FINAL ENVIRONMENTAL IMPACT STATEMENT

408 PERMISSION AND 404 PERMIT TO THREE RIVERS LEVEE IMPROVEMENT AUTHORITY

FOR THE

FEATHER RIVER LEVEE REPAIR PROJECT, CALIFORNIA SEGMENT 2

APPENDIX H – CORRESPONDENCE REGARDING SPECIAL-STATUS SPECIES

October 2008

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APPENDIX H – CORRESPONDENCE REGARDING SPECIAL-STATUS SPECIES

Biological Assessment and Additional Information, Segment 2

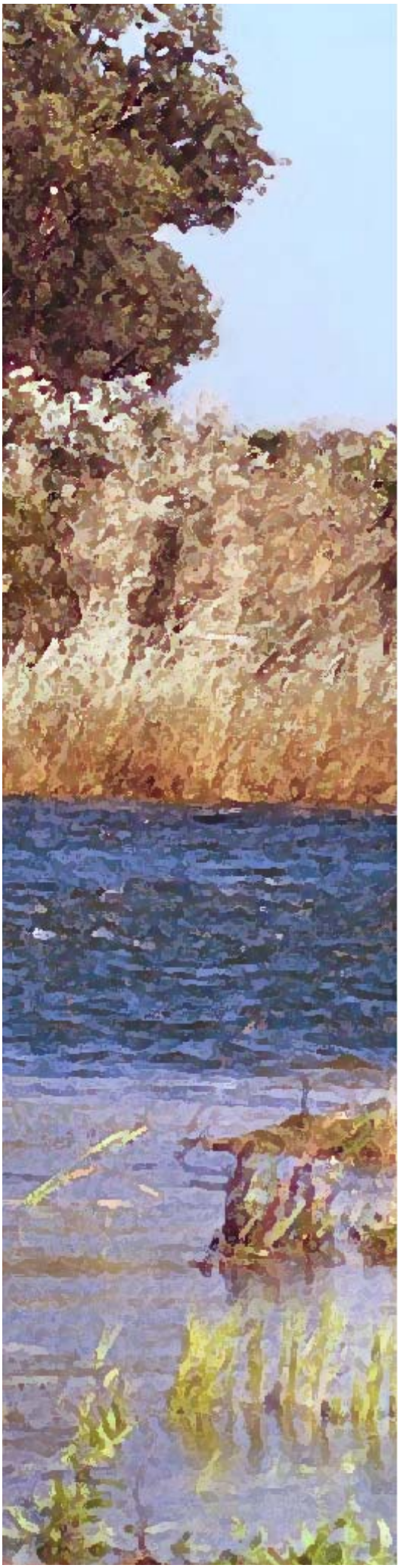
Final Biological Opinion, Segment 2

Final Coordination Act Report

Biological Assessment/Essential Fish Habitat Assessment and Letter of Concurrence, Segment 2

October 2008

Biological Assessment and Additional Information, Segment 2



U.S. Fish and Wildlife Service
BIOLOGICAL ASSESSMENT

FOR THE
FEATHER RIVER LEVEE REPAIR PROJECT
SEGMENT 2

AN ELEMENT OF THE
YUBA-FEATHER SUPPLEMENTAL
FLOOD CONTROL PROJECT

PREPARED FOR

THREE RIVERS LEVEE IMPROVEMENT AUTHORITY

PREPARED BY

EDAW

August 2007

BIOLOGICAL ASSESSMENT

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AN ELEMENT OF THE
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FLOOD CONTROL PROJECT

PREPARED FOR

THREE RIVERS LEVEE IMPROVEMENT AUTHORITY
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August 2007

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INTRODUCTION

Studies by the California Department of Water Resources (DWR), the U.S. Army Corps of Engineers (USACE), Reclamation District (RD) 784, and Three Rivers Levee Improvement Authority (TRLIA) have found that several reaches of the levee system protecting the RD 784 area do not satisfy geotechnical criteria for seepage at the water surface elevation for the 100-year flood event. To correct the deficiencies identified along levee segments on the east bank of the Feather River and a small segment of the south bank of the Yuba River, TRLIA is undertaking the Feather River Levee Repair Project (FRLRP). The FRLRP represents a portion of the Phase IV TRLIA program to repair and improve the Feather River and Yuba River levees within RD 784. The FRLRP area is located south of Marysville (Exhibit 1) and, for study, design, and construction purposes, is divided into the three project segments described below and depicted in Exhibit 2.

- Segment 1—The existing Feather River left bank levee from Project Levee Mile (PLM) 13.3 to PLM 17.2 (from approximately Pump Station No. 2 to Star Bend). Improvements to this levee segment consist of repairing and strengthening the existing levee in place to correct seepage and/or stability deficiencies.

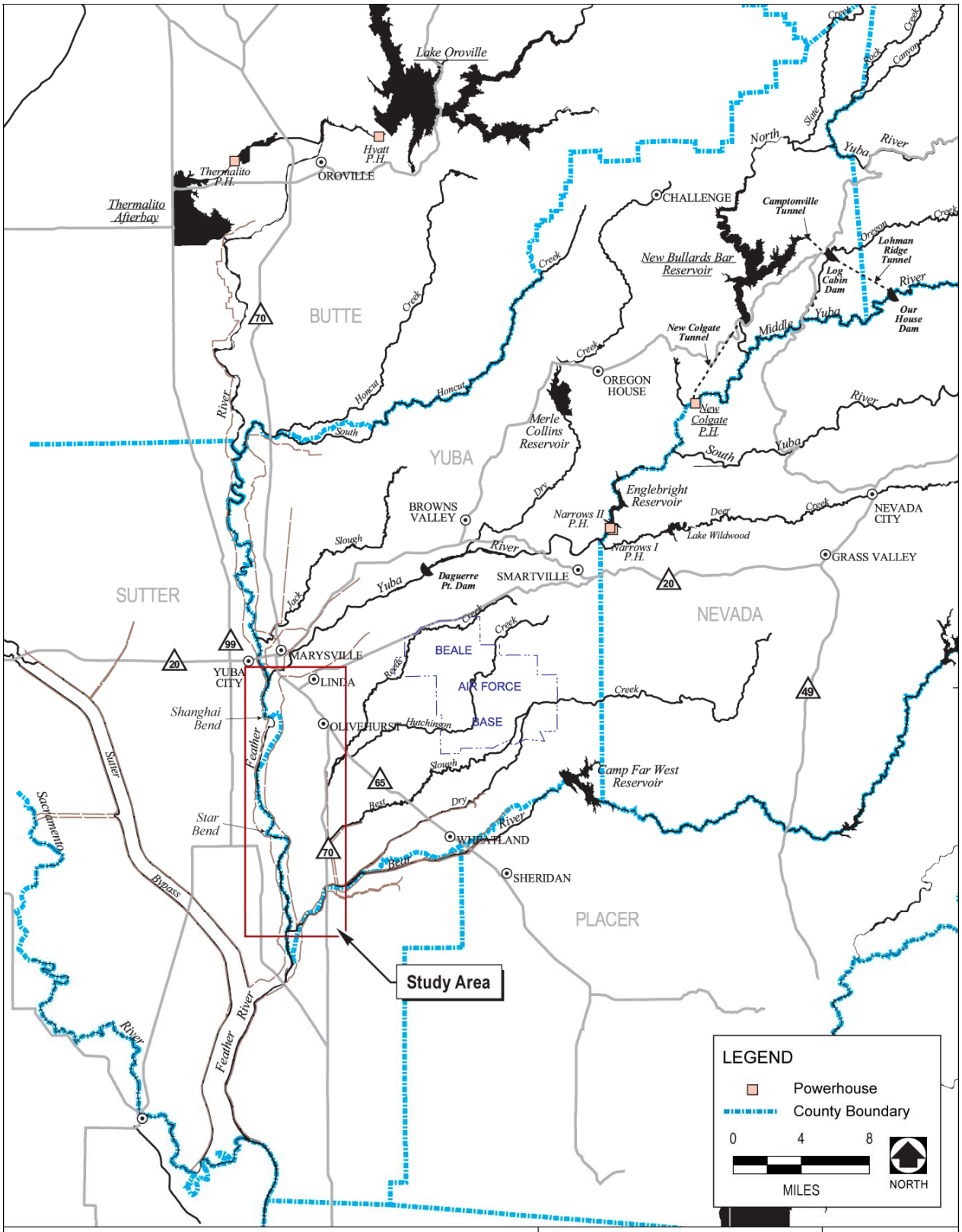
- Segment 2—The existing Feather River left bank levee from approximately PLM 17.2 to PLM 23.4 (from Star Bend to immediately south of Shanghai Bend [west of the Yuba County Airport]). TRLIA's planned improvement in this project segment is a setback levee. After the setback levee is constructed, the existing levee will be removed in various locations to allow floodwaters to enter the setback area. Pump Station No. 3 will be relocated to the land side of the setback levee.

- Segment 3—The existing Feather River left bank levee from PLM 23.4 to PLM 26.1, and the Yuba River left bank levee from PLM 0.0 to PLM 0.3 (west of the Yuba County Airport to the Western Pacific Railroad crossing just west of the State Route [SR] 70 bridge). Improvements to this levee segment consist of repairing and strengthening the existing levee in place to correct seepage and/or stability deficiencies, as in Segment 1.

The improvements to Segments 1 and 3 have been undertaken in a separate design and construction effort from the setback levee design and construction in Segment 2; project design and construction planning included coordination with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) to ensure that no take of listed species would occur.

The subject of this Biological Assessment is restricted to construction of the setback levee and related activities in Segment 2 of the FRLRP area. The purpose of this document is to review these activities in sufficient detail to determine to what extent they could affect any federally listed threatened or endangered terrestrial species and species that are candidates for listing. Effects on federally listed fish species are addressed in a separate Biological Assessment being submitted to NMFS. This document was prepared in accordance with requirements set forth under Section 7 of the Endangered Species Act (ESA) (16 U.S.C. 1536[c]). TRLIA is requesting authorization from the USACE under Section 404 of the Clean Water Act for the discharge of dredged or fill materials into waters of the United States that could result from implementation of the proposed project. In response to TRLIA's request for this federal action, the USACE will initiate Section 7 consultation with the USFWS and NMFS.

Based on review of existing information on federally listed species with potential to occur in the project vicinity, habitat requirements of the relevant species, and field surveys conducted to characterize habitat conditions on the project site, it was determined that valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) and giant garter snake (*Thamnophis gigas*) are the only federally listed terrestrial species that could be affected by the proposed project. The project site is not within designated critical habitat for valley elderberry longhorn beetle, and no critical habitat has been designated for giant garter snake.



Feather River Levee Repair Project

Regional Setting

Sources: Data Provided by EDAW and GEI 2007

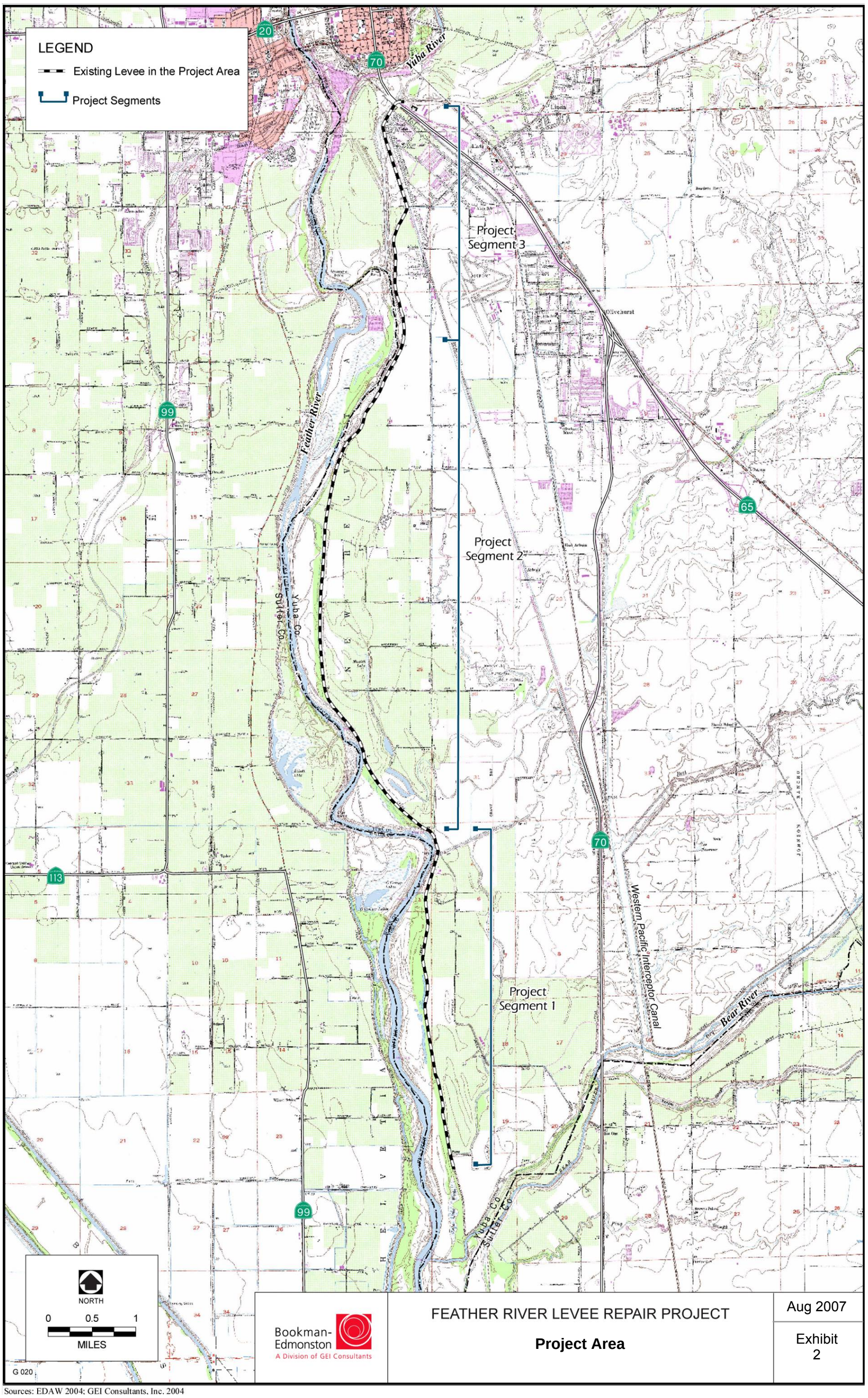
G024

THREE RIVERS LEVEE IMPROVEMENT AUTHORITY

114 Yuba Street, Suite 218
Marysville, CA 95901

Aug 2007

Exhibit 1



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A Division of GEI Consultants

FEATHER RIVER LEVEE REPAIR PROJECT

Project Area

Aug 2007

Exhibit 2

Sources: EDAW 2004; GEI Consultants, Inc. 2004

CONSULTATION TO DATE

Technical assistance was provided by USFWS regarding potential effects to giant garter snake and valley elderberry longhorn beetle from construction activities in Segments 1 and 3 of the FRLRP. A request for technical assistance was submitted to Holly Herod on February 6, 2007. Jennifer Hobbs subsequently attended a meeting at which the Segments 1 and 3 activities were discussed. The Segment 2 setback levee was also discussed at this meeting, including a preliminary description of the proposed action and potential mechanisms and schedule for completing the formal Section 7 consultation.

DESCRIPTION OF THE PROPOSED ACTION

The proposed action would be limited to project activities in FRLRP Segment 2, including construction of the setback levee, relocation of Pump Station No. 3 and additional facilities and structures within the levee setback area, degradation of the existing Feather River east levee within Segment 2, and grading to facilitate drainage of the levee setback area after flood events. A more detailed description of these specific components is provided below.

SETBACK LEVEE ALIGNMENT

The proposed alignment for the setback levee in FRLRP Segment 2 is shown in Exhibit 3. This alignment was selected to achieve substantial reductions in river flood stage elevations while maintaining a Feather River floodway width that is consistent with upstream and downstream reaches of the river. A second consideration was to take advantage of the existing configuration of the levee system to identify constructible locations where the setback levee could be connected to the existing levee. This alignment has been refined based on topographic, geologic, and socioeconomic considerations. The location of the setback levee was aligned as much as possible along a topographically elevated area formed by older, more consolidated soils that are less susceptible to underseepage and therefore more suitable for a levee foundation. Consideration was also given to reducing impacts on occupied residential units.

The setback levee will be 5.7 miles long and replaces 6.2 miles of existing levee. The new levee segment will generally be set back approximately 0.5 mile to the east of the existing Feather River levee, except near the northern and southern ends, where it will join the existing levee. The area between the existing levee and the setback levee alignment (the levee setback area) and the footprint of the setback levee will include approximately 1,600 acres.

SETBACK LEVEE AND MAINTENANCE CORRIDOR DIMENSIONS

It is anticipated that the design crown elevation of the setback levee will be the same as the crown elevation of the existing levee at each given latitude along the alignment. A review of the available topographic data for the project vicinity developed as part of the Sacramento and San Joaquin River Basins Comprehensive Study indicates that the height of the setback levee will generally range from about 20 to 30 feet above the existing ground surface. The most common levee height above the adjacent land will be about 25 feet.

The existing levee has been reconstructed by the USACE to provide a minimum of 3 feet of freeboard above the 1957 design profile. Because the levee setback will lower most flow profiles by widening the flow channel, it follows that the setback levee, if constructed to the crown elevations described above, will have freeboard of at least 3 feet above the 1957 design profile.

Other anticipated dimensions of the setback levee are:

- crown width of 20 feet,
- footprint width of approximately 170 feet depending on levee height,
- waterside and landside slope of 3:1 (H:V), and
- 12-foot-wide patrol road on levee crown.

On each side of the setback levee, stability berms integral to the levee embankment will be provided in portions of the southern alignment where the foundation of the levee contains soft clay and silt deposits. In all other sections of the alignment, a 50-foot access corridor will be provided to support levee maintenance and inspection and flood fighting activities. Adjacent to the landside access corridor, a drainage ditch will be constructed to intercept and transport stormwater flows moving toward the levee. The drainage ditch will be sized to meet flow demands.

Feather River Levee Repair Project

Segment 2

Setback Levee Construction Elements

Source: Data Provided by EDAW and GEI 2007

X118

THREE RIVERS LEVEE IMPROVEMENT AUTHORITY

1114 Yuba Street, Suite 218
Marysville, CA 95901

Aug 2007

Exhibit 3

An approximately 65-foot-wide utility corridor will be provided east of the landside access corridor to accommodate the drainage ditch, a 15-foot-wide maintenance road, and other required utilities. Based on these parameters, the levee right-of-way in these portions of the alignment will be up to approximately 335 feet wide.

PROJECT CONSTRUCTION ELEMENTS

Flood control improvements in Segment 2 of the FRLRP area will be completed in two stages to accommodate schedule challenges related to beginning construction of the setback levee to replace the extremely deficient segment of existing levee, while undergoing the process for USACE and the State of California Reclamation Board (The Reclamation Board) approval to degrade the existing levee. If these processes were to take place at the same time (i.e., if TRLIA were to wait to construct the setback levee until approval to degrade the existing levee is obtained), it would delay the construction of the setback levee, which is recommended to be started as soon as possible because of the deficiencies in the existing levee. Stage 1 of the FRLRP Segment 2 activities includes construction of the setback levee and associated stability berms, construction of the new Pump Station No. 3 and associated facilities, removal and relocation of existing utilities and structures within the setback area, and excavation of borrow material. Stage 2 of the project includes degradation of all or portions of the existing Feather River east levee within Segment 2; removal of the old Pump Station No. 3; filling of Plumas Lake Canal on the water side from the setback levee to where the canal opens into the pond-like feature, and on the land side from the setback levee to the new Pump Station No. 3; and recontouring of portions of the levee setback area and an existing drainage to facilitate drainage of water from the levee setback area after flood events. Specific Stage 1 and Stage 2 activities are described in greater detail below.

STAGE 1

BORROW MATERIAL ACQUISITION

Borrow material will be obtained locally from borrow areas developed inside and outside the levee setback area. It is currently estimated that a total of approximately 3.4 million cubic yards (cy) of compacted borrow material will be required to construct the setback levee. A detailed investigation of borrow areas suitable for levee embankment materials is currently underway. The location and limits of borrow areas will be determined and refined as a result of this effort.

Objectives for use of local borrow areas include: 1) reducing the impact on land resources; 2) shortening borrow haul distances to reduce impacts on air quality and traffic; and 3) promoting the use of large off-road earthmoving equipment such as scrapers rather than trucks to reduce construction costs.

Two general objectives are important in the selection of borrow areas:

- Haul distances to the setback levee alignment should be minimized and a continuous or nearly continuous borrow source provided. Minimizing haul distances is important to minimize project construction costs, air emissions, and traffic impacts.

- Potential for seepage impacts at the foundation of the setback levee should be reduced by maintaining a distance of 400 feet or greater from the edge of the borrow area to the toe of the proposed levee unless there is an incised drainage channel between the setback levee alignment and the borrow area. If such an incised drainage exists, borrow excavation closer to the levee may be allowed, based on an evaluation of local site conditions. Borrow areas may also be developed closer than 400 feet from the toe of the setback levee if the borrow pit is to be subsequently backfilled.

It is anticipated that borrow will be extracted from wide, shallow (5–10 feet deep) excavations, rather than deep trenches. At the conclusion of the work, the borrow areas will be graded to blend with the topography, leaving slopes flat enough to reduce erosion and promote conditions conducive to vegetative growth (slopes 3:1 [H:V] or

flatter), or filled with material from removal of existing levees (during stage 2). If not filled, the bottom of the borrow areas will be regraded to drain away from the levee and toward the river or toward existing drainageways to ensure fish movement out of the levee setback area into the main channel of the Feather River when flood flows recede following inundating flood events. The borrow areas will be revegetated to conform to the surrounding landscape. Some stockpiled topsoil, and other excess earth materials (organic soils, roots, and grass) from borrow areas and the setback levee foundation could be spread over borrow sites after excavation has been completed.

Aggregate base needed to surface the patrol road on the levee crown and similar materials will be obtained from commercial sand and gravel operations in the Marysville–Yuba City area and will be hauled to the setback levee alignment by truck.

SETBACK LEVEE FOUNDATION PREPARATION

Preparation of the foundation of the setback levee will involve a sequence of several activities. The setback levee footprint will be cleared and grubbed of all trees, brush, loose stone, abandoned structures, existing utilities, buried pipelines, and other deleterious materials that may exist within 10 feet of the levee toes. After clearing and grubbing, the setback levee foundation will be stripped to remove low-growing vegetation and topsoil to a depth of at least 6 inches, although local areas with extensive tree roots or deep organic soils could require excavation to a depth of 3 feet or greater. Overall, the depth of stripping is expected to average 1–3 feet. The topsoil will be placed in a designated "unsuitable material" spoil area or used for borrow area reclamation. After stripping, an inspection trench will be excavated. The trench then will be backfilled and compacted.

Before placement of the embankment fill, the foundation surface will be proof-rolled, and any remaining soft materials will be removed and replaced with compacted fill, treated with lime stabilization, or strengthened with geogrid mesh. Before the first lift of fill is placed, the foundation surface will be scarified to a depth of about 4 inches and moisture conditioned to help create a good bond between the foundation and the embankment fill.

SEEPAGE CONTROL/SLURRY CUTOFF WALL CONSTRUCTION

Based on the performance history of the existing levees and the results of investigations along the proposed setback levee alignment, it is anticipated that seepage control measures will be required along significant portions of the setback levee. Susceptibility of the setback levee embankment and foundation soils to seepage and internal erosion is the primary concern related to levee integrity and stability.

Construction of a slurry cutoff wall is proposed along those portions of the setback levee where widespread strata of permeable sands and gravels exist in the foundation. The purpose of the slurry cutoff wall is to dissipate the hydraulic gradient in the levee foundation and reduce seepage quantities. To achieve maximum effectiveness, the slurry cutoff wall must extend completely through the permeable strata and terminate some distance into an underlying, reasonably continuous layer with lower permeability.

Construction of the slurry cutoff wall to the depths required along the proposed setback levee alignment will be accomplished with large modified backhoes. This equipment and the associated sequence of excavation, backfill preparation, and placement of backfill back into the slurry cutoff wall trench will require an approximately 80-foot-wide work platform. The slurry cutoff wall is expected to be as much as 80 feet deep. Therefore, for each section of the setback levee where a slurry cutoff wall is needed, the wall will be installed before the levee embankment is constructed. In addition, the work platform will need to be at least 4–5 feet above the highest groundwater level to provide a stable base for the excavation equipment.

SETBACK LEVEE EMBANKMENT CONSTRUCTION

Construction of the setback levee embankment will begin as soon as sufficient lengths of levee foundation are complete and weather conditions allow. The embankment will be constructed as an engineered fill, with the fill placed in horizontal lifts. Each lift will be moisture conditioned and compacted to the specified density using a suitable compactor, such as a sheepsfoot, tamping-foot, or rubber-tired roller. Landside stability berms integral to the levee embankment will be constructed in portions of the southern alignment where the foundation of the levee contains soft clay and silt deposits. This will require fill of a small portion Plumas Lake Canal.

PUMP STATION NO. 3 RELOCATION

The current location of Pump Station No. 3 experiences excessive seepage and boils during high-water events. In addition, after the setback levee is complete, the existing Pump Station No. 3 will be in the setback area and exposed to flooding after the existing levee is degraded. Therefore, as part of the setback levee project, a new/replacement Pump Station No. 3 will be constructed on the land side of the setback levee in Stage 1 and the existing pump station will be removed in Stage 2. The new pump station will be located where the setback levee is adjacent to Plumas Lake Canal. The new Pump Station No. 3 will be a reinforced-concrete structure similar to the recently constructed Pump Station No. 2 and Pump Station No. 6 in RD 784. The specific capacity of the new Pump Station No. 3 will be determined during detailed project design.

UTILITY RELOCATION AND STRUCTURE REMOVAL

Implementation of the setback levee project would necessitate the removal of all structures (houses, trailers, sheds, barns, other agricultural outbuildings) from the levee setback area, which would be subject to periodic flooding following removal of the existing levee. Approximately 20 structures in the levee setback area will be displaced by the project. Displaced structures include six residential dwelling units, and remaining structures include associated agricultural use buildings and dilapidated barns. Some utilities and other facilities located in the levee setback area will need to be relocated or reinforced with implementation of the levee setback.
As discussed previously, RD 784 Pump Station No. 3 will be relocated to the land side of the proposed setback levee. A PG&E 115-kilovolt (kV) transmission line called the Bogue Loop crosses the levee setback area on four towers. The foundations for these steel structures will likely require reinforcement or replacement to maintain their integrity during periods of flood water inundation. Other steel towers along the same transmission line are located on the water side of the existing Feather River levee and are supported by elevated steel pile foundations.

Other existing facilities that may need to be abandoned, reinforced, or relocated include roads, power distribution lines, irrigation pipelines, drainage ditches, wells, fill stations, and communications lines. Several private irrigation lines will be cut off by the construction of the setback levee, separating some lands on both sides of the setback levee that require irrigation from current water sources. During detailed design, and in coordination with landowners, appropriate water sources and irrigation infrastructure will be determined for lands where irrigation lines were cut off and that will continue to require irrigation water after project construction. The wells within the setback area will be retained for use in environmental enhancement activities over the next several years, to support continuing agricultural activities, or will be destroyed in accordance with California's water well regulations. Wells and fill stations in the levee setback area to be abandoned will be removed and filled, and new wells will be dug and fill stations built outside the levee setback area to replace the abandoned facilities, as appropriate. Wells and fill stations to be retained in the levee setback area will be retrofitted to accommodate periodic flooding. New power lines and power poles may be required for any new wells and fill stations.

STAGE 2

FILL OF CANAL SEGMENTS ADJACENT TO SETBACK LEVEE

Construction of the new setback in Stage 1 will divide the Plumas Lake Canal, with portions of the canal remaining intact on either side of the setback levee. To minimize potential for underseepage that could result from having an excavated feature too close to the levee, approximately 800 feet of the canal on the west (water) side of the setback levee will be completely filled (from the west side of the setback levee alignment to where the canal opens into Plumas Lake). Approximately 2,200 feet of canal on the east (land) side of the setback levee will be filled between the new Pump Station No. 3 and the setback levee alignment. An approximately 2-foot-deep ditch will remain along the canal alignment to drain surface runoff from landside areas at the southern end of the setback levee to the new Pump Station No. 3.

REMOVAL OF THE EXISTING LEVEE

There are no plans to use material in the existing Feather River left bank levee in Segment 2 as borrow material for the new setback levee. It is expected that for some period of time, the existing levee and the new setback levee will be in place concurrently (see "Project Schedule" below). During this period, the setback levee will function as a "backup" levee, providing a second line of levee protection if the existing levee in Segment 2 were to breach during a flood event.

All or portions of the existing levee in Segment 2 will be removed to achieve the maximum hydraulic benefits of the levee setback by allowing water to flow into and out of the levee setback area during high river stages. Where the existing levee will be excavated to allow flood waters to pass into and out of the levee setback area, the existing embankment will be excavated to the level of the adjoining ground surface. Specific sections to be retained will be determined in final project design and will be based on factors that include possible mitigation value for project impacts on sensitive species. Sections of the existing levee that are left in place will not be maintained.

REMOVAL OF PUMP STATION NO. 3 AND FACILITATION OF SETBACK AREA DRAINAGE

The existing Pump Station No. 3 will be removed and the adjacent area currently occupied by the existing Feather River levee and maintenance zone will be excavated to facilitate drainage and allow flood waters to recede from the setback area in a manner that minimizes fish stranding. The existing channel that currently conveys discharges from Pump Station No. 3 will likely need to be enlarged and deepened to accommodate flood flows leaving the setback area and to minimize the potential for fish stranding as flood waters recede. Whether this drainage location or another is used, the channel will be located and constructed in a manner that minimizes vegetation disturbance, fish stranding, and other environmental impacts. A site-specific drainage plan for the entire setback area will be developed in final design.

The swale will also act to allow backwater to flow into the setback area from the Feather River, increasing the inundation frequency of the setback area and improving habitat quality. It is estimated that the 40-foot stage will be inundated in two out of every three years for a period of at least one week between March 15 and May 15. Floodplain land at or below this elevation will provide a broad suite of valuable ecosystem functions, including provision of nutrients and seasonal habitat for aquatic species.

HABITAT RESTORATION AND MANAGEMENT OF THE LEVEE SETBACK AREA

At this time, it is unclear whether existing agricultural land uses will be maintained in the levee setback area. TRLIA is discussing the feasibility of continuing agricultural practices throughout the setback area with various landowners and stakeholders. TRLIA is also discussing the potential for active restoration with landowners,

stakeholders, and various regulatory agencies. It is possible that a portion of the setback levee area will be restored to riparian habitat via active or passive restoration in the event that agricultural uses are discontinued.

STAGING AREAS, ACCESS ROUTES, AND MATERIAL DISPOSAL

It is anticipated that several staging areas will be developed along the setback levee alignment to allow for efficient use and distribution of materials and equipment. Staging areas will be located within the construction corridor and near active construction areas, so they can be relocated as construction progresses. Because the work area is essentially flat, suitable sites for construction staging are abundant. Final selection of staging areas will be based on contractor preference and environmental and land use constraints.

Personnel, equipment, and imported materials will reach the project site via SR 70 and Feather River Boulevard. At the project site, the primary construction corridor will include the setback levee alignment, soil borrow areas, and roads used for access to the work areas, including Feather River Boulevard. Access roads will consist mainly of the existing east-west lateral roads between SR 70, Feather River Boulevard, and the levee setback area.

Excess earth materials (organic soils, roots, and grass from borrow areas and the setback levee foundation; excavated material that does not meet levee embankment criteria) will be used in the reclamation of borrow areas or will be placed in a surplus material berm at the waterside toe of the setback levee. In addition, excess material could be used in the contouring of the setback area to facilitate drainage to the Feather River and prevent fish stranding. Cleared vegetation (i.e., trees, brush) will be hauled off-site. Debris from structure demolition, power poles, piping, and other materials requiring disposal will be hauled off-site to a suitable landfill.

PROJECT SCHEDULE

A period of up to approximately 22 months is planned for construction of the setback levee project, with contractor mobilization beginning in late September 2007, the setback levee embankment (Stage 1) completed in December 2008, the existing levee breached (Stage 2) in spring/summer 2009, and final clean-up and contractor demobilization in fall 2009. Schedule highlights are as follows:

- **Mobilization:** Mobilization will include setting up construction offices and transporting heavy earthmoving equipment to the site. These activities will take approximately one month.

- **Levee Foundation Preparation:** This activity will begin soon after mobilization. Construction will take approximately eight to nine months depending on the amount of equipment working simultaneously, weather conditions, and permit requirements.

- **Slurry Cutoff Wall Construction:** Installation of slurry cutoff walls along the setback levee alignment will occur simultaneously with levee foundation preparation.

- **Levee Embankment Construction (including stability berms):** Because the setback levee alignment is nearly 6 miles long, levee embankment construction could begin in some areas while foundation preparation is underway along other portions of the alignment. Levee embankment construction is anticipated to take approximately eight months.

- **Borrow Material Excavation:** Excavation of borrow materials for use in the construction of the setback levee embankment could begin simultaneously with levee foundation preparation or slurry wall construction and would occur for the duration of levee embankment construction.

- **Tie-ins to Existing Levees:** Elements of tying in the setback levee to the existing levees will take place during levee foundation preparation, levee embankment construction, and potentially during slurry cutoff wall construction.

- **Pump Station No. 3 Construction:** Pump Station No. 3 will be constructed concurrent with levee embankment construction. Procurement of long-lead items (e.g., pumps, motors, valves, and generator) could begin as early as 2007.

- **Fill of Portions of the Plumas Lake Canal:** The portion of Plumas Lake Canal within the levee embankment footprint will be filled during levee foundation preparation. The portion of canal downstream of the setback levee and between the setback levee and Pump Station No. 3 will be filled concurrent with removal of the existing levee.

- **Removal of the Existing Levee:** The existing Feather River levee in the setback area will not be removed until the setback levee is complete, and removal activities will occur outside of the identified Feather River flood season. Levee removal is anticipated to occur in spring/summer 2009.

- **Decommission of the Existing Pump Station No. 3:** Removal of the existing pump station would be done concurrent with removal of the existing levee.

- **Facilitation of Setback Area Drainage:** Grading of the setback area to facilitate drainage of floodwaters back to the Feather River and enhancement of the setback area drainage channel would be conducted concurrent with removal of the existing levee.

- **Demobilization:** Demobilization will include removal of equipment and materials from the project site, disposal of excess materials at appropriate facilities, and restoration of staging areas and temporary access roads to pre-project conditions. Demobilization activities will likely occur in various locations as construction proceeds along the project alignment, but will be completed in fall 2009 after removal of the existing Feather River levee is complete.

AVOIDANCE, MINIMIZATION, AND CONSERVATION MEASURES

Measures described below will be implemented to avoid and minimize potential adverse effects to valley elderberry longhorn beetle and giant garter snake resulting from implementation of project Segment 2 elements. These measures will be incorporated into the construction specifications.

VALLEY ELDERBERRY LONGHORN BEETLE

- Elderberry shrubs that require removal will be transplanted to an appropriate location within the project area or an alternative suitable site agreed upon by USFWS.

- A worker awareness training program for construction personnel will be conducted by a qualified biologist prior to beginning construction activities. The program will inform all construction personnel about the life history and status of the beetle, requirements to avoid damaging the elderberry plants, and the possible penalties for not complying with these requirements. Written documentation of the training will be submitted to USFWS within 30 days of its completion.

- Elderberry shrubs that do not require transplantation will be protected through establishment of a fenced avoidance area. In most cases, fencing will be placed at least 20 feet from the dripline of the shrub. In some cases, construction activity may be required within 20 feet of a shrub. In these cases, fencing will be placed at the greatest possible distance from the shrubs.

- No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used within 100 feet of elderberry shrubs.

- Dirt roadways and other areas of disturbed bare ground within 100 feet of elderberry shrubs will be watered at least twice a day to minimize dust emissions.

GIANT GARTER SNAKE

- A worker awareness training program for construction personnel will be conducted by a qualified biologist prior to beginning construction activities. The program will provide workers with information on their responsibilities with regard to the snake, an overview of the life-history of this species, a description of measures to minimize potential for take of the snake, and an explanation of the possible penalties for not properly implementing these measures. Written documentation of the training will be submitted to USFWS within 30 days of its completion.

- Construction and other ground-disturbing activities in areas within 200 feet of suitable aquatic habitat will not occur between October 1 and April 30. Dewatering of suitable aquatic habitat will not occur before April 15, and dewatered habitat will remain dry for at least 15 days prior to fill or excavation.

- Prior to beginning construction activities, high-visibility fencing will be erected to protect areas of giant garter snake habitat from encroachment. These areas will be avoided by all construction personnel. The fencing will be inspected before the start of each work day and maintained by the project proponents until all construction activities are completed.

- Within 24 hours before beginning construction activities, areas within 200 feet of suitable aquatic habitat for giant garter snake will be surveyed by a qualified biologist. The biologist will provide USFWS written documentation of the monitoring efforts within 48 hours after the survey is completed. Habitat will be re-inspected by the monitoring biologist whenever a lapse in construction activity of 2 weeks or greater occurs. The biologist will be present on-site during initial ground disturbance activities, including clearing and grubbing/stripping. The biologist will be available throughout the construction period and will conduct regular monitoring visits to ensure avoidance and minimization measures are being properly implemented.

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

- During construction operations, stockpiling of construction materials, portable equipment, vehicles, and supplies will be restricted to the designated construction staging areas. To eliminate an attraction to predators of the snake, all food-related trash items, such as wrappers, cans, bottles, and food scraps, will be disposed of in closed containers.

MITIGATION FOR UNAVOIDABLE ADVERSE EFFECTS

VALLEY ELDERBERRY LONGHORN BEETLE

Unavoidable impacts to valley elderberry longhorn beetle habitat will be mitigated by implementation of the following measures:

- If feasible, based on construction timing, elderberry shrubs will be transplanted when the plants are dormant (November through the first 2 weeks of February) to increase the success of transplanting. A qualified biologist will be available to monitor transplanting activity.

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

- Shrubs will be removed with a Vemeer spade, backhoe, front end loader, or other suitable equipment. When a shrub is being excavated, as much of the root ball as possible will be removed and replanted immediately at the mitigation site. Care will be taken to ensure that the soil is not dislodged from the root ball.

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

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

- Each elderberry stem measuring 1 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted or destroyed) will be replaced with elderberry seedlings and seedlings of associated species, in accordance with the USFWS Conservation Guidelines (USFWS 1999a). Elderberry seedlings or cuttings will be replaced at ratios ranging from 1:1 to 6:1 (new plantings to affected stems), depending on the diameter of the affected elderberry stems and the presence of beetle exit holes.

- Associated native plants will be planted at 1:1 or 2:1 ratios, depending on the presence of beetle exit holes in the affected elderberry stems. Stock of seedlings and/or cuttings will be obtained from local sources.

GIANT GARTER SNAKE

Unavoidable adverse effects to giant garter snake will be mitigated through creation, enhancement, and/or preservation of suitable aquatic and adjacent upland habitat for the species. Mitigation will be provided through purchase of mitigation credits at a USFWS-approved giant garter snake mitigation bank whose service area includes the project site. Currently, the most likely mitigation bank is Gilsizer Slough, which is owned and managed by Wildlands, Inc. A letter of credit for purchase of giant garter snake habitat mitigation acres at Gilzier Slough has been drafted and is expected to be signed in July 2007. This letter of credit outlines a payment schedule for purchase of the mitigation acreage.

ACTION AREA

The action area for the FRLRP Segment 2 Stage 1 activities includes the setback levee footprint (including landside and waterside corridors), borrows site(s), excess soil disposal areas, and the Pump Station No. 3 relocation area. The action area for the FRLRP Segment 2 Stage 2 activities includes downstream portions of Plumas Lake Canal between the new pump station and the setback levee, the levee setback area, the existing levee and adjacent water side toe access corridor and immediately adjacent riparian habitat, and the existing drainage channel that connects the current Pump Station No. 3 outfall to the Feather River channel. Key construction components and landmarks are depicted in Exhibit 3. Borrow site locations are not depicted in this exhibit because they are not know at this time. However, the borrow sites are likely to be within agricultural lands in the levee setback area or between the setback levee and Feather River Boulevard.

The action area is dominated by orchards. Other habitat types and land uses include row crop fields, developed areas (houses, farm buildings, roadways, etc.), levees and adjacent maintenance zones, and relatively limited areas of riparian and aquatic habitats associated with the Feather River and with Plumas Lake Canal and connected agricultural and drainage ditches and canals.

SPECIES ACCOUNTS AND STATUS IN THE ACTION AREA

VALLEY ELDERBERRY LONGHORN BEETLE

The valley elderberry longhorn beetle has four life stages: egg, larva, pupa, and adult. The species is nearly always found on or close to its host plant, elderberry (Sambucus species). Females lay their eggs on the bark, and larvae hatch and burrow into the stems. The larval stage can last 2 years, after which the larvae enter the pupal stage and transform into adults. Adults are active (feeding and mating) from March through early June (USFWS 2006). It appears that to function as habitat for the valley elderberry longhorn beetle, host elderberry shrubs must have stems that are 1.0 inch or greater in diameter at ground level. Use of the plants by the beetle is rarely apparent. Frequently, the only exterior evidence of the shrub's use by the beetle is an oval exit hole created by the larva just before the pupal stage. Field studies conducted along the Cosumnes River and in the Folsom Lake area suggest that larval galleries can be found in elderberry stems with no evidence of exit holes. The larvae either succumb before constructing an exit hole or are not far enough along in the developmental process to construct an exit hole (USFWS 1996).

Valley elderberry longhorn beetles are patchily distributed throughout the remaining riparian forests of the Central Valley from Redding to Bakersfield. The beetle appears to be only locally common (i.e., found in population clusters that are not evenly distributed across the Central Valley). Extensive loss of California's Central Valley riparian forests has occurred since 1900, declining by 80–96% depending on the region (USFWS 2006). Although wide-ranging, the valley elderberry longhorn beetle is thought to have suffered a long-term decline because of human activities that have resulted in widespread alteration and fragmentation of riparian habitats and, to a lesser extent, upland habitats that support the beetle. Low density and limited dispersal capability may cause the beetle to be particularly vulnerable to population isolation as a result of habitat fragmentation. Insecticide and herbicide use in agricultural areas and along road rights-of-way may be factors limiting the beetle's distribution. The age and quality of individual elderberry shrubs/trees and stands as a food plant for beetle may be a factor in its limited distribution.

USFWS released a 5-year status review for the valley elderberry longhorn beetle on October 2, 2006 (USFWS 2006). This review reported an increase in known beetle locations from 10 at the time of listing in 1980 to 190 in 2006. Because of this observed population increase and the concurrent protection and restoration of several thousand acres of riparian habitat suitable for valley elderberry longhorn beetles, the USFWS status review determined that this species is no longer in danger of extinction, and recommended that the species no longer be listed under the ESA. This recommendation is not a guarantee that the species will be delisted, however,

because formal changes in the classification of listed species require a separate USFWS rulemaking process distinct from the 5-year review. If valley elderberry longhorn beetles are removed from the ESA list, the delisting is unlikely to be finalized prior to late 2008.

Elderberry shrubs are widely distributed throughout riparian areas along the Feather River and irrigation ditches in the setback levee area. A survey of elderberry shrubs located within 100 feet of the existing Feather River Levee and in the vicinity of the setback levee alignment was conducted by EDAW biologist John Downs in April 2007. A survey of additional shrubs along the existing Pump Station No. 3 outfall and associated channel between the existing levee and the Feather River was conducted by Mr. Downs in June 2007. This channel will be improved for drainage and fish passage purposes. The locations of all shrubs mapped during the EDAW surveys are depicted in Exhibits 4a and 4b.

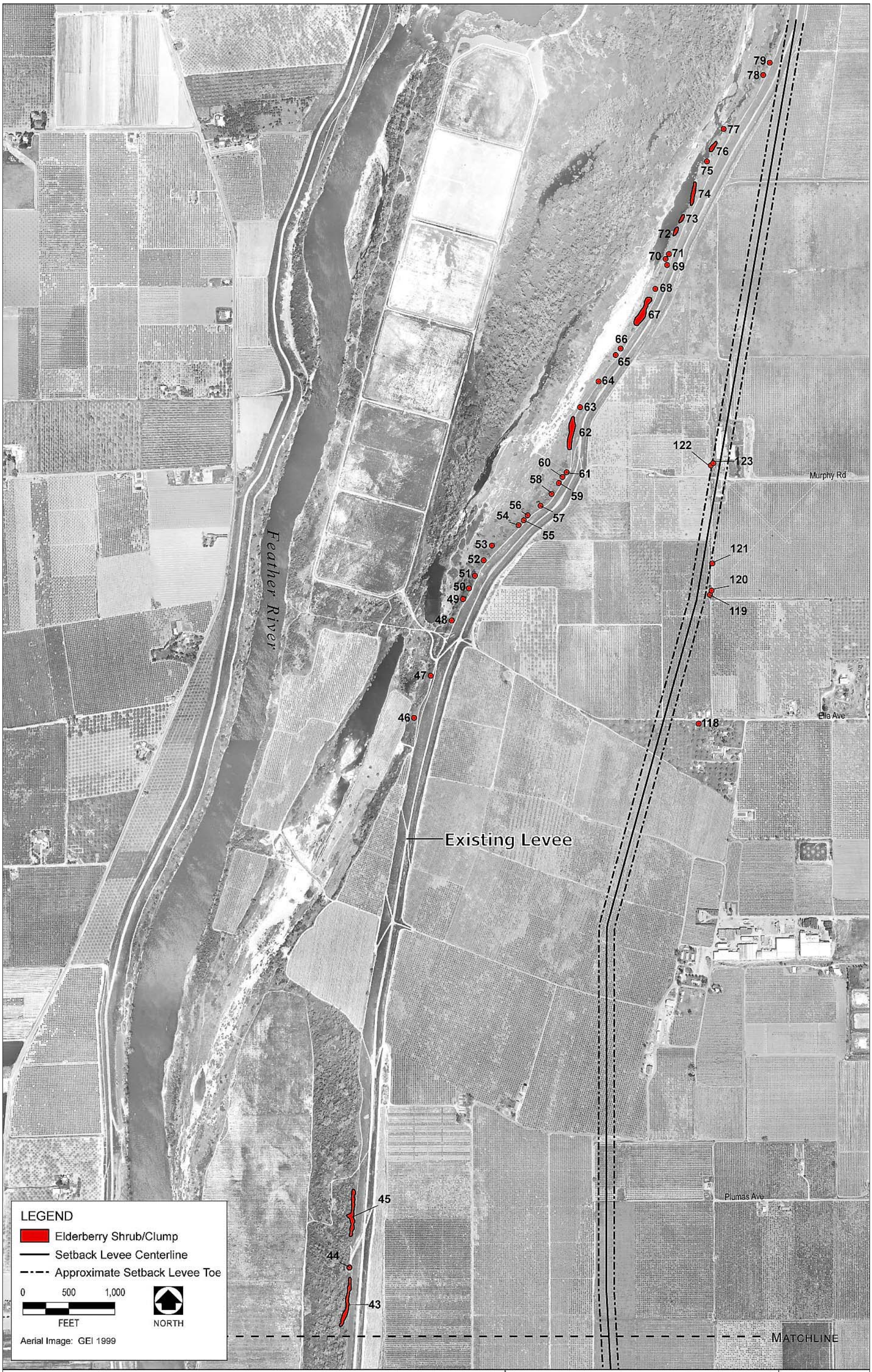
GIANT GARTER SNAKE

Suitable giant garter snake habitat is characterized by all of the features necessary to support permanent populations of the species, including: 1) sufficient water during the active summer season to supply cover and food such as small fish and amphibians; 2) emergent, herbaceous aquatic vegetation accompanied by vegetated banks to provide basking and foraging habitat; 3) bankside burrows, holes, and crevices to provide short-term aestivation sites; and 4) high ground or upland habitat above the annual high water mark to provide cover and refugia from floodwaters during the dormant winter season (Hansen 1988, Hansen and Brode 1980). Occupied aquatic habitats typically contain permanent or seasonal water, mud bottoms, and vegetated dirt banks (Fitch 1940, Hansen and Brode 1980).

Giant garter snakes typically emerge from winter retreats from late March to early April and can remain active through October. The timing of their annual activities is subject to varying seasonal weather conditions. Cool winter months are spent in dormancy or periods of reduced activity. While this species is strongly associated with aquatic habitats, individuals have been noted using burrows as far as 165 feet from marsh edges during the active season and retreats more than 800 feet from the edge of wetland habitats while overwintering (Wylie et al. 1997, USFWS 1999b). Based on these observations, USFWS has defined giant garter snake upland habitat adjacent to aquatic habitat as suitable uplands within 200 feet of the edge of the aquatic habitat (USFWS 1997).

Giant garter snakes formerly ranged throughout the wetlands of California's Central Valley, from Buena Vista Lake near Bakersfield in Kern County north to the vicinity of Chico in Glenn and Butte Counties (Hansen and Brode 1980). They appear to have been extirpated from the San Joaquin Valley south of Mendota in Fresno County (Hansen and Brode 1980, USFWS 1999b) and have suffered serious declines in other parts of their former range. The primary cause of decline, aquatic habitat loss or degradation caused by agricultural development, has been compounded by the loss of upland refugia (e.g., burrows and crevices) and bankside vegetation cover (Thelander 1994). Other sources of decline include predation on young snakes by introduced species, modification of levees and upland habitat, and elimination of prey species by pesticides. Giant garter snakes are currently distributed in 13 recognized populations in California. These populations are isolated, without protected dispersal corridors to other adjacent populations, and are threatened by land use practices and other human activities, including development of wetland and suitable agricultural habitats.

The CNDDB documents seven giant garter snake locality records within 10 miles of the project site; only one of these is within 5 miles. The nearest record (CNDDB Occurrence Record 108) represents an undisclosed number of individuals northeast of Rio Oso, east of Highway 70, and south of the Bear River, that were sighted prior to, but not during, a 1986–1987 study by George Hansen. No giant garter snakes have been officially documented in the project vicinity north of the Bear River, although there was a reported sighting at the Olivehurst detention basin site (less than 5 miles east of the project site) in 1998 (Sycamore Environmental 1998).



Feather River Levee Repair Project

Segment 2

Elderberry Shrubs in Vicinity of Construction Areas

Source: Data Provided by EDAW and GEI 2007

X091

THREE RIVERS LEVEE IMPROVEMENT AUTHORITY

1114 Yuba Street, Suite 218
Marysville, CA 95901

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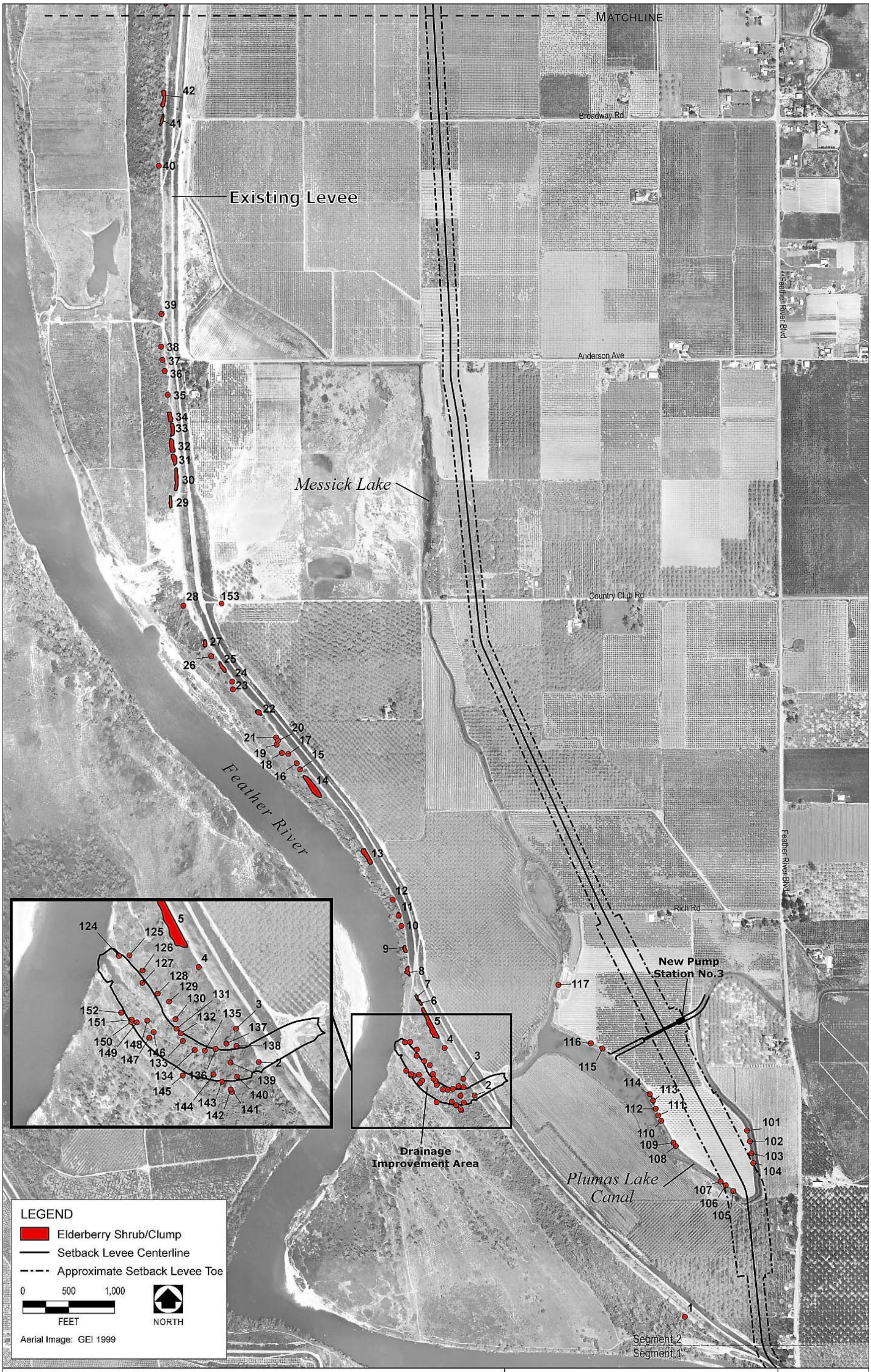
Exhibit 4a



Feather River Levee Repair Project

Segment 2

Elderberry Shrubs in Vicinity of Construction Areas

Source: Data Provided by EDAW and GEI 2007

X092

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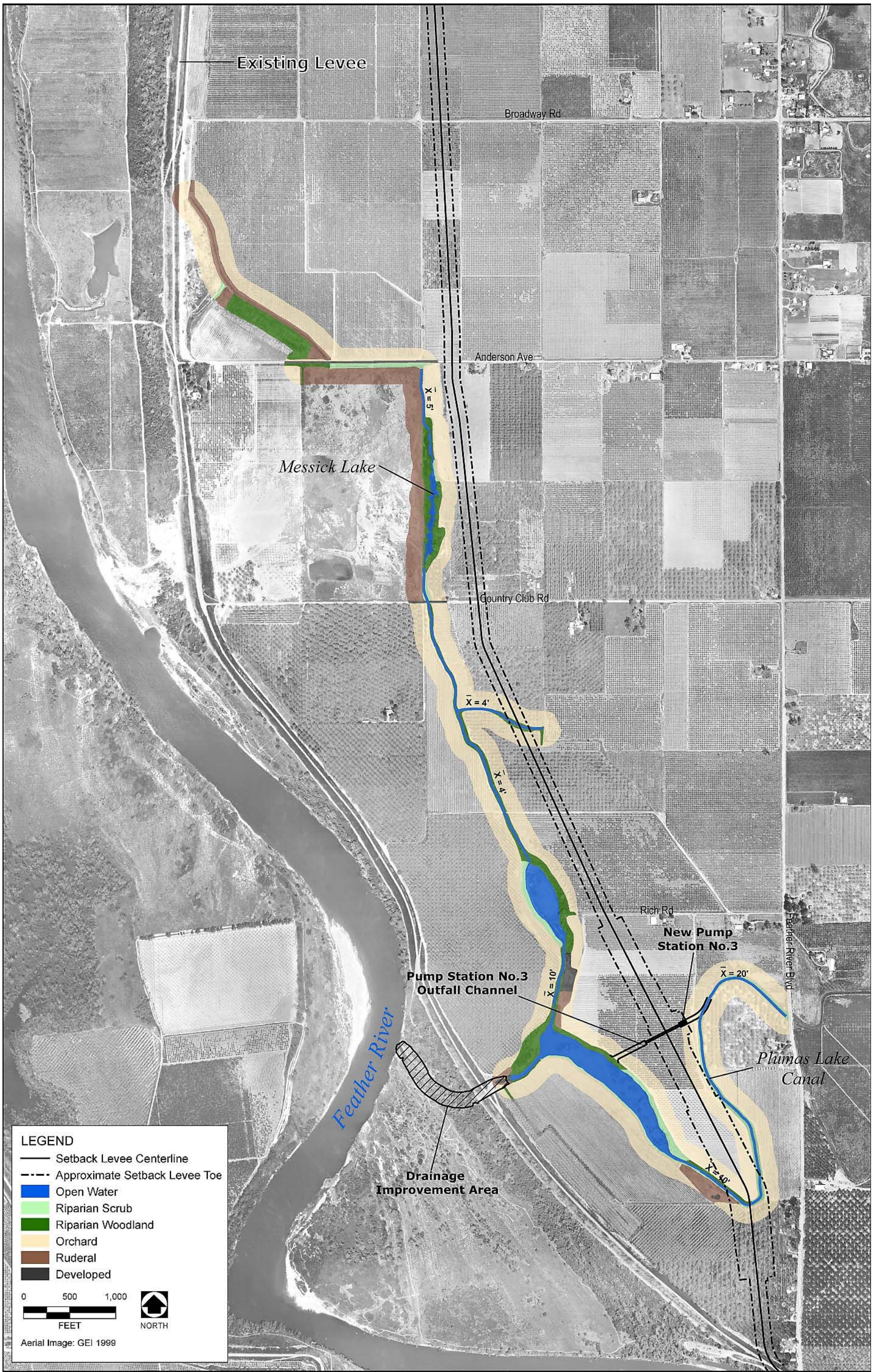
Exhibit 4b

Despite the near lack of giant garter snake records in the project vicinity, portions of Plumas Lake Canal and associated drainage ditches on the project site are potentially suitable for giant garter snake and are hydrologically connected to other areas capable of supporting the species. Exhibit 5 depicts Plumas Lake Canal and associated drainage ditches within the project area, and upland habitats within 200 feet. All of these areas were examined during an assessment of habitat suitability conducted by EDAW biologist Anne King on May 18, 2007. Based on this evaluation, many of the upland areas were determined to be unsuitable for the species because they are actively farmed orchards or riparian woodland dominated by tall woody shrubs and trees that completely shade the understory. In addition, some of the aquatic habitats were determined to be unsuitable because they are located in the upper reaches of the drainage system and do not retain water during the garter snake active season (they were dry at the time of the EDAW survey). Exhibits 6a and 6b depict the approximately 17 acres of aquatic habitat and 11 acres of upland habitat the habitats that were determined to be suitable for giant garter snake, based on the field evaluation. In general, all open water habitat is considered potentially suitable for giant garter snake, even if it is completely shaded by overhead riparian woodland vegetation, because snakes could utilize these ditches to travel between areas of more suitable habitat. However ditches in the northern portion of Exhibit 5, including the ditch south of and parallel to Anderson Avenue and ditches north of Anderson Avenue are unsuitable due to lack of water during the snake's active season. Suitable upland vegetation includes all areas mapped as ruderal or riparian scrub that are adjacent to suitable aquatic habitat. One exception to this is the ruderal habitat mapped west of Messick Lake. This is an active borrow/disposal site that is regularly disked and maintained for borrow extraction purposes. Therefore, uplands on this property are not suitable for giant garter snake. Representative photographs of aquatic and adjacent upland habitats in the action area are provided as an appendix, and photo locations are shown on Exhibits 5, 6a, and 6b.



Feather River Levee Repair Project

Segment 2

Aquatic Habitat and Adjacent Uplands within the Action Area

Source: Data Provided by EDAW and GEI 2007

X124

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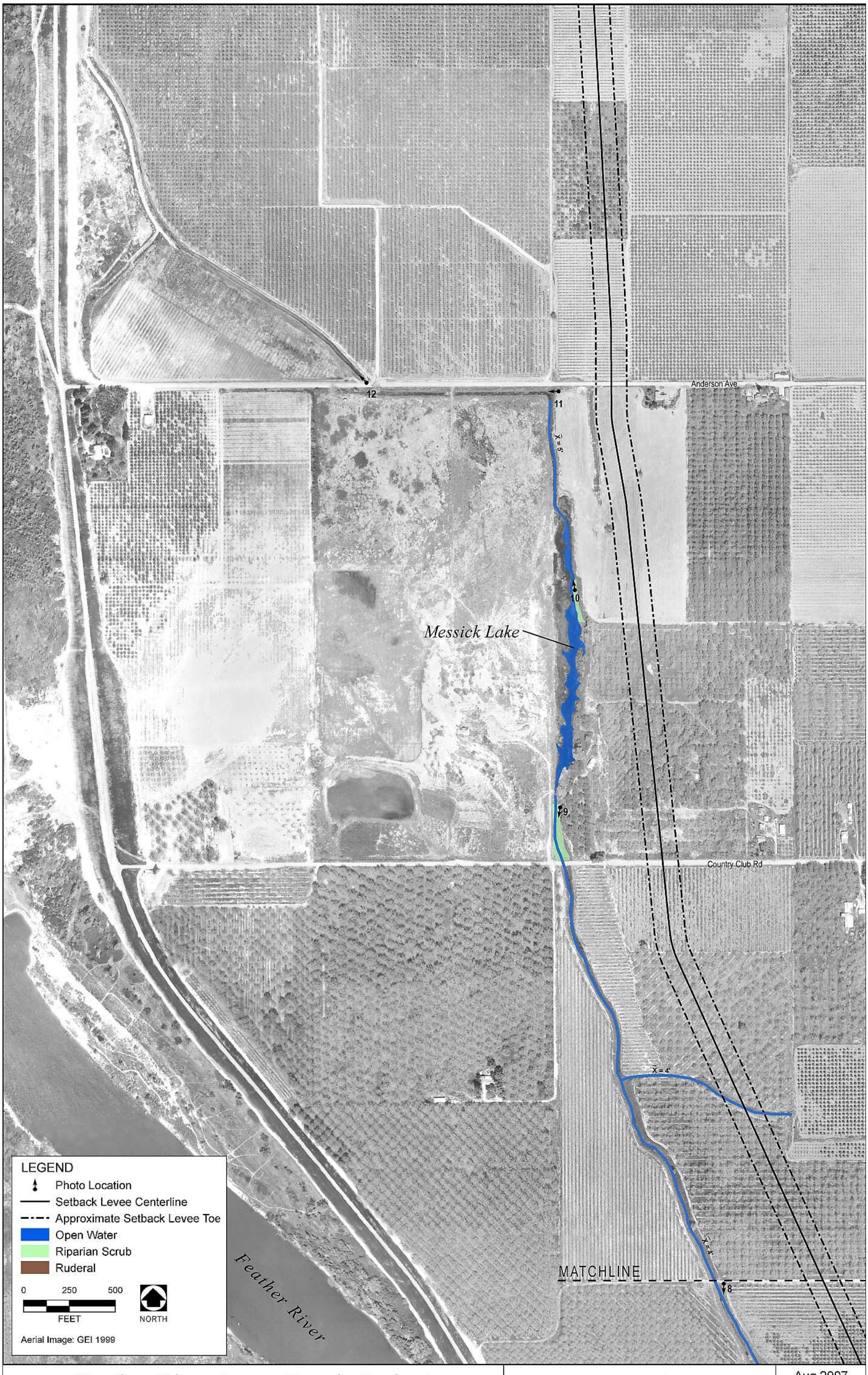
Exhibit 5



Feather River Levee Repair Project

Segment 2

Suitable Giant Garter Snake Habitat within the Action Area

Source: Data Provided by EDAW and GEI 2007

X116

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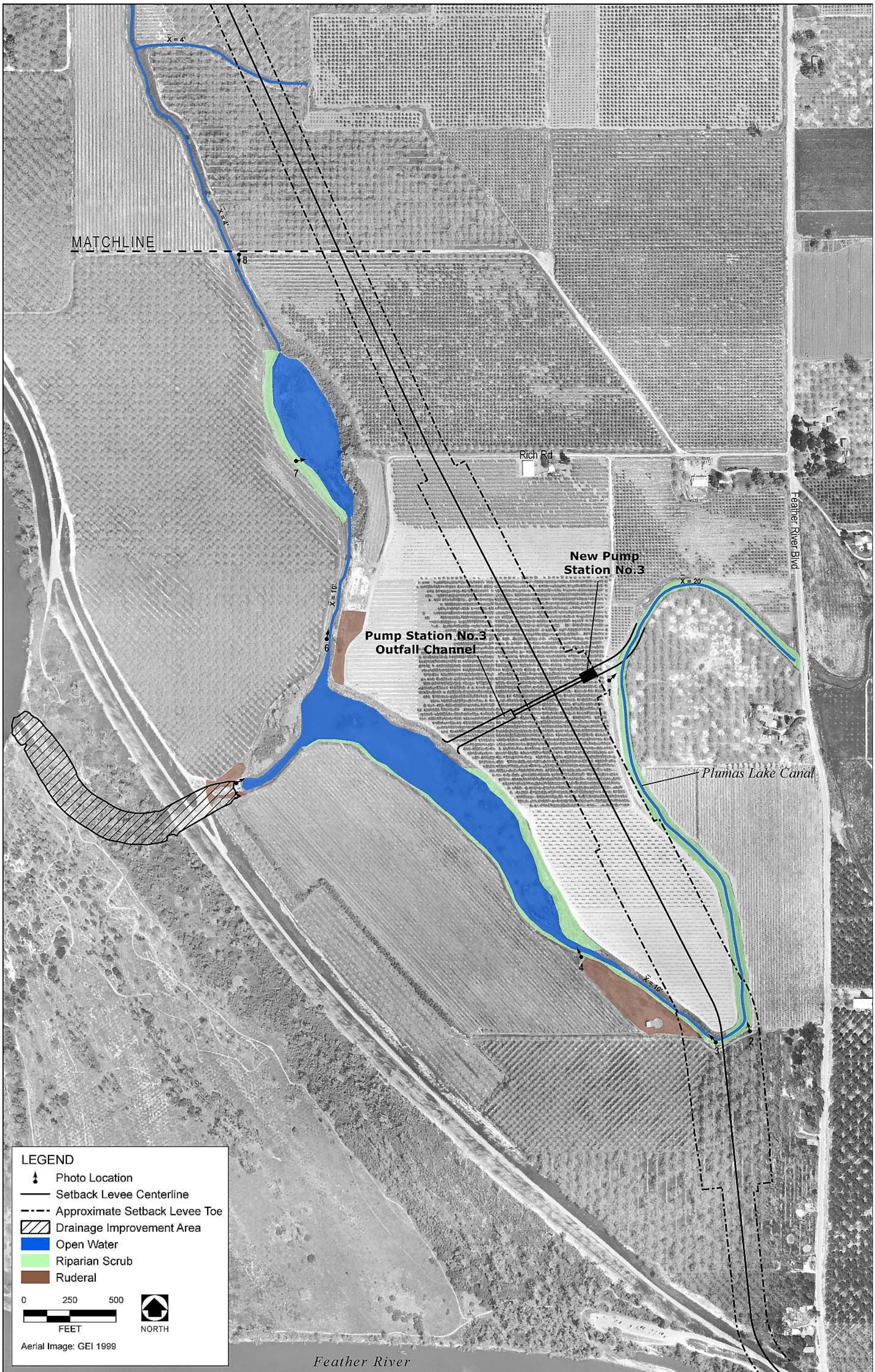
Exhibit 6a



Feather River Levee Repair Project

Segment 2

Suitable Giant Garter Snake Habitat within the Action Area

Source: Data Provided by EDAW and GEI 2007

X117

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Exhibit 6b

EFFECTS

DIRECT AND INDIRECT EFFECTS TO THE SPECIES IN THE ACTION AREA

VALLEY ELDERBERRY LONGHORN BEETLE

A total of 10 shrubs depicted in Exhibits 4a and 4b (shrubs #103, 104, 105, 106, 107, 119, 120, 121, 122, and 123) are within the current setback levee or adjacent levee maintenance zone and could require removal during Stage 1. Shrubs #103, 104, 105, 106, and 107 are along Plumas Lake Canal; Shrubs #105 and 106 appear to be within the levee footprint, and the remaining shrubs (#103, 104, and 107) are potentially within the waterside maintenance zone. The other three shrubs are in isolated locations along orchard boundaries near the northern end of the setback levee alignment. Three of these shrubs (#121, 122, and 123) are within the levee footprint, and the other shrubs (#119 and 120) may be within the landside maintenance zone. Table 1 provides information on the number and size of stems for each of these shrubs, as well as whether or not they have beetle exit holes. An additional 30 shrubs are present in the vicinity of the existing Pump Station No. 3 outfall channel that will be re-graded in Stage 2 to enhance drainage and fish passage from the setback area. Specific information on stem sizes and presence or absence of beetle exit holes will be collected after a detailed project design is developed and the need for shrub removal in this area can be evaluated.

Table 1
Survey Information for Elderberry Shrubs That May Require Removal During Construction of the Feather River Segment 2 Setback Levee

Shrub Number	Number of Stems per Diameter Category (inches)			Beetle Exit Holes Present?	Within Riparian Habitat?
	≥ 1 and ≤ 3	≥ 3 and ≤ 5	≥ 5		
103*	3	3	0	Unknown	Yes
104*	2	0	0	Unknown	Yes
105	5	0	0	No	Yes
106*	5	0	0	Unknown	Yes
107*	2	0	0	Unknown	Yes
119	7	3	0	No	No
120	7	1	0	No	No
121	1	2	0	No	No
122	7	4	0	No	No
123	5	0	0	No	No

Source: EDAW 2007 survey data
* Shrubs are growing within dense blackberry thicket; stem counts one estimates and shrubs were not surveyed for exit holes.

Approximately 57 stems greater than 1 inch in diameter at ground level could be removed in Stage 1, potentially resulting in direct effects to valley elderberry longhorn beetles. An exact determination of whether or not these shrubs require removal and how many stems would be affected will be provided after the project design is finalized. If the stems are occupied by beetles, any early-stage individuals are likely to be killed when the shrub is removed. Removed shrubs will be transplanted during the shrub's dormant season, if feasible. It may not be possible to do so if setback levee construction in the vicinity of the relevant shrubs must proceed prior to the onset of the dormant season in fall 2007. In addition, shrubs on the water side of the existing levee must be transplanted prior to or long enough after high river flows to allow access and appropriate ground conditions. Although complete loss of the shrubs to be removed should be avoided with transplantation, transplanted elderberry shrubs can experience stress or health problems because of changes in soil, hydrology, microclimate, or associated vegetation, and mortality of transplanted shrubs precludes their future use by the beetle. In addition, it will take 5

or more years for replacement elderberry plantings to reach a size conducive to use as habitat by valley elderberry longhorn beetles. Therefore, there could be a temporary loss of habitat available to the beetle.

Elderberry shrubs along the existing levee are not anticipated to require removal, because activity in the vicinity of these shrubs will be restricted to levee degradation and will not result in disturbance of any adjacent riparian vegetation. It is also anticipated that the six shrubs along portions of Plumas Lake Canal that will be filled in Stage 2 can be preserved. Although the canal requires filling in these areas, and vegetation on the canal banks will need to be removed to facilitate this fill, it is anticipated that vegetation on the top of bank, including the elderberry shrubs, can be preserved. A more detailed evaluation of this preliminary conclusion will be conducted after a detailed project design is developed.

Although construction activity could, in some cases, occur within the typical 20-foot core avoidance area of shrubs along the existing Feather River levee and Plumas Lake Canal, construction will be largely limited to already disturbed areas, such as levee maintenance corridors and established roadways. Construction will rarely result in impacts to previously undisturbed ground within 20 feet of an elderberry shrub and is unlikely to threaten the health of these shrubs. Therefore, preserving these shrubs in place rather than transplanting them would likely be more beneficial to valley elderberry longhorn beetle larvae that could be in the stems of these shrubs.

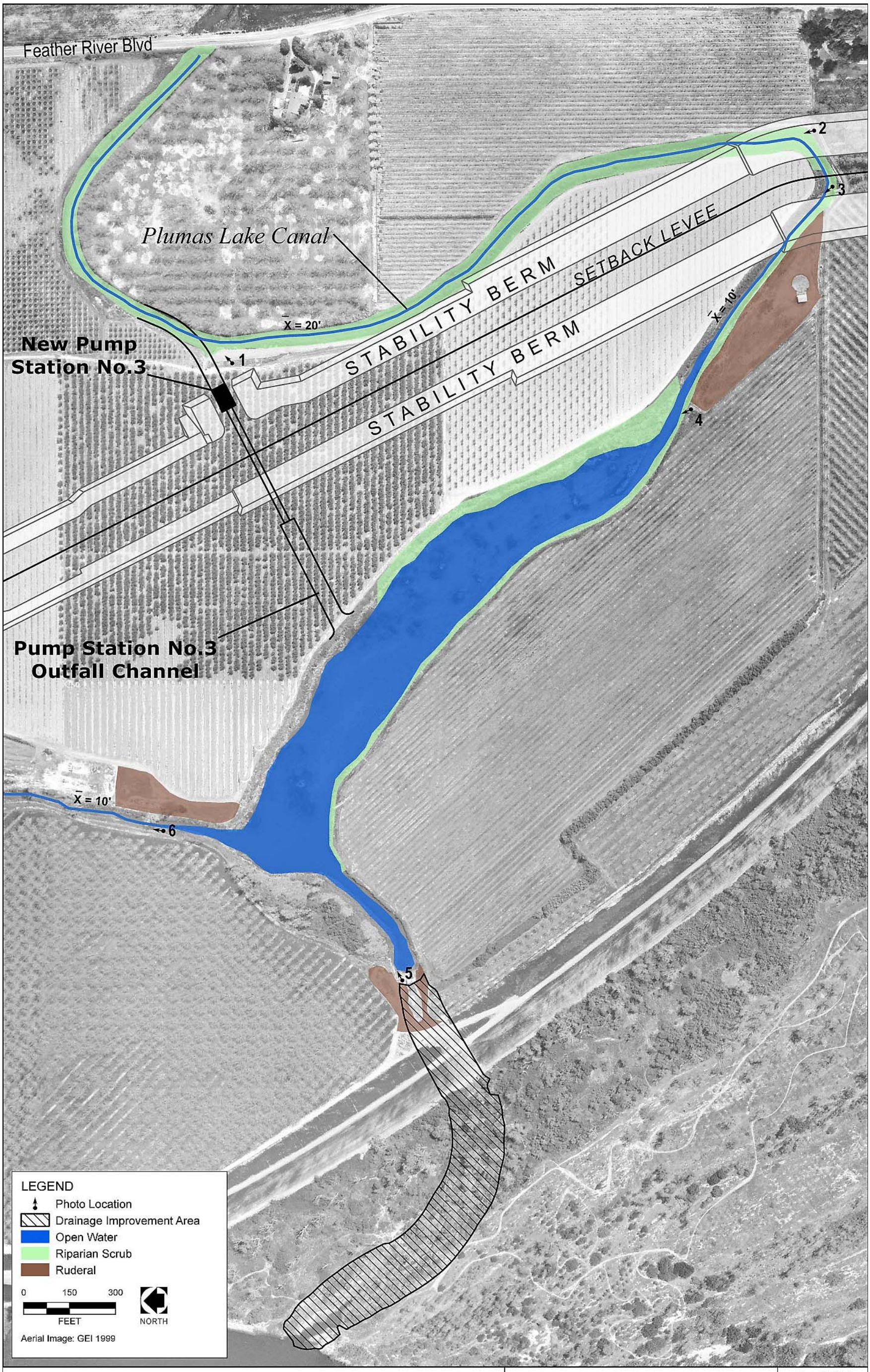
GIANT GARTER SNAKE

Adverse effects to suitable giant garter snake habitat that will occur during Stage 1 construction are limited to direct impacts resulting from construction of the setback levee where it crosses Plumas Lake Canal and construction of the new Pump Station No. 3. These areas are depicted in Exhibit 7. Construction of the setback levee and stability berms and establishment of the adjacent maintenance corridor will result in permanent loss of 0.38 acre of suitable aquatic habitat for giant garter snake provided by Plumas Lake Canal and 1.70 acres of suitable adjacent upland. Relocation of Pump Station No. 3 will result in temporary effects to 0.11 acre of aquatic habitat and permanent loss of 0.09 acre of upland habitat. The temporary effects to aquatic habitat would result from dewatering a segment of the existing canal during pump station construction; this habitat would be restored to pre-project conditions when construction is complete. During Stage 1, a total of 2.17 acres of giant garter snake habitat (0.38 aquatic and 1.79 upland) will be permanently lost, and an additional 0.11 acre of aquatic habitat will be temporarily affected.

The majority of adverse effects to giant garter snake habitat resulting from implementation of the proposed project are associated with Stage 2. These effects include direct loss of 0.35 acre of aquatic habitat resulting from fill of portions of Plumas Lake Canal adjacent to the setback levee. However, the primary potential impact to garter snake habitat will occur when the existing Feather River levee is degraded and the remaining areas of suitable habitat within the setback area are exposed to flooding. A total of 15.87 acres of potentially suitable aquatic habitat and 10.45 acres of suitable upland habitat will be indirectly lost as a result of this action. Therefore, a total of 26.67 acres of potentially suitable giant garter snake habitat (16.22 aquatic and 10.45 upland) will be considered permanently affected during Stage 2.

CUMULATIVE EFFECTS

There are a number of present and future projects that could result in effects similar to those of the FRLRP Segment 2 setback levee construction and related activities. These projects are grouped into three general categories: flood control, development, and ecosystem and habitat restoration. Information on relevant projects and studies is provided in the Environmental Impact Report for the Feather River Levee Repair Project (Three Rivers Levee Improvement Authority 2006). Most of these current and potential future projects mentioned would require a federal action, and, therefore, be subject to Section 7 consultation. Effects of such projects would not be considered cumulative to the FRLRP. However, an undetermined number of future land use conversions



Feather River Levee Repair Project
Segment 2

Direct Impacts to Giant Garter Snake Habitat

Source: Data Provided by EDAW and GEI 2007

X123

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Exhibit 7

and routine agricultural practices not subject to federal authorization or funding could alter the habitat for and/or increase incidental take of valley elderberry longhorn beetle and giant garter snake. These projects are, therefore, cumulative to the FRLRP and could contribute to cumulative adverse effects to these species.

Construction of the Segment 2 setback levee also has the potential to contribute to a cumulative benefit to biological resources, including valley elderberry longhorn beetle, by precluding the potential for development in the 1,600-acre levee setback area and enhancing the riverine ecosystem along the Feather River. Although there would be no beneficial effects to giant garter snake, which requires habitat outside of the floodplain, many species that thrive in dynamic riverine systems could benefit. Expansion of the Feather River floodway could increase the amount of riverine aquatic and riparian habitat and reduce habitat fragmentation. In combination with restoration projects in the region, this would enhance regional migratory corridors and provide larger habitat units for many aquatic and terrestrial species.

GROWTH-INDUCING IMPACTS

Flooding that occurred in the Central Valley in 1986 resulted in initiation of various flood control studies and projects in the Yuba River basin and in the RD 784 area of Yuba County. The System Evaluation Project prepared by the USACE and DWR was the first of these flood control projects. This project was followed in 1988 by Yuba County Water Agency's (YCWA's) initiation of the Yuba Basin Project.

In 1993, following the initiation of the System Evaluation Project and the Yuba River Basin Project, and before the floods of 1997, Yuba County approved the Plumas Lake Specific Plan, which provides for a 12,000-home development on 5,200 acres in the southern portion of the RD 784 area. A few years before, the County also approved the smaller East Linda Specific Plan adjacent to Yuba Community College, north of Olivehurst. Construction of the Plumas Lake and East Linda developments began in 2002. However, the results of a USACE floodplain mapping study completed in 2003 indicated that the people and property in the RD 784 area, including homes that had already been built in the Plumas Lake Specific Plan area before the release of the USACE study, were subject to a much higher flood risk than previously believed. Without levee improvements that meet Federal Emergency Management Agency (FEMA) criteria, FEMA could issue new Flood Insurance Rate Maps for the RD 784 area.

To avoid having RD 784 mapped into the FEMA 100-year floodplain, YCWA, RD 784, and Yuba County, in consultation with many landowners and developers in southern Yuba County, elected to move aggressively on a program for achieving FEMA accreditation of the RD 784 levees. As a result of this program, various levee repair/improvement projects and other flood protection projects have been completed, are under way, or are being studied in the RD 784 area, including the FRLRP.

In 2005, The Reclamation Board issued an encroachment permit for work on Phase 3 of a program of flood control elements, which included Bear River and Western Pacific Interceptor Canal levee improvements and construction of the Olivehurst detention basin. Notably, the encroachment permit contained a special condition that limited the issuance of building permits in the RD 784 area to 800 in 2005 and 700 in 2006. Limitations on building permits would be removed after planned flood protection projects were completed. This condition in The Reclamation Board's encroachment permit, which was agreed to by Yuba County, provided a nexus between completion of flood protection efforts and future growth/development in the RD 784 area.

Since 2005, remaining state bond funding for TRLIA's levee improvements under the Costa-Machado Water Act of 2000 has been expended. The lack of available funding has constrained TRLIA's ability to continue planned flood protection improvements, including implementation of the FRLRP, as well as additional levee repair work on the Yuba River left (south) bank levee. These circumstances contributed to the April 21 and May 19, 2006, decisions by The Reclamation Board to approve a resolution allowing TRLIA to accelerate its levee improvement program using developer-generated funding. The resolution allows developers to generate these funds by removing the previous Reclamation Board limitation on building permits (800 in 2005 and 700 in 2006).

The Reclamation Board found that the building permit limitation in the Plumas Lake Specific Plan area was, indeed, limiting TRLIA's ability to continue necessary levee improvement and construction projects. Therefore, it was determined that development could proceed in the specific plan area without the previous constraints.

However, The Reclamation Board's April 2006 resolution includes various conditions that must be met to allow continued development, to which all parties agreed. TRLIA made a commitment to use its best efforts to complete all elements of the flood control program by 2008. The developers must purchase flood insurance for homeowners in the Plumas Lake Specific Plan developments until 2008, or until completion of necessary flood protection efforts. Furthermore, the County agreed to satisfy concerns expressed by The Reclamation Board regarding the status of its Flood Safety Information and Emergency Evacuation Plan. The decision by The Reclamation Board to lift the previous building restrictions allows TRLIA, in partnership with Yuba County and the local landowners, to finalize and implement its finance program to raise the $135 million necessary to complete the levee improvement program.

Because the FRLRP would not involve the construction of housing, it would not be directly growth inducing. It does, however, remove an obstacle to growth, because continuing buildout of the Plumas Lake Specific Plan area is directly linked to continuing levee improvements that are proposed under the FRLRP. Based on the conditions of The Reclamation Board's April 2006 resolution without implementation of the FRLRP and other flood protection projects, development in the Plumas Lake Specific Plan area could not proceed beyond 2008. Therefore, implementation of the FRLRP is growth inducing in the sense that it removes an obstacle to future development.

This future development will result in loss of agricultural land and other habitats that could be suitable for giant garter snake and valley elderberry longhorn beetle. Therefore, the FRLRP, including construction of the Segment 2 setback levee, could facilitate future take of these species. However, as discussed above under "Cumulative Impacts," this future development would likely require a federal action, and, therefore, be subject to Section 7 consultation and resulting terms and conditions to mitigate the take.

ANALYSIS OF ALTERNATE ACTIONS

Three alternatives to the setback levee component of the FRLRP were evaluated in the Environmental Impact Report for the Feather River Levee Repair Project (Three Rivers Levee Improvement Authority 2006). Alternatives evaluated with the proposed action include the Levee Strengthening Alternative and the Levee Strengthening and Intermediate Setback Levee Alternative.

The Levee Strengthening Alternative would repair and strengthen the existing levee in place to correct seepage and/or stability deficiencies and address areas of the levee where erosion has been identified as a concern. This alternative would not result in an increase in floodway area.

The Levee Strengthening and Intermediate Setback Levee Alternative would replace the existing levee in project Segment 2 with a new setback levee (the intermediate setback levee), with the northern portion of this setback levee located mostly west of the proposed setback levee alignment. This alternative would result in an increase in floodway area less than that of the proposed alternative. Relocation and replacement of Pump Station No. 3 is also included with this alternative.

The levee setback alignment described as the proposed action was selected because it would provide the greatest security against flood events that are likely to occur over the life of the alternatives. This security would derive from the variety of different improvements to the flood protection system working in combination to reduce the potential for catastrophic flooding in the project area: addressing deficiencies associated with the north levee of the lower Bear River, providing increased flood protection more than sufficient to protect against the designated 200-year storm event, and providing a new levee constructed on a more stable foundation using the latest engineering methods. The setback levee could also provide substantial overall long-term environmental benefits associated with an expanded floodway, such as increases in fish and wildlife habitat, width of the riparian corridor, and ecosystem complexity.

CONCLUSION AND DETERMINATION

VALLEY ELDERBERRY LONGHORN BEETLE

Construction of the setback levee could require removal of ten shrubs with approximately 57 stems ≥1 inch and ≤5 inches in diameter at ground level. These impacts will occur in Stage 1. A total of 30 additional shrubs are present in the vicinity of the drainage channel that will be improved during Stage 2 to facilitate setback area drainage and fish passage. Some of these shrubs are likely to require removal; however, enhancement of the channel would result in an overall improvement in its habitat quality. The exact number of shrubs and their stems that would be removed will be determined after the project design is finalized the need for shrub removal can be evaluated. Adverse effects to additional shrubs within 100 feet of areas that would be disturbed by project construction during both stages could occur. Such effects would be minimized by implementation of avoidance zones, as described above under "Avoidance, Minimization, and Conservation Measures." Compensation for unavoidable adverse effects will be provided, in accordance with the USFWS Conservation Guidelines (USFWS 1999a).

Elderberry shrubs that require removal will be transplanted to the project area or an alternative suitable site approved by USFWS. Replacement elderberry cuttings or seedlings and associated plants of appropriate native species will also be planted in the mitigation area. The appropriate number of replacement plantings will be determined based on the habitat in which the transplanted shrubs were located (riparian vs. non-riparian), the size of the stems on the transplanted shrubs, and whether or not beetle exit holes are present on the transplanted shrubs. If the shrubs cannot be transplanted during the dormant season, the number of replacement elderberry cuttings or seedlings and associated native plants and size of the mitigation area may be increased, based on consultation with USFWS. The transplant area will include a minimum of 1,800 square feet (0.04 acre) for each transplanted shrub and up to five replacement elderberry seedlings and five associated native plants.

Implementation of the proposed action will adversely affect habitat for valley elderberry longhorn beetle and could result in take of the species. However, based on implementation of avoidance and minimization measures that will preserve the majority of the more than 100 elderberry shrubs that have been documented in the vicinity of project construction areas and mitigation to compensate for adverse effects to shrubs that cannot be preserved in place, the proposed project would not jeopardize the continued existence of valley elderberry longhorn beetle. In addition, the species would benefit in the long term from overall enhancement of the Feather River floodway.

GIANT GARTER SNAKE

Construction of the setback levee and new Pump Station No. 3 would result in permanent loss of 0.38 acre of suitable aquatic habitat for giant garter snake and 1.79 acres of adjacent suitable upland, as well as temporary effects to 0.11 acre of aquatic habitat. These impacts would occur in Stage 1. A total of 16.22 additional acres of suitable aquatic and 10.45 acres of adjacent upland habitat would be permanently affected in Stage 2, as a result of direct fill and exposure of habitat in the setback area to flood waters. Therefore, a total of 28.95 acres of giant garter snake habitat would be affected as a result of the proposed action, including permanent loss of 16.60 acres of aquatic and 12.24 acres of upland habitat and temporary loss of 0.11 acre of aquatic habitat.

Compensation for this unavoidable loss of giant garter snake will be provided through creation, enhancement, and/or preservation of suitable aquatic and adjacent upland habitat at an appropriate site and in an amount to be determined in consultation with the USFWS. Mitigation is anticipated to be provided through purchase of mitigation credits at Gilsizer Slough or another USFWS-approved mitigation bank.

Implementation of the proposed action would adversely affect habitat for giant garter snake and could result in take of the species. However, based on implementation of mitigation to compensate for this habitat loss, the proposed project would not jeopardize the continued existence of giant garter snake.

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APPENDIX

Representative Photographs

Photo 1: Blackberry scrub along western side of Plumas Lake Canal in vicinity of new Pump Station No. 3 location *(EDAW 2007*)

Photo 2: Plumas Lake Canal immediately east of where the setback levee will cross the canal; this portion of the canal will be filled in Stage 2 *(EDAW 2007*)

Photo 3: Plumas Lake Canal immediately west of where the setback levee will cross the canal; this portion of the canal will be filled in Stage 2 *(EDAW 2007*)

Photo 4: Southern pond with dense blackberry scrub along western edge and blackberry/willow scrub along eastern edge *(EDAW 2007*)

Photo 5: Existing Pump Station No. 3, with adjacent developed, ruderal, and riparian woodland habitats *(EDAW 2007*)

Photo 6: Canal segment between northern and southern ponds, with riparian woodland shading the canal and banks *(EDAW 2007*)

Photo 7: Northern pond with dense blackberry scrub in foreground along western edge and riparian woodland/forest in background along eastern edge *(EDAW 2007*)

Photo 8: Canal segment between the northern pond and Messick Lake, with riparian woodland/forest and scrub completely concealing the drainage feature *(EDAW 2007*)

Photo 9: Riparian scrub along canal south of Messick Lake *(EDAW 2007*)

Photo 10: Messick Lake, with dense blackberry scrub along the eastern edge and riparian woodland in the background throughout the northern portions of the lake *(EDAW 2007*)

Photo 11: Dry drainage ditch parallel to and south of Anderson Avenue *(EDAW 2007*)

Photo 12: Dry drainage ditch and adjacent ruderal and riparian woodland habitats north of Anderson Avenue *(EDAW 2007*)

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December 31, 2007

Ms. Nancy Haley
Chief, California Central Valley North Section
U.S. Army Corps of Engineers
1325 J Street
Sacramento, CA 95825-1846

Subject: Additional Information for the Proposed Feather River Levee Repair Project Segment 2 (81420-08-1-0344), Yuba County, California

Dear Ms. Haley:

In response to the December 7, 2007 letter to you from the U.S. Fish and Wildlife Service, and on behalf of our client the Three Rivers Levee Improvement Authority (TRLIA), we are providing additional information regarding Segment 2 of the Feather River Levee Repair Project. Your letter specifically requested additional information regarding: 1) the number and size of elderberry stems anticipated to be affected by Stage 2 of project construction and a discussion of effects from and appropriate compensation for transplantation of shrubs outside of the dormant season; and 2) expansion of the analysis of cumulative effects on listed species from land use conversion. Both of these items are addressed below.

Adverse Effects on Valley Elderberry Longhorn Beetle

Additional field surveys were conducted by three EDAW biologists on December 18, 2007 to count stems and collect additional relevant data on elderberry shrubs located within the Stage 2 drainage improvement area. Shrubs in the area would likely require removal and those nearby could be indirectly affected by construction activities. The enclosed exhibit serves as a replacement for Exhibit 4b of the August 2007 Biological Assessment and provides a more precise depiction of the potentially affected elderberry shrubs and clumps.

A total of 43 shrubs/clumps depicted in Exhibit 4b are immediately adjacent to or are at least partially within the drainage improvement area and could require removal during Stage 2. The enclosed table provides information on the number and size of stems for each of these shrubs, as well as whether or not they have beetle exit holes; all of them are within riparian habitat. These shrubs support 655 stems greater than 1 inch in diameter at ground level. As indicated in the Biological Assessment, shrub removal could result in direct effects to valley elderberry longhorn beetles. If the stems are occupied by beetles, any early-stage individuals are likely to be killed when the shrub is removed. Removed shrubs will be transplanted during the shrub's dormant season, if feasible, based on river flows and ground conditions. Although complete loss of the shrubs to be removed should be avoided with transplantation, transplanted elderberry shrubs can experience stress or health problems because of changes in soil, hydrology, microclimate, or associated vegetation, and mortality of transplanted shrubs precludes their future use by the beetle. In addition, it will take 5 or more years for replacement elderberry plantings to reach a size conducive to use as habitat by valley elderberry longhorn beetles. Therefore, there could be a temporary loss of habitat available to the beetle.

If removal of shrubs to accommodate Stage 1 or 2 construction must occur outside of the dormant season, potential for the adverse effects described above may increase, and additional replacement elderberry and associated native species planting may be warranted if the transplanted shrubs do not survive. The transplanted shrubs will be monitored for survival as part of monitoring of the mitigation planting success. If transplanted shrubs do not exhibit new growth by the second growing season after transplantation and are determined to have died, additional mitigation will be provided to offset the additional loss. The exact amount of additional mitigation will be determined based on the characteristics of the affected shrubs and in consultation with USFWS.

Cumulative Effects of Land Use Conversion

TRLIA concurs with the Service that returning 100-year flood protection to the RD 784 area may allow for planned development within the Plumas Lakes area and that some of the future development projects will have a Section 7 nexus through the U.S. Army Corps of Engineers 404 Regulatory Branch office or other federal involvement. TRLIA also recognizes that some of these projects may not have a federal nexus. Therefore, it is TRLIA's intent to facilitate the development of a Memorandum of Agreement (MOA) between FWS and Yuba County that establishes an approach for ensuring proper coordination with USFWS for all projects in the RD 784 area.

Please feel free to contact me at (916) 414-5800 or Anja Kelsey of PBS&J at (916) 325-1484 if you have any questions or concerns regarding this submittal.

Sincerely,

Anne King
Senior Wildlife Biologist

Cc Jennifer Hobbs, USFWS
Jana Millikin, USFWS
Ken Sanchez, USFWS
Paul Brunner, TRLIA
Ric Reinhardt, MBK
Dan Wanket, GEI
Anja Kelsey, PBS&J

Encl Exhibit 4b: Elderberry Shrubs in Vicinity of Construction Areas
Table: Survey Information for Elderberry Shrubs That May Require Removal During Stage 2

Survey Information for Elderberry Shrubs That May Require Removal During Stage 2 of the Feather River Segment 2 Setback Levee				
Shrub/Clump Number	Number of Stems per Diameter Category (inches)			Beetle Exit Holes Present?
	≥ 1 and ≤ 3	≥ 3 and ≤ 5	≥ 5	
124	3	1	1	
125	10	3	5	Y
127		1	2	
130-131	10	10	4	
132	5	4	1	Y
133	25	7	9	Y
134	12	3	7	Y
135	6	7	3	
136	1		4	Y
139	2	1		
140	48	6	1	
143	19	3	2	
144	9	6		Y
145	51	19	9	Y
147	9	6	8	Y
148	6			Y
149	14	6	3	
150-151	11	1		
152	8	2		Y
155	1	4	2	
156		1		
157	4	7	3	Y
158	10	1		
159	4	3		
160	2	3	2	
161		1		
162	7	3	1	
164	1			
165	1		2	Y
167		2		
168	4	2		

Survey Information for Elderberry Shrubs That May Require Removal During Stage 2 of the Feather River Segment 2 Setback Levee				
Shrub/Clump Number	Number of Stems per Diameter Category (inches)			Beetle Exit Holes Present?
	≥ 1 and ≤ 3	≥ 3 and ≤ 5	≥ 5	
169	12	4		Y
170	6			
171	14		1	Y
172	5	6	2	
173	30	15	15	Y
175	10	5	2	Y
176	7	15	1	
177	6	4	2	Y
178	16	9		
179	1	1	1	
Total	**390**	**172**	**93**	
Source: EDAW 2007 survey data				

MATCHLINE

Broadway Rd

Anderson Ave

Country Club Rd

Rich Rd

Feather River Blvd

Feather River

Messick Lake

Plumas Lake Canal

New Pump Station No.3

Drainage Improvement Area

Segment 2

Segment 1

LEGEND

Elderberry Shrub/Clump

Setback Levee Centerline

Approximate Setback Levee Toe

0 500 1,000

FEET

NORTH

Aerial Image: GEI 1999

Feather River Levee Repair Project

Segment 2

Elderberry Shrubs in Vicinity of Construction Areas

Source: Data Provided by EDAW and GEI 2007

X092

THREE RIVERS LEVEE IMPROVEMENT AUTHORITY

1114 Yuba Street, Suite 218
Marysville, CA 95901

July 2007

Exhibit 4b

Final Biological Opinion, Segment 2

United States Department of the Interior

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

In reply refer to:
81420-2008-F-0344-4

September 29, 2008

Ms. Nancy Haley
Chief, California Central Valley North Section
U.S. Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814-2922

Subject: Biological Opinion on the Proposed Feather River Levee Repair Project Segment 2 (Corps file number 2007005778), Yuba County, California

Dear Ms. Haley:

This letter is in response to the U.S. Army Corps of Engineers (Corps) request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed Feather River Levee Repair Project, Segment 2 (proposed project) in Yuba County, California. Your November 6, 2007, request was received in our office on November 9, 2007. This document represents the Service's biological opinion on the effects of the action on the federally threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle), and the threatened giant garter snake (*Thamnophis gigas*) (snake). The Service has determined that in addition to the above two species, the proposed project is within the current range of the threatened vernal pool fairy shrimp (*Branchinecta lynchi*) and the endangered vernal pool tadpole shrimp (*Lepidurus packardi*) (vernal pool crustaceans). This document is issued in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act).

The findings and recommendations in this biological opinion are based on: (1) the August 2007, *Biological Assessment for the Feather River Levee Repair Project Segment 2* by EDAW; (2) the November 6, 2007, letter requesting formal consultation; (3) the August 2006, *Draft Environmental Impact Report for the Feather River Levee Repair Project* by EDAW; (4) additional information provided by Three Rivers Levee Improvement Authority (TRLIA) on December 31, 2007; (5) a March 18, 2008, e-mail from Anja Kelsey (EIP) indicating that Yuba County's Board of Supervisors had agreed to sign a memorandum of agreement with the Service to address indirect effects of the proposed project; and (6) other information available to the Service.

BIOLOGICAL OPINION

Consultation History

March 13, 2007. The Service, Jennifer Hobbs, attended a meeting with Anne King of EDAW, Anja Kelsey of EIP, and Howard Brown of National Marine Fisheries Service, and discussed the proposed project and potential effects to giant garter snake.

November 9, 2007. The Service received the Corps request to initiate formal consultation on the proposed project.

November 30, 2007. The Service alerted Anja Kelsey of PBS&J that the earliest a biological opinion could be completed was the end of January.

December 7, 2007. The Service issued a letter requesting additional information on the proposed project (Service file number 81420-08-I-0344).

December 17, 2007. The Service, Ken Sanchez and Jennifer Hobbs, attended a meeting with Anja Kelsey of EIP and Paul Brunner of TRLIA, to discuss schedule of the biological opinion and the additional information request. It was agreed that the earliest a biological opinion could be completed was January 31, 2008. Additionally, the Service requested that TRLIA work with Yuba County to develop a memorandum of agreement (MOA) between the Service and Yuba County which would ensure coordination between developers and the Service under the Act.

January 2, 2008. The TRLIA sent a letter dated December 31, 2007, which provided additional information on elderberry shrub stem counts for the entire project and stated that it is their intent to facilitate a MOA between the Service and Yuba County which would establish coordination on development projects which occur within reclamation district (RD) 784.

February 27, 2008. A meeting occurred between the Service (Ken Sanchez, Jennifer Hobbs, and Jana Milliken), Yuba County Planning Staff, and TRLIA (Anja Kelsey and Paul Brunner). The Service requested an MOA be developed with Yuba County. Yuba County agreed to bring the proposal to the Board of Supervisors for a vote and the Service agreed that if the Board of Supervisors passed a resolution to enter into an MOA with the Service then the Service would provide a biological opinion to the Corps where compensation for indirect effects due to facilitating planned growth would be covered by the MOA.

March 18, 2007. Anja Kelsey of EIP sent an e-mail stating that the Yuba County Board of Supervisors had voted 5-0 in favor of doing an MOA with the Service.

Proposed Project Description

The proposed project is located in the southern portion of Yuba County. This project is part of an overall plan to enhance flood protection to properties in TRLIA's service area, RD 784. These levee improvements are intended to reduce potential threats to three factors of levee integrity: stability, height, and susceptibility to erosion.

The proposed project would construct a setback levee that is 5.7 miles long and replaces 6.2 miles of existing levee. The new levee segment will be set back approximately 0.5 mile to the east of the Feather River levee. The project is divided into two stages. Stage 1 includes construction of the setback levee and associated stability berms, construction of the new Pump Station No. 3 and associated facilities, removal and relocation of existing utilities and structures within the setback area, and excavation of borrow material. Stage 2 of the project includes degradation of all or portions of the existing Feather River east levee within the project area, removal of the old Pump Station No. 3, filling of Plumas Lake Canal on the water side from the setback levee to where the canal opens into the pond-like feature, and on the land side from the setback levee to the new Pump Station No. 3, and recontouring the portions of the levee setback area and an existing drainage to facilitate drainage of water from the levee setback area after flood events. Specific activities for Stage 1 and Stage 2 are described below in greater detail.

Stage 1

Borrow Material Acquisition

Borrow material will be obtained locally from borrow areas developed inside and outside the levee setback area. It is currently estimated that a total of approximately 3.4 million cubic yards (cy) of compacted borrow material will be required to construct the setback levee. A detailed investigation of borrow areas suitable for levee embankment materials is currently underway. The location and limits of borrow areas will be determined and refined as a result of this effort.

It is anticipated that borrow will be extracted from wide, shallow (5-10 feet deep) excavations, rather than deep trenches. At the conclusion of the work, the borrow areas will be graded to blend with the topography, leaving slopes flat enough to reduce erosion and promote conditions conducive to vegetative growth [slopes 3:1 (H:V) or flatter], or filled with material from removal of existing levees (during Stage 2). If not filled, the bottom of the borrow areas will be regraded to drain away from the levee and toward the river or toward existing drainageways to ensure fish movement out of the levee setback area into the main channel of the Feather River when flood flows recede following inundating flood events. The borrow areas will be revegetated to conform to the surrounding landscape. Some stockpiled topsoil, and other excess earth materials (organic soils, roots, and grass) from borrow areas and the setback levee foundation could be spread over borrow sites after excavation has been completed.

Aggregate base needed to surface the patrol road on the levee crown and similar materials will be obtained from commercial sand and gravel operations in the Marysville-Yuba City area and will be hauled to the setback levee alignment by truck.

Setback Levee Foundation Preparation

Preparation of the foundation of the setback levee will involve a sequence of several activities. The setback levee footprint will be cleared and grubbed of all trees, brush, loose stone, abandoned structures, existing utilities, buried pipelines, and other deleterious materials that may exist within 10 feet of the levee toes. After clearing and grubbing, the setback levee foundation will be stripped to remove low-growing vegetation and topsoil to a depth of at least 6 inches, although local areas with extensive tree roots or deep organic soils could require excavation to a

depth of 3 feet or greater. Overall, the depth of stripping is expected to average 1-3 feet. The topsoil will be placed in a designated "unsuitable material" spoil area or used for borrow area reclamation. After stripping, an inspection trench will be excavated. The trench then will be backfilled and compacted.

During foundation preparation 8 elderberry shrubs would be relocated to an area within the new setback that would be restored to riparian vegetation. Transplantation would occur in August or September of 2008.

Before placement of the embankment fill, the foundation surface will be proof-rolled, and any remaining soft materials will be removed and replaced with compacted fill, treated with lime stabilization, or strengthened with geogrid mesh. Before the first lift of fill is placed, the foundation surface will be scarified to a depth of about 4 inches and moisture conditioned to help create a good bond between the foundation and the embankment fill.

Seepage Control/Slurry Cutoff Wall Construction

Based on the performance history of the existing levees and the results of investigations along the proposed setback levee alignment, it is anticipated that seepage control measures will be required along significant portions of the setback levee. Susceptibility of the setback levee embankment and foundation soils to seepage and internal erosion is the primary concern related to levee integrity and stability.

Construction of a slurry cutoff wall is proposed along those portions of the setback levee where widespread strata of permeable sands and gravels exist in the foundation. The purpose of the slurry cutoff wall is to dissipate the hydraulic gradient in the levee foundation and reduce seepage quantities. To achieve maximum effectiveness, the slurry cutoff wall must extend completely through the permeable strata and terminate some distance into an underlying, reasonably continuous layer with lower permeability.

Construction of the slurry cutoff wall to the depths required along the proposed setback levee alignment will be accomplished with large modified backhoes. This equipment and the associated sequence of excavation, backfill preparation, and placement of backfill back into the slurry cutoff wall trench will require an approximately 80-foot-wide work platform. The slurry cutoff wall is expected to be as much as 80 feet deep. Therefore, for each section of the setback levee where a slurry cutoff wall is needed, the wall will be installed before the levee embankment is constructed. In addition, the work platform will need to be at least 4-5 feet above the highest groundwater level to provide a stable base for the excavation equipment.

Setback Levee Embankment Construction

Construction of the setback levee embankment will begin as soon as sufficient lengths of levee foundation are complete and weather conditions allow. The embankment will be constructed as an engineered fill, with the fill placed in horizontal lifts. Each lift will be moisture conditioned and compacted to the specified density using a suitable compactor, such as a sheepsfoot, tamping-foot, or rubber-tired roller. Landside stability berms integral to the levee embankment

will be constructed in portions of the southern alignment where the foundation of the levee contains soft clay and silt deposits. This will require fill of a small portion of Plumas Lake Canal.

Pump Station No. 3 Relocation

The current location of Pump Station No. 3 experiences excessive seepage and boils during high-water events. In addition, after the setback levee is complete, the existing Pump Station No. 3 will be in the setback area and exposed to flooding after the existing levee is degraded. Therefore, as part of the setback levee project, a new/replacement Pump Station No. 3 will be constructed on the land side of the setback levee in Stage 1 and the existing pump station will be removed in Stage 2. The new pump station will be located where the setback levee is adjacent to Plumas Lake Canal. The new Pump Station No. 3 will be a reinforced-concrete structure similar to the recently constructed Pump Station No. 2 and Pump Station No. 6 in RD 784. The specific capacity of the new Pump Station No. 3 will be determined during detailed project design.

Utility Relocation and Structure Removal

Implementation of the setback levee project would necessitate the removal of all structures (houses, trailers, sheds, barns, other agricultural outbuildings) from the levee setback area, which would be subject to periodic flooding following removal of the existing levee. Approximately 20 structures in the levee setback area will be displaced by the project. Displaced structures include six residential dwelling units, and remaining structures include associated agricultural use buildings and dilapidated barns. Some utilities and other facilities located in the levee setback area will need to be relocated or reinforced with implementation of the levee setback. As discussed previously, RD 784 Pump Station No. 3 will be relocated to the land side of the proposed setback levee. A PG&E 115-kilovolt (kV) transmission line called the Bogue Loop crosses the levee setback area on four towers. The foundations for these steel structures will likely require reinforcement or replacement to maintain their integrity during periods of flood water inundation. Other steel towers along the same transmission line are located on the water side of the existing Feather River levee and are supported by elevated steel pile foundations.

Other existing facilities that may need to be abandoned, reinforced, or relocated include roads, power distribution lines, irrigation pipelines, drainage ditches, wells, fill stations, and communications lines. Several private irrigation lines will be cut off by the construction of the setback levee, separating some lands on both sides of the setback levee that require irrigation from current water sources. During detailed design, and in coordination with landowners, appropriate water sources and irrigation infrastructure will be determined for lands where irrigation lines were cut off and that will continue to require irrigation water after project construction. The wells within the setback area will be retained for use in environmental enhancement activities over the next several years, to support continuing agricultural activities, or will be destroyed in accordance with California's water well regulations. Wells and fill stations in the levee setback area to be abandoned will be removed and filled, and new wells will be dug and fill stations built outside the levee setback area to replace the abandoned facilities, as appropriate. Wells and fill stations to be retained in the levee setback area will be retrofitted to

accommodate periodic flooding. New power lines and power poles may be required for any new wells and fill stations.

Stage 2

Fill of Canal Segments Adjacent to Setback Levee

Construction of the new setback in Stage 1 will divide the Plumas Lake Canal, with portions of the canal remaining intact on either side of the setback levee. To minimize potential for underseepage that could result from having an excavated feature too close to the levee, approximately 800 feet of the canal on the west (water) side of the setback levee will be completely filled (from the west side of the setback levee alignment to where the canal opens into Plumas Lake). Approximately 2,200 feet of canal on the east (land) side of the setback levee will be filled between the new Pump Station No. 3 and the setback levee alignment. An approximately 2-foot-deep ditch will remain along the canal alignment to drain surface runoff from landside areas at the southern end of the setback levee to the new Pump Station No. 3.

Removal of the Existing Levee

There are no plans to use material in the existing Feather River left bank levee in Segment 2 as borrow material for the new setback levee. It is expected that for some period of time, the existing levee and the new setback levee will be in place concurrently (see "Project Schedule" below). During this period, the setback levee will function as a "backup" levee, providing a second line of levee protection if the existing levee in Segment 2 were to breach during a flood event.

All or portions of the existing levee in Segment 2 will be removed to achieve the maximum hydraulic benefits of the levee setback by allowing water to flow into and out of the levee setback area during high river stages. Where the existing levee will be excavated to allow flood waters to pass into and out of the levee setback area, the existing embankment will be excavated to the level of the adjoining ground surface. Specific sections to be retained will be determined in final project design and will be based on factors that include possible mitigation value for project impacts on sensitive species. Sections of the existing levee that are left in place will not be maintained.

Removal of Pump Station No. 3 and Facilitation of Setback Area Drainage

The existing Pump Station No. 3 will be removed and the adjacent area currently occupied by the existing Feather River levee and maintenance zone will be excavated to facilitate drainage and allow flood waters to recede from the setback area in a manner that minimizes fish stranding. The existing channel that currently conveys discharges from Pump Station No. 3 will likely need to be enlarged and deepened to accommodate flood flows leaving the setback area and to minimize the potential for fish stranding as flood waters recede. Whether this drainage location or another is used, the channel will be located and constructed in a manner that minimizes vegetation disturbance, fish stranding, and other environmental impacts. A site-specific drainage plan for the entire setback area will be developed in final design.

The swale will also act to allow backwater to flow into the setback area from the Feather River, increasing the inundation frequency of the setback area and improving habitat quality. It is estimated that the 31-foot stage will be inundated in two out of every three years for a period of at least one week between March 15 and May 15. Floodplain land at or below this elevation will provide a broad suite of valuable ecosystem functions, including provision of nutrients and seasonal habitat for aquatic species.

Habitat Restoration and Management of the Levee Setback Area

The TRLIA Board of Directors passed a resolution on March 28, 2008, stipulating that agricultural practices will be maintained to the maximum extent possible. TRLIA is also discussing the potential for active restoration with landowners, stakeholders, and various regulatory agencies. It is possible that a portion of the setback levee area will be restored to riparian habitat via active or passive restoration in the event that agricultural uses are discontinued.

Staging Areas, Access Routes, and Material Disposal

It is anticipated that several staging areas will be developed along the setback levee alignment to allow for efficient use and distribution of materials and equipment. Staging areas will be located within the construction corridor and near active construction areas, so they can be relocated as construction progresses. Because the work area is essentially flat, suitable sites for construction staging are abundant. Final selection of staging areas will be based on contractor preference and environmental and land use constraints.

Personnel, equipment, and imported materials will reach the project site via State Route (SR) 70 and Feather River Boulevard. At the project site, the primary construction corridor will include the setback levee alignment, soil borrow areas, and roads used for access to the work areas, including Feather River Boulevard. Access roads will consist mainly of the existing east-west lateral roads between SR 70, Feather River Boulevard, and the levee setback area.

Excess earth materials (organic soils, roots, and grass from borrow areas and the setback levee foundation; excavated material that does not meet levee embankment criteria) will be used in the reclamation of borrow areas or will be placed in a surplus material berm at the waterside toe of the setback levee. In addition, excess material could be used in the contouring of the setback area to facilitate drainage to the Feather River and prevent fish stranding. Cleared vegetation (i.e., trees, brush) will be hauled off-site. Debris from structure demolition, power poles, piping, and other materials requiring disposal will be hauled off-site to a suitable landfill.

Project Schedule

A period of approximately 20 to 28 months is planned for construction of the setback levee project, with contractor mobilization beginning in May 2008, the setback levee embankment (Stage 1) completed in June 2009, the existing levee breached (Stage 2) in summer 2009, and

final clean-up and contractor demobilization in summer 2010. Schedule highlights are described briefly below and presented in Table 1:

- **Mobilization:** Mobilization will include setting up construction offices and transporting heavy earthmoving equipment to the site. These activities will take approximately one month.

Table 1
Proposed Construction Schedule for the Feather River Levee Improvement Project – Segment 2

Stage	Construction Activity	Start	End
1	Mobilization	May 2008	May 2008
	Levee foundation preparation	June 2008	November 2008
	Slurry cutoff wall construction	June 2008	November 2008
	Fill of Plumas Lakes Canal	April 2009	May 2009
	Pump Station No. 3 construction	June 2008	November 2008
	Levee embankment construction	June 2008	November 2008
2	Removal of the existing levee	August 2009	June 2010
	Decommission of existing Pump Station No. 3	August 2009	June 2010
	Setback Area Drainage Improvements	August 2009	June 2010
	Demobilization	August 2010	August 2010

Source: Data provided by GEI Consultants, Inc.

- **Levee Foundation Preparation:** This activity will begin soon after mobilization. Construction will take approximately four months depending on the amount of equipment working simultaneously, weather conditions, and permit requirements.
- **Slurry Cutoff Wall Construction:** Installation of slurry cutoff walls along the setback levee alignment will occur simultaneously with levee foundation preparation.
- **Fill of Portions of the Plumas Lake Canal:** The portion of Plumas Lake Canal within the levee embankment footprint will be filled during levee foundation preparation. The portion of canal downstream of the setback levee and between the setback levee and Pump Station No. 3 will be filled concurrent with removal of the existing levee.
- **Levee Embankment Construction (including stability berms):** Because the setback levee alignment is nearly 6 miles long, levee embankment construction could begin in some areas while foundation preparation is underway along other portions of the alignment. Levee embankment construction is anticipated to take approximately eight months.
- **Pump Station No. 3 Construction:** Pump Station No. 3 will be constructed concurrent with levee embankment construction.
- **Borrow Material Excavation:** Excavation of borrow materials for use in the construction of the setback levee embankment could begin simultaneously with levee foundation

preparation or slurry wall construction and would occur for the duration of levee embankment construction.

- **Tie-ins to Existing Levees:** Elements of tying in the setback levee to the existing levees will take place during levee foundation preparation, levee embankment construction, and potentially during slurry cutoff wall construction.
- **Removal of the Existing Levee:** The existing Feather River levee in the setback area will not be removed until the setback levee is complete, and removal activities will occur outside of the identified Feather River flood season. Levee removal is anticipated to occur in spring/summer 2009.
- **Decommission of the Existing Pump Station No. 3:** Removal of the existing pump station would be done concurrent with removal of the existing levee.
- **Facilitation of Setback Area Drainage:** Grading of the setback area to facilitate drainage of floodwaters back to the Feather River and enhancement of the setback area drainage channel would be conducted concurrent with removal of the existing levee.
- **Demobilization:** Demobilization will include removal of equipment and materials from the project site, disposal of excess materials at appropriate facilities, and restoration of staging areas and temporary access roads to pre-project conditions. Demobilization activities will likely occur in various locations as construction proceeds along the project alignment, but will be completed in August 2010 after removal of the existing Feather River levee is complete.

Proposed Conservation Measures

All Listed Species

1. A Service approved biologist will identify boundaries of sensitive habitats and have the contractor fence the areas with orange construction fencing. Erosion control fencing will be placed at the edges of construction where the construction activities are upslope of wetlands and channels to prevent washing of sediments offsite. All fencing will be installed prior to any construction activities beginning and will be maintained throughout the construction period.

2. During construction operations, stockpiling of construction materials, portable equipment, vehicles, and supplies will be restricted to the designated construction staging areas. To eliminate an attraction to predators of listed species, all food-related trash items, such as wrappers, cans, bottles, and food scraps, will be disposed of in closed containers. Revegetation will occur on all areas temporarily disturbed during construction.

3. Fugitive dust emissions will be minimized by adhering to the Feather River Air Quality Management Districts requirements for the control of dust emissions.

4. The proposed project will facilitate planned growth within the boundaries in RD 784, and this future growth is likely to result in the loss of habitat for species listed pursuant to the Act. Thus, to address the responsibilities of the action agency (the Corps) and their applicant to analyze and disclose these indirect effects pursuant to the Act (50 CFR §402), TRLIA will facilitate the development of a MOA between the Service and the

entity with land use authority (Yuba County), whereby Yuba County would not approve land use decisions like development until the applicant/developer provides confirmation from the Service that shows compliance with the Act.

Valley Elderberry Longhorn Beetle

1. A worker awareness training program for construction personnel will be conducted by a qualified biologist prior to beginning construction activities. The program will inform all construction personnel about the life history and status of the beetle, requirements to avoid damaging the elderberry plants, and the possible penalties for not complying with these requirements. Written documentation of the training will be submitted to U.S. Fish and Wildlife Service (USFWS) within 30 days of its completion.

2. Pre-construction and post-construction surveys will be done of the elderberry shrubs in the project area. The post-construction survey will confirm that there was no additional damage to any of the elderberry shrubs than as described in this BO.

3. All areas to be avoided during construction activities will be fenced and flagged. In most cases, fencing will be placed at least 20 feet from the dripline of the shrub. In some cases, construction activity may be required within 20 feet of a shrub. In these cases, fencing will be placed at the greatest possible distance from the shrubs.

4. Transplant up to 53 elderberry shrubs with 434 stems between 1 and 3 inches, 185 stems between 3 and 5 inches and 93 stems greater than 5 inches at ground level, and provide additional plantings as described in Service's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Conservation Guidelines). Elderberry shrubs that require removal will be transplanted to an appropriate location within the project area or an alternative suitable site agreed upon by USFWS. The 8 elderberry shrubs which will be transplanted in August or September 2008 will compensate an additional 2.5 times the Conservation Guidelines ratios because the shrubs would be transplanted outside of the elderberry shrub dormant season.

   According to the 1999 Guidelines, the required compensation for the proposed project would be to transplant the fifty-three shrubs and plant additional cuttings and associated riparian plantings at a Service-approved conservation area or bank. The elderberry compensation plantings will be incorporated into an on-site mitigation area (Table 2).

Table 2: Proposed 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 if transplanted during the dormant season.

Location	Stems (maximum diameter at ground level)	Exit Hole on Shrub (Yes or No)	Elderberry Seedling Ratio	Associated Native Plant Ratio	Number of Stems Observed	Required Elderberry Plantings	Required Associated Native Plant Plantings
Riparian	stems ≥1" & ≤3"	No	2:1	1:1	177	354	354
		Yes	4:1	2:1	235	940	1,880
Riparian	stems > 3" & <5"	No	3:1	1:1	87	261	261
		Yes	6:1	2:1	88	528	1,056
Riparian	stems ≥5"	No	4:1	1:1	25	100	100
		Yes	8:1	2:1	68	544	1,088
Elderberry Shrubs Transplanted between June 15 and October 31 (multiplier of 2.5)							
Non-riparian	stems ≥1" & ≤3"	No	1:1	1:1	37	93	93
Non-riparian	stems >3" & <5"	No	2:1	1:1	10	50	50
Total replacement plantings						2,870	4,882
Total Elderberry shrubs to be transplanted						58	
7,752/10 = 775.2 valley elderberry longhorn units or 32.03 acres							

5. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used within 100 feet of elderberry shrubs. All drainage water during and following construction will be diverted away from the elderberry shrubs.

6. Dirt roadways and other areas of disturbed bare ground within 100 feet of elderberry shrubs will be watered at least twice a day to minimize dust emissions.

7. A qualified biologist (monitor) will be on-site for the duration of the transplanting of the elderberry shrubs to ensure that no unauthorized take of the beetle occurs. If unauthorized take occurs, the monitor will 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 (CDFG).

Giant Garter Snake

1. A worker awareness training program for construction personnel will be conducted by a qualified biologist prior to beginning construction activities. The program will provide workers with information on their responsibilities with regard to the snake, an overview of the life-history of this species, a description of measures to minimize potential for take of the snake, and an explanation of the possible penalties for not properly implementing

these measures. Written documentation of the training will be submitted to the Service within 30 days of its completion.

2. All construction activity within snake habitat (e.g., aquatic, upland, and rice habitat) would 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. More danger is posed to snakes during their inactive period because they are occupying underground burrows or crevices and are more susceptible to direct effects, especially during excavation activities. If it appears that construction activity may need to extend beyond October 1, the project proponent(s) would contact the Service as soon as possible and no later than August 15 to determine if additional measures are necessary to minimize take of the snake. Dewatering of suitable aquatic habitat will not occur before April 15, and dewatered habitat will remain dry for at least 15 days prior to fill or excavation.

3. At least 30 days prior to initiating construction activities, the project proponents will submit the names and curriculum vitae of the biological monitor(s) for the project to the Service for review and approval.

4. Within 24 hours before beginning construction activities, areas within 200 feet of suitable aquatic habitat for giant garter snake will be surveyed by a qualified biologist. The biologist will provide USFWS written documentation of the monitoring efforts within 48 hours after the survey is completed. Habitat will be re-inspected by the monitoring biologist whenever a lapse in construction activity of 2 weeks or greater occurs. The biologist will be present on-site during initial ground disturbance activities, including clearing and grubbing/stripping. The biologist will be available throughout the construction period and will conduct regular monitoring visits to ensure avoidance and minimization measures are being properly implemented.

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

6. The applicant will restore 0.11 acre (.04 ha) of temporarily affected aquatic snake habitat according the *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat* (Appendix A) and the *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake (Thamnophis gigas) Habitat* (Appendix C).

7. Permanent loss of giant garter snake habitat will be compensated for at a ratio of 3:1 at a Service approved mitigation site.

STATUS OF THE SPECIES AND ENVIRONMENTAL BASELINE

Valley Elderberry Longhorn Beetle

Status of the Species

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 proposed project is outside of the areas designated as critical habitat. 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).

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 is 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. 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 are 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 California Natural Diversity Database (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.

Threats to the Species

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 as 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 CDFG 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 extirpated, 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). The above 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 (*Forficularia 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 monitor*) 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*), Himalaya blackberry (*Rubus armeniacus*), tree of heaven (*Ailanthus altissima*), Spanish broom (*Spartium junceum*), Russian olive (*Eleagnus angustifolia*), edible fig (*Ficus carica*), and Chinese tallowtree (*Sapium sebiferum*). Non-woody invasives such as ripgut brome (*Bromus diandrus*), foxtail barley (*Hordeum murinum*), *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 valley elderberry longhorn 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 prolonged flooding (i.e., anoxia) and becomes severely stressed, then the beetle may be affected. The duration and magnitude of flooding at which elderberry stress occurs 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 Fresno 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 extirpation 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% 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 along the Feather River within 5 to 6 miles of the proposed project area. Elderberry shrubs with stems one inch or greater in diameter that provide suitable habitat are found in and adjacent to the action area. 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.

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. The snake was listed as a threatened species on October 20, 1993 (58 **FR** 54053).

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 & 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 1951; 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 and Brode 1980; Hansen 1980). By 1971, so much wetland habitat had been reclaimed, that the CDFG classified the giant garter snake as a rare animal and conducted a series of field surveys. The results of these surveys indicate that snake populations were distributed in marsh wetlands, tributary streams, and portions of the rice productions zones of the Sacramento Valley in Butte, Glenn, Colusa, Sutter, Yolo and Sacramento Counties, in the Delta region along the eastern fringes of the Sacramento-San Joaquin River Delta in Solano, Contra Costa, Sacramento, and San Joaquin Counties, and in the San Joaquin Valley in San Joaquin, Stanislaus, Merced, Mendota, and Fresno Counties (Hansen & Brode 1980; Hansen 1988).

Upon Federal listing in 1993, the Service identified 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records (Service 1993). A population is a group of organisms that interbreed and share a gene pool. The boundaries of a population, both in space and time, are generally not discrete and, in practice, are usually defined by the researcher (Krebbs 1994). The gene pool and breeding patterns of the 13 giant garter snake populations identified in the final rule remain unstudied and unknown. What was described as "13 populations" should therefore be described more accurately as sub-populations and occurrences that note observations of individuals about which much remains unknown (Service 2003). The 13 populations largely coincide with historical flood basins and tributary streams throughout the Central Valley: (1) Butte Basin, (2) Colusa Basin, (3) Sutter Basin, (4) American Basin, (5) Yolo Basin/Willow Slough, (6) Yolo Basin/Liberty Farms, (7) Sacramento Basin, (8) Badger Creek/Willow Creek, (9) Caldoni Marsh/White Slough, (10) East Stockton--Diverting Canal & Duck Creek, (11) North and South Grasslands, (12) Mendota, and (13) Burrel/Lanare.

Surveys over the last 25 years suggest that sub-populations of giant garter snake in the northern parts of its range, (Butte, Colusa, and Sutter Counties) are relatively large and stable (Wylie et al. 1997a; Wylie et al. 2003a). However, habitat corridors connecting sub-populations are either not present or not protected, and urban encroachment increases as a serious threat (Service 2003). Sub-populations in Yolo, Sacramento, Solano, and San Joaquin Counties are small, fragmented, and threatened by urbanization (Service 2003; Hansen 2004). Those sub-populations in the San Joaquin Valley, however, are most vulnerable having suffered near-devastating declines and possible extirpations over the last two decades (including populations in Stanislaus, Merced, Madera and Fresno Counties) (Hansen 1988; Dickert 2002, 2003; Williams & Wunderlich 2003). These sub-populations are extremely small, distributed discontinuously in isolated patches, and therefore are highly vulnerable to extinction by random environmental, demographic, and genetic processes (Goodman 1987).

Description - The giant garter snake is one of the largest garter snake species reaching a total length of approximately 64 inches (162 centimeters). Females tend to be slightly longer and proportionately heavier than males. The weight of adult female snakes is typically 1.1-1.5 pounds (500-700 grams). Dorsal background coloration varies from brown to olive with a cream, yellow, or orange dorsal stripe and two light colored lateral stripes. Some individuals have a checkered pattern of black spots between the dorsal and lateral stripes. Background coloration and prominence of the checkered pattern and three yellow stripes are geographically and individually variable; individuals in the northern Sacramento Valley tend to be darker with more pronounced mid-dorsal and lateral stripes (Hansen 1980; Rossman et al. 1996). Ventral coloration is variable from cream to orange to olive-brown to pale blue with or without ventral markings (Hansen 1980).

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 2003). The snake feeds on small fishes, tadpoles, and frogs (Fitch 1941; Hansen and Brode 1980, Hansen 1988; Hansen and Brode 1993). Essential habitat components consist of: (1) wetlands with adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover, (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season, (3) upland habitat with grassy banks and openings in waterside vegetation for basking, and (4) higher elevation uplands for over-wintering habitat with escape cover (vegetation, burrows) and underground refugia (crevices and small mammal burrows) (Hansen 1988). Snakes are typically absent from larger rivers and other bodies of water that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates (Hansen and Brode 1980, Hansen 1988; 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). Historically, giant garter snake prey likely consisted of Sacramento blackfish (*Orthodon microlepidots*), thick-tailed chub (*Gila crassicauda*), and red-legged frog (*Rana aurora*)

(Rossman et al. 1996; Service 2003). Because these prey species are no longer available (chub extinct, red-legged frog extirpated from the Central Valley, blackfish declining) 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 and Brode 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). Brood size is variable, ranging from 10 to 46 individual young, with a mean of 23 individuals (Hansen and Hansen 1990). At birth, young average about 8.1 inches (20.6 centimeters) snout-to-vent length and 3-5 grams. Although growth rates are variable, young typically more than double in size by one year of age, and sexual maturity averages three years in males and five years for females (Service 1993).

Movements and Habitat Use - The giant garter snake is highly aquatic but also occupies a terrestrial niche (Service 2003). Aquatic habitat includes remnant native marshes and sloughs, restored wetlands, low gradient streams, and agricultural wetlands including rice fields and irrigation and drainage canals. Terrestrial habitat includes adjacent uplands which provide areas for basking, retreats and over-wintering. Basking takes place in tules, cattails, saltbush, and shrubs over-hanging the water, patches of floating vegetation including waterweed, on rice checks, and on grassy banks (Service 2003). 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. 1996). It also uses burrows as refuge from extreme heat during its active period (Wylie et al. 1997). 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; Wylie et al. 2003a). Snakes typically select burrows with sunny exposures along south and west facing slopes (Service 1993).

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). Home range (area of daily activity) averages about 0.1 miles^2 (25 hectares) in both the Natomas Basin and Colusa NWR (Wylie 1998; Wylie et al. 2002). Total activity varies widely between individuals; however, individual snakes have been documented moving up to 5 miles (8 kilometers) over a few days in response to dewatering of habitat, and snake home range has been shown to be as large as 14.5 square miles (3744 hectares) (Wylie et al. 1997; Wylie and Martin 2004).

In agricultural areas, snakes were documented using rice fields in 19-20 percent of the observations, marsh habitat in 20-23 percent of observations, and canal and agricultural waterway habitats in 50-56 percent of the observations (Wylie 1999). In the Natomas Basin, habitat used consisted almost entirely of irrigation ditches and established rice fields (Wylie 1998). 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; more than 31 percent of observations were in uplands (Wylie 1999). Snakes observed in uplands during the active season were consistently near vegetative

cover, particularly where cover exceeded 50 percent in the area within 1.6 ft (0.5 m) of the snake (Wylie 1999).

Predators - Giant garter snakes are eaten by a variety of predators, including raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis virginiansa*), bull frogs (*Rana catesbiana*), hawks (*Buteo* sp.), egrets (*Casmerodius albus, Egretta thula*), and great blue herons (*Ardea herodias*) (Service 2003; Dickert 2003; Wylie et al. 2003b). 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. 1996).

Reasons for Decline and Threats to Survival - The current distribution and abundance of the giant garter snake is much reduced from former times (Service 2003). Less than 10 percent of the historic 4.5 million acres (1.8 million hectares) of Central Valley wetlands remain, approximately 319,000 acres (129,000 hectares) (U.S. Department of Interior 1994), of which very little currently 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. Cattail and bulrush floodplain habitat historically typified much of the Sacramento Valley (Hinds 1952). 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). 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), planned by the State of California, and built and operated by the Federal Bureau of Reclamation, is the largest water management system in California. The CVP and the historic water development activities that preceded it have not only resulted in the loss of all but approximately 10 percent of wetlands, they have created an ecosystem altered to such an extent that remaining wetlands, including agriculture, depend on managed water (U.S. Department of Interior 1994). The historic disturbance events associated with seasonal inundation that occur naturally in dynamic riverine, riparian, and wetland ecosystems have been largely eliminated. In addition to the highly managed water regimes, implementation of CVP has resulted in conversion of native habitats to agriculture, and has facilitated urban development throughout the Central Valley (Service 2003). In 1992, Congress enacted the Central Valley Project Improvement Act (CVPIA), the principal concerns of which include pricing and management of Central Valley water and attempting to mitigate for the fish, wildlife, and associated habitat impacts of the project. CVPIA, however, has been largely ineffective, addressing primarily only the water needs of publicly-owned wetlands, which account for less than one-fourth of the wetlands in the Central Valley (Service 2003).

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 (Service 2003). Biocides applied to control aquatic vegetation reduce cover for the

snake and may harm prey species (Wylie et al. 1996). Rodent control threatens the snake's upland estivation habitat (Wylie et al. 1996). Restriction of suitable habitat to water canals bordered by roadways and levee tops renders snakes vulnerable to vehicular mortality (Wylie et al. 1997). Materials used in construction projects (e.g., erosion control netting) can entangle and kill snakes (Stuart et al. 2001). 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). Fluctuation in rice and agricultural production affects stability and availability of habitat (Wylie and Casazza 2001).

Other land use practices also currently threaten the survival of the snake. Recreational activities, such as fishing, may disturb snakes and disrupt basking and foraging activities. Nonnative predators, including introduced predatory game fish, bullfrogs, and domestic cats, can threaten snake populations (Wylie et al. 1996; Dickert 2003; Wylie et al. 2003b). 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. Degraded water quality continues to be a threat to the species both on and off refuges.

The Central Valley is among the most endangered ecosystems due to its fertile soils, amiable climates, easy terrains, and other factors that historically have encouraged human settlement and exploitation (Noss et al. 2003). Environmental impacts associated with urbanization include loss of biodiversity and habitat, alteration of natural fire regimes, fragmentation of habitat from road construction, and degradation due to pollutants (Service 2003). Rapidly expanding cities within the snake's range include Chico, Yuba City, the Sacramento area, Galt, Stockton, Gustine, and Los Banos.

Status with Respect to Recovery - The revised draft recovery plan for the giant garter snake subdivides its range into three proposed recovery units (Service 2003): (1) Northern Sacramento Valley Recovery Unit, (2) Southern Sacramento Valley Recovery Unit, and (3) San Joaquin Valley Recovery Unit.

The Northern Sacramento Valley Unit at the northern end of the species' range contains sub-populations in the Butte Basin, Colusa Basin, and Sutter Basin (Service 2003). 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 northern most recovery unit is known to support relatively large, stable sub-populations of giant garter snakes (Wylie et al. 1996; Wylie et al. 2002). Habitat corridors connecting subpopulations, however, are either not present or not protected.

The Southern Sacramento Valley Unit includes sub-populations in the American Basin, Yolo Basin, and Delta Basin (Service 2003). The status of Southern Sacramento Valley sub-populations is very uncertain; each is very small, highly fragmented, isolated, and threatened by urbanization (Service 2003; Hansen 2004). The American Basin sub-population, although also threatened by urban development, receives protection from the Metro Air Park and Natomas

Basin habitat conservation plans (HCP), which share a regional strategy to maintain a viable snake sub-population in the Natomas Basin.

The San Joaquin Valley Unit includes sub-populations in the San Joaquin Basin and Tulare Basin. The San Joaquin Valley Unit 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 (Wylie 1998; Dickert 2002). Giant garter snakes currently occur in the northern and central San Joaquin Basin within the Grassland Wetlands, in North and South Grasslands, Mendota Area, and Burrel/Lanare Area. Agricultural and flood control activities are presumed to have extirpated the snake from the Tulare Basin (Hansen 1995); however, comprehensive surveys for this area are lacking and where habitat remains, the giant garter snake may be present (Service 2003).

Since 1995, BRD has been studying life history and habitat requirements of the giant garter snake within a few of the "13 populations" identified in the listing. BRD has studied snake sub-populations at the Sacramento, Delevan, and Colusa NWRs, 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, and in the Natomas Basin within the American Basin, (Wylie et al. 1996, 2002, 2003a, 2004; Wylie 1998, 1999, 2003; Hansen 2003, 2004), which represent 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).

Until recently, there were no post-1980 sightings of giant garter snakes from Stockton southward, and surveys of historic localities conducted in 1986 did not detect any snakes (Hansen 1988). Since 1995, however, surveys conducted by CDFG in cooperation with BRD around Los Banos and Volta Wildlife Area in the Grasslands, and Mendota Wildlife Area in the Mendota Area have detected snakes, but in small numbers much lower than those found in Sacramento Valley sub-populations (Wylie 1998; Dickert 2002, 2003; Williams & Wunderlich 2003). The estimated total population size for Volta Wildlife Area is 45 individuals, approximately only 3.5 snakes per kilometer. Such low numbers are suggestive of a tenuously small snake population. Also, one-third of the giant garter snakes found had lumps on their bodies suggestive of a parasitic nematode infection (Dickert 2003); further study is underway. Ten of the 31 snakes found in 2003, however, weighed less than 40 grams indicating that giant garter snakes have been breeding at Volta Wildlife Area. These results demonstrate that giant garter snakes are still extant in the northern San Joaquin Valley, but probably in extremely low numbers/densities. All sub-populations are isolated from each other with no protected dispersal corridors. Opportunities for re-colonization of small sub-populations that may become extirpated are unlikely given the isolation from larger populations and lack of dispersal corridors between them.

The revised draft recovery criteria require multiple, stable sub-populations within each of the three 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 counter threats to the species (Service 2003). Currently, only the Northern Sacramento Valley Recovery Unit is known to support relatively large, stable giant garter snake sub-populations. Habitat corridors connecting sub-populations, even for the Northern 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 land use, and are, thus, uncertain and unpredictable.

Environmental Baseline

The proposed project is located within the American Basin snake population, in the Southern Sacramento Valley Recovery Unit (Service 2003). Fifty-nine CNDDB (2005) locality records are known from the American Basin. These locality records include the Natomas Basin, Bear River and associated tributaries, the Middle-American Basin just north of the Natomas Cross Canal, as well as other locations within the basin.

The distribution of the snake in Yuba County is not well known. A search of the California Natural Diversity Database (CNDDB 2005) indicates one locality record known from Yuba County, located 3.7 miles (6 km) to the south of the proposed project site, just south of Bear River and east of SR 70. The Service maintains an additional locality record of the snake in the Clark Lateral Diversion Canal directly west of its junction with SR 70 (Sycamore Environmental Consulting, Inc 1998), located approximately 4 miles (6.4 km) north of the proposed project site. While CNDDB indicates that snakes are widely distributed throughout the southern part of the American Basin, which includes the Natomas Basin, suggesting that a large snake population inhabits this rice production district, few records exist for the northern part of the American Basin (CNDDB 2005). This paucity of records, however, may reflect a lack of survey efforts rather than absence of the species. Intensive survey efforts will be required before it can be concluded snakes are absent from the northern portion of the American Basin.

Factors Affecting the Snake within the Action Area - The American Basin represents one of the largest and better protected giant garter snake sub-populations. Nonetheless, this sub-population is subject to the affects of a number of projects. Numerous development projects have been constructed in or near snake habitat in this rapidly urbanizing area. Any remaining sub-populations are vulnerable to secondary effects of urbanization, such as increased predation by house cats, water pollution, and increased vehicular mortality. Most documented localities have been adversely impacted by development, including freeway construction, flood control projects, and commercial development. Several former localities are known to have been lost and/or depleted to the extent that continued viability is in question (Brode and Hansen 1992). The scarcity of remaining suitable habitat, flooding, stochastic processes, and continued threats of habitat loss pose a severe threat to this sub-population (Goodman 1987).

A number of State, local, private, and unrelated Federal actions have occurred within the action area and adjacent region affecting the environmental baseline of the species. Some of these projects have been subject to prior section 7 consultation. These actions have resulted in both direct and indirect effects to snake habitat within the region. Projects affecting the environment

in the action area include flood control projects and road projects. In the past 10 years, the Service has authorized take on approximately 335 acres in the American Basin.

Ongoing agricultural and flood control activities may decrease and degrade the remaining habitat throughout the snake's extant range affecting the environmental baseline for the snake. Such activities are largely not subject to section 7 consultation. Some agriculture, such as rice farming, can provide valuable seasonal foraging and upland habitat for the snake. Although rice fields and agricultural waterways can provide habitat for the snake, agricultural activities such as waterway maintenance, weed abatement, rodent control, and discharge of contaminants into wetlands and waterways can degrade snake habitat and increase the risk of snake mortality (Service 2003). On-going maintenance of agricultural waterways can also eliminate or prevent establishment of snake habitat, eliminate food resources for the snake, and fragment existing habitat and prevent dispersal of snakes (Service 2003).

Flood control and maintenance activities which can result in snake mortality and degradation of habitat include levee construction, stream channelization, and rip-rapping of streams and canals (Service 2003). Flood control programs are administered by the Corps, and the Corps typically has consulted on previous projects and is expected to continue to do so on future projects. The ongoing nature of these activities and the administration under various programs, however, makes it difficult to determine the continuing and accumulative effects of these activities.

In addition to projects already discussed, projects affecting the environment in the action area include transportation projects with Federal, county, or local involvement. The FHWA and/or the Corps have consulted with the Service on the issuance of wetland fill permits for several transportation-related projects within the American Basin that affected snake habitats. The direct effect of these projects is often small and localized, but the effects of transportation projects, which improve access and therefore indirectly affect snakes by facilitating further development of habitat in the area and by increasing snake mortality via vehicles, are not quantifiable.

Ongoing 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 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). TNBC is the plan operator responsible for acquiring and managing habitat mitigation lands for the MAPHCP and NBHCP. The MAPHCP and NBHCP permits authorized the development of 17,500 acres of land in the Natomas Basin; of this, approximately 8,512 acres is suitable snake habitat (e.g., ponds, canals, and rice fields) (Service 2003). A key component of the MAPHCP and NBHCP's conservation strategy is the acquisition of 0.5 acre of habitat mitigation lands for every acre of land developed. A total of 75 percent of the mitigation lands will be suitable for the snake, with 50 percent in rice fields and 25 percent in managed marsh. Once the MAPHCP and NBHCP have been built out, approximately 6,562 acres of habitat will have been acquired for the snake, including 4,375 acres of rice fields and 2,187.5 acres of managed marsh. As of January 21, 2004, TNBC had acquired 3,415 acres of lands to mitigate the impacts of these HCPs.

Construction activities associated with the proposed project are likely to adversely affect the snake. While no reported occurrences of snakes are known for the proposed project site, CNDDB (2005) records indicate that the snake occurs in vicinity of the proposed project area, with two records within 5 miles (8 km) of the site itself. The snake has been documented to move 5 miles (8 km) over the course of a few days (Wylie et al. 1997). Therefore, due to proximity of snake observation records and their hydrologic connection to the project, the occurrence of highly suitable habitat in nearby areas, the biology and ecology of this species, as well as the presence of suitable habitat in and adjacent to the proposed project site, the Service believes that the snake is reasonably certain to occur within the action area and, therefore, the proposed project is likely to adversely affect the species through permanent and temporary loss of habitat.

Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

Status of the Species

The vernal pool tadpole shrimp and vernal pool fairy shrimp were listed as endangered and threatened, respectively, on September 19, 1994. Complete descriptions of these species are found in the final rule listing these species under the Act (Service 1994). These branchiopods are restricted to vernal pools and swales and other seasonal aquatic habitats. The vernal pool fairy shrimp is found in California and southern Oregon, and the vernal pool tadpole shrimp is found in California. Eng et al. (1990) and Simovich et al. (1992) provide further details about their life history and ecology. The Service did not designate any critical habitat for the vernal pool crustaceans in Sacramento County.

Life history of vernal pool tadpole shrimp - The vernal pool tadpole shrimp has dorsal compound eyes, a large shield-like carapace that covers most of its body, and a pair of long cercopods at the end of its last abdominal segment (Linder 1952; Longhurst 1955; Pennak 1989). It is primarily a benthic animal that swims with its legs down. Vernal pool tadpole shrimp climb or scramble over objects, and plow along bottom sediments as they forage for food. Its diet consists of organic detritus and living organisms, such as fairy shrimp and other invertebrates (Pennak 1989; Fryer 1987). The females deposit their eggs on vegetation and other objects on the pool bottom. Tadpole shrimp eggs are known as cysts, and during the dry months of the year, they lie dormant in the dry pool sediments (Lanaway 1974; Ahl 1991).

The life history of the vernal pool tadpole shrimp is linked to the environmental characteristics of its vernal pool habitat. After winter rains fill the pools, dormant vernal pool tadpole shrimp cysts may hatch in as little as four days (Ahl 1991; Rogers in lit. 2001), and tadpole shrimp may become sexually mature within three to four weeks after hatching (Ahl 1991; Helm 1998; King 1996). A portion of the cysts hatch immediately and the rest remain dormant in the soil to hatch during later rainy seasons (Ahl 1991). The vernal pool tadpole shrimp is a relatively long-lived species (Ahl 1991), and will generally survive for as long as their habitats remain inundated, sometimes for six months or more (Ahl 1991; Gallagher 1996; Helm 1998). Adults are often present and reproductive until the pools dry up in the spring (Ahl 1991; Simovich et al. 1992). Mature adults may be present in pools until the habitats dry up in the spring (Ahl 1991; Gallagher 1996; Simovich et al. 1992).

Life history of vernal pool fairy shrimp - Vernal pool fairy shrimp have delicate elongate bodies, large stalked compound eyes, no carapace, and 11 pairs of phyllopods, or gill-like structures that also serve as legs. They swim or glide gracefully upside-down by means of complex, wavelike beating movements. Fairy shrimp feed on algae, bacteria, protozoa, rotifers, and detritus. The second pair of antennae in fairy shrimp adult males are greatly enlarged and specialized for clasping the females during copulation. The females carry eggs in an oval or elongate ventral brood sac. The eggs are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks. The dormant cysts are capable of withstanding heat, cold, and prolonged desiccation, and they can remain viable in the soil for decades after deposition. When the pools refill in the same or subsequent seasons, some, but not all, of the cysts may hatch. The cyst bank in the soil may therefore be comprised of cysts from several years of breeding (Donald 1983). The early stages of the fairy shrimp develop rapidly into adults. The vernal pool fairy shrimp can mature quickly, allowing populations to persist in short-lived shallow pools (Simovich et al. 1992). In pools that persist for several weeks to a few months, fairy shrimp may have multiple hatches during a single season (Helm 1998; Gallagher 1996).

Vernal Pool Ecology and Species Adaptations – The hydrology that maintains the pattern of inundation and drying characteristic of vernal pool habitats is complex. Vernal pool habitats form in depressions above an impervious soil layer (duripan) or rock substrate. After winter rains begin, this impervious layer prevents the downward percolation of water and creates a perched water table causing the depression (or pool) to fill. Due to local topography and geology, the depressions are generally part of an undulating landscape, where soil mounds are interspersed with basins, swales, and drainages (Nikiforoff 1941; Holland and Jain 1978). These features form an interconnected hydrological unit known as a vernal pool complex. Although vernal pool hydrology is driven by the input of precipitation, water input to vernal pool basins also occurs from surface and subsurface flow from the swale and upland portions of the complex (Zedler 1987; Hanes et al. 1990; Hanes and Stromberg 1998). Surface flow through the swale portion of the complex allows vernal pool species to move directly from one vernal pool to another. Upland areas are a critical component of vernal pool hydrology because they directly influence the rate of vernal pool filling, the length of the inundation period, and the rate of vernal pool drying (Zedler 1987; Hanes and Stromberg 1998). Upland areas associated with vernal pools are also an important source of nutrients to vernal pool organisms (Wetzel 1975). Vernal pool habitats derive most of their nutrients from detritus that is washed into the pool from adjacent uplands, and these nutrients provide the foundation for the vernal pool aquatic community food chain.

Both of the vernal pool crustaceans addressed in this biological opinion have evolved unique physical adaptations to survive in vernal pools. Vernal pool environments are characterized by a short inundation phase during the winter, a drying phase during the spring, and a dry phase during the summer (Holland and Jain 1978). The timing and duration of these phases can vary significantly from year to year, and in some years vernal pools may not inundate at all. In order to take advantage of the short inundation phase, vernal pool crustaceans have evolved short reproduction times and high reproductive rates. The listed crustaceans generally hatch within a few days after their habitats fill with water, and can start reproducing within a few weeks (Eng et al. 1990; Helm 1998; Eriksen and Belk 1999). Vernal pool crustaceans can complete their entire life cycle in a single season, and some species may complete several life cycles. Vernal pool

crustaceans can also produce numerous offspring when environmental conditions are favorable. Some species may produce thousands of cysts during their life spans.

To survive the prolonged heat and desiccation of the vernal pool dry phase, vernal pool crustaceans have developed a dormant stage. The dormant egg, or cyst, can withstand temperatures near boiling (Carlisle 1968), fire (Wells et al. 1997), freezing, and anoxic conditions without damage to the embryo. The cyst wall cannot be affected by digestive enzymes, and can be transported in the digestive tracts of animals without harm (Horne 1967). Most fairy shrimp cysts can remain viable in the soil for a decade or longer (Belk 1998). Because the cyst contains a well developed embryo, the animal can quickly develop into a fully mature adult. This allows vernal pool crustaceans to reproduce before the vernal pool enters the dry phase, sometimes within only a few weeks (Helm 1998; Eriksen and Belk 1999). In some species, cysts may hatch immediately without going through a dormant stage, if they are deposited while the vernal pool still contains water. These cysts are referred to as quiescent, and allow the vernal pool crustacean to produce multiple generations in a single wet season as long as their habitat remains inundated.

Distribution of vernal pool tadpole shrimp - Vernal pool tadpole shrimp are found only in ephemeral freshwater habitats in California. The vernal pool tadpole shrimp is known from 168 occurrences in the Central Valley (CNDDB 2005), ranging from east of Redding in Shasta County south to Fresno County, and from a single vernal pool complex located in the San Francisco Bay National Wildlife Refuge in Alameda County. It inhabits vernal pools containing clear to highly turbid water, ranging in size from 54 square feet in the Mather Air Force Base area of Sacramento County, to the 89-acre Olcott Lake at Jepson Prairie in Solano County. Although vernal pool tadpole shrimp are found on a variety of geologic formations and soil types, Helm (1998) found that over 50 percent of vernal pool tadpole shrimp occurrences were on High Terrace landforms and Redding and Corning soils.

Based on genetic differences, King (1996) separated vernal pool tadpole shrimp populations into two distinct groups. One group was comprised of animals inhabiting the floor of the Central Valley, near the Sacramento and San Joaquin Rivers. The other group contained vernal pool tadpole shrimp from sites along the eastern margin of the valley. King (1996) concluded that these two groups may have diverged because cyst dispersal by overland flooding historically connected populations on the valley floor, while populations on the eastern margin of the valley were not periodically connected by large scale flooding, and were therefore historically more isolated. When dispersal of these foothill populations occurred, it was probably through different mechanisms such as migratory birds.

Distribution of vernal pool fairy shrimp - Vernal pool fairy shrimp are found only in ephemeral freshwater habitats in California and Southern Oregon. The vernal pool fairy shrimp is known from 342 occurrences extending from the Stillwater Plain in Shasta County through most of the length of the Central Valley to Pinnacles in San Benito County (Eng et al. 1990; Fugate 1992; Sugnet and Associates 1993; CNDDB 2005). Five additional, disjunct populations exist: one near Soda Lake in San Luis Obispo County; one in the mountain grasslands of northern Santa Barbara County; one on the Santa Rosa Plateau in Riverside County; one near Rancho California in Riverside County; and one on the Agate Desert near Medford, Oregon. Three of these isolated

populations each contain only a single pool known to be occupied by the vernal pool fairy shrimp. The vernal pool fairy shrimp inhabits vernal pools with clear to tea-colored water, most commonly in grass- or mud-bottomed swales, basalt flow depression pools in unplowed grasslands, or even sandstone rock outcrops or alkaline vernal pools.

Although the vernal pool crustaceans addressed in this biological opinion are not often found in the same vernal pool at the same time, when coexistence does occur, it is generally in deeper, longer lived pools (Eng et al. 1990; Thiery 1991; Gallagher 1996; Simovich 1998). In larger pools, vernal pool crustacean species may be able to coexist by utilizing different physical portions of the vernal pool or by eating different food sources (Daborn 1978; Mura 1991; Hamer and Appleton 1991; Thiery 1991), or by hatching at different temperatures or developing at different rates (Thiery 1991; Hathaway and Simovich 1996).

Dispersal - The primary historic dispersal method for the vernal pool tadpole shrimp and vernal pool fairy shrimp likely was large scale flooding resulting from winter and spring rains which allowed the animals to colonize different individual vernal pools and other vernal pool complexes (J. King, pers. comm., 1995). This dispersal is currently non-functional due to the construction of dams, levees, and other flood control measures, and widespread urbanization within significant portions of the range of this species. Waterfowl and shorebirds may now be the primary dispersal agents for vernal pool tadpole shrimp and vernal pool fairy shrimp. The eggs of these branchiopods are either ingested (Krapu 1974; Swanson et al. 1974; Driver 1981; Ahl 1991) and/or adhere to the legs and feathers where they are transported to new habitats. Cysts may also be dispersed by a number of other species, such as salamanders, toads, cattle, and humans (Eriksen and Belk 1999).

Vernal pool crustaceans are often dispersed from one pool to another through surface swales that connect one vernal pool to another. These dispersal events allow for genetic exchange between pools and create a population of animals that extends beyond the boundaries of a single pool. Instead, populations of vernal pool crustaceans are defined by the entire vernal pool complex in which they occur (Simovich et al. 1992, King 1996). These dispersal events also allow vernal pool crustaceans to move into pools with a range of sizes and depths. In dry years, animals may only emerge in the largest and deepest pools. In wet years, animals may be present in all pools, or in only the smallest pools. The movement of vernal pool crustaceans into vernal pools of different sizes and depths allows these species to survive the environmental variability that is characteristic of their habitats.

Reasons for Decline and Threats to Survival - The genetic characteristics of these species, as well as ecological conditions, such as watershed continuity, indicate that populations of vernal pool crustaceans are defined by pool complexes rather than by individual vernal pools (Fugate 1992). Therefore, the most accurate indication of the distribution and abundance of these species is the number of inhabited vernal pool complexes. The pools and, in some cases, pool complexes supporting these species may be small. Human-caused and unforeseen natural catastrophic events such as long-term drought, non-native predators, off-road vehicles, pollution, berming, and urban development, threaten to extirpate vernal pool crustaceans at some sites. Vernal pool fairy shrimp and vernal pool tadpole shrimp continue to be threatened by all of the

factors which led to the original listing of these species, primarily habitat loss through agricultural conversion and urbanization (CNDDB 2005).

Environmental Baseline

Historically, vernal pools and vernal pool complexes occurred extensively throughout the Sacramento Valley of California. Conversion of vernal pools and vernal pool complexes, however, has resulted in a 91 percent loss of vernal pool resources in California (State of California 2003d). By 1973, between 60 and 85 percent of the area within the Central Valley that once supported vernal pools had been destroyed (Holland 1978). In subsequent years, threats to this habitat type have continued and resulted in a substantial amount of vernal pool habitat being converted for human uses in spite of Federal regulations implemented to protect wetlands. For example, between 1987 and 1992, 467 acres of wetlands within the Sacramento area were filled pursuant to Nationwide Permit 26 (Service 1992). A majority of those wetlands losses involved vernal pools, the endemic habitat of the vernal pool tadpole shrimp, the vernal pool fairy shrimp and slender and Sacramento Orcutt grasses (*Orcuttia tenuis* and *Orcuttia viscida*). It was estimated that within 20 years human activities will destroy 60 to 70 percent of the remaining vernal pools (Coe 1988).

In addition to direct habitat loss, the tadpole and fairy shrimp populations have been, and continue to be, highly fragmented throughout their ranges due to conversion of natural habitat for urban and agricultural uses. Fragmentation results in small isolated shrimp populations. Ecological theory predicts that such populations will be highly susceptible to extirpation due to chance events, inbreeding depression, or additional environmental disturbance (Gilpin and Soulé 1988; Goodman 1987a, b). If an extirpation event occurs in a population that has been fragmented, the opportunities for re-colonization would be greatly reduced due to physical (geographic) isolation from other (source) populations.

The proposed project is located in southern Yuba County, which is within the northern portion of the Southeastern Sacramento Valley Vernal Pool Region and the southern portion of the Northern Eastern Sacramento Valley Vernal Pool Region (Keeler-Wolf et al. 1998 and Service 2005). Yuba County contains occurrences of both the vernal pool tadpole shrimp and vernal pool fairy shrimp, although much of the terrain in southern Yuba County has been converted to active agriculture, including rice farming and orchards. In the late 1990s, Holland (1998) identified over 8,000 acres of remnant vernal pool habitat east and southeast of Marysville between the Yuba and Bear Rivers and outside of Beale AFB. In Yuba County, between 1995 and 1997, vernal pool acres declined at a rate of 1.47 percent per year.

The value of these remaining fragments of ephemeral wetlands for the listed vernal pool branchiopods is threatened by direct and indirect effects of urbanization, mining, and conversion to vineyards, as well as by their isolation. The increased urban development and conversion of agricultural lands has resulted in the loss of vernal pool resources. Historically, California has lost an estimated 91 percent of vernal pool resources (State of California 2003). The vernal pool tadpole shrimp and vernal pool fairy shrimp are imperiled by a variety of human-caused activities. Their habitats have been lost through direct destruction and modification due to filling, grading, disking, leveling, and other activities. In addition, vernal pools have been

imperiled by a variety of anthropogenic modifications to upland habitats and watersheds. These activities, primarily urban development, water supply/flood control projects, land conversion for agriculture, off-road vehicle use, certain mosquito abatement measures, and pesticide/herbicide use can lead to disturbance of natural flood regimes, changes in water table depth, alterations of the timing and duration of vernal pool inundation, introduction of non-native plants and animals, and water pollution. These indirect effects can result in adverse effects to vernal pool species.

A number of State, local, private, and unrelated Federal actions have occurred within the project area and adjacent region affecting the environmental baseline of these species. Some of these projects have been subject to prior section 7 consultation. These actions have resulted in both direct and indirect impacts to vernal pools within the region, and have contributed to the loss of vernal pool tadpole shrimp and vernal pool fairy shrimp populations. Although a reduction of federally-listed vernal pool branchiopod populations has not been quantified, the acreage of lost habitat continues to grow.

CNDDB (2004) indicates six locality records of the vernal pool fairy shrimp and two records of the vernal pool tadpole shrimp in Yuba County. Most of these records are from the Beale Air Force Base, located approximately 10-11 miles (16-17.7 km) east of the proposed project site. Seasonal wetlands and seasonal ponds are located on the proposed project site. Wet-season sampling for listed branchiopods were completed by Jones and Stokes on March 17, 2004, in three of the seasonal wetlands. Vernal pool tadpole shrimp were observed in the project area in one of the seasonal wetlands. Because vernal pool fairy shrimp are known to occur in the vicinity of the proposed project, all of the on-site seasonal wetlands and seasonal ponds identified during the field evaluation are suitable habitat for the vernal pool fairy shrimp and vernal pool tadpole shrimp. Based on this information the Service has determined that there is a high likelihood that the vernal pool fairy shrimp inhabit the proposed project site and the vernal pool tadpole shrimp does inhabit the proposed project site.

EFFECTS OF THE PROPOSED ACTION

Direct Effects

Valley Elderberry Longhorn Beetle

The proposed project will require the removal of 15 elderberry shrubs during Stage 1 and potentially 43 elderberry shrubs during Stage 2. Beetle exit holes are assumed to be located on 7 shrubs which would be affected during Stage 1 construction because TRLIA was unable to survey the stems for exit holes, and have been located on 17 shrubs which would be affected during Stage 2 construction. Construction activities during Stage 2 include regrading the existing Pump Station No. 3 outfall channel to enhance drainage and fish passage within the new setback area. However, TRLIA does not yet have detailed designs for regrading this area and it is assumed that all existing elderberry shrubs within the area (43 shrubs) would be affected by construction. This biological opinion evaluates effects of transplanting all 43 shrubs during Stage 2. However because the area would be within newly created floodplain habitat, the Service encourages TRLIA and their contractors to avoid transplanting as many of the elderberry shrubs as possible by working around elderberry shrubs whenever possible, thereby avoiding

some of the following effects to the beetle due to transplanting. Compensation would apply only to elderberry shrubs which are actually transplanted as a result of the project.

Loss of an elderberry shrub or even a stem can affect valley elderberry longhorn beetle breeding and feeding because adult beetles rely solely on elderberry flowers for food and must lay their eggs on elderberry stems to successfully reproduce. Due to the accelerated schedule of the project it is highly likely that during Stage 1 elderberry shrubs would be transplanted outside of the typical transplant window (November 1 to February 15). To avoid adult beetle mortality transplanting should not occur during the beetle's flight season (March 15 to June 15). Additional stress occurs to elderberry shrubs when transplanted outside of their dormant season particularly when temperatures are high. This stress increases the likelihood of shrub mortality and consequently an additional temporal loss of habitat for the beetle. Due to this effect transplanting which occurs between February 15 and March 15 should have an increased compensation of 2 times the recommended ratios in the Conservation Guidelines and between June15 and October 31 should have an increased compensation of 2.5 times the recommended ratios in the Conservation Guidelines. Stage 2 elderberry shrubs would be transplanted during the transplant window.

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

Giant Garter Snake

Construction activities associated with the project may disturb, harass, injure, or kill snakes. Construction activities may remove vegetative cover and basking sites, fill or crush burrows or crevices, and decrease prey base. The construction, earthen work activities, and earth surface modifications will permanently and temporarily disturb aquatic and upland habitats. Because snakes utilize small mammal burrows and soil crevices as retreat sites, snakes may be crushed, buried, or otherwise injured from construction activities. Snakes may be killed or injured by construction equipment or other vehicles accessing the construction site. Snakes may also be killed or injured by becoming entangled in netting used for erosion control (Stuart et. al. 2001). Disturbance from construction activities may also cause snakes to temporarily move into or across areas of unsuitable habitat where they may be prone to higher rates of mortality from vehicles and predation.

Stage 1 work including construction of the setback levee, its accompanying stability berms, and of the new Pump Station No. 3 would result in permanent loss of 0.38 acre of giant garter snake aquatic habitat and 1.70 acres of giant garter snake upland habitat and temporary loss of 0.11 acre of aquatic habitat. Stage 2 work would have greater effects to giant garter snake habitat with the degradation of the existing Feather River levee and opening the area up to flooding as well as filling portions of Plumas Lake Canal landside of the setback levee. A total of 26.67 acres of giant garter snake habitat would be lost from Stage 2 work including

16.22 acres of aquatic and 10.45 acres of upland habitats. Therefore, the entire project would permanently affect 16.60 acres of giant garter snake aquatic habitat and 12.24 acres of giant garter snake upland habitat and temporarily affect 0.11 acre of giant garter snake aquatic habitat. The aquatic habitat provides water during the snake's active period, and the uplands provides habitat for basking, cover, and retreat sites, and higher elevation upland for cover and refuge from flood waters.

Indirect Effects

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Future Federal actions that have not undergone section 7 consultation and future non-Federal activities can also be included as indirect effects of the project provided they are reasonably certain to occur and will result from the action under consideration.

The Service considered indirect effects of future activities that are reasonably certain to occur as a result of the proposed project. These actions, particularly those related to the facilitation of planned growth in the action area, may affect federally-listed species. The Service considered relevant plans that direct and guide planned growth in the action area of the proposed project. These included: Yuba County General Plan, North Arboga Study Area, and Plumas Lake Specific Plan.

While the Service recognizes that TRLIA is not directly involved in the planning or construction of housing within RD 784, providing flood control to RD 784 would indirectly facilitate planned growth. Yuba County is experiencing population growth. Specific plans for these areas were designed to accommodate this population growth. Unfortunately, neither the specific plans for areas designated for development nor the environmental impact reports prepared for these plans provide acreages for the various habitats which occur. However, given the previous flood control projects, and known listed species occurrences within the project area, the Service believes that giant garter snake, valley elderberry longhorn beetle, and vernal pool crustaceans are reasonably certain to occur within the Specific Plan Areas in RD 784.

Effect of Planned Development to Listed Species

Planned development within RD 784 will result in the loss of a large amount of land in southern Yuba County. When complete, over half of the existing 16,500 acres in RD 784, will be developed with housing, retail, businesses, and infrastructure including schools, parks, and roads. Construction on these 9,386 acres slated for development began in 2002 and has continued to date. Projects considered in this analysis include those which may affect non-jurisdictional wetlands or uplands and do not need a permit from the Corps Regulatory Branch. It is impossible to determine how much take of threatened and endangered species may have occurred from projects completed without the benefit of section 7 consultation or a habitat conservation plan, and how much could occur when the full planned build-out within RD 784 is completed. Mitigation measures were addressed in the EIRs for the various specific plans. Unfortunately, all of the plans were written and evaluated prior to the listing of the giant garter snake and vernal pool species. Specific mitigation was not provided for the valley elderberry

longhorn beetle in any of the Specific Plans or the General Plan, TRLIA has created a large block of valley elderberry longhorn beetle habitat within the Bear River setback. The Bear River Setback Project restored approximately 500 acres of riparian habitat and planted approximately 15,000 elderberry seedlings only a small fraction of which (1,600 elderberry seedlings) were compensation for direct effects due to construction of the setback levee and levee improvements. Consequently, while there is potential for take of the valley elderberry longhorn beetle through planned development within RD 784, TRLIA's efforts to restore riparian habitat and specifically beetle habitat would offset the loss of individual elderberry shrubs within RD 784. Though, individual developers would still be responsible to minimize and compensate for any affects their projects may have on the valley elderberry longhorn beetle.

Proposed mitigation in the Plumas Lakes Specific Plan EIR, for drainage ditches and swales is to incorporate a 25-foot setback buffer. Giant garter snake movements have been documented to be as far as 800 feet from aquatic area and this would not provide sufficient upland habitat to avoid take of snakes. Due to the lack of data of giant garter snake habitat within the area the Service can only estimate how much habitat remains for giant garter snake within the Plumas Lakes Specific Plan Area. Using aerial photos from 2005, the Service estimated that approximately 8.1 miles of aquatic habitat exists within the Plumas Lakes Specific Plan Area. Typically anything within 200 feet on either side of the aquatic habitat is considered upland habitat for giant garter snake. Using 400 feet for upland habitat and 15 feet for the width of aquatic habitat the Service estimates that approximately 407 acres of giant garter snake habitat is within the boundaries of the Plumas Lakes Specific Plan Area. While the Specific Plan provides provisions for protecting the aquatic habitat it does not protect the adjacent upland and consequently a large portion of giant garter snake upland habitat would be lost through future development.

The Specific Plan recommended that owners are responsible for contacting the Corps Regulatory only for jurisdictional wetlands greater than one acre. Vernal pools are often located in very small wetlands, less than an acre, and are not always considered to be jurisdictional by the Corps Regulatory Branch. However, they may still be habitat for listed vernal pool crustaceans. Therefore, the EIR's recommendations would allow for the filling of these small wetlands without compliance under the Act. Due to lack of data, the Service was forced to estimate the potential acreage of vernal pool habitat within the Plumas Lakes Specific Plan Area. The Service based their vernal pool density on the creation density of vernal pools at a near-by compensation site (Best Slough). This compensation site used a density of 10% because that was the historical density and the remnant density of vernal pools within the area. The Service is assuming that 10% (462.5 acres) of the remaining undeveloped lands within the Plumas Lake Specific Plan Area is habitat for vernal pool crustaceans and would be affected by future planned construction.

The Service recognizes that the acreage estimates for giant garter snake habitat and vernal pool crustacean habitat is high. Over the course of time, changes in land use within RD 784 such as conversion to agriculture, has likely changed the amount of available habitat for the listed species to be much less than what the Service estimated. The acreages for giant garter snake and vernal pool crustaceans are conservative estimates to the benefit of the listed species, however we would expect the actual acreage numbers to be much lower if the area were surveyed for listed species and their habitat.

Development projects which affect jurisdictional wetlands would need to get a Clean Water Act 404 permit from the Corps. Therefore, some of the effects to vernal pool crustaceans and to giant garter snakes due to their habitat being affected would be analyzed under a section 7 consultation between the Corps and the Service. However, effects to vernal pools which are non-jurisdictional and to upland giant garter snake habitat should be completed via section 10 of the Act. Because the Service has concerns over whether or not individual developers comply with the Act when there is not a section 7 nexus, TRLIA has proposed to facilitate an MOA with Yuba County and the Service whereby Yuba County would only approve a development project when the developer can demonstrate they have coordinated with the Service and their project complies with the Act. The TRLIA has approached Yuba County with the idea of becoming a signatory with the Service in an MOA. In a Board of Supervisors meeting in March of 2008, the Board of Supervisors approved an MOA with the Service. Coordination between Yuba County and the Service is expected to continue and result in a signed MOA. Therefore, the Service feels that indirect effects to listed species from planned growth within RD 784 have been minimized.

Cumulative Effects

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

Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

Because the vernal pool tadpole shrimp and vernal pool fairy shrimp are endemic to vernal pools in the Central Valley, Coast Ranges, and a limited number of sites in the Transverse Range and Santa Rosa Plateau of California, the Service anticipates that a wide range of activities will affect these species. Such activities include, but are not limited to, urban, water, flood control, highway and utility projects, chemical contaminants, as well as conversion of vernal pools to agricultural use.

Valley Elderberry Longhorn Beetle

Many of the activities affecting the beetle may affect elderberry shrubs located within riparian ecosystems adjoining or within jurisdictional wetlands. These projects will be evaluated via formal consultation between the Service and the Corps via the Federal nexus provided by section 404 of the Clean Water Act. There are, however, a number of projects for which there is no need to discharge dredged or fill materials into waters of the U.S. These projects, for which no section 404 permit is required, may lack a Federal nexus and, thus, move forward with no formal consultation. These projects could result in the take of the beetle, particularly when they result in the removal of elderberry savanna ecosystems. These foothill/upland landscapes often consist of

mixed stands of elderberry shrubs and oak (*Quercus* spp.) trees which are interspersed with open grasslands in a savanna-like arrangement.

Giant Garter Snake

The Service is aware of other projects currently under review by the State, county and local authorities where biological surveys have documented the occurrence of federally- listed species. These projects include such actions such as water transfer projects that may not have a Federal nexus and continued agricultural development. Additionally, an undetermined number of future land use conversions and routine agricultural practices are not subject to Federal permitting processes and may alter the habitat or increase incidental take of snakes, and are, therefore, cumulative to the proposed project. These additional cumulative effects include: (1) unpredictable fluctuations in aquatic habitat due to water management; (2) dredging and clearing of vegetation from irrigation canals; (3) discing or mowing upland habitat; (4) increased vehicular traffic on access roads adjacent to aquatic habitat; (5) use of burrow fumigants on levees and other potential upland refugia; (6) human intrusion into habitat; (7) diversion of water; (8) rip-rapping or lining of canals and stream banks; and (9) use of plastic erosion control netting (Stuart et al. 2001). Specific cumulative effects related to the proposed project include maintenance activities and/or an increased potential for vandalism, which may degrade or destroy habitat or cause unpredictable fluctuations in habitat.

Conclusion

The Service has reviewed the current status of the listed species, the environmental baseline for the action area, the effects of the proposed Feather River Levee Repair project, and the cumulative effects. The direct and indirect effects of the proposed action will result in take of listed species. Although it is not possible to determine an exact amount of effects to listed species habitats from indirect effects, the Service believes that an MOA with Yuba County would compensate for these indirect effects and combined with direct and cumulative effects will not jeopardize the continued existence of the impacted listed species. This is based on an analysis of the effects of the action viewed against the status of the listed species. Critical habitat for the vernal pool crustaceans and valley elderberry longhorn beetle does not occur in the action area of the project and therefore, will not be adversely modified. No critical habitat has been designated or proposed for the snake; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

While the Service has determined there will likely be incidental take resulting from the indirect effects described previously, this take cannot be exempted from the prohibitions of section 9 through this biological opinion's incidental take statement. The reasons for this are as follows: the Act requires that incidental take be minimized to the maximum extent possible through reasonable and prudent measures; to do this requires sufficient information to determine the amount or extent of take, and the authority of the action agency or applicant to comply with and implement terms and conditions for the action under consideration. Neither the Corps nor TRLIA have authority to require Yuba County Planning agency or individual development project proponents to implement any terms or conditions that could minimize the take associated

with these future projects. Therefore, while the Service is able to make a determination that the potential take from these indirect effects would not result in jeopardy, projects proposed under this planned growth will need to either undergo individual section 7 consultations or have a habitat conservation plan developed pursuant to the MOA with Yuba County.

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

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

Amount or Extent of Take

Valley Elderberry Longhorn Beetle

The Service anticipates 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 a dead specimen unlikely. The species occur 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 the action. Therefore, the Service estimates that all beetles inhibiting 53 elderberry plants containing stems 1 inch or greater at ground level (434 stems between 1-3 inches, 185 stems between 3 and 5 inches and 93 stems $\geq$5 inches; see Table 2 in the text) will become unsuitable as a result of the proposed action.

Giant Garter Snake

The Service anticipates that incidental take of the snake will be difficult to detect or quantify for the following reasons: 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 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 16.60 acres of aquatic and 12.24 acres of adjacent upland habitat may be harassed, harmed, or killed by loss and destruction of habitat (1 snake), as a result of the project.

Upon implementation of the following reasonable and prudent measures, incidental take associated with the project on listed valley elderberry longhorn beetle and giant garter snake, in the form of harm, harassment, or mortality from habitat loss or direct mortality will become exempt from the prohibitions described under section 9 of the Act for direct and indirect impacts, except for indirect effects of planned development actions described on pages 36-39. Each of those projects must receive its own incidental take authorization. In addition, incidental take in the form of harm, harassment, or mortality associated with the proposed project will be exempt from the prohibitions described under section 9 of the Act. The incidental take associated with the direct effects of the proposed levee construction is hereby exempted from prohibitions of take under section 9 of the Act.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the valley elderberry longhorn beetle and giant garter snake. Critical habitat for the valley elderberry longhorn beetle does not occur in the action area of the project and therefore, will not be adversely modified. No critical habitat has been designated or proposed for the snake; therefore, none will be affected.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the effect of the proposed Feather River Levee Repair Project on the valley elderberry longhorn beetle and giant garter snake.

1. Adverse effects to listed valley elderberry longhorn beetle and giant garter snake shall be minimized.

2. Impacts of temporary and permanent losses and degradation of habitat of listed valley elderberry longhorn beetles and giant garter snakes shall be minimized and, to the

greatest extent practicable, habitat restored to its pre-project condition. Temporal and permanent loss of habitat shall be compensated.

3. Indirect effects to listed species shall be minimized.

Terms and Conditions

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

1. The following terms and conditions implement reasonable and prudent measure number one (1):

    a. The Corps and TRLIA shall assure all conservation measures as proposed by the project proponent as described on pages 9-12 of this biological opinion are fully implemented.

    b. If the project proponent utilizes an outside contractor to implement the project, the project proponent shall include a copy of this biological opinion within its solicitations for construction of the proposed project, making the prime 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. The project proponents shall make the terms and conditions in this biological opinion a required item in all contracts for the project that are issued by TRLIA to all contractors. The project proponents shall provide the Division Chief of Endangered Species (Central Valley) at the Sacramento Fish and Wildlife Office with a hardcopy of the contract(s) for this project at least ten (10) working days before it is accepted or awarded.

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

    d. A Service-approved biologist must be on-site during all construction-related activities that occur within 200 ft (61 m) of aquatic snake habitat, and that could result in the take of this federally-listed species. The written qualifications of the biologist must be presented to the Service prior to groundbreaking for review and approval prior to any construction-related activities at the project site. The biologist will have the authority to halt any action that might result in take of listed species. If a snake is encountered during construction, all activities will cease until appropriate corrective measures have been completed or until the snake is determined to be unharmed. The biologist will redirect construction activities away from the snake, and the snake will be allowed to move away from

e. the work area on its own. If the biologist exercises this authority, the Service and the CDFG shall be notified by telephone and letter within one (1) working day.

f. A Worker Environmental Awareness Training Program for construction personnel shall be conducted before the commencement of construction. The program shall provide workers with information on their responsibilities with regard to the listed valley elderberry longhorn beetle and the snake, an overview of the life-history of the species, information on take prohibitions, and an explanation of the relevant terms and conditions of this biological opinion. Written documentation of the training must be submitted to the Sacramento Fish and Wildlife Office within thirty (30) working days of the completion of instruction.

g. Prior to groundbreaking, high-visibility fencing that is at least 5 ft (1.5 m) tall shall be placed around valley elderberry longhorn beetle and snake habitat to prevent encroachment of construction equipment and personnel into the avoidance areas during construction activities. Such fencing will be inspected by the on-site biologist at the beginning of each work day and in good condition.

   The fencing may be removed only when the construction of the project is completed.

h. During construction operations, the number of access routes, number and size of staging areas, and the total area of the proposed project activity will be limited to the minimum necessary. Routes and boundaries will be clearly demarcated. Movement of heavy equipment to and from the project site will be restricted to established roadways to minimize habitat disturbance, and all vehicle traffic on access road will observe a speed limit of 20 miles per hour. The stockpiling of construction materials, portable equipment, vehicles, and supplies will be restricted to the designated construction staging areas and exclusive of the wetland avoidance areas. All fueling, cleaning, and maintenance of vehicles and other equipment will occur only within designated areas and at least 200 ft (76 m) away from any wetland habitats. The applicant will ensure contamination of habitat does not occur during such operations. All workers will be informed of the importance of preventing spills and appropriate measures to take should a spill occur. Any spills or hazardous materials will be cleaned up immediately. Such spills will be reported in the post-construction compliance reports.

i. To control erosion during and after implementation of the project, the applicant will implement BMPs, as identified by the Central Valley Regional Water Quality Control Board. Erosion control measures and BMPs, which retain soil or sediment, runoff from dust control, and hazardous materials on the construction site and prevent these from entering the snake aquatic habitat, will be placed, monitored, and maintained throughout the construction operations. These measures and BMPs may include, but are not limited to, silt fencing, sterile hay bales, vegetative strips, and temporary sediment disposal. The project

proponent(s) would not place any plastic, monofilament, jute, or similar erosion control matting that could entangle snakes on the project site.

j. The project proponent(s) will meet water quality objectives through the implementation of construction provisions (Best Management Practices), precautions, and stipulations addressed in the Section 404 permit, the condition of the 401 Water Quality Certification and the 1601 Streambed Alteration Agreement.

k. 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.

l. If requested, during or upon completion of construction activities, the on-site biologist shall accompany Service or CDFG personnel on a on-site inspection of the site to review project effects on listed valley elderberry longhorn beetle and/or giant garter snake.

m. The project proponents will maintain and monitor the project site for one calendar year following the completion of construction and restoration activities. Monitoring reports documenting the restoration effort should be submitted to the Service upon the completion of the restoration implementation and one year after the restoration implementation. Monitoring reports should include photo-documentation, when restoration was completed, what materials were used, specified hydroseed mixes, and justifications of any substitutions to the Service-recommended guidelines.

n. After completion of construction activities, the project proponent(s) would remove any temporary fill, stockpiled materials, trash, and construction debris. The proposed area would be re-graded to its preexisting contour, or to a contour that would improve the restoration potential of the project site. The project area would be reseeded with erosion control seeding consisting of a sterile, non-proliferating grass species, such as cereal barley or green. The seed mix shall not contain fertilizers or chemicals. The project proponent(s) would restore all temporarily disturbed snake habitat (including aquatic and upland habitats) within the same construction season (i.e., May 1 through October 1) that disturbance occurs and according to the *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat.*

o. The Corps and TRLIA shall ensure the applicant complies with the *Reporting Requirements* of this biological opinion.

2. The following terms and conditions implement reasonable and prudent measure number two (2):

   a. Valley elderberry longhorn beetle

      i. In accordance with the Service's *Conservation Guidelines for the Valley Elderberry Longhorn Beetle, 9 July, 1999*, TRLIA shall transplant 53 shrubs, plant 2,754 elderberry seedlings and 4,746 associated native species in a Service approved site, protected in perpetuity, or by purchasing 750 credits at a Service-approved valley elderberry longhorn beetle conservation bank.

      ii. The TRLIA shall designate a qualified biologist to serve as the on-site monitor. The monitor shall be present on a daily basis during the elderberry transplantation process to ensure the Guidelines are followed. The monitor shall quantify the total stems in the three size classes, and shall note any presence of exit holes. Should the number of stems transplanted require over 2,754 elderberry seedlings and 4,746 associated plant seedlings for compensation via the Guidelines, TRLIA shall notify the Service immediately to reinitiate consultation.

      iii. Roadways and disturbed areas within 100 feet of elderberry plants shall be watered at least twice a day to minimize dust emissions.

      iv.

      v. Runoff from dust control, and oil or other chemicals used in other construction activities shall be retained in the construction site and prevented from flowing into adjacent vernal pool preserves. The runoff will be retained in the construction site by creating small earthen berms, installing silt fences or hay-bale dikes, or implementing other measures on the construction site to prevent runoff.

   b. Giant garter snake

      i. As described in the biological assessment and the project description of this biological opinion, prior to work occurring within giant garter snake habitat, the project applicant (TRLIA) shall purchase the equivalent of 86.52 ac (35.01 ha) of snake habitat credits at a Service-approved conservation bank or site. The amount of snake habitat credits is determined by a 3:1 ratio for permanent effects to 16.60 acres (6.72 ha) of aquatic habitat and 12.24 ac (4.95 ha) of upland habitat.

      ii. Construction activity within snake habitat 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 will contact the Service as soon as possible and no later than August 15 to determine if additional measures are necessary to minimize take.

iii. Aquatic habitat will be dewatered, if required by project needs, for 15 days after April 15 and prior to the initiation of construction activities, including the trenching and backfilling of snake habitat. If complete dewatering is not possible, potential snake prey (i.e., fish and tadpoles) will be removed so that snakes and other wildlife are not attracted to the construction area.

iv. All areas to be avoided during construction activities will be fenced and flagged. In most cases, fencing will be placed at least 200 feet from aquatic giant garter snake habitat. In some cases, construction activity may be required within 200 feet of aquatic habitat. In these cases, fencing will be placed at the greatest possible distance from aquatic habitat.

v. The project area shall be surveyed by a Service-approved biologist for snakes no more than 24 hours prior to commencement of construction activities. Surveys of the project area will be repeated if a lapse in construction activity of two (2) weeks or greater occurs.

vi. To avoid attraction of predators that may feed on the snake, garbage shall be removed from the construction area daily and disposed of at an appropriate site. All litter, debris, and unused materials, equipment, or supplies must be removed from the construction staging areas at the end each day during project construction.

vii. Upon completion of this project, snake habitat temporarily affected by a single season in the project area, including 0.11 acre (0.04 ha) of aquatic habitat, 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. 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.

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

   a. Prior to work occurring in listed species habitat Yuba County and the Service shall have completed the MOA.

Reporting Requirements

A post-construction compliance report prepared by the monitoring biologists must be submitted to the Division Chief of Endangered Species (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 TRLIA to report to the Service immediately any information about take or suspected take of federally listed species not authorized in this biological opinion. The TRLIA must notify the Service within 24 hours of receiving such information. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. In the case of a dead animal, the individual animal should be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen. The Service contact persons are Peter Cross, Division Chief of Endangered Species (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 representative. This representative must contact the CDFG immediately in the case of a dead or injured listed species. The CDFG contact for immediate assistance is State Dispatch at (916) 445-0045.

CONSERVATION RECOMMENDATIONS

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

1. It is recommended that the Corps work with the Service to address significant, unavoidable environmental impacts resulting from projects proposed by non-Federal parties.

2. It is recommended that TRLIA incorporate into bidding documents the enclosed *Standard Avoidance and Minimization Measures for Construction Activities in Giant Garter Snake Habitat* when appropriate.

3. It is recommended that the TRLIA protect and restore riparian and wetland habitats in the

Sacramento River basin, including the area within the Feather River setback, to increase habitat for the valley elderberry longhorn beetle.

4. It is recommended that the Corps assist in the implementation of the recovery plans for listed valley elderberry longhorn beetle and the giant garter snake.

5. It is recommended that the TRLIA should develop and implement operations and maintenance standards to minimize effects of maintenance activities on the valley elderberry longhorn beetle, giant garter snake, and riparian habitats.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

RE-INITIATION--CLOSING STATEMENT

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

Please contact Jennifer Hobbs (916) 414-6541, or Jana Milliken, Sacramento Valley Branch Chief (916) 414-6645 if you have questions regarding this biological opinion.

Sincerely,

Ken Sanchez
Acting Field Supervisor

cc:
Kent Smith, California Department of Fish and Game, Region 2, Rancho Cordova, California
Kelly Fitzgerald, EDAW Inc., Sacramento, California
Anja Raudabaugh, PBS&J, Sacramento, California
John Suazo, Corps of Engineers, Sacramento, California

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Final Coordination Act Report

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
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Sacramento, California 95825

In Reply Refer To:
81420-2008-FA-0458

Mr. Francis C. Piccola
Chief, Planning Division
U.S Army Corps of Engineers, Sacramento District
1325 J Street
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OCT 2 2008

Dear Mr. Piccola:

This letter constitutes the Fish and Wildlife Service's (Service) Fish and Wildlife Coordination Act (FWCA) report, as provided for in section 2(b) of the FWCA (Public Law 85-624; 16 U.S.C. 661-667e) on the Feather River Levee Repair Project. A biological opinion pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act) was signed on August 28, 2008.

Project Description

Studies by the California Department of Water Resources (DWR), the U.S. Army Corps of Engineers (Corps), Reclamation District (RD) 784, and the Three Rivers Levee Improvement Authority (TRLIA) have found that several reaches of the levee system protecting the RD 784 area, including the lower Yuba River left (south) bank levee and the Feather River left (east) bank levee, do not satisfy geotechnical criteria for seepage at the water surface elevation for the 100-year flood event. To correct deficiencies identified along segments of the Feather and Yuba River levees and to improve flood protection within the RD 784 area, TRLIA is undertaking the Feather River Levee Repair Project (FRLRP). For planning and design purposes, the levee reaches identified for repairs and improvements in the FRLRP are divided into three project segments (Segments 1, 2, and 3). Improvements to the existing levees in Segments 1 and 3 have independent utility from the improvements in Segment 2. Segment 1 and 3 improvements have been addressed in a separate planning and design effort and were subject to separate permitting processes, which have been completed. Proposed improvements to Segment 2, generally consisting of construction of a setback levee and subsequent degradation of the existing levee, compose this project.

Four alternatives were evaluated for the Feather River Levee Repair Project: 1) No Action Alternative; 2) Above Star Bend (ASB) Setback Levee Alternative; 3) Intermediate Setback

Levee Alternative; and 4) Levee Strengthening Alternative. The tentatively proposed action (ASB Setback Levee Alternative) would result in a 5.7 mile long setback levee between Star Bend upstream to Shanghai Bend. The setback in this alternative would generally be about 0.5 mile to the east of the existing Feather River levee. Alternative 3 would also be a setback levee however it would be 5.5 miles long. Alternative 4 would repair the existing Feather River levee. Repairs would include slurry walls, relief wells, raising and/or constructing seepage/stability berms, and correcting waterside erosion problem areas.

Service Involvement

The Service has been working with the Corps and TRLIA on the Feather River Levee Repair Project for the last 7 months. The Corps initiated section 7 consultation under the Act on November 6, 2007. The Service provided a draft biological opinion on April 28, 2008 and a final biological opinion on August 28, 2008. The Service has also been coordinating with the Corps under the Yuba County Flood Control Project which includes a potential setback along the Feather River. The Service will be providing a FWCA report to accompany the draft EIS for all components of that project.

Recommendations/Conclusions

Of the four alternatives evaluated by the Corps, the Service supports adoption of the preliminary proposed action (ASB Setback Levee Alternative). For a complete description of this alternative, refer to draft EIS.

Based on our review of documentation available we have the following recommendations in regards to the project:

1) Include restoration of the entire setback area. Habitat types should include riparian forest which should include elderberry shrubs, seasonal wetland, riparian savanna, and native grassland. Design of the restoration area should be based on a review of the final elevation of the area and the soil types.

2) Minimize the impact on migratory birds by conducting pre-construction nesting surveys and avoiding construction at those sites where nests are found until the young have fledged the nest.

3) Comply with the Terms and Conditions of the August 28, 2008, biological opinion (Service Number 81420-2008-F-344-4).

4) Comply with Appendix A, Measures to Avoid Impact to Swainson's Hawk and Burrowing Owl, provided by California Department of Fish and Game (CDFG).

5) Create an operations and maintenance plan for any habitat created within the newly created floodplain. This plan should be coordinated with the Service and the entity responsible for long-term maintenance of the site.

If you have any questions regarding this report or other aspects of the FWCA, please contact Jennifer Hobbs at (916) 414-6541.

Sincerely,

M. Kathleen Wood

M. Kathleen Wood
Assistant Field Supervisor

Enclosure

cc:
John Suazo, Corps, Sacramento, California
Kent Smith, CDFG, Rancho Cordova, California

Appendix A
Measures to Avoid Impact to Swainson's Hawk

The Corps shall ensure the following measures are implemented to mitigate or avoid impacts to Swainson's hawks (*Buteo swainsoni*) and burrowing owls (*Athene cunicularia*):

1. Pre-construction surveys for nesting raptors, including Swainson's hawks and burrowing owls should be conducted 15 days prior to tree pruning, tree removal, staging, ground disturbing or construction activities. Surveys should be conducted a minimum of 3 separate days during the 15 days prior to disturbance. For Swainson's hawk, conduct preconstruction surveys to determine if an active nest is within ¼ mile of construction activities.

2. Avoid the removal of active Swainson's hawk nest trees until nestlings have fledged.

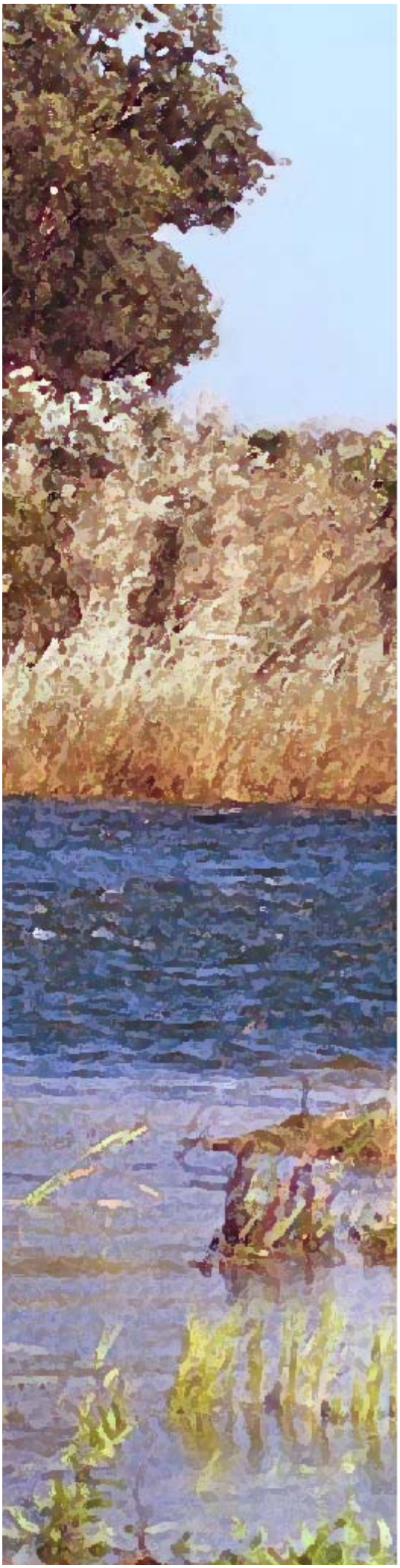
3. Avoid any work within ¼ mile of a nesting Swainson's hawk between March 1 and August 15, or until nestlings have fledged. If an active Swainson's hawk nest is found within ¼ miles of the proposed work, consult CDFG for additional avoidance measures. Additional avoidance measures may include but are not limited to the following: a) Whenever construction occurs within 1/4 mile of an active nest, a biological monitor will observe the nesting hawks for stressed/detrimental behavior that threatens nest success; b) If it is determined during construction that the birds appear stressed, the monitor will have authority to stop construction activities until it has been determined that the birds will not be harmed; c) Construction will not commence until additional avoidance or mitigation measures are implemented that will ensure that the birds will not be harmed by construction activities. These measures will be coordinated and approved by CDFG and the monitor; and d) If no additional avoidance or mitigation measures can prevent harming the birds, construction will not commence until the chicks have fledged and can leave the area.

4. If occupied burrowing owl burrows are found during pre-construction surveys, impacts shall be avoided by establishing a buffer of 160 feet during the non-breeding season (September 1 to January 31) or 250 feet during the breeding season (February 1 to August 31) for all project-related construction activities. If occupied burrows are found within 160 feet of project activities and staging areas during the non-breeding season and the burrow will be impacted, passive relocation measures shall be implemented according to the Burrowing Owl Consortium Guidelines. Passive relocation shall not occur during the breeding season. If occupied burrows are located within 160 feet of project activities during the non-breeding season but the burrow will not be impacted, CDFG should be contacted to determine if project activities may commence without passive relocation of the burrow. The CDFG encourages preservation of burrows if they will not be impacted and owls will not be disturbed during activities; once activities area complete, owls may continue using the habitat.

5. The CDFG requires mitigation for the loss of burrowing owl habitat by providing suitable habitat for foraging and nesting for every occupied burrow that is passively relocated. The habitat shall be contiguous with known, occupied burrowing owl habitat. The CDFG is currently revising burrowing owl guidelines including mitigation measures, and should be consulted to determine appropriate compensation. Project proponents shall ensure the mitigation lands are protected in perpetuity and shall provide for the long-term management of the lands by funding a management endowment. Burrowing owl mitigation banks may be available in the counties where project activities are occurring.

6. Provide a worker environmental awareness program.

Biological Assessment/Essential Fish Habitat Assessment and
Letter of Concurrence, Segment 2



National Marine Fisheries Service
BIOLOGICAL ASSESSMENT/
ESSENTIAL FISH HABITAT ASSESSMENT

FOR THE
FEATHER RIVER LEVEE REPAIR PROJECT
SEGMENT 2

AN ELEMENT OF THE
YUBA-FEATHER SUPPLEMENTAL
FLOOD CONTROL PROJECT

PREPARED FOR

THREE RIVERS LEVEE IMPROVEMENT AUTHORITY

PREPARED BY

EDAW

August 2007

National Marine Fisheries Service
BIOLOGICAL ASSESSMENT/
ESSENTIAL FISH HABITAT ASSESSMENT

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FEATHER RIVER LEVEE REPAIR PROJECT
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AN ELEMENT OF THE
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FLOOD CONTROL PROJECT

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August 2007

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EXECUTIVE SUMMARY

The Three Rivers Levee Improvement Authority (TRLIA), a joint powers authority with the mission of advancing the flood safety of southwestern Yuba County, is undertaking the Feather River Levee Repair Project (FRLRP) as part of the final phase of its program to correct deficiencies in the federal levee system protecting the Reclamation District 784 area of Yuba County. The FRLRP will entail improving levee segments on the east bank of the Feather River and a small segment of the south bank of the Yuba River. For study and design purposes, the levees addressed in the FRLRP have been divided into three segments (Segments 1–3). The levee in Segments 1 and 3 will be improved in place. TRLIA's intended levee improvements in Segment 2 consist of a setback levee along a portion of the east bank of the Feather River between the Bear and Yuba Rivers, from Star Bend to immediately south of Shanghai Bend (west of the Yuba County Airport). The setback levee will replace the reach of levee that failed during the January 1997 flood, causing three deaths and over $500 million in property damage. TRLIA is requesting authorization from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act for the discharge of dredged or fill materials into waters of the United States that could result from implementation of the FRLRP Segment 2 levee setback.

This biological assessment (BA) has been prepared in accordance with Section 7 of the Endangered Species Act (ESA) to address the FRLRP Segment 2 levee setback. The improvements to Segments 1 and 3 have been undertaken in a separate design and construction effort from the setback levee design and construction in Segment 2. Technical assistance was provided by the National Oceanic and Atmospheric Administration, National Marine Fisheries Service on February 28, 2007, regarding the consideration of potential effects to listed anadromous fish species from construction activities in Segments 1 and 3; it was agreed that the Segment 1 and 3 improvements would be unlikely to adversely affect listed species.

This BA addresses the extent to which the project could affect federally listed threatened or endangered anadromous fish species and their designated critical habitat. It also evaluates the proposed project's effects on essential fish habitat (EFH), consistent with the requirements of the Magnuson-Stevens Fishery Conservation and Management Act, as amended (16 U.S.C. 1801 et seq.). The species addressed in detail in this BA and EFH assessment include Central Valley spring-run chinook salmon evolutionary significant unit (ESU) (*Oncorhynchus tshawytscha*), Central Valley fall-/late fall-run chinook salmon ESU (*O. tshawytscha*), Central Valley steelhead ESU (*O. mykiss*), and green sturgeon (*Acipenser medirostris*). Sacramento River winter-run chinook salmon ESU (*O. tshawytscha*) are not likely to occur in the action area and, therefore, are only discussed in detail in the "Species Accounts" section of this BA. Avoidance, minimization, and conservation measures have been developed for all of these species and are included in this BA.

Direct take of these species is unlikely because of the nature of the project and avoidance, minimization, and conservation measures included in the proposed project. The proposed project will substantially expand and improve floodplain habitat on the lower Feather River, providing long-term benefits to these species. With implementation of the measures included in the project, and given the beneficial project elements, the proposed action is unlikely to adversely affect Central Valley spring-run chinook salmon, Central Valley steelhead, or green sturgeon and their critical habitat. The proposed action is also not likely to adversely affect the spawning, rearing, and migratory EFH functions for Pacific salmon in the Feather River.

INTRODUCTION

PROJECT BACKGROUND

Studies by the California Department of Water Resources (DWR), the U.S. Army Corps of Engineers (USACE), Reclamation District (RD) 784, and Three Rivers Levee Improvement Authority (TRLIA) have found that several reaches of the levee system protecting the RD 784 area do not satisfy geotechnical criteria for seepage at the water surface elevation for the 100-year flood event. To correct the deficiencies identified along levee segments on the east bank of the Feather River and a small segment of the south bank of the Yuba River, TRLIA is undertaking the Feather River Levee Repair Project (FRLRP). The FRLRP represents a portion of the Phase IV TRLIA program to repair and improve the Feather River and Yuba River levees within RD 784. The FRLRP area is located south of Marysville (Exhibit 1) and, for study, design, and construction purposes, is divided into the three project segments described below and depicted in Exhibit 2.

- Segment 1—The existing Feather River left bank levee from Project Levee Mile (PLM) 13.3 to PLM 17.2 (from approximately Pump Station No. 2 to Star Bend). Improvements to this levee segment consist of repairing and strengthening the existing levee in place to correct seepage and/or stability deficiencies.

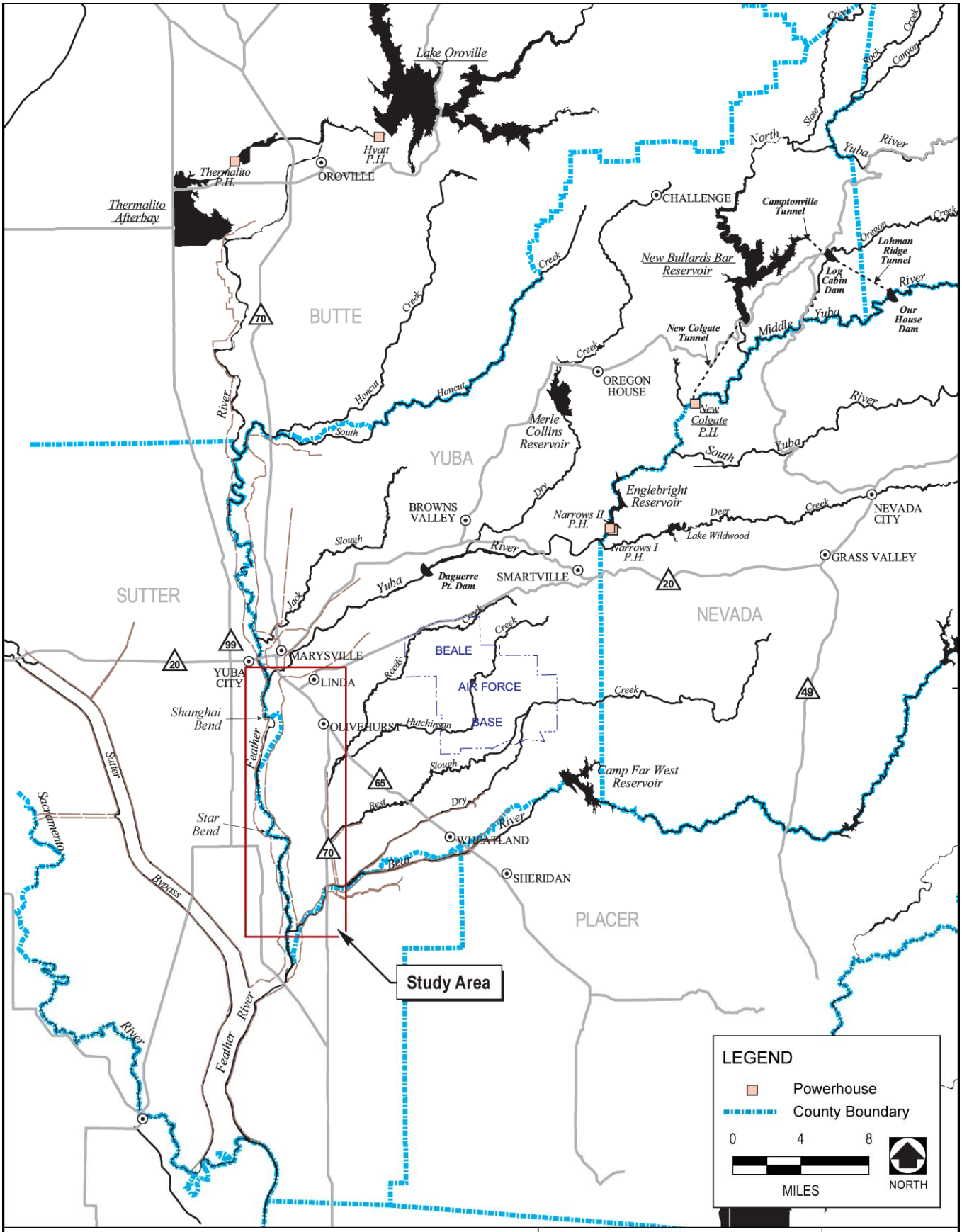
- Segment 2—The existing Feather River left bank levee from approximately PLM 17.2 to PLM 23.4 (from Star Bend to immediately south of Shanghai Bend [west of the Yuba County Airport]). TRLIA's planned improvement in this project segment is a setback levee following the route shown in Exhibit 2. After the setback levee is constructed, the existing levee will be removed in various locations to allow floodwaters to enter the setback area. Pump Station No. 3 will be relocated to the land side of the setback levee.

- Segment 3—The existing Feather River left bank levee from PLM 23.4 to PLM 26.1, and the Yuba River left bank levee from PLM 0.0 to PLM 0.3 (west of the Yuba County Airport to the Western Pacific Railroad crossing just west of the State Route [SR] 70 bridge). Improvements to this levee segment consist of repairing and strengthening the existing levee in place to correct seepage and/or stability deficiencies, as in Segment 1.

This document addresses project Segment 2. The improvements to Segments 1 and 3 have been undertaken in a separate design and construction effort from the setback levee design and construction in Segment 2; project design and construction planning for Segments 1 and 3 included coordination with the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) to ensure that no take of listed species would occur.

PURPOSE OF BIOLOGICAL ASSESSMENT

The purpose of this biological assessment (BA) is to review proposed project activities in sufficient detail to determine to what extent they could affect any federally listed threatened or endangered anadromous fish species, and their designated critical habitat, under the jurisdiction of NMFS. This BA was prepared in accordance with requirements set forth under Section 7 of the Endangered Species Act (ESA) (16 USC 1536[c]). This BA also evaluates effects on essential fish habitat (EFH) as required by the Magnuson-Stevens Fishery Conservation and Management Act, as amended (16 USC 1801 et seq.). Effects on federally listed terrestrial species are addressed in a separate BA being submitted to USFWS. There are no federally listed freshwater fish species that occur in the action area. TRLIA is requesting authorization from the USACE under Section 404 of the Clean Water Act (CWA) for the discharge of dredged or fill materials into waters of the United States that could result from implementation of the project. In response to TRLIA's request for this federal action, the USACE has initiated Section 7 consultation with NMFS, thus necessitating this BA.



Feather River Levee Repair Project

Setback Levee in Project Segment 2

Regional Setting

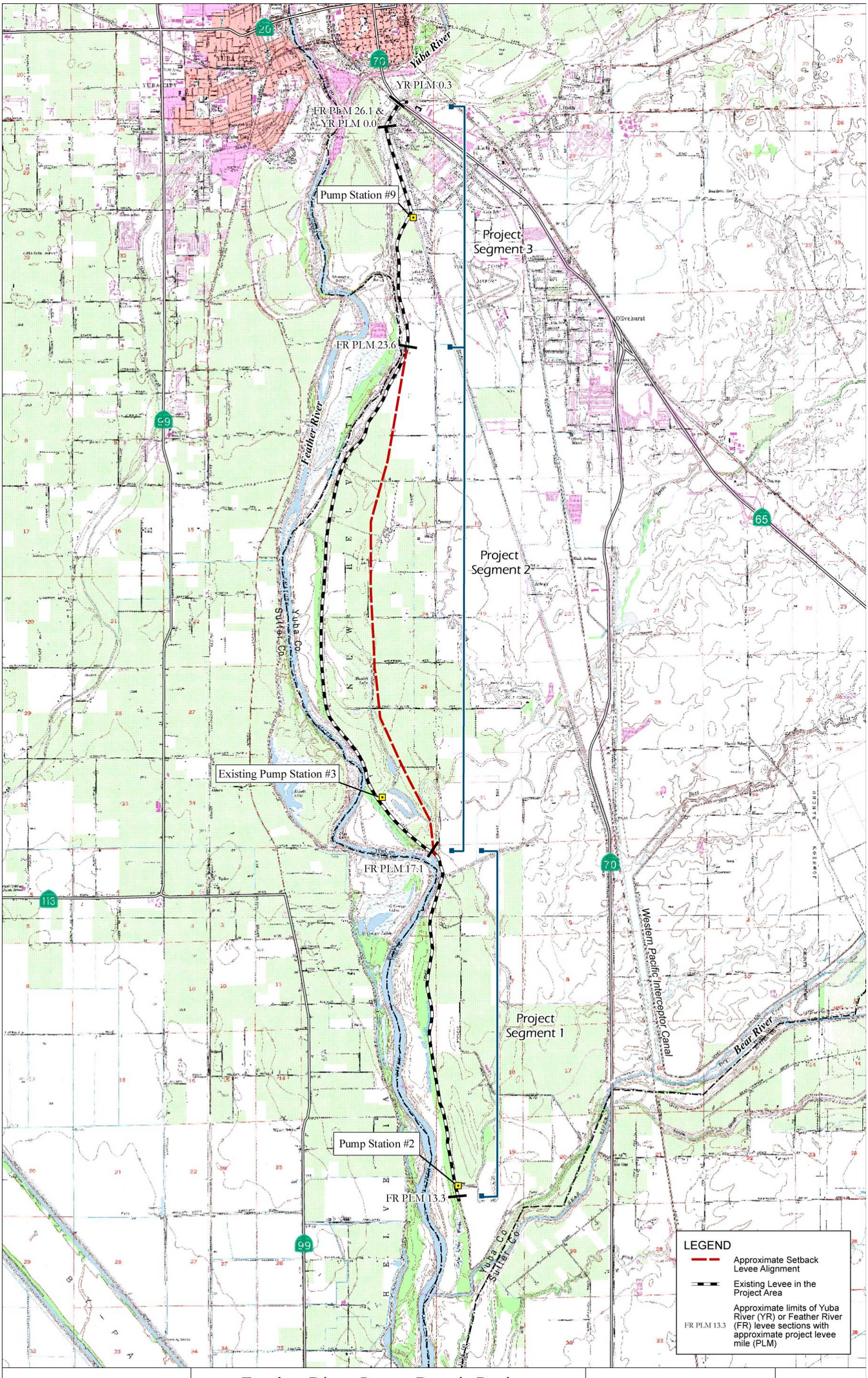
Sources: Data Provided by EDAW and GEI 2007

G024

THREE RIVERS LEVEE IMPROVEMENT AUTHORITY

114 Yuba Street, Suite 218
Marysville, CA 95901

Exhibit 1



Feather River Levee Repair Project

Setback Levee in Project Segment 2
Project Area

Source: Data Provided by EDAW and GEI 2007

G025

THREE RIVERS LEVEE IMPROVEMENT AUTHORITY
114 Yuba Street, Suite 218
Marysville, CA 95901

Exhibit 2

Information from existing documents was reviewed to determine whether project Segment 2 construction activities could affect any species that are listed as endangered or threatened, proposed for listing, or candidates for listing under the ESA.

The following documents were reviewed as part of this process:

- *List of Federal Endangered and Threatened Species that Occur in or May be Affected by Projects in Yuba County and/or the Nicolaus and Olivehurst U.S. Geologic Survey* (USGS) *Quadrangles* (U.S. Fish and Wildlife Service 2007);
- record searches of the California Natural Diversity Database (2007) for the Nicolaus and Olivehurst USGS quadrangles and other areas within 2 miles of the project site;
- *Biological Assessment/Essential Fish Habitat Assessment for the Feather-Bear-WPIC Levee Improvements Project – Stage 2* (Central Valley Regional Water Quality Control Board 2005); and
- *Environmental Impact Report for the Feather River Levee Repair Project* (TRLIA 2006a).

Based on informal consultation with NMFS, review of the USFWS list, other documents listed above, and information on habitat requirements of the documented species, it was determined that the Central Valley spring-run chinook salmon evolutionarily significant unit (ESU) (*Oncorhynchus tshawytscha*), Central Valley steelhead ESU (*O. mykiss*), and green sturgeon (*Acipenser medirostris*) are the only federally listed anadromous fish species that could be directly affected by the proposed project. Sacramento River winter-run chinook salmon ESU (*O. tshawytscha*) are not likely to occur in the action area and, therefore, are discussed only in the "Species Accounts" section of this BA. This BA also evaluates the project's effects on designated critical habitat for these species and EFH for Pacific salmon. Fish species in the project area that are covered under the EFH assessment are Central Valley spring-run chinook salmon, Central Valley steelhead, and Central Valley fall-/late fall-run chinook salmon (*O. tshawytscha*), a NMFS species of concern (69 FR 19975).

The proposed action addressed in this BA falls within designated critical habitat for Central Valley spring-run chinook salmon ESU and Central Valley steelhead ESU. Critical habitat for the Central Valley spring-run chinook salmon ESU and Central Valley steelhead ESU was designated on August 12, 2005. Critical habitat for both species is designated to include select waters in the Sacramento and San Joaquin River basins, including the Feather River.

The green sturgeon has recently been listed as threatened under the ESA by NMFS. Although critical habitat has not yet been defined, project-related effects and avoidance, minimization, and conservation measures developed for other federally listed fish species included in this BA will also generally apply to the green sturgeon.

CONSULTATION TO DATE

Technical assistance was provided by NMFS regarding potential effects to listed anadromous fish species from FRLRP construction activities. Howard Brown, NMFS Protected Resources Division Biologist, attended a meeting on February 28, 2007, at which the Segments 1 and 3 activities were discussed. The Segment 2 setback levee was also discussed at this meeting, including a preliminary description of the proposed action and potential mechanisms and schedule for completing the formal Section 7 consultation.

DESCRIPTION OF THE PROPOSED ACTION

The proposed action would be limited to project activities in FRLRP Segment 2, including construction of the setback levee, relocation of Pump Station No. 3 and additional facilities and structures within the levee setback area, degradation of the existing Feather River east levee within Segment 2, and grading to facilitate drainage of the levee setback area after flood events. A more detailed description of these specific components is provided below (see also Exhibit 3).

SETBACK LEVEE ALIGNMENT

The proposed alignment for the setback levee in FRLRP Segment 2 is shown in Exhibit 3. This alignment was selected to achieve substantial reductions in river flood stage elevations while maintaining a Feather River floodway width that is consistent with upstream and downstream reaches of the river. A second consideration was to take advantage of the existing configuration of the levee system to identify constructible locations where the setback levee could be connected to the existing levee. This alignment has been refined based on topographic, geologic, and socioeconomic considerations. The location of the setback levee was aligned as much as possible along a topographically elevated area formed by older, more consolidated soils that are less susceptible to underseepage and therefore more suitable for a levee foundation. Consideration was also given to reducing impacts on occupied residential units.

The setback levee will be 5.7 miles long and replaces 6.2 miles of existing levee. The new levee segment will generally be set back approximately 0.5 mile to the east of the existing Feather River levee, except near the northern and southern ends, where it will join the existing levee. The area between the existing levee and the setback levee alignment (the levee setback area) and the footprint of the setback levee will include approximately 1,600 acres.

SETBACK LEVEE AND EASEMENT DIMENSIONS

It is anticipated that the design crown elevation of the setback levee will be the same as the crown elevation of the existing levee at each given latitude along the alignment. A review of the available topographic data for the project vicinity developed as part of the Sacramento and San Joaquin River Basins Comprehensive Study indicates that the height of the setback levee will generally range from about 20 to 30 feet above the existing ground surface. The most common levee height above the adjacent land will be about 25 feet.

The existing levee has been reconstructed by the USACE to provide a minimum of 3 feet of freeboard above the 1957 design profile. Because the levee setback will lower most flow profiles by widening the flow channel, it follows that the setback levee, if constructed to the crown elevations described above, will have freeboard of at least 3 feet above the 1957 design profile.

Other anticipated dimensions of the setback levee are:

- crown width of 20 feet,
- footprint width of approximately 170 feet depending on levee height,
- waterside and landside slope of 3:1 (H:V), and
- 12-foot-wide patrol road on levee crown.

On each side of the setback levee, stability berms integral to the levee embankment will be provided in portions of the southern alignment where the foundation of the levee contains soft clay and silt deposits. In all other sections of the alignment, a 50-foot access corridor will be provided to support levee maintenance and inspection and flood fighting activities. Adjacent to the landside access corridor, a drainage ditch will be constructed to intercept and transport stormwater flows moving toward the levee. The drainage ditch will be sized to meet flow demands.

An approximately 65-foot-wide utility corridor will be provided east of the landside access corridor to accommodate the drainage ditch, a 15-foot-wide maintenance road, and other required utilities. Based on these parameters, the levee right-of-way in these portions of the alignment will be up to approximately 335 feet wide.

PROJECT CONSTRUCTION ELEMENTS

Flood control improvements in Segment 2 of the FRLRP area will be completed in two stages to accommodate schedule challenges related to beginning construction of the setback levee to replace the extremely deficient segment of existing levee, while undergoing the process for USACE and the State of California Reclamation Board (The Reclamation Board) approval to degrade the existing levee. If these processes were to take place at the same time (i.e., if TRLIA were to wait to construct the setback levee until approval to degrade the existing levee is obtained), it would delay the construction of the setback levee, which is recommended to be started as soon as possible because of the deficiencies in the existing levee. Stage 1 of the FRLRP Segment 2 activities includes construction of the setback levee and associated stability berms, construction of the new Pump Station No. 3 and associated facilities, removal and relocation of existing utilities and structures within the setback area, and excavation of borrow material. Stage 2 of the project includes degradation of all or portions of the existing Feather River east levee within Segment 2; removal of the old Pump Station No. 3; filling of Plumas Lake Canal on the water side from the setback levee to where the canal opens into the pond-like feature, and on the land side from the setback levee to the new Pump Station No. 3; and recontouring of portions of the levee setback area and an existing drainage to facilitate drainage of water from the levee setback area after flood events. Specific Stage 1 and Stage 2 activities are described in greater detail below.

STAGE 1

BORROW MATERIAL ACQUISITION

Borrow material will be obtained locally from borrow areas developed inside and outside the levee setback area. It is currently estimated that a total of approximately 3.4 million cubic yards (cy) of compacted borrow material will be required to construct the setback levee. A detailed investigation of borrow areas suitable for levee embankment materials is currently underway. The location and limits of borrow areas will be determined and refined as a result of this effort.

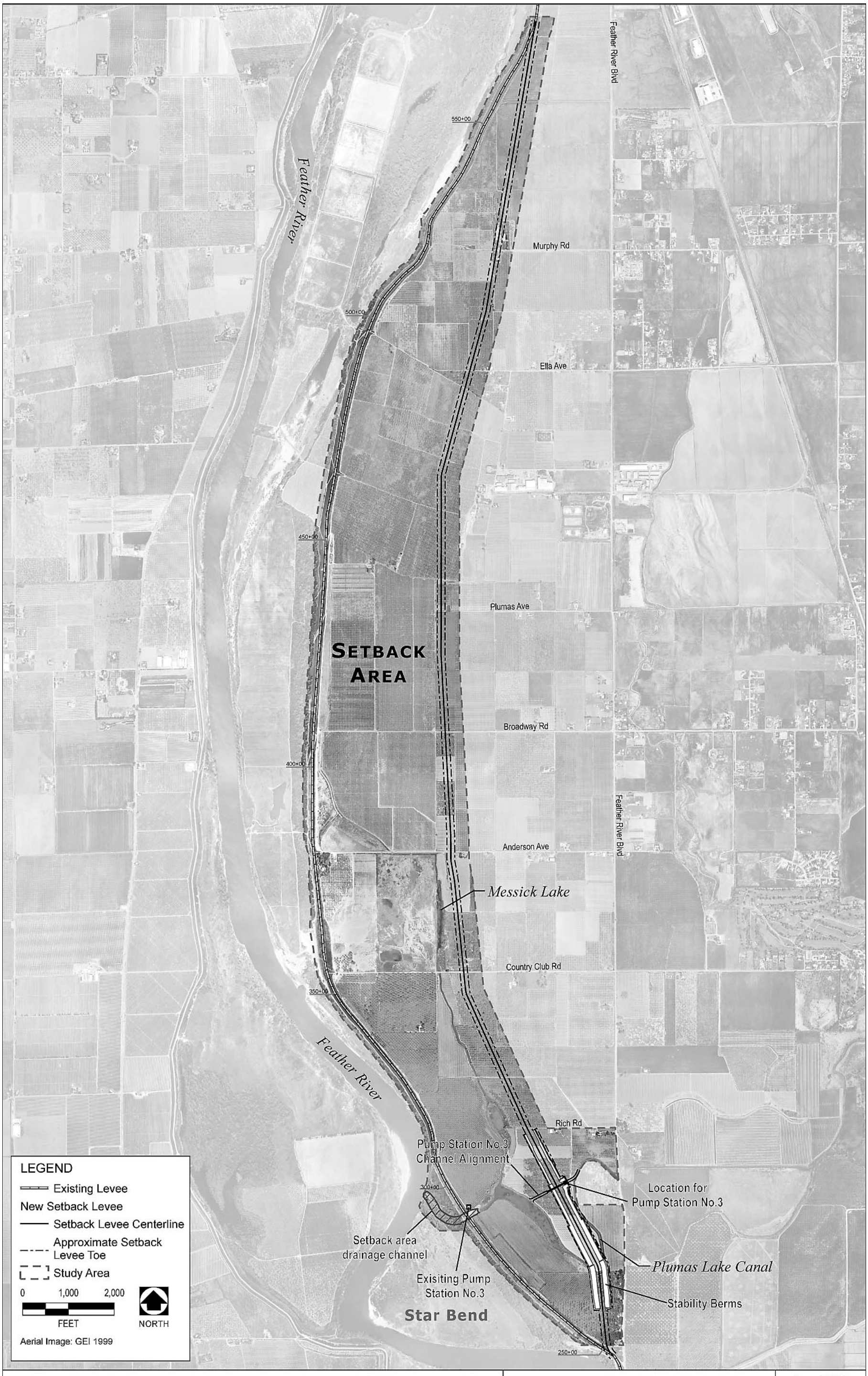
Objectives for use of local borrow areas include: 1) reducing the impact on land resources; 2) shortening borrow haul distances to reduce impacts on air quality and traffic; and 3) promoting the use of large off-road earthmoving equipment such as scrapers rather than trucks to reduce construction costs.

Two general objectives are important in the selection of borrow areas:

- Haul distances to the setback levee alignment should be minimized and a continuous or nearly continuous borrow source provided. Minimizing haul distances is important to minimize project construction costs, air emissions, and traffic impacts.

- Potential for seepage impacts at the foundation of the setback levee should be reduced by maintaining a distance of 400 feet or greater from the edge of the borrow area to the toe of the proposed levee unless there is an incised drainage channel between the setback levee alignment and the borrow area. If such an incised drainage exists, borrow excavation closer to the levee may be allowed, based on an evaluation of local site conditions. Borrow areas may also be developed closer than 400 feet from the toe of the setback levee if the borrow pit is to be subsequently backfilled.

It is anticipated that borrow will be extracted from wide, shallow (5–10 feet deep) excavations, rather than deep trenches. At the conclusion of the work, the borrow areas will be graded to blend with the topography, leaving



Feather River Levee Repair Project

Setback Levee in Project Segment 2

Feather River Setback Levee Segment 2 Alignment

Source: Data Provided by EDAW and GEI 2007

X080

THREE RIVERS LEVEE IMPROVEMENT AUTHORITY

1114 Yuba Street, Suite 218
Marysville, CA 95901

Aug 2007

Exhibit 3

slopes flat enough to reduce erosion and promote conditions conducive to vegetative growth (slopes 3:1 [H:V] or flatter), or filled with material from removal of existing levees (during stage 2). If not filled, the bottom of the borrow areas will be regraded to drain away from the levee and toward the river or toward existing drainageways to ensure fish movement out of the levee setback area into the main channel of the Feather River when flood flows recede following inundating flood events. The borrow areas will be revegetated to conform to the surrounding landscape. Some stockpiled topsoil, and other excess earth materials (organic soils, roots, and grass) from borrow areas and the setback levee foundation could be spread over borrow sites after excavation has been completed.

Aggregate base needed to surface the patrol road on the levee crown and similar materials will be obtained from commercial sand and gravel operations in the Marysville–Yuba City area and will be hauled to the setback levee alignment by truck.

SETBACK LEVEE FOUNDATION PREPARATION

Preparation of the foundation of the setback levee will involve a sequence of several activities. The setback levee footprint will be cleared and grubbed of all trees, brush, loose stone, abandoned structures, existing utilities, buried pipelines, and other deleterious materials that may exist within 10 feet of the levee toes. After clearing and grubbing, the setback levee foundation will be stripped to remove low-growing vegetation and topsoil to a depth of at least 6 inches, although local areas with extensive tree roots or deep organic soils could require excavation to a depth of 3 feet or greater. Overall, the depth of stripping is expected to average 1–3 feet. The topsoil will be placed in a designated "unsuitable material" spoil area or used for borrow area reclamation. After stripping, an inspection trench will be excavated. The trench then will be backfilled and compacted.

Before placement of the embankment fill, the foundation surface will be proof-rolled, and any remaining soft materials will be removed and replaced with compacted fill, treated with lime stabilization, or strengthened with geogrid mesh. Before the first lift of fill is placed, the foundation surface will be scarified to a depth of about 4 inches and moisture conditioned to help create a good bond between the foundation and the embankment fill.

SEEPAGE CONTROL/SLURRY CUTOFF WALL CONSTRUCTION

Based on the performance history of the existing levees and the results of investigations along the proposed setback levee alignment, it is anticipated that seepage control measures will be required along significant portions of the setback levee. Susceptibility of the setback levee embankment and foundation soils to seepage and internal erosion is the primary concern related to levee integrity and stability.

Construction of a slurry cutoff wall is proposed along those portions of the setback levee where widespread strata of permeable sands and gravels exist in the foundation. The purpose of the slurry cutoff wall is to dissipate the hydraulic gradient in the levee foundation and reduce seepage quantities. To achieve maximum effectiveness, the slurry cutoff wall must extend completely through the permeable strata and terminate some distance into an underlying, reasonably continuous layer with lower permeability.

Construction of the slurry cutoff wall to the depths required along the proposed setback levee alignment will be accomplished with large modified backhoes. This equipment and the associated sequence of excavation, backfill preparation, and placement of backfill back into the slurry cutoff wall trench will require an approximately 80-foot-wide work platform. The slurry cutoff wall is expected to be as much as 80 feet deep. Therefore, for each section of the setback levee where a slurry cutoff wall is needed, the wall will be installed before the levee embankment is constructed. In addition, the work platform will need to be at least 4–5 feet above the highest groundwater level to provide a stable base for the excavation equipment.

SETBACK LEVEE EMBANKMENT CONSTRUCTION

Construction of the setback levee embankment will begin as soon as sufficient lengths of levee foundation are complete and weather conditions allow. The embankment will be constructed as an engineered fill, with the fill placed in horizontal lifts. Each lift will be moisture conditioned and compacted to the specified density using a suitable compactor, such as a sheepsfoot, tamping-foot, or rubber-tired roller. Landside stability berms integral to the levee embankment will be constructed in portions of the southern alignment where the foundation of the levee contains soft clay and silt deposits. This will require fill of a small portion Plumas Lake Canal.

PUMP STATION NO. 3 RELOCATION

The current location of Pump Station No. 3 experiences excessive seepage and boils during high-water events. In addition, after the setback levee is complete, the existing Pump Station No. 3 will be in the setback area and exposed to flooding after the existing levee is degraded. Therefore, as part of the setback levee project, a new/replacement Pump Station No. 3 will be constructed on the land side of the setback levee in Stage 1 and the existing pump station will be removed in Stage 2. The new pump station will be located where the setback levee is adjacent to Plumas Lake Canal. The new Pump Station No. 3 will be a reinforced-concrete structure similar to the recently constructed Pump Station No. 2 and Pump Station No. 6 in RD 784. The specific capacity of the new Pump Station No. 3 will be determined during detailed project design.

DETENTION BASIN CONSTRUCTION

A portion of the stormwater runoff from the western portion of RD 784 passes into and through the setback levee area. Drainage from this area is conveyed in the Plumas Lake Canal and pumped into the Feather River at Pump Station No. 3. When flows exceed the capacity of Pump Station No. 3, there are several areas where water can pond and be temporarily stored until flow rates decline. Construction of the setback levee will cut off and remove some of the ponding area where excess drainage water is temporarily stored. At the same time, construction of the setback levee will reduce the drainage area reporting to the Plumas Lake Canal and therefore reduce the volume of runoff that requires storage or pumping. Detailed drainage studies are currently underway to assess the net effect of the setback levee on interior drainage conditions.

If it is necessary to mitigate the lost storage capacity, a detention basin could be constructed adjacent to the Plumas Lake Canal to allow water to be diverted from the canal into the basin when needed. The basin would be excavated to a depth of about 5–8 feet. Suitable soils excavated during construction of the detention basin would be used as borrow material for construction of the setback levee.

Alternatively, if mitigation is needed but a detention basin is not constructed as part of the setback levee project, the size of the pumps in Pump Station No. 3 could be increased sufficiently to accommodate peak stormwater flows without the balancing effects of detention capacity. These alternatives are being evaluated as part of the detailed interior drainage studies now underway.

UTILITY RELOCATION AND STRUCTURE REMOVAL

Implementation of the setback levee project would necessitate the removal of all structures (houses, trailers, sheds, barns, other agricultural outbuildings) from the levee setback area, which would be subject to periodic flooding following removal of the existing levee. Approximately 20 structures in the levee setback area will be displaced by the project. Displaced structures include six residential dwelling units, and remaining structures include associated agricultural use buildings and dilapidated barns. Some utilities and other facilities located in the levee setback area will need to be relocated or reinforced with implementation of the levee setback.
As discussed previously, RD 784 Pump Station No. 3 will be relocated to the land side of the proposed setback levee. A PG&E 115-kilovolt (kV) transmission line called the Bogue Loop crosses the levee setback area on four towers. The foundations for these steel structures will likely require reinforcement or replacement to maintain

their integrity during periods of flood water inundation. Other steel towers along the same transmission line are located on the water side of the existing Feather River levee and are supported by elevated steel pile foundations.

Other existing facilities that may need to be abandoned, reinforced, or relocated include roads, power distribution lines, irrigation pipelines, drainage ditches, wells, fill stations, and communications lines. Several private irrigation lines will be cut off by the construction of the setback levee, separating some lands on both sides of the setback levee that require irrigation from current water sources. During detailed design, and in coordination with landowners, appropriate water sources and irrigation infrastructure will be determined for lands where irrigation lines were cut off and that will continue to require irrigation water after project construction. The wells within the setback area will be retained for use in environmental enhancement activities over the next several years, to support continuing agricultural activities, or will be destroyed in accordance with California's water well regulations. Wells and fill stations in the levee setback area to be abandoned will be removed and filled, and new wells will be dug and fill stations built outside the levee setback area to replace the abandoned facilities, as appropriate. Wells and fill stations to be retained in the levee setback area will be retrofitted to accommodate periodic flooding. New power lines and power poles may be required for any new wells and fill stations.

STAGE 2

FILL OF CANAL SEGMENTS ADJACENT TO SETBACK LEVEE

Construction of the new setback in Stage 1 will divide the Plumas Lake Canal, with portions of the canal remaining intact on either side of the setback levee. To minimize potential for underseepage that could result from having an excavated feature too close to the levee, approximately 800 feet of the canal on the west (water) side of the setback levee will be completely filled (from the west side of the setback levee alignment to where the canal opens into Plumas Lake). Approximately 2,200 feet of canal on the east (land) side of the setback levee will be filled between the new Pump Station No. 3 and the setback levee alignment. An approximately 2-foot-deep ditch will remain along the canal alignment to drain surface runoff from landside areas at the southern end of the setback levee to the new Pump Station No. 3.

REMOVAL OF THE EXISTING LEVEE

There are no plans to use material in the existing Feather River left bank levee in Segment 2 as borrow material for the new setback levee. It is expected that for some period of time, the existing levee and the new setback levee will be in place concurrently (see "Project Schedule" below). During this period, the setback levee will function as a "backup" levee, providing a second line of levee protection if the existing levee in Segment 2 were to breach during a flood event.

All or portions of the existing levee in Segment 2 will be removed to achieve the maximum hydraulic benefits of the levee setback by allowing water to flow into and out of the levee setback area during high river stages. Where the existing levee will be excavated to allow flood waters to pass into and out of the levee setback area, the existing embankment will be excavated to the level of the adjoining ground surface. Specific sections to be retained will be determined in final project design and will be based on factors that include possible mitigation value for project impacts on sensitive species. Sections of the existing levee that are left in place will not be maintained.

REMOVAL OF PUMP STATION NO. 3 AND FACILITATION OF SETBACK AREA DRAINAGE

The existing Pump Station No. 3 will be removed and the adjacent area currently occupied by the existing Feather River levee and maintenance zone will be excavated to facilitate drainage and allow flood waters to recede from the setback area in a manner that minimizes fish stranding. The existing channel that currently conveys discharges from Pump Station No. 3 will likely need to be enlarged and deepened to accommodate flood flows leaving the setback area and to minimize the potential for fish stranding as flood waters recede. Whether this drainage

location or another is used, the channel will be located and constructed in a manner that minimizes vegetation disturbance, fish stranding, and other environmental impacts. A site-specific drainage plan for the entire setback area will be developed in final design.

The swale will also act to allow backwater to flow into the setback area from the Feather River, increasing the inundation frequency of the setback area and improving habitat quality. It is estimated that the 40-foot stage will be inundated in two out of every three years for a period of at least one week between March 15 and May 15. Floodplain land at or below this elevation will provide a broad suite of valuable ecosystem functions, including provision of nutrients and seasonal habitat for aquatic species.

HABITAT RESTORATION AND MANAGEMENT OF THE LEVEE SETBACK AREA

At this time, it is unclear whether existing agricultural land uses will be maintained in the levee setback area. TRLIA is discussing the feasibility of continuing agricultural practices throughout the setback area with various landowners and stakeholders. TRLIA is also discussing the potential for active restoration with landowners, stakeholders, and various regulatory agencies. It is possible that a portion of the setback levee area will be restored to riparian habitat via active or passive restoration in the event that agricultural uses are discontinued.

STAGING AREAS, ACCESS ROUTES, AND DISPOSAL OF EXCESS MATERIALS

It is anticipated that several staging areas will be developed along the setback levee alignment to allow for efficient use and distribution of materials and equipment. Staging areas will be located within the construction corridor and near active construction areas, so they can be relocated as construction progresses. Because the work area is essentially flat, suitable sites for construction staging are abundant. Final selection of staging areas will be based on contractor preference and environmental and land use constraints.

Personnel, equipment, and imported materials will reach the project site via SR 70 and Feather River Boulevard. At the project site, the primary construction corridor will include the setback levee alignment, soil borrow areas, and roads used for access to the work areas, including Feather River Boulevard. Access roads will consist mainly of the existing east-west lateral roads between SR 70, Feather River Boulevard, and the levee setback area.

Excess earth materials (organic soils, roots, and grass from borrow areas and the setback levee foundation; excavated material that does not meet levee embankment criteria) will be used in the reclamation of borrow areas or will be placed in a surplus material berm at the waterside toe of the setback levee. In addition, excess material could be used in the contouring of the setback area to facilitate drainage to the Feather River and prevent fish stranding. Cleared vegetation (i.e., trees, brush) will be hauled off-site. Debris from structure demolition, power poles, piping, and other materials requiring disposal will be hauled off-site to a suitable landfill.

ANTICIPATED HYDROLOGIC AND HYDRAULIC CONDITIONS

The setback levee will work within the capacities of the current flood control system. The existing system design flow for the Feather River between the Yuba and Bear Rivers is 300,000 cubic feet per second (cfs). The upstream reservoirs operate to maintain flows in the Feather River at or below this design flow, insofar as possible. With the setback levee in place along the Feather River, the reservoirs could continue to operate in the same manner as under current conditions. The levee setback will result in flood control benefits because it will lower water levels in the river during flood events and because the setback levee will be constructed in a more secure location than the existing levee, based on current engineering standards.

MBK Engineers (TRLIA 2006b) performed hydraulic modeling of the proposed levee setback. The following sections summarize the results of these modeling studies.

FLOODING OF THE LEVEE SETBACK AREA

Flows will enter the upstream end of the levee setback area (i.e., the new floodway) when the river stage rises above the ground elevation at the current levee alignment, which is approximately 50 feet. Analysis performed by MBK Engineers (TRLIA 2006b) indicates that flows passing downstream will enter the levee setback area approximately once every 3 years on average, when the rate of flow is approximately 50,000 cfs. This is similar to the frequency of flooding now experienced in areas that are within the currently leveed channel of the Feather River but are outside the low-flow channel.

The proposed levee setback would increase the capacity of the Feather River floodway to convey flood flows. Increasing the conveyance area by increasing the floodplain width would decrease the depth and velocity of flood flows in this portion of the Feather River floodway (along project Segment 2). This decrease in velocity would result in a decrease in shear stresses along this part of the Feather River (TRLIA 2007). Shear stress is an expression of the lateral force of water against the adjacent shoreline. Higher shear stresses typically indicate greater erosion potential. Therefore, the presence of the setback levee would be expected to lessen the potential for channel bed and bank erosion on the Feather River along project Segment 2.

REDUCTIONS IN RIVER STAGES

The hydraulic performance of the proposed setback levee was evaluated using an unsteady-flow model (HEC-RAS) originally developed by the USACE in support of the Lower Feather River Floodplain Mapping Study and subsequently modified and calibrated to the flow and high-water data from the 1997 flood by MBK Engineers (TRLIA 2006b). Simulations were performed for the 1-in-100 and 1-in-200 annual exceedance probability (AEP) events to assess the effect of the potential setback on river stages.

The results of the evaluation indicate that the proposed setback levee alignment will be effective in lowering water levels. For the 1-in-100 AEP flood (i.e., the “100-year flood”), it was determined that the levee setback will lower the water level at the confluence of the Feather and Yuba Rivers by approximately 1.3 feet. For the 1-in-200 AEP flood, the maximum water depth in the setback area is expected to fall approximately 1.6 feet.

PROJECT SCHEDULE

A period of up to approximately 22 months is planned for construction of the setback levee project, with contractor mobilization beginning in late September 2007, the setback levee embankment (Stage 1) completed in December 2008, the existing levee breached (Stage 2) in spring/summer 2009, and final clean-up and contractor demobilization in fall 2009. Schedule highlights are as follows:

- **Mobilization:** Mobilization will include setting up construction offices and transporting heavy earthmoving equipment to the site. These activities will take approximately one month.

- **Levee Foundation Preparation:** This activity will begin soon after mobilization. Construction will take approximately eight to nine months depending on the amount of equipment working simultaneously, weather conditions, and permit requirements.

- **Slurry Cutoff Wall Construction:** Installation of slurry cutoff walls along the setback levee alignment will occur simultaneously with levee foundation preparation.

- **Levee Embankment Construction (including stability berms):** Because the setback levee alignment is nearly 6 miles long, levee embankment construction could begin in some areas while foundation preparation is underway along other portions of the alignment. Levee embankment construction is anticipated to take approximately eight months.

- **Borrow Material Excavation:** Excavation of borrow materials for use in the construction of the setback levee embankment could begin simultaneously with levee foundation preparation or slurry wall construction and would occur for the duration of levee embankment construction.

- **Tie-ins to Existing Levees:** Elements of tying in the setback levee to the existing levees will take place during levee foundation preparation, levee embankment construction, and potentially during slurry cutoff wall construction.

- **Pump Station No. 3 Construction:** Pump Station No. 3 will be constructed concurrent with levee embankment construction. Procurement of long-lead items (e.g., pumps, motors, valves, and generator) could begin as early as 2007.

- **Fill of Portions of the Plumas Lake Canal:** The portion of Plumas Lake Canal within the levee embankment footprint will be filled during levee foundation preparation. The portion of canal downstream of the setback levee and between the setback levee and Pump Station No. 3 will be filled concurrent with removal of the existing levee.

- **Removal of the Existing Levee:** The existing Feather River levee in the setback area will not be removed until the setback levee is complete, and removal activities will occur outside of the identified Feather River flood season. Levee removal is anticipated to occur in spring/summer 2009.

- **Decommission of the Existing Pump Station No. 3:** Removal of the existing pump station would be done concurrent with removal of the existing levee.

- **Facilitation of Setback Area Drainage:** Grading of the setback area to facilitate drainage of floodwaters back to the Feather River and enhancement of the setback area drainage channel would be conducted concurrent with removal of the existing levee.

- **Demobilization:** Demobilization will include removal of equipment and materials from the project site, disposal of excess materials at appropriate facilities, and restoration of staging areas and temporary access roads to pre-project conditions. Demobilization activities will likely occur in various locations as construction proceeds along the project alignment, but will be completed in fall 2009 after removal of the existing Feather River levee is complete.

AVOIDANCE, MINIMIZATION, AND CONSERVATION MEASURES

The project has been designed to include several elements to minimize potential adverse effects. These elements include fisheries conservation measures and water quality conservation measures to avoid and minimize potential adverse effects on Central Valley spring-run chinook salmon, Central Valley steelhead, and green sturgeon resulting from implementation of the proposed action.

FISHERIES CONSERVATION

The following conservation measures will be implemented to minimize potential adverse effects to fish species and avoid direct take:

- All in-channel construction activities shall be conducted during months when sensitive fish species are less likely to be present or less susceptible to disturbance (i.e., June 15 to September 15).

- Levee degradation shall not take place during the designated flood season (i.e., November 1 to April 15) and shall not begin until evaluation of upstream conditions (e.g., reservoir storage and snowpack) indicate that inundation of these areas is unlikely to occur.

- Approximately 1,600 acres of floodplain would be reconnected to the Feather River with implementation of setback levee. It is possible that a portion of this setback levee area will be restored to riparian habitat via active or passive restoration in the event that agricultural uses are discontinued. This will fully compensate for and exceed the loss of a small amount (up to 5.5 acres) of shaded riverine aquatic (SRA) and riparian habitat resulting from improvements to the drainage channel outfall to the Feather River.

- The project shall incorporate features designed to avoid the potential for stranding of fish within the setback levee area. These include restoring a hydrologic connection from the small ponds at existing Pump Station No. 3 to the Feather River at the southern end of the project area (see Exhibit 3). Connectivity to waters that drain to the Feather River will be ensured for any areas where water could potentially pond and become isolated.

  An operations and maintenance plan that identifies specific monitoring tasks for the setback area, including waterways within the floodplain, will be developed as part of the design of Stage 2 and will be submitted to NMFS and the California Department of Fish and Game (DFG) as soon as it is available. Monitoring of the setback area drainage channel and adjacent floodplain will be conducted for 5 years after the drainage channel is fully constructed. The length, frequency, and scope of any additional monitoring will be determined in coordination with NMFS and DFG and will depend on results from the 5-year monitoring period, including the extent of floodplain habitat development and its effect on monitoring feasibility. The following specific monitoring actions will be conducted:

  - A baseline visual assessment of the levee setback area shall be conducted by a qualified biologist after the drainage channel is fully constructed, any potential restoration is complete, and levee degradation has occurred, and before the high-flow season begins November 1. The survey will document features of the setback area, including physical and biological components of the site, such as vegetation and expected fish passage routes. Specific stations will be established to conduct photodocumentation of the levee setback area during subsequent surveys.

  - For the first 5 years following the completion of construction, visual surveys shall be conducted by a qualified biologist after up to one event per year that inundates the new drainage channel, setback area, and adjacent floodplain. A survey shall also be conducted after each of the first three events that inundate the setback area from the upstream eastern end by overtopping the bank of the Feather River. The purpose of these surveys will be to identify the extent of any ponded areas that cannot drain to the floodplain drainage channel. Photodocumentation will be conducted from the stations established during the baseline visual survey and from other points, as necessary, to document the condition of the improved drainage channel and adjacent floodplain.

  - Following each year when monitoring is conducted, a letter report summarizing the overall condition of the floodplain habitat and any changes that have occurred since the previous report shall be submitted to NMFS and DFG by August 1. The focus of the report will be an assessment on potential for fish passage and stranding. The report will recommend remediation measures, if needed, along with a schedule specifying when the remediation activities will occur. Based on project design and hydraulic and sediment deposition analyses, potential remediation is anticipated to be restricted to minor activities to remove debris and fish passage barriers, such as beaver dams, from the improved drainage channel. The ultimate goal is that the setback area and improved drainage channel function naturally to provide beneficial floodplain habitat conditions and as planned with minimal human intervention and maintenance.

WATER QUALITY CONSERVATION

The following measures, which include all applicable measures identified in the environmental impact report (TRLIA 2006a), will be implemented to minimize potential adverse effects to water quality and related impacts on fish:

- To the extent practicable, all work immediately adjacent to the rivers shall be conducted during low flows.
- Earth moving in the setback area shall be conducted only when floodwaters from the Feather River are not present in the excavation area and there is no immediate threat of floodwaters inundating the area.
- A Phase I Environmental Site Assessment shall be conducted for portions of the levee setback area where excavation is planned to occur; levee borrow material shall be evaluated for potential contaminants in coordination with the Regional Water Quality Control Board (RWQCB).
- All local, state, and federal regulations and environmental requirements regarding turbidity-reduction measures shall be complied with, including the following: obtain and comply with relevant agency permits (e.g., DFG Streambed Alteration Agreement, RWQCB Clean Water Act Section 401 Certification, Section 404 permit), and developing and implementing a storm water pollution prevention plan (SWPPP) that identifies specific best management practices (BMPs) to avoid and minimize impacts on water quality during construction activities. These standard erosion control measures shall be designed to reduce the potential for soil erosion and sedimentation of drainage channels.

  At a minimum, the following specific BMPs are proposed for implementation:

  - Conduct all work according to site-specific construction plans that identify areas for clearing, grading, and revegetation so that ground disturbance is minimized.
  - Avoid riparian and wetland vegetation wherever possible and identify vegetation to be retained for habitat maintenance (i.e., as identified through preconstruction biological surveys), cover cleared areas with mulches, install silt fences near riparian areas or waterways to control erosion and trap sediment, and reseed cleared areas with native vegetation.
  - Stabilize disturbed soils of the new levees, existing levee removal areas, and borrow sites before the onset of the winter rainfall season.
  - Stabilize and protect stockpiles from exposure to erosion and flooding.

  The SWPPP also shall specify appropriate hazardous materials handling, storage, and spill response practices to reduce the possibility of adverse impacts from use or accidental spills or releases of contaminants. Specific measures applicable to the project include, but are not limited to, the following:

  - Develop and implement strict on-site handling rules to keep construction and maintenance materials out of drainages and waterways.
  - Conduct all refueling and servicing of equipment with absorbent material or drip pans underneath to contain spilled fuel. Collect any fluid drained from machinery during servicing in leak-proof containers and deliver to an appropriate disposal or recycling facility.
  - Maintain controlled construction staging, site entrance, concrete washout, and fueling areas at least 100 feet away from waterways or wetlands to minimize accidental spills and runoff of contaminants in stormwater.

- Prevent raw cement; concrete or concrete washings; asphalt, paint, or other coating material; oil or other petroleum products; or any other substances that could be hazardous to aquatic life from contaminating the soil or entering watercourses.

- Maintain spill cleanup equipment in proper working condition. Clean up all spills immediately according to the spill prevention and response plan, and immediately notify NMFS, DFG, and the RWQCB of any spills and cleanup procedures.

- A worker awareness training program shall be conducted for construction crews before the start of construction activities. The program shall include a brief overview of sensitive fish resources on the project site, measures to minimize impacts on those resources, and conditions of relevant regulatory permits.

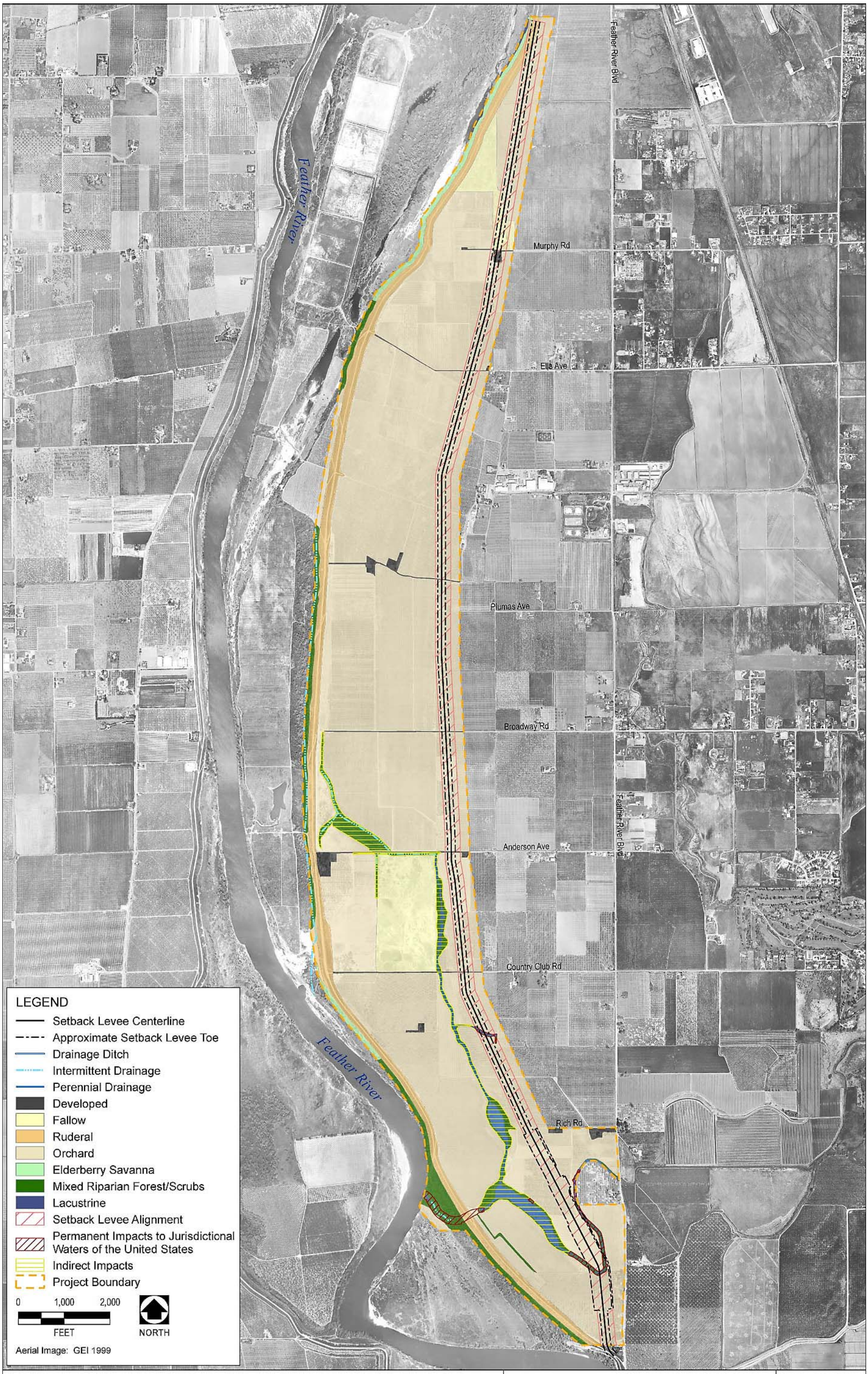
- If any in-water work is to be conducted, a qualified biologist or resource specialist shall be present during such work to monitor construction activities and ensure compliance with mitigation requirements and terms and conditions of permits issued by regulatory agencies.

ENVIRONMENTAL BASELINE

The Feather River's three separate forks (North, Middle, and South) flow out of the Sierra Nevada and into Lake Oroville, northeast of Oroville in eastern Butte County. Lake Oroville is the largest reservoir in California's State Water Project, providing water to Central and Southern California. Flows out of Oroville Dam feed the lower Feather River, which flows into the Sacramento River about 20 miles north-northwest of Sacramento. Oroville Dam is the upstream limit of anadromous fish migration in the Feather River. It stores the water conveyed from the Sierra Nevada by the upper forks of the Feather River. Most of the water released from Lake Oroville is diverted at Thermalito Diversion Dam into the Thermalito complex. During controlled releases by DWR, water is released at a constant rate of 600 cfs through the Fish Barrier Dam to Feather River Hatchery and then into the low-flow section of the Feather River. This 8-mile reach, which extends downstream to the Thermalito Afterbay outlet, provides important spawning and rearing habitat for fall- and spring-run chinook salmon and steelhead. Fourteen miles of additional spawning and rearing habitat exists between the Thermalito Afterbay outlet and the mouth of Honcut Creek, which is located upstream of the project area.

The largest tributary to the Feather River is the Yuba River, which converges with the Feather near Marysville (upstream extent of the project area). Similar to the Feather, the upper tributaries of the Yuba flow out of the Sierra Nevada and into a reservoir created by Englebright Dam, which regulates flow releases to the lower Yuba River. However, unlike the Feather River, the Yuba River does not contain a fish hatchery and still supports self-sustaining runs of chinook salmon (Central Valley fall- and spring-run) and steelhead trout. At varying life stages, Feather and Yuba River salmon and steelhead may utilize similar habitat areas. Both adult and juvenile fish from the Yuba may be found in the Feather River, as it is a migration corridor and may provide quality rearing habitat.

Of special importance to the chinook salmon and steelhead considered in this BA is the presence of SRA habitat. SRA habitat is defined as the nearshore aquatic habitat occurring at the interface between a river and adjacent woody riparian habitat. The principal attributes of this cover type are that (1) the adjacent bank comprises natural, eroding substrates supporting riparian vegetation that either overhang or protrude into the water; and (2) the water contains variable amounts of woody debris, such as leaves, logs, branches, and roots, and has variable water depths, velocities, and currents. Often, much of the instream vegetation consists of dead woody debris that has fallen from the overhanging riparian vegetation. These attributes provide high-value feeding areas and escape cover for salmonids. SRA habitat is present along the Feather River adjacent to the project site (see mixed riparian forest/scrub in Exhibit 4).



Feather River Levee Repair Project

Setback Levee in Project Segment 2

Effects to Jurisdictional Waters of the United States

Source: Data Provided by EDAW and GEI 2007

X079

THREE RIVERS LEVEE IMPROVEMENT AUTHORITY

1114 Yuba Street, Suite 218
Marysville, CA 95901

Aug 2007

Exhibit 4

SPECIES ACCOUNTS

ACTION AREA

The action area for the FRLRP Segment 2 levee setback is the Feather River from the confluence of the Yuba River (west of the Yuba County Airport) downstream to the confluence with the Bear River. The action area extends approximately 0.5 mile east (landside) of the current alignment of the Feather River levee. The entire project area will include approximately 1,600 acres that are currently mainly agricultural lands, between the existing levee alignment and the setback levee alignment. Construction staging areas will include the landside right-of-way for the setback levee, the area between the current levee and setback levee alignments, and various locations within the levee setback area. Based on the nature of project, construction requirements, and conservation measures, areas downstream of the project site are not included in the action area because no direct or indirect effects on fish in the area are anticipated to occur. The action area is dominated by existing riparian forest/scrub on the waterside of the existing levee and orchards on the landside. Other habitat types and land uses include row crop fields, developed areas (e.g., farm buildings, roadways), levees and adjacent maintenance zones, and relatively limited areas of riparian and aquatic habitats associated with agricultural drainage systems.

SPECIES ACCOUNTS

SALMON AND STEELHEAD

The runs of chinook salmon and steelhead in California are differentiated by:

- the maturity of fish entering freshwater,
- time of spawning migrations,
- spawning areas,
- incubation times,
- incubation temperature requirements, and
- migration timing of juveniles.

Differences in life histories effectively isolate the different runs of chinook; thus, the traits are undoubtedly inherited. Allozymic differences between inland populations of California chinook salmon have also been observed, with various degrees of differentiation between rivers in drainages and between drainages. Therefore, each run of salmon should be considered to be genetically distinct to varying degrees.

Spawning of all races of chinook salmon and steelhead occurs predominantly in clean, loose, gravel in swift, relatively shallow riffles, pool tail-outs, or along the margins of deeper runs. After eggs hatch and fry emerge from gravels in upstream habitats, the fry tend to seek shallow, nearshore habitat with slow water velocities and move to progressively deeper, faster water as they grow. Once in the main stems of larger rivers, juvenile chinook salmon and steelhead tend to migrate along the margins of the river, rather than in the increased velocity found in the middle of the channel. When the channel of the river is greater than 9–10 feet deep, the juvenile salmon tend to inhabit the surface waters (Healy 1982).

Important winter habitat for juvenile chinook salmon and steelhead includes flooded bars, side channels, and overbank areas with relatively low water velocities. Juvenile chinook salmon and steelhead have been found to successfully rear in floodplain habitat, which routinely floods but is dry at other times. Growth rates appear to be enhanced by the conditions found in floodplain habitats.

Cover structures, space, and food are necessary components for chinook salmon and steelhead rearing habitat. Suitable habitat includes areas with instream and overhead cover in the form of undercut banks, downed trees, and large, overhanging tree branches. The organic materials forming fish cover also help provide sources of food,

in the form of both aquatic and terrestrial insects. Growth of juveniles in floodplain habitat is fast relative to growth in river habitat. Juveniles have been found to have growth rates in excess of 1 millimeter per day when they rear in flooded habitat and growth rates of as much as 20 millimeters in 2–3 weeks (U.S. Army Corps of Engineers 2001). The water temperature in floodplain habitat is typically higher than that in main channel habitats. While higher temperatures increase metabolic requirements, the productivity in flooded habitat is also increased, resulting in higher growth rates (Sommer et al. 2001). For example, the production of drift invertebrates in the Yolo Bypass has been found to be one to two times greater than in the river (Sommer et al. 2001). Also, grasses that are flooded support invertebrates that are also a substantial source of food for rearing juveniles. Increased areas of flooded habitat can also reduce the competition for food and space and can potentially decrease the possible encounters with predators (Sommer et al. 2001). Juvenile chinook salmon and steelhead that grow faster are likely to migrate downstream sooner, which may help to reduce the risks of predation and competition in freshwater systems.

Juvenile chinook salmon typically rear in freshwater for up to 5 months before migrating to sea, although spring-run juveniles frequently reside in freshwater habitat for 12–16 months before leaving freshwater habitats. Juvenile steelhead typically rear 1–3 years in freshwater. As they begin their seaward migration, chinook salmon and steelhead juveniles undergo smoltification, a set of physiological changes preparing them for a saltwater environment and ocean life. Chinook salmon then spend 2–4 years maturing in the ocean before returning to their natal streams to spawn, while steelhead spend 1–2 years at sea before they return (Moyle 2002). Chinook salmon die after they spawn once, while steelhead may return to sea to further mature and migrate upstream for subsequent spawning runs.

CENTRAL VALLEY SPRING-RUN CHINOOK SALMON ESU

STATUS AND LIFE HISTORY

NMFS initially listed Central Valley spring-run chinook salmon as threatened on September 16, 1999 (50 FR 50394). Following an updated status review, NMFS reaffirmed the threatened status on June 28, 2005 (70 FR 37160). The ESU includes all naturally spawned populations of spring-run chinook salmon in California's Sacramento River and its tributaries. This includes the Feather River and the Feather River Hatchery spring-run chinook program.

Adult Central Valley spring-run chinook salmon migrate into the Sacramento River system between March and July, peaking in May through June. They hold in coldwater streams before spawning, conserving energy while their gonadal tissue matures. They spawn from late August through early October, peaking in September (Fisher 1994; Yoshiyama, Fisher, and Moyle 1998). Between 56% and 87% of adult spring-run chinook salmon that enter the Sacramento River basin to spawn are 3-year-olds (Fisher 1994). Spring-run chinook salmon fry emerge from the gravel from November to March and spend about 3 to 15 months in freshwater habitats before emigrating to the ocean (Kjelson, Raquel, and Fisher 1982). Juveniles emigrate downstream from November to April.

Estimates for adult escapement/spawning stock for the past 30 years have shown a highly variable population for the Central Valley spring-run chinook salmon ESU. Even though the abundance of fish may increase from one year to the next, the overall average population trend has declined during this time period. The variations in annual population levels may result from differences in individual tributary cohort recruitment levels. Central Valley spring-run chinook salmon have a lower fecundity than the larger fish of the Central Valley fall-/late fall-runs of chinook salmon. Lower fecundity, coupled with their need for coldwater habitat in which to over-summer while waiting for gonadal tissue to mature, places the Central Valley spring-run chinook salmon population at a higher risk for population declines than the fall-/late fall-run populations. Warmer summer water temperatures increase the likelihood of disease and lowered fertility in fish that have to hold in suboptimal conditions (National Marine Fisheries Service 2003).

The species' exclusion from historical spawning grounds found at higher elevations in the watersheds is a factor that has led to the decline of this species/race. Historically, spring-run chinook salmon were abundant throughout the Sacramento and San Joaquin River systems. Spring-run chinook salmon typically spawned in watersheds at higher elevations within the San Joaquin, American, Yuba, Feather, Sacramento, McCloud, and Pit Rivers. Currently, spring-run chinook salmon cannot access most of their historical spawning and rearing grounds in the Central Valley because of the construction of impassable dams in the lower portions of the Central Valley's waterways. Today, the only streams that are considered to harbor naturally spawning wild stocks of spring-run chinook salmon are Mill, Deer, and Butte Creeks, all smaller tributaries to the Sacramento River. None of these creeks have a major dam or migration barrier. Some additional spawning occurs in the main stem of the Feather River and the Sacramento River. However, the genetic characteristics of these fish suggest introgression with both spring-run and fall-run hatchery fish. Elevated water temperatures, agricultural and municipal water diversions, regulated water flows, entrainment into unscreened or poorly functioning screened diversions, and degraded riparian habitat all have negatively affected the Central Valley spring-run chinook salmon ESU (National Marine Fisheries Service 2003).

HABITAT USE IN THE ACTION AREA

In the vicinity of the project action area, the Feather River provides migration (adult upstream and juvenile downstream) and juvenile rearing habitat for spring-run chinook salmon. The Feather River Fish Hatchery sustains the spring-run population on the Feather River, but the genetic integrity of that run is questionable (California Department of Water Resources 1997). Adult spring-run chinook salmon that return to the Feather River Fish Hatchery have been counted each year since 1963, and their numbers have ranged from 146 in 1967 to 8,662 in 2003 (California Department of Fish and Game 2004). The majority of spawning by in-river spring-run chinook salmon is concentrated in the uppermost 3 miles of accessible habitat in the Feather River below the Feather River Fish Hatchery (California Department of Water Resources 2001). The Yuba River is just upstream of the project action area and also supports one of the last large remaining runs of wild stock chinook salmon, including spring-run. These Yuba River fish must pass through the project action area on their spawning and downstream migrations.

CRITICAL HABITAT FOR CENTRAL VALLEY SPRING-RUN CHINOOK SALMON

Critical habitat for the Central Valley spring-run chinook salmon was designated on August 12, 2005; a final designation was published on September 2, 2005, with an effective date of January 2, 2006 (70 FR 52487). Critical habitat is designated to include selected waters in the Sacramento River basin from approximately Redding (River Mile 302) to approximately Chipps Island (River Mile 0) at the westward margin of the Delta including the portion of the Feather River in the project action area.

ESSENTIAL FISH HABITAT FOR CENTRAL VALLEY SPRING-RUN CHINOOK SALMON

EFH has been identified for Central Valley spring-run chinook salmon. Spring-run EFH includes migration and rearing habitat for the Feather River below Oroville Dam (National Marine Fisheries Service 1998a).

RECOVERY PLANNING

While not an official NMFS recovery plan for Central Valley spring-run chinook salmon, the Sacramento–San Joaquin Delta Native Fishes Recovery Plan (U.S. Fish and Wildlife Service 1996) aims to increase the abundance and distribution of Central Valley spring-run chinook salmon in the Sacramento River basin. Because adult Central Valley spring-run chinook salmon no longer occur in the San Joaquin River basin, the recovery plan outlines conservation measures and restoration objectives and criteria for spring-run chinook salmon only in the Sacramento River basin (U.S. Fish and Wildlife Service 1996). The proposed project is designed to improve the environmental baseline conditions consistent with restoration objectives identified in the recovery plan.

Additionally, NMFS is in the process of writing a multi-species recovery plan for Central Valley spring-run chinook salmon, Sacramento River winter-run chinook salmon, and Central Valley steelhead. The final plan is expected to be complete by December 2008. Levee setback projects that increase floodplain availability and improve morphological function of river channels are expected to be high priority recovery actions (Brown, pers. comm., 2007).

CENTRAL VALLEY FALL-/LATE FALL-RUN CHINOOK SALMON ESU

STATUS AND LIFE HISTORY

After its listing was proposed, on September 16, 1999 (50 FR 50394), NMFS determined that listing was not warranted for Central Valley fall-/late fall-run chinook salmon ESU. However, the ESU was designated as a candidate for listing because of concerns over specific risk factors. On April 14, 2004 (69 FR 19975), the ESU was reclassified as a species of concern.

This ESU includes fall- and late fall-run chinook salmon spawning in the Sacramento and San Joaquin River basin and their tributaries. Major river basins containing spawning and rearing habitat compose approximately 13,760 square miles in California. Populations of this ESU enter the Sacramento and San Joaquin Rivers from July through April and spawn from October through February. Both runs are ocean-type chinook salmon, emigrating predominantly as fry and subyearlings and remaining off the California coast during their ocean migration. All chinook salmon in the Sacramento/San Joaquin Basin are genetically and physically distinguishable from coastal forms (Clark 1929, Myers et al. 1998).

Young fall-/late fall-run fish emerge from redds as fry from November through April, with most emerging in February. Some fry soon migrate downstream into the Sacramento River and the Delta, or are involuntarily displaced from the tributaries by high flows; whether such fry survive to contribute significantly to the total production is not known. Most fry remain in the tributaries until spring, when they undergo smoltification and begin their seaward migration. The smolt emigration peaks in April and May, but can extend from late February through June. Some fish do not join the spring emigration, but instead remain in the tributaries over summer, emigrating in October and November as yearlings. Emigrating smolts experience considerable mortality in the lower reaches of the tributaries, the Sacramento River, the Delta and San Francisco Bay, and during the first year of ocean life.

HABITAT USE IN THE ACTION AREA

Fall-run chinook salmon occur in the Feather River at the project site. Adults are anticipated to occur in the vicinity of the project site from July through December as they migrate up the Feather River to spawn. Juveniles may rear in the Feather River as they move downstream from January through June.

ESSENTIAL FISH HABITAT DESIGNATION FOR CENTRAL VALLEY FALL-/LATE FALL-RUN CHINOOK SALMON

EFH has been identified for Central Valley fall-/late fall-run chinook salmon. Fall-run EFH includes migration and rearing habitat for the Feather River and opportunistic/intermittent spawning, holding, and rearing habitat for the Bear and Yuba Rivers (National Marine Fisheries Service 1998b). No late fall-run EFH has been designated for the Feather River (National Marine Fisheries Service 1998c).

RECOVERY PLANNING

While not an official NMFS recovery plan for Central Valley fall-/late fall-run chinook salmon, the Sacramento/San Joaquin Delta Native Fishes Recovery Plan includes restoring the abundance and distribution of Central Valley fall-run chinook salmon (U.S. Fish and Wildlife Service 1996. Reasons for decline identified in the

plan include habitat loss, reduced habitat quality and complexity, poor survival of outmigrants, adult harvest, competition from hatchery fish, and poor water quality. The proposed project is designed to improve the environmental baseline conditions consistent with restoration objectives identified in the recovery plan.

CENTRAL VALLEY STEELHEAD ESU

STATUS AND LIFE HISTORY

On March 19, 1998, NMFS listed the Central Valley steelhead as threatened (63 FR 13347). Following an updated status review, NMFS reaffirmed the threatened status on June 28, 2005 (70 FR 37160). The ESU includes all naturally spawned populations of steelhead (and their progeny) in the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco and San Pablo Bays and their tributaries.

Central Valley steelhead are all considered to be winter-run steelhead (McEwan and Jackson 1996), which are fish that mature in the ocean before entering freshwater on their spawning migrations. Before the large-scale construction of dams in the 1940s, summer steelhead may have been present in the Sacramento River system (Interagency Ecological Program Steelhead Project Work Team 1999, cited in National Marine Fisheries Service 2003). The timing of adult river entry is often correlated with an increase in river flow, such as occurs during freshets and precipitation events, which lower ambient water temperatures. The preferred water temperatures for migrating adult steelhead are between 46° and 52° F (Reiser and Bjornn 1979). Entry into the river system occurs from July through May, with a peak in late September. Spawning can start as early as December, but typically peaks between January and March and can continue as late as April, depending on water conditions (McEwan and Jackson 1996). Steelhead are capable of spawning more than once (iteroparity) unlike other anadromous salmonids, which die after spawning (semelparity). However, the percentage of repeat spawning often is low and is predominated by female fish (Busby et al. 1996). Steelhead prefer to spawn in cool, clear streams with suitable gravel size, water depth, and water velocities. Ephemeral streams may be used for spawning if suitable conditions in the headwaters remain during the dry season and are accessible to juvenile fish seeking thermal refuge from excessive temperatures and dewatering in the lower elevation reaches of the natal stream (Barnhart 1986, cited in National Marine Fisheries Service 2003).

In Central Valley streams, fry emergence usually occurs between February and May, but can occur as late as June. After emerging from the gravel, fry migrate to shallow, protected areas associated with the margins of the natal stream (Barnhart 1986, cited in National Marine Fisheries Service 2003). Fry will take up and defend feeding stations in the stream as they mature and force smaller, less dominant fry to lower-quality locations (Shapovalov and Taft 1954, cited in National Marine Fisheries Service 2003). In-stream cover and velocity refugia are essential for the survival of steelhead fry, as is riparian vegetation, which provides overhead cover, shade, and complex habitats. As fry mature, they move into deeper waters in the stream channel, occupying riffles during their first year in freshwater. Larger fish may inhabit pools or deeper runs (Barnhart 1986, cited in National Marine Fisheries Service 2003). Juvenile steelhead feed on a variety of aquatic and terrestrial invertebrates and may even prey on the fry and juveniles of steelhead, salmon, and other fish species. Steelhead juveniles may reside in freshwater habitat for extended periods of time before emigrating to the ocean. Optimal water temperatures for fry and juvenile rearing in freshwater is between 45° and 60° F. The upper lethal limit for steelhead is approximately 75° F (Reiser and Bjornn 1979). Temperatures over 70° F can result in respiratory distress for steelhead because of low dissolved oxygen levels (National Marine Fisheries Service 2003).

Steelhead typically spend 1–3 years in freshwater before migrating downstream to the ocean. Most Central Valley steelhead will migrate to the ocean after spending 2 years in freshwater, with the bulk of migration occurring from November to May, although some low levels may occur during all months of the year. The juvenile outmigration peaks from April to May on the Stanislaus River, while in the American River the larger smolt-sized fish emigrate from December to February and smaller-sized steelhead fry come through later in spring (March and April). Feather River steelhead smolts are observed in the river until September, which is believed to be the end of the outmigration period (National Marine Fisheries Service 2003).

Historically, Central Valley steelhead were found throughout the Sacramento and San Joaquin drainages, where waterways were accessible to migrating fish. Steelhead commonly migrated far up tributaries and into headwater streams where cool, well-oxygenated waters were present year round. Currently, in the Central Valley, viable populations of naturally produced steelhead are found only in the Sacramento River and its tributaries (U.S. Fish and Wildlife Service 1998). Wild steelhead populations appear to be restricted to tributaries on the Sacramento River below Keswick Dam, such as Antelope, Deer, and Mill Creeks, and in the Yuba River below Englebright Dam (McEwan and Jackson 1996). It is possible that other naturally spawning populations exist in other Central Valley streams but are not detected because of a lack of sufficient monitoring and genetic sampling of presumed resident rainbow trout and the presence of hatchery steelhead (Interagency Ecological Program Steelhead Project Work Team 1999, cited in National Marine Fisheries Service 2003).

Over the past 30 years, the naturally spawned steelhead populations in the upper Sacramento River have declined substantially. Central Valley steelhead are susceptible to population declines because of the lack of cool summer water temperature required for the survival of juvenile fish and the presence of large dams on major rivers that preclude access to large areas of historic and optimum habitats. Where steelhead can still access tributaries, often summer water flows are influenced by water diversions to support agriculture. Instream flows are frequently reduced, and the ambient water temperatures in the tailwater sections of the tributaries may exceed the tolerances of juvenile steelhead, thereby increasing fish mortality in these sections (National Marine Fisheries Service 2003).

HABITAT USE IN THE ACTION AREA

Steelhead occur at the project action area. They are anticipated to occur in the vicinity of the project site from July through March as they migrate up the Feather River to spawn. Juveniles may rear in the action area year round or pass through the action area as they move downstream in the Feather River to the Sacramento River from January through September.

CRITICAL HABITAT FOR CENTRAL VALLEY STEELHEAD

Critical habitat for the Central Valley steelhead ESU was designated on August 12, 2005; a final designation was published on September 2, 2005, with an effective date of January 2, 2006 (70 FR 52487). Critical habitat is designated to include select waters in the Sacramento and San Joaquin River basins, including the portion of the Feather River in the action area.

RECOVERY PLANNING

While not an official NMFS recovery plan for Central Valley steelhead, the Steelhead Restoration and Management Plan for California includes measures for restoring abundance and distribution of Central Valley steelhead (McEwan and Jackson 1996). Management focus for Central Valley steelhead is to recover native and wild populations and restore hatchery-maintained runs.

Steelhead restoration and management goals outlined in the plan include (1) increasing natural production, as mandated by The Salmon, Steelhead Trout, and Anadromous Fisheries Program Act of 1988, so that steelhead populations are self-sustaining and maintained in good condition; and (2) enhancing angling opportunities and nonconsumptive uses (McEwan and Jackson 1996).

Strategies outlined in the plan to accomplish these goals include (McEwan and Jackson 1996):

- restoring degraded habitat;
- restoring access to historic habitat that is presently blocked;
- reviewing angling regulations to ensure that steelhead adults and juveniles are not over-harvested;

- maintaining and improve hatchery runs, where appropriate; and
- developing and facilitate research to address deficiencies in information on freshwater and ocean life history, behavior, habitat requirements, and other aspects of steelhead biology.

The proposed project is designed to improve the environmental baseline conditions consistent with restoration objectives identified in the recovery plan.

Additionally, NMFS is in the process of writing a multi-species recovery plan for Central Valley spring-run chinook salmon, Sacramento River winter-run chinook salmon, and Central Valley steelhead. The final plan is expected to be complete by December 2008. Levee setback projects that increase floodplain availability and improve morphological function of river channels are expected to be high priority recovery actions (Brown, pers. comm., 2007).

SACRAMENTO RIVER WINTER-RUN CHINOOK SALMON ESU

STATUS AND LIFE HISTORY

On January 4, 1994 NMFS listed the Sacramento River winter-run chinook salmon as endangered under the ESA (59 FR 440). Following an updated status review, NMFS reaffirmed the status on June 28, 2005. While the winter-run ESU formerly included a population in the Stanislaus River (until 1984), it currently is limited to all naturally spawned winter-run fish in the Sacramento River system.

Historically, winter-run chinook salmon depended on access to spring-fed tributaries to the upper Sacramento River that stayed cool during the summer and early fall. Adults enter freshwater in early winter through spring and spawn in the spring and summer. Juveniles rear near the spawning location until at least the fall, when water temperatures in lower reaches are suitable for migration. Winter-run chinook salmon were abundant and made up populations in the McCloud, Pit, and Little Sacramento, with perhaps smaller populations in Battle Creek. On the basis of commercial fishery landings in the 1870s, Fisher (1994) estimated that the total run size of winter-run chinook salmon may have been 200,000 fish.

The most obvious challenge to winter-run chinook salmon was the construction of Shasta Dam, which blocked access to the entire historic spawning habitat. It was not expected that winter-run chinook salmon will survive this habitat alteration (Moffett 1949). Cold-water releases from Shasta, however, created conditions suitable for winter-run chinook salmon downstream from the dam. Presumably, there were several independent populations of winter-run chinook salmon in the Pitt, McCloud, and Little Sacramento Rivers, and various tributaries to these rivers, such as Hat Creek and the Fall River. These populations merged to form the present single population.

In addition to having only a single extant population dependent on artificially created conditions, winter-run chinook salmon face numerous other threats. Chief among these is small population size—escapement fell below 200 fish in the 1990s. Population size declined monotonically from highs of near 100,000 fish in the late 1960s, indicating a sustained period of poor survival. There are questions of genetic integrity from winter-run chinook salmon having passed through several bottlenecks in the 20th century. Other threats include inadequately screened water diversions, predation at artificial structures and by nonnative species, pollution from Iron Mountain Mine (among other sources), adverse flow conditions, high summer water temperatures, unsustainable harvest rates, passage problems at various structures (e.g., Red Bluff Diversion Dam), and vulnerability to drought.

Adult winter-run chinook enter freshwater in an immature reproductive state similar to spring-run chinook, but winter-run chinook move upstream much more quickly and then hold in the cool waters below Keswick Dam for an extended period before spawning (Moyle et al. 1989). Acceptable temperatures for adults migrating upstream range from 57° to 67° F. Similar to spring-run chinook, winter-run chinook spawned in the headwaters of the McCloud, Pit, and Little Sacramento rivers, and Hat Creek. However, Scofield (1900) reported that salmon

arriving "earlier" than spring-run (presumably winter-run) fish ascended Pit River Falls and entered the Fall River (a spring creek), while succeeding spring-run chinook remained below the falls to spawn. This provided winter-run fish with access to the highest portions of the headwaters including springs that provide cold, stable temperatures for successful egg incubation over the summer (Slater 1963). Currently winter-run chinook spawn in the area from Redding downstream to Tehama; however, spawning location is highly temperature dependent. Most spawning occurs in the third year of life (Hallock and Fisher 1985) and average female fecundity is estimated at 3,800 eggs per female.

Spawning takes place from late April through mid-August with a peak in spawning activity in May and June. The preferred temperature for chinook salmon incubation is generally 52° F (between 42° and 56° F). Fry emergence occurs from mid-June through mid-October with subsequent downstream migration taking place from January through April. After initially hiding within the gravel, salmon fry move into calm shallow waters with fine sediments and bank cover. As they increase in size, they gradually move to deeper and faster waters associated with coarser substrates. Generally winter-run juveniles reside in fresh and estuarine waters for 5 to 9 months before actively emigrating as smolts to the ocean.

A variety of factors are likely responsible for the decline of the Sacramento River winter-run chinook salmon population. Water quality degradation because of pollution entering the water from agriculture, mining, and urban and industrial development have likely been responsible for the deaths of many salmon, especially in drought years. Water diversions from the river and in the Delta may be the single most important driver of population decline. Since the late 1800s, unscreened water diversions have drawn a large percentage of Sacramento River water from the system for a variety of purposes. Further, many dams were built in the Sacramento River watershed during the 20th century for water storage and diversion including Battle Creek, the Pit River, and the main stem Sacramento River. These dams manipulated natural flow regimes, decreased the overall amount of water moving through the river, increased temperatures, reduced the amount of sediment and woody debris inputs to the system, and blocked access to natural historic spawning areas including the McCloud, Pit, and Upper Sacramento Rivers.

HABITAT USE IN THE ACTION AREA

Adult winter-run chinook salmon may stray into the Feather River and the project action area on their spawning migrations. Some stray individuals may continue up the Feather River and find spawning habitat. Also, juveniles born in the Sacramento River may periodically move into the lower portions of these systems during downstream migration. However, the entire population of winter-run fish exists only in the Sacramento River below Keswick Dam and individuals are not regularly found in the Feather River.

CRITICAL HABITAT FOR WINTER-RUN CHINOOK SALMON

Critical habitat for the winter-run chinook salmon was designated on June 16, 1993 by NMFS (58 FR 33212) with an effective date of July 16, 1993. Critical habitat is designated to include the Sacramento River from Keswick Dam (River Mile 302) to Chipps Island (River Mile 0) and all waters westward including the San Francisco Bay north of the Bay Bridge to the Golden Gate Bridge.

RECOVERY PLANNING

Pursuant to Section 4(f) of the ESA, a recovery plan must be developed for the winter-run chinook. A draft recovery plan was written by NMFS in 1997 to provide a review of the species, identify risk factors, and provide a recovery goal. Management focus for Sacramento River winter-run chinook salmon is to recover native, wild populations and restore hatchery-maintained runs. Recovery efforts for the run are aimed at dealing with the causes of population decline (outlined above).

Additionally, NMFS is in the process of writing a multi-species recovery plan for Central Valley spring-run chinook salmon, Sacramento River winter-run chinook salmon, and Central Valley steelhead. The final plan is expected to be complete by December 2008. Levee setback projects that increase floodplain availability and improve morphological function of river channels are expected to be high priority recovery actions (Brown, pers. comm., 2007).

DFG has outlined a series of restoration projects including reducing take at Delta diversion facilities, evaluating the success of Coleman National Fish Hatchery and exploring restoration of Battle Creek, and altering the management/operation of the Red Bluff Diversion Dam.

GREEN STURGEON

On April 7, 2006 NMFS listed the southern district population segment (DPS) of the North American green sturgeon as threatened under the ESA. The southern DPS includes individual reproductive populations south of the Eel River. The populations north of the Eel River, grouped as the northern DPS, currently do not warrant listing.

The green sturgeon is a primitive, bottom-dwelling fish found from Ensenada, Mexico, to the Bering Sea and Japan (Wang 1986). It is characterized by its large size (up to 7 feet long and 350 pounds), a long, round body, and "scutes," or plates along dorsal and lateral sides. It is known to migrate up to 600 miles between freshwater and saltwater environments and is commercially caught in the Columbia River and coastal Washington (PSMFC 2007). Very little is known about the life history of the green sturgeon relative to other fish species. Populations exist in the San Francisco Bay and certain tributaries (in the Eel, Trinity, and Klamath Rivers) and farther north in Oregon to the Columbia River. It is an anadromous fish that spends most of its life in salt water and returns to spawn in freshwater. It is slow growing and late maturing and may spawn as little as every 4 to 11 years, beginning at age 15 for males and age 17 for females. Individuals congregate in the bays of these systems in summer, while some may travel upstream to spawn in spring and summer.

Spawning occurs in the lower reaches of large rivers with swift currents and large cobble. Adults broadcast spawn in the water column and fertilized eggs sink and attach to bottom substrate until they hatch (PSMFC 2007). Flow has been identified as the key determinant to larval survival, therefore water diversions and low dam releases may negatively impact green sturgeon survival rates (PSMFC 2007). Juveniles feed on algae and small invertebrates and migrate downstream before they enter their third year of life. They may remain in the estuary for a short time before entering the ocean to feed on benthic invertebrates and fish.

Green and white sturgeon adults have been observed periodically in small numbers in the Feather River (Beamesderfer et al. 2004). There are at least two confirmed records of adult green sturgeon. There are no records of larval or juvenile sturgeon of either species, even before the 1960s when Oroville Dam was built. There are reports that green sturgeon may reproduce in the Feather River during high flow years (California Department of Fish and Game 2002), but these are not specific and are unconfirmed.

DFG suggests that Oroville Dam blocks access to potential spawning habitat and that Thermalito Afterbay warm water releases may increase temperatures to levels that are undesirable for spawning and incubation. Green sturgeon continue to be occasionally sighted in the Feather River (Beamesderfer et al. 2004) and green sturgeon are thought to enter the Bear River (immediately downstream of the action area) during the spring of most wet years (U.S. Fish and Wildlife Service 1996). Sturgeon, including some documented green sturgeon, still regularly occurs in the Bear and Yuba Rivers (California Department of Fish and Game 2002, Beamesderfer et al. 2004) and therefore must migrate through the Feather River and the project site. Salmonid habitat evaluations also suggest spawning habitat above Oroville Dam, but this habitat has been lost since the construction of the dam. No green sturgeon spawning, eggs, larvae, or juveniles have ever been documented in the Feather River (Beamesderfer et al. 2004).

The southern green sturgeon DPS population trend information is less definitive than that of the northern DPS and the populations face a larger number of potential threats. In addition to the sizeable threats faced in the northern DPS, Green sturgeon populations in the southern DPS face smaller population size, potentially lethal temperature limits, entrainment by water projects, and influence of toxic material and exotic species. Population sizes are unknown in this DPS, but are clearly much smaller than in the northern one and therefore more susceptible to catastrophic events. This makes the lack of information about population trend an even greater risk factor. Larval green sturgeon have been shown to have lethal temperature limits near the summer temperatures in the Sacramento River. Temperature control efforts for winter-run chinook have probably been very beneficial in improving conditions for sturgeon larvae. Spawning habitat may have been lost behind dams and water diversions throughout the Central Valley. Green sturgeon in this DPS also face entrainment in pumps associated with the California water project. The entrainment numbers have decreased dramatically since 1985. The reasons for this decrease are unknown. There are significant concerns for winter-run chinook from pesticides and introduced species and green sturgeon in this DPS are probably subject to similar risks.

HABITAT USE IN THE ACTION AREA

Green sturgeon historically have been present in the Feather River. Reproduction is not likely to take place within the Feather River, but rather in the Sacramento River. However, green sturgeon are consistently documented within the Feather River and are known to be present in the Yuba River, which enters the Feather River immediately upstream of the project action area. Therefore, individuals must pass through the action area during migrations to and from the Yuba River and upstream areas of the Feather River.

CRITICAL HABITAT FOR GREEN STURGEON

Critical habitat is defined in Section 3 of the ESA as: (i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the ESA, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed upon a determination that such areas are essential for the conservation of the species (16 USC 1532[5][A]). Section 4(b) of the ESA states that designation of critical habitat should occur at the same time as the final ruling, unless the Secretary deems that critical habitat is not then determinable, in which case the time to critical habitat designation may be extended by 1 year. In the case of green sturgeon, the Secretary has determined that critical habitat designation for the Southern DPS is not yet determinable. Currently, more time is needed to gather information to put together a description of critical habitat for green sturgeon.

RECOVERY PLANNING

A recovery plan for green sturgeon has yet to be drafted because it was only recently listed by NMFS.

EFFECTS

DIRECT AND INDIRECT EFFECTS TO SPECIES IN THE ACTION AREA

Following is a discussion of the direct and indirect effects of the project. Under the ESA, direct effects are typically those project effects that occur at the same time as the action (see "Construction-Related Effects"). Indirect effects are typically those effects that are caused by the proposed action but occur later in time, but are reasonably certain to occur (see "Operations-Related Effects").

Because all of the fish species covered in this BA fundamentally use the same habitat, the direct and indirect effects for these species are discussed together. Specific habitat elements and migrational, spawning, and rearing timing differences are addressed for individual species/races where appropriate.

CONSTRUCTION-RELATED EFFECTS

WATER QUALITY

If construction is to take place when any of the species are present, construction activities could temporarily reduce the amount and quality of fish habitat. Degrading the existing Feather River levee and restoring the setback area and floodway orchard area will disturb soils in the floodplain. Any resulting erosion or runoff could temporarily increase turbidity and sedimentation downstream of the construction sites if soils are transported in stormwater runoff. Fish population levels and survival have been linked to levels of turbidity and siltation in a watershed (Waters 1995). Prolonged exposure to high levels of suspended sediment can create a loss of visual capability, leading to a reduction in feeding and growth rates; a thickening of the gill epithelium, potentially causing the loss of respiratory function; clogging and abrasion of gill filaments; and increases in stress levels, reducing the tolerance of fish to disease and toxicants (Waters 1995).

In addition, high levels of suspended sediments cause movement and redistribution of chinook salmon, steelhead, and other fish populations and can affect physical habitat. Once suspended sediment is deposited, it can alter habitat, decreasing the water's physical carrying capacity for juvenile and adult fish (Waters 1995). Increased sediment loading can also degrade food-producing habitat immediately downstream of the project area. Sediment loading can interfere with photosynthesis of aquatic flora and displaces aquatic fauna. Chinook salmon, steelhead, and many other fish species are sight feeders, and turbid waters reduce the efficiency of these fish in locating and feeding on prey. Some fish, particularly juveniles, can become disoriented, and leave areas where their main food sources are located, ultimately reducing their growth rates. Increases in turbidity and sedimentation commonly result in fish avoiding an area. Fish will not occupy areas that are not suitable for survival unless they have no other option. Therefore, habitat can become limited in systems where high turbidity precludes a species from occupying habitat required for specific life stages.

The potential also exists for contaminants such as concrete, fuels, oils, and other petroleum products used in construction activities to be introduced into the water system directly or through surface runoff. Contaminants may be toxic to fish or cause altered oxygen diffusion rates and acute and chronic toxicity to aquatic organisms, thereby reducing growth and survival.

Measures designed into the project to avoid and minimize degradation of water quality for both turbidity/ sedimentation and contaminant runoff will be implemented, as described above under "Avoidance, Minimization, and Conservation Measures." Because implementation of these measures will substantially reduce water quality-related effects on spring-run chinook salmon, fall-/late fall-run chinook salmon, steelhead, and green sturgeon potentially occurring in project area, temporary effects on water quality and associated habitat are not anticipated to result in adverse effects to these species/races.

RIPARIAN AND SHADED RIVERINE AQUATIC HABITAT

Up to 5.5 acres of mixed riparian vegetation, intermittent drainage, and perennial drainage (i.e., Feather River backwater) will be temporarily affected during construction of the drainage channel outlet in Stage 2. This vegetation and other habitat elements could provide overhead cover for fish or contribute instream woody material to the Feather River channel. However, any potential temporary loss in these benefits will be limited by the relatively small size of the affected area and compensation will be provided by passive restoration and enhancement of the drainage channel as well as the enlarged floodplain (i.e., 1,600-acre setback area).

OPERATIONS-RELATED EFFECTS

RIPARIAN, SHADED RIVERINE AQUATIC, AND FLOODPLAIN HABITAT

The project includes creation of floodplain habitat for the Feather River to expand in times of elevated flows. Vegetation and debris within the floodplain (including leaves, logs, branches, and roots) provide important nutrients and structure for habitat. These attributes provide high-value feeding areas and escape cover for chinook salmon, steelhead, and other native fish species. Shading provided by SRA habitat may also contribute to reduced water temperatures, which will benefit chinook salmon, steelhead, green sturgeon, and other coldwater fish species that occur at the project site.

Degradation of existing Feather River levee segments in Stage 2 will open the levee setback area to inundation and create and restore access to floodplain habitat. Hydraulic analysis of flood frequency for the Feather River setback area has not been done; however, predictions for flood frequency can be made with information gathered for the Feather-Bear River levee setback project downstream. The majority of the setback floodplain area at the Feather-Bear River confluence is about 30–35 feet above sea level and is inundated every 1–2 years. The setback area in the Feather River project is mostly between 35 and 45 feet above sea level and will therefore be inundated with similar frequency to the floodplain in the Feather-Bear confluence (TRLIA 2007).

Floodplains provide important seasonal habitat for native fish species during the winter and spring flood periods in some years. For this reason, a key restoration goal of the CALFED Bay-Delta Program is to improve the connectivity between rivers and floodplain habitat, as well as increase the amount of shallow water habitat in the Central Valley (CALFED Bay-Delta Program 2001). Implementation of the proposed project will contribute to achieving this goal. Numerous studies have shown that shallow water and dense vegetation in these areas provide highly productive rearing areas for numerous species, including chinook salmon and steelhead (Sommer, Baxter, and Herbold 1997; Sommer et al. 2001; Sommer et al. 2002, Baxter et al. 1996, Moyle et al. 2000, Sacramento Area Flood Control Agency 1999). Floodplain habitat also offers protection from large piscivorous fish such as striped bass (*Morone saxatilis*). The temporary nature of the flooded habitat and the protection offered by relatively shallow water and dense vegetative cover serve to exclude nonnative predatory fish.

FISH STRANDING

The floodplain to be created by removal of portions of the existing Feather River levee in Stage 2 is relatively flat land area that drains to the south and currently includes agricultural lands, riparian vegetation, drainage ditches, ponds, roads, and structures. The presence of these multiple uses indicates that the area has some variation in topography. After the area is flooded during high-water events, water will drain to the areas of lowest elevation and pool or flow to the river. This creates a potential situation where fish that enter the floodplain with the high water could become stranded in remnant pools that do not fully drain back to the river. Stranded fish, including chinook salmon and steelhead, could experience high mortality as a result of lethal water temperatures, poor water quality, predation, or desiccation of these areas; with no means to return to the river, trapped fish will inevitably die. However, construction elements designed into the project to avoid long-term fish stranding will be implemented to avoid any potential fish stranding.

EFFECTS OF INTERRELATED AND INTERDEPENDENT ACTIONS

Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no significant independent utility apart from the action that is under consideration. Interrelated and interdependent actions are activities that will not occur "but for" the proposed action.

No interrelated or interdependent actions that could affect federally listed anadromous fish species covered in this BA have been identified in relation to the Feather Levee Improvements Program.

CUMULATIVE EFFECTS

Cumulative effects include those of future state, tribal, local, or private actions that are reasonably certain to occur in the action area under consideration. There are a number of present and reasonably foreseeable future projects that could result in effects similar to those of the FRLRP Segment 2 levee setback. These projects are generally grouped into three general categories: flood control, development, and ecosystem and habitat restoration. Information on relevant projects and studies is provided in the *Environmental Impact Report for the Feather River Levee Repairs Project* (TRLIA 2006a). In summary, specific flood control projects include the Olivehurst Detention Basin Project, the Yuba River South Levee Improvements Project, the Yuba Basin Project, and the Feather-Bear-Western Pacific interceptor Canal Improvements Project. Analyses and feasibility studies regarding potential additional measures for flood control have also been completed or are underway, such as the Sutter County Feasibility Study. Current and future development projects include the Plumas Lake Specific Plan, East Linda Specific Plan, River Highlands Community Plan, and additional individual projects, such as the Yuba County Motorplex and Yuba County Casino. These projects are unlikely to have any direct effects on fish but could indirectly affect fish habitat through effects on water quality via runoff. Ecosystem and habitat restoration efforts include various programs and planning groups, such as the CALFED Bay-Delta Program, the Lower Yuba River Fisheries Technical Working Group, Yuba County Water Agency Fisheries-Related Projects and Investigations, and the Feather River Coordinated Resource Management Group. Actions associated with these programs would generally be focused on improving habitat conditions for fish and other biological resources.

Most of the current and potential projects mentioned above would likely require a federal action, and, therefore, be subject to Section 7 consultation. Although impacts on fisheries could be mitigated to be a less-than-significant level on a project-by-project basis, it is possible that multiple projects that affect Feather River waterways could result in a significant cumulative effect on fisheries resources. However, the proposed project will not contribute to any potential cumulative impact on fish because of the project's overall long-term beneficial effects on fisheries habitat.

Construction of the Segment 2 setback levee also has the potential to contribute to a cumulative benefit to other biological resources by enhancing the riverine ecosystem along the Feather River. Expansion of the Feather River floodway could increase the amount of riverine aquatic and riparian habitat and reduce habitat fragmentation. In combination with restoration projects in the region, this would enhance regional migratory corridors and provide larger habitat units for many aquatic and terrestrial species.

CONCLUSION AND DETERMINATION

ESA SECTION 7

Based on the status of federally listed anadromous fish species in the action area, analysis of effects to the species that may occur in the action area, and avoidance, minimization, and conservation measures that will be implemented, it is concluded that the project is unlikely to adversely affect Central Valley spring-run chinook salmon, Central Valley steelhead, green sturgeon, or their designated critical habitat. Additionally, the project is unlikely to adversely affect other fish species, including Sacramento River winter-run chinook salmon.

Direct and indirect take of Central Valley spring-run chinook salmon, Central Valley fall-/late fall-run chinook salmon, Central Valley steelhead, and green sturgeon is unlikely to occur because of the avoidance, minimization, and conservation measures to be included as part of the project.

Implementation of the project will likely improve the overall success of these and other native fish species that use the area. Adverse effects will be avoided and habitat quality improved by construction and passive restoration of the drainage channel into the Feather River. In addition, widening the floodway by setting back the levee will expand the available floodplain habitat for chinook salmon, steelhead, and other native fish species. The newly created floodplain will create refugia during peak flows. This could help reverse regional riparian habitat losses, increase the effective amount of habitat available to native fish species, and improve the conveyance capacity of the floodplain to provide migration corridors for, and sustain, fish populations. Providing larger habitat units is especially important for migratory fish species, such as chinook salmon and steelhead, as it could increase the extent of SRA and floodplain habitat potentially available to these species/races for rearing. The proposed levee setback will be expected to have long-term benefits.

Given the current status of Central Valley spring-run chinook salmon and its critical habitat, Central Valley steelhead and its critical habitat, and green sturgeon; the environmental baseline for the action area; and the effects of the proposed action and its cumulative effects, it is concluded that the FRLRP Segment 2 levee setback is not likely to adversely affect these species.

ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act, as amended (16 USC 1801), requires that EFH be identified and described in federal fishery management plans. Federal action agencies must consult with NMFS on any activity that they fund, permit, or carry out that may adversely affect EFH. The EFH regulations require that federal action agencies obligated to consult on EFH also provide NMFS with a written assessment of the effects of their action on EFH (50 CFR 600.920). NMFS is required to provide EFH conservation and enhancement recommendations to the federal action agencies. The statute also requires federal action agencies receiving NMFS EFH Conservation Recommendations to provide a detailed written response to NMFS within 30 days upon receipt detailing how they intend to avoid, mitigate, or offset the impact of the activity on EFH (Section 305[b][4][B]).

EFH is defined as those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purposes of interpreting the definition of EFH, “waters” includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” means habitat required to support a sustainable fishery and a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers all habitat types used by a species throughout its life cycle.

The Pacific Fishery Management Council (PFMC) has identified and described EFH, adverse impacts, and recommended conservation measures for salmon in Amendment 14 to the Pacific Coast Salmon Plan (Salmon

Plan) (PFMC 2003). Freshwater EFH for Pacific salmon in the Central Valley includes waters currently or historically accessible to salmon within the Central Valley ecosystem as described in Myers et al. (1998), and includes the Feather River watershed, which covers the project action area. Central Valley spring-run chinook salmon and Central Valley fall-/late fall-run chinook salmon are species managed under the Salmon Plan that occur in the action area.

CONCLUSIONS

Upon review of the potential project effects, it is concluded that the proposed action is not likely to adversely affect the spawning, rearing, and migratory EFH functions of Pacific salmon currently or previously managed under the Magnuson-Stevens Fishery Conservation and Management Act, as amended, in the Feather River.

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NMFS Letter of Concurrence

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

December 13, 2007

In response refer to:
2007/07371

Nancy Haley
Chief, California North Section
U.S. Army Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Dear Ms. Haley:

This letter responds to your November 6, 2007, request for NOAA's National Marine Fisheries Service's (NMFS) concurrence that segment 2 of the Feather River Levee Repair project (FRLRP), in Yuba County, California, is not likely to adversely effect Federally listed, threatened Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley steelhead (*O. mykiss*), and the threatened Southern Distinct Population Segment (DPS) of North American green sturgeon (*Acipenser medirostris*), or their respective designated critical habitat, or the Essential Fish Habitat (EFH) of Pacific salmon.

The U.S. Army Corps of Engineers (Corps) proposes to permit the Three Rivers Levee Improvement Authority (TRLIA) to construct segment 2 of the FRLRP. TRLIA is a joint powers authority with the mission of advancing flood safety in southwestern Yuba County. Studies by the Corps, the California Department of Water Resources, and TRLIA have found that several reaches of the levee system protecting Reclamation District (RD) 784 do not satisfy geotechnical criteria for seepage at the water surface elevations for a 100-year flood event. TRLIA is implementing the FRLRP as part of the final phase of a program to repair levee deficiencies in RD 784. The FRLRP has been divided into three segments. Segments 1 and 3 will repair the levee in place, and segment 2 will construct a setback levee. This consultation addresses the segment 2 setback levee construction.

Segment 2 will be built along the east bank of the Feather River from project levee mile 17.2 to 23.4, between the Bear and Yuba Rivers, from Star Bend to immediately south of Shanghai Bend. The setback levee will replace a reach of levee that failed during the January 1997 flood. The new levee will be set back approximately 0.5 miles to the east of the existing alignment. After the setback levee is constructed, the existing levee will be breached at several locations to allow floodwaters to enter the setback area. A pump station located within the setback area will be relocated to the landside of the new levee.

Segment 2 will be completed in two stages. Stage one activities include construction of the setback levee and associated stability berms, construction of the new pump station, and excavation of borrow material. Stage two activities include degradation of all or portions of the existing levee, removal of the old pump station, filling Plumas Lake Canal from the setback

levee to the new pump station, and recontouring portions of the setback area to facilitate drainage of flood water back to the Feather River and to prevent fish stranding.

The project is anticipated to take approximately 22 months to construct. The setback levee embankment will be completed by December 2008, and the existing levee will be breached or removed by summer 2009. All in-channel construction activities will occur between June 15 and September 15, when listed anadromous fish are not expected to be present or affected by project activities. Levee degradation will not occur during the designated flood season, from November 1 to April 15, and earthwork in the setback area will only occur when flood waters of the Feather River will not be present. Approximately 1,600 acres of floodplain will be reconnected to the Feather River. Much of this area will be restored to riparian habitat through either passive or active restoration. An operations and maintenance plan will be developed and submitted to NMFS. Monitoring of the habitat development within the setback area will occur for five years. An annual monitoring summary will be submitted to NMFS by August 1 for each monitoring year.

Endangered Species Act (ESA) Section 7 Consultation

NMFS has received the information necessary to initiate consultation on Federally listed salmonids within the project area for the proposed action. Based on our review of the material provided with your request, and the best scientific and commercial information currently available, NMFS has determined that the action is not likely to adversely affect Central Valley spring-run Chinook salmon, Central Valley steelhead, the Southern DPS of North American green sturgeon, or their designated critical habitat. NMFS reached this determination for the following reasons: (1) In-channel construction activities will occur during winter months when adult and juvenile Central Valley spring-run Chinook salmon, Central Valley steelhead, and green sturgeon are not expected to be exposed to construction-related activities; (2) levee degradation or removal will not occur during the flood season, and earthwork in the setback area will only occur when flood waters of the Feather River will not be present; (3) the setback area will be graded to avoid fish stranding once the existing levee is breached or removed; (4) the site will be monitored for five years to validate that design and restoration objectives are met; and (5) the action will be beneficial to anadromous fish because it will increase the amount of floodplain area and the quantity and quality of shallow-water rearing and refugia habitat.

This concludes consultation for the proposed action. This concurrence does not provide incidental take authorization pursuant to section 7(b)(4) and section 7(o)(2) of the ESA. Reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered; (2) the action is subsequently modified in a manner that causes adverse effects to listed species or critical habitat; or (3) a new species is listed or critical habitat designated that may be affected by this action.

EFH Consultation

The proposed project is within the region identified as EFH for Pacific salmon in Amendment 14 of the Pacific Salmon Fishery Management Plan, pursuant to the Magnuson-Stevens Conservation and Management Act (MSA). We have reviewed this project for impacts to EFH for Pacific salmon under section 305(b)(2) of the MSA, and find the implementation of the project will not adversely affect EFH for Pacific salmon; therefore, we do not have any additional conservation recommendations for the proposed action.

Please contact Howard Brown at (916) 930-3608, or via e-mail at howard.brown@noaa.gov if you have any questions concerning this project, or require additional information.

Sincerely,

for Rodney R. McInnis
Regional Administrator

cc: Copy to file: ARN151422SWR07SA00475
Anja Kelsey, EIP/PBS&J, 1410 Rocky Ridge Drive, Suite 190, Roseville, CA 95661
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