CONCEPTUAL MITIGATION, MANAGEMENT, AND MONITORING PLAN FOR SAFCA’S NLIP LANDSIDE IMPROVEMENTS PROJECT

A Mitigation, Management, and Monitoring Plan (Plan) is being prepared to guide the Sacramento Area Flood Control Agency (SAFCA) and its partners as they manage compensatory habitats and land in perpetuity as a mitigation component of the Natomas Levee Improvement Program’s (NLIP) Landside Improvements project (proposed project). The proposed project is described in more detail in the Biological Assessment [for the] Natomas Levee Improvement Program Landside Improvements Project (BA; EDAW 2008a) and the Application for California Endangered Species Act Section 2081(b) Incidental Take Permit [for the] Natomas Levee Improvement Program Landside Improvements Project (2081 Permit Application; EDAW 2008b), which were submitted to the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (DFG), respectively, in May of 2008.


The Plan will address the habitat creation, restoration, enhancement, and preservation components of the proposed project. The Plan will describe specific success criteria for habitat components, specify remedial measures to be undertaken if success criteria are not met (e.g., adaptive management, physical adjustments to created habitat, additional monitoring), and describe short- and long-term maintenance and management of the features. Also described will be the strategies and funding for the long-term protection of the habitat components. SAFCA, the regulatory agencies, and other entities cooperating in the implementation of the proposed project will decide upon the appropriate funding mechanisms to achieve the proposed project’s objectives.

PLAN GOAL.

The goal of the Plan is to ensure that the conservation values of the created, enhanced, restored, and preserved habitats are maintained in good condition in perpetuity. The Plan will discuss specific management strategies designed to maintain the conservation values for each of the habitat mitigation components and identify performance criteria that will be used to determine the success of the mitigation habitats. The Plan’s biological goals include: (1) the preservation of the abundance and diversity of native species, and particularly special-status species, in the mitigation habitats; (2) the protection of the habitat features from the effects of indiscriminate land uses that may adversely impact mitigation habitats; and (3) the elimination of any adverse condition within the mitigation habitat areas that may affect or potentially affect these areas.

PROTECTION AND MANAGEMENT OF MITIGATION HABITAT AREAS

The Plan describes the framework for the design and management of the mitigation habitat components of the proposed project. The framework will be implemented through a variety of mechanisms. The primary mechanism will be easements between public landowners (SAFCA and Sacramento County) and public or non-profit agencies charged with land conservation, drainage, irrigation, and flood control. Many of these easements will pursue the dual purposes of public safety or utility goals, such as flood control and water distribution, and conservation goals, such as habitat preservation. Where that is the case, the NLIP easements will implement SAFCA’s vision of interagency, conservation-minded cooperation with provisions for outside enforcement
of conservation requirements, clear notice and communication procedures to protect all easement purposes, and conflict resolution procedures. Conservation easements, where appropriate, will also be a central component of Basin-wide implementation of the NLIP.

The Plan's strategy for managing mitigation habitat further relies on Stakeholder-Specific Management Agreements. These contractual agreements will focus on the management obligations specific to each entity, and describe the financial and legal assurances necessary to implement the Plan and protect and manage the habitat mitigation components in perpetuity. These contractual agreements will be subject to review and approval by the USFWS, USACE, and DFG, and enforced by SAFCA, in perpetuity, and by USACE through permit issuance. All of these easements and agreements will provide USFWS, USACE, and DFG with a perpetual right of entry to inspect the mitigation habitat areas.

FUNDING MECHANISM
Funding for implementation of the Plan has been incorporated into the overall budget for implementation of the proposed project. SAFCA anticipates that funding for construction, monitoring, and long-term management of the mitigation habitat will be provided through the Consolidated Capital Assessment District and existing Operations and Management District. This District funding source will sunset in 2037, at which point, the funding will transition into a non-wasting endowment. SAFCA will provide DFG with a letter of credit or endowment for the five-year monitoring period.

RESPONSIBLE PARTIES
The Land Management Entities are:
- Sacramento Area Flood Control Agency
- Sacramento County Airport System (SCAS or Airport)
- Reclamation District (RD) 1000
- Natomas Central Mutual Water Company (NCMWC)
- The Natomas Basin Conservancy (TNBC)

SACRAMENTO AREA FLOOD CONTROL AGENCY
SAFCA will be responsible for the design and construction of all levee improvements, maintenance access and inspection roads and rights-of-way, replacement canals and associated drainage and irrigation structures, and habitat creation and enhancement areas. In addition, SAFCA will be responsible for all land acquisitions and easements necessary to construct the proposed project's features and achieve the proposed project's objectives. However, once these proposed project features are completed, most of the land or land management responsibility will be conferred by SAFCA to the other management entities listed above. SAFCA will use memoranda of agreement, land ownership transfers, easements or management endowments and contracts to transfer land management responsibility to the appropriate public agency or nonprofit land management entity. At the end of the construction period, all lands will be in public ownership and/or will be under the permanent control of a natural resource conservation entity.

SACRAMENTO COUNTY AIRPORT SYSTEM
SCAS manages the Sacramento County-owned bufferlands outside the Airport Operations Area. All proposed project components on land under SCAS management will remain in public ownership.
RECLAMATION DISTRICT 1000
The mission and purpose of RD 1000 is to operate and maintain the flood protection levees surrounding the Natomas Basin and to operate and maintain the internal drainage system to evacuate agricultural and urban stormwater and incidental runoff. RD 1000 will be responsible for the management of the proposed levee improvements, reconstructed Pumping Plant No. 2, and drainage features. Typical maintenance activities include: mowing grassland along levee slopes, berms, and rights-of-way; removing sediment and noxious aquatic weeds from the canals; and managing bank vegetation.

NATOMAS CENTRAL MUTUAL WATER COMPANY
NCMWC is a nonprofit mutual water company with the primary focus of keeping the water conveyance functioning to serve the company shareholders. Intensive maintenance to maximize agricultural irrigation services throughout the Basin is generally conducted in a given year on only 10% of the approximately 100 miles in the Natomas Basin canal system operated by NCMWC. NCMWC will be responsible for maintaining and managing the relocated Elkhorn and Riverside Canals and existing irrigation canals. The relocated canals will be maintained in the same manner as the existing canals. Typical maintenance activities include operating and repairing water control structures and barrier gates, periodically removing sediment and noxious aquatic weeds from the canals, repairing canal roads, managing bank vegetation, and mowing grassland along canal and road rights-of-way. However, the relocated Elkhorn and Riverside Canals will have improved levees, better water control structures, and wider roads and rights-of-way than the existing canals. These improvements are expected to ease annual canal management efforts, allowing for a proportionately greater focus on maintenance and operations and less need for system repair and dredging.

THE NATOMAS BASIN CONSERVANCY
TNBC acquires and manages land for the purpose of meeting the objectives of the Natomas Basin Habitat Conservation Plan (NBHCP) (City of Sacramento et al. 2003). To meet the mitigation goals of the NBHCP, developers of projects pay a mitigation fee to TNBC when they apply for building permits. TNBC then uses the mitigation fees to acquire, restore, and manage mitigation lands to provide habitat for protected species and maintain agriculture in the Natomas Basin. TNBC owns approximately 30 mitigation properties totaling more than 4,500 acres. Under the NLIP, it is anticipated that private land acquired by SAFCA and converted to managed marsh, preserved in rice, or used for woodland establishment will be conveyed to TNBC after creation of permanent marsh, woodlands, and habitat buffer zones. SAFCA may also contract with TNBC to manage certain mitigation habitat areas. Further, TNBC may be the third party beneficiary of the habitat conservation provisions of the NLIP easements over SCAS property.

SUMMARY OF PROPOSED PROJECT IMPACTS AND HABITAT COMPENSATION
As shown in Table 1, the proposed project will result in permanent alterations to the habitats of three special-status species during the three-year construction phase; these species are: giant garter snake (GGS; Thamnophis gigas), Swainson’s hawk (Buteo swainsonii), and valley elderberry longhorn beetle (VELB; Desmocerus californicus dimorphus). Please refer to the BA and 2081 Permit Application for a more detailed description of these impacts.
In order to successfully offset the proposed project's impacts on the habitats of listed species, SAFCA is coordinating with several land owners and land managers in the Natomas Basin to create, enhance, restore, and preserve habitat for listed species. As summarized in Table 2, habitat compensation will occur in the Natomas Basin as a component of the proposed project's implementation in the 2008 and 2009/2010 construction years.

### Table 1: Permanent Habitat Alterations Resulting from Proposed Project Construction

<table>
<thead>
<tr>
<th>Species/Habitat Type</th>
<th>Permanent Habitat Loss</th>
<th>2008</th>
<th>2009 - 2010 (Estimated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canals</td>
<td></td>
<td>2 acres</td>
<td>18 acres</td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td>205 acres</td>
<td>235 acres</td>
</tr>
<tr>
<td>Swainson’s Hawk Habitat</td>
<td></td>
<td>285 acres</td>
<td>95 acres</td>
</tr>
<tr>
<td>Landside Woodlands/Scrub</td>
<td></td>
<td>10 acres</td>
<td>23 acres</td>
</tr>
<tr>
<td>Valley Elderberry Longhorn Beetle Habitat</td>
<td></td>
<td>23 shrubs</td>
<td>15 shrubs</td>
</tr>
</tbody>
</table>

### Table 2: Proposed Habitat Compensation

<table>
<thead>
<tr>
<th>Species/Habitat Type</th>
<th>HABITAT COMPENSATION</th>
<th>2008</th>
<th>2009 - 2010 (Projected)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giant Garter Snake Habitat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Newly Constructed Irrigation Canals</td>
<td></td>
<td>19² acres</td>
<td>42³ acres</td>
</tr>
<tr>
<td>Newly Constructed GGS/ Drainage Canal</td>
<td></td>
<td>14⁴ acres</td>
<td>24⁵ acres</td>
</tr>
<tr>
<td>Enhanced West Drainage Canal</td>
<td></td>
<td>7⁷ acres</td>
<td>35 acres</td>
</tr>
<tr>
<td>Preserved Rice</td>
<td></td>
<td>215 acres</td>
<td>35 acres</td>
</tr>
<tr>
<td>Created Managed Marsh</td>
<td></td>
<td>230 acres</td>
<td>230 acres</td>
</tr>
<tr>
<td>Swainson’s Hawk Habitat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preserved Field/ Row Crop</td>
<td></td>
<td>50 acres</td>
<td>TBD⁶</td>
</tr>
<tr>
<td>Created Grasslands (Levee Slopes, Seepage, Berms, Access ROWs, Canal Embankments)</td>
<td></td>
<td>291 acres</td>
<td>265 acres</td>
</tr>
<tr>
<td>Reclaimed Grasslands (Borrow)</td>
<td></td>
<td>320 acres</td>
<td>475 acres</td>
</tr>
<tr>
<td>Created Landside Woodlands</td>
<td></td>
<td>30 acres</td>
<td>95 acres</td>
</tr>
<tr>
<td>Preserved Landside Woodlands</td>
<td></td>
<td>16 acres</td>
<td>TBD⁶</td>
</tr>
<tr>
<td>Valley Elderberry Longhorn Beetle Habitat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elderberry Shrub/ Associated Native Planting</td>
<td></td>
<td>7 acres⁸</td>
<td>TBD⁶</td>
</tr>
</tbody>
</table>

**Notes:**
1. Acreages include only aquatic habitat components.
2. TBD = To Be Determined. Acreages and locations of these mitigation habitat components have yet to determined; however, the compensation will follow the conservation strategy guidelines described in more detail below.
3. Compensation for VELB will follow the Valley Elderberry Longhorn Beetle Conservation Guidelines (USFWS 1999). This acreage is an estimate based on the stem counts for the 23 elderberry shrubs that will be impacted during the 2008 construction phase. The VELB mitigation will be integrated into the created landside woodlands.

The proposed compensation is designed to be applied at the project (2008) and programmatic (2009/2010) levels. Therefore, while acreages of habitat compensation in 2009/2010 are only rough estimates, the compensation commitment can be approximated with a high level of
confidence based both on projections that follow the compensation strategy, which is described in
more detail below, and on SAFCA’s demonstrated commitment to the implementation of the
2008 phase of the proposed project.

OVERVIEW OF CONSERVATION STRATEGY
The proposed project’s conservation strategy will, in its entirety, support and significantly
contribute towards the emergence of an urban habitat refuge in the Natomas Basin. The refuge is
projected to occupy approximately 15,000 acres once the NBHCP objectives and other proposed
conservation programs are completed. Through habitat creation, restoration, and preservation,
SAFCA will increase the amount of protected habitat available for NBHCP-covered species.
Further, SAFCA’s proposed project will consolidate large areas of habitat, assisting in the
expansion of TNBC reserve blocks in the northwestern and southwestern regions of the Basin.
Finally, the construction of new canals and the establishment of woodland corridors will greatly
improve the connectivity between core habitat reserves that are distributed throughout the Basin,
and substantially increase acreage and patch size of these critical habitats.

Overall, the proposed project is an opportunity to employ a landscape-scale vision, helping to
advance the goals and objectives of the NBHCP and assist the Federal Aviation Administration
(FAA), USACE, and the local Reclamation Districts in achieving their goals. SAFCA’s NLIP
presents a unique, one-time opportunity to reconfigure habitat and connective corridors in the
Basin at a landscape scale.

Other projects in the Basin that have come before and will come after the NLIP only provide
piecemeal approaches to habitat protection. SAFCA’s proposed project secures and expands the
amount of habitat protected in the Basin, establishes the components that tie the preserves and
disparate mitigation sites together in perpetuity under public and conservancy management, and
increases the quality and viability of this emerging urban reserve.

Increase Amount of Protected Habitat
While the proposed project will result in loss and reconfiguration of landside habitats adjacent to
the widened levees in the Natomas Basin, the proposed project has been specifically designed to
minimize impacts to these landside habitats, and to avoid impacts to riparian habitats along the
Sacramento River and Natomas Cross Canal (NCC). The construction of an adjacent setback
levee and installation of seepage cutoff walls enable SAFCA to retain the mature riparian tree
corridor and numerous SWH nests that are located along the sides of the Natomas Basin
levees. The proposed project’s conservation strategy includes the preservation, enhancement, and
creation of over 2,000 acres of compensatory habitats, including:

- 230 acres of created, managed marsh,
- 1,350 acres of created or reclaimed grasslands,
- 105 acres of canals (16 canal miles) and associated uplands,
- 140 acres of landside valley oak woodlands and savannah,
- 250 acres of preserved rice fields, and
- 50 acres or more of agricultural field crops.

Expansion and Consolidation of Protected Habitat in the Natomas Basin
The proposed project will consolidate large areas of habitat, assisting in the expansion and infill
of TNBC reserve blocks in the northwestern and southwestern regions of the Basin. SAFCA will
acquire several properties to provide compensatory habitat, either in the form of preserved rice
and agricultural crop fields or created managed marsh, managed grasslands, or landside woodlands. Many of these properties are contiguous with existing TNBC reserves or other completed or planned mitigation habitats. Protecting habitat adjacent to existing TNBC reserves and other mitigation sites creates a larger contiguous area managed for GGS and SWH than currently exists. This significantly increases the habitat value, sustainability, and functions that these individual properties would otherwise provide in isolation, contributing to GGS and SWH recovery in the Basin.

SAFCA will create managed marsh in the Airport’s northern bufferlands and near Fisherman’s Lake, the northwestern and southwestern areas of the Basin, respectively. The 110-acre managed marsh that will be created on the Airport’s northern bufferlands is expected to be contiguous with the expansive Prichard Lake managed marsh mitigation area, and with TNBC’s created wetlands complex north of Prichard Lake. The construction of a 110-acre managed marsh will increase the total area of marsh in the Airport’s northern bufferlands to approximately 230 acres. SAFCA will create managed marsh on approximately 120 acres of land in the Fisherman’s Lake area. TNBC recently enhanced a site from a rice field to a managed marsh complex on which GGS were subsequently recorded, thus demonstrating that GGS will utilize restored managed marsh habitats and that enhancement in this area may contribute to sustaining the southern Basin’s GGS population. SAFCA’s proposed expansion of managed marsh habitat in and around Fisherman’s Lake provides an opportunity to assist TNBC in the achievement of its goals—specifically, to sustain GGS populations in the southern reserve area.

A goal of the proposed project’s woodland compensation proposal is to increase overall patch size of existing, isolated groves by enlarging the contiguous size of one or more groves and creating connecting woodland corridors between two or more existing groves. Increasing the patch size and expanding age class and species diversity of woodland habitat will provide greater nesting success to native bird species and superior refuge and habitat diversity for many other woodland- and oak savannah-dependent wildlife species. Further, woodlands will be established along the edges of some TNBC reserves in the interior of the Basin that are managed as SWH foraging habitat. Establishing woodlands along the borders of these properties will increase the foraging value of the sites by providing roosting and potential nesting sites for raptors in close proximity to suitable foraging habitats.

Strengthen Connectivity between TNBC Reserves

In many ways, enhancing existing Basin landscapes, as proposed, will contribute more to the successful implementation of the NBHCP, rather than acquiring large quantities of mitigation land. The connective canal and woodland corridors that SAFCA proposes to establish and/or improve are enhancements that will aid in NBHCP implementation, providing TNBC with an opportunity to improve its overall performance towards the goals of the NBHCP. Canal corridors will provide enhanced habitat functionality by permanently linking TNBC properties in the northern and southern reserve areas that are managed for GGS habitat.

SUMMARY OF HABITAT MITIGATION COMPONENTS

What follows is a summary of the Plan for each of the compensatory habitat components. Specifically, the summary includes the proposed configurations and performance objectives for each habitat component, the long-term management criteria, and the legal framework for protecting and managing the sites as habitat in perpetuity. The habitat mitigation components addressed in this plan are: relocated and new canal systems; managed marsh; created and reclaimed grasslands; landside woodlands; agricultural field crops; and rice fields.
IRRIGATION CANALS

GOAL OF MITIGATION
To mitigate for impacts to canals that may support suitable aquatic habitat for GGS, SAFCA will relocate the Elkhorn and Riverside Irrigation Canals, creating 56 acres of irrigation canal habitat east of the Sacramento River east levee. The primary purpose of irrigation canal replacements is for management of the existing NCMWC water supply infrastructure (primarily main highline supply canals) impacted within the footprint of NLIP levee widening, although these relocated canals are also expected to support suitable GGS aquatic habitat.

Objectives:
- Design canals to minimize maintenance needs, reduce the frequency and extent of maintenance disturbance to canal bed and banks, and facilitate long-term maintenance.
- Facilitate implementation of NCMWC’s existing Best Management Practices (BMPs) along canals to enhance their value as aquatic habitat for GGS and along the canal embankments and access right-of-ways as foraging habitat for SWII.
- Minimize interruption of the water supply distribution system for the Natomas Basin, and provide concurrent GGS habitat compensation.

PROPOSED MITIGATION SITES
Location and Present Uses of Mitigation Sites
- The relocated Elkhorn Canal will consist of 17,200 linear feet of open irrigation canal and 3,500 feet of pipeline. The proposed relocation alignment is currently field crop.
  - In 2008, 700’ of pipeline and 10,600’ of open canal will be constructed from the North Drainage Canal to the Elkhorn Reservoir.
  - In 2009, 2,800’ of pipeline will be constructed through Teal Bend Golf Course and 6,600’ of open canal will be constructed from Teal Bend Golf Course south to 1,000’ south of Elkhorn Boulevard.
- The relocated Riverside Canal will consist of 20,500 linear feet of irrigation canal. The proposed relocation alignment is currently field crop.
  - In 2009, 20,500’ of open canal will be constructed from approximately ¼ mile north of Pumping Plant No. 3 to Interstate 80.

Ownership and Management
- Airport bufferlands are currently, and will continue to be, owned by SCAS. NCMWC will acquire an easement from Sacramento County to manage the newly constructed irrigation canals that cross over SCAS lands.
- SAFCA will acquire parcels where irrigation canals cross over private lands and grant NCMWC an easement for management of these canals.

DESCRIPTION OF MITIGATION DESIGNS
- Design canals with 3:1 water-side slopes and 3:1 slopes on the outside of the embankment. Canal bed will have a 12-foot-wide bottom width to improve water transport where invasive aquatic weeds are present.
- Design canals with approximately 7 feet to the top of the embankment and a 5-6 foot maximum water depth during the irrigation season.
- Line the bottom of the irrigation canals to prevent tule growth and facilitate maintenance of the bottom of the channels.
Design canals with gentle side slopes to facilitate the shoreline growth of freshwater marsh plants including native sedges, rushes and tules that will provide habitat enhancement for GGS. Plant perennial grasses on banks above the row of shoreline marsh plants to provide better cover for GGS, discourage weeds, raise cutting height above the ground, and reduce the frequency of disturbance to bank vegetation.

Establish a 15-foot-wide gravel-surfac ed patrol road along the west (levee-side) canal embankment for operators to monitor water levels, adjust check structures for level control, operate irrigation turnouts, and maintain canal as needed (i.e. dredging sediment, organic debris removal).

Establish a 15-foot-wide east (field-side) canal embankment to provide for maintenance equipment access to canal and mowing bank vegetation on bank slopes.

**Mitigation Site Protection and Management**

NCMWC will acquire the right and obligation to maintain the two relocated irrigation canals in accordance with Agency-approved management principles. On Airport property, NCMWC will acquire a Water Facilities Easement from Sacramento County for the following three purposes: (1) to enable NCMWC to maintain and operate the irrigation canals for water distribution; (2) to enable NCMWC to maintain and protect the irrigation canals, along with their embankments and right-of-ways, as habitat; and (3) to ensure continued service of these areas as safety buffers for Airport operations. This easement will establish mandatory notice, review, and comment procedures for the benefit of SAFCA, USFWS, USACE, and DFG should NCMWC or SCAS consider undertaking any action that could have a materially adverse impact on the habitat features of the canals or their embankments. In case of conflict between the irrigation, habitat, and aviation safety purposes of the Water Facilities Easement, the easement will permit SCAS, NCMWC, or SAFCA to refer the dispute to mediation guided by procedures described in the easement.

On lands acquired by SAFCA (where the irrigation canals cross private lands), SAFCA will grant NCMWC a Water Facilities Easement. This easement will be similar to that between the County and NCMWC, absent provisions regarding aviation safety.

Pending approval of their fish screen project, NCMWC will sign the NBHCP committing to a number of management practices that have been negotiated with USFWS and DFG. In addition, both easements governing the irrigation canals will obligate NCMWC to adhere to the long-term management and monitoring guidelines described in the Mitigation, Management, and Monitoring Plan; these guidelines will be consistent with the management practices previously negotiated with USFWS and DFG.

**Long-Term Management**

The relocated Elkhorn and Riverside Canals will be maintained to ensure timely movement of irrigation water for agricultural purposes. Generally, only 10% of NCMWC's 100 miles of irrigation canals are intensively maintained annually. NCMWC will maintain and manage the relocated Elkhorn and Riverside Canals in the same manner as the existing canals, including managing bank vegetation and mowing grassland along canal and road rights-of-way.
GGS/DRAINAGE CANAL

GOAL OF MITIGATION
To mitigate for impacts to GGS aquatic habitat resulting from direct fill, removal, and/or relocation of existing canals, SAFCA will create 26,100 linear feet (approximately 38 acres) of new canal (GGS/Drainage Canal) and improve 16,000 linear feet (approximately 7 acres) of the existing West Drainage Canal as GGS habitat. The GGS/Drainage canal is a major new canal, not a direct replacement for an existing canal of the same size and extent.

Objectives:
➢ Create a continuous, north-south aquatic habitat corridor between the North Drainage Canal (in the northern area of the Basin) and Fisherman’s Lake (in the southern area of the Basin) to enhance GGS migration, habitat connectivity, and population resilience within the Natomas Basin.
➢ Provide reliable connectivity between large clusters of aquatic habitats (rice fields and managed marshes) located in three primary areas within the Natomas Basin to enhance GGS population viability and exchange.
➢ Dewater the problematic Airport West Ditch by creating a new irrigation and drainage canal system to the west (farther from the runway) that requires less intensive management practices to discourage hazardous wildlife attraction.
➢ Improve connectivity of the canal system for GGS movement and cover under the Interstate 5 (I-5) crossing, and along the existing West Drainage Canal between I-5 and TNBC preserves south of I-5.
➢ Enhance 3 miles of the existing West Drainage Canal, which currently offers low quality GGS habitat and poor linkage functions between GGS populations.
➢ Create secondary inter-connections to large managed marsh nodes with high quality GGS habitat (rice and marsh managed by TNBC; marsh mitigation sites by SCAS and SAFCA).
➢ Design canals to minimize maintenance needs, reduce the frequency and extent of maintenance disturbance to canal bed and banks, and facilitate long-term maintenance.
➢ Design canals with gentle side slopes to facilitate the shoreline growth of freshwater marsh plants including native sedges, rushes and tules that will provide habitat enhancement for GGS. Plant perennial grasses on banks above the row of shoreline marsh plants to provide better cover for GGS, discourage weeds, raise cutting height above the ground, and reduce the frequency of disturbance to bank vegetation.

PROPOSED MITIGATION SITES
Location and Present Uses of Mitigation Sites
The new GGS/Drainage Canal will consist of open canal generally parallel to the proposed Sacramento River adjacent levee, between the North Drainage Canal at the RD 1000 Pumping Plant 2 in the north and tying into the West Drainage Canal south of I-5. A segment of the existing West Drainage Canal will be enhanced to improve GGS habitat quality and connectivity. The length of the entire GGS Canal, including both new canal construction and reconstructed sections, will be approximately 42,100 linear feet (8 miles).

➢ In 2008, 10,500 linear feet of new open canal will be constructed from the North Drainage Canal to the Elkhorn Reservoir. The proposed new alignment is currently field crop.
In 2009, 15,600 linear feet of new open canal will be constructed from the Teal Bend Golf Course south to the West Drainage Canal. The proposed new alignment is currently field crop.

In 2009, 16,000 linear feet of the existing West Drainage Canal will be enhanced. These canal improvements include reconstruction of the West Drainage Canal from approximately 1,000 feet south of Elkhorn Boulevard to a point approximately 3,000 feet east of Power Line Road. The canal widening is currently private field crop and fallow airport land.

Ownership and Management

Airport bufferlands are currently, and will continue to be, owned by SCAS. SAFCA will acquire an easement from Sacramento County to manage new drainage canals that cross Airport lands. For those sections of the West Drainage Canal that SAFCA will enhance and reconstruct, RD 1000 will retain or renegotiate its drainage canal easement with Sacramento County.

SAFCA will acquire parcels where the GGS/Drainage Canal crosses over private lands. SAFCA will grant a drainage canal easement to RD 1000 for canal management. TNBC will be a third-party beneficiary to this easement.

DESCRIPTION OF MITIGATION DESIGNS

Design new canal as a low flow channel with a 10-foot-wide bottom width and 3:1 bank slopes. (Note that existing canals have typical side slopes of 2:1 to 1:1 requiring more frequent dredging, bank, repair and bank disturbance).

Create a managed seasonal marsh on a 50-foot-wide bench above and parallel to the new GGS/Drainage Canal bank between Teal Bend Golf Course and I-5.

Enhance the existing West Drainage Canal (from south of I-5 to a point approximately 3,000 feet east of Power Line Road) with a 10-foot-wide bench and gentle 3:1 bank slope.

Plant canal side slopes with seed and plugs of native marsh plants (e.g., sedge, rush, bulrush, tule) and native perennial grasses.

Place hibernacula rock piles along the canal bank slopes every few hundred feet.

Grade and plant water control structures on both sides to provide GGS cover while passing the structure.

Construct water control structures along the length of the canal to maintain consistent water levels in the low-flow channel of the canal during the GGS active season (April–October). Water depth in canals designed to 4.5-feet plus or minus six inches and will flow at approximately 5 cfs to avoid eutrophication and anaerobic condition.

SAFCA will purchase specialized equipment and vehicles, such as a large hydraulic-arm excavator, for efficiency and ease of canal maintenance and to reduce or eliminate the need to drag a bucket, scraper, or V-plow on canal banks.

MITIGATION SITE PROTECTION AND MANAGEMENT

SAFCA will have the right and obligation to maintain the newly constructed canal. On SCAS property, SAFCA will acquire a Drainage Canal Easement for the following three purposes: (1) to enable SAFCA to maintain and operate the canal for drainage; (2) to enable SAFCA to maintain and protect the canal, along with its embankments and right-of-ways, as habitat; and (3) to ensure that the canal area continues to serve as a safety buffer for Airport operations. This Drainage Canal Easement, which will bind any successor in interest to either party, will designate TNBC as a third-party beneficiary with the right to enforce the habitat conservation and protection.
provisions of the easement as against either party to the easement. In addition, the Drainage Canal Easement will establish mandatory notice, review, and comment procedures for the benefit of SAFCA, TNBC, USFWS, USACE, and DFG should SAFCA or SCAS consider undertaking any action that could have a materially adverse impact on the habitat features of the canal or its embankments. In case of conflict between the drainage, habitat, and aviation safety functions of the canal, the Drainage Canal Easement will permit SCAS, SAFCA, or TNBC to refer the dispute to mediation guided by procedures described in the easement.

RD 1000 will serve as manager of the newly constructed drainage canal. SAFCA will enter into a Stakeholder-Specific Management Agreement with RD 1000 that will obligate it to adhere to the long-term management and monitoring guidelines described in the Mitigation, Management, and Monitoring Plan that will be consistent with the Agency-approved management practices.

Land acquired by SAFCA (where the drainage canal crosses private property) will be governed by similar protections and protocols. SAFCA will retain fee ownership of these parcels and enter into a Stakeholder-Specific Management Agreement with RD 1000 containing the same terms as those described for the Drainage Canal Easement on SCAS lands (absent provisions concerning aviation safety) as well as the long-term management and monitoring guidelines described in the Plan.

For those sections of the West Drainage Canal that SAFCA will enhance and reconstruct, RD 1000 will retain or renegotiate its drainage canal easement with Sacramento County. As consideration for SAFCA’s improvements to these sections, RD 1000 will enter into a Stakeholder-Specific Management Agreement with SAFCA that will bind RD 1000 to the long-term management and monitoring guidelines described in the Plan.

Canal water will be supplied by NMCWC under a long-term purchase contract with SAFCA. Existing diversions from the Sacramento River will provide the source of canal water.

LONG-TERM MANAGEMENT

The GGS/Drainage Canal and reconstructed West Drainage Canal will be managed in a manner that maximizes habitat suitability and minimizes potential for GGS injury and mortality, while maintaining the canals’ function as drainage canals for the Natomas Basin. Management goals include: maintaining a reliable source of water in the canal throughout the GGS active season; ensuring that high quality water is retained in the canal system during the entire GGS active season; and managing the canal in such a way that maintenance practices result in fewer and less invasive disturbances to GGS habitat than existing standard canal management practices in the Natomas Basin.
MANAGED MARSH

GOAL OF MITIGATION
To mitigate for GGS habitat impacted by the proposed project, SAFCA will create 230 acres of high-value managed marsh, consisting of open water channels, freshwater marshes, and upland plant communities, at various sites in the Natomas Basin. These habitats will provide GGS with basking areas, vegetative cover from predators, and foraging habitat. In addition, the managed marsh habitat compensates for losses of waters of the U.S. associated with the proposed project.

Objectives:
- Maximize habitat edge transitions that will provide for short distance between burrow, basking, and foraging areas.
- Design and manage marshes specifically both to enhance their value for GGS and to minimize the attraction to hazardous wildlife species. Converting rice to marsh will reduce the level of bird attraction to the Airport lands, thus reducing aviation hazards, and provide upland hibernation sites in close proximity to marsh foraging and juvenile rearing habitat.
- Provide connectivity between adjacent TNBC properties that are managed for GGS habitat, creating a larger contiguous area managed for GGS than currently exists. The overall habitat value of the preserves will be enhanced, thus, contributing to GGS recovery.

PROPOSED MITIGATION SITES
Location and Present Uses of Mitigation Sites
Managed marsh site locations are in the process of being identified by SAFCA based on strategic land acquisitions and the need for borrow sites throughout the NLIP proposed project area. Potential sites include approximately 110 acres on the Airport's northern bufferlands and approximately 120 acres in the vicinity of Fisherman's Lake. Sites are either cultivated or fallowed rice fields.

Ownership and Management
- Airport bufferlands are currently, and will continue to be, owned by SCAS. SAFCA will enter into a long-term lease or Stakeholder-Specific Management Agreement with SCAS to secure the long-term protection and management of the mitigation site. SAFCA may subsequently contract with TNBC to oversee mitigation site management.
- SAFCA will acquire and develop (as managed marsh) parcels in the vicinity of Fisherman's Lake, and subsequently grant TNBC a conservation easement and enter into a Stakeholder-Specific Management Agreement with TNBC, ensuring the permanent protection and management of these sites as habitat and open space.

DESCRIPTION OF MITIGATION DESIGNS
In 2009-2010, approximately 230 acres of rice fields (either fallow or recently cultivated) will be temporarily utilized for borrow, with borrowing activities excavating between 1 and 5 feet of soil from each of the borrow sites. These sites will then be converted to managed marsh. Design of the managed marshes will follow the templates established by TNBC on recent projects, the design of SCAS's Willey mitigation site being developed in the northeast part of the Basin, and the existing SCAS marsh mitigation project at Prichard Lake. The managed marshes will consist of a mosaic of aquatic and upland habitats, and an upland buffer between the restoration sites and adjacent roads. Managed marsh developed on the Airport's bufferlands could potentially be
contiguous with the recently developed marsh on the Prichard Lake restoration and mitigation site.

**MITIGATION SITE PROTECTION AND MANAGEMENT**

On Airport bufferlands, SAFCA will be responsible for managing the marsh site under a Stakeholder-Specific Management Agreement or a long-term lease from Sacramento County. TNBC will likely manage these sites as GGS habitat pursuant to a Stakeholder-Specific Management Agreement (including an endowment) with SAFCA.

On the parcels in the vicinity of Fisherman’s Lake, SAFCA will acquire and develop the sites as managed marsh and grant TNBC a conservation easement for their permanent protection. SAFCA will also enter into a Stakeholder-Specific Management Agreement with TNBC for permanent management of these marshes funded by an endowment.

All leases, conservation easements, or agreements concerning marsh sites will specify a commitment to adhere to the long-term management and monitoring guidelines described in the Plan. SAFCA will secure long-term contractual agreements from NCMWC to ensure a reliable water supply to the created managed marshes.

**LONG-TERM MANAGEMENT**

The managed marshes will be planted and seeded with native vegetation; all invasive weeds will be targeted for removal and long-term control through manual or selective chemical methods or through mowing and/or grazing. Any method shall be consistent with Agency-approved conservation measures to avoid and minimize effects on GGS. An essential component of the managed marshes will be procurement of a firm, reliable water supply and good water quality throughout the GGS active season of April–October. The marshes will be drawn down to a minimal water surface area during the GGS inactive season (i.e., October–April) in order to reduce the attraction of winter waterfowl to the marshes, and thus avoid potential airport hazards. A drydown of the marshes is also essential to prevent a monoculture of cattail and invasive aquatic and emergent weed species. Stringent water-level management guidelines that are consistent with GGS requirements will be implemented. Management of sedimentation in open-water channel habitats will be based on TNBC site-specific management plans for its managed marsh reserves and will be consistent with management practices implemented at similar sites.

The wildlife hazards of managed marsh, as compared to rice fields, can be more effectively managed and reduced, thus, attracting substantially fewer wintering waterfowl than are attracted to flooded rice fields.

**MONITORING DURING THE 5-YEAR ESTABLISHMENT PERIOD**

After construction of the proposed project, a 5-year monitoring program will be conducted to determine each mitigation site’s progress toward meeting the established success criteria. Qualitative and quantitative biological inspections, as well as water level monitoring, will be conducted during the year to ensure that the various habitat types become successfully established and can be maintained for perpetuity. Special-status species surveys and monitoring (following established Agency-approved protocols) will be conducted annually during the first 5 years. After the 5-year establishment period, subsequent monitoring activities focus on twice annual general inspections and regular biological inspections.
CREATED AND RECLAIMED GRASSLANDS

GOAL OF MITIGATION

To partially mitigate for losses of SWH foraging habitat impacted by the proposed project, SAFCA will create over 555 acres of grassland in the Natomas Basin to provide moderate-to high-quality SWH foraging habitat and reclaim nearly 795 acres of grassland on the Airport’s north bufferlands.

Objectives:

➢ Maximize habitat edge transitions with shorter distances between nesting and foraging areas.
➢ Manage grasslands specifically to enhance their foraging value for SWH within the constraints of the management requirements for Airport safety and maintenance of the flood control system. Some SAFCA-acquired land will be dedicated exclusively to nesting and foraging habitat without the constraints of management requirements for overlapping land uses and flood control functions. The conversion from rice to managed grassland will reduce the level of bird attraction to the Airport lands, therefore reducing aviation hazards.
➢ Provide connectivity between adjacent TNBC properties that are managed for SWH foraging habitat, creating a larger contiguous area managed for SWH than currently exists. This will increase the habitat value and functions that these individual properties would otherwise provide in isolation, contributing to SWH recovery in the Basin.

PROPOSED MITIGATION SITES

Location and Present Uses of Mitigation Sites

➢ Approximately 555 acres along the length of the proposed project alignment (e.g., levee slopes, seepage berms, access right-of-ways), and canal embankments. Sites are currently field crop, rice, canal, and woodland.
➢ Approximately 795 acres on the Airport’s northern bufferlands. The precise acreage and location is still in the process of being identified by SAFCA based on strategic land acquisitions. Sites are currently cultivated or fallowed rice and agricultural row crop fields.

Ownership and Management

➢ Airport lands are currently, and will continue to be, owned by SCAS. Along the length of the proposed project alignment that crosses Airport property, SAFCA will obtain a flood control easement that will designate TNBC as a third-party beneficiary to enforce the habitat conservation and protection provisions of the easement. On borrow sites in the Airport’s northern bufferlands, SAFCA will obtain a right-of-way to remove borrow materials and establish grassland cover. Where drainage and irrigation canals cross Airport property, RD 1000 and NCMWC will maintain the banks of these canals as grassland foraging habitat pursuant to easements described above.
➢ Along the length of the proposed project alignment on private land, SAFCA will acquire land for newly constructed levees and utility right-of-ways. Subsequently, SAFCA will enter into a Stakeholder-Specific Management Agreement with RD 1000 for flood control and habitat management in accordance with the Plan.
➢ Where the irrigation and drainage canals cross private property, SAFCA will acquire the canal footprints and access right-of-ways in fee title and grant easements to RD 1000 or NCMWC for canal management. These easements will bind RD 1000 and NCMWC to
manage the canals’ grassland embankments in accordance with the Mitigation, Management, and Monitoring Plan.

➢ To the extent possible under FAA guidelines, ownership and management of all grasslands will emphasize the protection of these sites as habitat and will support TNBC’s goal of prioritizing foraging opportunities in the SWH zone.

DESCRIPTION OF MITIGATION DESIGNS

Managed Grassland on the Flood Control Facility
Parallel to the landslide toe of enlarged levees and, in some areas, seepage berms will be maintenance access roads in some locations. Additional setback bufferland will flank some of these features, and property acquisition for the proposed project may leave SAFCA with remnant portions of acquired parcels that are nonessential to flood control uses. Managed grasslands will be established on these sites. Managed grassland may include annual grassland, non-irrigated hay, irrigated hay, irrigated pasture, and/or dryland winter wheat.

Managed Grassland on Canal Embankments
Adjacent to the newly constructed and relocated canals will be embankments and access rights-of-way, on which native grassland will be established.

Managed Grasslands at Borrow Sites Owned by Sacramento County
Borrow activities will excavate between 1 and 5 feet of soil from each of the Airport borrow sites. These lands will then be reclaimed as grassland. All borrow sites will have finish grade that is sufficiently above the measured water table to accommodate grassland or, potentially, irrigated crops. Geotechnical studies are currently underway at the proposed borrow sites in order to more accurately measure the water table and observe water table fluctuations during higher winter flows and storm events.

MITIGATION SITE PROTECTION AND MANAGEMENT

Grassland foraging habitat will be established on Airport property in three areas: along the proposed project alignment, at borrow sites in the northern bufferlands, and along the irrigation and drainage canal embankments and access rights-of-way. Along the proposed project alignment (i.e., where the levees cross Airport property), SAFCA will acquire a Flood Control Easement for the following four purposes: (1) maintenance and operation of the levees for flood control; (2) maintenance and operation of levee slopes, seepage berms, and maintenance areas as habitat; (3) maintenance and operation of utility corridors; and (4) continued service of these areas as safety buffers for Airport operations. This Flood Control Easement, which will bind any successor in interest to either party, will designate TNBC as a third-party beneficiary with the right to enforce the easement’s habitat protection provisions as against parties to the easement. In addition, the Flood Control Easement will establish mandatory notice, review, and comment procedures for the benefit of SAFCA, TNBC, USFWS, and DFG should SAFCA, its designees, or SCAS consider undertaking any action that could have a materially adverse impact on habitat features of the levees. In case of conflict between the flood control, aviation safety, habitat, and utility functions of the levee areas, the Flood Control Easement will permit SCAS, SAFCA, or TNBC to refer the dispute to mediation guided by procedures described in the easement.

On borrow sites in the Airport’s northern bufferlands, SAFCA will obtain a right-of-way to remove borrow materials and establish grassland cover. Embankments of the Airport-owned sections of the drainage and irrigation canals will be managed as grassland habitat pursuant to the Water Facilities Easement between SCAS and NCMWC and the Drainage Canal Easement.
between SCAS and SAFCA. TNBC will have enforcement authority over the habitat-related requirements of the Drainage Canal Easement as a third-party beneficiary to that document.

Grasslands along the proposed project alignment acquired by SAFCA (i.e., where the levee crosses private property) will be governed by a Stakeholder-Specific Management Agreement between SAFCA and RD 1000 for levee operation and maintenance as well as grassland habitat maintenance. Where the irrigation and drainage canals cross private land acquired by SAFCA, the grassland banks of the canals will be managed by NCMWC or RD 1000, as appropriate, pursuant to the terms of, respectively, the Water Facilities and Drainage Canal Easements. TNBC will have enforcement authority over the habitat-related requirements of the Drainage Canal Easement between SAFCA and RD 1000 as a third-party beneficiary to that document.

All easements and Stakeholder-Specific Management Agreements concerning NLIP grasslands will obligate the parties to adhere to the long-term management and monitoring guidelines described in the Mitigation, Management, and Monitoring Plan that will be consistent with the Agency-approved management practices.

LONG-TERM MANAGEMENT
 Managed Grassland on the Flood Control Facility
 The primary purpose and management priority of levees and seepage berms will continue to be flood protection, for which RD 1000 has principal management and maintenance responsibility. Typical maintenance activities include mowing grassland along levee slopes and berms, and rights-of-way, and remnant parcels. The quality of habitats will be attained through a best-efforts pledge that commits to a 5-year period to reduce non-native encroachment. Seasonal mowing will be utilized to optimize SWH foraging habitat as well as flood control efforts.

Managed Grassland on Canal Embankments and Rights-of-Way
 RD 1000: The primary purpose and management priority of drainage canals will continue to be flood protection and drainage, for which RD 1000 has principal management and maintenance responsibility. Typical maintenance activities include mowing grassland along canal banks and rights-of-way; managing canal bank vegetation, including noxious weed control.
 NCMWC: Generally, only 10% of NCMWC’s 100 miles of irrigation canals are intensively maintained annually. NMWC will maintain and manage the relocated Elkhorn and Riverside Canals in the same manner as the existing canals, including managing bank vegetation and mowing grassland along canal and road rights-of-way.

Managed Grasslands on Land Owned by Sacramento County
 Managed grassland within 10,000 feet of the Airport runways will be managed primarily to reduce the area’s attractiveness to wildlife considered hazardous to aircraft safety in order to comply with FAA regulations. The primary management objective on reclaimed grasslands on the Airport bufferlands will be to reduce populations of hazardous wildlife to the extent necessary to comply with Title 14, Part 139 of the Code of Federal Regulations and FAA advisory circulars that address hazardous wildlife. All management practices on managed grasslands will be consistent with the implementation measures in the Airport’s current Wildlife Hazard Management Plan. A variety of management practices can reduce hazardous wildlife use, including modifying the selection of plants and grazing animals, and varying the amount and timing of tillage, irrigation, grazing, and cutting to create opportunities to adaptively manage land. Grassland parcels outside of the Airport Critical Zone will be managed specifically to provide SWH foraging opportunities, emphasizing mowing and grazing procedures to maintain an optimal stubble height for SWH foraging.
LANDSIDE WOODLANDS

GOAL OF MITIGATION
Loss of woodland, some of which may support suitable nesting habitat for SWH, will be offset by the establishment and/or preservation of 140 acres of Basin woodlands.

Objectives:
- Increase the patch size of existing woodland habitat to provide greater nesting success to native bird species, and superior refuge, habitat diversity and cover for many wildlife species.
- Connect existing, isolated woodland groves to increase overall patch size and continuity of existing, isolated groves by planting corridors between groves, or enlarging the contiguous size of one or more groves.
- Connect riparian forest with Basin woodlands to enhance daily and seasonal movement corridors for wildlife and avian populations between habitat types and between foraging and breeding areas.
- Provide tree groves within the Basin interior where SWH forage areas are concentrated, maximizing habitat edge transitions that will provide for shorter distances between nesting and foraging areas.
- Substantially increase the acreage and spatial distribution of landside woodlands and surround these with protected and managed grasslands, cropland, and wetlands to provide an important opportunity to diversify landscape complexity and habitat edge effects.

PROPOSED MITIGATION SITES

Location and Present Uses of Mitigation Sites
- Establish woodlands on approximately 125 acres along the 50- to 200-foot-wide alignment between the expanded levees and the new and/or relocated canals, including on the Airport’s bufferlands with smaller portions around the margins of TNBC properties. Create larger, wider groves on contiguous parcels between the Sacramento River and the Rio Ramazo housing area; this woodland cluster is in addition to the typical, planned 50-200-foot wide woodland corridor parallel to the levee. Sites are either cultivated or fallowed field crops.
- Preserve approximately 16 acres of existing woodland along the Sacramento River east levee will be preserved.

Ownership and Management
- Airport bufferlands are currently, and will continue to be, owned and managed by SCAS. SAFCA will obtain a Woodlands Conservation Easement from the Airport and enter into a Stakeholder-Specific Management Agreement with TNBC for site management.
- TNBC properties will continue to be owned and managed by TNBC.
- SAFCA will acquire the remaining woodland acreage. It will grant TNBC a conservation easement and an endowed Stakeholder-Specific Management Agreement for permanent management and protection of these woodlands.

DESCRIPTION OF MITIGATION DESIGNS
Woodland groves will be established throughout the proposed project area. Groves will generally be at least 50 feet wide and several hundred feet long, depending on location constraints. In some areas, woodlands will be at least 100 feet wide or wider to promote successful nesting by a variety of native birds deeper within the grove canopy, where nest parasitism by crows, cowbirds,
and starlings would be less of a factor in breeding success. At maturity, stand structure will vary from closed canopy oak woodland and mixed riparian forest to Valley oak savanna vegetation types.

Mature valley oak woodland and savannah will be the primary objective of woodland replacement. A mixture of native riparian species will be planted, with predominant species being valley oak, the primary tree species that will be affected by the proposed improvements to the Sacramento River east levee, as well as sycamore and cottonwood, which are preferred nest trees for SWH in the Basin and are faster growing than valley oak. Native grassland can be established with valley oak woodland savannah where appropriate. The woodland planting areas will also provide locations for transplanting any elderberry shrubs that will need to be moved from the footprint of flood control improvements and for additional compensatory elderberry plantings in association with woodland trees and shrubs.

Planting will generally occur during late fall and winter when the plants are dormant, air temperature is lowest, and soil conditions are moist. Where trees will be removed from existing groves to make way for the proposed flood control system features, smaller, multi-stemmed oaks will be transplanted to new locations, including within newly planted groves, to the extent feasible. Establishment of woody vegetation will likely require more than one technique, including seeding of ground cover in late fall/early winter, flood irrigation, drip or agricultural-scale spray heads, live cuttings, nursery material in specialized containers used for revegetation projects, and acorn planting. Planting sites will require suitable soil conditions, water supply during a 3- to 5-year establishment phase, managed buffers for reduced risk of wildfire, and minimal depth to seasonally high groundwater or other natural water sources to sustain trees once irrigation ceases.

**MITIGATION SITE PROTECTION AND MANAGEMENT**

At woodland sites on Airport property, SCAS will retain fee title and grant a conservation easement to SAFCA. This easement will protect these woodland habitats in perpetuity, while also ensuring that these areas continue to serve as safety buffers for Airport operations. This Conservation Easement will designate TNBC as a third-party beneficiary with the right to enforce the habitat functions of the easement against parties to the easement. In addition, the easement will establish mandatory notice, review, and comment procedures for the benefit of SAFCA, TNBC, USFWS, and DFG should SAFCA or SCAS consider undertaking any action that could have a materially adverse impact on the woodlands’ habitat features. In case of conflict between the conservation and aviation safety purposes of these areas, the conservation easement will permit SCAS, SAFCA, or TNBC to refer the dispute to mediation guided by procedures described in the easement.

TNBC will manage woodlands on Airport property under Stakeholder-Specific Management Agreements with SAFCA. TNBC will also continue to own and manage woodlands currently under TNBC ownership. On the remaining woodlands acreage acquired by SAFCA, SAFCA will grant a conservation easement to, and enter into a Stakeholder-Specific Management Agreement with, TNBC for site protection and management in perpetuity. In all cases, these agreements will specify a commitment to adhere to the long-term management and monitoring guidelines described in the *Mitigation, Management, and Monitoring Plan*. Management will be funded by a long-term endowment to TNBC.
LONG-TERM MANAGEMENT
The establishment of these woodlands will require at least 3 to 5 years of intensive irrigation, monitoring, and management, with fire prevention/ control efforts being conducted indefinitely.

MONITORING DURING THE 5-YEAR ESTABLISHMENT PERIOD
After construction of the proposed project, there will be a 5-year monitoring program to determine each mitigation site’s progress toward meeting the established success criteria. Qualitative and quantitative biological inspections will be conducted during the year to ensure that the various habitat types become successfully established and can be maintained for perpetuity. Special-status species surveys and monitoring (following established Agency-approved protocols) will be conducted annually during the first 5 years. After the 5-year establishment period, subsequent monitoring activities focus on twice annual general inspections and regular biological inspections.

The planting sites will realize value as grassland or early-successional shrubland in the short-term. With adequate precipitation and proper water management, the woodlands will become established and begin to function as refuge and nesting habitat for a variety of bird species, potentially including SWH habitat. Taking into account predictable and unavoidable mortality within the first 5 years of establishment, the intent is to have an average stem density of approximately 50–100 trees and shrubs per acre within 5–10 years of growth. After the first year, it is anticipated that the sites will be able to be evaluated to determine some level of project success and apply adaptive management, if necessary. Within three to five years, depending on physical site characteristics, conditions should be consistent enough to estimate community composition and general success of planting efforts. By the close of year 5, the proposed project sites are intended to be self-sustaining and not require irrigation or intensive weed control.
AGRICULTURAL FIELD CROPS

GOAL OF MITIGATION
To partially mitigate for SWH foraging habitat impacted by the proposed project, SAFCA will acquire at least 50 acres of agricultural field crop land (or irrigated pasture) in the Basin, located in Reaches 5A through 6A, between the newly constructed canals, and the levee maintenance area.

Objectives:
- Maximize habitat edge transitions with shorter distances between nesting and foraging areas.
- Manage agricultural field crops specifically to enhance their foraging value for SWH within the constraints of maintenance of the flood control system where present.
- Provide connectivity between adjacent TNBC properties that are managed for SWH foraging habitat, creating a larger contiguous area managed for SWH than currently exists. This increases the habitat value and functions that these individual properties would otherwise provide in isolation, contributing to SWH recovery in the Basin.

PROPOSED MITIGATION SITES
Location and Present Uses of Mitigation Sites
At least 50 acres in the western portion of the Basin. Site is either cultivated or fallowed agricultural field crops.

Ownership and Management
SAFCA will acquire the agricultural field crops land and grant a conservation easement to, and enter into a Stakeholder-Specific Management Agreement with, TNBC for the permanent protection and management of the site.

DESCRIPTION OF MITIGATION DESIGNS
Additional setback bufferland will remain between the setback levees and the newly constructed canals. Thus, property acquisition for the proposed project may leave SAFCA with remnant portions of acquired parcels that are nonessential to flood control uses. The cultivation of agricultural field crops will be retained on these sites.

MITIGATION SITE PROTECTION AND MANAGEMENT
SAFCA will grant TNBC an agricultural conservation easement on field crop sites. In addition, SAFCA will enter into a Stakeholder-Specific Management Agreement with TNBC that specifies a commitment to adhere to the long-term management and monitoring guidelines described in the Mitigation, Management, and Monitoring Plan and provides a permanent endowment for TNBC's management of the sites.

LONG-TERM MANAGEMENT
The agricultural field crops will be cultivated and managed in a manner that maximizes habitat suitability for SWH. The monitoring and management of these agricultural field crops will be consistent with the mechanisms described in the NBHCP.
RICE FIELDS

GOAL OF MITIGATION
To partially mitigate for GGS habitat impacted by the proposed project, SAFCA will acquire 250 acres of rice fields in the northeastern part of the Basin, providing GGS foraging habitat.

Objectives:
- Ensure the stability and availability of GGS foraging and rearing habitat in the Natomas Basin through the preservation of rice in perpetuity.
- Maximize habitat edge transitions that will provide for shorter distances between basking, burrowing, and foraging areas by establishing marsh habitats adjacent to rice fields.
- Create larger contiguous area managed for GGS than currently exists by protecting rice fields within an emerging mosaic of managed marsh habitats, thereby increasing the habitat value and functions that these individual properties would otherwise provide in isolation and contributing to GGS recovery in the Natomas Basin.
- GGS are not known to occur in the northeastern portion of the Natomas Basin. SAFCA will improve the canal on the south side of the property, improving its connection under 70/99.
- SAFCA will aim to improve surface-water irrigation to the site, in order to reduce the site’s dependence on groundwater. Thereby, SAFCA will contribute to the balance of the groundwater aquifer (whose recharge may be affected by the installment of cutoff walls).

PROPOSED MITIGATION SITES
Location and Present Uses of Mitigation Sites
Approximately 250 acres in the northeastern portion of the Basin. Site is either cultivated or fallowed rice fields.

Ownership and Management
SAFCA will acquire the rice fields and grant a conservation easement to, and enter into a Stakeholder-Specific Management Agreement with, TNBC for the sites’ permanent protection and management.

DESCRIPTION OF MITIGATION DESIGN
Some borrow material for 2009 and 2010 construction is anticipated to come from rice fields on the 250-acre Brookfield property, located west of the PGCC at Fifield Road, which will be acquired by SAFCA. After the removal of borrow material, the land will be returned to rice cultivation.

MITIGATION SITE PROTECTION AND MANAGEMENT
SAFCA will grant TNBC an agricultural conservation easement on rice fields. In addition, SAFCA will enter into a Stakeholder-Specific Management Agreement with TNBC that specifies a commitment to adhere to the long-term management and monitoring guidelines described in the Mitigation, Management, and Monitoring Plan and provides a permanent endowment for TNBC’s management of the sites.

LONG-TERM MANAGEMENT
The preserved rice fields will be cultivated and managed in a manner that maximizes habitat suitability and minimizes potential for GGS injury and mortality. The monitoring and management of these rice fields will be consistent with the mechanisms described in the NBHCP.
REFERENCES


March 23, 2009

To: Todd Gardner – California Department of Fish and Game
From: Peter Buck, Tim Washburn—Sacramento Area Flood Control Agency
Subject: Updates to 2081 Permit Application for the Natomas Levee Improvement Program’s Landside Improvements Project

The Sacramento Area Flood Control Agency (SAFCA) submitted an application for a California Endangered Species Act section 2081(b) permit to the California Department of Fish and Game (CDFG) in May 2008. This application requested incidental take coverage for State-listed species that could be affected by the implementation of SAFCA’s Natomas Levee Improvement Program (NLIP) Landside Improvements Project (project), specifically Phase 2 (previously called the 2008 construction phase) of the project. The permit application requested take coverage for the following species:

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giant garter snake</td>
<td><em>Thamnophis gigas</em></td>
<td>Threatened</td>
</tr>
<tr>
<td>Swainson’s hawk</td>
<td><em>Buteo swainsoni</em></td>
<td>Threatened</td>
</tr>
<tr>
<td>Central Valley spring-run chinook salmon (evolutionarily significant unit)</td>
<td><em>Oncorhynchus tshawytscha</em></td>
<td>Threatened</td>
</tr>
<tr>
<td>Sacramento River winter-run chinook salmon (evolutionarily significant unit)</td>
<td><em>Oncorhynchus tshawytscha</em></td>
<td>Endangered</td>
</tr>
</tbody>
</table>

With this memorandum, SAFCA is revising its permit application to remove Central Valley spring-run Chinook salmon and Sacramento River winter-run Chinook salmon from its request for take coverage for the Phase 2 project. The U.S. Army Corps of Engineers (USACE) and SAFCA informally consulted with the National Marine Fisheries Service (NMFS) in evaluating the potential effects of the Phase 2 project on Federally- and State-listed fish species. NMFS issued a letter to USACE on January 14, 2009 (NMFS file no. 2008/05035), concluding that the project would not likely adversely affect listed fish species and would not adversely modify designated critical habitat or essential fish habitat. Based on this finding, SAFCA no longer is seeking take coverage for State-listed fish species for the Phase 2 project. However, SAFCA may require take covered for State-listed fish species in Phases 3 and 4 of the project; therefore, it is possible that these species may need to be included in the forthcoming programmatic 2081 permit.

SAFCA’s 2081(b) permit application submittal in May 2008 also provided an overview of a project-level and program-level conservation strategy that would offset potential effects to biological resources, including State-listed species (such as the giant garter snake and Swainson’s hawk) and their habitats that may be temporarily or permanently affected by the implementation of the project. Some components of this conservation strategy have changed...
since the May 2008 application submittal; therefore, this memorandum provides an update to SAFCA’s project-level and program-level conservation strategy.

**Summary of Conservation Strategy for the NLIP Landside Improvements Project**

**Habitat Enhancement, Development and Management**

The NLIP Landside Improvements Project includes a basin-wide habitat creation, enhancement, and preservation component and associated conservation strategy. In addition, specific measures would be implemented to avoid and minimize the potential for adverse effects resulting from implementation of the project to giant garter snake, Swainson’s hawk, valley elderberry longhorn beetle, and other species covered by the Natomas Basin Habitat Conservation Plan (NBHCP).

**Conservation Strategy Overview**

The project conservation strategy would, in its entirety, significantly contribute toward the establishment of a valuable habitat reserve in the increasingly urbanized landscape of the Natomas Basin (basin). The reserve would occupy an estimated 15,000 acres after the NBHCP objectives and other proposed conservation programs are completed. Through habitat creation, restoration, and preservation, SAFCA would increase the amount of protected habitat available for NBHCP-covered species. Further, SAFCA’s proposed plan would consolidate large areas of habitat, assisting in the expansion of The Natomas Basin Conservancy’s (TNBC) habitat reserve blocks in the northwestern and southwestern regions of the basin. Finally, the construction of new canals and the establishment of woodland corridors would greatly improve the connectivity between core habitat reserves that are distributed throughout the basin, and substantially increase acreage and patch size of these critical habitats.

A key component of the conservation strategy is to support the NBHCP’s goals that promote biological conservation in conjunction with expected economic and urban development in the Natomas Basin. The premise of the NBHCP is its multispecies conservation program that minimizes and mitigates the expected loss of habitat values and incidental take of “covered species” that could result from urban development and operation and maintenance of irrigation and drainage systems in the basin.

Overall, the NLIP Landside Improvements Project is an opportunity to employ a landscape-scale vision, helping to advance the goals and objectives of the NBHCP and assist the Federal Aviation Administration, USACE, and the local Reclamation Districts in achieving their goals. SAFCA’s Natomas Landside Improvements Project presents a unique, one-time opportunity to reconfigure habitat and connective corridors in the basin at a landscape scale. SAFCA’s NLIP Landside Improvements Project secures and expands the amount of habitat protected in the basin, establishes the components that tie the preserves and disparate mitigation sites together in perpetuity under public ownership, and increases the quality and viability of this emerging habitat reserve. The following subsections provide an overview of the primary goals and landscape-level benefits of this habitat conservation strategy.

**Increase Amount of Protected Habitat**

While the Landside Improvements project would result in loss and reconfiguration of landside habitats adjacent to the widened levees in the Natomas Basin, the project has been specifically designed to minimize impacts on these landside habitats and to avoid impacts on riparian habitats along the Sacramento River and NCC. The construction of an adjacent setback levee and installation of seepage cutoff walls enable SAFCA to retain the mature riparian tree corridor and numerous Swainson’s hawk nests that are located along the water side of the Natomas Basin levees. The project’s conservation strategy includes the preservation, enhancement, and creation of over 1,500 acres of compensatory habitats, including:

- Approximately 100 acres of created, managed marsh;
- Over 850 acres of created, managed grasslands;
- Approximately 60 acres of canals and 80 acres of associated uplands;
- Approximately 150 acres of preserved field crops;
- At least 140 acres of preserved and created landslide valley oak woodlands and savannah and;
- Up to 175 acres of preserved rice fields.

The project would result in the creation of a larger contiguous area protected and managed for giant garter snake, Swainson’s hawk, valley elderberry longhorn beetle, and other NBHCP-covered species than currently exists.

**Expansion and Consolidation of Protected Habitat in the Natomas Basin**

The project would consolidate large areas of habitat, assisting in the expansion and infill of TNBC reserve blocks in the northwestern and southwestern regions of the Basin. SAFCA would acquire several properties to provide compensatory habitat, either in the form of preserved rice and agricultural crop fields, or created managed marsh, managed grasslands, or landslide woodlands. Many of these properties are contiguous with existing TNBC reserves or other completed or planned mitigation habitats. Protecting habitat adjacent to existing TNBC reserves and other mitigation sites creates a larger contiguous area managed for NBHCP-covered species than currently exists. This increases the habitat value, sustainability, and functions that these individual properties would otherwise provide in isolation, potentially contributing to giant garter snake and Swainson’s hawk recovery in the basin.

**Strengthen Connectivity between TNBC Reserves**

In many ways, the proposed enhancements of existing basin landscapes are more important to the successful implementation of the NBHCP, rather than the acquisition of large quantities of mitigation land. The connective canal and woodland corridors that SAFCA proposes to establish and/or improve are enhancements that would aid in the implementation of the NBHCP, providing TNBC with an opportunity to improve its overall performance toward the goals of the NBHCP. Canal corridors would provide enhanced habitat functionality by permanently linking TNBC properties in the north and Fisherman’s Lake reserve areas in the south that are managed for giant garter snake habitat. The establishment of a landside woodland corridor would provide more nesting and perching habitat for Swainson’s hawk in the basin than currently exists, and bring potential nesting- and perching sites in closer proximity to areas that are managed as foraging habitat for this species in the basin.

**Improved Habitat Design and Management**

The project includes the creation of a new aquatic corridor (GGS/Drainage Canal) along the west side of the basin, as well as improvements to the existing West Drainage Canal. These canals may in the future represent the only continuous, north-south movement corridor connecting the basin’s northern and southern concentrations of giant garter snakes. Unlike the tenuous water supply to many existing canals, the new canal and canal improvements will have a permanent, reliable water supply. The canal designs would require less maintenance and, thus, less disturbance through increased canal flow capacity and reduced erosion and would have rock pile refugia installed along its length.

The project’s conservation strategy for woodlands also includes increasing overall patch size of existing, isolated woodland groves by enlarging the contiguous size of one or more groves, and creating connecting woodland corridors between existing groves. Increasing the patch size and
expanding age class and species diversity of woodland habitat will provide greater nesting success to native bird species and superior refuge and habitat diversity for many other woodland- and oak savannah-dependent wildlife species. Woodland creation between the Sacramento River and Rio Ramaza area will represent the largest concentration of valley oak woodland in the basin, and the only large woodland groves protected and managed exclusively for wildlife values.

**Mitigation and Monitoring Plan and Long-term Management Plan**
Mitigation and monitoring plans (MMP) and a programmatic long-term management plan (LTMP) for the compensatory habitat components are being prepared to guide SAFCA and its partners as they manage the compensatory land components in perpetuity. The MMPs would address the habitat creation and preservation components of the NLIP Landside Improvements project. The MMPs and LTMP would establish specific success criteria for the habitat components, specify remedial measures to be undertaken if success criteria are not met (e.g., adaptive management, physical adjustments, additional monitoring), and describe short- and long-term management and maintenance of the habitat lands. The MMPs and LTMP would also describe the strategies for the long-term protection of these habitats and funding for the management as provided through appropriate mechanisms, which would be determined by SAFCA, the regulatory agencies, and other entities cooperating in the implementation of the project.

The goal of the MMPs and LTMP is to ensure that the conservation values of the preserved, restored, and created habitats are maintained in good condition in perpetuity. The MMPs and LTMP would discuss specific management strategies designed to maintain the conservation values for each of the habitat mitigation components and identify performance criteria used to determine the success of the mitigation habitats. The biological goals include: (1) the preservation of the abundance and diversity of native species, and particularly special-status species, in the mitigation habitats; (2) the protection of the habitat features from the effects of indiscriminate land uses that may adversely impact mitigation habitats; and (3) the restoration of any adverse condition within the mitigation habitat areas that may affect or potentially affect these areas.

**IMPLEMENTING MECHANISMS FOR LONG-TERM PROTECTION AND MANAGEMENT**
The MMPs and LTMP would describe the framework for the protection and management of the mitigation habitat components of the NLIP Landside Improvements project. The actual implementation of this framework would be enacted through easements, stakeholder-specific management agreements or memoranda of understandings, and contractual agreements. These contractual agreements would focus on the management obligations specific to each management entity, and describe the demonstrated financial and legal assurances necessary to implement the MMPs and LTMP to protect and manage the habitat mitigation components in perpetuity. These contractual agreements would be subject to review and approval by USFWS, USACE, and DFG, and enforced by SAFCA, in perpetuity, and by USACE through permit issuance.

**MANAGEMENT ENTITIES FOR PROJECT FEATURES**
Agencies and organizations anticipated to have management responsibility for project features are as follows:

- **Sacramento Area Flood Control Agency**: Responsible for the design and construction of all project components, including compensatory habitats. Once these project features are completed, most of the land or land management responsibility would be conferred by SAFCA to the other management entities. Memoranda of understanding, land ownership
transfers, or management endowments and contracts would be used by SAFCA to transfer land management responsibility to the appropriate public agency or nonprofit land management organization.

- **Reclamation District 1000**: RD 1000 would be responsible for the management of the proposed levee improvements and the GGS/Drainage Canal.

- **Natomas Central Mutual Water Company**: NCMWC would be responsible for maintaining and managing the relocated Elkhorn and Riverside Canals. The relocated canals would be maintained and operated in the same manner as the existing canals.

- **The Natomas Basin Conservancy**: Private land acquired by SAFCA and converted to managed marsh, preserved in rice or agricultural uplands, or used for woodland establishment would be conveyed to TNBC after creation of these habitats. SAFCA may also contract with TNBC for monitoring elements of some habitat features (e.g., the GGS/Drainage Canal).

**Funding Mechanism**

Funding for implementation of the MMP and LTMP, including construction, monitoring, and long-term management of the compensatory habitat components, has been incorporated into the overall budget for implementation of the NLIP Landslide Improvements project. Funding for the management and administration of the various habitat components will be negotiated through agreements with RD 1000 (GGS/Drainage Canal management, managed grasslands), TNBC (rice fields, field crops, landside woodlands, and GGS/Drainage Canal administration), and NCMWC (water).

SAFCA anticipates that funding for the agreements with RD 1000 and NCMWC will be provided on an annual basis from the special assessments collected as part of the Consolidated Capital Assessment District (CCAD). In order to ensure timely payment for the services rendered under these agreements, SAFCA will maintain reserve accounts with balances sufficient to support annual funding for two years for each agreement. Upon termination of the CCAD in 2037, these payments will be covered by assessments collected as part of SAFCA's existing Operation and Maintenance Assessment District. Funding for the agreement with TNBC will be provided through a non-wasting endowment funded by CCAD assessments.

**Summary of Compensatory Offsets for Effects on Listed Species and Habitats**

All phases of the project would result in land cover changes. Along the existing levees, existing annual grasslands, fallow and active agricultural fields, rice fields, woodlands, and some canals would be converted to native perennial grassland by the levee footprint expansion. Along the alignments of the relocated and new canals, agricultural fields and annual grasslands would be converted to open-channel aquatic habitat and associated uplands (e.g., native perennial grasslands). Agricultural fields and rice fields on borrow sites would be temporarily affected, but the existing land use would be restored after the completion of borrow activities.

The majority of the land cover changes that would result from implementation of the overall Landslide Improvements Project would result in conversions of one type of habitat to another, and the resulting cover types would be suitable for use by a variety of species, including those covered by the NBHCP. Some of the land cover conversions, for example, agricultural lands to woodlands, would continue to function as suitable habitat for listed species (e.g., Swainson's hawk) regardless of the conversion of land cover. In addition, over 1,500 acres of land currently in private ownership would be acquired by SAFCA and specifically managed for habitat purposes and preserved in perpetuity. This includes existing rice land and row/field crops that would be preserved in production, rice that would be converted to managed marsh, existing
woodland to be preserved, and created woodland. The acquisition, long-term management, and preservation of these habitats in public ownership would compensate for the permanent habitat loss and temporal habitat loss during construction.

**Summary of the Species- and Habitat-Specific Conservation Strategy**

Land acquisition and habitat preservation is a key component of the project, and SAFCA expects to offset temporary and permanent effects that the project may have on listed species and their habitat through habitat creation, preservation, and enhancement. However, the primary benefit of the project's conservation strategy is the increased functionality and connectivity of habitat in the Natomas Basin.

**Giant Garter Snake**

The project would result in permanent loss and temporary loss and disturbance of potential giant garter snake habitat. Fill, temporary and permanent dewatering, land conversion, and other construction disturbances could adversely affect snakes utilizing affected habitats, including irrigation ditches, drainage canals, rice fields, and associated uplands. Project construction activities in areas of potentially suitable habitat could also result in direct disturbance and loss of individual giant garter snakes. The temporary and permanent effects to giant garter snake habitat, and the corresponding compensatory components, are summarized in Table 1.

<table>
<thead>
<tr>
<th>Temporary Habitat Loss</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4 (Estimated)</th>
<th>Compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice (Brookfield and Fisherman's Lake borrow sites)</td>
<td>Up to 160 acres</td>
<td>Up to 190 acres</td>
<td>48 acres</td>
<td>Up to 175 acres (0.5:1)</td>
</tr>
</tbody>
</table>
| Elkhorn and Riverside Canals-aquatic | 0.52 acres | 5.51 acres | 4.12 acres | Establish 35.8 acres of aquatic habitat in relocated canals
| Elkhorn and Riverside Canals-upland | 19.76 acres | 34.33 acres | 0.85 acre | Establish 49.36 of associated upland in relocated canals
| Miscellaneous upland around GGS/Drainage Canal footprint | 1.24 acres | 1.43 acres | 0 | Restore 2.67 acres |
| **TOTAL (Non-rice only)** | 21.32 acres | 41.27 acres | 4.97 acres | |

<table>
<thead>
<tr>
<th>Permanent Habitat Loss</th>
<th>Compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice (SREL Reach 1, PGCC, Riverside Canal footprint)</td>
<td>17.54 acres</td>
</tr>
<tr>
<td>Aquatic habitat (e.g., canals, ditches, marsh)</td>
<td>8.57 acres</td>
</tr>
<tr>
<td>Upland habitat (SREL Reach 1, PGCC)</td>
<td>3.01 acres</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>TOTAL (All habitats)</td>
<td>29.12 acres</td>
</tr>
</tbody>
</table>

Notes: 1-These rice fields will be converted into managed marsh habitat in the vicinity of Fisherman’s Lake in Phase 4; 2-Includes open channel portions of the replacement canals; 3-The amount of aquatic habitat is increased (relative to the existing) in the relocated canals because of the widened design of the canals; 4-The amount of upland is decreased (relative to the existing) because (1) the impact assumed any suitable upland habitat that extended 200 feet out from suitable aquatic habitat, and (2) the replacement uplands only include the embankments of the canals, and no surrounding land, despite the cover type.

**Temporary Effects on Habitat**

Temporary affects means that the habitat would not be available or usable for one giant garter snake active season. These temporarily affected habitats include the aquatic and suitable upland habitat associated with the Elkhorn Canal, upland habitat around lateral canals where the new GGS/Drainage Canal would be constructed, and rice fields on the Brookfield borrow site.

**Aquatic and Upland:** Approximately 10.16 acres of aquatic habitat and 54.93 acres of associated upland habitat in the existing Elkhorn and Riverside Canals would be temporarily affected by project implementation. Another 2.67 acres of upland habitat would be temporarily affected by the construction of the GGS/Drainage Canal.

Replacement segments for the Elkhorn and Riverside Canals will be constructed without interruption of existing irrigation service. The goal is to provide habitat prior to impacts occurring, resulting in the relocation of 35.8 acres of aquatic habitat and 49.36 acres of upland habitat. The loss of habitat associated with these canals is temporary in nature because where feasible, the replacement habitat would be constructed and functional concurrently with and where feasible, prior to the impact occurring. For instance, the replacement segment for the existing Elkhorn Canal that would be filled in the Phase 3 project as a result of the levee improvements would have already been constructed in the Phase 2 project. The replacement habitats are wider and provide higher habitat value than those affected. The replacement canal will have gentle side slopes, resulting in less sedimentation, and a concrete-lined invert, result in a reduction of aquatic weeds. These design components will ultimately minimize maintenance requirements, lessen the frequency and intensity of maintenance, and reduce habitat degradation and snake injury and mortality. Although a few segments of the replacement Elkhorn Canal will be piped, numerous existing lateral canals connect to the Elkhorn Canal north and south of the piped segments, thus providing continuity of aquatic habitat.

The 2.67 acres of upland habitat around the GGS/Drainage Canal would be restored in the same season that the impact occurs.

**Rice:** Up to 375 acres of rice habitat could be temporarily affected during borrow extraction at the Brookfield borrow site. Portions of the site may be used as a borrow source for levee improvements in phases 2 and 3; however, no area of the property would be used in consecutive years. This site would be returned to rice cultivation after the completion of borrow activities. Any temporarily affected rice will be preserved at a 0.5:1 ratio by placing a conservation
easement over the corresponding acreage at the Brookfield site. The land would be owned by SAFCA and managed by TNBC for the benefit of the species. The preserved rice fields would be cultivated in a manner that maximizes habitat suitability and minimizes potential for injury and mortality.

The Brookfield property is situated in a critical area of the Natoma Basin, along the NCC and east of State Route (SR) 70/99. The preservation of this site will enhance the connection of the Natoma Basin to the floodplain outside of the basin (i.e., Area B and the greater American Basin), thus, potentially contributing to improved genetic exchange of giant garter snakes north and south of the NCC. This protection of this site and the preservation of rice there would ensure that there remains giant garter snake habitat in the northeastern part of the basin, which is planned for development by Sutter County.

**PERMANENT EFFECTS ON HABITAT**

*Aquatic and Upland:* Approximately 19.27 acres of aquatic habitat and 8.94 acres of upland habitat would be permanently affected by project implementation, specifically through the filling of irrigation and drainage canals, including the Airport West Ditch, and small amount of existing marsh habitats.

The project includes the construction of the new GGS/Drainage Canal, which will include approximately 25 acres of aquatic habitat and 30.77 acres of associated upland habitat. While this canal will not be covered by a traditional conservation easement, it will enhance habitat connectivity in the Basin and improve overall habitat functionality. The GGS/Drainage Canal is being specifically designed to create aquatic and upland habitat suitable to giant garter snakes, specifically for movement, foraging, and cover from predators with bench features that will be periodically irrigated, tule plantings, and appropriate side slopes. The habitat quality of the GGS/Drainage Canal is anticipated to be higher than that of the canal habitat that would be lost. Creation and enhancement of this canal would include a number of features designed to maximize the amount and quality of habitat, as well as minimize the need for maintenance activities that temporarily reduce habitat quality and can result in injury and mortality of giant garter snakes. In addition, the configuration and design of the GGS/Drainage Canal enhancement was specifically formulated based on the goal of providing a functional travel corridor between giant garter snake concentrations in the northwestern and southern portions of the Natoma Basin. Loss and deterioration in the quality of existing travel corridors has been identified as a primary concern in maintaining a genetic connection between these two snake populations.

To fully offset the permanent effects to aquatic and upland habitats, SAFCA will create 28.21 acres of managed marsh in the vicinity of Fisherman’s Lake during Phase 4 of the project.

*Rice:* Approximately 65.5 acres of rice habitat would be permanently affected by project implementation by levee expansion onto adjacent rice fields. To fully offset these effects, SAFCA will create an additional 65.5 acres of managed marsh in the vicinity of Fisherman’s Lake during Phase 4 of the project.

While rice fields are an important component of giant garter snake habitat, especially if they are managed specifically to meet the life cycle needs of the giant garter snake, the quality of the created marsh habitat is expected to be even higher than managed rice. The marsh areas would include uplands, which are a very important component of snake habitat that is nearly lacking in rice fields. Managed marsh would also provide habitat consistently from one year to the next, while rice fields can periodically sit fallow and fail to provide aquatic habitat during key periods.
The marsh areas would also be managed in a manner that minimizes potential for snake injury and mortality that can result from typical farming practices. The created managed marsh complex will serve to enhance and consolidate parcels of land adjacent to existing TNBC managed marsh reserves for giant garter snake in the general vicinity of Fisherman's Lake. Approximately 48 acres of rice lands in the Fisherman's Lake area would be converted to managed marsh concurrently with borrow operations, and, thus, this is characterized as a temporary effect.

**Swainson's Hawk**

The project would result in the removal of potential nesting habitat for Swainson's hawk. The project effects and the corresponding compensatory components are summarized in Table 2.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Effects to Potential Swainson's Hawk Nesting Habitat Resulting from Project</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Phase 2</td>
</tr>
<tr>
<td>Removal</td>
<td></td>
</tr>
<tr>
<td>of</td>
<td>14.88</td>
</tr>
<tr>
<td>Potential</td>
<td>acres</td>
</tr>
<tr>
<td>Nesting</td>
<td></td>
</tr>
<tr>
<td>Habitat¹</td>
<td></td>
</tr>
<tr>
<td>Creation</td>
<td>43.17</td>
</tr>
<tr>
<td>of</td>
<td>acres²</td>
</tr>
<tr>
<td>Landside</td>
<td></td>
</tr>
<tr>
<td>Woodlands</td>
<td></td>
</tr>
<tr>
<td>Preservation</td>
<td>17.9</td>
</tr>
<tr>
<td>of</td>
<td>acres</td>
</tr>
<tr>
<td>Existing</td>
<td></td>
</tr>
<tr>
<td>Landside</td>
<td></td>
</tr>
<tr>
<td>Woodlands</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1-Total woodland loss is expected to be less as the utility corridors are being designed to avoid woodlands, as feasible; 2-Includes removal of up to 20 acres of woodlands in the Phase 4 project footprint (Sacramento River east levee, Reaches 10-12A)

Notes: A-Includes woodland corridor in Sacramento River east levee (SREL) Reaches 1-2, and woodland groves at the Cummings and Lausevic sites; B-Includes woodland corridor in SREL Reaches 7-9 and an additional 15 acres of woodland grove at a site yet to be determined; C-Includes woodland groves at the South, North, and Northeast Rio Ramaza sites

**Effects on Potential Nesting Habitat**

Implementation of the project will result in the removal of approximately 64.97 acres of woodlands that represent potential nesting habitat for the Swainson’s hawk. The project includes the creation of 111.39 acres and the preservation of 28.61 acres of landside woodlands.

The created woodlands will increase overall patch size of existing, isolated woodland groves by enlarging the contiguous size of one or more groves, and creating connecting woodland corridors between existing groves. These woodlands will represent the largest concentration of valley oak woodland in the basin, and the only large woodlands protected and managed exclusively for wildlife values.
cc: Kelly Holland
    Mike Eng—EDAW
APPENDIX B. PERSONAL COMMUNICATIONS REGARDING SWAINSON’S HAWK USE OF NATIVE GRASSLANDS

Conversation held between Ann Chrisney, EDAW biologist, and Jim Estep, biologist specializing in Swainson’s hawks, on December 19, 2008.

Jim said that John Roberts has planted some native grass habitat on a parcel of land at one of The Natomas Basin Conservancy (TNBC) preserves. Jim said that the site is very productive in terms of vegetative growth. Jim said that he believes there is a good likelihood that Microtus are more abundant in these native grasslands than in a typical annual grassland habitat. The grasses were quite tall (about 3 feet), which is not ideal for Swainson’s hawk foraging. However, because native grasses are bunch grasses, the habitat was more open than a typical annual grass habitat, thus making prey more available to Swainson’s hawks. He said that Swainson’s hawks are foraging at this site. Jim believes that mowed native grassland on the Natomas Levee Improvement Project (NLIP) berms and levees would provide good foraging habitat for Swainson’s hawks, although he emphasized the need to minimize the height of the grasses. Generally, 4–12 inches is a good height for foraging Swainson’s hawks, depending on the density of the vegetation; the denser the vegetation, the shorter it should be. In addition, he thought native grasslands adjacent to crops could provide refuge for small mammals when crops are being harvested. He also mentioned that Swainson’s hawks frequently forage on alfalfa fields right after they are cut.

Conversation held between Ann and John Roberts, Executive Director of TNBC on December 19, 2008.

In 2002, TNBC planted 25 acres of native grasses, barley, and clover (e.g., three week clover, California barley, California brome, Idaho fescue, purple needle grass, and pine bunch grass). They fertilized the area, amended the soil, and used herbicides periodically to keep the forbs down. They graze goats on the property after seed shatter to stomp the seeds into the dirt and to shorten the vegetation. The two primary management concerns are invasive plants and excessive thatch in the understory. They use fire to minimize the amount of thatch.

Voles (Microtus) build tunnels in the moist mass of vegetation above the ground in the understory. Based on the number of tunnels they have seen during incidental observations, Microtus populations appear to be very high at this site. Mike Bradbury of DWR, who with Jim Estep makes up the SWHA Technical Committee, told John Roberts that he had never seen so much Microtus activity. John Roberts stated that Swainson’s hawk are foraging in the area, especially when the goats are grazing because the goats flush the Microtus.
Mr. Francis C. Piccola  
Chief, Planning Division  
U.S. Army Corps of Engineers, Sacramento District  
1325 J Street  
Sacramento, California  95814  

Subject: Section 7 Programmatic Formal Consultation on the Natomas Levee Improvement Program, Landside Improvements Project, Sacramento and Sutter Counties, California  

Dear Mr. Piccola:  

This is in response to the U.S. Army Corps of Engineers (Corps) June 9, 2008, request for consultation with the U.S. Fish and Wildlife Service (Service) on the proposed Natomas Levee Improvement Program, Landside Improvements Project (proposed project) in Sacramento and Sutter Counties, California. Your request was received in our office on June 11, 2008. This document represents the Service’s programmatic biological opinion on the effects of the action to two federally-listed threatened species: the valley elderberry longhorn beetle (Desmocerus californicus dimorphus) and the giant garter snake (Thamnophis gigas) and project-level biological opinion for Phase 2 work for the same species, in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act).  

This biological opinion is based on information provided in the Corps’ letter requesting consultation and their biological assessment. A complete administrative record is on file at the Sacramento Fish and Wildlife Office.
CONSULTATION HISTORY

September 25, 2006. The Sacramento Area Flood Control Agency (SAFCA) had a meeting with the Service to briefly describe the conceptual Natomas Levee Improvement Project.

May 10, 2007. The SAFCA made a presentation of their Natomas Levee Improvement Program Conceptual Plan to the Natomas Joint Vision, which included staff from the Service, California Department of Fish and Game (CDFG), the City of Sacramento, the Sacramento International Airport (Airport), and the Corps. This presentation included additional details and conceptual project designs.


January 11, 2008. The SAFCA, the Corps, the Service, and CDFG began holding coordination meetings on the Natomas Levee Improvement Project to discuss project description and schedule.

January 24, 2008. The SAFCA, the Corps, the Service, and CDFG held a coordination meeting, which included John Roberts from the Natomas Basin Conservancy (TNBC) to discuss project effects.

March 28, 2008. The Service met with SAFCA and Congresswoman Doris Matsui to discuss the project and schedule of the project.

June 17, 2008. The SAFCA and the Corps held a meeting with CDFG and the Service to discuss work proposed for construction in 2009.

June 25, 2008. The Corps, EDAW, CDFG, and Service held a meeting to go over the effects of the project on specific cover-types.

July 2, 2008. The Service met again with Congresswoman Doris Matsui to discuss the schedule of the biological opinion.

July 9, 2008. The Service met with SAFCA, EDAW, CDFG, and the Corps to discuss endowments and easements for the conservation measures. The Service advised SAFCA that anything other than a conservation easement for protection of compensation areas would take a great deal of time to work through.

July 10, 2008. The Corps, EDAW, SAFCA, CDFG, and Service held a meeting to discuss effects and schedule of the project.
July 15, 2008. The Service and Corps met with SAFCA to resolve schedule differences for the biological opinion. The Service committed to completing the biological opinion by September 24, 2008.

July 17, 2008. The Service provided a request via e-mail for 39 additional acres of managed marsh creation as part of the compensation strategy. This request was sent to EDAW, SAFCA, Corps, and CDFG.

July 21, 2008. The Service, Corps, EDAW, SAFCA, and CDFG met to discuss project effects and compensation strategy.

September 9, 2008. The SAFCA provided an updated compensation strategy based on landuse changes at borrow sites on Sacramento County Airport lands.

September 17, 2008. SAFCA, EDAW, and the Service had a meeting in which SAFCA proposed an idea to develop a compensation bank within the Natomas Basin.

September 19, 2008. The Service responded to the proposal submitted by SAFCA for a compensation bank and suggested that in order to provide a biological opinion to the Corps and SAFCA by September 24, 2008, SAFCA not include compensation banking as part of their project description. The Service also suggested that placing a conservation easement on ½ of the area borrowed at Brookfield would help compensate for effects due to the project.

September 21, 2008. SAFCA’s consultant provided an e-mail which agreed to the Service’s September 19, 2008, e-mail.

BIOLOGICAL OPINION

Description of Action Area

The proposed project area is located in the Natomas Basin in northern Sacramento and southern Sutter Counties, generally bounded by leveed reaches of the Natomas Cross Canal (NCC) on the north, the Sacramento River on the west, the American River on the south, and the Pleasant Grove Creek Canal (PGCC) and Natomas East Main Drainage Canal (NEMDC)/Steelhead Creek on the east. This project, which is part of the larger Natomas Levee Improvement Program (NLIP) being undertaken by SAFCA, consists of three construction phases, generally occurring between 2008 and 2011. Construction Phase 2 includes the 5.3-mile NCC south levee, the Sacramento River east levee from the NCC south levee to 2,000 feet south of the North Drainage Canal (Reaches 1-4B), 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. Construction Phase 3 includes the Sacramento River east levee south of the limits of the Phase 2 improvements to just south of I-5 (Reaches 5A–9B), the PGCC west levee, the NEMDC west levee between Elkhorn Boulevard and
Northgate Boulevard, the area between Elkhorn Reservoir and the West Drainage Canal where a new canal designed to provide drainage and associated giant garter snake habitat (referred to in this document as the “GGS/Drainage Canal”) would be constructed, the portion of the West Drainage Canal north of Interstate 5 (I-5), the Elkhorn Canal downstream of Elkhorn Reservoir, and RD 1000 Pumping Plant No. 2. Construction Phase 4, which is still undergoing study, includes the Sacramento River east levee south of the limits of the Phase 3 improvements to the junction with the American River north levee (Reaches 10–20), the NEMDC west levee between Sanky Road and Elkhorn Boulevard, the Riversides Main Irrigation Canal (Riverside Canal), and the West Drainage Canal south of I-5 to Fisherman’s Lake. Phase 1 of the project occurred during the summers of 2007 and 2008 and consisted of placing slurry wall along 9,700 linear feet of the Natoma Cross Canal (Service file number 1-1-07-F-0207).

Because the Corps and SAFCA only have a detailed project description for Phase 2 of the entire Natoma Levee Improvement Project, this biological opinion analyzes the landscape effects of the project for all Phases (2, 3, and 4) but will only analyze and provide incidental take coverage for Phase 2. Each subsequent phase will initiate section 7 consultation with the Service under the umbrella of this programmatic biological opinion.

Overview of NLIP Landside Improvements Project

The 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 Water Board (formerly The Reclamation Board), to address the deficiencies in the Natoma 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 land side 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 would 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 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 Swainson’s hawk, 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 would 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 would 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 giant garter snake habitat.

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

**Existing Project Facilities and Potential Borrow Sites**

Construction activities for all project phases would take place within the Natomas Basin, except for potential development of a borrow site on RD 1001 land northeast of the basin. The following subsections describe the existing flood control facilities, their general setting, and adjacent irrigation infrastructure and the potential borrow sources for the project as provided by the Corps in their Environmental Impact Statement for the proposed project.
Flood Control and Irrigation Facilities

Natomas Cross Canal South Levee

The NCC is a 5.3-mile-long channel that carries water from several tributary watersheds in western Placer County and eastern Sutter County to the Sacramento River. The NCC begins at the PGCC and East Side Canal and extends southwest to its confluence with the Sacramento River near the Sankey Road/Garden Highway intersection. During periods of flooding, the Sutter Bypass, Sacramento River, and NCC all contribute to raised water elevations that can affect the NCC levees. For engineering purposes, the south levee is divided into seven reaches. Much of the south levee contains an existing stability berm with an internal drainage system. Levee slopes are approximately 3H:1V on the water side and 2H:1V on the land side.

There is an approximately 80- to 100-foot maintenance access area on the landside of the levee through most of the NCC’s length. Farms and rural residences are located on both sides of the NCC, with rice the primary crop under cultivation. The Lucich North and Frazer Habitat Preserves, maintained by TNBC, lie south of the NCC south levee from the eastern end of Reach 2 through the western end of Reach 6. A drainage canal, referred to as the Vestal Drain, runs parallel to the NCC south levee through much of Reach 2, approximately 100 feet from the landside levee toe. There is a private irrigation pump and irrigation canal at the landside levee toe in Reach 1. Natomas Central Mutual Water Company’s (NMWC) Bennett Pumping Plant and RD 1000’s Pumping Plant No. 4 are located in Reach 2, and the NMWC Northern Pumping Plant is located in Reach 3. The NMWC North Main Canal runs parallel to the levee through Reaches 4 and 5, approximately 100 feet from the landside levee toe.

Sacramento River East Levee

An 18-mile-long section of the east levee of the Sacramento River protects the west side of the Natomas Basin between the NCC and the American River. For planning purposes, the levee is divided into 20 reaches. Garden Highway is located on top of the levee crown within all 20 reaches. A drained, 10-foot-wide stability berm is present on the landside slope of the levee between the NCC and Powerline Road (Reaches 1–11). Cutoff walls to address through-levee seepage remediation were previously constructed through the levee in Reaches 12–20. The land uses along the levee vary from north to south. Along the landside, Reaches 1–13 are bordered mainly by private agricultural lands containing a few rural residences, Airport bufferlands, and two farmed TNBC parcels. Teal Bend Golf Club is west of the Airport, adjacent to the levee along Reach 6. The parcels bordering Reaches 14–18 contain more residences, several rural estates, and three TNBC parcels. The landside of Reaches 19 and 20 are bordered by residential subdivisions, a business park, the City of Sacramento’s Natomas Oaks Park, undeveloped Costa Park site, and Shorebird Park.

Several irrigation canals, pipelines, wells, and pump stations exist along the Sacramento River east levee. The Elkhorn Canal and the Riverside Canal are key agricultural irrigation canals in the NMWC system. The Elkhorn Canal runs parallel to the Sacramento River east levee from the
North Drainage Canal in Reach 4B through Reach 8 and into the start of Reach 9 (1,250 feet south of Elkhorn Boulevard); this canal is supplied by the Prichard and Elkhorn Pumping Plants on the Sacramento River. The Riverside Canal extends from just north of Reach 13 to the middle of Reach 19 and is supplied by the Riverside Pumping Plant, on the Sacramento River just north of Radio Road. Several lateral canals connect to the Elkhorn and Riverside Canals. The existing Elkhorn and Riverside Canals are highline canals that use gravity flow to deliver water for irrigation by maintaining water levels above the surrounding ground levels. These canals have earthen embankments with side slopes that are nearly vertical, requiring regular maintenance. Approximately 1 mile of the existing Elkhorn Canal is concrete lined and the entire Riverside Canal is concrete lined.

In addition to the NMWC irrigation systems, there are several landowner-operated systems along the levee. These facilities are located primarily in Reaches 1–4A and 9–12, in areas not currently served by the NMWC systems. The areas are serviced by either well pumps on the landside or river pumps, which discharge into buried pipelines, small irrigation ditches, or directly onto fields. The distribution systems run along the landside toe of the levee to supply fields that slope away from the levee. There are approximately nine small pumping plants that provide water from the river and approximately 10 groundwater well pumps.

Several drainage pumping plants are operated by RD 1000 along the Sacramento River east levee. These facilities pump drain water from the main drainage canal system into the river. They include Pumping Plant No. 2, located in Reach 4B; Pumping Plant No. 5, located in Reach 10; Pumping Plant No. 3, located in Reach 13; and Pumping Plant No. 1, located in Reach 20A. Pumping Plant No. 2 was temporarily removed as part of an emergency levee repair in 2006 and would be replaced as an element of the proposed project in the 2009–2010 construction phases. In addition to these RD 1000 pumping stations, the City of Sacramento operates the Willow Creek drainage pumping station, which is located in Reach 19B.

Pleasant Grove Creek Canal West Levee

The PGCC west levee extends southerly from the east end of the NCC south levee to the north end of the NEMDC/Steelhead Creek levee near the Sankey Road crossing. The PGCC west levee protects the Natomas Basin from flood flows from Pleasant Grove Creek and other creeks in western Placer County, as well as from water that backs up in the NCC during high river stages in the Sacramento River. Levee slopes are generally 2H:1V on both the water side and land side of the levee. Natomas Road is located on top of the levee crown. No berms support this levee. A private canal extends parallel to the PGCC west levee for about 1,500 feet at the landside levee toe. Farms and scattered rural residences are located on the landside of the PGCC west levee, and a manufacturing facility and a railroad siding are located within several hundred feet of the levee, just south of Sankey Road.
Natomas East Main Drainage Canal

The 13.3-mile NEMDC/Steelhead Creek west levee extends southerly from the south end of the PGCC west levee near the Sankey Road crossing to Northgate Boulevard. The NEMDC west levee protects the Natomas Basin from flood flows from Arcade and Dry Creeks, as well as from water during high river stages in the American River. Natomas and East Levee Roads are located on top of the levee crown. Private canals extend parallel to portions of the NEMDC west levee landside levee toe. Farms and scattered rural residences are located on the land side of the northern portion of the NEMDC west levee (between Sankey Road and Elkhorn Boulevard), while the southern portion (generally south of Del Paso Road to Northgate Boulevard) is bordered by urban and commercial/industrial development.

The SAFCA NEMDC stormwater pumping station, a facility that is connected to the NEMDC/Steelhead Creek west levee and the Dry Creek north levee, is situated between Del Paso Road and Elkhorn Boulevard. Other pumping stations occur along the NEMDC west levee, including NMWC Pumping Plant Nos. 6 and 8, which pump water out of the Natomas Basin for in-basin drainage and flood control. RD 1000 operates Pumping Plant Nos. 6 and 8 and City of Sacramento operates Pump Station No. 102 on the NEMDC west levee.

Borrow Sites

Borrow sites are areas from which earthen materials would be removed for use in construction. Where borrow sites would be used over more than one construction season, the work would progress in cells that would be incrementally developed as habitat or returned to agricultural use as the borrow activities are completed. Several properties have been identified as likely sources of soil borrow, mainly for use in the improvements to the Sacramento River east levee. The SAFCA has identified the following preferred borrow sources for the construction of the flood control and irrigation infrastructure improvements for construction Phases 2, 3, and 4, and a redundant source that may be pursued if negotiations regarding the preferred sources are unsuccessful or additional quantities are found to be needed during construction:

- **Brookfield property (Phases 2, and 3 preferred):** Private property west of the PGCC at Fifield Road, which was in rice cultivation in 2008. Material from this property could be used along the NCC south levee and the upper reaches of the Sacramento River east levee in construction Phase 2 and on the PGCC west levee in construction Phases 3. While the overall property may be used as borrow during multiple years, no area of the property would be used for consecutive years. After the removal of borrow material, the land would be returned to rice cultivation in the same season or if too late to plant, then in the following season.

- **Airport bufferlands north of the Airport complex (Phases 2 and 3 preferred, Phase 4 potential):** Sacramento County property north of Elverta Road and west of Powerline Road. These lands could provide soil for use along the middle reaches of the Sacramento River east levee in construction Phases 2 and 3. They could also provide material for
construction in the lower reaches of the levee in construction Phase 4, if needed. While the overall property may be used as borrow during multiple years, no area of the property would be used for consecutive years. After the removal of borrow material, the borrow areas, which are currently either fallow agricultural lands or ruderal grassland, would be returned to fallow agricultural fields.

- Fisherman's Lake area (Phase 4 preferred): Privately owned parcels between TNBC-managed habitat areas. Several parcels, which are currently planted in rice, orchards, or field crops, may be suitable sources of borrow material for use in the lower reaches of the Sacramento River east levee and are strategically situated for creation of habitat that would link existing TNBC parcels.

- Krumenacher property (Phase 3 preferred): Private parcel at the intersection of East Levee Road and Elkhorn Boulevard. This parcel is a component of the Natomas Panhandle, identified in the Natomas Basin Habitat Conservation Plan (NBHCP) and development of this parcel is already covered by a July 25, 2007, biological opinion (1-1-06-F-0294). This land, which is primarily grassland, could provide a borrow source for the levee widening improvements to the NEMDC.

- Twin Rivers Unified School District (Phase 3 preferred): Material stockpiled on property owned by Twin Rivers Unified School District, immediately south of Krumenacher. This parcel is a component of the Natomas Panhandle, identified in the NBHCP, and development of this parcel is already covered by a July 25, 2007, biological opinion (1-1-06-F-0294). This material could provide a borrow source for the levee widening improvements to the NEMDC.

- Horangic/Private Property Northwest of Garden Highway and Reservoir Road (Phase 3 preferred): Private parcel located in Reach 6A along the Sacramento River east levee. The portion of this site that would not be in the levee footprint could provide borrow material for seepage berms in Reaches 5A–5B. The site would be shallow-graded for borrow material and returned to field crops.

- Binford deYoung/Private Property Southwest of Garden Highway and Elverta Road (Phase 3 preferred): Private parcel located in Reach 5B along the Sacramento River east levee. The portion of this site that would not be in the levee footprint could provide borrow material for seepage berms in Reaches 5A–5B. The site would be shallow-graded for borrow material and returned to field crops.

- Bianchi/Private Property Northwest of Garden Highway and Reservoir Road (Phase 3 potential): Private parcel located in Reach 7 along the Sacramento River east levee. This property could borrow material for levee construction south of the Teal Bend Golf Club. The site would be shallow graded for borrow material and returned to field crops.
Pacific Terrace (Phase 3 preferred): A 276-acre site located north of I-5 and east of Schoolhouse Road. Approximately 120 acres of this site could be used for levee construction south of the Teal Bend Golf Club. The site would be shallow graded for borrow material and returned to field crops.

Novak property (Phase 3 preferred, Phase 4 potential): A SAFCA-owned, 94-acre property located south of Del Paso Road and east of Powerline Road in Reach 12A along the Sacramento River east levee. The site could be used for levee construction south of the Teal Bend Golf Course. The site would be shallow graded for borrow material and returned to grassland or field crops.

RD 1001 (Phase 4 potential): Existing and future borrow sites owned by RD 1001, about 5 miles northeast of the Natomas Basin along Pacific Avenue. Material from the sites could be used in constructing Phase 4.

Overview of the Project Elements

The elements of the proposed project are categorized into five broad, overlapping categories:

- levee raising and seepage remediation,
- improvements to major irrigation and drainage infrastructure,
- acquisition of right-of-way within the footprint of the proposed features, at borrow sites, and to prevent encroachment and provide for maintenance access along the land side of the flood control facilities,
- habitat development and management for giant garter snakes and Swainson’s hawks, and
- additional actions to meet Federal Emergency Management Agency requirements: encroachment management and bridge crossing modifications.

Levee Raising and Seepage Remediation

General Methods - The following subsections provide an overview of the approaches to addressing freeboard deficiencies and seepage potential that would be used in various combinations on the NCC south levee and Sacramento River east levee, and the PGCC and NEMDC west levees.

Raising, Widening and Flattening Levees (Phases 2, 3, 4)

The entire NCC south levee, much of the Sacramento River east levee and a portion of the PGCC west levee at Sankey Road lack the required 3 feet of freeboard above the 100-year water surface profile. To meet overall NLIP goals, SAFCA would increase the levee freeboard sufficiently in freeboard-deficient areas to meet the desired minimum of 3 feet of freeboard above the 200-year water surface profile. The levee height increases would be accomplished through raises of the existing NCC south levee or through construction of the raised adjacent setback levee adjacent to the existing Sacramento River cast levee:
Raise of existing levee (NCC south levee). For a minor raise of the levee crown elevation (typically 6 inches or less), the raise may be limited to the levee crown area, provided that there is enough existing crown width to accommodate the raise without narrowing the crown to a width that is less than the minimum requirement. For most of the NLIP levee raises, however, a greater crown raise is required and/or the levee slopes must be flattened. The required crown elevation would be met through a full levee raise. Full levee raises consist of an embankment raised from the landside or waterside toe (or both) upward to the increased crown elevation. This requires partially excavating the levee slope to provide a working platform for equipment, typically 10 feet wide, and rebuilding the levee to the appropriate elevation by benching the new embankment material into the existing embankment material.

Adjacent setback levee (Sacramento River east levee). The proposed adjacent setback levee adjoining the Sacramento River east levee would be constructed with a crown elevation 3 feet above the 200-year water surface profile. In the upper reaches, where the existing levee has freeboard deficiencies of as much as 3 feet, the crown of the adjacent setback levee would be higher than the existing levee and Garden Highway roadway. In the lower reaches, where the existing levee has sufficient freeboard, the adjacent setback levee would be the same height as the existing levee.

The only levee segment that lacks adequate levee height that would be maintained at its current elevation is the PGCC west levee at Sankey Road because the flows through this levee segment into the interior of the Natomas Basin during a Federal Emergency Management Agency (FEMA) 100-year or “200-year” design event are not damaging and are subject to management as part of the basin’s interior drainage system. Along the NEMDC west levee between Northgate Boulevard and Elkhorn Boulevard, the levee currently meets FEMA 100-year levee height requirements and also meets the “200-year” plus 3 feet of levee height design for the top of the levee profile.

The final levee configuration must meet the Corps criteria of a 20-foot-wide minimum crown, a 3H:1V waterside slope, and a 3H:1V (preferred) or 2H:1V (maximum) landside slope. Because the levees in most of the project reaches currently have landside slopes of 2H:1V, the proposed project includes flattening these slopes to at least a 3H:1V profile, and preferably 5H:1V. The PGCC west levee would be expanded on the landside to provide a levee width to encompass, at a minimum, a theoretical 3H:1V waterside slope, a crown width of at least 20 feet, and a landside slope of at least 3H:1V. The intent of the landside expansion is to preserve the existing Natomas Road and East Levee Road, which are County/City-maintained roads located on top of the existing PGCC and NEMDC west levees. Levee widening and slope flattening would also occur along the NEMDC west levee between Elkhorn Boulevard and the NEMDC stormwater pumping station.

Seepage Remediation

Underseepage problems can occur where levees are constructed on low-permeability foundation soil (silt and clay) underlain by a layer of higher permeability (sand and gravel). Excessive
underseepage makes the levee susceptible to failure during periods of high river stage. Under these conditions, seepage travels horizontally under the levee and then is forced vertically upward through the low-permeability foundation layer, often referred to as a "blanket." Failure of the blanket can occur either by uplift, a condition in which the blanket does not have enough weight to resist the confined pressure acting on the bottom of the blanket, or by piping (internal erosion) caused by water flowing under high vertical gradients through the erodible blanket and carrying fine soil particles out of the foundation materials. Through-seepage is seepage through a levee embankment that can occur during periods of high river stage. Depending on the duration of high water and the permeability of embankment soil, seepage may exit the landside face of the levee. Seepage can also pass directly through pervious layers in the levee if such layers are present. Under these conditions, the stability of the landside levee slope may be reduced.

During Phases 2–4, along the Sacramento River east levee, cutoff walls would be constructed through the adjacent levee in some reaches, and 100-foot-wide earthen seepage berms would be constructed in others for seepage remediation. Although portions of this reach of the Natomas perimeter levee system are considered susceptible to seismically induced ground shaking, such a condition would likely not cause deformation of the soil-bentonite (SB) walls in the adjacent levee because of its malleability and location farther away from the river channel, where levee failure is more likely to occur in association with seismically induced collapse of the river bank. Additionally, because an SB seepage cutoff wall is constructed lower in the levee section, it is not likely to be significantly affected by failure of the levee itself if the levee were to collapse. Relief wells cause the least amount of construction disturbance but require routine maintenance of the wells themselves and the drainage and pumping facilities necessary to support them. Seepage berms are feasible where there is sufficient room for construction.

Phase 2 includes the construction of a seepage cutoff wall through the levee crown of the NCC within Reaches 3–7. Phase 3 includes the construction of SB cutoff walls within the PGCC west levee where required to provide seepage remediation. Along the NEMDC west levee between the NEMDC stormwater pumping station and Northgate Boulevard, an SB or soil-cement-bentonite cutoff wall would likely be constructed.

**Major Irrigation and Drainage Infrastructure Modifications**

There are two major canal systems in the Natomas Basin: an irrigation system owned and operated by NMWC and a drainage system owned and operated by RD 1000. The NMWC pumps water into the basin to provide irrigation water to its shareholders for agricultural use within the basin. During winter (October–April), drainage is primarily rainfall runoff; during summer (May–September), drainage water from agricultural fields is typically recirculated for irrigation. Because the basin is surrounded by levees, all excess drainage within the basin must be pumped out. In general, irrigation water is pumped into the basin from the Sacramento River and NCC and returned to the perimeter rivers and canals via RD 1000’s drainage system. In the southern part of the Natomas Basin, the City of Sacramento also operates several drainage pump stations that serve residential areas.
As a result of the planned levee improvements in the Natomas Basin, the irrigation canals currently at the toe of the Sacramento River east levee (the Elkhorn Canal and the Riverside Canal) would be replaced by new irrigation canals set back from the existing levee farther to the east. Where constraints exist, certain portions of the canals would be piped. The existing and proposed irrigation canals are highline canals, which means that the bottom of the canal is roughly equal to the surrounding ground elevation. Irrigation canals would be constructed high enough to raise water levels above the levels of the adjacent fields to allow for gravity flow into the fields.

A new drainage canal would be constructed to improve the connectivity of giant garter snake habitat between the North Drainage Canal and West Drainage Canal. The proposed GGS/Drainage Canal would be constructed with the top of bank roughly at existing ground level to facilitate drainage. Material excavated to construct the GGS/Drainage Canal would generally be used to construct the embankments of the adjacent highline irrigation canals. Some import and export of soil materials for levee construction would be required to accommodate the phasing of the activities. The following subsections provide an overview of these irrigation and drainage infrastructure modifications.

Relocation of the Elkhorn and Riverside Canals

General Construction Plan for Relocated Canals - The Elkhorn and Riverside Canals would be constructed with sufficient height to raise water levels above the levels of adjacent fields. Design water levels would be based on existing levels at service points along the alignments and the tops of embankments would provide for 1 foot of freeboard. To provide for stable banks, side slopes of 3H:1V would be used. The invert of canals would be lined with concrete to control vegetation and to allow for maintenance with minimal disturbance of aquatic habitat along the water's edge.

To avoid interruptions in service along the existing irrigation canals, the relocated canals would be constructed and operational before construction of planned levee improvements that would conflict with the existing irrigation canals. Thus, in any particular reach, the new canal would be constructed before the levee improvements in that same reach. Approximately half of the new Elkhorn Canal (North Drainage Canal to Elkhorn Reservoir) is planned for construction in Phase 2. The GGS/Drainage Canal from the North Drainage Canal to Elkhorn Reservoir also would be constructed in Phase 2, because this section would run parallel to and within the same right-of-way as the proposed Elkhorn Canal in this area. Concurrent construction of these new irrigation and drainage facilities would facilitate the use of excavated material from the GGS/Drainage Canal excavation for use as embankment material along the Elkhorn Canal. The remainder of the Elkhorn Canal and GGS/Drainage Canal would be constructed in Phase 3, and the new Riverside Canal would be constructed during the Phase 4.

Elkhorn Canal - Approximately 22,300 feet of the Elkhorn Canal would be relocated to accommodate the levee construction. This facility is a main irrigation canal that services NMWC Central and Elkhorn systems from the Prichard and Elkhorn Pumping Plants on the Sacramento River. Approximately 1 mile of the existing Elkhorn Canal is concrete lined, including segments
between Elverta Road and the Elkhorn Pumping Plant and also just north and south of Elkhorn Road; the remainder is earth lined.

The proposed alignment of the new Elkhorn Canal is based primarily on the extent of the planned levee improvements. The canal was sited as close as possible to the projected toe of the new levee (with allowance made for a 5H:1V landside levee slope). After this initial alignment was determined, a number of site-specific factors were considered and used to refine the alignment. The resulting alignment minimizes conflicts with known cultural resources sites and existing trees and is roughly parallel to the projected levee toe.

North of Elkhorn Reservoir, the maximum bottom width of the new canal would be 12 feet. The canal embankments would be approximately 7 feet tall with 15-foot-wide patrol roads along the top of the embankments with a two percent grade sloped down towards the canal. The vegetated side slopes would be 3H:1V to provide for stable banks. Overall, the width of the canal would be approximately 140 feet, with additional width required for a buffer and maintenance area for the canal construction north of Elkhorn Reservoir.

To minimize project impacts on the existing Teal Bend Golf Club, the alignment of the Elkhorn Canal through the golf course would be piped (approximately 3,200 feet). Two 36-inch pipes would be aligned parallel to the levee toe and side of the flood control facility corridor. This alignment would avoid existing golf course infrastructure to the extent possible.

South of Teal Bend, the Elkhorn Canal would return to an open channel parallel to the toe of the new levee. The majority of this reach of earthen canal has a design bottom width of 5 feet, with a minimum of 1 foot of levee height and 3H:1V side slopes. A 15-foot-wide patrol road would be located on the top of the field side of the canal; the other embankment would be 8 feet wide on the crown. The only portion of the new canal that would have a concrete-lined invert would be the 4,100-foot section where the existing canal is lined. The remaining 2,900 feet of new canal would be earthen-lined. To avoid impacts on existing residences, a second section (approximately 950 feet through the Mortensen and Bréese properties) of the Elkhorn Canal may be piped using a single 36-inch pipe. The materials to construct the Elkhorn Canal would come primarily from the construction of the GGS/Drainage canal north of I-5. However, a small amount of import from the Airport north borrow sites is expected to be used to support construction of a portion of Phase 2 improvements.

**Riverside Canal** - Approximately 18,600 feet of the Riverside Canal would be relocated to accommodate the levee construction. This facility is a main irrigation canal that services NMWC Riverside system. The supply for this canal is the Riverside Pumping Plant. The canal flows south along the landside toe of the levee to approximately Bryte Bend Road. The canal south of Bryte Bend Road has not been used in recent years. The canal north of the Riverside Pumping Plant is supplied by relifted water at RD 1000’s Pumping Plant No. 3. From Pumping Plant No. 3, the canal flows north approximately 950 feet and turns away from the levee. The entire existing Riverside Canal is concrete lined, although much of the concrete lining is broken and in poor condition.
Like the Elkhorn Canal alignment, the alignment of the Riverside Canal would be based primarily on the extent of the planned levee improvements. The canal would be sited as close as possible to the projected toe of the new levee (allowing for a 5H:1V landside levee slope). After this initial alignment is determined, a number of other factors would be considered and used to refine the alignment. One-half to three-quarters of a mile south of San Juan Road southward to I-80, there are a number of residences along the landside toe of the levee. To avoid bisecting these private properties, it is likely that the Riverside Canal alignment would follow the eastern property line of these parcels. The final alignment would also aim to minimize conflicts with existing trees and other site-specific constraints that are identified during design. Based on these site-specific factors and the variation of the proposed seepage remediation methods in different reaches, the alignment would be only roughly parallel to the projected levee toe. The proposed bottom width of the relocated Riverside Canal would be determined during final design to meet existing capacity needs.

Construction of the New GGS/Drainage Canal - The new GGS/Drainage Canal would enhance habitat functionality by permanently linking known giant garter snake population centers and TNBC properties in the northern and southern reserve areas that are managed for GGS habitat, thus, improving habitat connectivity between the North Drainage Canal and West Drainage Canal and augmenting movement opportunities for this species within the Natomas Basin. This would link emerging blocks of managed giant garter snake habitat in the vicinity of Prichard Lake north of the Airport and around Fisherman’s Lake south of the Airport. In addition to providing giant garter snake habitat, the GGS/Drainage Canal would intercept flows from non-Airport property sources. Irrigation and drainage water currently flowing into the Airport West Ditch from non-Airport property would be incorporated into the GGS/Drainage Canal.

The GGS/Drainage Canal would generally extend parallel to the Sacramento River east levee, extending from the North Drainage Canal at the RD 1000 Pumping Plant No. 2 in the north to the West Drainage Canal in the south, approximately 1,000 feet south of Elkhorn Boulevard. The GGS/Drainage Canal construction would include reconstruction of the West Drainage Canal from I-5 to Fisherman’s Lake. The length of the entire GGS/Drainage Canal, including the reconstruction, would be approximately 43,800 linear feet. The GGS/Drainage Canal would have a series of check structures along its length to maintain consistent water levels in the low-flow channel of the canal during the snake’s active season (April–October). Supplemental water would be provided from NMWC irrigation system. The low-flow channel would have a top width of approximately 50 feet and an average depth of approximately 6 feet. Vegetation would be managed within the canal excavation and on the banks by mowing.

The portion of the GGS/Drainage Canal that would be constructed in Phase 2 is north of Elkhorn Reservoir would be parallel and approximately 30 feet west of the edge of the Elkhorn Canal. Thus, the alignment was based on the same factors as discussed above for the Elkhorn Canal. North of Reservoir Road the canal would be set back a minimum of 200 feet from the projected levee toe to minimize concerns of excessive seepage exit gradients in the bottom of the canal.
The canal in this location would have a 10-foot bottom width and vegetated 3H:1V side slopes. The canal would be approximately five feet deep with two percent grade sloped down towards the canal from the edge of the Elkhorn Canal embankment and the adjacent ground for a distance of 12 feet to allow for a patrol road. The depth would be sufficient to provide a minimum water depth of 4.5 feet with allowance for 1 foot of water level variance and a minimum of 1 foot of freeboard. The footprint of the GGS/Drainage Canal is approximately 50 feet wide. A 30-foot right-of-way would separate the proposed GGS/Drainage Canal from the proposed relocated Elkhorn Canal.

South of Elkhorn Reservoir, the new canal would be constructed with roughly the same proportions as the segment north of Elkhorn Reservoir, with one notable exception. Between the sedimentation basin and Walnut Road, for a total of 2,200 feet, a 15-foot-wide managed tule (Scirpus acutus) bench would be constructed alongside the main channel. This bench would typically be seasonally inundated with water, similar to a managed marsh, and which would drain into the main channel. The 5,900-foot segment of the canal between the southeastern corner of Teal Bend Golf Club and the West Drainage Canal would have a 50-foot-wide managed tule bench.

The GGS/Drainage Canal north of Teal Bend Golf Club would be managed primarily as a linear high-quality giant garter snake habitat and movement corridor, with stormwater drainage a secondary function during major storm events, which typically occur in the snake’s inactive season. South of Teal Bend Golf Club, the canal would also serve as a primary giant garter snake habitat area and movement corridor, but the volume of stormwater drainage would increase in a southerly direction as the canal collects additional runoff as a result of the natural slope of the basin. Winter storm–related runoff exceeding the capacity of the West Drainage Canal south of I-5 would be pumped into the Sacramento River using RD 1000’s Pumping Plant No. 3, consistent with existing stormwater management practice.

The shoreline and lower bank of the GGS/Drainage Canal (including the improved West Drainage Canal) would be planted or managed to promote tule/cattail (Typha latifolia) vegetation as suitable cover and foraging habitat for giant garter snake. However, management of the canal would also require removal of noxious aquatic weeds that obstruct the flow of water. A secure water supply would ensure that water of a suitable quality is present and flowing at low velocity in the canal during the active season of the giant garter snake, and that the water surface would be managed within a range of approximately 1 foot to provide consistent cover from predators along the tule fringe of canal banks. Input of supplemental canal water would begin at a diversion point on the North Drainage Canal at the north end of the new GGS/Drainage Canal. Other points of inflow may occur at downstream locations.

**Removal of Airport West Ditch**

To take advantage of common construction practices and to maximize the use of common facilities, the rearrangement of irrigation and drainage facilities required to provide for rerouting of flows that contribute to the Airport West Ditch would be undertaken in conjunction with these
proposed NLIP improvements in construction Phase 3. This work would include modifications and extension of existing irrigation infrastructure and modification of some local drainage conveyance facilities.

Removal of Culvert and Reconstruction at Pumping Plant No. 2

The project would include the removal of a deep culvert beneath the levee section at the RD 1000 Pumping Plant No. 2 location and the replacement of a relocated RD 1000 Pumping Plant No. 2, which was removed from the western end of the North Drainage Canal in response to underseepage observed during extended winter storms in January 2006.

Land Acquisition

Several of the measures described above would increase the footprint of the flood control system: levees would be widened on the land side as a result of raising, constructing an adjacent setback levee, and flattening the waterside and/or landside slopes. In addition, a 50- to 100-foot-wide access and maintenance corridor would be established at the landside toes of the levees. The proposed improvements also include woodland corridors and groves to replace trees that are removed from within the levee footprint and maintenance access areas, and canal construction east of the flood control features. The SAFCA also would acquire adjacent land for relocation of infrastructure from the flood control corridor and planned improvements outside the flood control corridor (e.g., the GOS/Drainage Canal), with appropriate easements provided to utility owners upon completion of the work. To meet its project footprint needs, SAFCA would acquire private lands in fee and would acquire an easement interest where the project features would be on Airport land (owned by Sacramento County). Where the project footprint would overlie land owned and managed by TNBC, SAFCA may either purchase the land in fee or obtain easements.

Additional Actions to Meet FEMA Requirements

Encroachment Management (Phases 3 and 4)

Corps levee guidance requires the removal of vegetation greater than 2 inches in diameter on the levee slopes and within 15 feet of the waterside and landside levee toes. The Corps levee guidance also requires an assessment of encroachments on the levee slopes, including utilities, fences, structures, retaining walls, driveways, and other features that penetrate the levee prism. Substantial encroachments are present on the Sacramento River east levee. One of the objectives of constructing an adjacent setback levee along the Sacramento River east levee is to facilitate acceptable management of existing vegetation and structural encroachments along the water side of this levee. By moving the hypothetical waterside slope of the levee (the "levee template") landward, the adjacent levee would significantly reduce most of the conflicts between these encroachments and applicable Corps levee operation and maintenance requirements. Should any of these existing encroachments be determined to reduce the integrity of the levee, increase flood risk unacceptably, or impede visibility or access to the waterside levee slope, the encroachments would need to be removed. Removal of some waterside slope encroachments may be required by
the end of 2011 to ensure that the levee system meets Federal criteria for the 100-year level of protection. Along the land side of the proposed adjacent setback levee, encroachment removal would typically be accomplished as part of the landside levee improvements. This activity would include the relocation of utility poles that are on the existing landside slope of the levee.

**Bridge Crossings (Phase 4)**

Under applicable Federal requirements, the plane of the northbound and southbound bridge crossings of SR 99/70 over the NCC must be 4 feet above the 100-year water surface elevation in the NCC. The 100-year water surface elevation is 44.4 NAVD 88. The soffit (underside) elevation of the northbound crossing is 44.9 NAVD 88, and the soffit elevation of the southbound crossing is 42.9 NAVD 88. Accordingly, during construction of Phase 4 the following options must be considered for implementation in conjunction with the California Department of Transportation:

1. Raise both bridge crossings as necessary to meet minimum FEMA clearance requirements.
2. Provide for installation of a closure structure across the southbound crossing in the event of a 100-year or greater flood.
3. Replace the bridge rail structures on the east and west sides of the bridge crossings and modify the levees connecting to these structures to provide at least 4 feet of levee height above the 100-year water surface elevation. Under any of these options, at least the northbound crossing could remain open for use during a 100-year flood event.

**Investigations to Aid Project Planning and Design**

**Geo-technical Investigations**

Additional exploration of geotechnical conditions is anticipated to be required in Phases 2–4 along the NCC south levee, Sacramento River east levee, PGCC west levee, NEMDC/Steelhead Creek west levee, and American River north levee to facilitate refinement of design for flood facility improvements. Exploration of subsurface conditions would primarily be conducted by drilling borings. Borings along the levees would generally be drilled to depths of 60-120 feet below the ground surface using either a rubber-tire truck-mounted drill rig or an all-terrain drill rig equipped with an 8-inch-diameter hollow-stem auger and a 4-inch-diameter rotary wash drill bit. Hollow-stem augers would generally be used to drill through the levee fill and would be left in place to act as temporary casing and protection against hydraulic fracturing of the levee. Rotary wash drilling methods would be used below the augers. Borings located at and landward of the levee toe would be drilled using rotary wash drilling methods.

Exploration of potential borrow sites will also be required to assess suitability of the material. Such exploration could include boring methods similar to those described above, but to shallower depths (10–12 feet below grade). Test pit excavation would be conducted using a tire-mounted backhoe to depths of 10–12 feet below grade. The test pits would likely be 1–3 feet wide along dirt roadways and 3–6 feet wide in agricultural fields by about 10 feet long. Samples
would be obtained by hand with shovels from the excavated materials. When the bottom depth has been reached, the test pits would be loosely backfilled with the spoils with minor compaction effort. In the dirt roadways, the backfilled materials would be compacted with more effort to maintain drivability and safety.

Cultural Resources Investigations

Archeological surveys within potential flood control facility improvement footprints and potential borrow sites are required to facilitate project planning in Phases 2-4 and satisfy requirements under Section 106 of the National Historic Preservation Act. The surveys would include up to three stages of work. All excavation work in Stages 1 and 2 would be conducted with hand tools, such as shovels and trowels. Stage 1 entails digging shovel test pits 15 inches in diameter and up to 3 feet deep to evaluate the characteristics of subsurface material; these test pits would be backfilled immediately. Depending on archeological evidence found within the shovel test pits, Stage 2 work may be initiated to allow for a more thorough site investigation. This Phase would include excavation of 1-meter-square and 5-foot-deep test units. These test units may need to remain open for several days until examination can be completed. Any sites requiring deeper excavation to further investigate subsurface features identified in the first two stages would be included in Stage 3. This stage would require the use of machinery, such as a backhoe.

Conservation Strategy Overview

According to SAFCA, the project conservation strategy will support and significantly contribute towards the emergence of an urban habitat refuge in the Natomas Basin. The refuge is projected to occupy approximately 15,000 acres once the NBHCP objectives and other proposed conservation programs are completed. Through habitat creation, restoration, and preservation, SAFCA will increase the amount of protected habitat available for NBHCP-covered species. Further, SAFCA’s proposed plan will consolidate large areas of habitat, assisting in the expansion of TNBC reserve blocks in the northwestern and southwestern regions of the Basin. Finally, the construction of new canals and the establishment of woodland corridors will greatly improve the connectivity between core habitat reserves that are distributed throughout the Basin, and substantially increase acreage and patch size of these critical habitats.

Overall, the proposed project is an opportunity to employ a landscape-scale vision, helping to advance the goals and objectives of the NBHCP and assist the Federal Aviation Administration (FAA), Corps, and the local Reclamation Districts in achieving their goals. The SAFCA’s Natomas Landside Improvements Project presents a unique, one-time opportunity to reconfigure habitat and connective corridors in the Basin at a landscape scale. Rather than a piecemeal approach to habitat protection, SAFCA’s proposed project secures and expands the amount of habitat protected in the Basin, establishes the components that tie the preserves and disparate mitigation sites together in perpetuity under public ownership, and increases the quality and viability of this emerging urban reserve. Refer to the June 18, 2008, Conceptual Mitigation, Management, and Monitoring Plan document (prepared by EDAW for
SAFCA) for a more complete summary of the conceptual strategy for creating/enhancing/preserving, protecting; and managing habitats in the Natomas Basin in perpetuity. The following subsections provide an overview of the primary goals and landscape-level benefits of this habitat conservation strategy.

**Increase Amount of Protected Habitat**

While the project will result in loss and reconfiguration of landside habitats adjacent to the widened levees in the Natomas Basin, the proposed project has been specifically designed to minimize impacts to these landside habitats, and to avoid impacts to riparian habitats along the Sacramento River and NCC. The construction of an adjacent setback levee and installation of seepage cutoff walls enable SAFCA to retain the mature riparian tree corridor and numerous Swainson’s hawk nests that are located along the waterside of the Natomas Basin levees. The project’s conservation strategy includes the preservation, enhancement, and creation of over 1,300 acres of compensatory habitats in the Natomas Basin, including:

- 72.98 acres of created, managed marsh,
- 616.15 acres of created, managed grasslands,
- 154.37 acres of canals (16 canal miles) and associated uplands,
- 140.85 acres of landside valley oak woodlands and savannah (125 acres created and 15.85 acres preserved),
- 175 acres of preserved rice fields, and
- 150 acres or more of agricultural field crops.

The project will result in the creation of a larger contiguous area protected and managed for the giant garter snakes and Swainson’s hawks than currently exists.

**Expansion and Consolidation of Protected Habitat in the Natomas Basin**

The project will consolidate large areas of habitat, assisting in the expansion and infill of TNBC reserve blocks in the northwestern and southwestern regions of the Basin. The SAFCA will acquire several properties to provide compensatory habitat, either in the form of preserved rice and agricultural crop fields or created managed marsh, managed grasslands, or landside woodlands. Many of these properties are contiguous with existing TNBC reserves or other completed or planned mitigation habitats. Protecting habitat adjacent to existing TNBC reserves and other mitigation sites creates a larger contiguous area managed for giant garter snake and Swainson’s hawk than currently exists. This increases the habitat value, sustainability, and functions that these individual properties would otherwise provide in isolation, contributing to giant garter snake and Swainson’s hawk recovery in the Basin.

**Strengthen Connectivity between TNBC Reserves**

The proposed enhancements of existing Basin landscapes are important to the successful implementation of the NBHCP, along with the acquisition and permanent protection of mitigation land. The connective canal and woodland corridors that SAFCA proposes to establish
and/or improve are enhancements that will aid in NBHCP implementation, providing TNBC with an opportunity to improve its overall performance towards the goals of the NBHCP. Canal corridors will provide enhanced habitat functionality by permanently linking TNBC properties in the north and Fisherman’s Lake reserve areas that are managed for the giant garter snake and other covered species.

Mitigation, Management, and Monitoring Plan

A Mitigation and Monitoring Plan (MMP) and a Long-Term Management Plan (LTMP) for the compensatory habitat components are being prepared to guide SAFCA and its partners as they manage the compensatory land components in perpetuity. The MMP would address the habitat creation and preservation components of the NLIP Landside Improvements project. The MMP and LTMP would establish specific success criteria for the habitat components, specify remedial measures to be undertaken if success criteria are not met (e.g., adaptive management, physical adjustments, additional monitoring), and describe short- and long-term management and maintenance of the habitat lands. The MMP and LTMP would also describe the strategies for the long-term protection of these habitats and funding for the management as provided through appropriate mechanisms, which would be determined by SAFCA, the regulatory agencies, and other entities cooperating in the implementation of the project.

Plan Goal

The goal of the MMP and LTMP is to ensure that the conservation values of the preserved, restored, and created habitats are maintained in good condition in perpetuity. The MMP and LTMP would discuss specific management strategies designed to maintain the conservation values for each of the habitat mitigation components and identifies performance criteria used to determine the success of the mitigation habitats. The biological goals include: (1) the preservation of the abundance and diversity of native species, and particularly special-status species, in the mitigation habitats; (2) the protection of the habitat features from the effects of indiscriminate land uses that may adversely impact mitigation habitats; and (3) the restoration of any adverse condition within the mitigation habitat areas that may affect or potentially affect these areas.

Implementing Mechanisms for Long-Term Protection and Management

The MMP and LTMP would describe the framework for the protection and management of the mitigation habitat components of the NLIP Landside Improvements project. The actual implementation of this framework would be enacted through easements, stakeholder-specific management agreements or memoranda of understandings, and contractual agreements. These contractual agreements would focus on the management obligations specific to each management entity, and describe the demonstrated financial and legal assurances necessary to implement the MMP and LTMP to protect and manage the habitat mitigation components in perpetuity. These contractual agreements would be subject to review and approval by USFWS, Corps, and CDFG, and enforced by SAFCA, in perpetuity, and by Corps through permit issuance.
Management Entities for Project Features

Agencies and organizations anticipated to have management responsibility for proposed project features are SAFCA, RD 1000, NMWC, the Airport, and TNBC.

Sacramento Area Flood Control Agency
SAFCA would be responsible for the design and construction of all levee improvements, maintenance access and inspection roads and rights-of-way, replacement canals and associated drainage and irrigation structures, and habitat creation sites. In addition, SAFCA would be responsible for all necessary land acquisitions and easements to construct the project features and achieve the project objectives. However, once these project features are completed, most of the land or land management responsibility would be conferred by SAFCA to the other management entities described below. Memoranda of agreement, land ownership transfers, or management endowments and contracts would be used by SAFCA to transfer land management responsibility to the appropriate public agency or nonprofit land management organization. At the end of the project construction period, all project lands would be in public ownership and/or would be under the permanent control of a natural resource conservation entity.

Reclamation District 1000
The mission and purpose of RD 1000 is to operate and maintain the flood protection levees surrounding the Natomas Basin and to operate and maintain the internal drainage system to evacuate agricultural and urban stormwater and incidental runoff. The RD 1000 would be responsible for the management of the proposed levee improvements, reconstructed Pumping Plant No. 2, and drainage features. Typical maintenance activities include mowing grassland along levee slopes, berms, and rights-of-way, removing sediment and noxious aquatic weeds from the canals, and managing bank vegetation.

Natomas Central Mutual Water Company
The NMWC is a nonprofit mutual water company with the primary focus of keeping the water conveyance functioning to serve the company shareholders. Intensive maintenance to maximize agricultural irrigation services throughout the basin is generally conducted in a given year on only 10 percent of the approximately 100 miles in the Natomas Basin canal system operated by NMWC. The NMWC would be responsible for maintaining and managing the relocated Elkhorn and Riverside Canals and existing irrigation canals. The relocated canals would be maintained in the same manner as the existing canals. Typical maintenance activities include operating and repairing water control structures and barrier gates, periodically removing sediment and noxious aquatic weeds from the canals, repairing canal roads, managing bank vegetation, and mowing grassland along canal and road rights-of-way. However, the relocated Elkhorn and Riverside Canals would have improved levees, better water control structures, and wider roads and rights-of-way than the existing canals. These improvements are expected to ease annual canal management efforts, allowing for a proportionately greater focus on maintenance and operations and less need for system repair and dredging.
Sacramento County Airport System
The SCAS manages the Sacramento County–owned bufferlands outside the Airport Operations Area. All project components on land under SCAS management would remain in public-ownership but project land must be protected in perpetuity for the benefit of the giant garter snake.

The Natomas Basin Conservancy
The TNBC acquires and manages land for the purpose of meeting the objectives of the NBHCP. To meet the mitigation goals of the NBHCP, developers of projects pay a mitigation fee to TNBC when they apply for building permits. The TNBC then uses the mitigation fees to acquire, restore, and manage mitigation lands to provide habitat for protected species and maintain agriculture in the Natomas Basin. The TNBC owns approximately 30 mitigation properties totaling more than 4,500 acres. Private land acquired by SAFCA and converted to managed marsh, preserved in rice, or used for woodland establishment would be conveyed to TNBC after creation of permanent habitats as marsh, woodlands, and habitat buffer zones. The SAFCA may also contract with TNBC for management elements of some habitat features (e.g., the GGS/Drainage Canal).

Stakeholder-Specific Management Agreements
The MMP will describe the framework for the design and management of the mitigation habitat components of the proposed project. The actual implementation of this framework will be enacted through Stakeholder-Specific Management Agreements. These contractual agreements will focus on the management obligations specific to each entity, and describe the demonstrated financial and legal assurances necessary to implement the MMP and protect and manage the habitat mitigation components in perpetuity. These contractual agreements will be subject to review and approval by the Service, Corps, and CDFG, and enforced by SAFCA, in perpetuity, and by Corps through permit issuance.

Funding Mechanism
Funding for implementation of the MMP and LTMP has been incorporated into the overall budget for implementation of the NLIP Landslide Improvements project. SAFCA anticipates funding for project construction, monitoring, and long-term management will be provided through the Consolidated Capital Assessment District and existing Operations and Management District. The Consolidated Capital Assessment District was created to provide local cost share for flood control project within the Sacramento Urban Area. It was adopted on April 26, 2007, after voters who would be within the assessment district voted to approve the assessment. A portion of the District Assessment Fee would be encumbered to specifically implement the MMP and LTMP. This District funding source will sunset in 2037, at which point, the funding would transition into a non-wasting endowment. The endowment would be built over time through a 2-year advance of the fee into the account.
Project Phasing

The proposed project is comprised of three phases of construction, spanning approximately 3 years. Phase 2 of the NLIP Landside Improvements project, for which SAFCA is currently requesting a permit, is described and analyzed in detail in this permit application, while Phases 3 and 4, for which subsequent requests for permits will be submitted, are described and analyzed at a more general, program level of detail in this document.

Phase 2 Work

Table 1 summarizes the major elements of Phase 2 of the Landside Improvements project (proposed project) and the general timeframes in which the elements are expected to be implemented. Note that although seepage berms are depicted as the primary means of providing underseepage remediation along the Sacramento River east levee, the use of cutoff walls continues to be evaluated, and cutoff walls will likely be implemented instead of berms in several locations. Each of the main project elements are described in more detail below.

Levee Raising and Seepage Remediation

Natomas Cross Canal South Levee

The proposed project would include raising the entire NCC south levee (Station 0+00 to Station 287+50, Reaches 1 to 7) and would continue the construction of a seepage cutoff wall from the eastern terminus of the NCC South Levee Phase 1 Improvements (NCC Phase 1 Improvements) initiated in 2007 (Station 0+00 to Station 61+00, beginning of Reach 1 to approximately middle of Reach 2) to the eastern end of the NCC south levee (approximately Station 56+00 to Station 287+50, approximately the middle of Reach 2 to end of Reach 7). NCC Reaches correspond roughly to the following Stations: Reach 1 (Station 0 to Station 3); Reach 2 (Station 4 to Station 103), Reach 3 (Station 103 to Station 123), Reach 4 (Station 123 to Station 170), Reach 5 (Station 171 to Station 195), Reach 6 (Station 195 to Station 277), and Reach 7 (Station 278 to Station 287). Phase 2 would include the construction of the NCC south levee component, which is anticipated to occur over one construction seasons, beginning in May 2009 and ending in October 2009. The primary construction activities are described below.

Preparation for construction of the cutoff wall would begin with using scrapers (or other suitable equipment, depending on the slope) to clear and grub(strip the surface to a depth of 2 inches to remove low-growing vegetation, loose stone, and surface soils. The aggregate base from the operating road also would be removed and stockpiled for later reuse. Waste material would be hauled to an off-site location.
<table>
<thead>
<tr>
<th>Project Element</th>
<th>Proposed Activity and Timing</th>
</tr>
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<tbody>
<tr>
<td>Levee raising and seepage remediation: NCC south levee</td>
<td>Raise and realign the NCC south levee to provide additional freeboard and more stable waterside and landside slopes and to reduce the need for removal of waterside vegetation. (May–October 2009) Construct a seepage cutoff wall through the levee crown in Reaches 3–7. (May–October 2009)</td>
</tr>
<tr>
<td>Levee raising and seepage remediation: Sacramento River east levee (adjacent setback levee)</td>
<td>Construct a raised adjacent setback levee from the NCC to just south of the North Drainage Canal (Reaches 1–4B) with a 100-foot seepage berm in Reach 4A and a 300-foot seepage berm in Reach 4B. (May–October 2009) Relocate utility poles. (November–December 2008)</td>
</tr>
<tr>
<td>Improvements to major irrigation and drainage infrastructure</td>
<td>Construct a new canal designed to provide drainage and associated giant garter snake habitat (the GGS/Drainage Canal) between the North Drainage Canal and Elkhorn Reservoir. (May–October 2009) Relocate the Elkhorn Canal (highline irrigation canal) between the North Drainage Canal and Elkhorn Reservoir in anticipation of the filling of the existing Elkhorn Canal at the toe of the Sacramento River east levee. (May–October 2009) Remove a deep culvert at the location of Pumping Plant No. 2. (May–October 2009)</td>
</tr>
<tr>
<td>Habitat enhancement, creation and management</td>
<td>Establish vegetative habitat features in the new GGS/Drainage Canal. (Fall 2009) Recontour and create habitat on lands used as borrow sources. (Fall 2009) Establish grassland on the adjacent setback levee slopes and seepage berms. (Fall 2009) Install woodland plantings to offset the loss of portions of tree groves in the landside levee footprint. (Fall 2008–Fall 2009)</td>
</tr>
<tr>
<td>Right-of-way acquisition</td>
<td>Acquire right-of-way through fee title or easement interest within the footprint of the project features, at the borrow sites and along the flood control system. (Before construction)</td>
</tr>
</tbody>
</table>

Notes: Elkhorn Canal = Elkhorn Main Irrigation Canal; GGS = Giant Garter Snake; NCC = Natomas Cross Canal

Construction of the cutoff wall would include degrading the existing levee to a depth equal to one-half its total height (approximately 9 feet). A 70-foot-deep cutoff wall would be constructed for a total length of 23,150 linear feet (2 million square feet), with the method of installation at the contractor's discretion. Given anticipated schedule constraints, a three-heading, double-shift
work schedule is anticipated. Material degraded to support cutoff wall construction would be compacted at the landside toe of the levee to support the levee raising operation described below. Unsuitable material generated from cutoff wall construction would be disposed of off-site.

Raising of the Natomas Cross Canal South Levee

Levee raising would occur throughout the entire length of the NCC to provide three feet of freeboard over the design water surface profile (this requires raising the levee approximately three feet). Throughout most of the NCC, this would be accomplished by setting the levee back towards the landside, such that there is a theoretical 3H:1V waterside slope extending from the existing waterside toe to the new waterside top. Following degrading of the levee for cutoff wall construction, the new levee crown would be constructed such that the actual waterside slope extends to meet the point of degrade on the waterside slope. This actual slope would be 3H:1V or flatter. The new levee crown would have a width of twenty feet and the new landside slope would be 3H:1V. Where an existing stability berm is present, it would be stripped and incorporated into the new levee prism. Any portion of the berm outside of the limits of new fill would be trimmed back to conform to the new landside 3H:1V slope. Where the berm is fully incorporated, it would be stripped and trimmed as necessary to accommodate placement of new fill material around it. Existing drain pipes exiting the berm would be extended to daylight landward of the new levee landside toe.

Throughout Reaches 6 and 7, Sutter County infrastructure (Howsley Road and related features) and private residences are close to the NCC south levee. To avoid the infrastructure and residences, between Station 215+00 and 245+00 (central portion of Reach 6, from just west of State Route (SR) 70/99 to just east of SR 70/99), the levee would be raised waterward, encroaching on the NCC channel approximately 30 feet. Between Stations 245+00 and 279+50 (remaining portion of Reach 6), the levee would be raised on the landside, similar to Stations 54+00 through 215+00 (approximately the middle of Reach 2 to initial portion of Reach 6). Smooth transition distances of up to 200–500 feet would link the waterward and landward raises.

Vegetation would be removed from the waterside slope in all locations above the elevation corresponding with the projection of the landside levee toe on the waterside slope. Between Station 0+00 and 54+00 (Reach 1 through first half of Reach 2), where there is significant vegetation on the waterside slope above this elevation, the levee would be set back an additional fifteen feet to provide a “root-free” zone on the levee slope, and the vegetation would remain.

Removal of Structures

Relocation of Howsley Road, the Morrison Canal, a roadway drainage pump station, and three residences and outbuildings would be required by landward levee raises in Reaches 6 and 7. If hydraulic modeling indicates that unacceptable hydraulic impacts would not result from waterside levee raising in Reaches 6 and 7, only two structures in Reach 7 (a residence and a semimobile trailer) would require relocation as a result of the proposed levee improvements.
Utility Modifications and Miscellaneous Work

Pipelines penetrate the NCC south levee at four locations: Odysseus Farms (Bolen Ranch); NMWC waterside Bennett Pumping Plant; NMWC Northern Pumping Plant; and RD 1000's landside Pumping Plant No. 4. None of these penetrations comply with current Corps regulations; therefore, the pipelines would be raised to have their inverted above the 200-year water surface elevation and would be equipped with waterside shutoff valves. If pipes are corroded, they may have to be replaced down the waterside slope of the levee.

As part of raising the pump station discharge pipelines that cross the NCC south levee, canals south of the levee would need to be relocated farther from the levee toe in the following locations: the RD 1000 Vestal Drain and NMWC Bennett Canal between Station 55+50 and Station 61+50 (middle of Reach 2) and the NMWC North Main Canal between Station 120+00 and Station 123+50 (end of Reach 3 to beginning of Reach 4) and between Station 216+00 and 218+00 (Reach 6, just west of SR 70/99). The ditch segments would be moved about 100 feet farther away from the levee toe. Some of this work may be accomplished by NMWC as part of its American Basin Fish Screen Project, but the timing of this NMWC project is uncertain. If the work is not accomplished by NMWC, SAFCA would relocate the canals at the time that the pipelines are raised.

Between Station 0+00 and Station 19+00 (beginning of Reach 1 through first eighth of Reach 2) of the NCC south levee, SAFCA intends to obtain a landside levee maintenance access area to match the 80- to 100-foot wide maintenance access area already established for the levee. This area is currently in active rice fields. Once the maintenance access area is established, this area would be filled to be above the agricultural field grade to prevent encroachment by farming operations into the maintenance access area and to provide an operating road at the levee toe. Between Station 99+00 and Station 124+00 (end of Reach 2 through Reach 3), a low-lying area between the levee's landside toe and an operating road for the Lucich North Habitat Preserve would be filled to raise the grade of the operating road at the landside toe.

In 1996, as part of SAFCA's NCC and PGCC Levee Project, 200 feet of floodwall was installed to raise the NCC levee around the State Route (SR) 99/70 bridges over the NCC. The top of wall for this floodwall is at elevation 44.80 feet (National Geodetic Vertical Datum 29). To conform to current levee criteria, the floodwall would need to be raised to elevation 49.3 feet.

Construction Staging Areas and Postconstruction Site Condition

Construction staging would take place in areas adjacent to the NCC south levee, within the maintenance access areas between Stations 0+00 and 56+00, 61+00 and 96+50, 99+00 and 216+00, and 251+00 and 281+00. Cutoff wall construction would require temporary establishment of three on-site slurry batch plants that would occupy about 1–2 acres each. Each batch plant site would likely contain tanks for water storage, a pug mill mixer, bulk bag supplies of bentonite, bentonite and cement storage silos, cyclone mixers, pumps, and generators. The sites would also include slurry tanks to store the blended slurries temporarily until they are
pumped to the work sites. Slurry constituents would be mixed with water at the batch plant and the mixture would be pumped from the tanks through pipes to the cutoff wall construction work sites.

After construction, the levee slopes and any previously vegetated areas disturbed during construction, including staging areas, would be seeded with a grass mix.

Sacramento River East Levee Reaches 1–4B

Phase 2 of construction would begin in 2009 for the Sacramento River east levee, which includes an adjacent levee extending from the northern end of Reach 1 at the NCC south levee through Reach 4B (approximately Station 0+00 to Station 226+00). Also included in Phase 2 is: installation of cutoff wall in Reach 2 of the adjacent levee; construction of a 100-foot scarp berm in Reach 4A and 300-foot berm in Reach 4B; planting of woodlands in a corridor and fallow fields extending from the lower end of Reach 1 through portions of Reach 4A; and reconstruction of the intersections of Sankey Road and Riego Road with Garden Highway.

An adjacent setback levee is proposed in lieu of in-place modification of the existing Sacramento River east levee, which has substantial structural and vegetation encroachments along its water side. The adjacent-levee raise would involve the construction of a new embankment adjacent to the existing levee. A minimum 5-foot-wide shoulder would extend from the landside edge of the crown of the existing levee to the water side of the new adjacent setback levee embankment. A 3H:1V slope would extend up to the crown of the adjacent setback levee. The crown would be at least 20 feet wide and would be topped with an aggregate base access road for inspection and maintenance. The adjacent setback levee would have a 5H:1V landside slope, except for approximately 5,000 feet in Reaches 2 and 3, which would be 3H:V1. It would be constructed of compacted random fill material from borrow sources and from the excavation of the existing landside stability berm.

It is assumed that a main construction staging area for this phase would be located on approximately 5 acres near Riego Road. The area would be fenced and would be 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 would be used for staging of construction materials and equipment. Personnel, equipment, and imported materials would reach the project site via SR 99/70, Sankey Road, Riego Road; and Elverta Road. The primary corridors where construction activity would take place are the adjacent levee alignment and existing dirt roads used for access to the work areas; soil borrow areas; and paved roads, including Powerline, Sankey, and Riego Roads.

Improvements to Reaches 1–4B are anticipated to occur over one construction season, beginning in May 2009 and ending in October 2009. The primary construction activities are described below.
Site Preparation (Tree Removal, Clearing, Grubbing, and Stripping) - Site preparation would entail removing trees and other large vegetation from the construction area and stripping the top 6 inches of material from the landside slope of the existing levee, the footprint of the adjacent setback levee, the seepage berm areas, and the 50-foot-wide permanent maintenance access corridor. Large roots and deleterious material would then be grubbed from the working area. To the extent feasible, trees that must be removed from within the footprint of the adjacent setback levee or berms would be relocated outside of the footprint to new woodland planting areas, where a substantial number of new trees would 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) would be used in the reclamation of borrow areas or hauled off-site to landfills. Cleared vegetation (i.e., trees, brush) would be hauled off-site to landfills.

Relocation of Irrigation Ditch - Odysseus Farms, located at the junction of the NCC south levee and Sacramento River east levee, maintains a private irrigation ditch that is situated within the proposed footprint of the adjacent setback levee. This private irrigation ditch is situated along the top of an existing berm in Reach 1 within the proposed footprint of the adjacent setback levee. Before filling of the existing ditch, a new ditch would be constructed in Reach 1 to serve irrigation needs for agricultural uses of the land along this reach. The new ditch would be constructed from Station 0+00 to Station 25+00 and would be elevated, similar to the existing canal, to allow for gravity flow southward from the NCC. The relocated ditch would cross under Sankey Road through a culvert and meet the existing canal lateral at Station 25+00. The existing ditch would be drained and any unsuitable material from the ditch bottom would be excavated and hauled off-site. To maintain irrigation system continuity, this relocation work would need to be implemented prior to May 1, 2009, as facilities begin operations prior to May and are continually in operation through the end of summer, thus presenting limited opportunities for relocation during the levee construction work window.

Removal of Landside Structures and Other Facilities - Residences and other farm structures that are within the proposed footprint of the adjacent setback levee embankment, berms, and maintenance areas at Station 35+00 in Reach 1 (house, barn, and shed) would have to be removed or relocated farther from the flood control facilities before the start of levee construction. Irrigation facility collection/distribution boxes, wells, and standpipes within the footprint of the flood control features would be demolished and replaced as needed. Debris from structure demolition, power poles, utility lines, piping, and other materials requiring disposal would be hauled off-site to a suitable landfill. As feasible, demolished concrete could be sent to a concrete recycling facility. Wells and septic systems would be abandoned in accordance with the applicable state and county requirements. Some utility poles would be relocated after October 1, 2008, after permit issuance; the removal of other landside structures and facilities would not occur until May of 2009.
Excavation of Stability Berm and Inspection Trench
The existing stability berm along the levee would be excavated and the soil and drain rock would be stockpiled for use in the construction of the adjacent setback levee. The geotextile fabric from the drain layer would be discarded. A 3-foot-deep inspection trench would also be excavated along the foundation of the adjacent levee raise area after stripping has occurred. The purpose of this trench is to expose or intercept any undesirable underground features such as old drain tile, water or sewer lines, other debris, animal burrows, buried logs, or pockets of unsuitable material (e.g., sand lenses). After inspection, the trench would be backfilled and compacted as part of the embankment construction.

Construction of Adjacent Levee Raise and Cutoff Walls
Borrow material would be excavated from several locations in the project area and would be delivered to the levee construction sites by scrapers or haul trucks where it would be spread by motor graders and compacted by sheepsfoot rollers to build the adjacent levee up to a height equal to about two-thirds of the height of the existing levee. This would create a working platform for cutoff wall installation using an excavator with a long-stick boom capable of digging a trench to a maximum depth of approximately 80 feet. Bentonite slurry would be pumped into the trench during excavation to prevent caving. The soil excavated from the trench would be mixed with bentonite and backfilled into the trench to create the cutoff wall.

Reconstruction of Garden Highway at Intersections - The Garden Highway intersections at Sankey and Kiego Roads would require reconstruction to accommodate the raised adjacent setback levee. It is anticipated that Garden Highway would be extended up and onto the widened adjacent levee at these locations to meet with the secondary roads. Approach embankments at the intersections would be enlarged and the entire intersections would be repaved. Intersecting roads would be raised at a slope of 15H:1V, extending the approach embankment approximately 350 feet outward from the levee. The side slopes of the raised embankments would be at a 3H:1V slope.

Installation of Surface Drainage Outlets across Garden Highway - Between the adjacent setback levee and the Garden Highway pavement, new storm drain facilities would be constructed to convey surface water beneath Garden Highway and toward the Sacramento River. A drainage swale collection system would convey runoff water to drop inlets located approximately 1,000 feet apart along an approximately 22,800-foot-long section of the improved levee, and new 12-inch diameter pipe laterals would convey the water beneath Garden Highway to the waterside slope berm. Excavation of a trench across Garden Highway and down the waterside levee slope would be required; those segments of Garden Highway where excavation occurs would have to be reconstructed. Single-lane traffic controls and through-traffic detours would be required during construction Phase 2. Drainage outlets would be located on the waterside levee berm, above the two-year ordinary high water mark. The construction of the drainage outlets entails the excavation of a 100 square foot area, of which the lower eighteen to twenty-four inches would be filled with a gravel/cobble mix, and the upper six to twelve inches would be an open depression. Water exiting the drainage outlets would settle in the depression, and then flow overland to the Sacramento River.
Site Restoration and Demobilization - Following construction, the levee slopes, seepage berms, maintenance access right-of-way, and any previously vegetated areas disturbed during construction would be seeded with a grass mix. Any construction debris would be hauled to an appropriate waste facility. Equipment and materials would be removed from the site, and staging areas and any temporary access roads would be restored to preproject conditions. Demobilization would likely occur in various locations as construction proceeds along the project alignment.

Major Irrigation and Drainage Infrastructure Modifications

Elkhorn Canal - The Phase 2 construction plan would include the new Elkhorn Canal from the North Drainage Canal to Elkhorn Reservoir, between Reach 4B and Reach 6B. On the north end, the new canal would be connected with the existing Prichard Pumping Plant outfall and an outlet to the North Drainage Canal would be constructed. An outfall to provide for connection to RD 1000 Pumping Plant No. 2, during its construction in Phase 3, would be incorporated into the Phase 2 canal construction to minimize the need for future canal disturbance. The discharge pipes from the Prichard Pumping Plant would be extended to the relocated canal. The outlet to the North Drainage Canal would be combined with the GGS/Drainage Canal outfall with a gated control structure in the irrigation canal and a piped outlet to the North Drainage Canal.

At the southern end, the relocated Elkhorn Canal would connect into an earthen-lined sediment basin. The sedimentation basin would consist of a number of watered, earthen-bottomed chambers separated by weirs, which may be concrete or rock covered. The basins would have 3H:1V embankments that are 15-foot-wide at the top to provide maintenance equipment access. The total area of basins including the embankments is approximately 9.6 acres, with nearly 3.3 acres of water surface. The proposed sediment basin would be connected to Elkhorn Reservoir with a temporary pipe and outfall structure. During construction Phase 3 (see below), Elkhorn Reservoir would be dewatered and piping from the Elkhorn Pumping Plant would be extended to the new sediment basin, at which time the Elkhorn Reservoir sediment basin would be abandoned and filled.

The GGS/Drainage Canal would be constructed parallel to and within the same right-of-way as the Elkhorn Canal. These features would be constructed concurrently to facilitate the use of excavated material from the GGS/Drainage Canal for use as embankment material along the Elkhorn Canal.

The primary construction stages for Elkhorn Canal are described in the subsections below.

Clearing and Grubbing/Stripping
Preparation for canal construction would entail using bulldozers/scrapers to clear and grub/strip the surface to a depth of 4-6 inches and remove low-growing vegetation and loose surface soils. Suitable materials removed during this stage could be stockpiled. Unsuitable material would be wasted and hauled off-site. The right-of-way for the canal that would need to be cleared (including the GGS/Drainage Canal right-of-way) is approximately 225 feet wide.
Bulldozers/scrapers and front-end loaders would be used to excavate and move material. Water trucks would be used to control dust and dump trucks would be used to haul unsuitable materials away.

This phase of construction would commence immediately after mobilization and would most likely occur in multiple sections of the Elkhorn Canal and GGS/Drainage Canal alignments simultaneously.

**Pump Discharge Pipe Extension**

Because the Elkhorn Canal would be relocated farther from NMWC pumping plants than the existing canal, additional pipe would need to be installed to maintain the connections between the pumping plants and the irrigation canals. In particular, discharge pipes would need to be extended at Prichard Pumping Plant and Elkhorn Pumping Plant. Pipes would be transported to the site on flatbed trucks. Excavators and backhoes would be used to dig the pipe trenches and lay the sections of welded steel pipe and backfill the trench. The trench would be deep enough to provide for a minimum of 12 inches of cover. A small compactor would be used to compact the soil over the pipe. The construction of pipelines at the existing Prichard Pumping Plant would occur during Phase 2 of construction, and at the Elkhorn Pumping Plant pipeline construction would occur during Phase 3 of construction.

**Prichard Pumping Plant Connection**

A new concrete transition structure would be constructed at the north end of the existing Elkhorn Canal to connect the existing Prichard outfall box culvert to the new Elkhorn Canal. Three reinforced concrete discharge pipes, two 36-inch and one 30-inch, approximately 600 feet in length, would be constructed in parallel from the new transition structure to the proposed distribution box located approximately 250 feet south of the western end of the North Drainage Canal. These pipes would connect the Prichard Pumping Plant outfall to the distribution box. From the distribution box, two 54-inch reinforced concrete discharge pipes, approximately 30 feet long, would connect the box to the new Elkhorn Canal.

The concrete distribution box footprint would be approximately 25 foot by 30 foot. A 60-inch discharge pipe stub and 48-inch intake pipe stub would be constructed on the north side of the distribution box. These stubs will provide for future connections of the distribution box to the North Drainage Canal and Pumping Plant No. 2.

**Water Control Facility Construction**

New facilities that would be constructed include distribution boxes, gate valves, cast-in-place concrete headwalls and control structures, culverts, and a proposed earthen-lined sediment basin adjacent to Elkhorn Reservoir. Backhoes and excavators would be used to excavate material for the new facilities. Precast distribution boxes, pipes, and other appurtenances would be transported to the site on flatbed trucks. Other concrete facilities would be poured in place and concrete would be transported to the site in ready-mix and boom concrete pumper trucks. Small compactors would be used to compact fill material around the facilities.
Embarkment and Access Road Construction
The existing Elkhorn Canal is a highline canal, and construction of its replacement would require little or no excavation but a large amount of borrow material. The bottom of the new Elkhorn Canal channel would be approximately at existing ground level. During construction, borrow material would be required to build up the embankments of the new canal, which would be approximately 4 feet above the channel bottom with 3H:1V side slopes. Bulldozers and graders would be used to move and shape the embankment material, sheepsfoot and smooth drum rollers would be used to compact the embankment material, and water trucks would be used on-site for dust control and moisture conditioning.

Canal Lining
The bottom 6 to 12 inches of the Elkhorn Canal channel would be lined with concrete to provide for maintenance between seasons while minimizing impacts on the adjacent canal banks. Ready-mix and concrete pumper trucks would be required to apply the concrete to the bottom of the channel. It is anticipated that approximately 3,000 cubic yards of concrete would be required in construction Phase 2 for the proposed Elkhorn Canal lining.

Irrigation Interconnections
This phase includes work required to interconnect the relocated Elkhorn Canal with the existing irrigation canals within the Natomas Basin. Excavators and backhoes would be used to trench any connectors and motor graders would be used to shape the embankments. A water truck would be used to control dust and provide moisture conditioning during the excavation and construction of the interconnection facilities. Canal interconnections would be performed before the abandonment of the existing Elkhorn Canal.

Central Main Flume Connection
A second concrete distribution box would be constructed to connect the Elkhorn Canal to the Central Main Flume. The box will be located at the intersection of the Elkhorn Canal with the Central Main Flume with a footprint that is approximately 19 feet by 49 feet and will be tied into the existing concrete flume. Three 48-inch slide gates would be constructed on both the north and south ends of the box to connect the box to the Elkhorn Canal both north and south of the flume. A 6 foot by 6 foot reinforced concrete box culvert on the east end of the distribution box would connect to an outfall structure and the end of the flume.

Erosion Control
Erosion control measures would be installed before the start of construction and would be maintained throughout the construction period to prevent sedimentation of adjacent waterways. A hydroseeding truck would be used at the end of construction to seed any disturbed area. Water trucks would be used throughout the construction period to control dust in any disturbed areas.

Irrigation Canal Abandonment
As the newly constructed canal is completed and operable, the existing Elkhorn Canal would be abandoned. Irrigation flows would be rerouted to the new canal and the existing canal would be dewatered and abandoned. The filling of the abandoned Elkhorn Canal in Reach 4B would take
place as part of Phase 2 of levee construction and in Reaches 5A to 6B would take place as part of the Phases 3 and 4 of levee construction. Portions of farm canals and other irrigation canals would be abandoned because of the relocation of the Elkhorn Canal. Such segments that are outside the footprint of the proposed levee improvements would be filled after the relocation of the Elkhorn Canal is completed. Dump trucks would be used to haul fill material to those canals, rollers would be used to compact the fill, and water trucks would be used for dust control.

Demobilization/Cleanup
This phase includes dismantling any temporary facilities, hauling away any leftover construction materials, and cleaning up the site. All disturbed areas would be reseeded and graded to drain. A front-end loader and dump trucks would be used to move materials. This phase of construction would also entail general cleanup and hauling away unused and waste materials. All construction equipment would be removed.

Scheduling for Phase 2 Construction of the Elkhorn Canal
The segment of the Elkhorn Canal from the Prichard Pumping Plant to the Elkhorn sedimentation basin would be constructed between May and October 2009. The segment of the Elkhorn Canal from the Central Main Flume to the Elkhorn sedimentation basin would be constructed between May and October 2009.

Phase 2 Construction on New GGS/Drainage Canal - The Phase 2 construction plan would include the construction of the GGS/Drainage Canal from the North Drainage Canal to the slough east of Elkhorn Reservoir, between Reach 4B and Reach 6B. The GGS/Drainage Canal and Elkhorn Canal would be parallel and separated by a 20-foot right-of-way access. The GGS/Drainage Canal would tie into the North Drainage Canal east of the proposed location of replacement RD 1000 Pumping Plant No. 2. Crossing of the Elkhorn Canal and tie-in to the North Drainage Canal are anticipated to be made via open, arching culverts (e.g., “Con-Arch” culverts) that allow the GGS/Drainage Canal to pass under the Elkhorn Canal and the access road on the south side of the North Drainage Canal without being confined to pipes.

Because portions of the GGS/Drainage Canal and the Elkhorn Canal would be constructed parallel within the same right-of-way, they would be constructed concurrently during Phase 2 construction. This approach would facilitate the use of material from the GGS/Drainage Canal excavation for use as embankment material along the Elkhorn Canal. Construction of the GGS/Drainage Canal would include the same construction phases as described above for the Elkhorn Canal, with a few exceptions. Unlike the Elkhorn Canal, the GGS/Drainage Canal would not be concrete lined. The top of bank for the GGS/Drainage Canal would be approximately at existing ground level. During construction, a trench at least 6 feet deep and an average width of 55 feet would need to be excavated for the construction of the GGS/Drainage Canal. Reclamation would include planting tules on the sloped banks. Backhoes would be used to prepare the planting areas and a water truck would be used to control dust.

Removal of Culvert at Pumping Plant No. 2 Site - SAFCA would undertake a second phase of the levee repairs and facility removal adjacent to the RD 1000 Pumping Plant No. 2 site at the
west end of the North Drainage Canal as part of the proposed project. This phase of work would include: (1) excavating and removing approximately 400 feet of the existing levee section adjacent to the Pumping Plant No. 2 site to expose a deep culvert and possible voids under the levee, (2) removing the deep culvert, (3) reconstructing the levee adjacent to the pumping plant sump with levee embankment fill, and (4) demolishing, removing, and relocating the pumping plant remnants within the project footprint. The last activity, reconstruction of the pumping plant, would be conducted in the 2009 construction phase and is described in the next subsection. The project-related work would be confined to an area of approximately 2.3 acres. A stockpile and staging area of approximately 4.5 acres would be established near the work area.

Excavation limits would be extended to reconstruct the levee section adjacent to the sump and to reach areas where anomalies were identified during a geophysical investigation of the site. An area on the water side of the sheet pile wall would be excavated to lower the ground surface so as to reduce the loading on the sheet pile and excavation shoring system as the excavation takes place on the land side of the sheet piles. Excavated material would be stored on the site along the dewatered section of the North Drainage Canal, east of the abandoned sump, and in an adjacent agricultural field along the canal.

During excavation, the remnants of the pumping plant would be demolished and removed. This work includes relocation of a 36-inch irrigation supply pipe that is within the excavation limits. A temporary plastic fabric-lined ditch at the outfall of this pipe would also be relocated to provide for sufficient staging and stockpile areas. A short irrigation system 'outage' would be required to allow for relocation of the pipe and ditch.

Heavy equipment required for construction includes semi flatbed and/or box trucks to deliver equipment and materials; a crane to drive sheet pilings for additional shoring needs; dump trucks to haul debris, stockpile excavated levee material, and import select soil materials for levee reconstruction; two hydraulic excavators; two dozers for stripping and stockpile material, a grader, water truck, and front-end loader for maintenance of haul roads and stockpiles; and a roller compactor for levee construction.

Habitat Enhancement, Development, and Management

Habitat enhancements and developments planned for Phase 2 of project construction include: the northern segments of the relocated Elkhorn Canal and the newly constructed GGS/Drainage Canal between the North Drainage Canal and Elkhorn Reservoir; the preservation and establishment of landside woodlands along the Sacramento River east levee; the creation of managed grasslands on the newly constructed levee slopes, seepage berms, access rights-of-ways, and canal embankments; and the preservation of rice land. Please refer to the June 18, 2008, Conceptual Mitigation, Management, and Monitoring Plan document (prepared by EDAW for SAFCA) for a more complete summary of the conceptual strategy for creating/enhancing/preserving, protecting, and managing habitats in the Natomas Basin in perpetuity.
The proposed project would offset temporary and permanent effects to habitat of listed species through the creation, enhancement, and preservation of habitat in the basin. The construction of the Elkhorn Canal and GGS/Drainage Canal, including their management elements, are described above in more detail. Design and management elements for the managed grasslands, landside woodlands, and rice fields are summarized below.

Managed Grasslands

Levee Slopes and Seepage Berms - Levee improvements would result in landside slopes that are less steep than the existing slopes, and several reaches of the Sacramento River east levee would have adjoining 80- 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 would be maintenance access roads and seepage relief wells in some locations. Additional setback buffer lands would flank some of these features, and property acquisition for the proposed project may leave SAFCA with remnant portions of acquired parcels that are nonessential to flood control uses. With the exception of the crown of the levee, these areas would be managed as grassland. Most grassland would be mowed or grazed throughout the growing season, with an emphasis on mowing procedures and stubble height to optimize these areas for Swainson's hawk foraging habitat. However, the primary purpose and management priority of levees and seepage berms would continue to be flood risk reduction, for which RD 1000 has principal management and maintenance responsibility, and they would be maintained in accordance with Corps and Central Valley Flood Protection Board operations and maintenance requirements.

Canal Embankments - The side slopes of the new GGS/Drainage Canal and relocated Elkhorn and Riverside Canals would be flatter than typical canal slopes in the Natomas Basin and consistent (3H:1V), resulting in greatly reduced erosion and sedimentation. Vegetation on the banks could easily be mowed to a specified stubble height using cutter blades instead of the existing, high-disturbance practice of flail mowing or scraping vegetation from the banks and canal with a drag bucket. These improved canal maintenance practices would substantially reduce disturbance and incidental mortality of giant garter snakes that use bank and shoreline vegetation as cover and feeding habitat.

Landside Woodlands

Woodlands consisting of native riparian species would be planted east of the maintenance corridor along the Sacramento River east levee improvements. In Phase 2, tree and shrub species, including elderberry shrubs (Sambucus mexicana), would be planted on approximately 30 acres of existing cropland or fallow or currently unused sites. Groves would generally be at least 50-100 feet wide and several hundred feet long. Wide woodland corridors would promote successful nesting by a variety of native birds deeper within the grove canopy, where nest parasitism by crows, cowbirds, and starlings is less of a factor in breeding success. At maturity, stand structure would vary from closed canopy woodland to grassland savanna vegetation types.

Planting sites would require suitable soil conditions, water supply 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. A mixture of native riparian
species would be planted, but predominant species would be Valley oak (*Quercus kelloggii*), the primary tree species that would be affected by the proposed improvements to the Sacramento River east levee, and cottonwood (*Populus fremontii*), which is a preferred nest tree for Swainson’s hawks in the basin and is faster growing than Valley oak. Establishment of woody vegetation would likely require more than one technique, including seeding in winter, flood irrigation, drip or agricultural-scale spray heads, cuttings, and acorn planting.

Where trees would be removed from existing groves to make way for the proposed flood control system features, they would be transplanted in new locations, including newly planted groves, to the extent feasible. The woodland planting areas would provide locations for transplanting any elderberry shrubs that would need to be moved from the proposed footprint of flood risk reduction improvements.

**Rice Fields**

**Brookfield** - The Brookfield property is a 353-acre private property that is located between Howsley Road and Fifield Road, west of the PGCC west levee. As of the summer of 2008, the property is currently in rice cultivation.

Up to 160 acres of the site may be utilized for borrow operations in Phase 2. After the completion of borrow excavation, the 160 acres would be returned to rice and at least 1/2 of the 353-acre site would be preserved in perpetuity. The removal of borrow material would entail excavating the site to a depth of up to approximately 6 feet, with an approximate net yield of approximately 3.6 million cubic yards of soil from the site. One foot of topsoil would be removed and stockpiled for reuse during reclamation of the site. This borrow material would be used for levee improvements along the NCC south levee (construction Phase 2), PGCC west levee (construction Phase 3), and possibly the NEMDC west levee (construction Phase 4); however, no area of the property would be used in consecutive years. Following the removal of borrow material for the levee construction, the site would be graded and returned to rice cultivation.

Currently, the site is irrigated from on-site wells. To provide irrigation to the site following the excavation of borrow material, the irrigation canal along the south side of the site would be deepened and reconfigured from the Brookfield site westward to the culvert under SR 99/70. Additionally, a field irrigation ditch would be constructed within the Brookfield site to provide irrigation water from the adjacent higline canal to the fields. Grading of the site would be performed at a slope that would allow the water to flow back to the drainage canals running along the west and south side of the property. The water from the eastern fields would be drained into a canal along the west side of the pasture land and into the southern drainage canal. The drainage channel along the west and south side of the property would be modified to allow the site to drain following borrow excavation.

Modifications include widening all canals to an 8-foot bottom width with 3H:1V side slopes. Specific canal improvements could include modification of approximately 4,480 feet of the
RD 1000 canal that borders the south end of the site, modification of 3,670 feet of the private north-south drainage ditch along the west edge of the property, creation of a 900-foot long drainage ditch along the west edge of the pasture lands, and modification of a 6,350-foot long section of the drainage canal along SR 99/70 from the RD 1000 canal south. Improvements of the drainage canal along SR 99/70 may require land acquisition of up to 25 acres to account for the additional width of the channel and flatter side slopes.

Reclamation of Other Borrow Sites

Borrow sites would provide material for Phase 2 flood control and irrigation infrastructure modifications. Following excavation of the borrow material, these sites would be reclaimed for postconstruction uses.

Airport North Borrow Sites - The Airport’s north bufferlands have been historically farmed as rice fields and field crops. However, based on FAA requirements to reduce hazardous wildlife attractants near runways, the Airport has opted to not renew rice leases on its bufferlands. Thus, these lands are currently either fallow agricultural fields or ruderal grassland. After borrow activities, these sites would be returned to their current condition.

Cut depths for all the borrow sites would be approximately 4–6 feet. Following the excavation of the borrow sites, disturbed areas would be finish graded to standard irrigation slopes so that the sites would drain and not have any standing water in less than 10-year storm events. Excavated soils not used for borrow material, such as the organic surface layer or soils considered unsuitable for levee construction, would be stockpiled and respread on-site following excavation. Any unsuitable borrow material would be stockpiled on-site and graded back into the restoration of the site. Revegetation activities would include erosion control on excavated slopes (i.e., hydroseeding) and application of fertilizer.

Overview of Construction Phases 3 and 4

Table 2 summarizes the major elements of Phases 3 and 4 of the proposed project and the anticipated general timeframes in which the elements are expected to be implemented. Note that although seepage berms are depicted as the primary means of providing underseepage remediation along the Sacramento River east levee, the use of cutoff walls continues to be evaluated, and cutoff walls will likely be implemented instead of berms in several locations.

Levee Raising and Seepage Remediation

Sacramento River East Levee Reaches 5A–20A

Improvements to the Sacramento River east levee would continue in construction Phases 3 and 4, and would extend from Reach 5A (below Station 226+00) through Reach 20A (Station 925+50). It is anticipated that construction of improvements to the Sacramento River east levee would encompass Reaches 5A-9B in construction Phase 3 and Reaches 10-20A in construction Phase 4. The construction season is assumed to be mid-April – November for both construction phases. The following descriptions of design and construction of the improvements to the Sacramento
<table>
<thead>
<tr>
<th>Project Element</th>
<th>Proposed Activity and Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levee raising and seepage remediation: Sacramento River east levee (adjacent setback levee)</td>
<td>Construct an adjacent setback levee along Stations 55+00 to 68+00 in Reach 2 and from just south of the North Drainage Canal to the American River north levee (Reach 5A–20B), raised where needed to provide adequate freeboard, with seepage berms, relief wells, and cutoff walls for seepage remediation as required (specific seepage remediation measures are still under study). (May 1, 2009–November 1, 2010)</td>
</tr>
<tr>
<td>Levee widening and flattening and seepage remediation: PGCC west levee</td>
<td>Widen the levee between Howsley Road and Sunkey Road to allow for seepage remediation and flatten the levee on the water side to meet Corps criteria. Construct cutoff walls or seepage berms where required. (April–November 2009)</td>
</tr>
<tr>
<td>Levee widening and flattening and seepage remediation: NEMDC west levee</td>
<td>Widen levee and flatten slope between Elkhorn Blvd and NEMDC stormwater pumping station. (April–November 2009) Construct a seepage cutoff wall from NEMDC stormwater pumping station to Northgate Blvd where required. (April–November 2009)</td>
</tr>
<tr>
<td>Improvements to major irrigation and drainage infrastructure</td>
<td>Construct the new GGS/Drainage Canal between Elkhorn Reservoir and the West Drainage Canal, and improve the West Drainage Canal to provide enhanced giant garter snake habitat. (May 1–November 1, 2009) Implement Airport West Ditch improvements in connection with construction of the GGS/Drainage Canal to allow the Airport to decommission the agricultural irrigation function of this facility and eliminate the hazards currently associated with it. The Airport stormwater detention function provided by this ditch would continue. The ditch would therefore be recontoured as a gently sloping swale to facilitate periodic maintenance such as mowing. (May 1–November 1, 2009) Relocate the Riverside Canal and the Elkhorn Canal downstream of Elkhorn Reservoir (specific alignments to be determined) and fill the existing canals. (May 1–November 1, 2009, and May 1–November 1, 2010) Construct RD 1000 Pumping Plant No. 2. (April 1, 2009–September 1, 2010)</td>
</tr>
<tr>
<td>Habitat enhancement, creation and management</td>
<td>Establish habitat enhancements in the new GGS/Drainage Canal and improved West Drainage Canal. (Fall 2009) Recontour and create marsh and managed grassland on lands used as borrow sources. (Fall or spring after borrow excavation in 2009 and 2010) Establish grassland on the adjacent setback levee slopes and seepage berms. (Fall after construction in 2009 and 2010) Install woodland plantings to offset the loss of portions of tree groves in the landside levee footprint (locations to be determined). (Fall 2009 and 2010)</td>
</tr>
<tr>
<td>Additional actions to meet FEMA requirements: encroachment management on the Sacramento River east levee, and bridge crossing modifications at the NCC</td>
<td>Remove encroachments from a portion of the water side and land side of the Sacramento River east levee as needed to ensure that the levee can be certified as meeting the minimum requirements of the NFIP and Corps design criteria (specific criteria still under discussion). (Timing to be determined) Modify the SR 99/70 crossing of the NCC as needed to meet FEMA requirements. (Timing to be determined)</td>
</tr>
<tr>
<td>Right-of-way acquisition</td>
<td>Acquire right-of-way through fee title or easement interest within the footprint of the project features, at the borrow sites and along the flood control system. (Before construction)</td>
</tr>
</tbody>
</table>

Notes: Airport = Sacramento International Airport; Elkhorn Canal = Elkhorn Main Irrigation Canal; FEMA = Federal Emergency Management Agency; GGS = Giant Garter Snake; NCC = Natomas Cross Canal; NFIP = National Flood Insurance Program; PGCC = Pleasant Grove Creek Canal; RD = Reclamation District; Riverside Canal = Riverside Main Irrigation Canal; SR = State Route; USACE = U.S. Army Corps of Engineers
River east levee proposed for construction Phases 3 and 4 are described in less detail than construction Phase 2 (improvements to the NCC south levee and Sacramento River east levee Reaches 1–4B) because they are not as far along in the project design process.

**Required Freeboard Increases and Proposed Underseepage Remediation** - Levee crown raises are required to provide adequate freeboard above the 100-year design water surface elevation in Reaches 5A–10 and above the 200-year design water surface elevation in Reaches 11A and 11B. Downstream of Reach 11B (Powerline Road), there is adequate freeboard above the 200-year design water surface elevation, and levee crown raises are not required. Substantial structural encroachments and large amounts of woody vegetation are present on the waterside slope of the existing levee, and the adjacent setback levee is proposed to extend through Reaches 5A–19A to avoid the need for extensive removal of the existing vegetation and encroachments on the waterside slope to meet Corps criteria. The existing levee in Reaches 19B–20B already has a wide crown, and extensive residential development is located along the landside levee toe; therefore, construction of the adjacent setback levee is not proposed for these reaches. The adjacent setback levee would extend outward at least 11 feet from the landside edge of the existing levee crown and would have a 3H:1V landside slope.

Underseepage remediation is required in many of the reaches from 5A through 20A. Reach 20B has sufficient freeboard for the 200-year water surface elevation and a cutoff wall (constructed by Corps in 2000) that meets current design criteria. Because this wall was constructed to an adequate depth, this reach does not need additional seepage remediation. Based on the results of geotechnical investigations, engineering and cost considerations, and land use constraints, cutoff walls are proposed for Reaches 5A–20A.

**Removal of Landside Structures and Vegetation** - Removal of some residences, other structures, and woodland vegetation, including mature trees, would be required to create ample space for the adjacent setback levee, berms, and maintenance access corridor. It is anticipated that residences would be removed at Station 62+00 in Reach 2, Station 245+00 in Reach 5A, Station 368+00 in Reach 8, Station 436+50 in Reach 9A, Station 468+00 in Reach 10, and at several locations along Reaches 15 through 18.

**Miscellaneous Construction Elements and Postconstruction Site Condition** - Modifications of roadway intersections with Garden Highway, utility relocations, removal of pumps and wells, and relocation of private canals would be similar to these activities as described for the improvements to Sacramento River east levee Reaches 1–4B. As described for Reaches 1–4B, after construction, the levee slopes, seepage berms, maintenance access right-of-way, and any previously vegetated areas disturbed during construction would be seeded with a grass mix.

**Pleasant Grove Creek Canal West Levee**

The PGCC west levee is vulnerable to seepage and has stability concerns. The proposed project includes improvements to 17,400 feet of the PGCC west levee, beginning at the east end of the NCC improvements at Howsley Road and extending southerly to Sankey Road. Construction is
anticipated to proceed in Phases 3 and 4 on this component of the NLIP. Details of the proposed improvements will be developed based on additional geotechnical studies and cost analysis. The improvements are expected to consist of the following:

- widening of the levee to provide a minimum top width of 20 feet to accommodate safe lane widths for Natomas Road;
- flattening the water side of the levee to a 3H:1V slope;
- reconstructing the landside levee slope with new, select material to create a 3H:1V slope (the existing slope ranges from 2:1 to 2.5:1);
- from its intersection with Howsley Road and continuing one quarter mile south, raising the widened levee one to two-tenths of a foot to provide 3 feet of levee height on the 100-year design water surface profile; and
- constructing a SB cutoff wall through three separate reaches, totaling approximately 5,000 linear feet, to coincide with areas where streams historically flowed east to west through the current PGCC alignment.

Irrigation and drainage canals at the landside toe of the existing levee would need to be relocated to the west to accommodate the berm construction. Several structures associated with the industrial facility near the southern end of the PGCC would need to be relocated.

The postproject site condition (grass-covered levee slopes and berms) and long-term maintenance practices would be as described above for the NCC south levee and Sacramento River east levee.

Natomas East Main Drainage Canal West Levee
The NEMDC west levee is vulnerable to seepage and has stability concerns. The proposed project includes improvements to the NEMDC west levee, beginning from Sankey Road south to Northgate Boulevard. Construction is anticipated to proceed in Phases 3 and 4 on this component of the NLIP. Details of the proposed improvements will be developed based on additional geotechnical studies and cost analysis. The improvements are expected to consist of the following:

- From the NEMDC pump station (between Elkhorn Boulevard and Del Paso Road) south to Northgate Boulevard, approximately 25,000 linear feet of cutoff wall is to be constructed to a depth of up to 80 feet from the levee crown. The existing maintenance easement on this stretch of the NEMDC will not accommodate levee reshaping or levee degrading beyond what is necessary to provide a minimum working platform for cutoff wall installation. Additionally, structures in close proximity of the landside levee toe make additional maintenance easement acquisition impractical. Where asphalt-concrete surfacing is present at the levee crown, it would be removed and disposed of off site. Following completion of the cutoff wall, the levee crown would be reconstructed and the operating road surface restored.

- North of the NEMDC pump station, to Elkhorn Boulevard, levee widening and slope flattening will occur similar to what is described for the PGCC west levee. These project components include:
  - widening of the levee to provide a minimum top width at least 20 feet to accommodate safe lane widths for Natomas and East Levee Roads;
- flattening the water side of the levee to a 3H:1V slope; and
- reconstructing the landside levee slope with new, select material to create a 3H:1V slope.

The postproject site condition and long-term maintenance practices would be as described above for the NCC south levee and Sacramento River east levee.

**Major Irrigation and Drainage Infrastructure Modifications**

**Elkhorn and Riverside Canals**

Construction Phases 3 and 4 would include the relocation of the remainder of the Elkhorn Canal (south of Elkhorn Reservoir) and the relocation of the Riverside Canal and would include the same construction phases as described for Phase 2. Timing of the new canal construction would be critical to avoid interruptions in irrigation service. The remainder of the relocated Elkhorn Canal, from Elkhorn Reservoir south, and the relocated Riverside Canal would be constructed before existing canals are filled in as part of the levee improvements in Reaches 6B–9A scheduled for construction Phase 3 and 12–20B scheduled for construction in Phase 4.

In addition to the general canal construction activities described for construction Phase 2, Elkhorn Reservoir would be dewatered and piping from the Elkhorn Pumping Plant would be extended to the new settling basin, at which time Elkhorn Reservoir would be abandoned and filled. The pipelines from the Elkhorn and Riverside Pumping Plants to the relocated irrigation canals would be constructed.

**Phase 3 Construction of the New GGS/Drainage Canal**

Phase 3 construction phase would include the construction of the GGS/Drainage Canal from north of Teal Bend Golf Course to the West Drainage Canal and improvements to the West Drainage Canal to enhance habitat value for giant garter snake. Because the GGS/Drainage Canal would be approximately 3.5–5.5 feet lower in elevation than the Elkhorn Canal, it would cross underneath the Elkhorn Canal, approximately 350 feet north of Elkhorn Reservoir, likely through a structure similar to that described above for the northern crossing. Reclamation would include planting tules on the sloped banks. In the portion of the canal below I-5, tules would be planted above the canal bench. Backhoes would be used to prepare the planting areas and a water truck would be used to control dust. A 2,200-foot-long section of the GGS/Drainage Canal between the sedimentation basin and Walnut Road as well as the 2,850-foot-long section of the existing West Drainage Canal would include a 15-foot-wide managed tule bench, which would typically be inundated with water and drain into the main channel. The 5,900-foot-long section between the southeastern corner of Teal Bend Golf Course and the West Drainage Canal would have a 50-foot-wide managed tule bench.

**Removal of Airport West Ditch**

As part of a safety survey conducted by the FAA for the Airport, the FAA expressed concern that the Airport West Ditch provides habitat for wildlife that potentially create a hazard to aircraft. The FAA recommended relocation of the ditch to alleviate the hazard. Additionally, a longstanding problem has existed with leakage from a 24-inch pipeline, resulting in marshy
conditions along its route, approximately 11,000 feet between the intake structure and delivery point at the Airport pumps. During the past year the Airport began receiving all of its domestic (drinking) water supply from the City of Sacramento via a pipeline and storage tank project. Two of the on-Airport water wells previously used to provide domestic water were connected to the Airport’s landscape irrigation piping system, and the water supply to the “leaky underground pipe” was deactivated. All of the Airport’s landscape irrigation needs are now provided on-site, and there is no need for the leaky pipe to remain in place. Irrigation water provided by NMWC still flows south through the Airport West Ditch, however, whereupon it is pumped to privately owned farms west of the Airport. The proposed project would include the construction of canal improvements to allow for decommissioning of the agricultural irrigation function of the ditch.

During storms, the Airport West Ditch receives stormwater runoff from a portion of the impervious surfaces on the west side of the Airport. Depending on the water volume, some of the stormwater is retained in the ditch until it can drain off-site to the Sacramento River. Therefore, the stormwater detention function of the Airport West Ditch must continue. In addition to the habitat-related safety issues, the ditch presents a physical obstruction hazard to planes that may leave the runway during adverse takeoff or landing situations. Therefore, the final stage of this project component would consist of regrading the Airport West Ditch to a gently sloping swale that can be easily maintained through mowing or other means. The more gradual gradient would also pose a lower threat to aircraft that may unexpectedly exit the runway.

To take advantage of common construction practices and to maximize the use of common facilities, the rearrangement of irrigation and drainage facilities required to provide for rerouting of flows that contribute to the Airport West Ditch would be accomplished along with the proposed NLIP improvements. The proposed GGS/Drainage Canal would intercept many of the Airport West Ditch’s off-site irrigation and drainage sources and reroute flows outside of the Airport Operations Area. The intent is to reroute year-round flows through the GGS/Drainage Canal. Additional irrigation infrastructure improvements required to reroute these flows would be implemented along with the GGS/Drainage Canal construction. Equipment that would be utilized in this reconfiguration includes excavators, loaders, compactors, dump trucks, water trucks, hydroteering trucks, and generators.

**Pumping Plant No. 2 Reconstruction and Relocation**

Pumping Plant No. 2 would be reconstructed and relocated as part of the proposed project at the western end of the North Drainage Canal, approximately 900 feet east of the centerline of the levee in the vicinity of the intersection with the P6 Drain. Long discharge pipes would extend over the levee to the Sacramento River. The work is expected to take place in construction Phase 3. Two 42-inch steel discharge pipes, approximately 850 feet long, would connect the two 300-horsepower pumps from the pump station to a new concrete outfall structure in the Sacramento River. The new outfall structure would be constructed close to the location of the original Pumping Plant No. 2 outfall structure. Equipment required for construction of Pumping Plant No. 2 include an excavator, dozer, loader, crane, boom truck, pile driver, concrete pump, generator, and water truck.
Habitat Enhancement, Development, and Management

Habitat enhancements and developments planned for Phases 3 and 4 of project construction include: the southern segments of the relocated Elkhorn Canal and the newly constructed GGS/Drainage Canal between the Elkhorn Reservoir and the West Drainage Canal and the relocated Riverside Canal; additional establishment of landside woodlands along the Sacramento River east levee; continued creation of managed grasslands on the newly constructed levee slopes, screepege berms, access rights-of-ways, and canal embankments; the creation of managed marsh in the southern areas of the basin; and preservation of additional rice and agricultural upland cropland. Please refer to the June 18, 2008, Conceptual Mitigation, Management, and Monitoring Plan document (prepared by EDAW for SAFCA) for a more complete summary of the conceptual strategy for creating, enhancing, preserving, protecting, and managing habitats in the Natomas Basin in perpetuity. Similar to Phase 2, temporary and permanent effects to habitats of listed species that result from the implementation of Phases 3 and 4 would be offset through the creation, enhancement, and preservation of habitat in the basin.

Programmatic Biological Opinion Implementing Procedure

Because the Corps and SAFCA only have a detailed project description for Phase 2 of the entire Natomas Levee Improvement Project, this biological opinion analyzes the landscape effects of the project for all Phases (2, 3, and 4) but will only analyze and provide incidental take coverage for Phase 2. For each subsequent phase, the Corps will initiate section 7 consultation with the Service under the umbrella of this programmatic biological opinion. The following process will be used when implementing projects under this programmatic biological opinion:

1. The Corps will submit a letter requesting that the proposed phase be tiered to this programmatic biological opinion and provide the Service the following:
   a. Project maps, which includes reaches under construction, cover types within the construction/maintenance boundary.
   b. Project schedule.
   c. An inventory of any elderberry stems >1 inch diameter that are within 100 feet of project actions and the number of shrubs and stems that would be transplanted and when and where they would be transplanted.
   d. A description of how compensation measures from the preceding phase are being implemented and the schedule for completion of those measures.

2. The Service will review new information that may reveal effects not considered previously and review the information provided to determine whether the activities described under future Phases were programmatical analyzied in this document.

3. The Corps and SAFCA should involve the Service on Phase 3 and Phase 4 early in the process to allow the Service an opportunity to comment on project descriptions and expedite the completion of biological opinions for those phases.
Giant Garter Snake

Status of the Species

Listing. The Service published a proposal to list the giant garter snake as an endangered species on December 27, 1991 (56 FR 67046). The Service reevaluated the status of the snake before adopting the final rule, which listed as a threatened species on October 20, 1993 (58 FR 54053). Critical habitat has not been designated for the giant garter snake.

Description. The giant garter snake is one of the largest garter snakes species reaching a total length of approximately 64 inches (162 centimeters). Females tend to be slightly longer and proportionately heavier than males. Generally, the snakes have a dark dorsal background color with pale dorsal and lateral stripes; although coloration and pattern prominence are geographically and individually variable (Hansen 1980; Rossman et al. 1996).

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


The known range of the giant garter snake has changed little since the time of listing. In 2005, giant garter snakes were observed at the City of Chico’s wastewater treatment facility, approximately ten miles north of what was previously believed to be the northernmost extent of the species’ range (D. Kelly pers. comm. 2006; E. Hansen pers. comm. 2006). The southernmost known occurrence is at the Mendota Wildlife Area in Fresno County. No sightings of giant garter snakes south of Mendota Wildlife Area within the historic range of the species have been made since the time of listing (Hansen 2002).
Essential Habitat Components. Endemic to wetlands in the Sacramento and San Joaquin valleys, the giant garter snake inhabits marshes, sloughs, ponds, small lakes, low gradient streams, and other waterways and agricultural wetlands, such as irrigation and drainage canals, rice fields and the adjacent uplands (Service 1999a). Essential habitat components consist of: (1) wetlands with adequate water during the snake’s active season (early-spring through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) upland habitat with grassy banks and openings in waterside vegetation for basking; and (4) higher elevation uplands for overwintering habitat with escape cover (vegetation, burrows) and underground refugia (crevices and small mammal burrows) (Hansen 1988). Snakes are typically absent from larger rivers and other bodies of water that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates (Hansen 1988; Hansen and Brode 1980; Rossman and Stewart 1987). Riparian woodlands do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations (Hansen 1988).

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

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

Movements and Habitat Use. The giant garter snake is highly aquatic but also occupies a terrestrial niche (Service 1999a; Wylie et al. 2004a). The snake typically inhabits small mammal burrows and other soil and/or rock crevices during the colder months of winter (i.e., October to April) (Hansen and Brode 1993; Wylie et al. 1995; Wylie et al. 2003a), and also uses burrows as refuge from extreme heat during its active period (Wylie et al. 1997; Wylie et al. 2004a). While individuals usually remain in close proximity to wetland habitats, the Biological Resource Division of the U.S. Geological Survey (BRD) has documented snakes using burrows as much as 165 feet (50 meters) away from the marsh edge to escape extreme heat, and as far as 820 feet (250 meters) from the edge of marsh habitat for over-wintering habitat (Wylie et al. 1997). Giant garter snakes have been observed tens to hundreds of meters distant from any water body in various types of habitat. Upland habitat is essential for snakes because it provides overwintering hibernacula and areas for which snakes to thermoregulate (regulate their body temperature), and small mammal burrows which are used by snakes for ecdysis (shedding of the skin). Upland habitat may be particularly important for neonates (newly born) giant garter snakes, which may
use the uplands more frequently than adults, possibly seeking terrestrial prey, such as earthworms or other insects.

In studies of marked snakes in the Natomas Basin, snakes moved about 0.25 to 0.5 miles (0.4 to 0.8 kilometers) per day (Hansen and Brode 1993). Total activity, however, varies widely between individuals; individual snakes have been documented to move up to 5 miles (8 kilometers) over a few days in response to dewatering of habitat (Wylie et al. 1997) and to use up to more than 8 miles (12.9 kilometers) of linear aquatic habitat over the course of a few months. Home range (area of daily activity) averages about 0.1 mile² (25 hectares) in both the Natomas Basin and the Colusa National Wildlife Refuge (NWR) (Wylie 1998a; Wylie et al. 2002), yet can be as large as 14.5 miles² (3744 hectares) (Wylie and Martin 2004).

Rice fields have become important habitat for giant garter snakes, particularly associated canals and their banks for both spring and summer active behavior and winter hibernation (Hansen 2004; Wylie 1998b). While within the rice fields, snakes forage in the shallow water for prey, utilizing rice plants and vegetated berms dividing rice checks for shelter and basking sites (Hansen and Brode 1993). In the Natomas Basin, habitat used consisted almost entirely of irrigation ditches and established rice fields (Wylie 1998a; Wylie et al. 2004b), while in the Colusa NWR, snakes were regularly found on or near edges of wetlands and ditches with vegetative cover (Wylie et al. 2003a). Telemetry studies also indicate that active snakes use uplands extensively, particularly where vegetative cover exceeds 50 percent in the area (Wylie 1998b).

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

Reasons for Decline and Threats to Survival. The current distribution and abundance of the giant garter snake is much reduced from former times (Service 1999a). Prior to reclamation activities beginning in the mid- to late-1800s, about 60 percent of the Sacramento Valley was subject to seasonal overflow flooding providing expansive areas of snake habitat (Hinds 1952). Now, less than 10 percent, or approximately 319,000 acres (129,000 hectares), of the historic 4.5 million acres (1.8 million hectares) of Central Valley wetlands remain (U.S. Department of Interior 1994), of which very little provides habitat suitable for the giant garter snake. Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one-third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lakebeds (Hansen 1980; Hansen and Brode 1980).
Valley flood wetlands are now subject to cumulative effects of upstream watershed modifications, water storage and diversion projects, as well as urban and agricultural development. The Central Valley Project (CVP), the largest water management system in California, created an ecosystem altered to such an extent that remaining wetlands depend on highly managed water regimes (U.S. Department of Interior 1994). Further, the implementation of CVP has resulted in conversion of native habitats to agriculture, and has facilitated urban development through the Central Valley (Service 1999a). For instance, residential and commercial growth with the Central Valley is consuming an estimated 15,000 acres of Central Valley farmland each year (American Farmland Trust 1999), with a project loss of more than one million acres by the year 2040 (USGS 2003). Environmental impacts associated with urbanization include loss of biodiversity and habitat, alternation of natural fire regimes, fragmentation of habitat from road construction, and degradation due to pollutants. Further, encroaching urbanization can inhibit rice cultivation (J. Roberts pers. comm. 2006). Rapidly expanding cities within the snake’s range include Chico, Yuba City, the Sacramento area, Galt, Stockton, Gustine, and Los Banos.

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

Other land use practices also currently threaten the survival of the snake. Recreational activities, such as fishing, may disturb snakes and disrupt thermoregulation and foraging activities (E. Hansen pers. comm. 2006). While large areas of seemingly suitable snake habitat exist in the form of duck clubs and waterfowl management areas, water management of these areas typically does not provide the summer water needed by the species (Beam and Menges 1997; Dickert 2005; Paquin et al. 2006).

Nonnative predators, including introduced predatory game fish, bullfrogs, and domestic cats, can threaten snake populations (Dickert 2003; Hansen 1986; Service 1993; Wylie et al. 1995; Wylie et al. 2003c). Nonnative competitors, such as the introduced water snake (*Nerodia fasciata*) in
the American River and associated tributaries near Folsom, may also threaten the giant garter snake (Stitt et al. 2005).

The disappearance of giant garter snakes from much of the west side of the San Joaquin Valley was approximately contemporaneous with the expansion of subsurface drainage systems in this area, providing circumstantial evidence that the resulting contamination of ditches and sloughs with drainwater constituents (principally selenium) may have contributed to the demise of giant garter snake populations. Dietary uptake is the principle route of toxic exposure to selenium in wildlife, including giant garter snakes (Beckon et al. 2003). Many open ditches in the northern San Joaquin Valley carry subsurface drainwater with elevated concentrations of selenium, and green sunfish (Lepomis cyanellus) have been found to have concentrations of selenium within the range of concentrations associated with adverse affects on predator aquatic reptiles (Hopkins et al. 2002; Saiki 1998). Studies on the effects of selenium on snakes suggest that snakes with high selenium loads in their internal organs can transfer potentially toxic quantities of selenium to their eggs (Hopkins et al. 2004) and also demonstrate higher rates of metabolic activity than uncontaminated snakes (Hopkins et al. 1999).

Status with Respect to Recovery. The draft recovery plan for the giant garter snake subdivides its range into four proposed recovery units (Service 1999a): (1) Sacramento Valley Recovery Unit; (2) Mid-Valley Recovery Unit; (3) San Joaquin Valley Recovery Unit; and (4) South Valley Recovery Unit.

The Sacramento Valley Unit at the northern end of the species' range contains sub-populations in the Butte Basin, Colusa Basin, and Sutter Basin (Service 1999a; Service 2006). Protected snake habitat is located on State refuges and refuges of the Sacramento National Wildlife Refuge (NWR) Complex in the Colusa and Sutter Basins. Suitable snake habitat is also found in low gradient streams and along waterways associated with rice farming. This northernmost recovery unit is known to support relatively large, stable sub-populations of giant garter snakes (Wylie et al. 1995; Wylie et al. 1997; Wylie et al. 2002; Wylie et al. 2003a; Wylie et al. 2004a). Habitat corridors connecting subpopulations, however, are either not present or not protected, and are threatened by urban encroachment.

The Mid-Valley Unit includes sub-populations in the American, Yolo, and Delta Basins (Service 1999a; Service 2006). The status of Mid-Valley sub-populations is very uncertain; each is small, highly fragmented, and located on isolated patches of limited quality habitat that is increasingly threatened by urbanization (E. Hansen 2002, 2004; Service 1993; Wylie 2003; Wylie and Martin 2004; Wylie et al. 2004b; Wylie et al. 2005; G. Wylie pers. comm. 2006). The American Basin sub-population, although threatened by urban development, receives protection from the Metro Air Park and Natomas Basin Habitat Conservation Plans, which share a regional strategy to maintain a viable snake sub-population in the Natomas Basin.

The San Joaquin Valley Unit, which includes sub-populations in the San Joaquin Basin, formerly supported large snake populations, but numbers have severely declined, and recent survey efforts indicate numbers are extremely low compared to Sacramento Valley sub-populations (Dickert
2002, 2003; Hansen 1988; Williams and Wunderlich 2003; Wylie 1998a). Giant garter snakes currently occur in the northern and central San Joaquin Basin within the Grassland Wetlands of Merced County and the Mendota Wildlife Area of Fresno County; however, these sub-populations remain small, fragmented, and unstable, and are probably decreasing (Dickert 2003, 2005; G. Wylie pers. comm., 2006).

The South Valley Unit included sub-populations in the Tulare Basin, however, agricultural and flood control activities are presumed to have extirpated the snake from the Tulare Basin (Hansen 1995). Comprehensive surveys for this area are lacking and where habitat remains, the giant garter snake may be present.

Since 1995, BRD has studied snake sub-populations at the Sacramento, Delevan, and Colusa NWRs and in the Colusa Basin Drain within the Colusa Basin, at Gilsizer Slough within the Sutter Basin, at the Badger Creek area of the Cosumnes River Preserve within the Badger Creek/Willow Creek area of the Delta Basin, and in the Natomas Basin within the American Basin (Hansen 2003, 2004; Wylie 1998a, 1998b, 2003; Wylie et al. 1995; Wylie et al. 2002; Wylie et al. 2003a, 2004a; Wylie et al. 2003b, 2004b). These areas contain the largest extant giant garter snake sub-populations. Outside of protected areas, however, snakes are still subject to all threats identified in the final rule. The other sub-populations are distributed discontinuously in small, isolated patches, and are vulnerable to extirpation by stochastic environmental, demographic, and genetic processes (Goodman 1987).

The draft recovery criteria require multiple, stable sub-populations within each of the four recovery units, with sub-populations well-connected by corridors of suitable habitat. This entails that corridors of suitable habitat between existing snake sub-populations be maintained or created to enhance sub-population interchange to offset threats to the species (Service 1999a). Currently, only the Sacramento Valley Recovery Unit is known to support relatively large, stable giant garter snake populations. Habitat corridors connecting sub-populations, even in the Sacramento Valley Recovery Unit, are either not present or not protected. Overall, the future availability of habitat in the form of canals, ditches, and flooded fields are subject to market-driven crop choices, agricultural practices, and urban development; and are, thus, uncertain and unpredictable.

Environmental Baseline

*American Basin.* The proposed project is located within the American Basin snake population, in the Mid Valley Recovery Unit (Service 1999a). Seventy-nine CNDB (2007) records are known from the American Basin. These records include the Natomas Basin, the Middle-American Basin just north of the Natomas Cross Canal, Rio Oso and associated tributaries, as well as other locations within the Basin.

Within the greater American Basin, the Natomas Basin is bounded on the west by the Sacramento River levee, on the north by the Natomas Cross Canal (NCC), on the east by the Natomas East Main Drainage Canal (NEMDC), and on the south by the American River levee.
The NBHCP applies to the 53,537-acre (21,666-hectare) area interior to the toes of the levees surrounding the Natomas Basin, located in the northern portion of Sacramento County and the southern portion of Sutter County. The baseline analysis done for the NBHCP found that, as of 2001, the Natomas Basin supported approximately 24,567 acres (9,942 hectares) of aquatic giant garter snake habitat. Of that, approximately 96 acres (39 hectares) are ponds and seasonally wet areas, 22,693 acres (9,184 hectares) are rice fields, and 1,778 acres (720 hectares) are canals (CH2M Hill 2002).

The BRD conducted giant garter snake studies in the Natomas Basin, including areas owned and managed by The Natomas Basin Conservancy (TNBC) (Wylie 1998a; Wylie et al. 2000; Wylie et al. 2003b, 2004b). Eric Hansen is now over-seeing these surveys (Jones and Stokes 2005). Surveys have established the presence of giant garter snakes throughout the Basin, including nearly all the TNBC properties with suitable habitat for the snake. The TNBC’s marsh and rice land preserves are being managed with the goal to maintain viable sub-populations of the giant garter snake and the NBHCP’s other wetland dependent species. Density estimates in the Natomas Basin range from 6 to 64 snakes per mile (4 to 40 snakes per kilometer) depending on the trapping location (Wylie et al. 2004b). Wylie et al. (2003b) suggest that TNBC properties have the potential to provide habitat to sustain snake populations in the Natomas Basin. They propose that development of giant garter snake habitat on TNBC lands should proceed as quickly as practical. In the Sacramento Valley, water is being purchased from rice growers and exported to the south. Fallowing of land appears to reduce or eliminate snake capture success in adjacent canals (Wylie et al. 2004b). If land fallowed by water sales increases in the Basin, the habitat managed by TNBC becomes all the more important for protecting snake sub-populations (Wylie et al. 2004b). Also, development projects in the southern end of the Natomas Basin will eliminate local snake sub-populations, particularly when there is no avenue of escape from construction activity (Wylie et al. 2003b).

Biologists funded by the Sacramento Area Flood Control Agency are conducting population dynamics studies in the Middle-American Basin, which lies north of the NCC (Hansen 2003, 2004); the Natomas Basin lies to the south of the NCC. Most giant garter snakes in the Middle-American Basin occur near the NCC and Main Canal where more rice and aquatic habitat is available. However, no snakes have been found to move within or across the NCC itself, suggesting that snakes are not moving between the middle-American Basin and the Natomas Basin. If the NCC represents a barrier to movement within the greater American Basin, then giant garter snakes may be present in two separate and genetically isolated sub-populations, requiring separate conservation and management. This type of genetic differentiation is known in giant garter snakes as revealed by regional subdivision in mitochondrial DNA haplotypes (Paquin et al. 2006).

The BRD has conducted studies at Gilsizer Slough, surrounding lands, and associated irrigation canals (Wylie et al. 1995; Wylie et al. 1997). Giant garter snakes were shown to use canal, marsh, and rice habitat (Wylie et al. 1995; Wylie et al. 1997). Snakes were particularly associated with irrigated canals that had thickly vegetated slopes. Fifty-five percent of telemetered snakes used rice fields at some time (Wylie et al. 1997). Because of few recaptures
and no clearly defined capture/recapture events, estimation of total numbers of giant garter snakes in the Gilsizer area was not possible; however, BRD speculates that numbers may be in the hundreds. Much of the Gilsizer Slough area is protected by the State. Also, 162 acres (66 hectares) of the Slough is protected as a result of mitigation for the Wild Goose Gas Pipeline and State Route 70-Algodon Road Interchange projects.

Factors Affecting the Snake within the Action Area - A number of State, local, private, and unrelated Federal actions have occurred within the action area (Natomas Basin) and adjacent region affecting the environmental baseline of the species. Some of these projects have been subject to prior section 7 consultation. These actions have resulted in both direct and indirect effects to giant garter snake habitat within the region. Projects affecting the environment in and around the action area include bridge replacements over the NEMDC and Steelhead Creek at Main Avenue, the Lower Dry Creek and Robia Creek Levee Improvement project, the Lower Northwest Interceptor project, and the North Natomas Comprehensive Drainage project.

The Sacramento International Airport has recently changed land use of lands they own north of the west runway. Until recently, this land had been leased to local farmers and has been actively farmed in rice. The Airport has not proposed any compensation nor have they initiated consultation with the Service in order to examine the effects the loss of this rice would have on giant garter snakes within the Natomas Basin. There is a loss of at least 617 acres of active rice that served as aquatic habitat for the giant garter snake on Airport property. The Airport has decided to not renew rice leases on this land based on a November 17, 2005, letter from the FAA which listed corrective actions they required the Sacramento County Airport to complete in order to avoid legal actions from the FAA. As of December 31, 2007, all of the leases for rice on SCAS lands were terminated. At the date of this biological opinion, the FAA has not initiated section 7 consultation with the Service on the effects to giant garter snakes of their Federal action to have the Sacramento County Airport terminate the rice leases.

On-going development within the Natomas Basin also affects the snake and its habitat. In February of 2002, the Service issued an incidental take permit (ITP) to the Metro Air Park Property Owners Association (MAPPOA) for development activities associated with the implementation of the Metro Air Park Habitat Conservation Plan (MAPHCP). On June 27, 2003, the Service issued ITPs to the City of Sacramento, Sutter County, and TNBC for activities associated with the implementation of the Final NBHCP (City of Sacramento et al. 2003). The TNBC is the plan operator responsible for acquiring and managing habitat mitigation lands for the MAPHCP and NBHCP. The MAPHCP and NBHCP permits authorized incidental take of the giant garter snake and several other species resulting from the development of 17,500 acres (7,082 hectares) of land in the Natomas Basin; of this, approximately 8,512 acres (3,445 hectares) is suitable giant garter snake habitat (e.g., ponds, canals, and rice fields) (Service 2003). A key component of the MAPHCP and NBHCP's Operating Conservation Strategy (OCS) is the acquisition of 0.5 acre (0.2 hectare) of habitat mitigation lands for every acre of land developed within the permit areas. A total of 75 percent of the mitigation lands protected under the plans will be suitable for the giant garter snake, with 50 percent in rice fields and 25 percent restored to managed marsh. Once the MAPHCP and NBHCP permit areas have been built out,
approximately 6,562 acres (2,656 hectares) of habitat will have been acquired/restored and will be actively managed for the giant garter snake, including 4,375 acres (1,771 hectares) of rice fields and 2,187.5 acres (521 hectares) of managed marsh.

As of December 31, 2006, the City of Sacramento had authorized grading on 6,785 acres (2,746 hectares) in the NBHCP permit area; Sutter County had not issued any urban development permits in the NBHCP permit area. In September of 2003, MAPPOA graded 800 acres (324 hectares) of the Metro Air Park site to prepare the site for development. Of the disturbed area, 190.4 acres (77 hectares) will be immediately developed; the remaining area will revert to agricultural use until it is eventually developed. As of December 31, 2007, no additional land has been graded at Metro Air Park. As of December 31, 2007, TNBC had acquired 4,092 acres (1,656 hectares) of lands to mitigate the impacts of these two HCPs.

The Service and CDFG consider the entire Natomas Basin as potential habitat for the snake because the lands are of generally uniform character and capable of restoration. To survive in the Basin, giant garter snakes require large blocks of wetland and adjacent upland habitat distributed throughout three population centers and connected to each other through a system of canals and other aquatic features. Brode and Hansen (1992) stated that the Basin provides the most important habitat remaining for the snake and observed that snake habitat within the Basin occurs in three large areas that are separated by major highways. Area 1 is defined as lands north of I-5 and west of State Route 99/70 (SR 99/70). Important habitat areas include Prichard Lake, the North Drain Canal, and its associated rice fields. Area 2 is defined as the lands south and west of I-5, and it’s most important habitat area is Fisherman’s Lake. Area 3 is defined as the lands east of I-5 and SR 99/70. The most important component of Area 3 is “Snake Alley”, an area comprised of the North Main Canal and its associated rice fields and irrigation ditches on the east side of SR 99/70. The authors hypothesized that snakes could move between the three areas through large box culverts under the major highways. Brode and Hansen (1992) attributed the snake’s continued success in the Basin to the numerous irrigation ditches, rice fields, and especially the extensive network of irrigation canals, feeder canals, and drains. The authors concluded by presenting a conceptual conservation plan for the snake in the Basin. This plan was based upon a minimum of one core habitat in each of the geographic areas with connecting canals to ensure snakes could move between each of the three areas. The Corps and SAFCA’s proposed project is located in portions of all three areas. Much of the borrow and construction would occur within Area 1 along the Sacramento River east levee and near the North Main Canal and Area 2 adjacent to Fisherman’s Lake and along the West Drainage Canal.

The continuing practice of fallowing rice fields on and around Airport property due to FAA corrective actions letter, and throughout the Natomas Basin, threatens the viability of giant garter snake populations and the effectiveness of the NBHCP OCS. Irrigated rice is important as foraging, shelter, and basking habitat for the snake. Rice may serve a particularly important role for snakes in the Natomas Basin as compared to its role as habitat in other parts of the species range. Rice, and other wetlands, adjacent to the ditches and canals may serve as vital nursery habitat for young giant garter snakes and as “way stations” for snakes as they make their way through the extensive ditch and canal system in the Natomas Basin. In particular, rice may be an
important resource for juvenile giant garter snakes by providing large amounts of cover and small prey for the juveniles to feed on late in the summer.

According to the CNDDDB (2008), there are 40 records of giant garter snakes within the Natomas Basin and all of them are within 5 miles of the proposed project. Giant garter snakes have been documented on and directly adjacent to portions of the project area and within canals and ditches in the general area that are hydrologically connected with the aquatic features on the proposed project site. As described in the Movements and Habitat Use section of this biological opinion, snakes can travel considerable distances over the course of days and years in both aquatic and uplands habitats.

The proposed project area contains habitat components suitable for giant garter snake feeding, resting, mating, and other essential behaviors, as well as for movement corridors. Because of the biology and ecology of the giant garter snake, the presence of suitable habitat within the proposed project, and observations of the species, the Service has determined that the giant garter snake is reasonably certain to occur within the action area and be affected by the proposed project.

Valley Elderberry Longhorn Beetle

Status of the Species

Listing. The beetle was listed as a threatened species under the Act on August 8, 1980 (45 FR 52803). Critical habitat for the species was designated and published in 50 CFR §17.95. Two areas along the American River in the Sacramento metropolitan area have been designated as critical habitat for the beetle. The first area designated as critical habitat for this species is along the lower American River at River Bend (formerly Goethe) and Ancil Hoffman parks (American River Parkway Zone) and the second area is at the Sacramento Zone, an area about a half mile from the American River downstream from the American River Parkway Zone. In addition, an area along Putah Creek, Solano County, and the area west of Nimbus Dam along the American River Parkway, Sacramento County, are considered essential habitat, according to The Valley Elderberry Longhorn Beetle Recovery Plan (USFWS 1984). These critical habitat areas and essential habitat areas within the American River parkway and Putah Creek support large numbers of mature elderberry shrubs with extensive evidence of use by the beetle.

Life History. The elderberry shrub (Sambucus sp.) is the sole host plant for the valley elderberry longhorn beetle. Elderberries are locally common components of the remaining riparian forest and savannah landscapes, and to a lesser extent the mixed chaparral-foothill woodlands, of the Central Valley. The occupancy rates of the beetle are reduced in non-riparian habitats (e.g., Talley et al. in press), indicating that riparian elderberry habitat an important habitat type for the beetle.

Use of elderberry shrubs by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the shrub's use by the beetle is an exit hole created by the larva emerging just prior to the pupal stage. Observations of elderberry shrubs along the Cosumnes River and in the
Folsom Lake area indicate that larval beetles can be found in elderberry stems with no apparent exit holes; the larvae either succumb prior to constructing an exit hole or not developed sufficiently to construct one. Larvae appear to be distributed in stems which are 1.0 inch or greater in diameter at ground level and can occur living stems. The Valley Elderberry Longhorn Beetle Recovery Plan (USFWS 1984) and Barr (1991) further describe the beetle's life history.

**Population Structure.** The beetle is a specialist on elderberry plants, and tends to have small population sizes and occurs in low densities (Barr 1991; Collinge et al. 2001). It has been observed feeding upon both blue and red elderberry (USFWS 1984, Barr 1991) with stems greater than or equal to one inch in diameter (Barr 1991). Sightings of the beetle are rare and in most circumstances, evidence of the beetle is derived from the observation of the exit holes left when adults emerge from elderberry stems. The beetle tends to occur in areas with higher elderberry densities, but has lower exit hole densities than a closely related species, the California elderberry longhorn beetle (Collinge et al. 2001).

**Distribution and Range.** When the beetle was listed in 1980, the species was known from less than ten localities along the American River, the Merced River, and Putah Creek. By the time the Valley Elderberry Longhorn Beetle Recovery Plan was prepared in 1984, additional occupied localities had been found along the American River and Putah Creek. As of 2005, the California Range wide distribution extends from the Sacramento River in Shasta County, southward to an area along Caliente Creek in Kern County (CNDDB 2005). The CNDDB contained 190 occurrences for this species in 44 drainages throughout the Central Valley. However, the number of records should be viewed with caution as a record does not necessarily indicate a unique population. In many cases, there are multiple records within close proximity to one another within the same watershed or river. For example, 24 records are known within two miles of the American River (CNDDB 2006).

The beetle is considered a poor disperser based on the spatial distribution of occupied shrubs (Barr 1991; Collinge et al. 2001). Huxel and Hastings (1999) used computer simulations of colonization and extinction patterns based on differing dispersal distances, and found that the short dispersal simulations best matched the 1997 census data in terms of site occupancy. This suggests that dispersal and colonization are limited to nearby sites. At spatial scales greater than 6.2 miles, such as across drainages, beetle occupancy appears to be strongly influenced by regional extinction and colonization processes, and colonization is constrained by limited dispersal (Collinge et al. 2001; Huxel and Hastings 1999). Except for one occasion, drainages examined by Barr that were occupied in 1991, remained occupied in 1997 (Collinge et al. 2001; Huxel and Hastings 1999). The one exception was Stoney Creek, which was occupied in 1991, but not in 1997. All drainages found by Barr (1991) to be unoccupied in 1991, were also unoccupied in 1997. Collinge et al. (2001) further found that while the proportions of occupancy were similar, the number of sites examined containing elderberry and the density of elderberry at sites had decreased since Barr (1991), resulting in fewer occupied sites and groups. Studies suggest that the beetle is unable to re-colonize drainages where the species has been extirpated, because of its limited dispersal ability (Barr 1991; Collinge et al. 2001). This data suggests that drainages unoccupied by the beetle remain unoccupied.
Reasons for Decline and Threats to Survival. The beetle continues to be threatened by habitat loss and fragmentation, predation by the non-native Argentine ants (*Linepithema humile*) (Holway 1998; Huxel 2000; Huxel and Hastings 1999; Huxel et al. 2001; Ward 1987), and possibly other factors such as pesticide drift, non-native plant invasion, improper burning regimes, off-road vehicle use, rip-rap bank protection projects, wood cutting, and over-grazing by livestock.

Habitat Loss - Habitat destruction is one of the most significant threats to the beetle. Riparian forests, the primary habitat for the beetle, have been severely depleted throughout the Central Valley over the last two centuries as a result of expansive agricultural and urban development (Huxel et al. 2001; Katibah 1984; Roberts et al. 1977; Thompson 1961). As of 1849, the rivers and larger streams of the Central Valley were largely undisturbed. They supported continuous bands of riparian woodland four to five miles in width along some major drainages, such as the lower Sacramento River, and generally about two miles wide along the lesser streams (Thompson 1961). Most of the riverine floodplains supported riparian vegetation to about the 100-year flood line (Katibah 1984).

A large human population influx occurred after 1849, however, and much of the Central Valley riparian habitat was rapidly converted to agriculture and used as a source of wood for fuel and construction to serve a wide area (Thompson 1961). The clearing of riparian forests for fuel and construction made this land available for agriculture (Thompson 1961). Natural levees bordering the rivers, once supporting vast tracts of riparian habitat, became prime agricultural land (Thompson 1961). As agriculture expanded in the Central Valley, needs for increased water supply and flood protection spurred water development and reclamation projects. Artificial levees, river channelization, dam building, water diversion, and heavy groundwater pumping further reduced riparian habitat to small, isolated fragments (Katibah 1984). In recent decades, these riparian areas have continued to decline as a result of ongoing agricultural conversion as well and urban development and stream channelization. As of 1989, there were over 100 dams within the Central Valley drainage basin, as well as thousands of miles of water delivery canals and streambank flood control projects for irrigation, municipal and industrial water supplies, hydroelectric power, flood control, navigation, and recreation (Frayer et al. 1989). Riparian forests in the Central Valley have dwindled to discontinuous strips of widths currently measurable in yards rather than miles.

Some accounts state that the Sacramento Valley supported approximately 775,000 to 800,000 acres of riparian forest as of approximately 1848, just prior to statehood (Smith 1977; Katibah 1984). No comparable estimates are available for the San Joaquin Valley. Based on early soil maps, however, more than 921,000 acres of riparian habitat are believed to have been present throughout the Central Valley under pre-settlement conditions (Huxel et al 2001; Katibah 1984). Another source estimates that of approximately 5,000,000 acres of wetlands in the Central Valley in the 1850s, approximately 1,600,000 acres were riparian wetlands (Warner and Hendrix 1985; Frayer et al. 1989).
Based on a California Department of Fish and Game riparian vegetation distribution map, by 1979, there were approximately 102,000 acres of riparian vegetation remaining in the Central Valley. This represents a decline in acreage of approximately 89 percent as of 1979 (Katibah 1984). More extreme figures were given by Frayer et al. (1989), who reported that woody riparian forests in the Central Valley had declined to 34,600 acres by the mid-1980s (from 65,400 acres in 1939).

An even more recent analysis, completed by The Central Valley Historic Mapping Project, observed similar decreases in the amount of riparian habitat (Geographic Information Center 2003). Loss of riparian habitat between 1900 and 1990 in the Central Valley was about 96% in the southern portion of the Valley (Kern County to Fresno County) (16,000 acres remaining), 84% in the middle Valley (Merced County to San Joaquin County) (21,000 acres remaining) and 80% in the northern Valley (Sacramento and Solano counties to Shasta County) (96,000 acres remaining). Although these studies have differing findings in terms of the number of acres lost (most likely explained by differing methodologies), they attest to a dramatic historic loss of riparian habitat in the Central Valley.

Habitat Fragmentation - Destruction of riparian habitat in central California has resulted not only in a significant acreage loss, but also has resulted in beetle habitat fragmentation. Fahrig (1997) states that habitat fragmentation is only important for habitats that have suffered greater than 80 percent loss. Riparian habitat in the Central Valley, which has experienced greater than 90 percent loss by most estimates, would meet this criterion as habitat vulnerable to effects of fragmentation. Existing data suggests that beetle populations, specifically, are affected by habitat fragmentation. Barr (1991) found that small, isolated habitat remnants were less likely to be occupied by beetles than larger patches, indicating that beetle subpopulations are extirpated from small habitat fragments. Barr (1991) and Collinge et al. (2001) consistently found beetle exit holes occurring in clumps of elderberry bushes rather than isolated bushes, suggesting that isolated shrubs do not typically provide long-term viable habitat for this species.

Habitat fragmentation can be an important factor contributing to species declines because: (1) it divides a large population into two or more small populations that become more vulnerable to direct loss, inbreeding depression, genetic drift, and other problems associated with small populations; (2) it limits a species’ potential for dispersal and colonization; and (3) it makes habitat more vulnerable to outside influences by increasing the edge:interior ratio (Primack 1998).

Small, isolated subpopulations are susceptible to extirpation from random demographic, environmental, and/or genetic events (Shaffer 1981; Lande 1988; Primack 1998). While a large area may support a single large population, the smaller subpopulations that result from habitat fragmentation may not be large enough to persist over a long time period. As a population becomes smaller, it tends to lose genetic variability through genetic drift, leading to inbreeding depression and a lack of adaptive flexibility. Smaller populations also become more vulnerable to random fluctuations in reproductive and mortality rates, and are more likely to be extirpated by random environmental factors. When a sub-population becomes extinct, habitat fragmentation
reduces the chance of recolonization from any remaining populations. The effect of habitat fragmentation likely is exacerbated by the poor dispersal abilities of the beetle (Collinge et al. 2001; Talley 2005).

Habitat fragmentation not only isolates small populations, but also increases the interface between habitat and urban or agricultural land, increasing negative edge effects such as the invasion of non-native species (Huxel et al. 2001; Huxel 2000) and pesticide contamination (Barr 1991). Several edge effect-related factors may be related to the decline of the beetle.

Predation - The invasive Argentine ant (*Linepithema humile*) is a potential threat to the beetle (Huxel 2000). This ant is both an aggressive competitor and predator on native fauna that is spreading throughout riparian habitats in California and displacing assemblages of native arthropods (Ward 1987; Human and Gordon 1997; Holway 1998). The Argentine ant requires moisture and it may thrive in riparian or irrigated areas. A negative association between the presence of the ant and beetle exit holes was observed along Putah Creek in 1997 (Huxel 2000). This aggressive ant could interfere with adult mating or feeding behavior, or prey on eggs and larvae (e.g., Way et al. 1992). Surveys along Putah Creek found beetle presence where Argentine ants were not present or had recently colonized, but the beetle was absent from otherwise suitable sites where Argentine ants had become well-established (Huxel, in prep.). Between 1998 and 2002, the number of sites infested by the Argentine ant increased by 3 along Putah Creek and the American River (30 sites total were examined) (Huxel 2000; Holyoak and Talley 2001). The Argentine ant has been expanding its range throughout California since its introduction around 1907, especially in riparian woodlands associated with perennial streams (Holway 1998; Ward 1987). Huxel (in prep.) concluded that, given the potential for Argentine ants to spread with the aid of human activities such as movement of plant nursery stock and agricultural products, this species may come to infest most drainages in the Central Valley along the valley floor, where the beetle is found.

The beetle is also likely preyed upon by insectivorous birds, lizards, and European earwigs (*Forficula auricularia*) (Klasson et al. 2005). These three predators move freely up and down elderberry stems searching for food. The European earwig is a scavenger and omnivore that was often found feeding on tethered mealworm (*Tenebrio molitor*) larvae. The earwig may be common in riparian areas and it may lay its eggs in dead elderberry shrubs. The earwig, like the Argentine ant, requires moisture and is often found in large numbers in riparian and urban areas. Earwig presence and densities tended to be highest in mitigation sites likely because of the irrigation, although this needs to be statistically tested (Klasson et al. 2005).

Pesticide Drift - Direct spraying with pesticides and related pesticide drift is a potentially harmful factor for the beetle. A wide range of such spraying is done to control mosquitoes, crop diseases, and undesirable plants and insects. Although there have been no studies specifically focusing on the direct and indirect effects of pesticides on the beetle, evidence suggests that the species may be adversely affected by some pesticide applications. Commonly used pesticides within the range of the beetle include insecticides, most of which are broad-spectrum and likely toxic to the beetle; herbicides, which may harm or kill its host elderberry plants; and broad-spectrum
pesticides toxic to many forms of life. The greatest pesticide use occurs in the San Joaquin Valley. Four counties in this region had the highest use: Fresno, Kern, Tulare, and San Joaquin (CDPR 2006). The peak timing of application depends on the chemical agent and other factors including the activity period of the targeted pest insects; the use of the agents may coincide with the most vulnerable period of beetle adult activity, egg-laying and initial larval exposure on the outside of elderberry stems (Talley et al. 2006). The California Department of Pesticide Regulation (CDPR) in 1997 listed 239 pesticide active ingredients applied in proximity to locations of beetle (same square mile per Marovich and Kishaba 1997 cited in Talley et al. 2006). Pesticide active ingredients sold in California have averaged on the order of 600 million pounds per year since about 1998 (CDPR 2006).

Pesticide use reported to the CDPR is only a fraction of the pesticides sold in California each year. About two-thirds of the active ingredients sold in a given year are not subject to use reporting, including home-use pesticide products. Recent studies of major rivers and streams documented that 96 percent of all fish, 100 percent of all surface water samples and 33 percent of major aquifers contained one or more pesticides at detectable levels (Gilliom 1999). Pesticides were identified as one of the 15 leading causes of impairment for streams included on the Clean Water Act section 303(d) lists of impaired waters. Because the beetle occurs primarily in riparian habitat, the contamination of rivers and streams likely has affects on this species and its habitat. Given the amount and scope of pesticide use, along with unreported household and other uses, and the proximity of agriculture to riparian vegetation in the Central Valley, it appears likely that pesticides are affecting the beetle and its elderberry habitat.

Invasive Plant Species - Invasive exotic plant species may significantly alter the habitat of the beetle. Without adequate eradication and control measures these non-native species may eliminate elderberry shrubs and other native plants. Pest plants of major importance in Central Valley riparian systems include black locust (Robinia pseudoacacia), giant reed (Arundo donax), red sesbania (Sesbania punicea), Himalayan blackberry (Rubus armeniacus), tree of heaven (Ailanthus altissima), Spanish broom (Spartium junceum), Russian olive (Elaeagnus angustifolia), edible fig (Ficus carica), and Chinese tallowtree (Sapium sebiferum). Non-woody invasives such as ripgut brome (Bromus diandrus), foxtail barley (Hordeum marinum), Lolium multiflorum, and starthistle/knapweed (Centaurea spp.) also may impair elderberry germination or establishment, or elevate the risk of fire. Invasive plant control efforts often are limited by funding, labor, coordination with landowners, and the resilience and spread of their target plants. No rangewide assessment has been completed on the overall degree of impact of invasive plants on the beetle and its habitat. However, there are a number of local efforts to control invasive riparian plant species. For example, the American River Parkway has invasive species removal efforts by Sacramento Weed Warriors (a community stewardship project associated with the California Native Plant Society) and others, and the Cosumnes River Preserve has a group of volunteers who regularly remove exotics and restore native habitats (Talley et al. 2006).

Other Threats - Several other factors may threaten the beetle including fire, flooding, and over-grazing by livestock. The condition of elderberry shrubs can be adversely affected by fire, which is often common at the urban-wildland interface. Brush fires initially have a negative effect on
shrub condition and, therefore, beetle larvae through direct burning and stem die-off. A year after fire, however, surviving elderberry resprout and display rapid stem growth (Crane 1989). Fires often scarify the hard elderberry seed coat leading to germination of seedlings the following season (Crane 1989). Frequent or repeated fire, however, may kill remaining shoots, root crowns and seeds, causing elderberry to be eliminated from an area for many years since recruitment by seeds is patchy and generally slow (Crane 1989). Elderberry shrubs appeared suitable for the beetle two to six years after burning, but were often uninhabited, with the presence of old, burned exit holes suggesting pre-burn occupancy and post-burn vacancy (Talley et al. 2006). The post-fire lag in occupancy is likely the result of the limited movements of the beetle. Beetle occupancy occurred six to seven years post burn and, as in the alluvial plain of the American River Parkway, is about the same within the post-burn compared with unburned areas (Talley et al. in press). No quantitative studies of the net effects of fire on the beetle have been undertaken (e.g., examining beetle and elderberry through time after burns or in areas with varying burn frequencies and magnitude).

The beetle can tolerate flooding of its riparian habitat. The animal has higher occupancy rates in riparian than non-riparian habitats, and associations between the beetle and proximity to rivers were either not observed or there was a weak positive correlation with nearness to the river (Halstead and Oldham 1990; Talley 2005; Talley et al. in press). These findings illustrate that the beetle is not likely harmed by flooding and that higher habitat quality may be associated with rivers. In addition, if elderberry, a facultative riparian shrub, can withstand flooding, then the beetle likely will survive these events. Most floods occur during winter or early spring when the beetle is in its early life history stages, so that the effects of floods are even less likely to affect the beetle. If the shrub is exposed to prolong flooding (i.e. anoxia) and becomes severely stressed, then the beetle may be affected. The duration and magnitude of flooding at which elderberry stresses is uncertain and the levels of stress that affect the beetle is also unknown. Elderberry shrubs have adaptations that plants use to persist with flooding such as lenticels and aerenchyma, demonstrating that it is probably at least somewhat flood tolerant. Finally, if an area is flooded too frequently so that elderberry cannot survive then no beetles would be able to inhabit the area (Talley 2005).

Another potential factor in the beetle’s decline is the effects of inappropriate levels of livestock grazing, which can result in destruction of entire elderberry plants and inhibition of elderberry regeneration. Cattle, sheep and goats readily forage on new elderberry growth, and goats will consume even decadent growth. Well-manicured stands of elderberries, such as occurs due to livestock grazing, have generally been shown to have a relative absence of beetles (USFWS 1984). The effects on the beetle of both grazing and exotic plant invasions are likely significantly exacerbated by the problem of habitat fragmentation of elderberries. Such fragmentation increases the edge:interior ratio of habitat patches, thereby facilitating the adverse effects of these outside influences.
Environmental Baseline

The beetle currently inhabits the Central Valley from southern Shasta County south to Kern County in the San Joaquin Valley (Barr 1991; Talley et al. 2006). Within this range, there are approximately 190 records of the animal, largely based on exit holes, (CNDDB 2006; Talley et al. 2006).

The beetle was listed as a threatened species due to the loss of its riparian habitat (USFWS 1980). Quantifying the loss of elderberry shrubs as a result of the agricultural and urban development over the past 200 years is near impossible. However, recent studies have identified plant communities that are associated with elderberry (Vaghti et al. submitted) and estimating loss of these communities offers insight into the loss of the beetle and its habitat. Lang et al. (1989) observed fewer numbers of elderberry shrubs in the lower reach (i.e., between Sacramento and Colusa) of the Sacramento River than the northern reach (i.e., Chico to Red Bluff). They attributed this difference to the loss of elderberry shrubs and riparian habitat in the southern reach of the Sacramento River as a result of extensive flood control activities such as the construction and maintenance of levees. The Central Valley Historic Mapping Project (Geographic Information Center 2003) observed similar decreases in the amount of riparian habitat. Loss of riparian habitat between 1900 and 1990 in the Central Valley was about 96% in the southern portion of the Valley (Kern County to Fresno County) (16,000 acres remaining), 84% in the middle Valley (Merced County to San Joaquin County) (21,000 acres remaining) and 80% in the northern Valley (Sacramento and Solano counties to Shasta County) (96,000 acres remaining).

In addition to the riparian habitat loss described by Lang et al. (1989), both the number of sites with elderberry shrubs and the density of elderberry within sites decreased between studies of the same areas in 1991 and 1997 which resulted in a lower number of occupied sites and shrub groups (Barr 1991; Collinge et al. 2001). Holyoak and Talley (2001) investigated natural recruitment and mortality rates of elderberry at seven sites along Putah Creek and the American River that had been previously sampled by Collinge et al. (2001). They observed that mortality and recruitment rates were similar between the two areas, illustrating that elderberry shrubs likely replace themselves in these relatively undisturbed areas.

In the northern portion of the beetle's range along the Sacramento River and 13 of its tributaries (including lands in Butte, Placer, Sacramento, Shasta, Sutter, Tehama, Yolo and Yuba counties), the beetle occurs in drainages that function as distinct, relatively isolated metapopulations (Collinge et al. 2001). Half of the 14 drainages in the Sacramento Valley surveyed by Barr (1991) in 1991 and again by Collinge et al. (2001) in 1997 remained unoccupied in both studies. The beetle experienced extinction in two drainages and neither were recolonized. Collinge et al. (2001) concluded that because of dispersal limitations, unoccupied drainages were likely to remain unoccupied and those where the resident beetle population became extirpated were not likely to be recolonized. One of the implications of their results for conservation was that there is little chance that natural populations would recover following declines (Collinge et al. 2001).
The increase in the amount of riparian habitat through restoration and compensation efforts is valuable, but remains small in comparison to estimated historic losses of the habitat. Approximately 50,000 acres of existing riparian habitat has been protected in the Sacramento and San Joaquin Valley since 1980. In addition, approximately 5,000 acres of habitat has been restored for the benefit of the beetle (including planting of elderberries) and another 1,600 acres of riparian habitat has been restored; however, no elderberry plantings were included (Talley et al. 2006). An undetermined amount of additional habitat has been restored as a result of compensation for section 7 projects. Despite the efforts of a number of agencies and organizations, the 5,000 acres of restoration activities is less than 1 percent of the estimated 890,000 acres of the historic riparian habitat lost in the Central Valley. Loss of the beetle and its habitat continues, including conversion of agricultural lands, urban development and other activities that are often unreported. The ability of restoration and enhancement of conservation sites to fully compensate for adverse effects to the animal and its lost remnant natural habitat, is uncertain (Holyoak et al. in press).

Evidence of the beetle, in the form of exit holes, have been found within some of the elderberry shrubs which would be transplanted as part of work under Phase 2. Additionally, evidence of valley elderberry longhorn beetles was documented in the California Natural Diversity Database 2008, along the Sacramento River in the southern portion of the Natomas Basin. The action area contains components that can be used by the listed animal for feeding, resting, mating, and other essential behaviors. Therefore, the Service believes that the valley elderberry longhorn beetle is reasonably certain to occur within the action area because of the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the action area, as well as recent observations of this listed species.

Effects of the Proposed Action

Giant garter snake

Direct Effects

Overall Project
Land use changes due to SAFCA’s project include the permanent loss of up to 299.65 acres of row and field crop, 78.48 acres of fallow agricultural fields (some of which was previously active rice), 45.03 acres of orchard, 127.98 acres of rice, and 30.37 acres of open water and other non-canal wetlands. The project includes a gain of 89.11 acres of woodland, 356.12 acres of grassland, 72.98 acres of managed marsh, and 65.88 acres of canals.

Depending on how the grasslands are managed, the conversion of row crop and fallow agricultural fields to grassland could be beneficial to giant garter snakes. Agricultural areas typically have high levels of disturbance due to crop maintenance and harvesting activities. Mortality of snakes by farm equipment would be highly likely. Fallow agricultural fields may lack adequate cover for snakes and increase the risk of predation. Some of the grassland would
be created on the slopes of the new levees and berms. While these grasslands would be subject to greater human disturbance than non-levee grasslands, due to maintenance requirements from the Corps, they would still suffer less disturbance than an active agricultural field. Flood control structures need to allow easy visual inspection from the top of the levee during the spring and fall. While RDs have varying ways of complying with this requirement, SAFCA is proposing to have RD 1000 mow levee slopes to a height which would allow for visual inspection but also be high enough to reduce the chance of coming into contact with a snake. The Corps also requires that the levee slopes receive rodent control measures to keep ground burrowing mammals from burrowing into the sides of the levee. This could include grouting ground squirrel holes closed, which would remove potential hibernacula for giant garter snakes in the winter months to using a rodenticide which would lessen the number of ground squirrels in the area.

Giant garter snakes are not typically found in orchards because of the high amount of overstory cover, therefore there would be a benefit to giant garter snake due to the loss of 45.03 acres of orchard habitat. However, SAFCA proposes to create an additional 89.11 acres of woodland to compensate for effects to Swainson’s hawk nesting trees. It is not expected that giant garter snakes will use dense woodland areas. Therefore, this represents a net loss of 44.08 acres of habitat that is not expected to be used by giant garter snakes.

Because of the project, 72.98 acres of rice would be permanently converted to an upland habitat type. The SAFCA has proposed to compensate for the loss of rice by creating 70 acres of managed marsh on 55 acres of existing rice fields and 15 acres of annual grassland near Fisherman’s Lake. Overall there would be a loss of 127.98 acres of rice from the Natomas Basin. Additionally, there will be a temporary loss of rice within the Natomas Basin due to borrow excavation from the Brookfield site. A total of 353 acres of rice would be unavailable for giant garter snakes in the Natomas Basin for one year due to borrow activities. The loss of rice reduces the amount and availability of habitat, including summer water, for the snake. Due to the large amount of rice that has been fallowed in the Natomas Basin (37 percent loss of active rice between 2004 and 2007), any additional loss of rice, even for 1 season, has a direct effect on giant garter snakes. Flooded rice fields act as seasonal marshes and produce high numbers of tadpoles, frogs and mosquitofish. Effects associated with reduced available summer water in the form of rice field habitat also include displacement of individual giant garter snakes from familiar habitat areas and result in giant garter snakes foraging over a wider area. Giant garter snakes may move to other areas of suitable habitat, but will encounter increased mortality from vehicles, exposure to temperature extremes, predation, and human disturbance while migrating to new areas. Migrating snakes or snakes using a larger foraging area may displace resident snakes or compete for food and shelter resources with resident snakes, resulting in reduced survivorship and fecundity of both resident and immigrant snakes.

Adverse effects from the reduction of rice fields may be greatest for gravid females, juveniles, and neonate snakes. Gravid females spend significant time basking in mid to late summer while incubating young, and thus may have reduced survivorship or fecundity if displaced from familiar retreats and basking sites (giant garter snakes are live bearers and contribute significant resources to brooding offspring). Abundant food resources are also essential for females to both
recover body mass after giving birth and to survive the overwintering period when the snakes do not forage. Abundant food resources are also essential to the survival of juveniles and neonates. Giant garter snakes typically double their weight in the first year, with rapid growth likely necessary to reach a size class no longer susceptible to predation by non-native predatory fish and bullfrogs. The reduced availability of rice fields will result in less small prey for young snakes, which would inhibit growth, result in delayed sexual maturation and decreased births and recruitment of individuals into the population. This could potentially skew the age structure of the population to older giant garter snakes. Juveniles and neonates also rely on developing sufficient body mass prior to overwintering in order to survive long periods without foraging. Temporary or permanent loss of rice fields will not only remove habitat, but will also have adverse effects on reproduction, recruitment, and survival of the snake that will continue to affect giant garter snake populations well beyond the project time frame.

To offset the effects of the permanent loss of 127.98 acres of rice and the temporary effects to 356 acres of rice in the basin, SAFCA proposes to create 72.98 acres of managed marsh and permanently protect 175 acres of rice. Managed marsh has the capability to provide higher quality habitat for giant garter snakes because the habitat is available for the snake year round, will be subject to less human disturbance from farming activities, protected in perpetuity with a Conservation Easement, and will hold water for longer periods of time than a rice field typically does. Providing protection in perpetuity in the form of a Conservation Easement on 175 acres of rice fields would also benefit the snake because the rice farming at this site would be managed by TNBC and would assure more “snake-friendly” rice habitat than a typical rice field.

SAFCA proposes to affect 14 acres of irrigation and drainage canals that are vitally important for giant garter snakes both for foraging and movement within the basin. The loss of a canal within the basin even for a single season could have a large detrimental effect to giant garter snakes and their ability to access areas within the Natomas Basin for foraging and cover. To minimize any temporal effects of filling irrigation and drainage ditches, SAFCA has proposed to construct the replacement irrigation canals and GGS/Drainage Canal before most of the fill of existing ditches and canals occurs, providing some time for habitat development before the loss. In some cases these canals would be created a full year in advance of filling existing canals. Additionally, SAFCA has proposed to create better aquatic canal habitat for giant garter snakes by assuring that the new GGS/Drainage Canal would have a minimum water depth of 4.5 feet between April and October, which is the active season for the giant garter snake. This reliable water supply will provide a corridor between TNBC reserves in the Fisherman’s Lake area and reserves along the North Drainage Canal in the northwestern portion of the Natomas Basin. About 31.24 acres of giant garter snake canal and 38.43 acres of irrigation canal would be created with this project. An integral part of the GGS/Drainage Canal is 10.21 acres of the benches that would be created intermittently along the canal. These benches would be inundated in the summer months and allow for the growth of vegetation which would provide both cover and a food source for giant garter snakes. While the canal itself provides connectivity between two core areas for giant garter snakes, the benches along the canal would provide the food source, cover, and potential nursery grounds for snakes as they travel between the two areas.
SAFCA proposes to purchase long-term water contracts from NCMWC to provide water for both the managed marsh and GGS/Drainage Canal. While the Service expects the GGS/Drainage Canal to provide benefits to giant garter snakes in the Natomas Basin by providing connectivity and offsetting the effects of their project, there is some concern regarding the long term protection of the canal because the project description does not provide a Conservation Easement on this feature. The SAFCA has assured the Service that it can provide the necessary protection through another type of easement for the giant garter snake and the Service is willing to work with SAFCA to create the language for the easement that satisfies all of the interested parties. However, it is the Service’s preference that a Conservation Easement be placed on this feature and if agreement cannot be reached on the language of the easement, then the Service will have to reanalyze their effects and the GGS/Drainage Canal would be viewed as a minimization measure for their effects not a compensation measure.

Phase 2 Construction
Phase 2 construction includes work along the NCC and reaches 1-4B along the Sacramento River east levee. The Corps and SAFCA have proposed to complete the majority of the work during the active season of the giant garter snake (May 1 to October 1). Construction during this time would occur in 61.1 acres of developed land, 139.6 acres of annual grassland, 645.5 acres of row and field crop and fallow agriculture, 1.5 acres of orchard, 185 acres of rice (25 would be a permanent effect, 160 acres would be a temporary effect), 2 acres of canals and ditches, 22 acres of open water and other non-canal wetlands, and 10.3 acres of woodland. At the end of the construction season the proposed land cover types will be 53.5 acres of developed land, 30 acres of created woodland, 15.85 acres of preserved woodland, 168 acres of levee slope grassland, 123 acres of grassland on seepage berms and canal embankments, 19 acres of irrigation canal, 13.5 acres of GGS/Drainage Canal, and 175 acres of preserved rice. The newly created cover-types with the project would be protected from future development through either a flood control easement, conservation easement, or drainage easement.

Phase 2 construction would primarily occur between May 1 and October 1. The only components of Phase 2 work which would occur outside of the giant garter snake’s active season would be relocation of power poles, relocation of private irrigation pipelines, canals, and wells, and the removal, transplantation, and/or planting of trees and elderberry shrubs that are located in the Phase 2 footprint. To reduce the likelihood of disturbing or killing a giant garter snake that may be overwintering in uplands that would be affected this winter, SAFCA has proposed to erect exclusionary fencing around the areas where they would be working prior to October 1. This fence would be monitored daily prior to and during construction to insure that there are no breaches that a snake could get through. This should remove the chance that project construction would kill giant garter snakes when they are working in the winter months.

The remainder of the project would be constructed during the active period (May 1 – October 1) for the snake, resulting in a decreased risk of direct mortality of snakes. However, given the number of acres of aquatic and upland giant garter snake habitat affected within Phase 2, it is highly likely effects to snakes would include removal of cover and basking sites, filling or crushing of burrows or crevices, obstructing snake movement, and decreasing the prey base, and
may result in the direct disturbance, displacement, injury, and/or mortality of snakes. Snakes may disperse across or may bask on existing roads, and thus may be killed or injured by construction equipment or other vehicles accessing the project site.

Compensation for the loss of rice in Phase 2 would occur during Phase 4 with the creation of 72.98 acres of managed marsh along the western boundary of Fisherman’s Lake. The creation of managed marsh at this location would connect to existing TNBC Preserve lands which currently are in managed marsh which would enlarge a core area for giant garter snakes in the Natoma Basin. While the Service recognizes the benefit of enlarging managed marsh within the Fisherman’s Lake area, there would be a temporal loss of aquatic habitat for giant garter snake between when rice is converted to upland in Phase 2 and when marsh is created in Phase 4. If for some reason the Corps and SAFCA either do not complete all the project phases or do not provide the 72.98 acres of managed marsh in 2011, then they would have to reinitiate consultation with the Service as outlined on page 79 of this biological opinion.

Within the construction of Phase 2, SAFCA has proposed to create canal habitat in advance of canal that would be filled in Phase 3. This helps to offset effects due to the filling of canal which would be a loss of aquatic habitat for snakes, by allowing the new canals to become established in advance and also allow vegetation to begin to grow along the banks, which would provide cover from predation for the giant garter snake.

**Valley Elderberry Longhorn Beetle**

Effects to the valley elderberry longhorn beetle may occur with the transplantation of elderberry shrubs outside of the footprint of the levee enlargement. Loss of an elderberry shrub or even a stem can result in direct mortality of valley elderberry longhorn beetles or affect valley elderberry longhorn breeding and feeding because adult beetles rely solely on elderberry flowers for food and must lay their eggs on elderberry stems to successfully reproduce.

All three phases of the project have potential to affect about 40 elderberry shrubs through transplantation. This action will adversely affect the valley elderberry longhorn beetle. Any beetle larvae occupying these plants are likely to be killed when the plants are removed. An additional number of elderberry shrubs would remain where they currently are however, construction work would occur within 100 feet but no closer than 20 feet from the dripline of an elderberry shrub.

Temporal loss of habitat will occur. Although mitigation for impacts on the beetle 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 generally takes 25 years or longer for riparian habitats to reach their full value (USFWS 1994). Temporal loss of habitat will temporarily reduce the amount of habitat available to beetles and may cause fragmentation of habitat and isolation of subpopulations. In cases where the proposed project will reduce the canopy closure of riparian forests, an edge effect is created that could result in reduced habitat quality for the
beetles. Beetles disperse poorly and the systematic removal of elderberry shrubs from a relatively connected river corridor has adverse effects well outside of the project’s footprint.

Proposed avoidance and minimization measures should minimize adverse effects resulting from elderberry stem trimming or elderberry transplantation.

**Effects of Phase 2 Construction to Valley Elderberry Longhorn Beetle**

Table 3 lists the elderberry shrub stem counts and sizes which would be transplanted as part of the Phase 2 construction. Effects to the valley elderberry longhorn beetle due to transplantation of these shrubs are described above. Elderberry shrubs would be transplanted and elderberry seedlings and associated natives would be planted at one of the following properties: Rio Ramaza, Cummings, or Lasuevic.

**Table 3. 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>Riparian</td>
<td>stems ≥1&quot; &amp; ≤3&quot;</td>
<td>No</td>
<td>2:1</td>
<td>1:1</td>
<td>33</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>4:1</td>
<td>2:1</td>
<td>57</td>
<td>228</td>
<td>456</td>
</tr>
<tr>
<td>Riparian</td>
<td>stems &gt; 3&quot; &amp; &lt;5&quot;</td>
<td>No</td>
<td>3:1</td>
<td>1:1</td>
<td>16</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>6:1</td>
<td>2:1</td>
<td>13</td>
<td>78</td>
<td>156</td>
</tr>
<tr>
<td>Riparian</td>
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<td>4:1</td>
<td>1:1</td>
<td>16</td>
<td>64</td>
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<td>2:1</td>
<td>16</td>
<td>128</td>
<td>256</td>
</tr>
<tr>
<td>Non-riparian</td>
<td>stems ≥1&quot; &amp; ≤3&quot;</td>
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<td>1:1</td>
<td>1:1</td>
<td>23</td>
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<td>2:1</td>
<td>5</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Non-riparian</td>
<td>stems &gt; 3&quot; &amp; &lt;5&quot;</td>
<td>No</td>
<td>2:1</td>
<td>1:1</td>
<td>8</td>
<td>16</td>
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<td></td>
<td>Yes</td>
<td>4:1</td>
<td>2:1</td>
<td>2</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Non-riparian</td>
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<td>3:1</td>
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<td>2:1</td>
<td>1</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

Total replacement plantings 681 1,139

Total Elderberry shrubs to be transplanted 23

1,820 /10 = 182 valley elderberry longhorn beetle credits or 7.52 acres
Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions affecting listed species that are reasonably certain to occur in the area considered in this biological opinion. Future Federal actions not related to this proposed action are not considered in determining the cumulative effects, but are subject to separate consultation requirements pursuant to section 7 of the Act.

The effectiveness of the NBHCP's Operating Conservation Strategy (OCS) relies on the City of Sacramento and Sutter County limiting development to a combined total of 15,517 acres within their respective permit areas. The proposed project site is located outside the permitted development area, and SAFCA is not a permittee under the NBHCP; however, the plan assumes no significant new development in the basin outside of the City of Sacramento and Sutter County permit areas. The NBHCP outlines a carefully constructed OCS that balances reasonable development in the Basin with conservation of snake habitat in order to maintain a viable population of giant garter snakes in the basin and avoid jeopardy to this threatened species. The NBHCP and MAPHCP allow for urban development of certain areas (totaling up to 17,500 acres) in the Basin in return for the preservation of, and in some cases, restoration and management of 8,725 acres, in an interconnected preserve system, which when added to the baseline of agricultural and undeveloped lands in the basin, will conserve the Natomas Basin snake population. While the proposed project does not increase the number of developed acres beyond the 17,500 contemplated under the NBHCP and MAPHCP, it does change (in some cases, permanently) habitat types from one type to another. Loss of habitat which the 22 covered species of the NBHCPs may use include 299.65 acres of row and field crop; 78 acres of fallow fields, 45.03 acres of orchard, and 30.37 acres of open water and other non-canal wetlands. Increases in the following habitat types would occur with the project: 89.11 acres of woodland, 356.12 acres of grassland, 72.98 acres of managed marsh, and 65.88 acres of canal. While there would be a change in habitat types within the basin, the NBHCP covered species would still be able to use the habitats that SAFCA's project would be creating and development would be precluded from these areas through conservation easements, flood control easements, and drainage easements.

While SAFCA is not a signatory to the NBHCP, the plan sets forth a regional conservation strategy that covers the entire basin. The NBHCP's efficacy in maintaining a viable population of giant garter snake in the Basin depends, in significant part, on the retention of a sufficient amount of undeveloped acreage throughout the Basin, to support giant garter snake.\(1\) The NBHCP operates under the assumption that agricultural land in the Basin would continuously rotate between crop types, and therefore all land provides habitat for all 22 of the NBHCP covered species, including the giant garter snake.

\(1\) In NWF v. Norton, 2005 U.S. Dist LEXIS 33768, Judge Levi upheld the NBHCP and its strategy to protect the GGS in the Natomas Basin. However, in footnote 13 of the opinion, he cautioned that, "the Service and those seeking an ITP in the future will face an uphill battle if they attempt to argue that additional development in the basin beyond the 17,500 acres will not result in jeopardy" to the snake.
SAFCA’s proposed project will directly affect existing land that has been preserved as mitigation for either the NBHCP or MAPHCP. During Phase 2 of the project, 1.63 acres of fallow row and grain crop would be affected at the Atkinson Preserve and 4.09 acres of alfalfa and 5.72 acres of wheat would be affected at the Huffman West Preserve. During Phase 4 of the project, 1.98 acres of alfalfa, 0.05 acre of developed, 0.83 acre of ruderal, and 0.48 acre of valley oak woodland would be affected at the Alleghany 50 Preserve and 0.044 acre of valley oak woodland and 0.00034 acre of riparian scrub would be affected at the Cummings Preserve. These areas would be replaced with levee slope covered in grassland. As provided for in the NBHCP (IV.C.2.c.(1)) SAFCA shall “pay for the value of replacing every acre of reserve land impacted.”

To accomplish this SAFCA has proposed to acquire existing TNBC land not currently dedicated to mitigation to offset acre-per-acre losses. This existing TNBC land would consist of rice, not the upland habitat types affected. The SAFCA will fund the perpetual maintenance, monitoring, and enhancement of these preserves for the benefit of the covered species. Because this land is currently and will be maintained in rice, this will benefit the giant garter snake.

The proposed project would positively affect the biological connectivity between and within two of the Basin’s three major geographical areas and TNBC’s preserve lands. The GGS/Drainage Canal that SAFCA proposes to construct would provide connectivity between the population of snakes and the TNBC preserves around Fisherman’s Lake with the population of snakes and TNBC preserves in the northwest portion of the Natomas Basin near the North Drainage Canal. The SAFCA would provide guaranteed water in the canal between April and October, which would create aquatic connectivity. In an effort to increase the habitat quality of the corridor, SAFCA will create benches along the canal, which would be shallowly inundated in the summer months to provide a prey base support emergent marsh vegetation which would provide cover for the giant garter snake. The SAFCA proposes to manage this canal in perpetuity for the giant garter snake, and proposes to encumber the canal with an easement in which the conservation values prevail over drainage values. The SAFCA’s plan to construct this canal would benefit connectivity and strengthen the success of the NBHCP.

In December 2008, FEMA will issue a new flood map for the Natomas Basin. This would place all of Natomas into the AE zone, which would require that builders place the bottom floor of new construction up to 20 feet above ground level to keep it out of the floodplain. This would effectively stop new construction in Natomas. While not directly growth-facilitating, the proposed project would serve planned and reasonably foreseeable growth by providing flood protection to the Natomas Basin which is currently an impediment to future growth (planned or otherwise) in the Natomas Basin. It is likely that some of the growth (commercial, municipal, and residential) in the Natomas Basin will not require section 7 consultation with the Service for compliance with the Act, and will not obtain take coverage pursuant to section 10 of the Act. Currently, the NBHCP and the East Contra Costa HCP are the only two permitted regional HCPs in the Sacramento area, although Placer, Yolo, South Sacramento, Yuba, and Sutter are all developing regional HCPs. Until these regional HCPs are finalized, there is no mechanism to provide “take” coverage for projects with no Federal nexus besides these projects pursuing their own individual HCPs. Some “take” of listed species is likely to occur for which no
minimization, avoidance, and compensation/mitigation measures for federally-listed species are implemented.

SAFCA, the Corps, the city of Sacramento, Sacramento County, and Sutter County should understand that future development within the Natomas Basin could negatively affect the NBHCP and MAPHCP and potentially jeopardize the giant garter snake in the Natomas Basin. Any additional “take” of listed species outside what has been analyzed in this biological opinion or the NBHCP and MAPHCP cannot occur without appropriate permits or consultations with the Service and CDFG.

The cumulative effects of reasonable foreseeable projects in the Natomas Basin may pose a significant threat to the eventual recovery of the giant garter snake. The following proposed projects could significantly affect the sustainability of giant garter snakes in the Natomas Basin when considered cumulatively with the proposed Natomas Levee Improvement Project:

- The proposed Greenbriar residential development is located on an approximately 577-acre site south of Elkhorn Boulevard and west of State Highway 99. Development on this site could result in the loss of giant garter snake habitat adjacent to Lone Tree Canal, depending on the configuration of houses and infrastructure.
- Natomas Joint Vision, as currently proposed by the City of Sacramento and Sacramento County, is to develop approximately 6,000 acres in the area of the County outside of the City’s permitted area under the NBHCP.
- Sacramento International Airport’s Master Plan would enlarge the airport on land currently owned by the airport and would occur through 2020. Much of the land slated for airport expansion is currently in agricultural production.

Other projects which are reasonably foreseeable and should be considered cumulative with the proposed project, but for which the Service has little to no information about the extent of their effects to giant garter snakes, include:

- Camino Norte
- Downtown Natomas Airport Light Rail
- Pacific Gas & Electric Line 406/407 Pipeline
- Sacramento Municipal Utility District Powerline – Elkhorn Substation
- Sutter Pointe Specific Plan

Conclusion

After reviewing the current status of the giant garter snake and valley elderberry longhorn beetle, the environmental baseline for the species, the effects of the proposed project, and the cumulative effects on this species, it is the Service’s biological opinion that the proposed Natomas Landside Improvements Project, as described herein, is not likely to jeopardize the continued existence of
the giant garter snake or valley elderberry longhorn beetle. The project will not result in a net
destruction or adverse modification of valley elderberry longhorn critical habitat.

The Corps and SAFCA have proposed to improve flood protection for the Natomas Basin above
what currently exists. Two HCPs currently exist within the Natomas Basin and are based on
future development occurring within the permit area of the MAPHCP and NBHCP. The
baselines and assumptions for which these HCPs were developed were based on no additional
development occurring within the basin outside of these permit areas and no change in landuse
practices. Sacramento County and the City of Sacramento are already proposing additional
development outside of the existing permit areas. Additionally, 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
SAFCA’s project would not jeopardize the giant garter snake or valley elderberry longhorn
beetle, it does facilitate growth within the Natomas Basin, which would require additional
analysis to determine if this growth could jeopardize any of the 22 species covered by the
MAPHCP and NBHCP. 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 2 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 2 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
**Giant Garter Snake**

The Service anticipates that incidental take of the snake will be difficult to detect or quantify for the following reasons: giant garter snakes 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 2 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 species per acre of habitat lost or affected as a result of the action. Therefore, the Service anticipates that all giant garter snakes inhabiting 187 acres of aquatic and 818.9 acres of upland habitat may be harassed, harmed, or 2 giant garter snakes killed by loss and destruction of habitat, as a result of the project.

**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 2 construction. Therefore, the Service estimates that all beetles inhabiting 23 elderberry plants containing stems 1 inch or greater at ground level (118 stems between 1-3 inches, 39 stems between 3 and 5 inches and 35 stems ≥5 inches; see Table 3 in the text) will become unsuitable as a result of the proposed action.

**Effect of the Take**

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the giant garter snake, or valley elderberry longhorn beetle, and will not result in the destruction or adverse modification of designated critical habitat because in the case of the giant garter snake critical habitat has not been designated and it is outside of the critical habitat for valley elderberry longhorn beetle.

**Reasonable and Prudent Measures**

The following reasonable and prudent measures are necessary and appropriate to minimize the effect of the proposed project on the giant garter snake and valley elderberry longhorn beetle.

1. The Corps and SAFCA shall implement the project as proposed in the biological assessment and this biological opinion.
2. Effects of harassment of individual giant garter snakes 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 the giant garter snake and valley elderberry longhorn beetle resulting from the project related activities by implementation of the project description as described in the biological assessment and the project description of this biological opinion.

   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 project effects to the snake and valley elderberry longhorn beetle.

   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. The program shall provide workers with information on their responsibilities with regard to the giant garter snake and valley elderberry longhorn beetle, an overview of the life-history of the species, information on take prohibitions, and protections afforded the species under the Act. Written documentation of the training must be submitted to the Sacramento Fish and Wildlife Office within 30 days of the completion of training. As needed, training shall be conducted in Spanish for Spanish language speakers and other languages as needed or necessary.

   d. The applicants shall include a copy of this biological opinion within its solicitations for design and construction of the proposed project making the primary contractor responsible for implementing all requirements and obligations included within the biological opinion, and to educate and inform all other contractors involved in the project as to the requirements of the biological opinion.
2. The following terms and conditions implement reasonable and prudent measure two (2):

a. The project proponents shall minimize the potential for harm or harassment of the snake resulting from project-related activities by implementation of the conservation measures as described in the Corps’ Biological Assessment and appearing in the project description (pages 3-44) of this biological opinion.

b. 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 giant garter snakes 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.

c. For Phase 2 work which would occur outside of the giant garter snake active window (power pole relocations and private irrigation canal relocation) exclusion fencing would be placed around upland areas that giant garter snakes could use to overwinter. The exclusionary fencing would be monitored everyday prior to and during construction to ensure that openings do not develop that would allow the entry of a giant garter snake into the construction area.

d. Construction activity shall be conducted between May 1 and October 1. This is the active period for the snake and direct mortality is lessened, because snakes are expected to actively move and avoid danger. If it appears that 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.

e. The project proponents shall implement Best Management Practices (BMPs) 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.

f. 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.

g. Project-related vehicles shall observe a 20-mile-per-hour speed limit within construction areas, except on County roads and State and Federal highways. This
is particularly important during periods when the snake may be sunning or moving on roadways.

h. To avoid attracting snake predators, all trash items, such as wrappers, cans, bottles, and food scraps, must be disposed of in closed containers and removed at least once a day from the entire project site.

i. Within 24-hours prior to the commencement of construction activities, the site shall be inspected by a Service-approved biologist. The biologist will provide the Service with a written report that adequately documents the monitoring efforts within 24-hours of commencement of construction activities. Snakes encountered during construction activities shall be allowed to move away from the area on their own volition. The biologist shall notify the Service immediately if any listed species are found on-site, and will submit a report, including date(s), location(s), habitat description, and any corrective measures taken to protect the species found. The biologist shall be required to report any take to the Service immediately by telephone at (916) 414-6600 and by electronic mail or written letter addressed to the Deputy Assistant Field Supervisor, 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.

j. Erosion control structures will be installed concurrently with construction. Erosion control structures will be constructed so runoff will be directed away from sensitive habitats. Tightly woven fiber netting (mesh size less than 0.25 inch) or similar material shall be used for erosion control or other purposes at the project site to ensure giant garter snakes and other reptiles or amphibians are not trapped by the erosion control material. This limitation will be communicated to the contractor through use of Special Provisions included in the bid solicitation package. Coconut coir matting is an acceptable erosion control material. No plastic mono-filament matting shall be used for erosion control. The edge of the material shall be buried in the ground to prevent giant garter snakes and other reptiles and amphibians from crawling underneath the material. Erosion control measures shall direct water flow into existing drainages or disperse water across vegetated areas in order to avoid concentrating water.

k. Movement of heavy equipment to and from the project site shall be restricted to established roadways to minimize habitat disturbance. Stockpiling of construction materials, including portable equipment, vehicles, and supplies, shall be restricted to the designated construction staging area and exclusive of aquatic habitat avoidance areas. Aquatic snake habitat adjacent to the project area shall be flagged and avoided by all construction personnel.
l. 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.

m. High visibility fencing shall be placed to prevent encroachment of construction personnel and equipment into areas containing snake habitat. The fencing shall be inspected before the start of each work day and maintained by the project proponents until completion of the project. The fencing may be removed only when the construction of the project is completed.

n. After completion of construction activities, any temporary fill and construction debris shall be removed. As described in the biological assessment and the project description of this biological opinion, the project proponents will restore all snake habitat subject to temporary ground disturbances, including storage and staging areas and temporary roads. These areas shall be re-contoured, if appropriate, and re-vegetated with appropriate locally-collected native plant species to promote restoration of the area to pre-project conditions. All temporary fill and construction debris shall be removed. An area subject to “temporary” disturbance includes any area that is disturbed during the project, but that, after project completion, will not be subject to further disturbance and has the potential to be re-vegetated. Appropriate methods and plant species used to re-vegetate such areas will be determined on a site-specific basis in consultation with the Service and the CDFG. Restoration work may include replanting emergent vegetation. Refer to the Service’s Guidelines for the Restoration and/or Replacement of Giant Garter Snake Habitat. A written report shall be submitted to the Service within ten (10) working days of the completion of construction at the project site.

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

p. Prior to construction on May 1, 2009, the Corps and SAFCA will have the following documents completed and approved by the Service:

- drainage easement language for the GGS/Drainage Canal;
- Mitigation and Monitoring Plan and Long-Term Management Plan;
- encumbrances on a portion of the District Assessment Fee; and
- contract with NCMWC to provide reliable water for the GGS/Drainage Canal and managed marsh.

3. The following terms and conditions implement reasonable and prudent measure three (3):

a. The procedures outlined in the Service’s Conservation Guidelines for the Valley Elderberry Longhorn Beetle dated July 9, 1999, shall be followed for all actions
related to the proposed project.

b. Elderberry shrubs will be fenced with high visibility construction fencing. In areas where the typical 20-foot buffer from the dripline of the elderberry shrub is encroached on, the fencing will be placed as far from the elderberry shrub's dripline as construction activities will allow.

c. 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.

d. Compensation plantings shall occur within the same year as the transplantation of the elderberry shrubs. The selection of the final compensation site for elderberry shrubs shall be coordinated with the Service. A Service reviewed plan for the long term maintenance and monitoring of the elderberry compensation site shall be completed prior to transplantation.

Reporting Requirements

A post-construction compliance report prepared by the monitoring biologists must be submitted to the Chief of the Endangered Species Division (Central Valley) 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 giant garter snake, 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 biological opinion. The 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 is, Chief of the Endangered Species Division (Central Valley) 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
CONSERVATION RECOMMENDATIONS

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

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

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 giant garter snake.

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

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. 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 biological opinion on the Natomas Landside Improvements Project, please contact Jennifer Hobbs at (916) 414-6541 or Jana Milliken, Sacramento Valley Branch Chief.

Sincerely,

Ken Sanchez
Acting Field Supervisor

cc:
Elizabeth Holland, Corps, Sacramento, CA
Todd Gardner, CDFG, Sacramento, CA
Peter Buck, SAFCA, Sacramento, CA
Kelly Fitzgerald, EDAW, Sacramento, CA
Literature Cited


California Natural Diversity Database (CNDDB). 2005. Natural Heritage Division, California Department of Fish and Game, Sacramento, California.

______. 2007. RareFind 3. California Department of Fish and Game, Natural Heritage Division, Sacramento, California.


———. 2005. Giant garter snake surveys at some areas of historic occupation in the Grassland Ecological Area, Merced County and Mendota Wildlife Area, Fresno County, California. California Department of Fish and Game 91(4):255-269.


Control Agency.


Mr. Francis C. Piccola

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PERSONAL COMMUNICATIONS


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

Date: November 6, 2008
To: Todd Gardner, CDFG
From: Ann Chrisney, EDAW
Subject: Effects of Natomas Levee Improvement Program activities on Swainson’s hawk foraging and nesting habitat

Distribution: Elizabeth Holland, Kate Dadey—USACE
Jennifer Hobbs—USFWS
Peter Buck, John Bassett—SAFCA
Mike Eng, Kelly Holland, Steve Chainey—EDAW

Dear Mr. Gardner,

The purpose of this memo is to present an analysis of the effects of the Natomas Levee Improvements Program’s (NLIP) Landside Improvements Project (project) on the Swainson’s hawk (Buteo swainsonii) in the Natomas Basin. The project would result in permanent loss and temporary disturbance of Swainson’s hawk foraging and nesting habitat. However, the project also includes components that would result in creation and/or preservation of native perennial and annual grasslands, croplands, and woodlands, which are anticipated to provide suitable foraging and nesting habitat for this species. Tables 1 and 2 below summarize the changes in Swainson’s hawk habitat in the Natomas Basin that would result from project implementation. The land cover types that would be affected by the project are depicted in the attached figure.

The project area is within a densely populated and important component of the Central Valley Swainson’s hawk population. Nesting pairs in the Natomas Basin may represent as much as 10% of the Swainson’s hawks that are found in the Central Valley. Most nest sites are located in the western portion of the basin along the Sacramento River; several nests are also typically scattered along the Natomas Cross Canal (NCC) and Pleasant Grove Creek Canal (PGCC). Nesting habitat includes riparian and non-riparian woodlands. In addition to these nest sites that are adjacent to the project area, there are agricultural fields and grassland habitats (including levee and canal maintenance zones) throughout the project area that provide suitable foraging habitat for Swainson’s hawk.
Table 1.
Permanent Effects of the Project on Swainson’s Hawk Foraging Habitat

<table>
<thead>
<tr>
<th></th>
<th>Impacted Cropland (in acres)</th>
<th>Created/Preserved Cropland (in acres)</th>
<th>Net Cropland (in acres)</th>
<th>Impacted Grassland (in acres)</th>
<th>Created Grassland (in acres)</th>
<th>Net Grassland (in acres)</th>
<th>Total Loss (in acres)</th>
<th>Total Increase (in acres)</th>
<th>Total Net (in acres)</th>
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<td>233</td>
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</table>

Table 2
Permanent Effects of the Project on Swainson’s Hawk Nesting Habitat

<table>
<thead>
<tr>
<th></th>
<th>Impacted Woodlands (in acres)</th>
<th>Created/Preserved Woodlands (in acres)</th>
<th>Net Woodlands (in acres)</th>
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</thead>
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<td></td>
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<td>58</td>
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</table>

The conversion of foraging and nesting habitat for Swainson’s hawk would result from construction of levees, berms, and operation, maintenance and utility corridors along the Sacramento River east levee (SREL), NCC south levee, PGCC and Natomas East Main Drainage Canal (NEMDC) west levees, the construction of the new GGS/Drainage and realigned Elkhorn and Riverside Canals, and the creation of woodland corridors. These activities will also affect some land types that do not support foraging or nesting habitat for Swainson’s hawks, including developed areas, orchards, rice crops, and irrigation canals and drainage ditches. However the majority of the land cover type conversion is from crops to grasslands. The project’s conservation strategy would offset impacts to foraging and nesting habitat through the preservation of approximately 150 acres of high quality foraging habitat (including field crops which have an alfalfa crop rotation), the creation of 60 acres of fallow agricultural land, the creation of 840 acres of native perennial and annual grasslands, and the creation of 125 acres and preservation of 10-20 acres of woodland along the landside of the SREL.

Alfalfa and other irrigated field crops can generally provide higher quality foraging habitat than uncultivated annual grasslands and ruderal areas due to prey abundance and availability. The crops can provide abundant cover and food for prey populations. Periodic disturbances such as harvesting, tilling and flooding can increase prey availability. Certain crops provide better foraging than others due to crop height and the frequency of the disturbance regime. Generally, alfalfa crops are considered the highest value foraging habitat for Swainson’s hawk. Next in order of preference is grass hay, fallow crops, row and grain crops, and finally annual grasslands (Estep 2007, Woodbridge 1998).
Alfalfa crops are typically managed by rotating in other crops such as tomatoes or beets or allowing the field to fallow in some years. Although agricultural crops provide higher quality foraging habitat for Swainson’s hawks at particular times in the cultivation cycle, grassland habitat also provides valuable foraging habitat because its availability is consistent throughout the entire period when Swainson’s hawks are present in the Natomas Basin. However, the value of common annual grassland may be less than that of the high-quality agricultural crops, such as alfalfa, at their peak of foraging quality (i.e., during irrigation and harvest). The value of native perennial grasslands as a source of forage for Swainson’s hawks has not been researched or well documented, although it likely exceeds the value of non-native annual grassland or other ruderal vegetation types.

**Summary of Effects on Swainson’s Hawk Habitat**

The total amount of foraging habitat being affected (819 acres) is less than the amount of foraging habitat being created (1,052 acres). However, the composition of the foraging habitat is changing from croplands to grasslands. Approximately 74% of the croplands and annual grasslands being affected would be converted to or reclaimed as native perennial grasslands; the remainder would be converted into woodlands and aquatic habitat. Of the 552 acres of croplands being impacted, about 32% (approximately 174 acres) are high quality foraging habitat. The other crop types being affected, in order of foraging value, include grass hay (18%), fallow crops (20%), and row and grain crops (30%).

The borrow sites used for this project would be temporarily affected by project activities and then returned to their prior conditions within approximately 2 years. The estimated acres of foraging habitat that would be temporarily affected in all borrow sites for Phases 2, 3, and 4 are 764, 460, and 286 acres, respectively. The majority of these affected acres are fallow crops (64%) with croplands and annual grasslands accounting for 21% and 15% of the acreage, respectively. Some of these borrow sites have been identified for field crop preservation to offset the impacts to foraging habitat.

The Sacramento Area Flood Control Agency (SAFCA) would create and/or preserve in perpetuity approximately 150 acres of high quality foraging habitat (e.g., field crops which include an alfalfa rotation) to mitigate for the permanent loss of this foraging habitat. This would be achieved primarily by acquiring, reclaiming, and preserving land utilized for borrow material. Sites being considered for this mitigation include the South Sutter (Thornton), Bianchi, and Novak borrow sites and approximately 14 acres of private land acquired in Reach 2 of the SREL.

The majority of grasslands being affected by this project are mostly non-native annual grasslands and ruderal areas. New grasslands would be created along new or realigned levee slopes and canal berms by drill seeding with native perennial grasses. They would be managed by mowing or grazing with an emphasis on creating appropriate stubble height to optimize the value of these areas for foraging hawks to the extent possible. These perennial grasslands would provide foraging habitat of moderate quality. The priority for levee maintenance is flood control which may constrain the management of grasslands on levee slopes as optimal foraging habitat.

Approximately 82 acres of landside woodlands would be impacted by project implementation. These impacts to landside woodlands may result in a reduction of potential resting and perching habitat for the Swainson’s hawk in the basin. To mitigate the loss of potential nesting habitat in landside woodlands, the proposed project includes planting a series of woodland corridors and larger woodland nodes alongside existing woodland habitats and preserving them. In areas where trees will be removed within the SREL footprint, a number of existing trees, especially valley oaks under 8”-10’ dbh, will be transplanted into the new woodland corridors.
Phase 2

In Phase 2, the loss of croplands (84 acres) and increase in grasslands (164 acres) would result in an increase of 80 acres of foraging habitat. However, the composition of this habitat would shift from 61% croplands to 67% grasslands, leading to a decrease in the quality of foraging habitat for the Swainson's hawk. Approximately 90 acres (40%) of the total croplands being impacted are considered high quality foraging habitat. The loss of high quality foraging habitat could force hawks to forage further from the nest or increase competition for prey with other hawks in the area. To offset impacts on this high quality foraging habitat, SAFCA would preserve approximately 90 acres of land in high quality foraging habitat within reclaimed borrow sites. This would reduce the impact to foraging habitat by ensuring preservation of field crops with the highest foraging value. The loss of croplands in Phase 2 represents approximately 1% of the total estimated agricultural lands in the basin and, therefore, is not considered a substantial reduction of foraging habitat in the basin overall.

The vast majority of Swainson's hawk nests in the basin are within the mature riparian forest along the waterside of Sacramento River levees. The design of the adjacent setback levee for the SREL avoids the need to remove waterside forest, which would otherwise be removed if the levee were being rebuilt and upgraded in place. The woodlands being affected in Phase 2 of the project are along the landside of the SREL where no nests have been documented since 2001. Nests that have been documented on the landside of the east levee are within substantial riparian corridors along ditches, sloughs, and canals towards the interior of the basin.

Approximately 17 acres of woodlands would be affected and 63 acres of woodlands created and/or preserved during Phase 2 of the project, resulting in a net increase of 46 acres of potential nesting habitat. There would be a temporal loss of the 17 acres of woodlands in the project area as the replacement plantings mature to provide potential nesting habitat within 10 to 15 years. This temporal loss represents a small proportion (2.6%, not including existing forest on the SREL) of the available nesting habitat in the basin. Trees are expected to be removed this winter (2008/2009) from within the project footprint in Reaches 1-4B of the SREL and along the new GGS/Drainage and relocated Elkhorn Canal alignments.

The woodland mitigation plan includes transplanting suitable trees from the project footprint where feasible as well as planting a variety of native tree species that could become potential nesting habitat for Swainson's hawks. Approximately 27 acres will be planted in two areas in Reaches 1 and 4A of the SREL. These planting areas would accommodate over 5,000 new plants, seed mix, and tree transplants. Ultimately, the planting of woodland corridors in Phase 2 of the project would increase potential nesting habitat by 7% in the basin. Because of the relatively small temporal loss of potential nesting trees and the ultimate net increase in potential nesting habitat, Phase 2 of the project would not have a substantial effect on the ability of Swainson's hawks to nest in the basin.

Project construction during the proposed project would occur during the Swainson's hawk nesting season and could result in disruption of nesting behavior. If project construction is already underway when pairs return to their nesting territories, project activity could render previously occupied territories unsuitable. If active nests are present near construction areas when construction begins, the nesting pairs could be disturbed potentially resulting in nest abandonment and loss of eggs or young. Various conservation measures would be implemented to avoid and minimize take of Swainson's hawks. These measures include conducting surveys of Swainson's hawk nests before and during construction to identify active nests in the vicinity of project activities, and establishing and maintaining buffers around the nests, in coordination with the California Department of Fish and Game (DFG), so that project activity does not result in detectable adverse effects on active nests.
Summary of Phases 2, 3, and 4

The loss of 340 acres of croplands and the creation of 573 acres of annual and native perennial grasslands for all phases of the project would result in a net increase of 233 acres of foraging habitat in the project area. However, the composition of foraging habitat across the entire project footprint would shift from 69% croplands to 82% grasslands, which may decrease the quality of foraging habitat for Swainson’s hawks. The majority of the high quality foraging habitat being converted (174 acres of alfalfa) would be partially offset by preserving 150 acres of alfalfa within sites used for borrow material extraction. Therefore, the net loss of alfalfa crops in the basin would be reduced to 24 acres, or approximately 2% of the estimated alfalfa in the basin. The amount of all crop types being converted is approximately 4% of the total croplands within the basin. In addition project activities would affect 82 acres of nesting habitat and create and/or preserve 140 acres of nesting habitat resulting in a net increase of 58 acres of potential nesting habitat for Swainson’s hawks.

The main impact to foraging habitat from the proposed project is a conversion from higher quality croplands to lower quality grasslands. This impact would be offset by a net increase of 233 acres of annual and native perennial grassland foraging habitat, the creation or preservation of high quality foraging habitat by preserving specific crop types (i.e., crop rotations including alfalfa) in reclaimed borrow areas, and the small amount (4%) of cropland foraging habitat being impacted in the basin overall. Although a detailed plan has not yet been prepared specifying how the grasslands would be managed to ensure that the appropriate habitat conditions are provided, a long term management plan for created grasslands and preserved field crops is currently in preparation. Creation of replacement habitat that does not provide the essential components (e.g., an adequate prey base or adequate nesting habitat) and is not managed in a way that maximizes habitat quality could result in a substantial adverse effect on the species, which would be a significant impact.

While there would be a temporal loss of 63 acres of nesting habitat until the created woodland corridors mature, the planted woodlands planted will ultimately increase potential nesting habitat in the basin by 13%.

Further Mitigation Measures

In addition to the measures described above, SAFCA and its primary contractors for engineering design and construction shall implement the following measures to avoid and minimize potential project effects on Swainson’s hawks:

- The primary engineering and construction contractors shall ensure, through coordination with a qualified biologist retained by SAFCA, that staging areas, construction sequence, and access routes are designed to minimize disturbance of known Swainson’s hawk nesting territories. The biologist shall conduct preconstruction surveys to identify active nests within 0.25 mile of construction areas, in accordance with DFG guidelines. Surveys shall be conducted in accordance with the Natoma Basin Habitat Conservation Plan (City of Sacramento et al. 2003) requirements and Recommended Timing and Methodology for Swainson’s Hawk Nesting Surveys In California’s Central Valley (Swainson’s Hawk Technical Advisory Committee 2000). If an active nest is found, an appropriate buffer that minimizes the potential for disturbance of the nest shall be determined by the biologist, in coordination with DFG. No project activities shall commence within the buffer area until a qualified biologist confirms that the nest is no longer active or the birds are not dependent on it. Monitoring shall be conducted by a qualified biologist to determine whether project activity results in detectable adverse effects on the nesting pair or their young. The size of the buffer may vary, depending on the nest location, nest stage, construction activity, and monitoring results. If implementation of the buffer becomes
infeasible or construction activities result in an unanticipated nest disturbance, DFG shall be consulted to determine the appropriate course of action.

- SAFCA shall develop and implement a plan to address management of grassland habitats that are created as part of the proposed project in order to ensure that the performance standard of no net loss of sensitive habitat is met. The management plan shall, at a minimum, establish specific success criteria for habitat creation, specify remedial measures to be undertaken if success criteria are not met (e.g., supplementary plantings and additional monitoring), and describe short- and long-term maintenance and management of the features. Long-term protection of the created features and funding for their management shall be provided through appropriate mechanisms to be determined by SAFCA, DFG, and other entities cooperating in implementation of the proposed project.

References:


Estep, Jim. Personal communication with Leo Edson and Anne King on July 20, and August 16, 2007.


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Footnotes: 1-Acreages of impacted habitat are based on the most of temporary impacts to Elkorn Canal; 4-Includes levee slopes in expanded levee footprint, as well as associated uplands along nan
### Land Cover Changes for Construction Phase 3 of the NIP Landslide Improvements Project

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#### Sacramento River East Levee Improvements (Reaches 5A-9B)

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#### Sacramento River East Levee, Phase 4 Cattle Removal (Reaches 10-12A)

| Subtotal          | 0.00                                  | 0.00  |

#### Pleasant Grove Creek Canal West Levee Improvements

| Subtotal          | 2.04                                  | 15.31 |

#### Nearman East Main Drain Canal West Levee Improvements (Elkhorn Rd-Northgate Rd.)

| Subtotal          | 2.38                                  | 15.38 |

#### Canals

| Elkhorn          | 0.23                                  | 0.73  | 8.33  | 1.01 |
| GS/CRE/Scavenge  | 0.10                                  | 31.22 | 0.50  | 0.62 |
| Subtotal          | 0.23                                  | 0.71  | 38.55 | 1.01 |

#### RD 1000 Pump Plant Z

| Subtotal          | 0.00                                  | 1.24  | 0.52  | 0.22 |
| VR/NDU/LNUN      | 0.00                                  | 4.34  | 0.00  | 0.47 |
| Subtotal          | 0.00                                  | 4.34  | 0.00  | 0.47 |

#### Airport West Ditch

| Subtotal          | 0.00                                  | 1.24  | 0.52  | 0.22 |
| VR/NDU/LNUN      | 0.00                                  | 4.34  | 0.00  | 0.47 |
| Subtotal          | 0.00                                  | 4.34  | 0.00  | 0.47 |

**Footnotes:** 1-Acreages of impacted habitat are based on the most recently available Jones & Malpas NHBIP Habitat Maps (2008); 2-Includes Garden Highway, roadway realignment and other non-road control structures; 3-Includes 90.76 acres of temporary impoundments; 4-Includes 5.31 acres of temporary impoundments in Elkhorn Canal and <1 acre of impacts to the waterside of PGCC; 5-Includes levee slopes in expanded levee footprint, as well as associated spoilbanks along new canals; 6-Total woodland loss is expected to be less as the utility corridor is being designed to avoid woodlands, as feasible; 7-Total woodland removal is expected to be less as the Phase 4 footprint is refined and woodlands are identified for avoidance and/or preservation.
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Footnotes: 1 Acres of impacted habitat are based on the most recently available Jones & Stokes NRHCP Habitat Maps (2008); 2-Includes Garden Highway, roadway realignment and other non-flood control structures; 3-Includes temporary impacts (21.0 acres in Phase 2, 35.76 in Phase 3, and 0.85 acres in Phase 4); 4- Includes temporary impacts (0.52 acres in Phase 2, 5.61 acres in Phase 3, and 4.13 acres in Phase 4); 5-Includes levee slopes in expanded levee footprint, as well as associated uplands along new canals; 6-Total woodland loss is expected to be less as the utility corridor is being designed to avoid woodlands, as feasible; 7- Includes 20 acres of tidal salt marshes (located in Reach 10-12A) that are removed during the Phase 3 project.
APPENDIX E
Woodland Plans and Specification Examples
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**LAVINIA - WOODLAND PLANTING AREA**

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**YEAR 3 PLANTING AREA**

"Proposed plants for areas that are shown after 2 years to be field approved by agency.

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*P.L. = PURE LIVE SEED; *S.P. = SEEDING PLACEMENT X PERCENT PURITY ON
REQUEST FOR PROPOSAL

Site Preparation Services &
Native Grass Drill Seeding (optional)

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<tr>
<td></td>
<td>Senior Natural Resource Specialist</td>
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<tr>
<td></td>
<td>Sacramento Area Flood Control Agency</td>
</tr>
<tr>
<td></td>
<td>1007 7th Street, 7th Floor</td>
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<td></td>
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| Submittal Contents:             | Written Proposal (3 copies)   |
|                                 | Sealed Cost Proposal (3 copies) |
|                                 | Electronic copy (to L. Crosbie – see email below) |

Questions regarding the content of this RFP should be directed in writing to: Lizette Crosbie, Senior Natural Resource Specialist at crosbiel@saccounty.net.

1.0 GENERAL INFORMATION

1.1 DESCRIPTION

The Sacramento Area Flood Control Agency (SAFCA) seeks an experienced Contractor to provide on-call mechanical site preparation services throughout Sacramento and Sutter County, California (Figure 1). Activities would include preparing sites for various restoration activities through mowing, discing, broad-leaf herbicide treatments and native grass drill seeding. These actions would be conducted on various sites within the Natomas Basin, south to South Sacramento and east to the Folsom Dam, as needed. SAFCA is including native grass drill seeding as an optional task for bidding purposes.

1.2 CONTRACTOR QUALIFICATIONS

The Contractor must have a minimum of 5 years operational experience as a company in site preparation activities for projects of similar scope and magnitude. At least one full-time restoration biologist must be employed by the Contractor during the duration of this contract. The Contractor shall be required to submit verification of staff and company qualifications for approval by SAFCA at the time of proposal submittal.
1.3 PRE-PROPOSAL SITE INSPECTION

It is mandatory that the Contractor attend a pre-proposal site walk to become familiar with various conditions and requirements for this project. This will occur on Sept. 16, 2008 at 1:00 pm. We will meet in the Natoma Basin near the intersection of Garden Highway and Riego Road. From Garden Highway, head east on Riego Road, turn right on Rio Ramaza Drive, turn right toward the fields (Figure 2). We shall do a short briefing here and travel to several locations in the northern Sacramento area. We are planning to conclude the trip by 4:00 pm.

1.4 QUALITY ASSURANCE

A qualified biologist (monitor) will be provided by SAFCA and will oversee the Contractor’s activities. Any unacceptable actions shall be immediately corrected according to SAFCA’s direction and at the Contractor’s expense.

1.5 CONDITIONS

The Contractor shall be responsible for coordinating and scheduling the delivery of the equipment and material to the project site for all work activities. Onsite storage of any materials or equipment requires prior written authorization by SAFCA.

1.6 MEASUREMENT AND BASIS FOR PAYMENT

Payment shall be made at the respective unit price, and shall be in full compensation for all labor, materials, and costs associated with the maintenance actions as directed by SAFCA. Prevailing wage law will apply.

2.0 SCOPE OF WORK

2.1 MOWING

Due to the condition of some sites, it may be necessary to mow areas to control invasive and noxious plants. The areas to be mowed shall vary in size. Please provide a quote on a per acre basis for the acreage ranges as follows:
- 1-25 acres
- 26-75 acres
- 75+ acres

2.2 BRUSH CLEARING

Due to the condition of some sites some may require clearing of brush and trees up to four inches in diameter. The areas to be brush cleared shall vary in size. Please provide a quote on a per acre basis for the acreage ranges as follows:
- 1-25 acres
- 26-75 acres
- 75+ acres
2.3 SOIL PREPARATION (Discing)

Due to the condition of some sites, it may be necessary to prepare the surface of the soil using a disc harrow. The areas to be harrowed shall vary in size. Please provide a quote on a per acre basis for the acreage ranges as follows:

- 1-25 acres
- 26-75 acres
- 75+ acres

2.4 BROAD-LEAF HERBICIDE APPLICATIONS

2.4.1 Certification

Prior to any herbicide application on behalf of SAFCA, the Contractor must supply SAFCA with a valid California ‘Qualified Applicator License’ of the person(s) performing and supervising herbicide applications as well as the business’s ‘Pest Control Business License’. Also, a copy of a record of completion of California mandatory continuing education requirements of the person(s) qualified to apply herbicides shall be furnished to SAFCA’s Natural Resource team.

2.4.2 Site Evaluation and Recommendation

Prior to any herbicide application, the Contractor must obtain a PCA (Pest Control Advisor) recommendation for each site. This written recommendation must be provided to and approved by SAFCA staff. The Contractor will be responsible for visiting each site with a SAFCA approved biologist, and the PCA if requested, to assess the current condition of the vegetation. This shall include an assessment of the species, general locations and densities of plants. The Contractor must understand the goals of each site and the characteristics of the desirable species in order to conduct proper treatments.

2.4.3 Notification and Application

The Contractor must carefully follow the guidelines on the pesticide label and on SAFCA’s pesticide use policy (see Attachment A).

The areas to be herbicide treated shall vary in size. Please provide a quote on a per acre basis for the acreage ranges as follows:

- 1-25 acres
- 26-75 acres
- 75+ acres
2.5 NATIVE GRASS DRILL SEEDING (OPTIONAL)

Planting shall consist of drill seeding native grasses using a Truax Range Drill. The composition of native grasses may vary according to site and could include, but not be limited to, the following:
- *Leymus triticoides* / Creeping Wildrye
- *Hordeum brachyantherum* / Meadow Barley
- *Nassella pulchra* / Purple Needlegrass
- *Nassella cernua* / Nodding Needlegrass
- *Elymus trachycaulus* / Slender Wheatgrass
- *Elymus glaucus* / Blue Wildrye

The areas to be seeded shall vary in size. Please provide a quote on a per acre basis for the acreage ranges as follows:
- 1-25 acres
- 26-75 acres
- .75+ acres

The success criteria for the drill seeding component of the project are as follows:
- Within 6 months:
  - >50-75% absolute cover of native herbaceous species;
  - <1% cover of invasive species (e.g., all thistles, knapweed, medusahead);
  - <25% cover of other nonnative herbaceous species.
- Within 18 months:
  - >75-90% absolute cover of native herbaceous species;
  - <1% cover of invasive species (as noted above);
  - <10% cover of other nonnative herbaceous species.
- Within 30 months:
  - >80-90% absolute cover of native herbaceous species;
  - <1% cover of invasive species (as noted above);
  - <10% cover of other nonnative herbaceous species.

2.6 GENERAL SPECIFICATIONS

2.6.1 CLEANUP

The Contractor shall remove all waste material/trash; said materials shall be disposed of, and recycled whenever possible, off-site according to State and local codes and regulations.

2.6.2 TRAFFIC CONTROL

The contractor will take any and all temporary traffic control measures necessary to ensure the safety of their crew and the public, including but not limited to the following:
- Positive protection devices to prevent the intrusion of motorized vehicles into the work space and other hazardous areas of the work zone;
- Exposure control measures to avoid or minimize worker exposure to motorized traffic, and road user exposure to work activities;
- Flagmen and other traffic control measures to reduce work zone crashes; and
- Safe exit and entry of work vehicles into and out of the work area from the travel lanes.
All haul routes and traffic control measures must be approved in writing by SAFCA prior to implementation.

2.6.3 COMMUNICATION

The Contractor shall possess at all times a serviceable telephone or radiotelephone system sufficient to communicate with SAFCA and Sacramento County Park Ranger Dispatch at (916) 875-6672. The communication system shall be in good operating condition, sufficient to provide prompt and reliable communications between the Contractor, SAFCA and the County. This communication system shall be operable continually during Contractor work operations.

2.6.4 FUELS

The Contractor shall adhere to Best Management Practices during work operations (mowing, fueling pumps/vehicles, driving etc.). The Contractor shall take reasonable precautions to prevent spills of petrochemical fuels and is responsible for documenting and notifying SAFCA of any hazardous material spills and any damage to natural resources or property by the Contractor. The Contractor shall remove all used oil filters from the work area and shall prohibit use of glass bottles and jugs in Contractor operations.

2.6.5 FIRE SAFETY

During periods of very high and extreme fire danger, specific equipment and fire precautionary measures are applicable as follows:

- **Codes.** The Contractor shall meet minimum requirements of Sections 4427 and 4428 of the California Public Resources Code (CPRC).
- **Fire Tools.** Fire tools kept at each Work Unit shall be sufficient to equip all employees present. Trucks, tractors, and other vehicles shall be equipped with and carry at all times a size 0 or larger shovel with an overall length of not less than 46 inches, and a 2 ½ pound axe or larger with an overall length of not less than 28 inches.
- **Fire Extinguishers.** The Contractor shall keep onsite, and equip each internal combustion vehicle with a fire extinguisher for oil and grease fires (Class 4-B, C, or larger). As a precautionary measure during mowing activities, the contractor will have a 500 gallon water tank, pump & hose available for backup fire suppression.
- **Spark Arrestors.** The Contractor shall equip all internal combustion engines and other equipment with a spark arrestor, except for motor vehicles equipped with a maintained muffler as defined by CPRC Section 4442 or tractors with exhaust-operated turbochargers. Spark arrestors shall be a model that has been tested and approved under Forest Service Standard 5100-1a (April 1970) and shall be maintained in good operating condition.
- **Power Saws.** Each power saw shall be equipped with a spark arrestor approved according to CPRC Sections 4442 and 4443, which shall be maintained in effective working order. One fire extinguisher meeting specifications of CPRC Section 4431 shall be kept with each operating power saw. A size 0 or larger shovel with an overall length of not less than 46 inches shall be kept with each gas can, but not less than 300 feet from each power saw when used off of cleared areas.
- **Smoking.** The Contractor shall ensure that smoking is prohibited in the work area, or contained within an appropriate smoking area (e.g. inside parked vehicles, in the back of an empty pickup truck, within a cleared staging area). Smoking areas shall be cleared of debris and vegetation. Cigarettes shall be properly extinguished and disposed of offsite.
Attachment A

Pesticide Use Policy
(effective 2/25/2002; modified 8/20/2008)

1. **72 hours Notice of Pesticide Use**
   - Written notice shall be provided to SAFCA’s Natural Resource staff a minimum of 72 hours in advance of all proposed pesticide applications.
   - The Contractor must receive written approval from SAFCA staff prior to all proposed pesticide applications. Depending on the species, location and herbicide suggested, SAFCA may require the Contract obtain a recommendation from a Pest Control Advisor (PCA).

2. **Content of Written Notice of Pesticide Use**
   - Name and license number of certified applicator(s) and parent company;
   - Date, time, and location (site specific) of proposed application;
   - Purpose for proposed application;
   - Pesticide proposed for use;
   - Method of application;
   - Rate and number of application(s) proposed;
   - Safety precautions proposed;
   - Anticipated weather conditions (temp, probability of precipitation, wind);
   - Signage
     - Appropriate signage notifying the public of pesticide will be posted 48 hours prior the initiation of application. Information should include the name of pesticide, date and time of application, reason for application and contact phone number. This signage shall remain posted at the site for 48-hours after the application.

3. **Post Pesticide Use Report**
   - A brief written account shall be supplied to SAFCA’s Natural Resource staff within 48 hours of pesticide application and shall contain the following information:
     - Mitigating circumstances requiring follow-up i.e. additional treatment areas, public usage, spills etc.
     - Actual Weather conditions at time of application (temperature, wind speed)
     - Estimated success of application i.e. Low, moderate, high.
     - Actual quantities of pesticide used.

4. **Certification**
   Prior to any pesticide application on SAFCA property and/or restoration sites:
   - Copy of valid California ‘Qualified Applicators Certificate(s)’ of persons performing and supervising pesticide applications shall be furnished to SAFCA’s Natural Resource staff.
   - Copy of record of completion of California mandatory continuing education requirements of persons qualified to apply pesticides shall be furnished to SAFCA’s Natural Resource staff.
United States Department of the Interior

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

Conservation Guidelines for the
Valley Elderberry Longhorn Beetle
9 July 1999

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

Background Information

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

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

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

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

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

**Avoid and Protect Habitat Whenever Possible**

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

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

Protective Measures

1. Fence and flag all areas to be avoided during construction activities. In areas where encroachment on the 100-foot buffer has been approved by the Service, provide a minimum setback of at least 20 feet from the dripline of each elderberry plant.

2. Brief contractors on the need to avoid damaging the elderberry plants and the possible penalties for not complying with these requirements.

3. Erect signs every 50 feet along the edge of the avoidance area with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be clearly readable from a distance of 20 feet, and must be maintained for the duration of construction.

4. Instruct work crews about the status of the beetle and the need to protect its elderberry host plant.

Restoration and Maintenance

1. Restore any damage done to the buffer area (area within 100 feet of elderberry plants) during construction. Provide erosion control and re-vegetate with appropriate native plants.

2. Buffer areas must continue to be protected after construction from adverse effects of the project. Measures such as fencing, signs, weeding, and trash removal are usually appropriate.

3. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant should be used in the buffer areas, or within 100 feet of any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level.
4. The applicant must provide a written description of how the buffer areas are to be restored, protected, and maintained after construction is completed.

5. Mowing of grasses/ground cover may occur from July through April to reduce fire hazard. No mowing should occur within five (5) feet of elderberry plant stems. Mowing must be done in a manner that avoids damaging plants (e.g., stripping away bark through careless use of mowing/trimming equipment).

Transplant Elderberry Plants That Cannot Be Avoided

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

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

1. Monitor. A qualified biologist (monitor) must be on-site for the duration of the transplanting of the elderberry plants to insure that no unauthorized take of the valley elderberry longhorn beetle occurs. If unauthorized take occurs, the monitor must have the authority to stop work until corrective measures have been completed. The monitor must immediately report any unauthorized take of the beetle or its habitat to the Service and to the California Department of Fish and Game.

2. Timing. Transplant elderberry plants when the plants are dormant, approximately November through the first two weeks in February, after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the plant and increase transplantation success.

3. Transplanting Procedure.

   a. Cut the plant back 3 to 6 feet from the ground or to 50 percent of its height (whichever is taller) by removing branches and stems above this height. The trunk and all stems measuring 1.0 inch or greater in diameter at ground level should be replanted. Any leaves remaining on the plant should be removed.
b. Excavate a hole of adequate size to receive the transplant.

c. Excavate the plant using a Vermeer spade, backhoe, front end loader, or other suitable equipment, taking as much of the root ball as possible, and replant immediately at the conservation area. Move the plant only by the root ball. If the plant is to be moved and transplanted off site, secure the root ball with wire and wrap it with burlap. Dampen the burlap with water, as necessary, to keep the root ball wet. Do not let the roots dry out. Care should be taken to ensure that the soil is not dislodged from around the roots of the transplant. If the site receiving the transplant does not have adequate soil moisture, pre-wet the soil a day or two before transplantation.

d. The planting area must be at least 1,800 square feet for each elderberry transplant. The root ball should be planted so that its top is level with the existing ground. Compact the soil sufficiently so that settlement does not occur. As many as five (5) additional elderberry plantings (cuttings or seedlings) and up to five (5) associated native species plantings (see below) may also be planted within the 1,800 square foot area with the transplant. The transplant and each new planting should have its own watering basin measuring at least three (3) feet in diameter. Watering basins should have a continuous berm measuring approximately eight (8) inches wide at the base and six (6) inches high.

e. Saturate the soil with water. Do not use fertilizers or other supplements or paint the tips of stems with pruning substances, as the effects of these compounds on the beetle are unknown.

f. Monitor to ascertain if additional watering is necessary. If the soil is sandy and well-drained, plants may need to be watered weekly or twice monthly. If the soil is clayey and poorly-drained, it may not be necessary to water after the initial saturation. However, most transplants require watering through the first summer. A drip watering system and timer is ideal. However, in situations where this is not possible, a water truck or other apparatus may be used.

Plant Additional Seedlings or Cuttings

Each elderberry stem measuring 1.0 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted or destroyed) must be replaced, in the conservation area, with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). Minimization ratios are listed and explained in Table 1. Stock of either seedlings or cuttings should be obtained from local sources. Cuttings may be obtained from the plants to be transplanted if the project site is in the vicinity of the conservation area. If the Service determines that the elderberry plants on the proposed project site are unsuitable candidates for
transplanting, the Service may allow the applicant to plant seedlings or cuttings at higher than the stated ratios in Table 1 for each elderberry plant that cannot be transplanted.

Plant Associated Native Species

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

Examples

Example 1
The project will adversely affect beetle habitat on a vacant lot on the land side of a river levee. This levee now separates beetle habitat on the vacant lot from extant Great Valley Mixed Riparian Forest (Holland 1986) adjacent to the river. However, it is clear that the beetle habitat located on the vacant lot was part of a more extensive mixed riparian forest ecosystem extending farther from the river’s edge prior to agricultural development and levee construction. Therefore, the beetle habitat on site is considered riparian. A total of two elderberry plants with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The two plants have a total of 15 stems measuring over 1.0 inch. No exit holes were found on either plant. Ten of the stems are between 1.0 and 3.0 inches in diameter and five of the stems are greater than 5.0 inches in diameter. The conservation area is suited for riparian forest habitat. Associated natives adjacent to the conservation area are box elder (Acer negundo californica), walnut (Juglans californica var. hindsii), sycamore (Platanus racemosa), cottonwood (Populus fremontii), willow (Salix gooddingii and S. laevigata), white alder (Alnus rhombifolia), ash (Fraxinus latifolia), button willow (Cephalanthus occidentalis), and wild grape (Vitis californica).
Conservation Guidelines for the Valley Elderberry Longhorn Beetle

Minimization (based on ratios in Table 1):

- Transplant the two elderberry plants that will be affected to the conservation area.

- Plant 40 elderberry rooted cuttings (10 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)

- Plant 40 associated native species (ratio of associated natives to elderberry plantings is 1:1 in areas with no exit holes):
  - 5 saplings each of box elder, sycamore, and cottonwood
  - 5 willow seedlings
  - 5 white alder seedlings
  - 5 saplings each of walnut and ash
  - 3 California button willow
  - 2 wild grape vines
  - Total: 40 associated native species

- Total area required is a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. Since, a total of 80 plants must be planted (40 elderberries and 40 associated natives), a total of 0.33 acre (14,400 square feet) will be required for conservation plantings. The conservation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period.

Example 2
The project will adversely affect beetle habitat in Blue Oak Woodland (Holland 1986). One elderberry plant with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The plant has a total of 10 stems measuring over 1.0 inch. Exit holes were found on the plant. Five of the stems are between 1.0 and 3.0 inches in diameter and five of the stems are between 3.0 and 5.0 inches in diameter. The conservation area is suited for elderberry savanna (non-riparian habitat). Associated natives adjacent to the conservation area are willow (Salix species), blue oak (Quercus douglasii), interior live oak (Q. wislizenii), sycamore, poison oak (Toxicodendron diversilobum), and wild grape.

Minimization (based on ratios in Table 1):

- Transplant the one elderberry plant that will be affected to the conservation area.

- Plant 30 elderberry seedlings (5 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)
Conservation Guidelines for the Valley Elderberry Longhorn Beetle

- Plant 60 associated native species (ratio of associated natives to elderberry plantings is 2:1 in areas with exit holes):
  
  20 saplings of blue oak, 20 saplings of sycamore, and 20 saplings of willow, and seed and plant with a mixture of native grasses and forbs

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

Conservation Area—Provide Habitat for the Beetle in Perpetuity

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

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

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

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

Depending on adjacent land use, a buffer area may also be needed between the conservation area and the adjacent lands. For example, herbicides and pesticides are
Conservation Guidelines for the Valley Elderberry Longhorn Beetle

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

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

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

3. Weed Control. Weeds and other plants that are not native to the conservation area must be removed at least once a year, or at the discretion of the Service and the California Department of Fish and Game. Mechanical means should be used; herbicides are prohibited unless approved by the Service.

4. Pesticide and Toxicant Control. Measures must be taken to insure that no pesticides, herbicides, fertilizers, or other chemical agents enter the conservation area. No spraying of these agents must be done within one 100 feet of the area, or if they have the potential to drift, flow, or be washed into the area in the opinion of biologists or law enforcement personnel from the Service or the California Department of Fish and Game.

5. Litter Control. No dumping of trash or other material may occur within the conservation area. Any trash or other foreign material found deposited within the conservation area must be removed within 10 working days of discovery.

6. Fencing. Permanent fencing must be placed completely around the conservation area to prevent unauthorized entry by off-road vehicles, equestrians, and other parties that might damage or destroy the habitat of the beetle, unless approved by the Service. The applicant must receive written approval from the Service that the fencing is acceptable prior to initiation of the conservation program. The fence must be maintained in perpetuity, and must be repaired/replaced within 10 working days if it is found to be damaged. Some conservation areas may be made available to the public for appropriate recreational and educational opportunities with written approval from the Service.
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these cases appropriate fencing and signs informing the public of the beetle’s threatened status and its natural history and ecology should be used and maintained in perpetuity.

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

Monitoring

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

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

1. A population census of the adult beetles, including the number of beetles observed, their condition, behavior, and their precise locations. Visual counts must be used; mark-recapture or other methods involving handling or harassment must not be used.

2. A census of beetle exit holes in elderberry stems, noting their precise locations and estimated ages.

3. An evaluation of the elderberry plants and associated native plants on the site, and on the conservation area, if disjunct, including the number of plants, their size and condition.

4. An evaluation of the adequacy of the fencing, signs, and weed control efforts in the avoidance and conservation areas.
5. A general assessment of the habitat, including any real or potential threats to the beetle and its host plants, such as erosion, fire, excessive grazing, off-road vehicle use, vandalism, excessive weed growth, etc.

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

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

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

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

Success Criteria

A minimum survival rate of at least 60 percent of the elderberry plants and 60 percent of the associated native plants must be maintained throughout the monitoring period. Within one year of discovery that survival has dropped below 60 percent, the applicant must replace failed plantings to bring survival above this level. The Service will make any determination as to the
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applicant's replacement responsibilities arising from circumstances beyond its control, such as plants damaged or killed as a result of severe flooding or vandalism.

Service Contact

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

U.S. Fish and Wildlife Service
Ecological Services
2800 Cottage Way, W-2605
Sacramento, CA 95825
Conservation Guidelines for the Valley Elderberry Longhorn Beetle

Figure 1: Range of the Valley Elderberry Longhorn Beetle
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Literature Cited


USFWS. 1980. Listing the valley elderberry longhorn beetle as a threatened species with critical habitat. Federal Register 45:52803-52807.

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

<table>
<thead>
<tr>
<th>Location</th>
<th>Stems (maximum diameter at ground level)</th>
<th>Exit Holes on Shrub Y/N (quantify)(^1)</th>
<th>Elderberry Seeding Ratio(^2)</th>
<th>Associated Native Plant Ratio(^3)</th>
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</thead>
<tbody>
<tr>
<td>non-riparian</td>
<td>stems (&gt; = 1'' &amp; = &lt; 3'')</td>
<td>No: 1:1</td>
<td>Yes: 2:1</td>
<td>1:1</td>
</tr>
<tr>
<td>non-riparian</td>
<td>stems (&gt; 3'' &amp; &lt; 5'')</td>
<td>No: 2:1</td>
<td>Yes: 4:1</td>
<td>2:1</td>
</tr>
<tr>
<td>non-riparian</td>
<td>stems (\geq 5'')</td>
<td>No: 3:1</td>
<td>Yes: 6:1</td>
<td>2:1</td>
</tr>
<tr>
<td>riparian</td>
<td>stems (&gt; = 1'' &amp; = &lt; 3'')</td>
<td>No: 2:1</td>
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<td>Yes: 8:1</td>
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\(^1\) All stems measuring one inch or greater in diameter at ground level on a single shrub are considered occupied when exit holes are present anywhere on the shrub.

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

\(^3\) Ratios in the Associated Native Plant Ratio column correspond to the number of associated native species to be planted per elderberry (seeding or cutting) planted.
Memorandum – Natomas Levee Improvement Program, Phase II

Date: January 28, 2009
To: John A. Bassett/Sacramento Area Flood Control Agency
From: Steve Chainey and Mike Eng/EDAW
Subject: DRAFT Property Analysis Record for the GGS/Drainage Canal Associated with Phase II of the Natomas Levee Improvement Program

Distribution: Ellen Martin/Economic Planning Systems, Kate Dadey/USACE, Project File

As requested by the United States Army Corps of Engineers (USACE), EDAW prepared a DRAFT Property Analysis Record (PAR) for the giant garter snake (*Thamnophis gigas couchi*) mitigation canal (GGS/Drainage Canal) associated with Phase II of the Natomas Levee Improvement Program (NLIP). The portion of the GGS/Drainage Canal associated with Phase II of the NLIP will extend approximately 11,800 feet adjacent to the Sacramento River levee from the Prichard Lake pumping station (near the Sutter-Sacramento county line) to the Teal Bend Golf Course. Ultimately, this portion of the canal will connect to additional canal segments constructed during future NLIP phases providing habitat connectivity for the snake between the northern and southern portions of the Natomas Basin.

The entire mitigation area, including adjacent grasslands and access roads, will be approximately 70 feet wide and approximately 19 acres in size. The parcels within which the canal will be constructed are owned by (or are in the process of being acquired by) either SAFCA or the Sacramento County Airport System (SCAS), and SAFCA and SCAS will retain ownership of those portions of the canal flowing through their respective parcels. Reclamation District 1000 (RD 1000) will be responsible for ongoing maintenance of the GGS/Drainage Canal in perpetuity, and The Natomas Basin Conservancy (TNBC) will hold a third-party interest in the GGS/Drainage Canal and monitor the conservation values of the GGS/Drainage Canal in perpetuity under a management agreement with SAFCA.

Funding for long-term maintenance and management will be provided to RD 1000 and TNBC by SAFCA as described in the Draft NLIP Phase II Mitigation and Monitoring Plan (MMP). This PAR was completed to calculate the approximate annual budget required to fund RD 1000's and TNBC's maintenance and management responsibilities. It should be considered a preliminary draft until the formal Long-Term Management Plan (LTMP) has been prepared for the GGS/Drainage Canal.

The following assumptions were used in preparing the DRAFT PAR analysis.
PRELIMINARY MANAGEMENT SCENARIO

For the purpose of developing a DRAFT PAR analysis, annual maintenance and management responsibilities were inferred from the MMP and/or from past EDAW experience with developing management recommendations for similar mitigation sites. It is recognized that, once the final LTMP is developed, the costs described herein may be different from the actual costs to complete required maintenance and management actions. These estimates should be considered an approximate estimate of the total required budget until the final LTMP is developed, and a final PAR is developed based on those tasks. A preliminary management scenario for the GGS/Drainage Canal is summarized below.

Management responsibilities of RD 1000 are expected to consist of the following activities.

- Vegetation will be actively managed to maintain areas of emergent macrophytes along the channel edges and an open water column.
- Hibernacula (i.e., constructed rock piles) will be located periodically above the high water mark along the channel to provide habitat for giant garter snake, and these rock piles will be maintained and/or re-constructed as necessary.
- Surrounding grasslands, which will be seeded with native perennial grasses to afford foraging habitat for the Swainson's hawk (Buteo swainsonii), will be periodically mowed to maintain prey visibility for the hawk.
- Other management activities, such as weed treatment, trash removal, and site patrolling for trespass control, are expected to be required.
- A series of water control facilities will be constructed within the GGS/Drainage Canal, and it is expected that these structures will require periodic maintenance and replacement.
- Culverts and similar structures may also require occasional maintenance and replacement.
- Maintenance of the GGS access road will be periodically required.
- Regular monitoring of water elevation gauges will be required to ensure appropriate water levels within the GGS/Drainage Canal.
- Coordination with SAFCA, SCAS, and TNBC will be required.

Management responsibilities for TNBC are expected to consist of the following activities.

- The general condition of the GGS/Drainage Canal will be regularly monitored to ensure appropriate habitat conditions are maintained. It is expected that monitoring will occur on at least a quarterly basis.
- Plant species cover and species composition will be quantitatively measured on a periodic basis, assumed to be once every ten years.
- Coordination with SAFCA, SCAS, and RD 1000 will be required.
- Annual regulatory agency reports will be required.
PAR COST ASSUMPTIONS

The assumptions and costs used in the PAR analysis were obtained from past EDAW experience; conversations with Ellen Martin, economic consultant to TNBC; cost estimates obtained from Paul Deveraoux, RD 1000 General Manager; and, staff from Mead & Hunt. Specific cost assumptions are listed below.

- RD 1000 fully-burdened labor rates were assumed to be $150/hr (for jobs involving heavy equipment) and $50/hr (field staff) or $100/hr (general manager) for all other tasks in 2009 dollars. Per hour rates for heavy equipment operation include fuel and related charges.

- TNBC fully-burdened labor rates are $44/hr for junior staff and $75/hr for senior staff in 2009 dollars.

- No admin or overhead costs were added for TNBC (i.e., the hourly staff rates used in the analysis included organizational overhead and admin expenses). An overhead rate of 25% was applied to the total RD 1000 annual budget.

- A 15% annual budget contingency was added to the total annual budget for TNBC, and a 10% contingency was added to the RD 1000 budget to account for unexpected expenses. The differences in contingency percentages reflect a difference in certainty of cost estimates provided by the two organizations.

- Approximately 12 hibernacula rock piles will be constructed along the GGS/Drainage Canal. Costs to replace hibernacula were not included in the PAR, but occasional costs to maintain or reconstruct the hibernacula were included.

- Two rock outfalls will be constructed along the canal. Rock erosion control structures constructed below the outfalls will require periodic maintenance and, eventually, reconstruction by RD 1000. It was assumed that Natomas Central Mutual Water Company (NCMWC) will incur any costs associated with replacing the outfall pipes, and these costs were not included in the PAR.

- Five water level control gates will be constructed within the GGS/Drainage Canal to maintain a constant water level. Costs for RD 1000 to replace each gate were estimated at $10,000 (labor and materials) in 2009 dollars. Water level control gates were assumed to have a useable lifespan of 50 years.

- Each water level control gate was assumed to require a 4-foot flashboard system. Each flashboard was assumed to have a 10-year useable lifespan.

- Six staff gauges will be installed within the GGS/Drainage Canal. These gauges were assumed to have a 10-year life span. Replacement costs were estimated at $200 ea, including labor, in 2009 dollars.

- Four culverts (totaling 700 linear feet) will be installed along the length of the GGS/Drainage Canal. Culverts will have a useable lifespan of 100 years and a replacement cost of $950/lf (labor and materials) in 2009 dollars.

- RD 1000 will mow surrounding perennial grasslands two times per year. Each mowing event was assumed to take 24 hours.
Accumulated sediment will need to be removed from the GGS/Drainage Canal and areas of bank sloughing re-constructed on an annual basis. For budget estimation purposes we assumed that sediment removal and bank re-construction would occur along 10% of the canal during each maintenance event and that each maintenance event would take 24 hours to complete.

RD 1000 will spot treat aquatic weeds, through mechanical removal, and upland weeds, through chemical control, on an annual basis. These activities were assumed to take a total of 48 hours annually.

Maintenance of water supply facilities (e.g., canal connection pipes) will be the responsibility of NCMWC; these costs were not incorporated into the PAR.

TNBC will monitor the condition of the GGS/Drainage Canal at least four times per year.

TNBC will collect quantitative data for plant species composition and cover every ten years.

TNBC will provide the USACE, United States Fish and Wildlife Service, and California Department of Fish and Game with an annual report describing the condition and status of the GGS/Drainage Canal and containing supporting data (maps, photographs, etc.) on an annual basis.

TNBC will conduct regular quarterly compliance monitoring for the first eight years of the project. These costs were calculated separately from the annual ongoing costs.

Giant garter snake-specific monitoring will not be required in perpetuity; the costs for TNBC to conduct GGS-specific monitoring were not included in the PAR.

Remedial planting of emergent macrophytes along the GGS channel edge will not be required beyond the initial establishment phase.

A fractional share of the replacement cost for durable goods (e.g., GPS unit, field vehicle, etc.) was added to the PAR based on the required level of staffing (in terms of full-time equivalencies) for TNBC to complete its management, maintenance, and monitoring responsibilities.

**RESULTS**

For TNBC, two amounts were calculated by the PAR analysis, an amount for Initial and Capital (I&C) expenses and an amount for Ongoing expenses. I&C expenses were calculated to cover the first eight years of TNBC oversight, and Ongoing expenses were calculated to determine TNBC’s annual management budget for the GGS/Drainage Canal in perpetuity. I&C expenses were not calculated for RD 1000 because it was assumed that its maintenance responsibilities would not start until after the first three years of the establishment period. During this period the installation contractor will be responsible for habitat maintenance.
The total amounts calculated by the DRAFT PAR analysis are:

- TNBC I&C: $76,231.20
- TNBC Ongoing: $9,041.30
- RD 1000 Ongoing: $56,773.75

Please contact us if you have any questions on this analysis.

Sincerely,

Steve Chainey, Senior Restoration Ecologist

Mike Eng, Environmental Planner

Attachment: Property Analysis Record Results
# Section 14 - Initial & Capital Tasks and Costs

**Property Title:** NLIP Phase II GGS Canal  
**PAR ID:** NLIPTNBC  
**Date:** 01/28/2009

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**Subtotal**  
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**Administration**  
0.00

**Total**  
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## Section 15 - Ongoing Tasks and Costs

### Property Title: NLIP Phase II GGS Canal

**PAR ID:** NLIPTNBC  01/28/2009

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Sub-Total: 28.75

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Subtotal: 9,041.30

Administration: 0.00

Total: 9,041.30
### Section 15 - Ongoing Tasks and Costs

**Property Title: NLIP Phase II GGS Canal RD 1000**  
**PAR ID: NLIP1000**  
**01/28/2009**

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Memorandum

Date: 11 March 2009
To: Todd Gardner
From: Sacramento Area Flood Control Agency: Peter E. F. Buck, Tim Washburn
Contingency Assurances for SAFCA’s NLIP Landside Improvements
Project’s Compensatory Habitat Components

Distribution: U.S. Army Corps of Engineers: Kate Dadey, Liz Holland
U.S. Fish and Wildlife Service: Jennifer Hobbs
Sacramento Area Flood Control Agency: Stein Buer, Tim Washburn, John Bassett, Ric Reinhardt
EDAW: Steve Chainey, Kelly Holland, Mike Eng

On January 30, 2009, the Sacramento Area Flood Control Agency (SAFCA) prepared a memorandum for the California Department of Fish and Game (DFG) proposing a series of contingency funding assurances regarding the creation, management, and monitoring of the habitat features included in the Natomas Levee Improvement Program Phase 2 Landside Improvements Project (Phase 2 Project). On February 23, 2009, DFG requested additional specific information in order to further evaluate the adequacy of SAFCA’s proposal. SAFCA has responded to this request by modifying the January 30, 2009 memorandum to provide the additional information. As set forth below, the modifications are shown in the underlined text.

- **State-Allocated Funds:** Approximately 70% of the cost of constructing the Phase 2 Project improvements, including the habitat mitigation components will be funded by the State of California. The total cost of construction is estimated to be $90.0 million of which the State’s share will be $63.0 million.

- **SAFCA-Allocated Funds:** Approximately 30% of the cost of constructing the Phase 2 Project improvements ($27.0 million), including the habitat mitigation components, and 100% of the cost of monitoring and managing these components will be funded by SAFCA through the Consolidated Capital Assessment District (CCAD). The CCAD was created in April 2007 by a vote of property owners occupying the American and Sacramento River floodplains in the Sacramento Area. The purpose of the CCAD is to fund the local share of the cost of constructing, operating and maintaining the projects that are necessary to provide the Sacramento Area with at
least a 200-year level of flood protection. Under the terms of Final Engineer’s Report (Final Report) adopted in connection with the CCAD (see Appendix A), SAFCA is authorized to collect special benefit assessments from the properties in the district through 2037. These assessments must be used to support construction of the improvements identified in the Final Report, including the improvements included in the Phase 2 Project.

A portion of the assessment revenue is specifically allocated to the cost of operating, maintaining and managing the constructed improvements including mitigation features. In the case of the Phase 2 Project, the management and administration of the various habitat mitigation features will be provided through long-term agreements between SAFCA and Reclamation District (RD) 1000 (for the GGS/Drainage Canal and grasslands on the flood control footprint), The Natomas Basin Conservancy (TNBC) (for rice and field crops and woodlands) and Natomas Central Mutual Water Company (NCMWC) (for water delivery to habitat mitigation sites). These agreements are collected in Appendix B. Funding for the agreements with RD 1000 and NCMWC will be provided on an annual basis from CCAD assessments through 2037 and thereafter from assessments collected as part of SAFCA’s Operation and Maintenance Assessment District. Commencing in 2010, SAFCA estimates RD 1000's annual cost for operating and maintaining the GGS/Drainage Canal and grassland features constructed as part of the Phase 2 Project will be approximately $100,000. The annual cost of procuring NCMWC water deliveries for this portion of the GGS/Drainage Canal will be approximately $5,000. To ensure timely payment for the services rendered under these agreements, SAFCA will maintain reserve accounts with balances in the amounts of $200,000 for RD 1000 and $10,000 for NCMWC. These amounts will be sufficient to support annual funding for two years of each agreement. Funding for the agreement with TNBC will be provided on an annual basis from CCAD special assessments through 2037 and thereafter from a non-wasting endowment funded by CCAD assessments. The amounts needed to fund these annual costs and establish the non-wasting endowment are discussed below.

- **Record of Land Acquisitions:** SAFCA has already acquired or is in the process of acquiring through direct purchase or condemnation the land that is needed to support the Phase 2 Project footprint, including the habitat mitigation sites. These sites include the rice fields and agricultural field crops that will be preserved, the sites where landside woodlands will be established and preserved, the flood control footprint where managed grasslands will be established, soil borrow sites reclaimed to cropland, and the land (including Airport land) where the new GGS/Drainage Canal and relocated Elkhorl Main Irrigation Canal will be constructed. These property acquisitions are identified in SAFCA’s Phase 2 Project EIR's.
Endowment Agreement with The Natomas Basin Conservancy: TNBC will hold the conservation easement for several of the habitat mitigation features components, including the rice fields, agricultural field crops, and landside woodlands. In addition, TNBC will oversee, monitor, and assist RD 1000 in managing the GGS/Drainage Canal to be constructed as part of the Phase 3 Project. Economic & Planning Systems, Inc. (EPS) has conducted the functional equivalent of a Property Analysis Record (PAR) for TNBC using a financial model that is currently used to calculate long term management costs for habitats as part of the Natomas Basin Habitat Conservation Plan (Appendix C). The PAR cash flow analysis calculated the annual TNBC site management costs for 2009 through 2037 and the estimated endowment fund amount required for annual site management costs in perpetuity commencing in 2038. SAFCA will make annual appropriations from the CCAD assessment to cover TNBC’s management costs through 2037 and will make a single lump sum payment into the endowment fund in 2009 funded by CCAD assessments. Compounding interest earnings from 2009 through 2037 will result in full funding of the endowment in 2038. Interest earned on this account will cover the annual payments due to TNBC under the agreement thereafter. TNBC’s annual site management costs for all of the habitat features within their responsibility are estimated at $105,000 (current price levels) rising to $269,000 in 2038 (with inflation). The single lump sum payment into the non-wasting endowment to cover future site management costs is estimated to be $1.6 million.

Water Supplies: Water supplies for the new GGS/Drainage Canal, rice fields, and field crops will be provided by NCMWC under existing landowner/shareholder rights acquired by SAFCA or under a long-term water purchase contract under negotiation between SAFCA and NCMWC. SAFCA will fund the cost of these water supplies from CCAD assessments. These costs will be included in the annual CCAD appropriation for TNBC through 2037, and from the TNBC endowment thereafter.

Existing Contracts and Bid-Ready Plans and Specifications: Under State law SAFCA cannot enter into a contractual agreement without encumbering the funds necessary to complete the work. SAFCA has issued several contracts and/or bid-ready plans and specifications that demonstrate its commitment to constructing the habitat mitigation components. These contracts include grading of the various habitat mitigation features, soil preparation and pre-planting weed removal, planting of woodlands and GGS Canal banks (in process), transplanting oak trees and elderberry shrubs, and establishment of native perennial grassland.

SAFCA’s Board Resolution: On January 29, 2009 the SAFCA Board adopted a resolution approving the Mitigation Monitoring and Reporting Program for the Phase 2 Project and committing SAFCA to complete the Phase 2 Project habitat mitigation features. Many of these features are already in progress (e.g., land acquisition, tree
and elderberry shrub transplantation). In addition, SAFCA has a reliable record of innovative design and successful implementation and management of habitat mitigation projects throughout the Sacramento Region. Many of these projects have been designed and closely coordinated/integrated with staff input from CDFG, US Fish and Wildlife Service and the National Marine Fisheries Service.

Altogether, the items in this contingency assurances memorandum demonstrate SAFCA's commitment and sufficient resources to implement all of the Phase 2 Project's habitat mitigation features, including land acquisition, construction, monitoring, and long-term management in accordance with the requirements of the Section 2081 permit.