F-0890) and amended on October 2, 2009 (File 81420-2009-F-0890-R001), and August 17, 2010 (81420-2009-F-0890-R002). A BO for the Phase 4a portion of the project was completed on May 20, 2010 (81420-2010-F-0446). The Service has reviewed the information submitted by your office requesting formal consultation on the effects of the Phase 4b project on the federally-listed endangered vernal pool tadpole shrimp (Lepidurus packardi) the federally-listed threatened vernal pool fairy shrimp (Branchinecta lynchi) (collectively, vernal pool crustaceans), valley elderberry longhorn beetle (Desmocerus californicus dimorphus), and giant garter snake (Thamnophis gigas) (GGS) in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act). Critical habitat has been designated for the beetle and vernal pool crustaceans; however, the proposed project is not located within nor will it affect critical habitat for these species or any other federally-listed species. Critical habitat has not been designated for the GGS; therefore, none will be affected.
The programmatic BO (File 81420-2008-F-0195-5) did not include effects to vernal pools or the species that could inhabit them. However, given the level of impacts to vernal pool species in this phase, the Service has determined that the project can be appended to the Service's February 28, 1996, Programmatic Formal Endangered Species Act Consultation on Issuance of 404 Permits for Projects with Relatively Small Effects on Listed Vernal Pool Crustaceans within the Jurisdiction of the Sacramento Field Office, California (1-1-96-F-001)(Vernal Pool Programmatic Opinion).

This BO is based on information provided in the U.S. Army Corps of Engineers' (Corps) letter requesting consultation and their biological assessment. A complete administrative record is on file at the Sacramento Fish and Wildlife Office.

**CONSULTATION HISTORY FOR PHASE 4b**

February 2010. AECOM, the consultant to the Sacramento Area Flood Control Agency (SAFCA), provided the Service with an administrative draft Phase 4b biological assessment.

June 23, 2010. The Service, the Corps, and AECOM met to discuss the draft Phase 4b biological assessment.


**BIOLOGICAL OPINION**

**Description of Action Area**

The NLIP Landside Improvements Project consists of the following phases of construction.

Phase 2, which was discussed in more detail in the Programmatic and Phase 2 BO includes work along:
- 5.3-milelong Natomas Cross Canal (NCC) south levee,
- the Sacramento River east levee from the NCC south levee to 2,000 feet south of the North Drainage Canal,
- the Elkhorn Main Irrigation Canal (Elkhorn Canal) between the North Drainage Canal and the Elkhorn Reservoir settling basin,
- the site of Reclamation District (RD) 1000 Pumping Plant No. 2, and
- adjacent land.

Phase 3, which was discussed in more detail in the Phase 3 BO, includes work along:
- the Sacramento River east levee south of the limits of the Phase 2 improvements to just south of Interstate 5 (I-5),
- the Pleasant Grove Creek Canal (PGCC) west levee,
- the Natomas East Main Drainage Canal (NEMDC) west levee between Elkhorn Boulevard and Northgate Boulevard,
the area between Elkhorn Reservoir and the West Drainage Canal where a new
GGS/Drainage Canal will be constructed,
the Elkhorn Canal downstream of Elkhorn Reservoir, and
RD 1000 Pumping Plant No. 2.

Phase 4a, which was discussed in more detail in the Phase 4a BO includes work along:
• improvements to the Sacramento River east levee south of the limits of the Phase 3
improvements to approximately 2.5 miles north of Interstate 80,
• the relocation of the Riverside Main Irrigation Canal (Riverside Canal),
• creation of habitat in the vicinity of Fisherman’s Lake, and
• improvements and modifications to a number of pumping plants along the Sacramento
River east levee and NCC south levee.

Phase 4b, will include work along:
• the Sacramento River east levee south of the limits of the Phase 4a Project along Reach
A:16–20 of the Sacramento River east levee,
• the American River north levee (Reach I:1–4),
• the PGCC (Reach E),
• the NEMDC west levee (Reaches F–H),
• improvements to the West Drainage Canal from I-5 to Fisherman’s Lake,
• relocation of the Rivero Road Canal along the NEMDC west levee, and
• relocation of the Vestal Drain and Morrison Canal along the NCC.

As greater flood protection will be provided for the entire Natomas Basin, the action area
includes the entire Natomas Basin.

Description of Proposed Action

Overview of NLIP Landside Improvements Project

SAFCA is designing the NLIP in coordination with the Federal and state flood control project
sponsors, the Corps, and the State of California Central Valley Flood Protection Board (CVFPB),
to address the deficiencies in the Natomas levee system with a focus on achieving a 100-year
level of flood protection by 2011. This will require improving the following landside conditions
along the NCC south levee, the Sacramento River east levee, and the PGCC and NEMDC west
levees:

► Inadequate freeboard—The NCC south levee and portions of the Sacramento River east levee
are not high enough to provide at least 3 feet of freeboard above the 100-year water surface
elevation. Additional reaches do not provide 3 feet of freeboard above the 200-year design
water surface elevation.
► Underseepage and through-seepage vulnerability—Most of the levee reaches do not meet
recently adopted Federal criteria for safely containing underseepage and through-seepage
when the water surface in the adjacent channel reaches the 100-year elevation or, in some cases, the 200-year elevation.

The NLIP Landside Improvements project encompasses addressing freeboard deficiencies through levee raises; addressing seepage potential using a combination of seepage berms, cutoff walls, and relief wells; and acquiring additional right-of-way to construct the improvements and to prevent encroachment into the flood control system. In addition, the project has been designed to include an enlarged levee embankment (adjacent setback levee) along the landside of the existing Sacramento River east levee to minimize the need for substantial removal of vegetation and structural encroachments on the water side of this levee in compliance with Corps guidance. These improvements will include recontouring the levee slopes where necessary to provide a 3:1 horizontal-to-vertical (3H:1V) waterside slope and a 3H:1V (preferred) or 2H:1V (maximum) landside slope.

The specific goal of the NLIP Landside Improvements Project is to provide at least 100-year flood protection as quickly as possible while laying the groundwork to achieve at least urban-standard (200-year) flood protection over time.

Additional project objectives that influenced SAFCA’s project design were to:

1. use flood control projects in the vicinity of the Sacramento County Airport (Airport) to facilitate better management of Airport lands to reduce hazards to aviation safety, and

2. use flood control projects to enhance habitat quality and values by increasing the extent and connectivity of the lands in the Natomas Basin being managed to provide habitat for the giant garter snake, the state-listed threatened Swainson’s hawk (*Buteo swainsoni*), and other special-status species.

Recognizing the importance of securing maximum Federal support for the flood control project, SAFCA has explored implementation approaches that also advance the achievement of Federal aviation and wildlife protection objectives where complementary opportunities exist. Accordingly, the proposed project includes the following elements:

- The project will include construction of the GGS/Drainage Canal to provide giant garter snake habitat and some drainage infrastructure west of the Airport. Construction of these facilities will allow for dewatering of the ditch running along the western portion of the Airport runway system, which the airport recognizes as a flight safety hazard, by offsetting the effects on drainage and irrigation needs and GGS habitat.

- The project will combine SAFCA’s need for levee embankment and berm material with the Sacramento County Airport System’s need to modify the condition and management of Airport bufferlands to reduce wildlife hazards affecting Airport operations in a manner that enhances the connectivity of areas managed specifically for their habitat value.
Levee Modifications and Seepage Remediation

Sacramento River East Levee Reach A: 16–20

Phase 4b construction on the Sacramento River east levee will include improvements along Reach A: 16–20, a distance of approximately 3.4 miles. Phase 4b Project work along the Sacramento River east levee includes:

- construct an adjacent levee in Reach A:16–20;
- install either soil-bentonite (SB), cement-bentonite (CB), or SCB cutoff wall through the existing levee or along the landside toe of the existing levee in Reach A:19B–20;
- construct 100- to 300-foot-wide seepage berms in Reach A:16 through a portion of Reach A:19B;
- install relief wells, spaced at 60- to 100-foot intervals, approximately 20 feet beyond the toe of the seepage berm locations in Reach A:16–19B and along some of the entrance channels to the landside pump stations;
- establish a 50-foot-wide operations and maintenance access corridor and a 20-foot-wide utility corridor adjacent to the toe of the adjacent levee or seepage berm in Reach A:16–19A;
- establish a 10-foot-wide operations and maintenance access corridor and a 20-foot-wide utility corridor adjacent to the toe of the adjacent levee or seepage berm in Reach A:19B–20;
- remove trees and elderberry shrubs during the dormant season as needed from the levee improvement footprint (Reach A:16–20), which extends to 120–460 feet from the existing levee centerline.
- fill the portions of the Riverside Canal still used for irrigation (Reach A:16–18A) and the abandoned portion of the Riverside Canal (Reach A:18A–19B); the relocated Riverside Canal was addressed in the Phase 4a Project BA (SAFCA 2010);
- plant up to 10 acres of woodland groves in Reach A:16 on the Marsten and Wang parcel;
- reconstruct the Garden Highway intersections at Orchard Lane and 20 additional private parcel ramps; and
- clear vegetation clearing within the modified levee prism and easement.

The main construction staging areas will be located on parcels located in Reach A: 16–18 of the Sacramento River east levee. These areas will be fenced and used for the contractor’s and engineer’s construction trailers, parking for personnel, machine maintenance tools and parts, possibly water trucks, and the storage of fuels and other materials to be used for construction. The project right-of-way along the construction area also will be used for staging of construction materials and equipment. This analysis does not include staging areas since they have not been specified at this time. Consultation will need to be reinitiated at a later date to include an effects analysis of these areas if needed.

Site Preparation (Tree Removal, Clearing, Grubbing, and Stripping)

Site preparation will entail clearing structures and woody vegetation from the action area (Reach A:16–20) and stripping the top 12 inches of material from the landside slope of the existing levee and the footprint of the adjacent setback levee and seepage berm (as applicable). All vegetation in the operations and maintenance corridor within 15 feet of the levee toe or seepage berm will
be cleared. However, outside of this 15-foot zone, trees within the utility and operations and maintenance corridors will be avoided where feasible. Where trees cannot be retained, the permanent maintenance access corridor will be cleared but not stripped. Large roots, tree stumps, root balls, deleterious material, and below-ground infrastructure will then be grubbed from the working area. To the extent feasible, trees that must be removed from within the footprint will be removed during winter prior to the construction season to avoid disturbing the nesting behavior of special-status birds in spring. Trees suitable for relocation will be transplanted outside of the footprint to new woodland planting areas, where a substantial number of new trees will also be planted. Excess earth materials (organic soils, roots, and grass from borrow areas and the adjacent levee foundation, and excavated material that does not meet levee embankment criteria) will be re-spread on the surface of the new levee slopes and seepage berms, be used in the reclamation of borrow areas, or hauled off-site to landfills. Debris generated during the clearing and grubbing operations will be hauled off-site to landfills, concrete recycling plants, or cogeneration facilities.

Vegetation, particularly trees and elderberry shrubs, will be removed within the Phase 4b footprint of the Sacramento River east levee (Reach A: 16–20), as needed, during the vegetation dormant season. This footprint consists of the adjacent setback levee, a seepage berm, an operation and maintenance corridor, and a utility corridor, resulting in a total project footprint that ranges from approximately 120 to 460 feet wide. This operation will require removal of some trees and relocation/removal of elderberry shrubs, which occur mostly adjacent to existing roads. During winter, large trees will be felled approximately 3 feet above ground level, with stumps temporarily left in place. Logs will be cut into rounds for removal by contractors with handheld equipment and removed in light vehicles. Small trees and elderberry shrubs, where feasible, will be relocated to woodland conservation corridors that are part of the Phase 4b Project with conservation easements placed on them. A minimal amount of ground disturbance in specific areas will occur. During the GGS active season (after May 1 and before October 1), the stumps will be removed and the footprint cleared and grubbed completely to prepare for construction.

Relocation and Removal of Landside Structures, Irrigation Ditches and Other Facilities

Approximately 21 residences along the Sacramento River east levee and other farm structures that are within the footprint of the levee improvements will have to be removed or relocated farther from the flood damage reduction facilities before the start of levee construction in those areas. About 15 residences identified for removal are in Reach A: 16–18B and approximately 6 residences in Reach A:19A–20. Irrigation facility conveyance features, distribution boxes, wells, and standpipes within the project footprint of will be demolished and replaced as needed.

Power poles that currently exist on the landside slope of the levee and at the landside levee toe will need to be relocated and/or rerouted to accommodate the widened levee footprint. To the extent feasible, mainline utility poles will be relocated beyond the landside levee toe or berms. Should placing poles on top of the seepage berms be required, either raised foundations or steel-reinforced concrete piers will be constructed to prevent the poles from affecting the seepage berms. Some poles may need to be relocated to the water side of the existing levee. Tree
pruning will likely be required in some locations to accommodate the poles and wires. The relocations will be conducted in coordination with the utility companies and the construction operations. The Corps will review where power pole relocations will occur and reinitiate section 7 consultation with the Service if use of these sites may affect federally listed species.

Debris from structure demolition, power poles, utility lines, piping, and other materials requiring disposal will be hauled off-site to a suitable landfill. Wells and septic systems will be abandoned in accordance with the applicable state and county requirements.

*Construction of Adjacent Levee, Cutoff Walls, and Seepage Berms*

Borrow material from the borrow source will be delivered to the levee construction sites by scrapers or haul trucks where it will be spread by motor graders and compacted by sheepsfoot rollers to build the adjacent levee and seepage berms. The existing levee already meets height requirements, and the top of the new levee will be no higher than the elevation of the existing levee crown. The landside slope of the adjacent levee will be 3H:1V (horizontal feet:vertical feet) in Reach A:16–19A and vary in Reach A:19B–20 between 3H:1V to 2H:1V. In those areas where a cutoff wall is required, the adjacent levee will be built up a height approximately 5 feet above existing grade at the toe of the levee to create a working platform for cutoff wall installation. Three-foot-wide cutoff walls made of SB, CB, or SCB will be installed either through the existing levee or along the landside toe of the existing levee, with the top of the cutoff walls being at least 5 feet above existing ground surface and extending to a maximum depth of 110 feet below ground surface in some areas. Between Reach A: 16–20 borrow material will be spread and compacted for construction of the 120- to 300-foot-wide seepage berms.

*Installation of Relief Wells and Monitoring Wells*

Relief wells will be constructed at selected locations where the seepage berms cannot be wide enough or cutoff walls deep enough to meet the required seepage remediation design parameters. Relief wells will be constructed along some of the entrance channels to the landside pump stations. Relief wells will be spaced at 60- to 100-foot intervals approximately 20 feet beyond the toe of the berm and will extend to depths of between 60 to 80 feet below the ground surface. Relief well surface discharge near the seepage berm toe will flow into new collection ditches or existing roadside ditches that will convey the water to RD 1000 Pumping Plant Nos. 1A and 1B, or other parts of the interior drainage system.

*Reconstruction of Garden Highway at Intersections*

Where the cutoff wall will be constructed through the crown of the adjacent levee, reconstruction work on Garden Highway will be required to restore the landside lane of the roadway. Garden Highway intersections at Orchard Lane and 20 private parcel ramps, RD 1000 facility access ramps at RD 1000 Pumping Plants Nos. 1A and 1B, and City Sump 160 will require reconstruction to accommodate the adjacent levee. It is anticipated that Garden Highway will be extended up and onto the widened adjacent levee at these locations to meet with the secondary roads. Approach embankments at the intersections will be enlarged and entire intersections will
be repaved. Intersecting roadway embankments will be designed to meet Sacramento County roadway design criteria, typically extending the approach embankment approximately 600 feet outward from the adjacent levee. Traffic control measures and detours will be required during this phase of construction.

**Lands Disturbed**

Improvements to Reaches 16-20 of the Sacramento River East Levee will disturb and convert 30.32 acres of developed areas such as homes, roads, and other infrastructure, 33.23 acres of annual grassland, 5.56 acres of row and field crop, 4.16 acres of orchard, 1.37 acres of canals or ditches, and 25.62 acres of woodlands to 28.8 acres of developed area and 71.46 acres of managed grassland on the new levee and seepage berm. Five elderberry shrubs with 44 stems greater than one inch in diameter will be transplanted due to levee and seepage rehabilitation.

**American River North Levee Reach I: 1-4**

Construction of the proposed action along the American River north levee will include improvements from the Gateway Oaks Drive to Northgate Boulevard, a distance of approximately 2.3 miles. Phase 4b Project work along the American River north levee includes:

- a new levee slope (3H:1V) will be constructed adjoining the existing American River north levee from Station 0+00 to 115+71;
- installation of a SB, CB, or SCB cutoff wall through the existing levee or along the landside toe of the existing levee from Station 0+00 to 115+71;
- establishment of a 20-foot-wide operations and maintenance access corridor and a 10-foot-wide utility corridor adjacent to the levee toe;
- removal and/or transplantation of trees and elderberry shrubs during the dormant season as needed from the levee improvement footprint, which extends 106 feet landward from the existing levee centerline;
- removal of landside woodlands within 15 feet of the new levee slope to comply with Corps levee vegetation standards;
- reconstruction of the Garden Highway intersections at Natomas Park Drive, Truxel Road, Arden Garden Connector, Northgate Boulevard, and four additional private parcel ramps; and
- vegetation clearing within the modified levee prism and easement.

**Site Preparation (Tree Removal, Clearing, Grubbing, and Stripping)**

Site preparation for the American River North Levee Reach I is the same as described above under the Sacramento River east levee reaches 16-20. The footprint consists of the adjacent setback levee, a seepage berm, an operation and maintenance corridor, and a utility corridor, resulting in a total flood control footprint is approximately 106 feet wide from the existing levee centerline. This operation will require removal of some trees and relocation/removal of elderberry shrubs.
Reconstruction of Garden Highway Intersections

Garden Highway intersections at Natomas Park Drive, Truxel Road, Arden Garden Connector, Northgate Boulevard, and four additional private parcel ramps will require reconstruction to accommodate the installation of the cutoff wall and levee slope flattening. The ramps will be reconstructed to current general ramp and intersection geometry. Where alternate access to the private parcels is available, the private ramps will be removed and not replaced. The design will meet City of Sacramento roadway design criteria. Traffic control measures and detours will be required during this phase of construction.

Lands Disturbed

Improvements to Reaches 1-4 of the American River North Levee will disturb and convert 19.59 acres of developed areas such as homes, roads, and other infrastructure, 0.03 acre of annual grassland, and 6.91 acres of woodlands to 12.69 acres of developed area and 13.84 acres of managed grassland on the new levee and seepage berm. Five elderberry shrubs with 37 stems greater than one inch in diameter will be transplanted due to levee and seepage rehabilitation.

Pleasant Grove Creek Canal West Levee, Reach E

Phase 4b Project construction on the PGCC west levee will include improvements along the entire length of the PGCC, a distance of approximately 3.3 miles. Phase 4b Project work along the PGCC west levee includes:

- raising the west levee by 1–1.5 feet above the existing levee height to provide 3 feet of levee height above the 0.005 AEP water surface profile;
- flattening levee slopes to 3H:1V;
- establishing a 50-foot-wide operations and maintenance access corridor and a 20-foot-wide utility corridor adjacent to the levee toe;
- removing trees and elderberry shrubs during the dormant season as needed from the levee improvement footprint, which extends 313 feet landward from the existing levee centerline; and
- clearing vegetation within the modified levee prism and easement.

Site Preparation

Site preparation is as described above under Sacramento River east levee except trees are generally not present along the landside or waterside toe of the existing toe of the PGCC west levee. If trees are present in the action area of the PGCC, trees will be relocated or avoided as appropriate and described above under the “Sacramento River East Levee – Site Preparation” section.

Levee Raising

Levee raising will be carried out in a manner similar to the work completed on the NCC as part of the Phase 2 Project. To obtain three feet of levee height above the 0.005AEP water surface,
these levee sections will be raised approximately 1–1.5 feet above the existing levee height. The levee will be constructed to a 3H:1V waterside slope and a 5H:1V theoretical landside slope due to the landward setback of the Phase 3 Project construction. The Triangle Properties Borrow Area will be the most likely source for import material.

*Lands Disturbed*

Improvements to the PGCC will disturb 1.37 acres of developed areas such as homes, roads, and other infrastructure, 3.35 acres of annual grassland, 16.02 acres of rice, and 0.017 acre of landside woodlands. This area will be converted to 20.91 acres of developed area.

**Natomas East Main Drainage Canal West Levee, Reaches F-H**

Phase 4b Project construction on the NEMDC west levee will include improvements along the entire length of the NEMDC, a distance of approximately 6.8 miles. Phase 4b Project work along the NEMDC west levee includes:

- raising the NEMDC South west levee by 1–1.5 feet above the existing levee height to provide 3 feet of levee height above the 0.005 AEP water surface profile along a 500-foot-long section of the NEMDC west levee south of Elkhorn Boulevard from Station 313+00 to 318+50;
- raising the NEMDC North west levee by 1–2 feet above the existing levee height to provide 3 feet of levee height above the 0.005 AEP water surface profile from Elkhorn Boulevard to a point approximately 1 mile upstream of Elverta Road;
- flattening levee slopes to 3H:1V along the NEMDC North;
- installing either SB, CB, or SCB cutoff wall through the existing levee or along the landside toe of the existing levee along the NEMDC North;
- establishing a 20-foot-wide operations and maintenance access corridor and a 15-foot-wide utility corridor adjacent to the levee toe;
- removing trees and elderberry shrubs during the dormant season as needed from the levee improvement footprint, which extends 313 feet landward from the existing levee centerline; and
- removing riparian woodlands and landside woodlands within 15 feet of the levee toe along NEMDC west levee from Sankey Road south to the intersection with the Arden-Garden Connector.

**Levee Raising**

Levee raising will be carried out in a manner similar to the work completed on the NCC as part of the Phase 2 Project. To obtain three feet of levee height above the 0.005 AEP water surface, levee sections will be raised approximately 1–2 feet above the existing levee height. The levee will be constructed to a 3H:1V waterside and landside slope. The Triangle Properties Borrow Area and the Krumenacher site will be the most likely source for import material.
Lands Disturbed

Improvements to the NEMDC will disturb 26.72 acres of developed areas such as homes, roads, and other infrastructure, 66.38 acres of annual grassland, 30.79 acres of fallow crops, 0.02 acre of canals or ditches, 0.03 acre of marsh, 22.48 acres of rice, 0.01 acre of seasonal wetlands, 2.09 acres of landside woodlands, and 0.74 acre of waterside woodlands. This area will be converted to 28.8 acres of developed area and 120.46 acres of managed grassland on the new levee and seepage berm.

Major Irrigation and Drainage Infrastructure Modifications

West Drainage Canal

Currently, the West Drainage Canal is characterized by mostly barren, steep banks with little or no cover or foraging habitat for GGS. This condition extends over several miles of the lower canal system. Improvements to the West Drainage Canal will be designed to enhance GGS corridor habitat compared to the existing habitat conditions found on the West Drainage Canal south of I-5 and to increase the functional values of the managed wetlands complex on the west side of Fisherman’s Lake. The canal abuts the north and east sides of TNBC’s Rosa Preserve for approximately 1.5 miles at the east end of the lower canal.

Improvements to the West Drainage Canal include realignment of an approximately 1 mile portion of the West Drainage Canal near Reach 11A of the Sacramento River east levee and modifications to the existing canal. The proposed realignment of the West Drainage Canal is designed to lessen the canal’s potential as a wildlife attraction hazard for Airport operations by relocating the western portion of the canal farther away from the airport operations area. The realigned West Drainage Canal has been designed to improve the continuity of the canal corridor for movement of GGS between Fisherman’s Lake managed wetlands and other managed wetlands and rice fields in the northern part of the Natomas Basin by creating a shoreline band of GGS habitat.

Canal Alignment

Habitat features will be designed into the realigned portion of the canal (in the vicinity of Reach 11A of the Sacramento River east levee) and added to the north bank of the existing canal between the realigned portion of the canal and Powerline Road and to the south bank between Powerline Road and the Fisherman’s Lake slough. The new alignment will abandon and reroute approximately 4,700 feet of the West Drainage Canal. The modified West Drainage Canal, which will require a right-of-way of up to 150 feet for approximately 1.2 miles, will have a bottom width of up to 30 feet, stable 3H:1V bank slopes on one or both sides, and a narrow, variable width bench on one side of the canal. A 20-foot-wide maintenance and inspection road will flank each side of the canal and will be slightly elevated above adjacent land to improve an all-weather road condition. Culverts will cross under the patrol road to allow continued drainage into the canal from adjacent fields. The realignment will include re-routing of a small section of the West Drainage Canal (starting at the M10 Drain south of I-5, which leads to RD 1000’s
Pumping Plant No. 5) to a north-south orientation to improve the management of adjacent agricultural parcels, and to move the canal farther from the Airport Operations Area in the vicinity of the west runway. Regrading of agricultural parcels between new and old canal alignment may be required for drainage. The normal managed water depth for this reach of the West Drainage Canal will be 6–7 feet in winter and 7–8 feet in summer under both existing and proposed conditions.

Opportunities to improve the existing West Drainage Canal are constrained by the existence of a row of power line poles located on the south side of the West Drainage Canal west of Powerline Road and on the north side of the canal east of Powerline Road. Because the poles are close to the top of the canal bank, canal improvements will not be feasible on both sides of the canal unless the power line poles were relocated farther away. Therefore, improvements will be focused on the north bank of the canal west of Powerline Road (east of the realigned portion) and the south bank of the canal east of Powerline Road. No improvements will be made to the south bank west of Powerline Road, and only a 20-foot-wide right-of-way for a maintenance road will be added to the north bank east of Powerline Road.

On the north side of the West Drainage Canal west of Powerline Road and the south side of the canal east of Powerline Road, the steep bank will be laid back to a stable 3H:1V slope to prevent ongoing bank slumping and reduce the need for future bank repairs and sediment removal. In these locations, the easement will be expanded between 25 and 35 feet to accommodate flattening of the banks, widening the maintenance road, and adding a 15- to 20-foot-wide setback between the road and adjacent crop fields to place and dry canal sediment and floating debris. Suitable excavated material from laying back the canal bank will be used to elevate an all-weather road above the existing field grade. Besides flattening to a 3H:1V slope, bank improvements will include creating a 2- to 10-foot-wide submerged bench with tule growth to prevent aquatic weeds such as water primrose from attaching to the bank and then expanding across the canal water surface. Bank width will vary depending upon site constraints.

Clearing and Grubbing/Stripping

Prior to construction of the realigned West Drainage Canal, the canal right-of-way surface will be cleared and stripped to a depth of 4 to 6 inches, with removal of low-growing vegetation and loose surface soils. Additional over-excavation up to 3 feet deep may be required if materials not suitable for embankment foundations are encountered. Earthen materials removed during this stage will be stockpiled for reuse in embankments, topsoil re-spread, or adjacent berm construction. Non-earthen materials that are not suitable for reuse in embankments will be wasted and hauled off-site. Natural gas pipelines, gas wells, and other gas facilities will be avoided or reconfigured in design of the new West Drainage Canal.

Erosion Control and Demobilization/Cleanup

Erosion control measures will be installed prior to the start of construction and maintained throughout the duration of the construction to minimize sedimentation of adjacent waterways. A hydroteam truck will be used at the end of the construction to seed any disturbed area. Water
trucks will be used throughout construction to control dust in any disturbed areas. Following construction, all disturbed areas will be vegetated and the construction site will be generally cleaned up including hauling off unused and waste materials. All construction equipment will be taken off-site.

*Lands Disturbed*

Modification to the West Drainage Canal will disturb 0.06 acre of annual grassland, 25.36 of row and field crops, 3.10 acres of fallow crops, 12.96 acres of canals or ditches, and 2.06 acres of rice. This area will be converted to 28.06 acres of developed area and 15.48 acres of canals.

*Riego Road Canal*

A portion of an irrigation canal owned by Natomas Central Mutual Water Company (NCMWC) will be disrupted by the proposed improvements to the NEMDC west levee (Reaches F–G). The affected portion includes approximately 4,000 feet of irrigation canal, approximately 250 feet of buried irrigation piping and culverts, and several irrigation control turn-out structures. These facilities will be relocated outside of the levee footprint as part of the Phase 4b Project. To prevent disruption of irrigation service, the NCMWC irrigation system will be replaced with in-kind facilities compatible with the new levee footprint. The new canal will be a highline canal with 3H:1V side slopes and a maintenance road on each of the embankments. A right-of-way of up to 100 feet beyond the new levee footprint will be required for the new facility.

*Lands Disturbed*

Modification to Riego Road Canal will disturb 0.70 acre of canals or ditches and 6.43 acres of rice. This area will be converted to 0.70 acre of managed grassland and 6.43 acres of canals.

*Private Irrigation Ditches and Groundwater Wells*

*Sacramento River East Levee Reach A: 16-20*

Several private irrigation water wells are located in the vicinity of Bryte Bend Road and Garden Highway. The wells at the southeast end of the Riverside Canal (Reach 18) adjacent to Bryte Bend Road will be disrupted by the proposed levee improvements and will be relocated as part of the proposed action. This well discharges directly to the existing Riverside Canal for irrigation service to the adjacent fields for agricultural use. The water well will be relocated outside of the flood control footprint (by drilling replacement wells and abandoning the existing well) and sited at least 100 feet off of the adjacent levee or seepage berm toe. To prevent disruption of service in the fields, the private irrigation well will be replaced with in-kind facilities compatible with the new levee footprint.

Depths of the proposed new and replacement wells on the landside of the Sacramento River east levee will typically range from 200 to 500 feet. Final depth will be determined after exploratory
drilling to evaluate yield of water-bearing strata. Agricultural wells will generally be 16 inches in diameter.

Well construction will begin with drilling of one exploratory hole (test boring) at each potential well site to identify the water-bearing strata: These data are used to evaluate preliminary design and to select well construction materials. Drilling of the exploratory holes will generally use mud rotary drilling methods which will utilize drilling muds (bentonite). For each test boring, a drill rig will be used to drill a 6- to 8-inch diameter test hole up to 500 feet in depth. Following completion of the test boring, the hole will be backfilled with the boring cuttings and bentonite.

For construction of each well, an outer casing and seal will initially be constructed to stabilize the hole and prevent contamination of lower soil layers during drilling process. An outer casing hole, generally 36-inch or less in diameter, will initially be drilled to approximately 50 to 60 feet deep, lined with a steel casing, and the annular space outside of casing will be filled with grout. After the grout has set, the well hole will be drilled up to 500 feet deep. The well casing will be steel pipe with wire-wrapped well screen or perforated casing set at water bearing layers. After installation, the annular space around the casing and screens will be packed with gravel, and the upper approximately 50 feet will be sealed with grout. For the larger wells, the well casing will be 16-inch diameter or less and the bore holes will be sized for a 4- to 6-inch thick gravel pack in the annular space.

The final phase of construction will be well development, test pumping, and disinfection. Development will consist of swabbing or scouring the well with drilling equipment and pumping to consolidate gravel pack and remove fines and drilling fluid. Test pumping will be performed to establish the well yield and drawdown for final pump selection. Finally, the well will be disinfected with chlorine treatment, and a temporary cap will be installed. Well water from test pumping will be discharged into existing irrigation facilities which the well serves, discharged into drainage ditches, or discharged directly onto adjacent agricultural fields.

Pumps will be installed in each well. For the mitigation wells, submersible pumps will normally be used. For the agricultural wells, a 6- by 6-foot concrete pad will be constructed at ground level to provide for mounting a vertical turbine well pump. A service pole with meter and control panel will need to be installed near each well to provide overhead electrical service.

Demolition of the existing wells will be performed in accordance with Sutter or Sacramento County regulations. Well equipment will be removed and salvaged or hauled away. The well pump bases and casing will be cut below surrounding grade. Abandonment will generally require grouting the well.

*Natomas East Main Drainage Canal*

Numerous private irrigation facilities along the NEMDC will be disrupted by the proposed levee improvements and will therefore be relocated as part of the proposed action. These private facilities include nine landside water wells that provide irrigation for cultivation of adjacent fields. The water wells will be relocated outside of the Phase 4b Project footprint (by drilling
replacement wells and abandoning existing wells) and sited at least 100 feet off of the future levee toe. In addition to the wells, approximately 1,500 feet of local field irrigation ditches and approximately 2,500 feet of buried irrigation piping will be relocated. To prevent disruption of service in the fields, the private irrigation systems will be replaced with in-kind facilities compatible with the new levee footprint.

_Pleasant Grove Creek Canal_

Numerous private irrigation facilities along the PGCC west levee will be disrupted by the proposed levee improvements and will be replaced as part of the proposed action. These private structures, consisting of eight landside water wells and one private river pump, service the adjacent fields for agricultural use. The water wells will be relocated outside of the Phase 4b Project footprint (by drilling replacement wells and abandoning the existing wells). The river pump discharge pipes through the levee will be raised and a new positive control valves and an air release/siphon breaker valve will be added. In addition to the wells and river pump, approximately 1,900 feet of local irrigation canals and approximately 2,200 feet of buried irrigation piping will be relocated. To prevent disruption of service in the fields, the private irrigation facilities will be replaced with in-kind structures compatible with the new levee footprint. Some RD 1000 drainage facilities will be relocated prior to PGCC construction, including approximately 5,900 feet of drainage canal and 750 feet of pipe.

_Lands Disturbed_

Modification to private irrigation relocations will disturb 0.26 acre of developed areas such as homes, roads, and other infrastructure, 2.85 acres of annual grassland, 0.02 acre of canals or ditches, and 13.11 acres of rice. This area will be converted to 16.24 acre of canals.

_Natomas Cross Canal South Levee Ditches_

Along the NCC south levee, between Stations 19+00 to 97+00, the Vestal Drain ditch runs parallel to the landside toe of the levee. The geotechnical analyses of the ditch in its present location results in unacceptable seepage gradients at the base of the canal. From Stations 199+00 to 244+00, the Morrison Irrigation Canal has similar gradient problems. Both canals will be removed and replaced as part of the proposed action. Replacement canals will be constructed 400 feet from the existing landside toe of slope. The new canal size will be designed with 3H:1V side slopes. It is anticipated that there will be a balance of fill material available to fill the old canal with the material excavated from the new canal. About 125,000 cubic yards will be excavated for the new canals and used to backfill the old canals.

Modification to the Morrison Canal and Vestal Drain will disturb 0.95 acre of developed areas such as homes, roads, and other infrastructure, 2.58 acres of annual grassland, 7.16 acres of fallow crops, 0.15 acre of canals or ditches, and 26.17 acres of rice. These areas will be converted to 37.01 acres of canals.
Modifications to Pumping Plants

Modification of RD 1000’s Pumping Plant Nos. 1B, 6, and 8

The existing discharge pipes at RD 1000’s Pumping Plant Nos. 1B, 6, and 8, which are within the limits of work for the proposed action, will be raised to cross the levee above the new 0.005 AEP water surface design. All pumping plants will require new discharge pipes and some additional modifications to accommodate the new criteria and levee improvements. The existing pumps will require modification or replacement to allow similar performance after the levee improvements and pipe raising. To mitigate for levee undereepage potential, relief wells and channel modifications to the pumping plant intake channels will be required. As design evaluations continue and the design is refined, additional modifications could be required to maintain the plant’s current operations, such as adding relief wells and lining the intake channel with either filter gravel or rock-covered geotextile fabric. In addition, relocating the pump stations may be necessary to accommodate the adjacent levee footprint.

Pumping Plant No. 1B - Pumping Plant No. 1B, located along Garden Highway approximately 1 mile west of Interstate 5 (I-5) and immediately adjacent to the landside levee toe in Reach 19B, consists of six pumps, a control-room building, and associated infrastructure for the pumping plant. Each pump for Pumping Plant No. 1B connects to a buried 48-inch discharge pipe that runs across the existing levee to an outfall structure on the east bank of the Sacramento River. Six air/siphon release valves, one for each pipe, are located close to the crown of the levee in a vault on the waterside of the levee. A metering vault is located on the landside of the levee. The pumping-plant modifications will include raising and replacing the discharge pipes that extend from Pumping Plant No. 1B across the levee within the confines of the planned levee construction to tie into the existing discharge pipes on the waterside. The air/siphon release valves will be replaced and shutoff valves will be added. The valves will be constructed in a new concrete vault in the waterside shoulder of the levee. The metering vault along with the plant access ramp may also be replaced or relocated. The pumps and motors will also be replaced and/or upgraded to account for the higher head associated with the raised discharge pipes.

To facilitate raising of the pump discharge pipes, Garden Highway will require a local raise of several feet in grade over the pipes. The road raise will transition back down to existing grade upstream and downstream of the local raise. This work will require partial regrading of the waterside slope for the length of the raised Garden Highway. The levee will transition upstream and downstream of this site from an adjacent levee to a raise of the existing levee in place. The levee at this site will require degrade and reconstruction with engineered fill.

Modification to Pumping Plant No. 1B will disturb 0.02 acre of waterside woodlands. This area will be converted to 0.02 acre of developed area.

Pumping Plant No. 6 - Pumping Plant No. 6 is located along the NEMDC, approximately three-quarters of a mile north of Elkhorn Boulevard. An excavated intake channel connects to the pumping plant. Four pumps, a control-room building, and associated infrastructure for the pumping plant are located immediately adjacent to the landside levee toe. Each pump for
Pumping Plant No. 6 connects to a buried discharge pipe that crosses the existing levee and connects to an outfall structure on the NEMDC. These pipes consist of one 42-inch pipe, two 36-inch pipes, and one 30-inch pipe. Four air/siphon release valves, one for each pipe, are located close to the NEMDC on the waterside of the levee.

The pumping-plant modifications will include raising and replacing the discharge pipes that extend from Pumping Plant No. 6 across the levee to tie into the existing discharge pipes within the waterside of the levee. The air/siphon release valves will be replaced and shutoff valves will be added. The valves will be constructed in a concrete vault in the waterside shoulder of the levee.

An upgrade to and/or replacement of the pumps, motors, and the electrical service including a new electrical building for Pumping Plant No. 6 will be required to provide the increased horsepower needed to pump over the levee. Use of new pumps could require the excavation of a deeper sump, which may require some associated modifications to the landside intake channel. To facilitate raising of the pump discharge pipes, East Levee Road will require a local raise in grade over the pipes. The road raise will transition back down to existing grade upstream and downstream of the local raise. This work will require partial regrading of the waterside slope for the length of the raised East Levee Road. The levee will transition upstream and downstream of this site from an adjacent levee to a raise of the existing levee in place. The levee at this site will require degrade and reconstruction with engineered fill. Traffic control measures and detours will be required during pipe removal and replacement under East Levee Road.

The pipe raise will require a new outfall to comply with the Corps siphon recovery limits criteria, which limit the distance from the top of the apex of the pipe to the top of the outlet pipe. Construction of a new outfall structure will require dewatering a portion of the NEMDC.

Modification to Pumping Plant No. 6 will disturb 0.86 acre of annual grassland, 0.06 acre of canals or ditches, and 0.04 acre of marsh. This area will be converted to 0.90 acre of developed area and 0.06 acre of canal.

Pumping Plant No. 8 - Pumping Plant No. 8 is located along the NEMDC, approximately two-thirds of a mile north of I-80. An excavated intake channel is located on the west side of Northgate Boulevard, and nine pumps and an equipment building are located immediately adjacent to the pump station on the west side of Northgate Boulevard. Each pump for Pumping Plant No. 8 connects to a buried discharge pipe that runs across the existing levee to an outfall structure on the NEMDC. There are a total of nine pipes, including five 54-inch pipes, three 36-inch pipes, and one 60-inch pipe. Nine air/siphon release valves, one for each pipe, are located close to the NEMDC on the waterside of the levee.

The pumping-plant modifications will include raising and replacing the discharge pipes that extend from Pumping Plant No. 8 across the levee to tie into the existing discharge pipes within the waterside bench. The air/siphon release valves will be replaced and shutoff valves will be added. The valves will be constructed in a concrete vault in the waterside shoulder of the levee.
The pumps will also be replaced and/or upgraded to account for the higher head associated with the raised discharge pipes.

An upgrade to and/or replacement of the pumps, motors, and the electrical service including a new electrical building for Pumping Plant No. 8 will be required to provide the increased horsepower needed to pump over the levee. Use of new pumps could require the excavation of a deeper sump, which may require some associated modifications to the landside intake channel. To facilitate raising of the pump discharge pipes, the existing bike trail will require a local raise in grade over the pipes. The trail raise will transition back down to existing grade upstream and downstream of the local raise. This work will require partial regrading of the waterside slope for the length of the raised bike trail. The levee at this site will require degrade and reconstruction with engineered fill. A detour or closure of the bike trail will be required for up to 30 days. Likewise, the pipes will need to be replaced under Northgate Boulevard.

The pipe raise will require a new outfall to comply with the Corps siphon recovery limits criteria, which limit the distance from the top of the apex of the pipe to the top of the outlet pipe. Construction of a new outfall structure will require dewatering a portion of the NEMDC.

Modification to Pumping Plant No. 8 will disturb 0.29 acre of annual grassland, 0.45 acre of canals or ditches, and 0.39 acre of marsh. This area will be converted to 0.68 acre of developed area and 0.45 acre of canal.

City of Sacramento Sump Pumps

The City of Sacramento owns and operates several storm drainage sump pumps to pump residential and urban stormwater out of the Basin. Under the new levee performance criteria, the discharge pipes are required to cross the levee above the new 0.005 AEP design water surface. Therefore, the discharge pipes will be raised and additional modifications will be made to bring all of the pumping plants into compliance with the new criteria. As design evaluations continue and the design is refined, additional modifications could be required to maintain the City Sump 102's current operations. In addition, relocating the pump stations away from the levee may be necessary to accommodate the adjacent levee footprint. The Corps will review any pump station relocations and reinitiate section 7 consultation with the Service if the relocations may affect federally listed species.

City Sump 160 (Sacramento River East Levee Reach A:19B) - City Sump 160 is located along Reach 19B of the Sacramento River east levee. A 90-inch storm drain carries stormwater drainage from adjacent properties to the pump station. A chain link fence with slats and barbed wire is located approximately 30 feet from the landside toe of the levee and, combined with a concrete block wall, surrounds the pump station. Five pumps, an equipment building, an aboveground diesel fuel storage tank, and electrical transformers are located behind the fence. Each pump for City Sump 160 connects to a buried steel discharge pipe that runs across the existing levee to an outfall structure on the Sacramento River. There are a total of five pipes, including two 54-inch pipes, two 42-inch pipes, and one 12-inch pipe. Five air/siphon release valves, one
for each pipe, are located on the landside of the levee near the top. A concrete pipe support wall is located approximately 100 feet from the outfall on the waterside of the levee.

The pumping-plant modifications will include raising the discharge pipes that extend from City Sump 160 across the levee to tie into the existing discharge pipes on the waterside. The air/siphon release valves will be replaced and shutoff valves will be added. The valves will be constructed in a concrete vault in the waterside shoulder of the levee. If necessary, the concrete pipe support wall will be removed and replaced. An upgrade to the pumps and diesel engines for City Sump 160 will likely be required to provide the increased horsepower needed to pump drainage water through the raised pipes.

To facilitate raising of the pump discharge pipes, Garden Highway will require a local raise in grade over the pipes. The road raise will transition back down to existing grade upstream and downstream of the local raise. This work will require partial regrading of the waterside slope for the raised Garden Highway. The levee will transition upstream and downstream of this site from an adjacent levee to a raise of the existing levee in place. The levee at this site will require degrade and reconstruction with engineered fill. The pipe raise will require a new outfall to comply with the Corps siphon recovery limits criteria, which limit the distance from the top of the apex of the pipe to the top of the outlet pipe. Construction of a new raised outfall structure will require dewatering a portion of the Sacramento River.

Modification to City Sump 160 will disturb 0.03 acre of seasonal wetland and 0.28 acre of waterside woodlands. This area will be converted to 0.31 acre of developed area.

City Sump 58 (American River North Levee) - City Sump 58 is located along the American River North Levee approximately 0.4 mile east of Truxel Road. A 30-inch storm drain carries stormwater drainage from adjacent properties to the pump station. A chain link fence with slats and barbed wire is located at the landside toe of the levee and surrounds the pump station. Three pumps, an equipment building, trash rack hoist, and electrical transformer are located immediately adjacent to the landside levee toe. Each pump for City Sump 58 connects to a buried discharge pipe that runs across the existing levee to an outfall structure on the NEMDC. There are three pipes, including two 20-inch pipes and one 12-inch pipe. Three air/siphon release valves, one for each pipe, are located close to Garden Highway on the landside of the levee. A concrete cutoff structure located within the pipe trench surrounding the pipes is located on the waterside of the levee.

The pumping-plant modifications will include replacing the discharge pipes that extend from City Sump 58 across the levee to tie into the existing discharge pipes on the waterside. The cutoff structure will be removed. The air/siphon release valves will be replaced and shutoff valves will be added. The valves will be constructed in a concrete vault in the waterside shoulder of the levee. An upgrade to the pumps, motors, and the electrical service for City Sump 58 will be required to provide the increased horsepower needed to pump through the raised pipes.
To facilitate raising of the pump discharge pipes, Garden Highway will require a local raise in grade over the pipes. The road raise will transition back down to existing grade upstream and downstream of the local raise. This work will require partial regrading of the waterside slope for the length of the raised Garden Highway. The levee at this site will require degrade and reconstruction with engineered fill.

The pipe raise will require a new outfall to comply with the Corps siphon recovery limits criteria, which limit the distance from the top of the apex of the pipe to the top of the outlet pipe. Construction of a new raised outfall structure will require dewatering a portion of the low-flow channel of the NEMDC within the American River floodway.

In addition, this pump station may need to be relocated as a seepage and stability mitigation measure because of the proximity of the pumps to the toe of the levee. Any landward shift in the levee toe will impact City Sump 58. The reconstructed City Sump 58 will consist of a cast-in-place concrete sump, with a trash rack and operating deck. An enclosure building will be provided to house the electrical, control, and monitoring equipment. The existing storm drain will need to be modified. Related infrastructure, such as access roads and utilities that serve City Sump 58 and are located within the levee footprint, will be relocated outside the footprint.

Modification to City Sump 58 will disturb 0.08 acre of waterside woodlands. This area will be converted to 0.08 acre of developed area.

City Sump 102 (Natomas East Main Drainage Canal at Gardenland Park) - City Sump 102 is located along the NEMDC west levee adjacent to Gardenland Park north of Bowman Avenue. A 60-inch storm drain carries stormwater drainage from adjacent properties to the pump station. A chain link fence with slats and barbed wire is located at the landside toe of the levee and surrounds the pump station. Four pumps, trash rack hoist, electrical transformer, and an equipment building are located immediately adjacent to the landside levee toe. Each pump for City Sump 102 connects to a buried discharge pipe that runs across the existing levee to an outfall structure on the NEMDC. There are four pipes, including three 36-inch pipes and one 12-inch pipe. Four air/siphon release valves, one for each pipe, are located on the waterside of the levee near the top of the levee.

The pumping-plant modifications will include replacing the discharge pipes that extend from City Sump 102 across the levee to tie into the existing discharge pipes within the waterside bench. The air/siphon release valves will be replaced and shutoff valves will be added. The valves will be constructed in a concrete vault in the waterside shoulder of the levee. An upgrade to the pumps, motors, and the electrical service for City Sump 102 will be required to provide the increased horsepower needed to pump through the raised pipes.

To facilitate raising of the pump discharge pipes, the bike trail will require a local raise in grade over the pipes. The trail raise will transition back down to existing grade upstream and downstream of the local raise. This work will require partial regrading of the waterside slope for the length of the raised bike trail. The levee will transition upstream and downstream of this site.
from an adjacent levee to a raise of the existing levee in place. The levee at this site will require
degradation and reconstruction with engineered fill.

The pipe raise will require a new outfall to comply with the Corps siphon recovery limits criteria,
which limit the distance from the top of the apex of the pipe to the top of the outlet pipe.
Construction of a new raised outfall structure will require dewatering a portion of the NEMDC.

In addition, this pump station may need to be relocated as a seepage and stability mitigation
measure because of the proximity of the pumps to the toe of the levee. Any landward shift in the
levee toe could also require relocation of City Sump 102. The reconstructed City Sump 102 will
consist of a cast-in-place concrete sump, with a trash rack and operating deck. An enclosure
building will be provided to house the electrical, control, and monitoring equipment. The
existing storm drain will need to be modified. Related infrastructure, such as access roads and
utilities that serve City Sump 102 and are located within the levee footprint, will be relocated
outside the footprint.

Modification to City Sump 102 will disturb 0.09 acre of annual grassland and 0.11 acre of canals
or ditches. This area will be converted to 0.09 acre of disturbed area and 0.11 acre of canal.

**Bank Protection and Other Waterside Improvements**

Erosion repair and rock slope protection are required at locations where erosion around the
outfall structures penetrating the PGCC and NEMDC levees has been observed. Additional
remediation to protect against damage caused by beavers and burrowing animals is needed along
the PGCC west levee and the NCC south levee, from State Route (SR) 99 to Howsley Road.
Finally, a portion of the low-flow channel of the NEMDC will be reconstructed.

**Bank Protection**

Along the PGCC and NEMDC, six erosion sites have been identified for levee slope erosion
repair, placement of rip rap, and/or channel realignment. All of the locations are at the
confluences of tributary streams where the channel of PGCC or NEMDC has migrated to the
west and threatens or has damaged the right levee. These include four sites along the PGCC west
bank (at Curry Creek, Pleasant Grove Creek, Howsley Road Bridge, and Pierce-Roberts Drain)
and two sites along the NEMDC west bank (at Dry Creek and Arcade Creek). As described
below, bank protection will be constructed along the PGCC (Reach E) and NEMDC South
(Reach H) to address the waterside erosion sites.

The bank protection areas on the west bank of the PGCC at Curry Creek, Pleasant Grove Creek,
and Pierce-Roberts Drain range from 300–400 feet in length. At Curry Creek and Pleasant Grove
Creek, riprap will be placed on the west levee waterside slopes opposite the confluences with
Curry and Pleasant Grove Creeks, extending from the waterside toe to the top of slope for about
50 feet upstream and 100 feet downstream of the confluences. The rock will likely be covered
with soil and grass. Riprap armor will also occur opposite the outlet of the Pierce-Roberts
Drain. Rock or other protection will be placed along the Howsley Road Bridge embankment and
along the landside of the PGCC west levee near the Howsley Road gap to prevent erosion from undermining the gap or affecting the landslide slope. Investigations are ongoing to determine if riprap should be placed around the left (west) abutment of the Howsley Road Bridge.

The linear extent of the proposed protection on the west bank of the NEMDC at the confluence with Dry Creek is approximately 2,500 feet. Proposed protection will include rock fill to bring the waterside bench up to existing grade, a rock blanket to stabilize the existing 2:1 bank slope below the bench, and a blanket of rock on the waterside toe to help minimize scour (launchable toe). The linear extent of the proposed protection on the west bank of the NEMDC at the confluence with Arcade Creek is approximately 400 feet. Proposed protection will include a variable width bench, a rock riprap blanket on the slope, and a launchable toe.

Erosion repair at six sites along the PGCC and NEMDC will disturb 2.52 acres of developed areas such as homes, roads, and other infrastructure, 3.35 acres of annual grassland, 1.09 acres of canal or ditch, and 6.12 acres of marsh. These areas will be converted to 13.08 acres of developed area.

**Beaver Exclusion Wall**

The PGCC west levee and the NCC south levee between SR 99 and Howsley Road also experience a significant problem with beavers and other burrowing animals. To provide low-maintenance mitigation for this concern, a beaver exclusion wall will be constructed in these areas. The wall will be constructed of reinforced concrete or steel or vinyl sheet piling, and will be located at the waterside levee toe at a distance of about 50 feet from the levee centerline. The top of the wall will be located above the ordinary high water mark, and the bottom of the wall will reach as deep as 20 feet. The wall will be completely submerged in the levee.

Modification to the PGCC west levee and NCC south levee to create a beaver wall will disturb 0.57 acre of developed areas such as homes, roads, and other infrastructure, 17.28 acres of annual grassland, 2.05 acres of marsh, and 0.37 acre of stream. This area will be converted to 20.27 acres of developed area.

**Low-Flow Channel Restoration**

The NEMDC low-flow channel beneath and downstream of I-80 has been disturbed by the City of Sacramento Pump Station 157 outfall structure. The outfall has caused the low-flow channel to meander towards the west (right) bank of the channel, which could eventually weaken the existing NEMDC west levee. To fix this problem, the low-flow channel will be reconstructed at the middle of the channel. This reconstruction will be accomplished by creating a diversion for the existing stream flow, filling the existing low-flow channel, and excavating a new low-flow channel. The total length of the channel realignment will be about 1,000 feet. A rock berm will be placed between the low-flow channel and Sump 157 to minimize the impact of the pump station discharge on the west levee.
**Natomas Cross Canal Bridge Remediation at State Route 99**

The undersides of the SR 99 bridges over the NCC will be affected by high river stages in a flood event. The southern abutment for both bridges is supported by the NCC south levee. The Phase 4b Project includes the construction of a moveable barrier system or a stop log gap at the south end of the SR 99 bridges to be used at high river stages to prevent overflow from reaching the landside of the NCC south levee. The bridge deck connections to the supporting piers and abutments will be modified as needed to resist uplift pressure during high water stages and additional seepage remediation, consisting of seepage cutoff walls where the bridges cross the NCC south levee (Reach D:6), will be installed.

Providing closure at SR 99 will entail constructing a removable barrier that will be stored off-site and installed across the roadway on the south side of the bridge when the NCC stage reached a pre-established elevation. To support the removable barrier, a permanent structure constructed at and adjacent to the highway will be constructed. The permanent support system will tie into levee raising work completed as part of the Phase 2 Project.

Underseepage mitigation at the bridges will be provided by a SCB cutoff wall constructed by the Deep-Mix Method (DMM) through the highway road section. The cutoff wall will be constructed through the centerline of the levee through the SR 99 roadway section to a depth of up to 95 feet.

Modification to the SR 99 bridges will disturb 0.76 acre of developed areas such as homes, roads, and other infrastructure, 0.92 acre of annual grassland, and 0.69 acre of canals or ditches. This area will be converted to 2.37 acres of developed area.

**Reclamation of Borrow Sites**

The South Fisherman's Lake, Triangle Properties Borrow Area, and the West Lakeside School Site are areas that have been identified as sources of soil borrow for construction of the Phase 4b Project. However, additional borrow sites already described in the biological assessments for the Phase 3 and 4a Projects, including the Fisherman's Lake Borrow Area, Krumancher Borrow Site, and the Twin Rivers Unified School District Stockpile Site, may be utilized if the borrow sites are not able to supply all of the required fill material. Borrow material will be excavated from primarily agricultural lands that either are currently fallow or produce row or field crops. These sites may also contain scattered rural housing, drainage and irrigation features, and woodlands. The excavation limits on the borrow sites will provide a minimum buffer of 50 feet from the edge of the borrow site boundary. However in areas with adjacent drainage features the borrow sites grading may extend into the canal bank with a new patrol road constructed along the top of bank. From the property line boundary setback, the slope from existing grade down to the bottom of the excavation will be no steeper than 3H:1V. After excavation, disturbed areas will be finish graded in compliance with criteria for drainage of reclaimed land uses. Excavated soils not used for borrow material, such as the organic surface layer or soils considered unsuitable for levee construction, will be stockpiled and re-spread on-site after excavation. For areas planned to be returned to agricultural use, approximately 1 foot of topsoil will be removed and stockpiled for reuse during reclamation of the site. Sites will be reclaimed for use and either returned to
agriculture or used for detention basin creation in the Triangle Properties Borrow Area. Revegetation activities will include erosion control on excavated slopes (i.e., hydrosed, application of fertilizer, and seeding.

Fisherman’s Lake Borrow Area, Krumenacher Borrow Site, and the Twin Rivers Stockpile Site

The 469-acre Fisherman’s Lake Borrow Area consists of multiple parcels beginning at Powerline Road and extending south to and beyond Radio Road. Impacts associated with use of the Fisherman’s Lake Borrow Area were addressed in the Phase 4a Project BA.

The 118-acre Krumenacher Borrow Site and the Twin Rivers Stockpile Site are located south of Elkhorn Boulevard, adjacent to the NEMDC South west levee. Impacts associated with use of these areas as a borrow source and stockpiling area were addressed in the Phase 3 Project BA.

Triangle Properties Borrow Area

The 1,808-acre Triangle Properties Borrow Area consists of multiple parcels along the east levee of the PGCC extending west toward the Union Pacific Railroad line. Existing land uses include developed, pasture, orchard, field crops, and rice cultivation. Some undeveloped lands in the Triangle Properties Borrow Area contain vernal pool habitat; these areas will not be used for borrow operations. Approximately 143 acres of the Triangle Properties Borrow Area will be available for excavation of borrow material. This area is currently in rice cultivation. Borrow activities would not remove the area from production for longer than once season. The areas excavated for borrow material will be reclaimed as rice. The Corps will place a conservation easement on half of the total area used for borrow.

South Fisherman’s Lake Borrow Area

The 269-acre South Fisherman’s Lake Borrow Area is located north and south of San Juan Road and east of the Sacramento River east levee. Existing land use is agricultural production of field crops. A small portion of the site is comprised of unimproved roads and irrigation ditches. Approximately 267 acres of the South Fisherman’s Lake Borrow Area will be available for excavation of borrow material. The areas excavated for borrow material will be reclaimed as agricultural land.

West Lakeside School Site

The 43-acre West Lakeside School Site is located north of Del Paso Road and east of the West Drainage Canal/ Fisherman’s Lake. Existing land use is agricultural production of field crops. A small portion of the site is comprised of unimproved roads and irrigation ditches. Approximately 42 acres of the West Lakeside School Site will be available for excavation of borrow material. The areas excavated for borrow material will be reclaimed as agricultural land.
Habitat Enhancement, Development, and Management

Several Phase 4b Project components involve the replacement and/or creation of habitat for listed species, including: landside woodland, the construction of the relocated West Drainage Canal, the creation of managed marsh at the Brookfield Property (or another ServiceUSFWS-approved location), the creation of managed grasslands on the newly constructed levee slopes, seepage berms, access rights-of-ways, canal embankments, and the preservation and establishment of landside woodlands along the Sacramento River east levee in Reach A:16, east of the NEMDC, and along Lower Dry Creek. The construction of the West Drainage Canal is described above in more detail. Refer to the Mitigation and Monitoring Plans for Phases 2 and 3, Natomas Levee Improvement Program, Landside Improvements Project document for a more complete summary of the strategy for creating, enhancing, preserving, protecting, and managing habitats in the Natomas Basin in perpetuity. A draft Mitigation and Management Plan (MMP) for Phase 4a is in review by the Corps, Service, and California Department of Fish and Game (CDFG). A Programmatic Long-Term Management Plan (LTMP) for all phases of the Project has been developed and approved by the Corps, Service, and CDFG. As the compensatory habitat components are developed, site-specific management plans and associated easements and management agreements are being created and incorporated into the LTMP.

Canal Habitat Enhancement

The West Drainage Canal will be enhanced to provide improved habitat for GGS. Bank slopes will be flattened reducing bank erosion and associated water quality problems. Besides flattening to a 3H:1V slope, bank improvements will include creating a 2- to 10-foot-wide submerged bench with tule growth to prevent aquatic weeds such as water primrose from attaching to the bank and then expanding across the canal water surface. Bank width will vary depending upon site constraints. Tule benches will provide cover for GGS as well as a source of prey.

The western portion of the West Drainage Canal, which is discussed above in more detail under the “Major Irrigation and Drainage Infrastructure Modifications” section, will be relocated farther away from the Airport operations area in an effort to lessen the canal’s potential as a wildlife attraction hazard for Airport operations. The realigned section of the canal will have a bottom width of up to 30 feet, stable 3H:1V bank slopes on one or both sides, and a narrow, variable width bench on one side of the canal. A 20-foot-wide maintenance and inspection road will flank each side of the canal and will be slightly elevated above adjacent land to improve an all-weather road condition.

The West Drainage Canal will continue to be managed for drainage function, as culverts will cross under the patrol road to allow continued drainage into the canal from adjacent fields. The West Drainage Canal will be maintained and operated in the same manner as the Lower GGS/Drainage Canal as described in the Site Specific Management Plan (SSMP).
Giant Garter Snake Habitat/Managed Marsh Complex

To compensate for adverse project effects on GGS habitat, 94.36 acres of managed marsh will be created within the Brookfield borrow site that is currently in rice production, and the adjacent Chappell Ditch and Drain will be improved. The site, which is located in the eastern portion of the Natomas Basin, south of Howsley Road and east of SR 99, will provide managed marsh in an area that is dominated by rice cultivation. As a component of the Phase 2 Project, approximately 160 acres of the 200-acre site was excavated to about 5 feet below existing grade to supply borrow material for NCC south levee improvements and about 80 acres had a conservation easement placed on it and will be left in rice in perpetuity. The Corps will also create managed marsh on this acreage.

In Phase 4b, the Brookfield Borrow Site will be finish graded and planted with native marsh vegetation by the project proponent to create approximately 174.63 acres of managed marsh complex (including approximately 30–40 percent upland and 60–70 percent wetland habitats) that will benefit the GGS. This habitat, consisting of open-water channels, freshwater marshes, and upland plant communities, will provide GGS with basking areas, vegetative cover from predators, and foraging habitat. After establishment of the managed marsh complex, the Corps and SAFCA will grant a conservation easement to and enter into a stakeholder-specific management agreement with TNBC, ensuring the permanent protection and management of these sites as habitat and open space.

Managed Marsh Creation

About 94.36 acres of managed marsh habitat will be created on cultivated rice fields at the Brookfield property (or another Service-approved borrow location). The marsh will consist of a mosaic of aquatic and upland habitats, and an upland buffer between the restoration sites and adjacent roads. This created marsh will maximize habitat edge transitions to provide for shorter distances between burrow, basking, and foraging areas.

Design of the GGS marsh will follow the templates established by TNBC on recent projects and experience with the design, construction, and management of the Airport System’s Willey mitigation site in the northeast part of the basin and its existing marsh mitigation project at Prichard Lake. These design templates feature a combination of uplands and shallow water bodies, sinuosity of swales, and water control structures to manage target water levels at different times of the year. The marsh will have perimeter fences to control and protect grazing animals, such as goats. Grazing by goats is a management technique successfully used to reduce invasions of weedy thatch and exotic plants while retaining sufficient cover for GGS and other semi-aquatic species that rely on grassy uplands adjoining the wetland ponds. A firm, reliable water supply consisting of good water quality throughout the GGS’s active season of April–October will be procured for the site.

The Brookfield property is adjacent to NCMWC’s Chappell Ditch and RD 1000’s CH1 Drain. Drainage improvements are proposed as part of the borrow site marsh design, which will improve drainage and irrigation to the Brookfield site. Currently, the Brookfield site’s water
supply comes from on-site wells, some of which are located within the footprint of the PGCC levee improvements. To provide irrigation to the site following the marsh creation and to eliminate the need to replace all of the on-site wells, the Chappell Ditch and CH1 Drain will be widened and extended to provide surface water to the Brookfield marsh and adjacent rice fields to the south and east. The side slopes will be graded at a 3:1 slope which will require less maintenance of the canal and more aquatic GGS habitat. This improvement will be designed to provide irrigation to approximately 940 acres formerly supplied by groundwater irrigation wells.

General Construction Plan for the Managed Marsh Complex

The excavation limits for the borrow sites will be a minimum of 50 feet from the edge of the site boundary. From this setback, the slope from existing grade down to the bottom of the excavation will be no steeper than 3H:1V. After excavation, disturbed areas will be finish graded to allow creation of the marsh complex. Finish grading and installation of operational facilities and habitat features will take place from August through October.

Excavated soils that were not used for borrow material in Phase 2, such as the 1-foot-deep organic surface layer or soils considered unsuitable for levee construction, were stockpiled and will be re-spread on-site after excavation. Soil graded back into the site will result in a finish grade elevation somewhat higher than the final design grades. The borrow-site excavation operations will use water for dust control and to maintain proper moisture content in the borrow material. Any excess groundwater generated during temporary dewatering activities will be discharged into adjacent irrigation and drainage canals after application of appropriate water quality best management practices (BMPs). Revegetation activities will include erosion control on excavated slopes (e.g., straw mulch, hydroseeding), application of fertilizer as needed, and seeding of an initial cover crop on the finish grade of the bottom of the borrow site. Marsh plantings will then be installed and the borrow site flooded. It is anticipated that no unsuitable soil material will be hauled off-site. Debris encountered during excavation will be hauled off-site.

The Chappell Ditch and CH1 Drain will be upgraded for approximately 5,000 feet from SR 99 east and extended east to the PGCC and south along the PGCC for approximately 6,500 feet, making the total length of improvements approximately 11,500 feet. The Chappell Ditch will have 3H:1V side slopes, a bottom width of 18 feet, a depth of 6 feet, and two 15-foot-wide access roads, one on each embankment. The Chappell Drain, which provides drainage for agricultural fields to the north, will have 3H:1V side slopes, a bottom width of 12 feet, and variable depth. The construction footprint varies in width from 90 to 165 feet, plus a 20-foot temporary construction easement on each side.

Other construction components are as follows:

- **Maintenance and access roads.** All-weather roads up to 15 feet wide will be constructed away from the open-water channels and between the upland areas in 25-foot-wide maintenance access areas.
Water supply and control facilities. An essential component of the managed marsh complex will be procurement of a firm, reliable water supply and good water quality throughout the GGS’s active season (i.e., April–October). A well to provide a backup source of water will be installed in a location where it could supply water to the network of channels if it is needed to replace or supplement the surface-water supply. Water control facilities, such as riser boards, will be installed at key points in the channels to allow maintenance of desired water levels.

Habitat features for giant garter snake. At points along the channels, clusters of rocks will be installed above the water line to provide basking areas for the snakes. Tule bench will be planted between upland areas and the channels to provide cover for the snakes.

Managed Grassland on Levee Slopes, Seepage Berms, and Rights-of-Way

The proposed levee improvements will result in landside slopes that are less steep than the existing slopes, and several reaches of the Sacramento River east levee will have adjoining 100- to 300-foot-wide earthen seepage berms with a nearly flat slope (50H:1V or less). Parallel to the landside toe of enlarged levees and seepage berms will be maintenance setbacks, gravel access roads, utility corridors, as well as relief wells in some locations. Additional setback bufferland (sometimes composed of woodland corridors, canal corridors, or field crops) will flank some of these features, and property acquisition for the proposed action may leave the project proponent with remnant portions of acquired parcels that are nonessential to flood control uses. With the exception of the crown of the levee and the seepage berm access road, these areas will be managed as native perennial grassland. Most grassland will be mowed or grazed throughout the growing season, with an emphasis on mowing procedures and stubble height that optimize these areas for Swainson’s hawk foraging habitat as described in the . This management regime will be in accordance with Corps and state guidelines for levee inspection. Longterm management of the grassland in Phase 4b will be included in the managed grassland SSMP and the Corps will review reinitiate section 7 consultation with the Service if management may affect federally listed species. However, the primary purpose and management priority of levees and seepage berms will continue to be flood damage reduction, for which RD 1000 has principal management and maintenance responsibility.

The forthcoming Phase 4b MMP will include methods to create the grasslands, including native-grass mixes that will be seeded along new levee slopes and seepage berms, staging areas, and adjacent maintenance and utility rights-of-way. An initial baseline assessment of managed grassland sites will be conducted after the initial seeding program, and then a monitoring program with performance criteria will be developed to determine the progress of the grassland habitats and to assess the need for adaptive management.

Landside Woodlands

Under the proposed action, woodlands consisting of native riparian and valley oak woodland species, including elderberry shrubs will be planted within a 10-acre area along Reach A:16 of the Sacramento River east levee and up to 60 acres along Lower Dry Creek C. Lower Dry Creek,
a 420-acre open space area located north of Main Avenue and east of the NEMDC, consists of Hansen Park, owned by the City of Sacramento, and the Coyle Property, which is owned by SAFCA. SAFCA has a conservation easement on Hansen Park (the western portion of the Lower Dry Creek area), and a conservation easement could also be placed on the Coyle property to the east. Existing woodland corridors along Dry Creek channels will be preserved, and additional woodland will be created by filling in gaps and widening these existing riparian corridors. Opportunities to create new woodland corridors may be available on historic stream channels that the creek has migrated away from over time. Created woodland will be designed to avoid vernal pools, seasonal wetlands, and relatively permanent water.

Groves will generally be at least 50 feet wide and several hundred feet long, depending on location constraints. Portions of the created woodlands will be at least 100 feet wide to promote successful nesting by a variety of native birds deeper within the grove canopy. At maturity, stand structure will vary from closed-canopy woodland to valley oak savanna vegetation types, with a native perennial grassland understory.

Planting sites will require suitable soil conditions, irrigation water during a 3- to 5-year establishment phase, reduced risk of wildfire, and minimal depth to seasonally high groundwater or other natural water sources to sustain trees once irrigation ceases. To provide irrigation water, groundwater wells will likely need to be drilled in the vicinity of the plantings. A mixture of native riparian and woodland species will be planted, but the predominant species will be valley oak, the primary tree species that will be affected by the proposed improvements to the Sacramento River east levee; and cottonwood, which is a preferred nest tree for Swainson’s hawks in the Basin and is faster growing than valley oak. Establishing woody vegetation will likely require more than one technique, including planting nursery stock, live cuttings, and acorn planting in winter, sustained by flood irrigation, drip, or agricultural-scale spray heads. The woodland planting areas will also accommodate trees and elderberry shrubs that will be removed from existing groves to make way for the proposed flood damage reduction system features and transplanted. Taking into account predictable and unavoidable mortality within the first 8 years of establishment, the intent is to have an average planted tree survival rate of 65 percent, transplanted tree survival rate of 60 percent, and a relative canopy cover of 35 percent. Wherever possible, groves will be bordered by restricted-access public lands and rights-of-way to reduce the risk of vandalism and other inappropriate uses that may threaten wildlife values or risk wildfires from human sources.

The forthcoming Phase 4b MMP will identify performance criteria that will be used to determine the progress of the woodland habitats. The criteria for measuring performance will be used to determine if the conservation component is trending toward sustainability (reduced human intervention) and to assess the need for adaptive management (e.g., changes in design or maintenance revisions).

Creation of the woodland corridor in Reach 16 and woodland groves near lower Dry Creek will disturb 50 acres of annual grassland and 10 acres of row and field crop. This areas will be converted to 60 acres of woodland.
Conservation Measures

Vernal Pool Crustaceans

The following measures shall be implemented to avoid, minimize, and compensate potential adverse effects on vernal pool crustaceans including the vernal pool fairy shrimp and the vernal pool tadpole shrimp:

- Worker awareness trainings for construction personnel shall be conducted by a qualified biologist approved by the Service before the commencement of construction activities and as needed when new personnel begin work on the project. The program shall inform all construction personnel about the life history and status of vernal pool crustaceans, measures to avoid and minimize impacts on this species and its habitat, the conditions of relevant regulatory permits, and the possible penalties for not complying with these requirements. Written documentation of the training shall be submitted to the Service within 30 days of the completion of training.
- All vernal pool crustacean habitat that is located adjacent to construction areas, but can be avoided, shall be protected through establishment of a fenced avoidance area. The 250-foot buffers shall be clearly identified by staking or flagging and high-visibility fencing shall be placed around sensitive habitat. This fencing shall prevent the encroachment of construction personnel and vehicles and protect vernal pool crustacean habitat. Suitable habitat for federally listed vernal pool crustaceans will be avoided at the Triangle Properties Borrow Area and the Lower Dry Creek woodland planting area.
- No insecticides, herbicides, or other chemicals that might harm vernal pool crustacean shall be used within 250 feet of the suitable habitat.
- Dirt roadways and disturbed areas within 250 feet of suitable habitat for vernal pool crustaceans shall be watered at least twice a day to minimize dust emissions.
- If loss of potential habitat occurs it will be compensated for at a Service-approved mitigation bank, at a preservation ratio of 2:1 and a creation ratio of 1:1.

Valley Elderberry Longhorn Beetle

The following measures shall be implemented to avoid, minimize, and compensate potential adverse effects on valley elderberry longhorn beetle:

- Prior to the commencement of construction of the proposed project, surveys shall be conducted for elderberry shrubs throughout the action area. The Corps shall re-initiate formal consultation with the Service if additional elderberry shrubs are found.
- Worker awareness trainings for construction personnel shall be conducted by a qualified biologist approved by the Service before the commencement of construction activities and as needed when new personnel begin work on the project. The program shall inform all construction personnel about the life history and status of the beetle, the need to avoid damaging the elderberry plants, measures to avoid and minimize impacts on this species and its habitat, the conditions of relevant regulatory permits, and the possible penalties for
not complying with these requirements. Written documentation of the training shall be submitted to the Service within 30 days of the completion of training.

- All elderberry shrubs that are located adjacent to construction areas, but can be avoided, shall be protected through establishment of a fenced avoidance area. The high visibility fencing shall be placed at least 20 feet from the dripline of the shrubs, unless otherwise approved by the Service. This fencing shall prevent the encroachment of construction personnel and vehicles and protect the shrubs.
- No insecticides, herbicides, or other chemicals that might harm the beetle or its host plant shall be used within 100 feet of the elderberry shrubs.
- Dirt roadways and disturbed areas within 100 feet of elderberry shrubs shall be watered at least twice a day to minimize dust emissions.
- Elderberry shrubs that require removal shall be transplanted to the woodland corridors and woodland restoration/creation areas. If areas of suitable habitat to be created as part of the proposed action will not be available before the impact will occur, alternative transplantation locations (e.g., TNBC preserves, NLIP woodland corridors) shall be identified and provided to the Service for their approval.

  ▪ If feasible, based on Service authorization, elderberry shrubs shall be transplanted when the plants are dormant (November through the first 2 weeks of February) to increase the success of transplanting. If it is not feasible to transplant elderberry shrubs during their dormant season, compensation will be increased by 2.5 times. Transplantation will not occur during the beetle’s flight season (March 15–June 15). A qualified biologist shall be available to monitor transplanting activity.

  ▪ Elderberry shrubs to be transplanted shall be cut back 3 to 6 feet from the ground or to 50% of their height (whichever is taller) by removal of branches and stems. The trunk and all stems measuring 1 inch in diameter or greater at ground level that are removed shall be replanted. All leaves on the shrubs shall be removed.

  ▪ Shrubs shall be removed with a truck-mounted hydraulic tree spade, backhoe, front-end loader, or other suitable equipment. When a shrub is being excavated, as much of the root ball as possible shall be removed and replanted immediately at the mitigation site. Care shall be taken to ensure that the soil is not dislodged from the root ball. Typically, the transplant hole is first excavated by the tree spade and deep-watered. Then the shrubs are transplanted with the same tree spade and immediately transported to the planting hole.

  ▪ The planting area shall be at least 1,800 square feet (0.04 acre) for every transplanted elderberry shrub. In this 1,800-square-foot area, associated tree and shrub species for each elderberry shrub shall also be planted. The root ball shall be planted so that the top is level with the existing ground and the soil shall be compacted so that settlement is minimized.

  ▪ A watering basin measuring at least 3 feet in diameter with a continuous berm (approximately 8 inches wide at the base and 6 inches high) shall be constructed around each transplanted elderberry shrub. Upon completion of planting, soil shall be saturated with water. No fertilizers or other
supplements or paint shall be used on the shrubs. The frequency of watering shall be determined based on soil conditions present at the mitigation site. Either a drip irrigation system or watering truck shall be used to provide water to the site.

- Each elderberry stem measuring 1 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted) shall be replaced with elderberry seedlings and seedlings of associated species, in accordance with the Service’s Conservation Guidelines (USFWS 1999). Elderberry seedlings or cuttings shall be replaced at ratios ranging from 1:1 to 8:1 (new plantings to affected stems), depending on the diameter of the affected elderberry stems and the presence of beetle exit holes. Native plants shall be planted, in association with the replacement elderberry shrub seedlings or cuttings, at 1:1 (for shrubs without evidence of beetle exit holes) or 2:1 (for shrubs with evidence of beetle exit holes) ratios. Stock of seedlings and/or cuttings shall be obtained from local sources. Table 1 lists the number of elderberry stems that will be affected and the proposed compensation plantings.

- An MMP and LTMP shall be prepared and implemented. These plans shall specify how the woodland/elderberry habitat creation areas will be managed to ensure that the appropriate habitat conditions are provided. The plans shall, at a minimum, describe requirements for transplantation of shrubs that require removal; specify the number of replacement elderberry shrubs and associated native plants to be established and associated success criteria; specify remedial measures to be undertaken if mitigation success criteria are not met; and describe short- and long-term maintenance and management. Long-term protection of the planting area for elderberry and associated species, and funding for its management, shall be provided through appropriate mechanisms to be determined by the Corps, Service, and other entities cooperating in implementation of the proposed action. The plan shall be reviewed and approved by the Service prior to implementation.

Table 1. Elderberry Stem Sizes and Compensation

<table>
<thead>
<tr>
<th>Location</th>
<th>Stems (maximum diameter at ground level)</th>
<th>Exit Hole on Shrub (Yes or No)</th>
<th>Elderberry Seedling Ratio</th>
<th>Associated Native Plant Ratio</th>
<th>Number of Stems Observed</th>
<th>Required Elderberry Plantings</th>
<th>Required Associated Native Plant Plantings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-riparian</td>
<td>stems ≥ 1” &amp; ≤ 3”</td>
<td>No</td>
<td>1:1</td>
<td>1:1</td>
<td>33</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>Non-riparian</td>
<td>stems &gt; 3” &amp; ≤ 5”</td>
<td>Yes</td>
<td>2:1</td>
<td>2:1</td>
<td>25</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Non-riparian</td>
<td>stems &gt; 5”</td>
<td>No</td>
<td>2:1</td>
<td>1:1</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Non-riparian</td>
<td></td>
<td>Yes</td>
<td>4:1</td>
<td>2:1</td>
<td>9</td>
<td>36</td>
<td>72</td>
</tr>
<tr>
<td>Non-riparian</td>
<td></td>
<td>No</td>
<td>3:1</td>
<td>1:1</td>
<td>2</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Non-riparian</td>
<td></td>
<td>Yes</td>
<td>6:1</td>
<td>2:1</td>
<td>8</td>
<td>48</td>
<td>96</td>
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<td>Total replacement plantings</td>
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<td></td>
<td></td>
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<td>Total Elderberry shrubs to be transplanted</td>
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<td></td>
<td></td>
<td></td>
<td>10</td>
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</table>
496 /10 = 49.6 valley elderberry longhorn beetle credits or 2.05 acres.
Giant Garter Snake

The following measures shall be implemented to avoid, minimize, and compensate potential adverse effects on GGS:

- Worker awareness trainings for construction personnel shall be conducted by a qualified biologist approved by the Service and CDFG before commencement of construction activities and as needed when new personnel begin work on the project. The program shall inform all construction personnel about the life history and status of the snake, the need to avoid damaging suitable habitat and causing snake mortality, measures to avoid and minimize impacts on this species and its habitats, the conditions of relevant regulatory permits, and the possible penalties for not complying with these requirements. Written documentation of the training shall be submitted to the Service and CDFG within 30 days of the completion of training.

- Construction activities and ground-disturbing activities other than those discussed in the following bullet within 200 feet of suitable aquatic habitat for the GGS shall not commence before May 1, with initial ground disturbance expected to correspond with the snake’s active season (as feasible in combination with minimizing disturbance of nesting Swainson’s hawks). Construction shall be completed by October 1.

- Some components of the proposed project may occur prior to the beginning of the defined GGS active season. Activities, such as utility relocations, and removal of residential or agricultural structures, will be conducted before May 1, typically farther than 200 feet from suitable aquatic habitat for GGSs or in habitat unsuitable for estivation.

- Some components of the proposed action may occur beyond the end of the defined GGS active season of all construction years. Major levee construction (site grading, compacting, etc.) begun in the summer months must halt no later than October 1 of each construction year. Some other activities such as demobilization and site restoration (e.g., hydroseeding, gravelling), may extend past October 1. The project proponent also acknowledges that unanticipated construction delays could occur and result in the need to extend construction work into the GGS inactive season. Should construction need to occur in snake habitat outside of the active season the Corps will notify the Service and CDFG by August 15 to reinitiate consultation. Further, the project proponent recognizes that it may be necessary to implement additional avoidance and minimization measures for project activities that occur beyond October 1.

- Any aquatic habitat for the snake that is dewatered shall remain dry for at least 15 consecutive days after April 15 and before excavating or filling of the dewatered habitat. If complete dewatering is not possible, potential snake prey (e.g., fish and tadpoles) shall be removed so that snakes and other wildlife are not attracted to the construction area.

- Within 24 hours before the commencement of ground-disturbing activities, areas within 200 feet of suitable aquatic habitat for GGS shall be surveyed for GGS by a qualified biologist. The biologist shall provide the Service with written documentation of the monitoring efforts within 48 hours after the survey is completed. The action area shall be re-inspected by a qualified biologist whenever a lapse in construction activity of 2 weeks or greater has occurred. A qualified biologist shall be present on-site during initial
ground disturbance activities. The biologist shall be available throughout the construction period and shall conduct weekly monitoring visits to ensure avoidance and minimization measures are being properly implemented.

- Before the commencement of construction activities, high-visibility fencing shall be erected to protect suitable GGS habitat that is located adjacent to construction areas, but can be avoided, from encroachment of personnel and equipment. The fencing shall be inspected before the start of each work day and maintained by SAFCA and construction personnel until completion of the project. The fencing shall be removed only when the construction within a given area is completed. This fencing shall conform to the specifications detailed in the measure below.

- Tightly woven fiber netting (mesh size less than 0.25 inch) or similar material shall be used for erosion control and other purposes at the project site to ensure that GGS are not trapped or become entangled by the erosion control material. 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 GGS from crawling underneath the material. Erosion control structures shall be constructed so runoff shall be directed away from sensitive habitats, directing water flow into existing drainages or disperse water across vegetated areas to avoid concentrating water.

- The number of access routes, the number and size of staging areas, and the total area of the proposed project activity shall be limited to the minimum necessary. Routes and boundaries shall be clearly demarcated. Movement of heavy equipment to and from the project site shall be restricted to established roadways and designated staging areas to minimize habitat disturbance. Project-related vehicles shall observe a 20-mile-per-hour speed limit within construction areas, except on county roads and on state and Federal highways.

- All snakes encountered shall not be harassed, harmed, or killed and shall be allowed to leave the construction area on their own volition. If any snake is observed retreating into an underground burrow within the project limits, no construction shall be allowed within a 50-foot radius of the burrow. A 50-foot radius nondisturbance buffer zone shall be established until a qualified biologist can make a determination that the snake is or is not a GGS. If a qualified biologist determines that a GGS has retreated into an underground burrow within the project limits, and the area of the burrow cannot be avoided by the project, then under the approval, supervision and direction of the Service and a qualified biologist, the burrow shall be excavated to allow personnel with appropriate authority to capture and handle the GGS to relocate the GGS outside of the action area. The biologist shall notify the Service immediately if any listed species are found on-site, and shall submit a report, including date(s), location(s), habitat description, and any corrective measures taken to protect the species found.

- During construction operations, stockpiling of construction materials, portable equipment, vehicles, and supplies shall be restricted to the designated construction staging areas. All heavy equipment, vehicles, and supplies shall be stored at the designated staging area at the end of each work period.

- To eliminate an attraction to predators of the GGS, all food-related trash items, such as wrappers, cans, bottles, and food scraps, shall be disposed of in closed containers.
After construction activities are complete, any temporary fill or construction debris shall be removed and temporarily disturbed areas restored to their preproject conditions. An area subject to “temporary” disturbance includes any area that is disturbed during the project, but that, after project completion, shall not be subject to further disturbance and has the potential to be revegetated. All GGS habitats subject to temporary ground disturbances, including storage and staging areas and temporary roads, shall be restored. These areas shall be recontoured, if appropriate, and revegetated with appropriate native plant species to promote restoration of the area to preproject conditions. Appropriate methods and plant species used to revegetate such areas shall be determined on a site-specific basis in consultation with the Service and CDFG and in accordance with the Service’s Guidelines for the Restoration and/or Replacement of Giant Garter Snake Habitat.

The Corps shall maintain and monitor temporarily disturbed areas of GGS habitat for 1 year following the completion of construction and restoration activities. Monitoring reports documenting restoration of these areas shall be submitted to the Service upon the completion of the restoration implementation and 1 year after the restoration implementation. Monitoring reports shall include photo-documentation and shall describe when restoration was completed, what materials were used, specified plantings, and justifications of any substitutions to the Service-recommended guidelines.

Unavoidable adverse effects to GGS habitat shall be compensated through the creation and preservation of suitable aquatic and upland habitat for this species.

Evaluation under Programmatic Consultation for Vernal Pool Crustaceans

This letter is an agreement by the Service to append the proposed project to the Vernal Pool Programmatic Opinion, and represents the Service’s biological opinion on the effects of the proposed action. By appending the project to the vernal pool programmatic the Corps acknowledges and accepts all of the conservation measures outlined within the vernal pool programmatic, including, but not limited to, the measures to minimize adverse impacts. The Corps will also follow all reasonable and prudent measures, and all terms and conditions as directed by the programmatic.

The proposed project will result in direct effects to 0.3 acre of habitat for vernal pool crustaceans. The agreed upon conservation responsibilities of the applicant are as follows:

1. Prior to the start of construction, the project applicant will purchase vernal pool preservation credits sufficient to preserve 0.6 acre (0.3 acre at a 2:1 ratio = 0.6 acre) at a Service-approved vernal pool crustacean conservation bank(s) with a service area covering the project. Proof of purchase of these credits shall be provided to the Service and the Corps before groundbreaking occurs for the proposed project.

2. Prior to the start of construction, the project applicant will purchase vernal pool creation credits sufficient to restore/create 0.3 acre (0.3 acre at a 1:1 ratio = 0.3 acre) at a Service-approved vernal pool crustacean conservation bank(s) with a service area covering the
project. Proof of purchase of these credits shall be provided to the Service and the Corps before groundbreaking occurs for the proposed project.

**Jeopardy Determination**

In accordance with policy and regulation, the jeopardy analysis in this BO relies on four components: (1) the *Status of the Species*, which evaluates the valley elderberry longhorn beetle’s vernal pool crustaceans’, and GGS’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 valley elderberry longhorn beetle, vernal pool crustaceans, and GGS in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the valley elderberry longhorn beetle, vernal pool crustaceans, and GGS; (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 valley elderberry longhorn beetle, vernal pool crustaceans, and GGS; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the valley elderberry longhorn beetle, vernal pool crustaceans, and GGS.

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 valley elderberry longhorn beetle’s, vernal pool crustaceans’, and GGS’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 valley elderberry longhorn beetle, vernal pool crustaceans and GGS.

The jeopardy analysis in this BO places an emphasis on consideration of the range-wide survival and recovery needs of the valley elderberry longhorn beetle, vernal pool crustaceans, and GGS and the role of the action area in the survival and recovery of the valley elderberry longhorn beetle, vernal pool crustaceans and GGS 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**
The status of the species for the valley elderberry longhorn beetle and GGS is incorporated by reference from the programmatic BO (pages 45-50 and 54-60).

**Environmental Baseline**
The environmental baseline for the valley elderberry longhorn beetle and GGS is incorporated by reference from the programmatic BO (page 50-54 and 61-62).
Effects of the Proposed Action

Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

The proposed project will directly affect listed crustaceans inhabiting a total of 0.3 acre of vernal pool crustacean habitat. Direct effects of this project are due to the filling of seasonal wetlands for the construction of the proposed levee improvements. During construction, vernal pool crustaceans and cysts will be crushed, buried, or otherwise destroyed. In addition to the adverse effects above, 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 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 Sacramento and Sutter Counties and throughout the range of these two listed vernal pool crustaceans.

The applicant has proposed to offset the effects on the listed vernal pool crustaceans inhabiting the 0.3 acre of suitable habitat that will be directly affected by the proposed project by purchasing preservation and creation credits at a Service-approved conservation bank(s). Contributing to the long-term preservation and management of the vernal pool habitat is critical for the species’ survival and recovery.

Valley Elderberry Longhorn Beetle

The proposed project will result in the transplantation, outside of the action area, of the 10 elderberry shrubs within the action area with stems greater than 1.0 inch in diameter. The 10 shrubs affected shrubs have 58 stems between 1 and 3 inches, 13 stems between 3 and 5 inches and 10 stems greater than 5 inches at ground level.

Loss of an elderberry shrub or even a stem can affect valley elderberry longhorn beetle breeding and feeding because adult valley elderberry longhorn beetles rely solely on elderberry foliage and flowers for food and must lay their eggs on elderberry stems to successfully reproduce.

Transplantation of elderberry shrubs that are or could be used by beetle larvae is expected to adversely affect the beetle. Valley elderberry longhorn beetle larvae may be killed or the valley elderberry longhorn beetles’ life cycle interrupted during or after the transplanting process. For example:

1. Transplanted elderberry shrubs may experience stress or become unhealthy due to changes in soil, hydrology, microclimate, or associated vegetation. This may reduce their quality as habitat for the valley elderberry longhorn beetle, or impair their production of habitat-quality stems in the future.

2. Elderberry shrubs may die as a result of transplantation.
3. Branches containing larvae may be cut, broken, or crushed as a result of the transplantation process.

Temporal loss of habitat may occur. Although conservation measures for effects on the valley elderberry longhorn beetle will involve creation or restoration of habitat, it generally takes five or more years for elderberry plants to become large enough to support beetles, and it may take 25 years or longer for riparian habitats to reach their full value. Temporal loss of habitat may cause fragmentation of habitat and isolation of subpopulations.

Habitat creation and transplantation of the shrubs will minimize the effect of permanent and temporary habitat loss on the valley elderberry longhorn beetle. Success of a restoration sites has been linked to presence of transplanted elderberry shrubs that have served to colonize a newly created riparian habitat. Transplants also provide an older larger shrubs within the plantings of young small elderberry seedlings that are planted as compensation. Elderberry shrubs will be transplanted and seedlings planted within the 10-acre woodland corridor that the Corps is constructing within the project area. This corridor will be managed in perpetuity for riparian habitat including valley elderberry longhorn beetle habitat, through the site specific management plan.

Giant garter snake

Phase 4b construction includes levee rehabilitation along Sacramento River east levee reaches 16-20, slope flattening and seepage remediation along American River north levee reaches 1-4, levee raising and seepage remediation along the PGCC west levee and NEMDC west levee, improvements to irrigation and drainage infrastructure, bank protection along PGCC and NEMDC, culvert remediation along the PGCC and detention basins, NCC bridge remediation at SR 99, creation of managed marsh at Brookfield borrow site, woodland corridor creation along reach 16 and along Lower Dry Creek, and land acquisitions. Construction during this phase will occur in 83.06 acres of developed land; 181.27 acres of annual grassland; 81.97 acres of row crop, field crop, and fallow agriculture; 4.16 acres of orchard; 86.16 acres of rice; 26.25 acres of canals, ditches, and marsh; 0.41 acre of seasonal wetlands or riverine wetlands; and 35.91 acres of landside and waterside woodland. At the end of construction for Phase 4b the proposed land cover types will be 157.06 acres of developed land; 60 acres of created woodland; 206.46 acres of grassland (levee slope grassland); and 75.78 acres of canals and ditches. The newly created cover-types from the project will be protected from future development through either a flood control easement, conservation easement, or drainage easement.

Components of Phase 4b work that will occur outside of the GGS’s active season include utility relocation, removal of residential or agricultural structures, and transplantation and planting of trees and elderberry shrubs. These will be conducted before April 15. GGS have been observed to overwinter as far as 250 meters from aquatic habitat (Wylie et.al 1997). Given that GGS are generally inactive during the winter months, SAFCA’s working during the inactive season will kill GGS that may be overwintering within the construction footprint. To reduce disturbing and/or killing GGS that may be overwintering in uplands that will be affected by working out of season, SAFCA has proposed to place exclusionary fencing, which will be erected prior to
October 1 in areas in which GGS may overwinter and SAFCA is proposing to remove/plant trees or elderberries. The fencing will exclude GGS from entering the area where SAFCA will be constructing during the winter. This fence will be monitored daily prior to and during construction to insure that there are no breaches that a snake could get through. Excluding snakes from these areas will affect the GGS by limiting its ability to utilize suitable upland habitat for winter hibernation and by changing its dispersal behavior. Increased construction activity in areas where GGS are known to occur could expose snakes to increased risks of injury and mortality from predation, exposure, vehicular traffic, and construction equipment. It may be forced to disperse through and/or around the construction sites in response to habitat changes and seasonal indicators at a time when snakes are slower moving due to temperatures. Areas that are unlikely to have overwintering GGS include areas which have active construction or agricultural activities occurring on them.

The remainder of the project will be constructed during the active period (May 1 – October 1) for the snake, resulting in a decreased risk of direct mortality of snakes and construction within any given area will be completed in one construction season, minimizing the length of the effects to snakes. Effects to snakes are highly likely given the number of acres affected within Phase 4b and given that work will occur and given that numerous rice fields border the eastern portion of the Natomas basin. Effects will include removal of cover and basking sites and filling or crushing of burrows or crevices due to excavation activities. Snake movements will be obstructed due to construction activities blocking access to aquatic or upland habitat. The large amount of construction equipment and number of workers within the Phase 4b action area will increase the likelihood of running over basking or dispersing snakes. Filling in of aquatic habitat such as rice, marsh and ditches will decrease the prey base for GGS. All of these effects are likely to result in the direct disturbance, displacement, injury, and/or mortality of snakes. Some of these effects will be minimized through the Corps’ conservation measures. Much of the work will occur during the snake’s active season, which will reduce snake mortality because the snakes will be able to leave or avoid habitat that is undergoing construction. Dewatering habitat prior to working within it by at least 2 weeks prior to disturbance will facilitate snakes leaving the construction areas. Speed limits along construction roads as well as worker awareness training should minimize vehicles running over basking or dispersing snakes. The Corps will to construct the realigned portion of the West Drainage Canal prior to filling the current alignment and will enlarge the canal and provide increased vegetated habitat for the GGS within the West Drainage Canal. Having RD 1000 maintain the canal in a similar manner to the Lower GGS/Drainage Canal will also provide long-term benefits to snakes in the area, as channel maintenance will be done less frequently and with built in conservation measures that will reduce harm or harassment of GGS. The bench that is included in the design should allow both an area for the snakes to take cover in as well as help provide prey for snakes. Other irrigation improvements such as Riego Road Canal, Vestal Drain, and Morrison Canal all provide more canal habitat then will be affected once construction is completed.

To acquire material for levee work in the northeastern portion of the project area, the Corps will borrow from 143 acres of rice fields in the Triangle Area, outside of the Natomas Basin. Borrow activities will preclude the area from being planted in rice and therefore, reduce the amount of habitat available for GGS. To minimize effects to GGS the Corps will only borrow from any one
area for no more than one growing season and the field will be placed back into production and available to GGS the following season. Additionally, the Corps has proposed to place a conservation easement on half of the total area of rice fields used for borrow. This will provide long term protection to this area and preclude this area from being developed in the future.

The Corps will be removing 86.16 acres of rice when constructing along the NEMDC levee, the PGCC levee, and irrigation canal construction. Additionally 8.63 acres of marsh habitat will be removed primarily during construction of the beaver wall, and erosion repair along the PGCC and NEMDC. To compensate for the loss of habitat, the Corps has proposed to compensate with 94.36 acres of managed marsh with a conservation easement on the Brookfield Borrow Site, which is in rice cultivation.

The Corps will be creating 94.36 acres of managed marsh in the northeastern portion of the Natomas Basin. Creation of marsh within this area will provide long term benefits to the Natomas Basin by permanently protecting and increasing marsh habitat within the Natomas Basin. In addition the canal improvements that the Corps will make at the Chappell Ditch and CH1 Drain will provide improved connectivity of the managed marsh to other locations within the Natomas Basin than currently exists. There will be a loss of aquatic GGS habitat in the form of rice during borrow activities and the construction of the managed marsh. Long term the amount of GGS habitat within the Natomas Basin will be increased and connectivity within the northeastern portion of the basin will be improved, which will offset the effects of the project on the GGS.

**Cumulative Effects**

The cumulative effects for the GGS have not changed and are incorporated by reference from the amended programmatic BO (pages 68-70).

**Conclusion**

After reviewing the current status of the vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, and GGS, the environmental baseline for the species, the effects of the proposed project, and the cumulative effects on this species, it is the Service’s BO that the proposed Natomas Landside Improvements Project Phase 4b, as described herein, is not likely to jeopardize the continued existence of the these species. Although critical habitat has been designated for the vernal pool crustaceans and valley elderberry longhorn beetle, the proposed action will not affect critical habitat.

The Corps and SAFCA have proposed to improve flood protection for the Natomas Basin above what currently exists. Two Habitat Conservation Plans (HCP) currently exist within the Natomas Basin and are based on future development occurring within the permit area of the Metro Air Park Habitat Conservation Plan (MAPHCP) and the NBHCP. The baselines and assumptions for which these HCPs were developed were based on no urban development occurring within the basin outside of these permit areas and landuse practices (primarily agriculture) remaining essentially the same. Sacramento County and the City of Sacramento have been in discussions
with the Service about additional development outside of the existing permit areas. As discussed in the Environmental Baseline, the Natomas Basin has experienced a large amount of rice fallowing both in land held by private farmers and leases terminated on Sacramento County Airport property. While the Service has concluded that the Corps and SAFCA’s project will not jeopardize the GGS, it could enable future growth to occur that otherwise will not be allowable but for these actions, which will require additional analysis to determine if this growth could jeopardize any of the 22 species covered by the MAPHCP and NBHCP. However, although future growth in the Natomas Basin outside of the permit area is under discussion, the Service does not consider it to be reasonably foreseeable at this time, as no specific proposals are proposed or under review. If growth outside of the permit areas were to occur within the Natomas Basin, these future projects must have a higher conservation outcome than currently exists in the HCPs and must be closely coordinated with the Service.

INCIDENTAL TAKE STATEMENT FOR PHASE 4B CONSTRUCTION

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking 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 nondiscretionary for listed species in Phase 4b of this opinion and must be implemented by the Corps in order for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity that is covered by this incidental take statement. If the Federal agency (1) fails to adhere to the terms and conditions of the incidental take statement, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

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 vernal pool crustaceans 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 0.3 acre of vernal pool habitat will be harassed, harmed, injured, or killed, as a result of the levee expansion. 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.

Valley Elderberry Longhorn Beetle

The Service expects that incidental take of the valley elderberry longhorn beetle will be difficult to detect or quantify. The cryptic nature of these species and their relatively small body size make the finding of an injured or dead specimen unlikely. The species occurs in habitats that make them difficult to detect. Due to the difficulty in quantifying the number of beetles that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of elderberry stems one inch or greater in diameter at ground level (beetle habitat) that will become unsuitable for beetles due to direct or indirect effects as a result of Phase 3 construction. Therefore, the Service estimates that all beetles inhabiting 10 elderberry plants containing stems 1 inch or greater at ground level (58 stems between 1-3 inches, 13 stems between 3 and 5 inches and 10 stems ≥5 inches; see Table 1 in the text) will become unsuitable as a result of the proposed action.

Giant Garter Snake

The Service anticipates that incidental take of the snake will be difficult to detect or quantify for the following reasons: GGS are cryptically colored, secretive, and known to be sensitive to human activities. Snakes may avoid detection by retreating to burrows, soil crevices, vegetation, or other cover. Individual snakes are difficult to detect unless they are observed, undisturbed, at a distance. Most close-range observations represent chance encounters that are difficult to predict. It is not possible to make an accurate estimate of the number of snakes that will be harassed, harmed or killed during Phase 4b construction activities (staging areas, work on canal banks, soil borrow areas, and vehicle traffic to and from borrow areas). In instances when take is difficult to detect, the Service may estimate take in numbers of individual snakes per acre of habitat lost or affected as a result of the action. Therefore, the Service anticipates that all GGS inhabiting 112.41 acres of aquatic and 263.24 acres of upland habitat may be harassed, harmed, or 3 GGS killed by loss and destruction of habitat due to construction of Phase 4b.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the valley elderberry longhorn beetle or GGS and that the proposed project, as described, fits within the parameters of the level of take anticipated in the vernal pool crustacean programmatic opinion and is not likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the vernal pool crustaceans in the wild.
Reasonable and Prudent Measures

The following Reasonable and Prudent Measures are necessary and appropriate to minimize the effect of the proposed project on the GGS.

1. All conservation measures as described in the biological assessment, and as re-stated here in the Project Description section of this BO, must be fully implemented and adhered to.

2. Effects of harassment of individual GGS within the proposed project, and of the loss or degradation of the species’ habitat shall be minimized.

3. Effects of harassment of individual valley elderberry longhorn beetle, and of the loss and degradation of the species’ habitat shall be minimized.

Terms and Conditions

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

1. The following Terms and Conditions implement Reasonable and Prudent Measure one (1):

   a. The Corps and SAFCA shall minimize the potential for incidental take of vernal pool crustaceans, valley elderberry longhorn beetles, and GGS resulting from the project related activities by implementation of the project description as described in the biological assessment and the project description (pages 2 - 37) of this BO.

   The Corps and SAFCA shall include full implementation and adherence to conservation measures as a condition of any permit issued or contract awarded for the project.

   b. If requested, before, during, or upon completion of ground-breaking and construction activities, the project proponents shall allow access by Service and/or California Department of Fish and Game personnel to the project site to inspect the project for effects to GGS and to determine if the proposed conservation measures are being implemented.

   c. A Service-approved Worker Environmental Awareness Training Program for construction personnel shall be conducted by a Service-approved biologist for all construction workers prior to the commencement of construction activities. As needed, training shall be conducted in Spanish for Spanish language speakers and other languages as needed or necessary.
d. The Corps and SAFCA shall require that all personnel associated with this project are made aware of the conservation measures and the responsibility to implement them fully. This could be accomplished by including a copy of this BO within its solicitations for design and construction of the proposed project and making the primary contractor responsible for implementing all requirements and obligations included within the BO, as well as and educating and informing all other contractors involved in the project as to the requirements of the BO.

e. The Corps shall provide quarterly construction activity updates which include what areas have been under construction, what construction activities have been occurring, estimates on completion dates, and what activities are planned for the next quarter.

2. The following Terms and Conditions implement Reasonable and Prudent Measure two (2):

a. At least 30 calendar days prior to initiating construction activities, the project proponents shall submit the names and curriculum vitae of the biological monitor(s) for the proposed project. Monitors shall have the ability to differentiate GGS from other snakes and 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.

b. For Phase 4b work that will occur outside of the GGS active window, (power pole relocations, removal or relocation of residential or agricultural structures, construction of lower GGS/Drainage Canal and portions of Elkhorn Canal, and removal of trees and elderberry shrubs) exclusion fencing shall be placed around upland areas that GGS could use to overwinter prior to October 1. The exclusionary fencing shall be monitored everyday prior to and during construction to ensure that openings do not develop that will allow the entry of a GGS into the construction area.

c. If it appears that any other construction activity may go beyond October 1, the project proponents shall contact the Service as soon as possible, but not later than July 15 of the year in question, to determine if additional measures are necessary to minimize take. Areas that have not had ground breaking occur prior to September 15 shall not work past October 1.

d. The project proponents shall implement Best Management Practices to prevent sediment from entering areas containing snake habitat, including, but not limited to, silt fencing, temporary berms, no cleaning of equipment in or near snake habitat, installation of vegetative strips, and temporary sediment disposal.

e. Runoff from dust control and oil and other chemicals used in other construction activities shall be retained in the construction site and prevented from flowing into
areas containing snake habitat. The runoff shall be retained in the construction areas by creating small earthen berms, installing silt fences or hay-bale dikes, or implementing other measures on the construction site to prevent runoff from entering the habitat of the snake.

f. 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 Division Chief, Endangered Species Program, within one (1) working day of the incident. The project area shall be re-inspected by the monitoring biologist whenever a lapse in construction activity of two weeks or greater has occurred.

g. To the extent feasible, the project proponents shall confine clearing of vegetation and scraping, or digging, of soil to the minimal area necessary to facilitate construction activities.

h. After completion of construction activities, any temporary fill and construction debris shall be removed. A written report regarding restoration of temporarily disturbed sites shall be submitted to the Service within ten (10) working days of the completion of construction at the project site.

i. The Corps and SAFCA shall ensure compliance with the reporting requirements.

3. The following Terms and Conditions implement Reasonable and Prudent Measure three (3):

a. A biological monitor will be present on site when work will encroach on the 20-foot elderberry buffer. The monitor will have the authority to stop construction within 20 feet of the shrub if unauthorized take of the beetle occurs. The monitor shall contact the Service immediately to determine what corrective measures need to be taken.

b. Compensation plantings shall occur within the same year as the transplantation of the elderberry shrubs.

**Reporting Requirements**

A post-construction compliance report prepared by the monitoring biologists must be submitted to the Deputy Assistant Field Supervisor at the Sacramento Fish and Wildlife Office within thirty (30) calendar days of the completion of construction activity or within thirty (30) calendar days of any break in construction activity lasting more than thirty (30) calendar days. This report shall detail: (i) dates that groundbreaking at the project started and the project was completed; (ii) pertinent information concerning the success of the project in meeting compensation and other
conservation measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the GGS, if any; (v) occurrences of incidental take of any these species; and (vi) other pertinent information.

The Corps must require SAFCA to report to the Service immediately any information about take or suspected take of federally-listed species not authorized in this BO. SAFCA must notify the Service within 24 hours of receiving such information. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. In the case of a dead animal, the individual animal should be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen. The Service contact persons are, Division Chief, Endangered Species Program at (916) 414-6600, and the Resident Agent-in-charge of the Service’s Law Enforcement Division at (916) 414-6660.

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

**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 recommendations:

1. The Corps and SAFCA should assist in the implementation of the draft, and when published, the final Recovery Plan for the GGS.

2. The Corps and SAFCA should provide funding to researchers studying topics identified by the Service in the draft, and when published, the final Recovery Plan for the GGS.

3. The Corps should use environmental restoration authorities to acquire and restore garter snake habitat.

To be kept informed of actions minimizing or avoiding adverse effects or benefiting listed and proposed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.
REINITIATION - CLOSING STATEMENT

This concludes formal consultation with the Corps on the Natomas Levee Improvement Project, Phase 4b. As provided in 50 CFR 402.16, re-initiation 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 proposed action 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 listed species or critical habitat that was not considered in this opinion; or (4) a new species or critical habitat is designated that may be affected by the proposed action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

If you have any questions regarding this BO on the Natomas Landslide Improvements Project Phase 4b, please contact Jennifer Hobbs at (916) 414-6541 or Micelle Tovar, Acting Chief, Sacramento Valley Branch at (916) 414-6645.

Sincerely,

[Signature]

Susan K. Moore
Field Supervisor

cc:
Elizabeth Holland, Corps, Sacramento, CA
Patrick Moeszinger, CDFG, Rancho Cordova, CA
Peter Buck, SAFCA, Sacramento, CA
Kelly Holland, AECOM, Sacramento, CA
Literature Cited