Appendix 3.C

Avoidance and Minimization Measures

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Acronyms and Abbreviations

AMM	avoidance and minimization measure
BDCP	Bay Delta Conservation Plan
BMP	best management practice
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
CGP	Construction General Permit
CM	Conservation Measure
CNDDB	California Natural Diversity Database
dB	decibels
DWR	California Department of Water Resources
EPA	U.S. Environmental Protection Agency
FR	*Federal Register*
GPS	global positioning system
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
SPCC plan	Spill prevention, containment, and countermeasure plan
SWPPP	stormwater pollution prevention plan
SWRCB	State Water Resources Control Board
USFWS	U.S. Fish and Wildlife Service

Appendix 3.C
Avoidance and Minimization Measures

3.C.1 Introduction

The avoidance and minimization measures (AMMs) described here have been developed to avoid and minimize effects on natural communities and covered species that could result from Bay Delta Conservation Plan (BDCP) covered activities. These AMMs will be implemented for covered activities throughout the BDCP permit term. AMMs are implemented at all phases of a project, from siting through design, construction, and on to operations and maintenance, as described in Section 3.C.1.2, *Applying Avoidance and Minimization through the Project Life Cycle*.

AMMs vary greatly depending on the protected resource, with different approaches used for natural communities, plants, wildlife, and fish. Biological differences between covered wildlife and fish species result in very different AMMs. Fish are generally not known to occur in a given site; rather if the site is known to provide suitable habitat, fish are assumed to be potentially present, at least at certain times of the year. Therefore, AMMs for fish are heavily focused on protecting their habitat from stresses such as water quality impairment, dewatering, and/or underwater noise. Wildlife species, on the other hand, often have very specific habitat requirements, and the individual animals can often be detected through application of established survey protocols, making field surveys a key component of wildlife AMMs. The organization of AMMs reflects these differences.

- AMM1 and AMM2 provide for environmental training and the application of standard best management practices (BMPs) to ensure substantial protections to all natural communities and covered species.
- AMM3 through AMM9 provide measures to avoid and minimize effects on covered fish species, primarily.
- AMM10 through AMM26 provide protections addressing the specific needs of covered plant or wildlife species and their associated natural communities.
- AMM27 through AMM36 focus primarily on human health and safety and on the protection of all natural communities and covered species.
- AMM37 provides measures to avoid and minimize recreation-related effects on covered plant or wildlife species and their associated natural communities.

While take of covered species and loss of their known and suitable habitat are assumed and mitigated under the regional approach to mitigation and conservation described in Chapter 3, *Conservation Strategy*, avoidance of habitat or nest sites for selected covered wildlife species is required. The selected species have the greatest potential to benefit from avoidance measures and are generally species with lower reproductive rates, such as birds and mammals, which suffer greater consequences from take of individuals, particularly when breeding.

Table 3.C-1 briefly summarizes the AMMs.

Table 3.C-1. Summary of the Avoidance and Minimization Measures

Number	Title	Summary
Benefit All Natural Communities and Covered Species		
AMM1	Worker Awareness Training	Includes procedures and training requirements to educate construction personnel on the types of sensitive resources in the project area, the applicable environmental rules and regulations, and the measures required to avoid and minimize effects on these resources.
AMM2	Construction Best Management Practices and Monitoring	Standard practices and measures that will be implemented prior, during, and after construction to avoid or minimize effects of construction activities on sensitive resources (e.g., species, habitat), and monitoring protocols for verifying the protection provided by the implemented measures.
Primarily Benefit Covered Fishes		
AMM3	Stormwater Pollution Prevention Plan	Includes measures that will be implemented to minimize pollutants in stormwater discharges during and after construction related to covered activities, and that will be incorporated into a stormwater pollution prevention plan to prevent water quality degradation related to pollutant delivery from project area runoff to receiving waters.
AMM4	Erosion and Sediment Control Plan	Includes measures that will be implemented for ground-disturbing activities to control short-term and long-term erosion and sedimentation effects and to restore soils and vegetation in areas affected by construction activities, and that will be incorporated into plans developed and implemented as part of the National Pollutant Discharge Elimination System permitting process for covered activities.
AMM5	Spill Prevention, Containment, and Countermeasure Plan	Includes measures to prevent and respond to spills of hazardous material that could affect navigable waters, as well as emergency notification procedures.
AMM6	Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material	Includes measures for handling, storage, beneficial reuse, and disposal of excavation or dredge spoils and reusable tunnel material, including procedures for the chemical characterization of this material or the decant water to comply with permit requirements, and reducing potential effects on aquatic habitat, as well as specific measures to avoid and minimize effects on species in the areas where reusable tunnel material would be used or disposed.
AMM7	Barge Operations Plan	Includes measures to avoid or minimize effects on aquatic species and habitat related to barge operations, by establishing specific protocols for the operation of all project-related vessels at the construction and/or barge landing sites. Also includes monitoring protocols to verify compliance with the plan and procedures for contingency plans.
AMM8	Fish Rescue and Salvage Plan	Includes measures that detail procedures for fish rescue and salvage to avoid and minimize the number of Chinook salmon, steelhead, green sturgeon, and other covered fish stranded during construction activities, especially during the placement and removal of cofferdams at the intake construction sites.
AMM9	Underwater Sound Control and Abatement Plan	Includes measures to minimize the effects of underwater construction noise on fish, particularly from impact pile–driving activities. Potential effects of pile driving will be minimized by restricting work to the least sensitive period of the year and by controlling or abating underwater noise generated during pile driving.

Number	Title	Summary
Primarily Benefit Covered Plants, Wildlife, or Natural Communities		
AMM10	Restoration of Temporarily Affected Natural Communities	Restore and monitor natural communities in the Plan Area that are temporarily affected by covered activities. Measures will be incorporated into restoration and monitoring plans and will include methods for stockpiling and storing topsoil, restoring soil conditions, and revegetating disturbed areas; schedules for monitoring and maintenance; strategies for adaptive management; reporting requirements; and success criteria.
AMM11	Covered Plant Species	Conduct botanical surveys during the project planning phase and implement protective measures, as necessary. Redesign to avoid indirect effects on modeled habitat and effects on core recovery areas.
AMM12	Vernal Pool Crustaceans	Includes provisions to require project design to minimize indirect effects on modeled habitat, avoid effects on core recovery areas, minimize ground-disturbing activities or alterations to hydrology, conduct protocol-level surveys, and redesign projects to ensure that habitat loss is minimized.
AMM13	California Tiger Salamander	During the project planning phase, identify suitable habitat within 1.3 miles of the project footprint, and survey aquatic habitats in potential work areas for California tiger salamander. If California tiger salamander larvae or eggs are found, implement prescribed mitigation.
AMM14	California Red-Legged Frog	During the project planning phase, identify suitable habitat within 1 mile of the project footprint, conduct a preconstruction survey, implement protective measures for areas where species presence is known or assumed, and establish appropriate buffer distances. If aquatic habitat cannot be avoided, implement prescribed surveys and mitigation.
AMM15	Valley Elderberry Longhorn Beetle	During the project planning phase, conduct surveys for elderberry shrubs within 100 feet of covered activities involving ground disturbance, and design project to avoid effects within 100 feet of shrubs, if feasible. Implement additional protective measures, as stipulated in AMM2. Elderberry shrubs identified within project footprints that cannot be avoided will be transplanted to previously approved conservation areas in the Plan Area.
AMM16	Giant Garter Snake	During the project planning phase, identify suitable aquatic habitat (wetlands, ditches, canals) in the project footprint. Conduct preconstruction surveys and implement protective measures.
AMM17	Western Pond Turtle	Identify suitable aquatic habitat and upland nesting and overwintering habitat in the project footprint. Conduct preconstruction surveys in suitable habitat twice including 1 week before and within 48 hours of construction. Implement protective measures as described.
AMM18	Swainson's Hawk and White-Tailed Kite	Conduct preconstruction surveys of potentially occupied breeding habitat in and within 0.25 mile of the project footprint to locate active nest sites. Implement prescribed mitigation (tree planting) and monitoring to verify attainment of performance standards.
AMM19	California Clapper Rail and California Black Rail	Identify suitable habitat in and within 500 feet of the project footprint. Perform surveys and implement prescribed protective measures in areas where species is present or assumed to be present.
AMM20	Greater Sandhill Crane	Conduct preconstruction surveys to determine winter roost occupancy within 0.75 mile of the project footprint, or assess location of roosting habitat within 0.75 mile of project footprint based on mapping performed by qualified crane expert. Identify foraging habitat in project footprint and potential indirect impact areas. Implement protective measures in and adjacent to habitat. Minimize direct and indirect effects of conveyance facility construction through the measures described herein.

Number	Title	Summary
AMM21	Tricolored Blackbird	Conduct preconstruction surveys in breeding habitat within 1,300 feet of the project footprint, if the project is to occur during the breeding season. Avoid any construction activity within 250 feet of an active tricolored blackbird nesting colony, and minimize such activity within 1,300 feet.
AMM22	Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo	Conduct preconstruction surveys of potential breeding habitat in and within 500 feet of project activities. It may be necessary to conduct the breeding bird surveys during the preceding year depending on when construction is scheduled to start. Implement protective measures in occupied areas.
AMM23	Western Burrowing Owl	Perform surveys where burrowing owl habitat (or sign) is encountered within 150 meters of a proposed construction area. If burrowing owls or suitable burrowing owl burrows are identified during the habitat survey, and if the project does not fully avoid direct and indirect impacts on the suitable habitat, perform preconstruction surveys and implement certain minimization measures.
AMM24	San Joaquin Kit Fox	Conduct habitat assessment in and within 250 feet of project footprint. If suitable habitat is present, conduct a preconstruction survey and implement U.S. Fish and Wildlife Service guidelines. Implement protective measures in occupied areas.
AMM25	Riparian Woodrat and Riparian Brush Rabbit	Conduct surveys for projects occurring within suitable habitat as identified from habitat modeling and by additional assessments conducted during the planning phase of construction or restoration projects following U.S. Fish and Wildlife Service guidelines. Implement protective measures in suitable habitat.
AMM26	Salt Marsh Harvest Mouse and Suisun Shrew	Identify suitable habitat in and within 100 feet of the project footprint for projects in the species range. Ground disturbance will be limited to the period between May 1 and November 30, to avoid destroying nests with young. Prior to ground-disturbing activities, vegetation will first be removed with nonmechanized hand tools (e.g., goat or sheep grazing, or in limited cases where the biological monitor can confirm that there is no risk of harming salt marsh harvest mouse or Suisun shrew, hoes, rakes, and shovels may be used). Implement protective measures in suitable habitat.
AMM27	Selenium Management	Develop and implement a plan to evaluate site-specific restoration conditions and include design elements that minimize any conditions that could be conducive to increases of bioavailable selenium in restored areas. Before ground-breaking activities associated with site-specific restoration occurs, identify and evaluate potentially feasible actions for the purpose of minimizing conditions that promote bioaccumulation of selenium in restored areas.
AMM28	Geotechnical Studies	Conduct geotechnical investigations to identify the types of soil avoidance or soil stabilization measures that should be implemented to ensure that the facilities are constructed to withstand subsidence and settlement and to conform to applicable state and federal standards.
AMM29	Design Standards and Building Codes	Ensure that the standards, guidelines, and codes, which establish minimum design criteria and construction requirements for project facilities, will be followed. Follow any other standards, guidelines, and code requirements that are promulgated during the detailed design and construction phases and during operation of the conveyance facilities.

Number	Title	Summary
AMM30	Transmission Line Design and Alignment Guidelines	Design the alignment of proposed transmission lines to minimize impacts on sensitive terrestrial and aquatic habitats when siting poles and towers. Restore disturbed areas to preconstruction conditions. In agricultural areas, implement additional BMPs. Site transmission lines to avoid greater sandhill crane roost sites or, for temporary roost sites, by relocating roost sites prior to construction if needed. Site transmission lines to minimize bird strike risk.
AMM31	Noise Abatement	Develop and implement a plan to avoid or reduce the potential in-air noise impacts related to construction, maintenance, and operations.
AMM32	Hazardous Material Management	Develop and implement site-specific plans that will provide detailed information on the types of hazardous materials used or stored at all sites associated with the water conveyance facilities and required emergency-response procedures in case of a spill. Before construction activities begin, establish a specific protocol for the proper handling and disposal of hazardous materials.
AMM33	Mosquito Management	Consult with appropriate mosquito and vector control districts before the sedimentation basins, solids lagoons, and the intermediate forebay inundation area become operational. Once these components are operational, consult again with the control districts to determine if mosquitoes are present in these facilities, and implement mosquito control techniques as applicable. Consult with the control districts when designing and planning restoration sites.
AMM34	Construction Site Security	Provide all security personnel with environmental training similar to that of onsite construction workers, so that they understand the environmental conditions and issues associated with the various areas for which they are responsible at a given time.
AMM35	Fugitive Dust Control	Implement basic and enhanced control measures at all construction and staging areas to reduce construction-related fugitive dust and ensure the project commitments are appropriately implemented before and during construction, and that proper documentation procedures are followed.
AMM36	Notification of Activities in Waterways	Before in-water construction or maintenance activities begin, notify appropriate agency representatives when these activities could affect water quality or aquatic species.
AMM37	Recreation	Implement avoidance and minimization measures for recreational use within the reserve system. Measures to be implemented address the siting, designing, and construction of trails and other recreational facilities. Allowable recreational uses will be controlled using a variety of techniques including fences, gates, clearly signed trails, educational kiosks, trail maps and brochures, interpretive programs, patrol by land management staff, and restrictions by area and time.

3.C.1.1 Critical Habitat

The AMMs have been designed to protect natural communities and covered species and to avoid adverse modification of designated critical habitat in the Plan Area for all federally listed threatened or endangered species with designated critical habitat. Covered terrestrial species with critical habitat in the Plan Area are addressed in their respective AMMs as follows: vernal pool species (conservancy fairy shrimp [Figure 3.C-1], vernal pool fairy shrimp [Figure 3.C-2], vernal pool tadpole shrimp [Figure 3.C-3]) in AMM12, California tiger salamander (Figure 3.C-4) in AMM13, California red-legged frog (Figure 3.C-5) in AMM14, and Suisun thistle (Figure 3.C-6) and soft bird's-

beak (Figure 3.C-7) in AMM11. Terrestrial species that are not covered by the BDCP but have designated critical habitat in the Plan Area are Delta green ground beetle (Figure 3.C-8), Contra Costa goldfields and Contra Costa wallflower (Figure 3.C-9), and Antioch Dunes evening primrose (Figure 3.C-10). Covered activities in designated critical habitat for these species will be limited to management activities that will not result in any ground disturbance or other adverse effects on critical habitat. Any other activities in these areas, if needed, would be performed only with prior concurrence from the U.S. Fish and Wildlife Service (USFWS) that such activities will not result in adverse modification of critical habitat for these species.

Five covered fish species have designated critical habitat in the Plan Area: delta smelt, Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, Central Valley steelhead, and green sturgeon. During the planning phase for construction of individual restoration projects, the Implementation Office will ensure that tidal natural communities restoration and channel margin enhancement projects or other covered activities will not result in the adverse modification of critical habitat for any of these species. AMM3 through AMM7 are protective of the water quality and physical habitat structure that establish the primary constituent elements of critical habitat (described in Appendix 5.I, *Critical Habitat, Essential Fish Habitat, and Southern Resident Killer Whale Analyses*) for these fishes, and thus serve to prevent adverse modification of designated critical habitat for these species. A complete presentation of BDCP effects on designated critical habitat is provided in Appendix 5.I.

3.C.1.2 Applying Avoidance and Minimization through the Project Life Cycle

AMMs will be implemented through all phases of project planning and implementation. Surveys will be conducted during project-level planning to identify needed AMMs (Section 3.C.1.2.1, *Conduct Planning-Level Surveys*). After planning-level surveys are conducted, projects will be sited to avoid and minimize impacts on covered species to the extent practicable, and project plans will incorporate any necessary seasonal or timing restrictions or other design measures that can be implemented to avoid and minimize take of covered species (Section 3.C.1.2.2, *Site and Design Projects to Avoid and Minimize Effects on Covered Species*). Immediately prior to project-related ground disturbance, site surveys and preparation may be necessary to locate species or habitat features and to relocate individuals and conduct site preparations (e.g., demarcate avoidance areas around nests, vacate and collapse burrows that could become occupied by covered species), as described in Section 3.C.1.2.3, *Conduct Preconstruction Surveys and Prepare Site*. AMMs and monitoring will also be necessary during project construction and operation, as described in Section 3.C.1.2.4, *Avoid and Minimize Effects during Project Construction and Operation.*

3.C.1.2.1 Conduct Planning-Level Surveys

The Implementation Office will conduct planning-level surveys during the site-specific planning process to identify natural communities and elements of covered species habitat in and adjacent to the project area. Planning-level surveys are required for all covered activities that result in ground disturbance, in-water work, inundation, or other effects that could result in take of covered species or habitats. These surveys will be conducted by qualified biologists familiar with identifying the natural communities and covered species habitats in the Plan Area and will use survey protocols previously approved by the fish and wildlife agencies (USFWS, California Department of Fish and Wildlife [CDFW], National Marine Fisheries Service [NMFS]).

Prior to conducting on the ground surveys, the Implementation Office will review existing information, including aerial photographs, BDCP file data, the most recent California Natural Diversity Database (CNDDB) records, and any other relevant sources of information. This literature and data review is intended to identify natural communities and covered species habitat or populations that are potentially present on the project site and that require specific AMMs. Based on results of the initial information review, site-specific surveys will be conducted as identified in the required AMMs to inform project design and incorporate site-specific avoidance and minimization actions.

Planning-level survey reports will be included with project design documents for covered activities. Planning survey reports will include the following.

- Description of the types of natural communities present in the project site.
- Maps of locations of suitable habitat and/or habitat features for covered species as defined by the covered species accounts (Appendix 2.A, *Covered Species Accounts*).
- Maps of covered species occurrences based on CNDDB and other available data.
- A list of the applicable AMMs required by the BDCP based on the resources present on the project site.

Results of the planning-level survey will provide information necessary to comply with the required AMMs. The required AMMs will be incorporated into the project design. The Implementation Office will review and approve all planning-level survey reports before implementing any covered activities. The Implementation Office will enter all relevant information in the survey reports into a database and use these data to monitor Plan compliance.

3.C.1.2.2 Site and Design Projects to Avoid and Minimize Impacts on Covered Species

The covered activities have been designed to avoid and minimize effects on the covered species at the programmatic level and at the scale of the Plan Area. The Implementation Office will ensure that covered activities are sited and designed to minimize the impact of take of covered species to the maximum extent practicable, according to the applicable AMMs. During the project design phase, measures set forth in AMMs to avoid and minimize effects on covered fish, wildlife, and plant species and their habitats will be included in the following plans developed as needed to comply with state and federal regulations.

- Stormwater pollution prevention plan (SWPPP) as required by the Central Valley Regional Water Quality Control Board (AMM3).
- Erosion and sediment control plan (AMM4).
- Spill prevention, containment, and countermeasure (SPCC) plan (AMM5).
- Disposal and reuse of spoils, reusable tunnel material (RTM), and dredged material (AMM6).
- Barge operations plan (AMM7).
- Fish rescue and salvage plan (AMM8).
- Underwater sound control and abatement plan (AMM9).

3.C.1.2.3 Conduct Preconstruction Surveys and Prepare Site

Preconstruction surveys and site preparation will be implemented after the project planning phase and prior to any ground-disturbing activity. Site preparation activities will in most cases include measures to protect against water quality impairments, erosion, or hazardous materials spills as required by AMM3, AMM4, and AMM5. At some sites, additional site preparation activities may be required as specified in AMM6 and AMM7.

Sensitive natural communities identified in project areas that will not be directly affected by construction activities will be avoided and minimized to the maximum extent practicable. The locations of sensitive natural communities to be avoided in projects areas will be clearly identified on construction plans and will be clearly demarcated in the field with construction fencing and signs indicating that these areas contain sensitive resources and are to be avoided. Additional measures pertaining to construction in and around sensitive resources are included in the BMPS in AMM2.

Some covered species will require surveys immediately prior to project implementation to locate or transplant individuals, identify and demarcate avoidance areas around nests or burrow sites, or vacate and collapse burrows that could become occupied by covered species. Some projects will require fish exclusion, collection, and salvage as described in the fish rescue and salvage plan (AMM8)

Although surveys are required in specific cases, overall, impacts on covered species are assumed to occur on all project sites. However, if the results of the preconstruction survey document a large or important population of a covered species other than those acknowledged in the Plan, the local agency reviewing or proposing the project must consult the Implementation Office for advice on species avoidance and minimization measures[1]. The Implementation Office will also contact the wildlife agencies (USFWS and CDFW) for technical advice.

3.C.1.2.4 Avoid and Minimize Effects during Project Construction and Operation

AMMs during project construction may include, for example, maintenance of preestablished avoidance buffers (many examples in AMM11 through AMM26), minimization of the effects of underwater sound (AMM9), or species-specific protective measures (AMM11 through AMM26). A qualified biologist will be present to monitor construction and ensure AMMs are being implemented appropriately. The qualifications necessary for the monitoring biologist and the measures to be implemented differ by species or resource, as described in the relevant AMMs.

[1] If new information is found through surveys or other data that greatly changes the understanding of covered species distribution or habitat requirements from that described in this Plan, the Plan would need to be reevaluated and an amendment may be necessary (see Section 6.5, *Changes to the Plan or Permits*, for the amendment process).

3.C.2 Avoidance and Minimization Measures

3.C.2.1 AMM1 Worker Awareness Training

The Implementation Office will provide training to field management and construction personnel on the importance of protecting sensitive natural resources (i.e., covered fish species, covered wildlife species, covered plant species, and designated critical and/or suitable habitats for these covered species). Training will be conducted during preconstruction meetings so that construction personnel are aware of their responsibilities and the importance of compliance. All trainees will be required to sign a sheet indicating their attendance and completion of environmental training. The training sheets will be provided to the fish and wildlife agencies if requested. These requirements also pertain to operations and maintenance personnel working in and adjacent to covered species habitat and natural communities.

Construction personnel will be educated on the types of sensitive resources located in the project area and the measures required to avoid and minimize effects on these resources. Materials covered in the training program will include environmental rules and regulations for the specific project and requirements for limiting activities to approved work areas, timing restrictions, and avoidance of sensitive resource areas. In general, trainings will include the following components.

- Important timing windows for covered species (i.e., timing of covered fish migration, spawning, and rearing; wildlife mating, nesting, and fledging; and plant flowering periods).
- Specific training related to the relevant AMMs that will be implemented during construction for the protection of covered fish, wildlife, and plant species and natural communities important for the covered species (i.e., AMM2 through AMM26).
- The legal requirements for resource avoidance and protection.
- Identification of relevant covered fish, wildlife, and plant species, depending upon work to be performed and location of the work (e.g., in-water, upland, wetland).
- Protocol for identifying the proper AMMs to implement for the protection of covered fish, wildlife and plants based upon the nature, timing, and location of construction activities to be performed.
- Brief discussions of covered species and natural communities of concern.
- Boundaries of the work area.
- Avoidance and minimization commitments.
- Exclusion and construction fencing methods.
- Roles and responsibilities.
- What to do when covered fish, wildlife, or plant species are encountered (dead, injured, stressed or entrapped) in work areas.
- Penalties for noncompliance.

A fact sheet or other supporting materials containing this information will be prepared and will be distributed along with a list of contacts (names, numbers, and affiliations) prior to initiating construction activities. A representative will be appointed by the project proponent to be the

primary point of contact for any employee or contractor who might inadvertently take a covered species, or a representative will be identified during the employee education program and the representative's name and telephone number provided to the fish and wildlife agencies.

If new construction personnel are added to the project, the contractor will ensure that the personnel receive the mandatory training and sign a sheet indicating their attendance and completion of the environmental training before starting work. The training sheets for new construction personnel will be provided to the fish and wildlife agencies, if requested.

3.C.2.2 AMM2 Construction Best Management Practices and Monitoring

The Implementation Office will ensure that all construction and operation and maintenance activities in and adjacent to sensitive resources areas (e.g., covered fish, wildlife, and plant species habitats, and natural communities), as identified in the BDCP or subsequent project-level documents, implement BMPs and have construction monitored by a qualified technical specialist(s). Depending on the resource of concern and construction timing, construction activities and areas will be monitored for compliance with water quality regulations (SWPPP monitoring) and with AMMs developed for sensitive biological resources (biological monitoring).

Before implementing an approved project, the Implementation Office will prepare a construction monitoring plan for the protection of covered fish, wildlife, and plant species. The plan will include, but not be limited to the following elements.

- Reference to or inclusion of the SWPPP prepared under the Construction General Permit, where one is needed (AMM3).
- Summaries or copies of planning and preconstruction surveys (if applicable) for natural communities and covered species.
- Description of AMMs to be implemented, including a description of project-specific BMPs or additional measures not otherwise included in the BDCP.
- Descriptions of monitoring parameters (e.g., turbidity), including the specific activities to be monitored (e.g., dredging, grading activities) and monitoring frequency and duration (e.g., once per hour during all in-water construction activities), as well as parameters and reporting criteria (e.g., Turbidity is not to exceed 10 NTU above background. Exceedances will be reported to the fish and wildlife agencies and the construction superintendent must identify and correct the cause.).
- Description of the onsite authority of the monitors to modify construction activity and protocols for notifying the CDFW, NMFS, and USFWS, if needed.
- A daily monitoring log prepared by the construction monitor, which documents the day's construction activities, notes any problems identified and solutions implemented to rectify those problems, and notifications to the construction superintendent and/or the fish and wildlife agencies regarding any exceedances of specific parameters (i.e., turbidity) or observations of covered species. The monitoring log will also document construction start/end times, weather and general site conditions, and any other relevant information.

The following measures will be implemented prior to and during construction activities or other covered activities for the protection of covered fish, wildlife and plant species, their designated

critical habitat, and natural communities. Additional measures may be developed for site-specific conditions or specific covered species during the review and preconstruction planning of individual projects.

- All in-water construction activities will be conducted during the allowable in-water work windows established by USFWS, NMFS, and CDFW for the protection of covered fish species.
- Qualified biologists will monitor construction activities in areas identified during the planning stages and species/habitat surveys as having covered fish, wildlife, and plant species, their designated critical habitat, and other sensitive natural communities. The intent of the biological monitoring is to ensure that specific AMMs that have been integrated into the project design and permit requirements are being implemented correctly during construction and are working appropriately and as intended for the protection of covered species, natural communities, and the environment in general.
- Biological monitors will be professional biologists selected for their knowledge of the covered species and natural communities that may be affected by construction activities. The qualifications of the biologist(s) will be presented to the fish and wildlife agencies for review and written approval prior to initiating construction. The biological monitors will have the authority to temporarily stop work in any area where a covered species has been observed until that individual has passively or physically been moved outside of the work area, or if any AMMs or BMPs are not functioning appropriately for the protection of covered fish, wildlife, or plant species.
- During construction, the nondisturbance buffers described under the covered species' AMMs, below, will be established and maintained as necessary. A qualified biologist will monitor the site consistent with the requirements described for covered species to ensure that buffers are enforced and covered resources are not disturbed.
- Exclusionary fencing will be placed at the edge of active construction activities and staging areas (after having been cleared by biological surveys) to restrict wildlife access from the adjacent habitats. The need for exclusionary fencing will be determined during the preconstruction surveys and construction planning phase and may vary depending on the species and habitats present. The fencing will consist of taut silt fabric, 24 inches high (36 inches high for California red-legged frogs), staked at 10-foot intervals, with the bottom buried 6 inches below grade. Fence stakes will face toward the work area (on the opposite side of adjacent habitat) to prevent wildlife from using stakes to climb over the exclusion fencing. Exclusion fencing will be maintained such that it is intact during rain events. Fencing will be checked by the biological monitor or construction foreman periodically throughout each work day. If fencing becomes damaged, it will be immediately repaired upon detection and the monitoring biologist will stop work in the vicinity of the fencing as needed to ensure that no sensitive wildlife species have entered. Active construction and staging areas will be delineated with high-visibility temporary fencing at least 4 feet in height, flagging, or other barrier to prevent encroachment of construction personnel and equipment outside the defined project footprint. Such fencing will be inspected and maintained daily by the construction foreman until completion of the project. The fencing will be removed from areas only after all construction activities are completed and equipment is removed. No project-related construction activities will occur outside the delineated project construction areas.
- Project-related vehicles will observe a speed limit of 20 miles per hour in construction areas, except on county roads and state and federal highways. A vehicle speed limit of 20 miles per

hour will be posted and enforced on all nonpublic access roads, particularly on rainy nights when California tiger salamanders and California red-legged frogs are most likely to be moving between breeding and upland habitats. Extra caution will be used on cool days when giant garter snakes may be basking on roads.

- All ingress/egress at the project site will be restricted to those routes identified in the project plans and description. Cross-country access routes will be clearly marked in the field with appropriate flagging and signs.
- All vehicle parking will be restricted to established areas, existing roads, or other suitable areas.
- To avoid attracting predators, all food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in enclosed containers and trash will be removed and disposed of at an appropriate facility at least once a week from the construction or project site.
- To avoid injury or death to wildlife, no firearms will be allowed on the project site except for those carried by authorized security personnel or local, state, or federal law enforcement officials.
- To prevent harassment, injury, or mortality of sensitive wildlife by dogs or cats, no canine or feline pets will be permitted in the active construction area.
- To prevent inadvertent entrapment of wildlife during construction, all excavated, steep-walled holes or trenches more than 1 foot deep will be covered at the close of each working day with plywood or similar material, and/or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals. If a covered species is encountered during construction work, to the extent feasible, construction activities should be diverted away from the animal until it can be moved by a USFWS- or CDFW-approved biologist.
- Capture and relocation of trapped or injured wildlife can only be performed by personnel with appropriate USFWS and CDFW handling permits. Any sightings and any incidental take will be reported to CDFW and USFWS via email within 1 working day of the discovery. A follow-up report will be sent to these agencies, including dates, locations, habitat description, and any corrective measures taken to protect covered species encountered. For each covered species encountered, the biologist will submit a completed CNDDB field survey form (or equivalent) to CDFW no more than 90 days after completing the last field visit to the project site.
- .Plastic monofilament netting or similar material will not be used for erosion control, because smaller wildlife may become entangled or trapped in it. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds. This limitation will be communicated to the contractor through specifications or special provisions included in the construction bid solicitation package.
- Covered wildlife can be attracted to den-like structures such as pipes and may enter stored pipes and become trapped or injured. All construction pipes, culverts, or similar structures; construction equipment; or construction debris left overnight in areas that may be occupied by wildlife will be inspected by the biological monitor prior to being used for construction. Such inspections will occur at the beginning of each day's activities, for those materials to be used or moved that day If necessary, and under the direct supervision of the biologist, the structure may be moved up to one time to isolate it from construction activities, until the covered species has

moved from the structure of their own volition, been captured and relocated, or otherwise been removed from the structure.

- Rodenticides and herbicides will be used in accordance with the manufacturer recommended uses and applications and in such a manner as to prevent primary or secondary poisoning of covered fish, wildlife, and plant species and depletion of prey populations upon which they depend. All uses of such compounds will observe label and other restrictions mandated by the U.S. Environmental Protection Agency (EPA), the California Department of Pesticide Regulation, and other appropriate state and federal regulations, as well as additional project-related restrictions imposed by USFWS, NMFS and/or CDFW. If rodent control must be conducted in San Joaquin kit fox habitat, zinc phosphide should be used because of its proven lower risk to kit fox. In addition, the method of rodent control will comply with those discussed in the 4(d) rule published in the final listing rule for tiger salamander (69 *Federal Register* [FR] 47211–47248). The rodent control restrictions described above will be implemented *in perpetuity*.

- Nets or bare hands may be used to capture and handle covered fish or wildlife species. A professional biologist will be responsible for and direct any efforts to capture and handle covered species. Any person who captures and handles covered species will not use soaps, oils, creams, lotions, insect repellents, solvents or other potentially harmful chemicals of any sort on their hands within 2 hours before handling covered fish or wildlife. Latex gloves will not be used either. To avoid transferring diseases or pathogens between aquatic habitats during the course of surveys or the capture and handling of covered fish or wildlife species, all species captured and handled will be released in a safe, aquatic environment as close to the point of capture as possible, and not transported and released to a different water body. When capturing and handing covered amphibians, the biologists will follow the Declining Amphibian Task Force's *Code of Practice* (U.S. Fish and Wildlife Service no date [a]). While in captivity, individual amphibians will be kept in a cool, moist, aerated environment such as a dark (i.e., green or brown) bucket containing a damp sponge. Containers used for holding or transporting these species will be sanitized and will not contain any standing water.

- CDFW, NMFS and/or USFWS will be notified within 1 working day of the discovery of, injury to, or mortality of a covered species that results from project-related construction activities or is observed at the project site. Notification will include the date, time, and location of the incident or of the discovery of an individual covered species that is dead or injured. For a covered species that is injured, general information on the type or extent of injury will be included. The location of the incident will be clearly indicated on a U.S. Geological Survey 7.5-minute quadrangle and/or similar map at a scale that will allow others to find the location in the field, or as requested by CDFW, NMFS and/or USFWS. The biologist is encouraged to include any other pertinent information in the notification.

- Habitat subject to permanent and temporary construction disturbances and other types of ongoing project-related disturbance activities will be minimized by adhering to the following activities. Project designs will limit or cluster permanent project features to the smallest area possible while still permitting achievement of project goals. To minimize temporary disturbances, all project-related vehicle traffic material storage will be restricted to established and/or designated ingress/egress points, construction areas, and other designated staging/storage areas. These areas will also be included in preconstruction surveys and, to the extent possible, will be established in locations disturbed by previous activities to prevent further effects.

- Spoils, RTM, and dredged material will be disposed of at an approved site or facility in accordance with all applicable federal, state, and local regulations.
- Upon completion of the project, all areas subject to temporary ground disturbances, including storage and staging areas, temporary roads, pipeline corridors, will be recontoured to preproject elevations, as appropriate and necessary, and revegetated with native vegetation to promote restoration of the area to pre-project conditions. An area subject to "temporary" disturbance is any area that is disturbed to allow for construction of the project, but is not required for operation or maintenance of any project-related infrastructure, will not be subject to further disturbance after project completion, and has the potential to be revegetated. Appropriate methods and native plant species used to revegetate such areas will be determined on a site-specific basis in consultation with USFWS, NMFS, and/or CDFW, and biologists (AMM10).

3.C.2.3 AMM3 Stormwater Pollution Prevention Plan

The Implementation Office commits to implementing measures, as described below, as part of the construction activities and in advance of any necessary permit(s). In accordance with these environmental commitments, the Implementation Office will ensure the preparation and implementation of SWPPPs to control short-term and long-term effects associated with construction-generated stormwater runoff. It is anticipated that multiple SWPPPs will be prepared for BDCP construction activities, each taking into account site-specific conditions (e.g., proximity to surface water, drainage). The SWPPPs will include all the necessary state requirements regarding construction-generated stormwater collection, detention, treatment, and discharge that will be in place throughout the construction period.

The Implementation Office is required to obtain coverage under the General Permit for Construction and Land Disturbance Activities (Construction General Permit [CGP]) (currently, Order No. 2010-0014-DWQ) issued from the State Water Resources Control Board (SWRCB), for projects that will disturb 1 or more acres of land. The intent of the CGP is to protect receiving waters from pollutants potentially occurring in construction stormwater discharges. The CGP requires the development and implementation of a SWPPP for National Pollutant Discharge Elimination System (NPDES) permit coverage for stormwater discharges. Projects that disturb 1 or more acres of land have the potential to alter stormwater runoff. This includes projects that require excavation, grading, or stockpiling material at project sites, which could result in temporary and/or permanent changes to drainage patterns, paths, and facilities that would, in turn, cause changes in drainage flow rates, directions, and velocities of runoff, or constituents of runoff. For the BDCP, a series of separate but related SWPPPs will be prepared by a Qualified SWPPP Developer (QSD) and will be implemented under the supervision of a Qualified SWPPP Practitioner (QSP).

As part of the procedure to gain coverage under the CGP, the risk level of the site will be determined, based on the probability of a significant risk of causing or contributing to an exceedance of a water quality standard based on the construction activities to be performed, the existing water quality, soil and sediment conditions, without the implementation of additional requirements (per Order No. 2009-0009-DWQ as amended by Order Nos. 2010-0014-DWQ and 2012-2006-DWQ). The risk is calculated separately for sediment and receiving water, with two risk categories for receiving water (low and high) and three risk categories for sediment risk (low, medium, and high). The overall project risk levels (1, 2, or 3) are then determined through a matrix, where Risk Level 1 applies to projects with low receiving water and sediment risks, Risk Level 3 for projects with high receiving

water and sediment risks, and Risk Level 2 for all other combinations of sediment and receiving water risks. These project risk levels determine the level of protection (i.e., BMPs) and monitoring that is required for the project. If the site is Risk Level 2 or 3, water sampling for pH and turbidity will be required and the SWPPP will specify sampling locations and schedule, sample collection and analysis procedures, and recordkeeping and reporting protocols. Other typical requirements for such situations are provided below under Risk Levels 2 and 3.

Changes in runoff characteristics associated with construction activities have the potential to be detrimental to covered fish and wildlife species as well as aquatic habitat and natural communities associated with receiving waters, through changes in ambient water temperature, sediment, and pollutants resulting from stormwater runoff. The objectives of the SWPPP are to identify pollutant sources associated with construction activities and operations that may affect the quality of stormwater and to identify, construct, and implement stormwater pollution prevention measures to reduce pollutants in stormwater discharges during and after construction. The SWPPP will be kept onsite during construction activity and operations and will be made available upon request to representatives of the San Francisco Bay and Central Valley Regional Water Quality Control Boards.

In accordance with the CGP, the SWPPP will describe site topographic, soil, and hydrologic characteristics; construction activities and schedule; construction materials, including sources of imported fill material to be used and other potential sources of pollutants at the construction site; potential nonstormwater discharges (e.g., trench dewatering); erosion and sediment control measures; "housekeeping" BMPs to be implemented; a BMP implementation schedule; a site and BMP inspection schedule; and ongoing personnel training requirements. The SWPPP will also include a hazardous materials management plan, described in AMM32.

These SWPPP provisions are intended to prevent water quality degradation related to pollutant discharge to receiving waters and to prevent or constrain changes to the pH of receiving waters. Performance standards will be met by implementing standard stormwater pollution prevention BMPs, as well as those tailored to specific-site conditions, including determining the risk level of individual construction sites. These environmental commitments mirror the requirements to gain and maintain coverage under the CGP. The Implementation Office will coordinate with the appropriate regional water quality control board to determine the appropriate aggregation of specific construction activities, or groups of activities, to be authorized under the CGP.

It is anticipated that multiple SWPPPs will be prepared for construction activities, with a given SWPPP prepared to cover a specific project component (e.g., intermediate forebay or tidal habitat restoration site) or groups of components (e.g., intakes). The risk level will be identified for each action covered by a specific SWPPP. These SWPPPs will generally follow the EPA (2007) guidelines for such plans and would typically identify the following list of BMPs, which are requirements common to all risk-level sites; however, some detail is provided under the "Inspection and monitoring" bullet, below, on various risk-level requirements.

- Erosion control measures:
    - Implement effective wind erosion BMPs, such as watering, application of soil binders/tackifiers, and covering stockpiles.
    - Provide effective soil cover for inactive areas and all finished slopes and utility backfill areas, such as seeding with a native seed mix, application of hydraulic mulch and bonded fiber matrices, and installation of erosion control blankets and rock slope protection.

- Sediment control measures:
  - Prevent transport of sediment at the construction site perimeter, toe of erodible slopes, soil stockpiles, and into storm drains.
  - Capture sediment via sedimentation and stormwater detention facilities.
  - Reduce runoff velocity on exposed slopes.
  - Reduce offsite sediment tracking.
- Management measures for construction materials:
  - Cover and berm loose stockpiled construction materials.
  - Store chemicals in watertight containers.
  - Minimize exposure of construction materials to stormwater.
  - Designate refueling and equipment inspection/maintenance locations.
  - Control drift and runoff from areas treated with herbicides, pesticides, and other chemicals that may be harmful to aquatic habitats.
- Waste management measures:
  - Prevent offsite disposal or runoff of any rinse or wash waters.
  - Implement concrete and truck washout facilities and appropriately sized storage, treatment, and disposal practices.
  - Ensure the containment of sanitation facilities (e.g., portable toilets).
  - Clean or replace sanitation facilities (as necessary) and inspect regularly for leaks/spills.
  - Cover waste disposal containers during rain events and at end of every day.
  - Protect stockpiled waste material from wind and rain.
- Construction site dewatering and pipeline testing measures:
  - Reclaim site dewatering discharges to the extent practicable, or use for other construction purposes (e.g., dust control).
  - Implement appropriate treatment and disposal of construction site dewatering from excavations to prevent discharges to surface waters.
  - Dechlorinate pipeline testing discharges to surface waters.
- Accidental spill prevention and response measures:
  - Maintain equipment and materials necessary for cleanup of accidental spills onsite.
  - Clean up accidental spills and leaks immediately and dispose of properly.
  - Ensure that trained spill response personnel are available.
- Nonstormwater management measures:
  - Control all nonstormwater discharges during construction.
  - Wash vehicles in such a manner as to prevent nonstormwater discharges to surface waters.

- Clean streets in such a manner as to prevent nonstormwater discharges from reaching surface water.
- Discontinue the application of any erodible landscape material during rain, or within 2 days before a forecasted rain event.

- Inspection and monitoring common to all risk level sites:
  - Ensure that all inspection, maintenance repair, and sampling activities at the construction site are performed or supervised by a QSP representing the discharger.
  - Develop and implement a written site-specific construction site monitoring program.
- Inspection, monitoring, and maintenance activities based on the risk level of the construction site (as defined in the SWRCB General Permit):
  - Risk Level 1 sites:
    - Perform weekly inspections of BMPs, and at least once each 24-hour period during extended storm events.
    - At least 2 business days (48 hours) prior to each qualifying rain event (a rain event producing 0.5 inch or more of precipitation), visually inspect: stormwater drainage areas to identify any spills, leaks, or uncontrolled pollutant sources; all BMPs to identify whether they have been properly implemented in accordance with the SWPP Plan; and stormwater storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.
    - Visually observe stormwater discharges at all discharge locations within 2 business days (48 hours) after each qualifying rain event, identify additional BMPs as necessary, and revise the SWPPP accordingly.
    - Conduct minimum quarterly visual inspections of each drainage area for the presence of (or indications of prior) unauthorized and authorized nonstormwater discharges and their sources.
    - Collect one or more samples of construction site effluent during any breach, malfunction, leakage, or spill observed within the construction site during a visual inspection that could result in the discharge of pollutants to surface waters whether visually detectable or not.
  - Risk Level 2 sites:
    - Perform all of the same visual inspection, monitoring, and maintenance measures specified for Risk Level 1 sites.
    - Perform sampling and analysis of stormwater discharges to characterize discharges associated with construction activity from the entire disturbed area at all discharge points where stormwater is discharged offsite.
    - At a minimum, collect and analyze three samples per day for pH and turbidity of a qualifying rain event. The CGP also requires the discharger to revise the SWPPP and immediately modify existing BMPs and/or implement new BMPs such that subsequent discharges are below the relevant numeric action levels (NALs). It may be a violation of the CGP if the discharger fails to take corrective action to reduce the discharge below the NALs specified by the CGP.

- When an active treatment system is deployed on the site or a portion on the site, collect active treatment system effluent samples and measurements from the discharge pipe or another location representative of the nature of the discharge.

- Risk Level 3 sites:
  - Perform all of the same visual inspection, monitoring, and maintenance measure specified for Risk Level 1 and 2 sites.
  - In the event that a numerical effluent limit (NEL) of the CGP (i.e., pH and turbidity) is violated and has a direct discharge into receiving waters, the discharger will subsequently sample receiving waters for all parameter(s) monitored in the discharge. An exceedance of a NEL is considered a violation of the CGP, and the discharger must electronically submit all storm-event sampling results to the state and regional water boards via Stormwater Multiple Application and Report Tracking System (SMARTS) no later than 5 days after the conclusion of the storm event.
  - If disturbing 30 acres or more of the landscape and discharging directly into receiving waters, conduct a benthic macroinvertebrate bioassessment of receiving waters prior to and after commencement of construction activities to determine if significant degradation to the receiving water's biota has occurred. However, if commencement of construction is outside of an index period (i.e., the period of time during which bioassessment samples must be collected to produce results suitable for assessing the biological integrity of streams and rivers) for the site location, the discharger will participate in the State of California's Surface Water Ambient Monitoring Program (SWAMP).

The SWPPP will also specify the forms and records that must be uploaded to SWRCB online SMARTS, such as quarterly nonstormwater inspection and annual compliance reports.

If the QSP determines the site is Risk Level 2 or 3, water sampling for pH and turbidity will be required, and the SWPPP will specify sampling locations and schedule, sample collection and analysis procedures, and recordkeeping and reporting protocols. In accordance with the CGP NAL requirements, the BDCP contractor's QSD will revise the SWPPP and modify existing BMPs or implement new BMPs when effluent monitoring indicates that daily average runoff pH is outside the range of 6.5 to 8.5 and that the daily average turbidity is greater than 250 nephelometric turbidity units (NTUs). Such BMPs may include those that are more costly to construct and maintain, such as construction of sediment traps and sediment basins, use of Baker tanks, installation of rock slope protection, covering of stockpiles with water-repellant geotextiles, dewatering basins, and use of Active Treatment Systems. The ability of other areas to withstand excessive erosion and sedimentation may be increased by applying additional mulching, bonded fiber matrices, and erosion control blankets; reseeding with a native seed mix; and installing additional fiber rolls, silt fences, and gravel bag berms. The QSD may also specify changes in the manner and frequency of BMP inspection and maintenance activities. The determination of which BMP should be applied in a given situation is very site-specific. QSDs typically refer to the California Stormwater Quality Association's *Stormwater Best Management Practice Handbook Portal: Construction* or the similar Caltrans manual for selecting BMPs for particular site conditions.

Additionally, if a given construction component is Risk Level 3, the Implementation Office will report to the SWRCB when effluent monitoring for that component indicates that daily average runoff pH is outside the range of 6.0 to 9.0 or the daily average turbidity is greater than 500 NTUs. In the event

that the turbidity NEL is exceeded, the Implementation Office may also be required to sample and report pH, turbidity, and suspended sediment concentration of receiving waters to the SWRCB for the duration of construction.

The contractor will also conduct sampling of runoff effluent when a leak, spill, or other discharge of pollutants is detected.

The CGP has specific monitoring and action level requirements for the risk levels, which are summarized in Table 3.C-2.

Table 3.C-2. SWPPP Monitoring and Action Requirements

SWPPP Requirements	Risk Level/Type		
	1	2	3
Minimum stormwater and nonstormwater BMPs	✓	✓	✓
Numeric action levels (NAL) NAL for pH: 6.5–8.5 pH units NAL for turbidity: 250 NTU		✓	✓
Numeric effluent limitations (NEL) NEL for pH: 6–9 pH units NEL for turbidity: 500 NTU			✓
Visual monitoring (weekly; before, during, after rain events; nonstormwater)	✓	✓	✓
runoff monitoring		✓	✓
Receiving water monitoring			✓

Note: The SWRCB has suspended the applicability of NELs for pH and turbidity at Risk Level 3/LUP Type 3 construction sites. In addition, because receiving-water monitoring is required only if the NELs are triggered, all receiving-water monitoring requirements are also suspended. The Level 3/Type 3 NEL are presented here assuming that such NELs will be reinstated when project construction commences.
BMP = best management practice; pH = potential hydrogen; NTU = nephelometric turbidity unit.

The QSD preparing a SWPPP may include in the SWPPP BMPs such as preservation of existing vegetation, perimeter control, seeding, mulching, fiber roll and silt fence barriers, erosion control blankets, protection of stockpiles, watering to control dust entrainment, rock slope protection, tracking control, equipment refueling and maintenance, concrete and solid waste management, and other measures to ensure compliance with the pH and turbidity level requirements defined by the CGP. Partly because the potential adverse effect on receiving waters depends on location of a work area relative to a waterway, the BMPs will be site-specific. For example, BMPs applied to level island-interior sites will be different than BMPs applied to water-side levee conditions. The QSP will be responsible for day-to-day implementation of the SWPPP, including BMP inspections, maintenance, water quality sampling, and reporting to SWRCB. If the water quality sampling results indicate an exceedance of NALs and NELs for pH and turbidity, as described above, the QSD will modify the type and/or location of the BMPs by amending the SWPPP to reduce pH, turbidity, and other contaminants to acceptable levels, consistent with NALs and NELs and with the water quality objectives and beneficial uses set forth in the Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board, Central Valley Region (Central Valley Regional Water Quality Control Board 2007).

3.C.2.4 AMM4 Erosion and Sediment Control Plan

An erosion and sediment control plan is typically required for ground-disturbing projects as part of the NPDES permitting process (U.S. Environmental Protection Agency 2007), depending on the size of the disturbed area. The proposed Phase II EPA rules would cover projects with greater than 1 acre of ground disturbance. The Implementation Office commits to implementing measures as described below as part of the construction activities and in advance of any necessary permit. In accordance with these environmental commitments, the Implementation Office will ensure the preparation and implementation of erosion and sediment control plans to control short-term and long-term erosion and sedimentation effects and to restore soils and vegetation in areas affected by construction activities. It is anticipated that multiple erosion and sediment control plans will be prepared for BDCP construction activities, each taking into account site-specific conditions such as proximity to surface water, erosion potential, drainage, etc. The plans will include all the necessary state requirements regarding erosion control and will implement BMPs for erosion and sediment control that will be in place for the duration of construction activities. These BMPs will be incorporated into the SWPPP (see Section 3.C.1.2.1, *Conduct Planning-Level Surveys*).

Erosion control measures will include the following.

- Install physical erosion control stabilization BMPs (hydroseeding with native seed mix, mulch, silt fencing, fiber rolls, sand bags, and erosion control blankets) to capture sediment and control both wind and water erosion. Erosion control may not utilize plastic monofilament netting or similar materials.
- Maintain emergency erosion control supplies onsite at all times during construction and direct contractor(s) to use these emergency stockpiles as needed. Ensure that supplies used from the emergency stockpiles are replaced within 48 hours. Remove materials used in construction of erosion control measures from the work site when no longer needed (property of the contractor).
- Design grading to be compatible with adjacent areas and result in minimal disturbance of the terrain and natural land features and minimize erosion in disturbed areas to the extent practicable.
- Divert runoff away from steep, denuded slopes, or other critical areas with barriers, berms, ditches, or other facilities.
- Retain native trees and vegetation to the extent feasible to stabilize hillsides, retain moisture, and reduce erosion.
- Limit construction, clearing of native vegetation, and disturbance of soils to areas of proven stability.
- Implement construction management and scheduling measures to avoid exposure to rainfall events, runoff, or flooding at construction sites to the extent feasible.
- Conduct frequent site inspections (before and after significant storm events) to ensure that control measures are intact and working properly and to correct problems as needed.
- Install drainage control features (e.g., berms and swales, slope drains) as necessary to avoid and minimize erosion.

- Install wind erosion control features (e.g., application of hydraulic mulch or bonded fiber matrix).

Sediment control measures will include the following.

- Use sediment ponds, silt traps, wattles, straw bale barriers, or similar measures to retain sediment transported by onsite runoff.
- Collect and direct surface runoff at nonerosive velocities to the common drainage courses.
- When ground-disturbing activities are required adjacent to surface water, wetlands, or aquatic habitat, the use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces.
- Prevent mud from being tracked onto public roadways by installing gravel on primary construction ingress/egress points, and/or truck tire washing.
- Deposit or store excavated materials away from drainage courses and cover if left in place for more than 5 days or storm events are forecast within 48 hours.

After construction is complete, site-specific restoration efforts will include grading, erosion control, and revegetation. Self-sustaining, local native plants that require little or no maintenance and do not create an extreme fire hazard will be used. All disturbed areas will be recontoured to preproject contours, as feasible, and seeded with a native seed mix. Consideration will also be given to additional replacement of or upgrades to drainage facilities to avoid and minimize erosion. Paved areas damaged from use over and above ordinary wear-and-tear from lawful use by construction activities will be repaved to avoid erosion due to pavement damage.

3.C.2.5 AMM5 Spill Prevention, Containment, and Countermeasure Plan

As required by local, state, or federal regulations, the Implementation Office will develop a SPCC plan for each project. Each SPCC plan will comply with the regulatory requirements of the Spill Prevention, Control, and Countermeasure Rule (40 Code of Federal Regulations [CFR] 112) under the Oil Pollution Act of 1990. This rule regulates nontransportation-related onshore and offshore facilities that could reasonably be expected to discharge oil into navigable waters of the United States or adjoining shorelines. The rule requires the preparation and implementation of site-specific SPCC plans to prevent and respond to oil discharges that could affect navigable waters. Each SPCC plan will address actions used to prevent spills in addition to specifying actions that will be taken should any spills occur, including emergency notification procedures. The SPCC plans will include the following measures and practices.

- Discharge prevention measures will include procedures for routine handling of products (e.g., loading, unloading, and facility transfers) (*40 CFR 112.7(a)(3)(i)*).
- Discharge or drainage controls will be implemented such as secondary containment around containers and other structures, equipment, and procedures for the control of a discharge (*40 CFR 112.7(a)(3)(ii)*).
- Countermeasures will be implemented for discharge discovery, response, and cleanup (both the facility's capability and those that might be required of a contractor) (*40 CFR 112.7(a)(3)(iii)*).

- Methods of disposal of recovered materials will comply with applicable legal requirements (*40 CFR 112.7(a)(3)(iv)*).
- Personnel will be trained in emergency response and spill containment techniques, and will also be made aware of the pollution control laws, rules, and regulations applicable to their work.
- Petroleum products will be stored in nonleaking containers at impervious storage sites from which an accidental spill cannot escape.
- Absorbent pads, pillows, socks, booms, and other spill containment materials will be stored and maintained at the hazardous materials storage sites for use in the event of an accidental spill.
- Contaminated absorbent pads, pillows, socks, booms, and other spill containment materials will be placed in nonleaking sealed containers until transported to an appropriate disposal facility.
- When transferring oil or other hazardous materials from trucks to storage containers, absorbent pads, pillows, socks, booms, or other spill containment material will be placed under the transfer area.
- Refueling of construction equipment will occur only in designated areas that will be a minimum of 150 feet from surface waters and other sensitive habitats, such as wetlands.
- Equipment used in direct contact with water will be inspected daily for oil, grease, and other petroleum products. All equipment will be cleaned of external petroleum products prior to beginning work, where contact with water may occur, to prevent the release of such products to surface waters.
- Oil-absorbent booms will be used when equipment is used in or immediately adjacent to waters.
- All reserve fuel supplies will be stored only within the confines of a designated staging area, to be located a minimum of 150 feet from surface waters and other sensitive habitats, such as wetlands.
- Fuel transfers will take place a minimum of 150 feet from surface waters and other sensitive habitats, such as wetlands, and absorbent pads will be placed under the fuel transfer operation.
- Staging areas will be designed to contain contaminants such as oil, grease, fuel, and other petroleum products so that should an accidental spill occur they do not drain toward receiving waters or storm drain inlets.
- All stationary equipment will be staged in appropriate staging areas and positioned over drip pans.
- In the event of an accidental spill, personnel will identify and secure the source of the discharge and contain the discharge with sorbents, sandbags, or other material from spill kits and will contact appropriate regulatory authorities (e.g., National Response Center will be contacted if the spill threatens navigable waters of the United States or adjoining shorelines, as well as other appropriate response personnel).

Methods of cleanup may include the following.

- Physical methods for the cleanup of dry chemicals include the use of brooms, shovels, sweepers, or plows.
- Mechanical methods could include the use of vacuum cleaning systems and pumps.

- Chemical methods include the use of appropriate chemical agents such as sorbents, gels, and foams.

3.C.2.6 AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material

In the course of constructing project features, substantial quantities of material are likely to be removed from their existing locations based upon their properties or the need for excavation of particular features. Spoils refer to excavated native soils and are associated with construction of pumping plant facilities and other water conveyance features. RTM refers to the mixture of saturated soils and biodegradable soil conditioners or additives that will be generated by tunneling operations and are appropriate for reuse based upon chemical characterization and physical properties. Dredged material refers to sediment removed from the bottom of a body of water for the purposes of in-water construction or water conveyance or storage requirements. The quantities of these materials generated by construction of BDCP features will vary based on various factors, such as location, topography and structure being constructed. These materials will require handling, storage, and disposal, as well as chemical characterization, prior to any reuse. Temporary storage areas will be designated for these materials. To potentially support implementation of other elements of the BDCP, the Implementation Office will develop site-specific plans for the beneficial reuse of these materials, to the extent practicable.

3.C.2.6.1 Temporary Storage Area Determination

Spoils, RTM, and dredged material will be temporarily or permanently stored in designated storage areas. Selection of designated storage areas will be based upon, but not limited to, the following criteria.

- Material may be placed in project designated borrow areas.
- Areas for temporary storage will be located within 10 miles of the construction feature.
- Areas for temporary storage will not be located within 100 feet of existing residential or commercial buildings.
- Areas for temporary storage will not be located within 100 feet of a military facility.
- Areas for temporary storage will not be located within 100 feet of existing roads, rail lines, or infrastructure.
- To the extent practicable, material will not be temporarily stored in the following habitat types: wetlands and surface waters, grasslands, and riparian areas. If it is necessary to temporarily store materials in any of the habitat types listed above, the appropriate covered species AMMs will be followed for that habitat type.
- Placement of material potentially affecting western burrowing owl burrows will be avoided to the extent practicable (see AMM23 for description of burrow avoidance).
- Placement of material in greater sandhill crane foraging habitat will be minimized as described in AMM20.
- Placement of material in greater sandhill crane roost sites will be avoided as described in AMM20.

- Storage sites on Staten Island will be sized and located in coordination with USFWS, CDFW, and greater sandhill crane experts to minimize direct and indirect effects on greater sandhill crane.
- Placement of material in vernal pool complex or alkali seasonal wetland complex will be avoided to the extent practicable. If avoidance of these complexes is not practicable, the wetted vernal pool or alkali seasonal wetland acres will be avoided by at least 250 feet).
- Landowner concerns and preferences will be considered in designating sites for temporary storage.
- Where practicable, dredged material will be disposed of on higher elevation land that is set back from surface water bodies a minimum of 150 feet. Upland disposal will help ensure that the material will not be in contact with surface water prior to its draining, characterization, and potential treatment.

3.C.2.6.2 Temporary Storage Site Preparation

A portion of the temporary storage sites selected for storage of spoils, RTM, and dredged material will be set aside for topsoil storage. The topsoil will be saved for reapplication to disturbed areas postconstruction. Vegetative material from work site clearing will be chipped, stockpiled, and spread over the topsoil after earthwork is completed, when practicable and appropriate to do so and where such material does not contain seeds of undesirable nonnative species (i.e., nonnative species that are highly invasive and threaten the ecological function of the natural community to be restored in that location). Cleared areas will be grubbed as necessary to prepare them for grading or other construction activities. Rocks and other inorganic grubbed materials will be used to backfill borrow areas. The contractor will remove from the work site all debris, rubbish, and other materials not directed to be salvaged, and will dispose of them in an approved disposal site after obtaining all permits required.

3.C.2.6.3 Draining, Chemical Characterization, and Treatment

RTM and associated decant liquid will undergo chemical characterization by the contractor(s) prior to reuse or discharge, respectively, to determine whether it will meet NPDES and the Central Valley Regional Water Quality Control Board requirements. Should RTM decant liquid constituents exceed discharge limits, these tunneling byproducts will be treated to comply with NPDES permit requirements. Discharges from RTM draining operations will be conducted in such a way as to not cause erosion at the discharge point. If RTM liquid requires chemical treatment, chemical treatment will ensure that RTM liquid will be nontoxic to native organisms.

While additives used to facilitate tunneling will be nontoxic and biodegradable, it is possible that some quantity of RTM will be deemed unsuitable for reuse. In such instances, which are anticipated to occur in less than 1% each of excavated spoils, RTM, and dredged material, the material will be disposed of at a site for which disposal of such material is approved.

Hazardous materials excavated during construction will be segregated from other construction spoils and properly handled in accordance with applicable federal, state, and local regulations. Riverine or in-Delta sediment dredging and dredge material disposal activities may involve potential contaminant discharges not addressed through typical NPDES or SWRCB CGP processes. Construction of dredge material disposal sites will likely be subject to the SWRCB General Permit (Order No. 2009-0009-DWQ). The following list of BMPs will be implemented during handling and disposal of any potentially hazardous dredged material.

- The Implementation Office will ensure the preparation and implementation of a pre-dredge sampling and analysis plan (SAP). The SAP will be developed and submitted by the contractors as part of the water plan required per standard California Department of Water Resources (DWR) contract specifications (Section 01570). Prior to initiating any dredging activity, the SAP will evaluate the presence of contaminants that may affect water quality from the following discharge routes.
    - Instream discharges during dredging.
    - Direct exposure to contaminants in the material through ingestion, inhalation, or dermal exposure.
    - Effluent (return flow) discharge from an upland disposal site.
    - Leachate from upland dredge material disposal that may affect groundwater or surface water.
- Conduct dredging within the allowable in-water work windows established by USFWS, NMFS, and CDFW.
- Conduct dredging activities in a manner that will not cause turbidity in the receiving water, as measured in surface waters 300 feet down-current from the construction site, to exceed the Basin Plan objectives beyond an approved averaging period by the Central Valley Regional Water Quality Control Board and CDFW. Existing threshold limits in the Basin Plan for turbidity generation are as follows.
    - Where natural turbidity is between 0 and 5 NTUs, increases will not exceed 1 NTU.
    - Where natural turbidity is between 5 and 50 NTUs, increases will not exceed 20%.
    - Where natural turbidity is between 50 and 100 NTUs, increases will not exceed 10 NTUs.
    - Where natural turbidity is greater than 100 NTUs, increases will not exceed 10%.
- If turbidity generated during dredging exceeds implementation requirements for compliance with the Basin Plan objectives, silt curtains will be used to control turbidity. Exceptions to turbidity limits set forth in the Basin Plan may be allowed for dredging operations; in this case, an allowable zone of dilution within which turbidity exceeds the limits will be defined and prescribed in a discharge permit.
- The dredge material disposal sites will be designed to contain all of the dredged material and all systems and equipment associated with necessary return flows from the dredge material disposal site to the receiving water will be operated to maximize treatment of return water and optimize the quality of the discharge.
- The dredged material disposal sites will be designed by a registered professional engineer.
- The dredged material disposal sites will be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.
- Two feet of freeboard above the 100-year flood event elevation will be maintained in all dredge material disposal site settling ponds at all times when they may be subject to washout from a 100-year flood event.
- Dredging equipment will be kept out of riparian areas and dredged material will be disposed of outside of riparian corridors.

Temporary storage sites will be constructed using appropriate BMPs such as erosion and sediment control measures (*AMM4 Erosion and Sediment Control Plan* and *AMM3 Stormwater Pollution Prevention Plan*) to prevent discharges of contaminated stormwater to surface waters or groundwater.

Once the excavation spoils, RTM, or dredged material have been suitably dewatered, and as the constituents of the material will allow, it will be placed in either a lined or unlined storage area, suitable for long-term storage. These long-term storage areas may be the same areas in which the material was previously dewatered or it may be a new area adjacent to the dewatering site. The storage areas will be created by excavating and stockpiling the native topsoil for future reuse. Once the area has been suitably excavated, and if a lined storage area is required, an impervious liner will be placed on the invert of the material storage area and along the interior slopes of the berms surrounding the pond. Due to the expected high groundwater tables, it is anticipated that there will be minimal excavation for construction of the long-term material storage areas. Additional features of the long-term material storage areas will include berms and erosion protection measures to contain storm runoff as necessary and provisions to allow for truck traffic during construction.

3.C.2.6.4 Material Reuse Plans

Prior to construction, draining, and chemical characterization of excavation spoils, RTM, and dredged material, the Implementation Office will identify sites for reusing such materials to the extent practicable, in connection with BDCP construction activities and habitat restoration and protection activities, as well as potential beneficial uses associated with flood protection and management of groundwater levels within the Plan Area. The Implementation Office will undertake a thorough investigation to identify sites for the appropriate reuse of material, and, based upon the properties of the material and in consultation with other interested parties, the Implementation Office will identify the specific site for that material. Potential methods of reuse may include, but not be limited to, the following.

- Fill material for construction of embankments or building pads.
- Fill material for levee maintenance.
- Fill material for habitat restoration projects.
- Fill material for roadway projects.
- Fill material for localized subsidence reversal.
- Material for flood response.
- Material to fill BDCP-related borrow areas.
- Other beneficial means of reuse.

Material applied to reduce the localized effects of subsidence will be placed on lower elevation lands and lands adjacent to levees to minimize effects on agricultural practices and improve levee stability. The material may be left in place and used as stockpile to assist in flood response; however, to the extent feasible, the material will be relocated and the storage site restored to its former condition in areas where such restoration is desirable for the conservation of covered species, such as locations supporting greater sandhill crane foraging habitat. The feasibility of these approaches to reuse will depend on the suitability of the material for each purpose based on testing of relevant properties. Site-specific factors such as local demand for materials and the ability to transport the

materials will also be important considerations in assessing options for reuse. To the extent that the reuse of the materials for these purposes may lead to adverse environmental effects, such effects will be addressed through site-specific environmental documents prepared under the National Environmental Policy Act and California Environmental Quality Act. These could include environmental documents for proposed habitat restoration projects for which the materials can be used.

Where the Implementation Office determines that it is appropriate that materials be used to prepare land at elevations suitable for BDCP-related restoration or protection projects, it will coordinate in developing site-specific plans for transporting and applying the materials to work sites.

Following removal of excavation spoils, RTM, and dredged material from temporary disposal sites, stockpiled topsoil at these areas will be reapplied, and disturbed areas will be returned, to the extent practicable, to preconstruction conditions, as specified in AMM10. The areas will be carefully graded to reestablish preconstruction surface conditions and elevations and features will be reconstructed (e.g., irrigation and drainage facilities). Restoration of the RTM draining sites will be designed to prevent surface erosion and subsequent siltation of adjacent water bodies. Following these activities, the land will be suitable for returning to agricultural production, under the discretion of the landowner. Such areas may also be appropriate for the implementation of habitat restoration or protection in consideration of the biological goals and objectives.

In some instances, it may not be practicable to transport and reuse spoil, RTM, or dredged materials due to factors such as the distances and costs involved and/or any environmental effects associated with transport (e.g., unacceptable traffic concerns or levels of diesel emissions). In such instances, sites will be evaluated for the potential to reapply topsoil over the spoils, RTM, or dredged material and to continue or recommence agricultural activities. If, in consultation with landowners and any other interested parties, the Implementation Office determines that continued use of the land for agricultural or habitat purposes will not be practicable, the potential for other productive uses of the land will be examined, including stockpile and staging areas for flood response or hosting solar or wind power generation facilities. Such instances may require the acquisition of interest in the land and/or coordination with utilities or other entities; specific arrangements will be made on a case-by-case basis.

3.C.2.7 AMM7 Barge Operations Plan

For each project that requires the use of a barge, the Implementation Office will develop a barge operations plan as required by local, state, or federal regulation. Each plan will be developed and submitted by the construction contractors per standard DWR contract specifications as part of the traffic plans required by those specifications (Section 01570 of standard DWR construction contracts). The barge operations plan will be part of a comprehensive traffic control plan coordinated with the U.S. Coast Guard for large channels. The comprehensive traffic control plan will address traffic routes and machines used to deliver materials to and from the barges. The barge operations plan will address the following.

- Bottom scour from propeller wash.
- Bank erosion or loss of submerged or emergent vegetation from propeller wash and/or excessive wake.
- Accidental material spillage.

- Sediment and benthic community disturbance from accidental or intentional barge grounding or deployment of barge spuds (extendable shafts for temporarily maintaining barge position) or anchors.
- Hazardous materials spills (e.g., fuel, oil, hydraulic fluids).

The barge operations plan will serve as a guide to barge operations and to a biological monitor who will evaluate barge operations on a daily basis during construction with respect to stated performance measures. This plan, when approved by the DWR and other resource agencies, will be read by barge operators and kept aboard all vessels operating at the BDCP construction sites and barge landings.

3.C.2.7.1 Sensitive Resources

The barge operations plan is intended to protect aquatic species and habitat in the vicinity of barge operations. The plan will be developed to avoid barge-related effects on aquatic species; if and when avoidance is not possible, the plan will include provisions to minimize effects on aquatic species as described in Section 3.C.2.7.3, *Avoidance Measures*, Section 3.C.2.7.4, *Environmental Training*, and Section 3.C.2.7.5, *Dock Approach and Departure Protocol*. The sensitive resources potentially affected by barge maneuvering and anchoring in affected areas are listed below.

- Sediments that could cause turbidity or changes in bathymetry, if disturbed.
- Bottom-dwelling (benthic) invertebrates that provide the prey base for a number of aquatic species.
- Riparian vegetation that provides shade, cover, habitat structure, and organic nutrients to the aquatic environment.
- Submerged aquatic vegetation that provides habitat structure and primary (plant) production.

3.C.2.7.2 Responsibilities

Construction contractors operating barges in the process of constructing the water conveyance facilities will be responsible for the following.

- Operate vessels safely and following the barge operations plan and other reasonable measures to prevent adverse effects on aquatic resources of the Delta.
- Read, understand, and follow the barge operations plan.
- Report to the project biological monitor any vessel grounding or other deviations from the barge operations plan that could have resulted in the disturbance of bottom sediments, damage to river banks, or loss of submerged, emergent, or riparian vegetation.
- Immediately report material fuel or oil spills to the CDFW Office of Spill Prevention and Response, the project biological monitor, and DWR.
- Follow all other relevant plans, including the hazardous materials management plan, SWPPP, and SPCC plan.

The biological monitor will be responsible for the following.

- Observe a sample of barge operation activities including loading and unloading at least one barge at each of the barge loading and unloading facilities.

- Provide same-day reports to DWR on any observed problems with barge operations.
- Provide annual reports to DWR, summarizing monitoring observations over the course of each construction year, including an evaluation of the plan performance measures. The annual report will also include a description of and representative photographs and/or videos of conditions of river banks and vegetation.
- Visit each intake and barge landing site to determine the extent of emergent and riparian vegetation, bank conditions, and general site conditions during the growing season prior to initiation of construction and then annually during and after construction. Monitor construction including observation of barge landing, loading, or unloading; departure of one or more barges at each active barge landing site and the condition of both river banks at each landing site; pile-driving; and other in-water construction activity as directed by DWR. The condition of river banks and vegetation will be photographed and verbally described in an annual monitoring report.

3.C.2.7.3 Avoidance Measures

The following avoidance measures are being implemented to ensure that the goal of avoiding impacts on aquatic resources from tugboat and barge operations will be achieved: training of tug boat operators, limiting vessel speed to minimize the effects of wake impinging on unarmored or vegetated banks and the potential for vessel wake to strand small fish, limiting the direction and/or velocity of propeller wash to prevent bottom scour and loss of aquatic vegetation, and prevention of spillage of materials and fluids from vessels.

If deviations from these procedures are required to maintain the safety of vessels and crew, the biological monitor will be informed of the circumstances and any apparent impacts on water quality, habitats, fish, or wildlife. Any such impacts will be brought to the attention of the applicable fish and wildlife agency to ascertain and implement appropriate remedial measures.

3.C.2.7.4 Environmental Training

All pilots operating at the barge landings and intake construction sites will be required to read and follow this plan and to keep a copy aboard and accessible while working at these sites. All pilots responsible for operating a vessel at either the intake or barge landing sites will read this plan and sign an affidavit as provided in the plan.

3.C.2.7.5 Dock Approach and Departure Protocol

The Implementation Office will develop and implement a protocol for dock approach and departure to ensure the following.

- Vessel operators will obey all federal and state navigation regulations that apply to the Delta.
- All vessels will approach and depart from the intake and barge landing sites at dead slow in order to reduce vessel wake and propeller wash at the sites frequented by tug and barge traffic.
- To minimize bottom disturbance, anchors and barge spuds will be used to secure vessels only when it is not possible to tie up.
- Barge anchoring will be preplanned. Anchors will be lowered into place and not be allowed to drag across the channel bed.

- Vessel operators will limit vessel speed as necessary to maintain wake of less than 2 feet (66 centimeters) at shore.
- Vessel operators will avoid pushing stationary vessels up against the cofferdam, dock, or other structures for extended periods, because this could result in excessive directed propeller wash impinging on a single location. Barges will be tied up whenever possible to avoid the necessity of maintaining stationary position by tugboat or by the use of barge spuds.
- Barges will not be anchored where they will ground during low tides.
- All vessels will obey U.S. Coast Guard regulations related to the prevention, notification, and cleanup of hazardous materials spills.
- All vessels will keep an oil spill containment kit and spill prevention and response plan onboard.
- In the event of a fuel spill, CDFW Office of Spills Prevention and Response will be contacted immediately at 800-852-7550 or 800-OILS-911 (800-645-7911) to report the spill.
- When transporting loose materials (e.g., sand, aggregate), barges will use deck walls or other features to prevent loose materials from blowing or washing off of the deck.

3.C.2.7.6 Performance Measures

Performance will be assessed based on the results of the biological monitoring reports. The assessment will evaluate observations for the following indicators of impacts.

- **Emergent vegetation loss.** The extent and dominant species of emergent vegetation will be determined and mapped by a global positioning system (GPS) unit at and cross-channel of each of the intake and barge landing sites during the growing seasons prior to, during, and after construction. Extent will be mapped as linear coverage along the landing and opposite banks. In the event that the linear extent of emergent vegetation is found to have decreased by 20% or more following construction (or as otherwise conditioned by applicable CDFW streambed alteration agreements), the position and nature of the change will be evaluated for the probability that the loss was due to barge grounding, propeller wash, or other effects related to barge operations. Adequate performance will be achieved if the linear extent of riparian and emergent vegetation following construction is at least 80% of the preconstruction extent (or as otherwise conditioned by applicable CDFW streambed alteration agreements).
- **Bank erosion and riparian vegetation loss.** The linear extent of bank erosion will be mapped by GPS at each of the intake and barge landing sites prior to, during, and after construction. Photos and written descriptions will be recorded for each area of eroded bank to describe the extent of the erosion. In the event that the linear extent of eroded bank is found to have increased by 20% or more following construction, the position and nature of the change will be evaluated for the probability (low, moderate, or high) that the erosion was due to barge grounding, propeller wash, or other effects related to barge operations, and preconstruction and postconstruction photographs will be compared to determine if riparian vegetation was also lost as a result of the erosion.
- **Cargo containment.** The biological monitor will note the use of deck walls or other appropriate containment during loading and unloading of sand, aggregate, or other materials from a barge at each landing site. Adequate performance will be achieved, if appropriate measures are in use during each observed loading and unloading. In the unlikely event that an accidental spill occurs in spite of appropriate containment, the barge crew will describe the type, amount, and location

of the spill to the biological monitor. The biological monitor will make observations at the site of the material spill and evaluate the potential impacts of the spill on biological resources for evaluation of whether mitigation is required and for inclusion in the annual monitoring report. Any such impacts will be brought to the attention of the applicable fish and wildlife agency to ascertain and implement appropriate remedial measures.

- **Fuels spill prevention.** Vessels operating in accordance with the SPCC plan and all applicable federal, state, and local safety and environmental laws and policies governing commercial vessel and barge operations will be considered to be performing adequately with regard to fuel spill prevention.
- **Barge grounding.** Barges are not to be grounded or anchored where falling tides are reasonably expected to cause grounding during a low tide. Barge grounding has the potential to disturb bottom sediments and benthic organisms, as well as creating a temporary obstacle to fish passage. Performance will be considered adequate, if no cases of vessel grounding occur.

3.C.2.7.7 Contingency Measures

In the event that the performance measures are not met, DWR will coordinate with NMFS, USFWS, CDFW, and Central Valley Regional Water Quality Control Board to determine appropriate rectification or compensation for impacts on aquatic resources.

3.C.2.8 AMM8 Fish Rescue and Salvage Plan

Fish rescue operations will occur at any in-water construction site where dewatering and resulting isolation of fish may occur (e.g., when dewatering creates isolated pools within the stream channel). Fish rescue and salvage plans will be developed by the Implementation Office and will include detailed procedures for fish rescue and salvage to minimize the number of Chinook salmon, steelhead, green sturgeon, and other fish stranded during placement and removal of cofferdams at the intake construction sites. The plans will identify the appropriate procedures for removing fish from the construction zone and preventing fish from reentering the construction zone during construction or prior to dewatering.

Prior to any in-water construction activities that could result in entrapping fish, a fish rescue and salvage plan will be implemented. The following draft plan includes detailed procedures for fish rescue and salvage to minimize the number of covered fish stranded during construction activities. The construction activity with the most potential to entrap fish is the construction of the in-water cofferdams at the intake sites. Although the following discussion focuses primarily on the application of this plan to cofferdam construction, the general procedures would apply to any in-water activity with the potential to entrap fish. The plan will be submitted to the fish and wildlife agencies for their review and acceptance and revised accordingly. An authorization letter from CDFW will be required before in-water construction activities that could result in needing to rescue or salvage trapped fish can occur.

Construction activities in the river channels will typically include placement of cofferdams to isolate construction areas from the stream channel and minimize adverse effects on fish and other aquatic species from subsequent construction activities. However, these species can become trapped within the cofferdam and need to be rescued or salvaged prior to cofferdam dewatering. Fish that become trapped in isolated pockets of water may be killed during dewatering of the construction area or other construction activities. Therefore, fish rescue operations will occur at any in-water

construction site, particularly where dewatering and resulting isolation of fish may occur (e.g., when dewatering creates isolated pools within the stream channel). All fish rescue and salvage operations will be conducted under the guidance of a qualified fish biologist and in accordance with required permits. These activities will occur during approved in-water construction work windows (typically between June 1 and October 31).

The plan will identify the appropriate procedures for excluding fish from the construction zones, and procedures for removing fish, should they become trapped. The primary procedure will be to block off the construction area and use seines (nets) and/or dip nets to collect and remove fish, although electrofishing techniques may also be permitted. In the case of cofferdam construction, the cofferdam would be installed to block off the construction area, before fish removal activities occur. For other in-water construction activities, block nets or other temporary exclusion methods (i.e., sandbag dike) could be used to isolate the construction area prior to the fish removal process.

The appropriate fish collection method will be determined by a qualified fish biologist, in consultation with the designated fish and wildlife agency biologist, and based on site-specific conditions prior to dewatering the cofferdam. Contact information provided by NMFS will be supplied to the biologist onsite. Prior to construction site dewatering, fish will be captured and relocated to avoid direct mortality and to minimize take. Capture, release, and relocation measures will be consistent with the general guidelines and procedures those set forth in Chapter 9 of the most recent edition of the *California Salmonid Stream Habitat Restoration Manual* (currently, California Department of Fish and Game 2010) to minimize impacts on aquatic habitat and species. Collection methods may include use of seines (nets) and/or dip nets to collect and remove fish; electrofishing techniques may also be permitted.

All fish rescue and salvage operations will be conducted under the guidance of a qualified fish biologist. These activities will occur during approved in-water construction work windows.

The following description includes detailed fish collection, holding, handling, and release procedures of the plan. Unless otherwise required by project permits, the construction contractor will provide the following.

- A minimum 7-day notice to the appropriate fish and wildlife agencies, prior to an anticipated activity that could result in isolating fish, such as installation of a cofferdam.
- A minimum 48-hour notice to the appropriate fish and wildlife agencies of dewatering activities that are expected to require fish rescue.
- Unrestricted access for the appropriate fish and wildlife agency personnel to the construction site for the duration of implementation of the fish rescue plan.
- Temporary cessation of dewatering if fish rescue workers determine that water levels may drop too quickly to allow successful rescue of fish.
- A work site that is accessible and safe for fish rescue workers.

3.C.2.8.1 Qualifications of Fish Rescue Team

The fish rescue team will include at least one person with a 4-year college degree in fisheries or biology, or a related degree. This person also must have at least 2 years of professional experience in fisheries field surveys and fish capture and handling procedures. The person will have completed an electrofishing training course such as Principles and Techniques of Electrofishing (USFWS, National

Conservation Training Center), or similar course, if electrofishing is used. In order to avoid and minimize the risk of injury to fish, attempts to seine and/or net fish will always precede the use of electrofishing equipment.

3.C.2.8.2 Seining and Dipnetting

Fish rescue and salvage operations should begin prior to completing the cofferdam, to herd fish from the area before installing the last sections of the cofferdam. If the water depth is less than 3 feet deep, fish would be herded out of the cofferdam enclosure by dragging a seine (net) through the enclosure, starting from the opposite end and continuing to the cofferdam opening. Depending on conditions, this process may need to be conducted several times. After completing this fish herding process, the net would be positioned at the cofferdam opening to prevent fish from reentering the enclosure while the final section of the cofferdam is installed. The net mesh will be no greater than 0.0125 inch, with the bottom edge of the net (lead line) securely weighted down to prevent fish from entering the area by moving under the net. Exclusion screening will be placed in areas of low water velocity to minimize impingement of fish on nets or screens. Screens will be checked periodically and cleaned of debris to permit free flow of water.

After installing the last sections of the cofferdam, the fish will be removed using seines, dip nets, electroshocking techniques, or a combination of these. The appropriate collection method will be determined by the fish biologist, in consultation with the designated fish and wildlife agency biologist, and based on site-specific conditions prior to dewatering the cofferdam. However, if the water depth within the cofferdam is too deep (greater than 2.5 feet) to effectively remove fish using these methods, dewatering activities may be used to reduce the water level to an appropriate and safe depth (see *Contingency Plans* below). Dewatering activities will also conform to the guidelines specified below (see *Dewatering* below). At the end of each net sweep through the enclosure, the fish rescue team will do the following.

- Carefully bring the ends of the net together and pull in the wings, ensuring the lead line is kept as close to the substrate as possible.
- Slowly turn the seine bag inside out to reveal captured fish, ensuring fish remain in the water as long as possible before transfer to an aerated container.
- Carefully remove each fish, record data (as described in *Electrofishing* below), and relocate fish to a predetermined release site.
- Process dead fish (as described in *Electrofishing* below).

Dipnetting is best suited for very small, shallow pools in which fish are concentrated and easily collected. Dip nets will be made of soft (nonabrasive) nylon material and small mesh size (0.125-inch) to collect small fish.

3.C.2.8.3 Electrofishing

After conducting the herding and netting operations described above, electrofishing may be necessary to remove as many fish as possible from the enclosure. Electrofishing will be conducted in accordance with NMFS (2000) electrofishing guidelines and other appropriate fish and wildlife agency guidelines. Electrofishing will be conducted by one or two 3- to 4-person teams, with each team having an electrofishing unit operator and two or three netters. At least three passes will be made through electrofished areas in an attempt to remove as many fish as possible. Fish initially will

be placed in 5-gallon buckets filled with river water. Following completion of each pass, the electrofishing team will do the following.

- Transfer fish into 5-gallon buckets filled with clean, cold river water, supplied with an aerator to maintain an adequate dissolved oxygen concentration.
- Maintain a healthy environment for captured fish, including low densities in holding containers to avoid effects of overcrowding.
- Use water-to-water transfers whenever possible.
- Cease capture operations if fish are abundant and release fish at predetermined locations.
- Segregate larger fish from smaller fish to minimize the risk of predation and physical damage to smaller fish from larger fish.
- Hold fish in 5-gallon buckets equipped with a lid and an aerator, and add fresh river water or small amounts of ice to the fish buckets if the water temperature in the buckets becomes more than 2°F warmer than ambient river waters.
- Limit holding time to about 10 minutes, if possible.
- Avoid handling fish during processing unless absolutely necessary and with wet hands or dip nets if handling is needed.
- Handle fish with hands that are free of potentially harmful products, including but not limited to sunscreen, lotion, and insect repellent.
- Avoid anesthetizing or measuring fish.
- Note the date, time, and location of collection; species; number of fish; approximate age (e.g., young-of-the-year, yearling, adult); fish condition (dead, visibly injured, healthy); and water temperature.
- If positive identification of fish cannot be made without handling the fish, note this and release fish without handling.
- In notes, indicate the level of accuracy of visual estimates to allow appropriate reporting to the appropriate fish and wildlife agencies (e.g., “Approx. 10–20 young-of-the-year steelhead”).
- Release fish in appropriate habitat either upstream or downstream of the enclosure, noting release date, time, and location.
- Stop efforts and immediately contact the appropriate fish and wildlife agencies, if mortality during relocation or the limits on take (harm or harassment) of federally listed species exceeds 5%.
- Place dead fish in sealed plastic bags with labels indicating species, location, date, and time of collection, and store them on ice.
- Freeze collected dead fish as soon as possible and provide the frozen specimens to the appropriate fish and wildlife agencies, as specified in the permits.

Sites selected for release of rescued fish either upstream or downstream of the construction area will be similar in temperature to the area from which fish were rescued, contain ample habitat, and have a low likelihood of fish reentering the construction area or being impinged on exclusion nets/screens.

3.C.2.8.4 Dewatering

After completing the fish rescue operations described above, dewatering the enclosure can begin. A dewatering plan will be submitted as part of the SWPPP/Water Pollution Control Program detailing the location of dewatering activities, equipment, and discharge point. Dewatering pump intakes will be screened to prevent entrainment of fish not removed through the rescue process. Screens will meet NMFS screening criteria for salmonid fry (National Marine Fisheries Service 1997), including the following.

- Perforated plate: screen openings shall not exceed 3/32 inch (2.38 mm), measured in diameter.
- Profile bar: screen openings shall not exceed 0.0689 inch (1.75 mm) in width.
- Woven wire: screen openings shall not exceed 3/32 inch (2.38 mm), measured diagonally (e.g., 6–14 mesh).
- Screen material shall provide a minimum of 27% open area.

During the dewatering process, a qualified biologist or fish rescue team will remain onsite to observe the process and remove additional fish using the rescue procedures described above.

3.C.2.8.5 Contingency Plans

In some cases, it may not be possible to conduct fish rescue because of inaccessibility for electrofishing or seining to be conducted effectively or where safety of field crews is compromised. In these situations, it may be necessary to begin the dewatering process. During the dewatering process, a qualified biologist or fish rescue team will be onsite with the aim of ensuring that an undue number of fish are not trapped in isolated areas or impinged on pump screen(s) or isolation nets, based on the professional judgment of the onsite fish biologist and the terms and conditions of the incidental take permit. In the event that the proposed methods are found to be insufficient to avoid the loss of an undue number of fish, the qualified biologist will revise the methods to minimize further losses and to offset those losses beyond the acceptable number.

If fish rescue cannot be attempted (e.g., because of safety), a visual survey from the bank will be undertaken to document fish presence and the likely extent of effects. Binoculars will be used to identify fish; however, this method may not be feasible, if water clarity is low.

3.C.2.8.6 Final Inspections and Reporting

Upon dewatering of areas to water depths at which neither electrofishing nor seining can effectively occur (e.g., less than 3 inches [0.1 meter]), the fish rescue team will inspect the areas to locate any remaining fish. Collection by dip net, data recording, and relocation will be performed as necessary according to the procedures outlined under *Electrofishing* above. The fish rescue team will notify the contractor when the fish rescue has been completed and that construction can recommence. The results of the fish rescue and salvage operations (including date, time, location, comments, method of capture, fish species, number of fish, approximate age, condition, release location, and release time) will be reported to the appropriate fish and wildlife agencies, as specified in the pertinent permits.

3.C.2.9 AMM9 Underwater Sound Control and Abatement Plan

The Implementation Office will develop and implement an underwater sound control and abatement plan outlining specific measures that will be implemented to avoid and minimize the effects of underwater construction noise on covered fish species, particularly the underwater noise effects associated with impact pile driving activities. Potential underwater noise effects on covered fish species from impact pile driving will be avoided and minimized by regulating the period during which impact pile driving is permitted and by controlling and/or abating underwater noise generated during impact pile driving.

The plan will be provided to the appropriate fish and wildlife agencies for their review and approval prior to implementation of any in-water impact pile driving activities. The plan will evaluate the potential effects of underwater noise on covered fish species in the context of applicable and interim underwater noise thresholds established for disturbance and injury of fish (National Marine Fisheries Service 2007). The thresholds include the following.

- Injury threshold for fish of all sizes includes a peak sound pressure level of 206 decibels (dB) relative to 1 micropascal.
- Injury threshold for fish less than 2 grams is 183 dB cumulative sound exposure level, and 187 dB cumulative sound exposure level for fish greater than or equal to 2 grams.
- Disturbance threshold for fish of all sizes is 150 dB root mean square relative to 1 micropascal.

The specific number of pilings that will be driven per day with an impact pile driver, and thus the number of pile strikes per day, will be defined as part of the design of project elements that require pilings. Coordination with the fish and wildlife agencies will occur as the number of strikes per day is better defined during design and the effects analysis for specific pile driving actions is updated/revised.

Most of the impact pile driving activities will occur at the north Delta intake sites, for either the installation of cofferdams to isolate subsequent intake construction activities from the water, or inside the work area isolated by the cofferdams. Additional impact pile driving will also occur at the barge landing sites to support the landing facilities. The sound control and abatement plan will restrict in-water work to the approved in-water work window for the Sacramento River (currently, June 1 through October 31), or an extended in-water work window that may be negotiated with and agreed to by the fish and wildlife agencies. An extension to the approved in-water work window may be agreed to by the fish and wildlife agencies under certain conditions, such as, but not limited to instances where cofferdam placement will allow work within the dewatered work area isolated by the cofferdam to continue beyond the typical in-water work window without affecting covered fish species or instances where underwater noise can be abated to a level that is acceptable to NMFS, USFWS and CDFW for the protection of covered fish species.

The underwater noise generated by impact pile driving will be abated using the best available and practicable technologies. Examples of such technologies include, but are not limited to, the use of vibratory rather than impact pile driving equipment or only proofing piles with an impact pile driver, use of pile caps (i.e., wood or mircata), bubble curtains, air-filled fabric barriers, and isolation piles that act as protective sleeves or discrete, piling specific cofferdams. Specific techniques to be used will be selected based on site-specific conditions. The effects will be evaluated prior to the initiation of pile driving activities and will be subject to review and approval by the fish and wildlife

agencies, with regard to the measures that will be used to best mitigate the underwater noise effects on covered fish species.

In addition to the primary use of vibratory-pile-driving methods and establishing protocols for attenuating underwater noise levels produced during in-water construction activities, the Implementation Office will develop operational protocols when impact pile driving is necessary, to further minimize potential underwater noise impacts. These operational protocols will be used to minimize the effects of impact pile driving on covered fish species. These protocols may include, but not be limited to, the following: monitoring the in-water work area for fish that may be showing signs of distress or injury as a result of pile driving activities and stopping work when distressed or injured fish are observed; initiating impact pile driving with a "soft-start," such that pile strikes are initiated at reduced impact and increase to full impact over several strikes to provide fish an opportunity to move out of the area; restricting impact pile driving activities to specific times of the day and for a specific duration to be determined through coordination with NMFS, USFWS and CDFW; and when more than one pile driving rig is employed, ensure pile driving activities are initiated in a way that provides an escape route and avoids "trapping" fish between pile driving and underwater noise levels that could potentially cause injury. These protocols are expected to avoid and minimize the overall extent, intensity, and duration of potential underwater noise effects associated with impact pile driving activities.

3.C.2.10 AMM10 Restoration of Temporarily Affected Natural Communities

Prior to initiating covered activities that will result in temporary effects on natural communities in the Plan Area, a restoration and monitoring plan will be developed. Restoration and monitoring plans will be prepared by the Implementation Office and kept on file for review by any of the fish and wildlife agencies at their request. A list of restoration and monitoring plans for temporary construction impacts will be provided to the fish and wildlife agencies as part of the BDCP annual report.

Restoration and monitoring plans will include methods for stockpiling and storing topsoil, restoring soil conditions, and revegetating disturbed areas; monitoring and maintenance schedules; adaptive management strategies; reporting requirements; and success criteria. Restoration will commence immediately after construction is completed, or if construction is completed during a season that is inappropriate for planting the natural community, restoration will commence during the appropriate season for restoring that natural community (e.g., fall plantings for riparian natural community) and within 1 year of completing construction.

With the exception of some borrow sites, temporarily disturbed areas will be restored to the natural community present prior to disturbance. Cultivated lands that are used for borrow sites and cannot be restored to cultivated lands following disturbance, because of topographic alteration, may be restored as grasslands.

The natural communities that are restored in temporarily disturbed areas can count toward the protection requirements in the conservation strategy only if they meet the siting and design criteria and other requirements described in the appropriate conservation measure, contribute to the BDCP biological goals and objectives, and are protected under permanent conservation easement or fee-title and managed *in perpetuity*. Natural communities that are restored in temporarily disturbed areas can count towards BDCP restoration requirements only if the site was disturbed prior to

construction and the restoration of the natural community meets the BDCP definition of restoration, based on the change from baseline site conditions prior to construction.

3.C.2.11 AMM11 Covered Plant Species

A complete botanical survey of project sites will be completed using *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (California Department of Fish and Game 2009). The surveys will be floristic in nature and conducted in a manner that maximizes the likelihood of locating special-status plant species or special-status natural communities that may be present (i.e., during the appropriate season and at an appropriate level of ground coverage).

Special-status plant surveys required for project-specific permit compliance will be conducted during the planning phase to allow design of the individual restoration projects to avoid adverse modification of habitat for specified covered plants. The purpose of these surveys will be to verify that the locations of special-status plants identified in previous record searches or surveys are extant, identify any new special-status plant occurrences, and cover any portions of the project area not previously identified. The extent of mitigation of direct loss of or indirect effects on special-status plants will be based on these survey results. Locations of special-status plants in proposed construction areas will be recorded using a GPS unit and flagged.

The following measures will be implemented.

- Design restoration projects to avoid the direct, temporary loss of occupied habitat from construction activities for delta button celery, slough thistle, and Suisun thistle. If delta button celery or slough thistle occurs in a floodplain restoration area, restoration projects may be designed to include occupied habitat in the restored floodplain provided ground disturbance is avoided in the occupied habitat and the restoration is designed such that the anticipated level of flooding and scouring is compatible with the life-history needs of the covered plant species. In tidal restoration areas, Suisun thistle occurrences may experience the indirect effect of tidal damping. This effect will be monitored and adaptively managed to ensure the occurrence is protected from loss.

- Avoid modeled habitat for vernal pool plants to the maximum extent practicable. Where practicable, no ground-disturbing activities or alterations to hydrology will occur within 250 feet of vernal pools. As identified in AMM12, the Implementation Office will ensure that there will be no adverse modification of critical habitat for vernal pool plants. No more than 10 wetted acres of vernal pools will be removed as a result of covered activities throughout the permit term.

- If an occurrence has more than 10 individuals, no more than 5% of the total number of individuals in the occurrence will be removed. If an occurrence has 10 or fewer individuals, all individuals may be removed. Loss of individuals for all occurrences will be offset through replacement of occupied habitat at a ratio of at least 1:1, to achieve no net loss of occupied habitat. These requirements do not pertain to Suisun thistle, slough thistle, and delta button celery, for which no individuals may be removed (see above). These requirements also do not apply to the historical occurrence of Heckard's peppergrass in Hass Slough (CNDDB Element Occurrence number 7); take of this occurrence by tidal restoration (CM4), while not expected, is allowed (Chapter 5, *Effects Analysis*, Table 5.6-19).

- To minimize the spread of nonnative, invasive plant species from restoration sites, the Implementation Office will retain a qualified botanist or weed scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas to be cleared contain invasive plants, then chipped vegetation material from those areas will not be used for erosion control; in these cases the material will be disposed of to minimize the spread of invasive plant propagules (e.g., burning, composting).
- To minimize the introduction of invasive plant species, construction vehicles and construction machinery will be cleaned prior to entering construction sites that are in or adjacent to natural communities other than cultivated lands, and prior to entering any BDCP restoration sites or conservation lands other than cultivated lands. Vehicles working in or travelling off paved roads through areas with infestations of invasive plant species will be cleaned before travelling to other parts of the Plan Area. Cleaning stations will be established at the perimeter of covered activities along construction routes as well as at the entrance to reserve system lands. Biological monitoring will include locating and mapping locations of invasive plant species within the construction areas during the construction phase and the restoration phase. Infestations of invasive plant species will be targeted for control or eradication as part of the restoration and revegetation of temporarily disturbed construction areas.

  This avoidance and minimization measure does not apply to the routine management, maintenance, and educational activities of the Implementation Office and its partners in the reserve system. The Implementation Office will determine during implementation the most effective and cost-efficient means to minimize the unintentional spread of invasive plants through vehicle travel.

During the planning phase, the Implementation Office will ensure that covered activities in designated critical habitat areas for Suisun thistle or soft bird's-beak (Figure 3.C-6 and Figure 3.C-7), if any, will not result in the adverse modification of any of the primary constituent elements for Suisun thistle or soft bird's-beak critical habitat. The CDFW Suisun Marsh Unit tracks both of these species (GIS-mapped) in Suisun. No covered activities will take place within designated Suisun thistle or soft bird's-beak critical habitat areas without prior written concurrence from USFWS that such activities will not adversely modify any primary constituent elements of Suisun thistle or soft bird's-beak critical habitat.

Primary constituent elements for Suisun thistle are defined as follows.

- Persistent emergent, intertidal, estuarine wetland at or above the mean high water mark as extended directly across any intersecting channels).
- Open channels that periodically contain moving water with ocean-derived salts in excess of 0.5%.
- Gaps in surrounding vegetation to allow for seed germination and growth.

Primary constituent elements for soft bird's-beak are defined as follows.

- Persistent emergent, intertidal, estuarine wetland at or above the mean high water mark (as extended directly across any intersecting channels).
- Rarity or absence of plants that naturally die in late spring (winter annuals).
- Partially open spring canopy cover (i.e., photosynthetic photo flux density of approximately 790 nMol/m2/s) at ground level, with many small openings to facilitate seedling germination.

Also see AMM37 for measures to avoid and minimize recreation-related effects on the following species: brittlescale, Carquinez goldenbush, delta button celery, heartscale, San Joaquin spearscale, and all vernal pool plant species.

3.C.2.12 AMM12 Vernal Pool Crustaceans

Vernal pool crustacean critical habitat is present in the Plan Area in Conservation Zones 1, 8, and 11. During the planning phase for individual projects, the Implementation Office will ensure that tidal natural communities restoration or other ground-disturbing covered activities in Conservation Zones 1 and 11 will not result in the adverse modification of primary constituent elements of critical habitat for vernal pool fairy shrimp, conservancy fairy shrimp, and vernal pool tadpole shrimp as defined by USFWS (*70 FR 46924–46998*; also see Figures 3.C-1, 3.C-2, and 3.C-3). These activities will occur at least 250 feet from vernal pool crustacean critical habitat containing the primary constituent elements defined below or some lesser distance, if it is determined through project review with concurrence from USFWS that the activities will not result in changes in hydrology or soil salinity that could adversely modify the primary constituent elements of vernal pool crustacean critical habitat. No covered activities will take place within designated vernal pool crustacean critical habitat units without prior written concurrence from USFWS that such activities will not adversely modify any primary constituent elements of vernal pool crustacean critical habitat. Also see AMM37 for measures to avoid and minimize recreation-related effects on these species.

Primary constituent elements for vernal pool fairy shrimp are defined as follows (*70 FR 46924–46998*).

- Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described below, providing for dispersal and promoting hydroperiods of adequate length in the pools.
- Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 18 days, in all but the driest years, thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.
- Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding.
- Structure within the pools described above, consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

Primary constituent elements for vernal pool tadpole shrimp are the same as above except the minimum period of inundation listed in the second bullet is 41 days instead of 18 days. Primary constituent elements for conservancy fairy shrimp are also the same as above except the minimum period of inundation listed in the second bullet is 19 days instead of 18 days.

During the planning phase, site-level assessments will be conducted and projects will be designed to avoid modeled habitat for vernal pool crustaceans to the maximum extent practicable. Where practicable, the project will be planned and designed to ensure no ground-disturbing activities or alterations to hydrology will occur within 250 feet of vernal pool crustacean habitat. As identified above, the Implementation Office will ensure that there will be no adverse modification of critical habitat for vernal pool crustaceans.

If covered activities are to occur in core recovery areas, protocol-level surveys for vernal pool crustaceans will be conducted to determine whether listed branchiopods are present. Surveys will be conducted according to the most recent USFWS guidelines by qualified biologists with the appropriate recovery permit under Section 10(a)(1)(A) of the Endangered Species Act. If conservancy or longhorn fairy shrimps are detected in core recovery areas, projects will be redesigned to ensure that no suitable habitat within these areas is adversely affected, due to the rarity of these species.

Projects will be designed to avoid direct and indirect effects on vernal pool crustacean habitat to the extent possible. No more than 10 wetted acres of vernal pool crustacean habitat will be removed throughout the permit term (this cap applies to both temporary and permanent loss). No more than 20 wetted acres will be indirectly affected by covered activities (a vernal pool is considered indirectly affected if activities that could cause hydrologic or other alternations to a pool occur within 250 feet of the vernal pool). Where construction occurs within 250 feet of vernal pool crustacean habitat, construction BMPs (AMM2) will be implemented to ensure that construction activities minimize effects on the habitat. Protective fencing will be installed around vernal pool crustacean habitat with signage identifying these areas as containing sensitive biological resources. A biological monitor will ensure that fencing and BMPs are maintained for the duration of construction and that construction personnel are provided the necessary worker awareness training (AMM1).

3.C.2.13 AMM13 California Tiger Salamander

Designated critical habitat for California tiger salamander is present in Critical Habitat Unit 2 in the Plan Area along the western edge of Conservation Zone 1. Critical Habitat Unit 2 extends along the west side of State Route 113 from the short east-west portion of State Route 113 south of Hay Road on the north to Creed Road on the south (Figure 3.C-4). During the planning phase for individual restoration projects, the Implementation Office will ensure that tidal natural communities restoration along Lindsey Slough and other covered activities near Jepson Prairie will not result in the adverse modification of critical habitat for California tiger salamander in this area. (The only construction activities that will affect California tiger salamander critical habitat are those related to restoration projects; construction of the water conveyance facilities will not affect this species.) These activities, if planned for areas within designated critical habitat areas, will be designed to avoid adverse modification of the primary constituent elements for the species as defined by USFWS (*70 FR 49379–49458*). Also see AMM37 for measures to avoid and minimize recreation-related effects on this species.

Tidal restoration and other covered activities will occur at least 250 feet from California tiger salamander critical habitat containing the primary constituent elements defined below. A lesser distance is allowed if it is determined through project review and concurrence by USFWS that tidal restoration actions will not result in changes in hydrology or soil salinity that could adversely modify the primary constituent elements of California tiger salamander critical habitat. No covered

activities will take place within designated California tiger salamander critical habitat areas without prior written concurrence from USFWS that such activities will not adversely modify any primary constituent elements of California tiger salamander critical habitat. Primary constituent elements for California tiger salamander are defined as follows (*70 FR 49379–49458*).

- Standing bodies of fresh water, including natural and human-made (e.g., stock) ponds, vernal pools, and other ephemeral or permanent water bodies that typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall.
- Upland habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground habitat that California tiger salamander depend upon for food, shelter, and protection from the elements and predation.
- Accessible upland dispersal habitat between occupied locations that allow for movement between such sites.

During the planning phase, aquatic habitats in potential work areas will be surveyed (nonprotocol) for California tiger salamander larvae and eggs. If California tiger salamander larvae or eggs are found, the project will be designed to avoid and minimize impacts on the aquatic habitat and these life stages. If the aquatic habitat cannot be avoided, USFWS and CDFW will be contacted and, if determined to be appropriate, measures will be developed to relocate larvae or eggs to the nearest suitable aquatic habitat, as determined by the USFWS- and CDFW-approved biologist.

AMMs for California tiger salamanders will only be required for projects occurring within suitable habitat as identified from the habitat modeling and by additional assessments conducted during the planning phase of construction or restoration projects. A qualified biologist familiar with the species and its habitat will conduct a field evaluation of suitable upland or aquatic habitat for California tiger salamander for all covered activities that occur within modeled habitat. Because California tiger salamanders are assumed to only occupy limited to areas of suitable habitat in the Plan Area, USFWS protocol-level surveys to determine presence are not necessary.

If the project does not fully avoid effects on suitable habitat, the following measures will be implemented.

- To the extent feasible, construction activities within 1.3 miles of California tiger salamander aquatic habitat will be restricted to the dry season, July 15 through October 15 (the period can be extended depending on the onset or cessation of rains), to avoid the period when they are most likely to be moving through upland areas. If construction activities must occur within suitable tiger salamander habitat during the wet season, such construction will avoid all suitable aquatic habitat. No construction activities will be conducted in upland habitat areas where tiger salamanders may occur if there is a greater than 70% chance of rain based on the National Oceanic and Atmospheric Administration's National Weather Service forecast or within 48 hours following a rain event greater than 0.25 inch, unless approved by the monitor.
- A USFWS- and CDFW-approved biologist will determine where exclusion fencing will be installed to protect California tiger salamander habitat adjacent to the defined project footprint and to minimize the potential for California tiger salamanders to enter the construction work area. The perimeter of construction sites will be fenced with amphibian exclusion fencing by October 15. The California tiger salamander exclusion fencing will be shown on the final construction plans. Where construction access is necessary, gates will be installed with the exclusion fence.

- Pipes or similar structures will be capped if stored overnight. Excavated holes and trenches will have escape ramps, and any open holes and trenches will be closed with plywood at the end of each work day. The biological monitor and construction foreman will be responsible for checking the exclusion fencing around the work areas daily to ensure that they are intact and upright. This will be especially critical during rain events, when flowing water can easily dislodge the fencing. Any necessary repairs will be immediately addressed. The amphibian exclusion fencing will remain in place for the duration of construction.
- If the fence is compromised during the rainy season, when California tiger salamanders are likely to be active, a survey will be conducted immediately preceding construction activity that occurs in designated tiger salamander habitat or in advance of any activity that may result in take of the species. The biologist will search along exclusion fences and in pipes and beneath vehicles each morning before they are moved. The survey will include a careful inspection of all potential hiding spots, such as along exclusion fencing, large downed woody debris, the perimeter of ponds, wetlands, and riparian areas. Any tiger salamanders found will be captured and relocated to suitable habitat a minimum of 300 feet outside of the work area that has been identified by a qualified biologist and approved by the wildlife agencies prior to commencement of construction.
- Surface-disturbing activities will be designed to minimize or eliminate effects on rodent burrows that may provide suitable aestivation habitat. Areas with a high concentration of burrows will be avoided by surface-disturbing activities to the maximum extent practicable. In addition, when a concentration of burrows is present in a project site, the area will be staked or flagged to ensure that work crews are aware of their location and to facilitate avoidance of the area.

Preconstruction surveys will be implemented after the project planning phase and prior to any ground-disturbing activity.

- No more than 1 week prior to any ground disturbance that could affect potential California tiger salamander habitat, preconstruction surveys for California tiger salamander will be conducted by a USFWS- and CDFW-approved biologist. These surveys will consist of walking surveys of the project limits. The USFWS-approved biologists will investigate potential California tiger salamander cover sites and aquatic habitats, if present. All mammal burrows within the project limits that cannot be avoided will be hand-excavated and collapsed.
- Any California tiger salamander adult found will be captured and immediately relocated to suitable habitat a minimum of 300 feet outside of the work area and predetermined prior to commencement of construction. Prior to and after handling salamanders, the biologist will observe the appropriate decontamination procedures to prevent the spread of chytrid fungus or other pathogens.

3.C.2.14 AMM14 California Red-Legged Frog

Designated critical habitat for the California red-legged frog overlaps with portions of Conservation Zones 8 and 11 (Figure 3.C-5). During the planning phase, the Implementation Office will ensure that covered activities avoid designated critical habitat areas, or if such habitat cannot be avoided, the covered activities will not result in the adverse modification of the primary constituent elements of critical habitat for California red-legged frog. No covered activities will take place within designated California red-legged frog critical habitat areas without prior written concurrence from USFWS that

such activities will not adversely modify any primary constituent elements of California red-legged frog critical habitat. Also see AMM37 for measures to avoid and minimize recreation-related effects on this species.

Primary constituent elements for California red-legged frog are defined as follows (*75 FR 12816–12959*).

- **Aquatic breeding habitat.** Standing bodies of fresh water (with salinities less than 4.5 parts per thousand), including natural and human-made (e.g., stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.
- **Aquatic nonbreeding habitat.** Freshwater pond and stream habitat, as described above, that may not hold water long enough for the species to complete its aquatic life cycle but which provide for shelter, foraging, predator avoidance, and aquatic dispersal of juvenile and adult California red-legged frogs. Other wetland habitats considered to meet these criteria include, but are not limited to, plunge pools within intermittent creeks, seeps, quiet water refugia within streams during high water flows, and springs of sufficient flow to withstand short-term dry periods.
- **Upland habitat.** Upland areas adjacent to or surrounding breeding and nonbreeding aquatic and riparian habitat up to a distance of 1 mile in most cases (i.e., depending on surrounding landscape and dispersal barriers) including various vegetation types such as grassland, woodland, forest, wetland, or riparian areas that provide shelter, forage, and predator avoidance for the California red-legged frog. Upland features are also essential in that they are needed to maintain the hydrologic, geographic, topographic, ecological, and edaphic features that support and surround the aquatic, wetland, or riparian habitat. These upland features contribute to filling of aquatic, wetland, or riparian habitats; maintaining suitable periods of pool inundation for larval frogs and their food sources; and providing nonbreeding, feeding, and sheltering habitat for juvenile and adult frogs (e.g., shelter, shade, moisture, cooler temperatures, a prey base, foraging opportunities, and areas for predator avoidance). Upland habitat should include structural features such as boulders, rocks, and organic debris (e.g., downed trees, logs, small mammal burrows, or moist leaf litter).
- **Dispersal habitat.** Accessible upland or riparian habitat within and between occupied or previously occupied sites that are located within 1 mile of each other, and that support movement between such sites (i.e., uplands that provide habitat connectivity between two or more aquatic habitat areas). Dispersal habitat includes various natural habitats, and altered habitats such as agricultural fields, that do not contain barriers (e.g., heavily traveled roads without bridges or culverts) to dispersal. Dispersal habitat does not include moderate- to high-density urban or industrial developments with large expanses of asphalt or concrete, nor does it include large lakes or reservoirs over 50 acres in size, or other areas that do not contain those features identified in the other primary constituent elements described above as essential to the conservation of the species.

During the planning phase, appropriate buffer distances will be established around aquatic habitat to minimize direct and indirect effects on California red-legged frog. If aquatic habitat cannot be avoided, aquatic habitats in potential work areas will be surveyed (nonprotocol) for tadpoles and egg masses. If California red-legged frog tadpoles or egg masses are found, and the aquatic habitat cannot be avoided, USFWS and CDFW will be contacted, and if determined to be appropriate,

measures will be developed to relocate tadpoles and eggs to the nearest suitable aquatic habitat, as determined by the USFWS- and CDFW-approved biologist

AMMs for California red-legged frogs will only be required for projects occurring within suitable habitat as identified from the habitat modeling and by additional assessments conducted during the planning phase of construction or restoration projects. A qualified biologist will conduct a field evaluation of suitable upland or aquatic habitat for California red-legged frogs for all covered activities that occur within modeled habitat. Surveys within modeled upland habitat will involve identifying suitable aquatic features that may not have been identified during the habitat modeling because the mapping unit was too small. Because California red-legged frogs are assumed to only occupy suitable habitat in the Plan Area, USFWS protocol-level surveys to determine presence are not necessary.

If the project does not fully avoid effects on suitable habitat, the following measures will be required.

- To the extent practicable, initial ground-disturbing activities will not be conducted between November 1 and March 31 in areas identified during the planning stages as providing potential California red-legged frog habitat to avoid the period when they are most likely to be moving through upland areas. When ground-disturbing activities must take place between November 1 and March 31, USFWS-approved biological monitor will conduct daily monitoring for California red-legged frog.
- Disturbance to suitable aquatic and upland sites within or near the project footprint will be avoided to the extent feasible, and the loss of aquatic habitat and grassland vegetation will be minimized through adjustments in project design, as practicable.
- A USFWS-approved biologist will determine where exclusion fencing will be installed to protect California red-legged frog habitat adjacent to the defined project footprint and to minimize the potential for California red-legged frogs to enter the construction work area. The perimeter of construction sites will be fenced with amphibian exclusion fencing by November 1. The California red-legged frog exclusion fencing will be shown on the final construction plans. Where construction access is necessary, gates will be installed with the exclusion fence.
- The biological monitor and construction foreman will be responsible for checking the exclusion fencing around the work areas daily to ensure that they are intact and upright. This will be especially critical during rain events, when flowing water can easily dislodge the fencing. Any necessary repairs will be immediately addressed. The amphibian exclusion fencing will remain in place for the duration of construction.
- If the exclusion fence is found to be compromised at any time, a survey will be conducted immediately preceding construction activity that occurs in designated California red-legged frog habitat or in advance of any activity that may result in take of the species. The biologist will search along exclusion fences and in pipes and beneath vehicles before they are moved. The survey will include a careful inspection of all potential hiding spots, such as along exclusion fencing, large downed woody debris, the perimeter of ponds, wetlands, and riparian areas. Any California red-legged frogs found will be captured and relocated to suitable habitat a minimum of 300 feet outside of the work area that has been identified by a qualified biologist and approved by the wildlife agencies prior to commencement of construction.
- Surface-disturbing activities will be designed to minimize or eliminate effects on rodent burrows that may provide suitable cover habitat for California red-legged frog. Areas with a high concentration of burrows will be avoided by surface-disturbing activities to the maximum

extent practicable. In addition, when a concentration of burrows is present in a project site, the area will be staked or flagged to ensure that work crews are aware of their location and to facilitate avoidance of the area.

Preconstruction surveys will be implemented after the project planning phase and prior to any ground-disturbing activity.

- No more than 1 week prior to any ground disturbance that could affect potential California red-legged frog habitat, preconstruction surveys for California red-legged frog will be conducted by a USFWS- and CDFW-approved biologist. These surveys will consist of walking the project limits. The USFWS-approved biologists will investigate potential California red-legged frog cover sites and aquatic habitats, if present. All mammal burrows that cannot be avoided will be hand-excavated and collapsed.
- Aquatic habitats in work areas will be surveyed (nonprotocol) for California red-legged frog adults and metamorphs. Any California red-legged frog adults or metamorphs found will be captured and held for a minimum amount of time necessary to relocate the animal to suitable habitat a minimum of 300 feet outside of the work area. Prior to and after handling frogs, the biologist will observe the appropriate decontamination procedures to ensure against spread of chytrid fungus or other pathogens.
- If construction activities will occur in streams, temporary aquatic barriers such as hardware cloth will be installed both up and downstream of the stream crossing, and animals will be relocated and excluded from the work area. The qualified USFWS-approved biologists will establish an adequate buffer on both sides of creeks and around potential aquatic habitat and will restrict entry during the construction period.

3.C.2.15 AMM15 Valley Elderberry Longhorn Beetle

During the planning phase, surveys for elderberry shrubs will be conducted in the Plan Area by a qualified biologist familiar with the appearance of valley elderberry longhorn beetle exit holes in elderberry shrubs. Elderberry shrubs will be avoided to the maximum extent practicable. Complete avoidance (i.e., no adverse effects) may be assumed when a buffer of at least a 100 feet is established and maintained around elderberry plants containing stems measuring 1 inch or greater in diameter at ground level.

Elderberry shrubs identified within project footprints that cannot be avoided will be transplanted to previously approved conservation areas in the Plan Area. Transplanting and associated compensation will follow the guidance outlined in USFWS's *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (U.S. Fish and Wildlife Service 1999). These guidelines also identify ratios of elderberry seedlings and associated native vegetation to plant in conservation areas depending on shrub stem counts and sizes, and landscape position (riparian or savannah).

For shrubs not directly affected by construction but that occur within 100 feet of ground-disturbing activities, the following measures will be implemented.

- Fence and flag all areas to be avoided during construction activities. In areas where encroachment on the 100-foot buffer has been approved by USFWS, provide a minimum setback of at least 20 feet from the dripline of each elderberry plant.
- Brief contractors on the need to avoid damaging the elderberry plants and the possible penalties for not complying with these requirements.

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

3.C.2.16 AMM16 Giant Garter Snake

AMMs for giant garter snakes will only be required for projects and operations and maintenance activities occurring within suitable habitat as identified from the habitat modeling and by additional assessments conducted during the planning phase of construction or restoration projects. A qualified biologist familiar with the species' habitat requirements will conduct a field evaluation of suitable upland or aquatic habitat for giant garter snake for all covered activities that occur within modeled habitat. The biologist will identify any aquatic features within modeled habitat that may have been missed during the modeling effort.

If the project or operation and maintenance activity does not fully avoid effects on suitable habitat, the following measures will be required.

- Disturbance to suitable aquatic and upland sites in or near the project footprint will be avoided to the extent feasible, and the loss of aquatic habitat and grassland vegetation will be minimized through adjustments to project design, as practicable.
- To the extent practicable, construction activities will be avoided within 200 feet of the banks of giant garter snake aquatic habitat, particularly in areas with a moderate to high likelihood of giant garter snake occurrence. Ground disturbance will be confined to the minimal area necessary to facilitate construction activities. Giant garter snake habitat will be clearly designated with construction fencing and signage identifying these areas as sensitive.
- A USFWS-approved biologist will determine where exclusion fencing will be installed to protect giant garter snake habitat adjacent to the defined project footprint and to minimize the potential for giant garter snakes to enter the construction work area. The perimeter of construction sites will be fenced with giant garter snake exclusion fencing between May 1 and September 1 (well in advance of snakes seeking overwintering refugia). The giant garter snake exclusion fencing will be shown on the final construction plans. Where construction access is necessary, gates will be installed with the exclusion fence.
- The biological monitor and construction foreman will be responsible for checking the exclusion fencing around the work areas daily to ensure that they are intact and upright. This will be especially critical during rain events, when flowing water can easily dislodge the fencing. Any necessary repairs will be immediately addressed. The giant garter snake exclusion fencing will remain in place for the duration of construction
- If exclusion fencing is found to be compromised, a survey will be conducted immediately preceding construction activity that occurs in designated giant garter snake habitat or in advance of any activity that may result in take of the species. The biologist will search along exclusion fences and in pipes and beneath vehicles before they are moved. Any giant garter snake found will be captured and relocated to suitable habitat a minimum of 200 feet outside of

the work area in a location that is identified by a qualified biologist and approved by USFWS and CDFW prior to commencement of construction.

- Preconstruction surveys will be implemented after the project planning phase and prior to any ground-disturbing activity.

3.C.2.17 AMM17 Western Pond Turtle

AMMs for western pond turtle will only be required for projects occurring within or adjacent to suitable habitat as identified from the habitat modeling and by additional assessments conducted during the project planning phase. A qualified biologist will conduct a field evaluation of suitable upland or aquatic habitat for western pond turtles for all covered activities that occur within modeled habitat. See also AMM8 for measures related to dewatering aquatic areas.

If the project does not fully avoid effects on suitable habitat, the following measures will be required.

- The project proponent will retain a qualified wildlife biologist to conduct a preconstruction survey within 48 hours of disturbance in aquatic and riparian habitats to determine presence or absence of pond turtles in the construction work area.
- If possible, the surveys will be timed to coincide with the time of day and year when turtles are most likely to be basking and visible (during the cooler part of the day, 8:00 a.m. to 12:00 p.m. during spring, summer, and late summer). Prior to conducting presence/absence surveys the biologist will locate the microhabitats for turtle basking (logs, rocks, brush thickets) and determine a location to quietly observe turtles.
- Each survey will include a 30-minute wait time after arriving onsite to allow startled turtles to return to open basking areas. The survey will consist of a minimum 15-minute observation time per area where turtles could be observed.
- If turtles are observed during a survey, they will be relocated outside of the construction area to appropriate aquatic habitat by a biologist with a valid memorandum of understanding from CDFW authorizing the capture and relocation of turtles and as determined during coordination with CDFW.
- If turtles are present within the project boundary for projects within 1 mile of Stone Lakes National Wildlife Refuge, the refuge manager will be contacted to determine if there is a location in the refuge where the refuge would like to relocate turtle. Turtles will then be captured with traps and relocated accordingly.

3.C.2.18 AMM18 Swainson's Hawk and White-Tailed Kite

3.C.2.18.1 Preconstruction Surveys

Preconstruction surveys will be conducted to identify the presence of active nest sites of tree-nesting raptors within 0.25 mile of project sites, by a qualified biologist with experience identifying Swainson's hawk and white-tailed kite nests. Surveys will be conducted to ensure nesting activity is documented prior to the onset of construction activity. Swainson's hawks nest in the Plan Area between approximately March 15 and September 15. While many nest sites are traditionally used for multiple years, new nest sites can be established in any year. Therefore, construction activity that is planned after March 15 of any year will require surveys during the year of the construction. If

construction is planned before March 15 of any year, surveys will be conducted the year immediately prior to the year of construction. If construction is planned before March 15 of any year and subject to prior-year surveys, but is later postponed to after March 15, surveys will also be conducted during the year of construction.

The survey protocol established in Table 3.C-3 is modified from the recommended timing and methodology for Swainson's hawk nesting surveys in the Central Valley (Swainson's Hawk Technical Advisory Committee 2000). The protocol will be used to detect active nests for Swainson's hawk and white-tailed kite. For construction activities initiated before March 15, both Phase 1 and Phase 2 surveys are required. The surveys are conducted in two phases depending on the timing of planned construction. Phase 1 surveys are required for all construction activity not initiated prior to March 15. Phase 1 surveys include three separate equally spaced surveys conducted from April 1 to April 20. If active nests are found or nesting activity is identified, construction is postponed near the active nest or nest activity area. If no activity is found following completion of the three surveys, then construction can proceed. Phase 2 surveys are conducted if construction activity is to occur during the breeding season. Phase 2 surveys include three separate surveys conducted at least 3 days apart anytime from June 1 to July 15. If active nests are found, appropriate avoidance and minimization measures will be implemented as described herein. If no activity is found, then construction can proceed with no restrictions until the following breeding season.

A 600-foot-radius nondisturbance buffer will be established around each active white-tailed kite and Swainson's hawk nest site. No entry of any kind related to the BDCP construction activity will be allowed in the buffer while a nest site is occupied by white-tailed kite or Swainson's hawk during the breeding season. The buffer size may be modified based on the field examination and determination by a qualified biologist of conditions that may minimize disturbance effects, including line-of-sight, topography, land use, type of disturbance, existing ambient noise and disturbance levels, and other relevant factors. Active nests will be monitored to track progress of nesting activities. Entry into the buffer will be granted when a qualified biologist determines that the young have fledged and are capable of independent survival or the nest has failed and the nest site is no longer active. Nest trees will not be removed unless avoiding removal is infeasible. If nest tree removal is necessary, tree removal will occur only during the nonbreeding season (September 15 through February 28).

Table 3.C-3. Timing and Methodology for Swainson's Hawk and White-Tailed Kite Nesting Surveys

	Survey Dates	Survey Time	Number of Surveys	Methodology
Phase 1 surveys (required for all construction activities initiated after March 15)	First week of April	Sunrise to 12:00 p.m.; 4:00 p.m. to sunset	1	Position the surveyor at 50 to 200 feet from suitable nesting habitat with a clear view of trees and surrounding area. Scan all trees for a minimum of 2 hours within 0.25 mile of the project boundary. Observe perching, nesting building, mating, courtship, and other prenesting behaviors to identify a nest or nesting activity area.
	Second week of April	Sunrise to 12:00 p.m.; 4:00 p.m. to sunset	1	Repeat the above survey in areas not determined to be occupied during the first survey. Attempt to confirm nest locations within nesting activity areas.
	Third week of April	Sunrise to 12:00 p.m.; 4:00 p.m. to sunset	1	Repeat the above survey in areas not determined to be occupied during the first and second survey. In cases where a nest site was not identified within a nesting activity area during the first two surveys, approach the nesting activity area carefully to locate nests. If a nest is not found where there is reasonable certainty of nesting activity, rely on observations of courtship, mating, nest building, and other behaviors to define a nesting area and establish a buffer.
Phase 2 surveys (also required for all construction activities initiated after May 30)	June 10 through July 15	Sunrise to 12:00 p.m.; 4:00 p.m. to sunset	3 surveys spaced at least 3 days apart	Inspect all previously identified nests for activity status. Walk and scan all other suitable nest trees within 0.25 mile of the project boundary for nests not found during the initial survey.

3.C.2.18.2 Nesting Habitat Replacement

The following measures will be implemented to minimize near-term effects on the Swainson's hawk and white-tailed kite populations that could otherwise result from loss of nesting habitat during the first 10 years of the permit term, before most of the restored riparian natural community has matured. Nesting habitat is limited throughout much of the Plan Area, consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside trees, and ornamental trees near rural residences. Removal of nest trees and nesting habitat could further reduce this limited resource and reduce or restrict the number of active Swainson's hawks and white-tailed kites within the Plan Area until restored riparian habitat is sufficiently developed. To account for this potential near-term loss of nesting habitat, the following additional measures will be implemented.

3.C.2.18.2.1 Tree Replacement with Saplings

Planting trees as potential nesting habitat for Swainson's hawk and white-tailed kite is addressed in *CM7 Riparian Natural Community Restoration* and *CM11 Natural Communities Enhancement and*

Management. While those measures address the overall long-term restoration of nesting habitat and the enhancement of BDCP reserves for these species, the following measures specifically address the removal of nest trees or nesting habitat during construction and provide a mechanism to compensate for this loss in order to minimize the near-term effects on Swainson's hawk and white-tailed kite populations.

a) At least five trees (5-gallon-container size) will be planted in the reserve system for every tree suitable for Swainson's hawk and white-tailed kite nesting (20 feet or taller) anticipated to be removed by construction during the near-term period. Of the replacement trees planted, a variety of native tree species will be planted to provide trees with differing growth rates, maturation, and life span.

b) Replacement trees will be planted in the reserve system in areas that support high-value Swainson's hawk and white-tailed kite foraging habitat. They will be planted in clumps of at least three trees each at appropriate sites within or adjacent to conserved cultivated lands, or may be incorporated into the riparian plantings as a component of the requirement for 5,000 acres of riparian restoration where they are in close proximity to suitable foraging habitat. Replacement trees that are incorporated into the riparian restoration will not be clustered in a single region of the Plan Area, but will be distributed throughout the lands protected as foraging habitat for Swainson's hawk and white-tailed kite.

c) At least 10% of replacement trees will be planted on lands in the reserve system that are specifically protected as Swainson's hawk and white-tailed kite foraging habitat acquired as part of the conservation strategy for cultivated lands or the grassland natural community. These plantings will count toward the nesting habitat requirement in Objective SH2.1 (Chapter 3, Section 3.3, *Biological Goals and Objectives*).

d) The survival success of the planted trees described in (a), (b), and (c) above will be monitored for a period of 5 years to assure survival and appropriate growth and development. Plantings will subsequently be monitored every 5 years to verify their continued survival and growth. For every tree lost during the first 5-year time period, a replacement tree will be planted immediately upon the detection of failure. All necessary planting requirements and maintenance (i.e., fertilizing, irrigation) to ensure success will be provided. Trees will be irrigated for a minimum of the first 5 years after planting, and then gradually weaned off the irrigation during a period of approximately 2 years. If larger stock is planted, the number of years of irrigation will be increased accordingly. In addition, 10 years after planting, a survey of the trees will be completed to assure at least 80% establishment success.

3.C.2.18.2.2 Tree Replacement with Mature Trees

To further and more directly minimize the effects of near-term loss of nesting habitat, a program to plant mature trees will be implemented. Planting larger, mature trees, including transplanting trees scheduled for removal, and supplemented with additional saplings, is expected to accelerate the development of potential replacement nesting habitat.

a) In addition to the planting of sapling nest trees as described in item (a) above (Section 3.C.2.18.2.2, *Tree Replacement with Saplings*), five mature native trees (at least 20 feet in height) will be planted for every 125 acres of construction footprint in which more than 50% of suitable nest trees (20 feet or taller) within the 125-acre block are removed. Replacement mature trees can be either nursery trees or trees scheduled to be removed by construction. To determine the number of replacement trees required, a grid of 125-acre blocks will be placed over each

component of project footprint in which trees are to be removed, and the grid will be fixed in a manner that places the most complete squares of the grid in the project footprint (i.e., the grid will be adjusted so that, to the extent possible, entire squares rather than portions of squares will overlap with the project footprint).

b) The mature trees will be planted at a location that otherwise supports suitable habitat conditions for Swainson's hawk or white-tailed kite. This could be around project facilities (while taking into consideration potential effects of noise and visual disturbance from facility operation), on reserve lands, other existing conservation lands (non-BDCP), or excess DWR land, as long as the Implementation Office controls the property. These trees will be planted close to the suitable nest tree affected, unless such location would have low long-term conservation value due to factors such as threat of seasonal flooding or sea level rise, in which case the trees may be planted elsewhere in the reserve system.

c) As with the sapling trees, the mature replacement trees will be monitored and maintained for 5 years to ensure survival and appropriate growth and development. Success will be measured using an 80% survival rate at 5 years after planting. In addition, 15 (5-gallon-container size) trees will be planted at each mature tree replacement site to provide longevity to the nest site. These 15 trees may be part of the trees committed to the project by item (a) included above as long they meet the survival criteria described in item (d) above (Section 3.C.2.18.2.2, *Tree Replacement with Saplings*).

d) To enhance Swainson's hawk and white-tailed kite reproductive output until the replacement nest trees become suitable for nesting, 100 acres of high-value foraging habitat (alfalfa rotation) will be protected in the near-term[2] for each potential nest site removed (a nest site is defined as a 125-acre block in which more than 50% of nest trees are 20 feet or greater in height) as a result of construction activity during the near-term. This high-value foraging habitat requirement will be in addition to the proposed 1-to-1 acre replacement of Swainson's hawk and white-tailed kite foraging habitat in the near-term as identified in the BDCP implementation schedule in Chapter 6 (Table 6-2). This requirement could be counted toward Objectives CLNC1.1 and SH1.1 (Chapter 3, Section 3.3, *Biological Goals and Objectives*). The foraging habitat to be protected will be within 6 kilometers of the removed tree within an otherwise suitable foraging landscape and on land not subject to threat of seasonal flooding, construction disturbances, or other conditions that would reduce the foraging value of the land.

e) To reduce temporal impacts resulting from the loss of mature nest trees, the plantings described above will occur prior to or concurrent with the loss of trees.

3.C.2.19 AMM19 California Clapper Rail and California Black Rail

If construction or restoration activities are necessary during the breeding season, preconstruction surveys for California clapper rail and California black rail will be conducted where suitable habitat for these species occurs within or adjacent to work areas. Surveys will be initiated sometime between January 15 and February 1. A minimum of four surveys will be conducted. The survey dates will be spaced at least 2 to 3 weeks apart and will cover the time period from the date of the first survey through the end of March and mid-April. This will allow the surveys to encompass the time

[2] Protection will occur in the near term, but the lands will be protected in perpetuity.

period when the highest frequency of calls is likely to occur. These surveys will involve the following protocols (based on U.S. Fish and Wildlife Service 2005 and Evens et al. 1991), or other USFWS- and CDFW-approved survey methodologies that may be developed based on new information and evolving science, and will be conducted by biologists with the qualifications stipulated in the USFWS- or CDFW-approved methodologies.

- Listening stations will be established at 100-meter intervals along roads, trails, and levees that will be affected by covered activities.
- California clapper rail and California black rail vocalization recordings will be played at each station, and playing will cease immediately once a response is detected.
- For California clapper rail, each listening station will be occupied for a period of 10 minutes, followed by 1 minute of playing California clapper rail vocalization recordings, then followed by an additional minute of listening.
- For California black rails, each listening station will be occupied for 1 minute of passive listening, 1 minute of "grr" calls followed by 30 seconds of "ki-ki-krrr" calls, then followed by another 3.5 minutes of passive listening.
- Sunrise surveys will begin 60 minutes before sunrise and conclude 75 minutes after sunrise (or until presence is detected).
- Sunset surveys will begin 75 minutes before sunset and conclude 60 minutes after sunset (or until presence is detected).
- Surveys will not be conducted when tides are greater than 4.5 National Geodetic Vertical Datum or when sloughs and marshes are more than bankfull.
- California clapper rail and California black rail vocalizations will be recorded on a data sheet. A GPS receiver and compass will be used to identify surveys stations, angles to call locations, and call locations and distances. The call type, location, distance, and time will be recorded on a data sheet.

If California clapper rail or California black rail is present in the immediate construction area, the following measures will apply during construction activities.

- To avoid the loss of individual California clapper rails or California black rails, activities within or adjacent to the species' habitat will not occur within 2 hours before or after extreme high tides (6.5 feet or above, as measured at the Golden Gate Bridge), when the marsh plain is inundated. During high tide, protective cover for California clapper rail and California black rail is sometimes limited, and activities could prevent them from reaching available cover.
- To avoid the loss of individual California clapper rails or California black rails, activities within or adjacent to tidal marsh areas (and managed wetlands for California black rail) will be avoided during the rail breeding season (February 1 through August 31), unless surveys are conducted to determine rail locations and territories can be avoided.
- If breeding California clapper rail or California black rail are determined to be present, activities will not occur within 500 feet of an identified calling center (or a smaller distance if approved by USFWS and CDFW). If the intervening distance is across a major slough channel or across a substantial barrier between the rail calling center and any activity area is greater than 200 feet, it may proceed at that location within the breeding season.

- **Exception:** Inspection, maintenance, research, or nonconstruction monitoring activities may be performed during the California clapper rail or California black rail breeding season in areas within or adjacent to breeding habitat (within 500 or 200 feet, as specified above) with USFWS and CDFW approval and under the supervision of a qualified, permitted biologist.

3.C.2.20 AMM20 Greater Sandhill Crane

If covered activities are to occur during greater sandhill crane wintering season (September 15 through March 15) in the Greater Sandhill Crane Winter Use Area (Appendix 2.A, Figure 2.A-19-2), the following avoidance and minimization measures will be implemented.

3.C.2.20.1.1 Timing

- Construction will be minimized during the sandhill crane wintering season to the extent practicable in light of project schedule and cost and logistical considerations. For example, construction of some project facilities such as vent shafts may be accelerated so that they occur outside of the crane wintering season. The loudest construction activities, such as pile driving, that need to occur for only limited time periods should be scheduled for periods outside the crane wintering season to the extent practicable.
- To the extent practicable, construction that cannot be completed prior to commencement of the wintering season will be started before September 15 or after March 15, such that no new sources of noise or other major disturbance that could affect cranes will be introduced after the cranes arrive at their wintering grounds.

3.C.2.20.1.2 Bird Strike Hazard

Performance Standard: No net increase in bird strike hazard to greater sandhill crane populations in the Plan Area

The BDCP will be implemented in a manner that will not result in a net increase in bird strike risk to greater sandhill cranes in the Plan Area, as measured by the methodology described in Attachment 5.J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*. The methodology entails measuring risk level based on geographic risk zones, which are rated based on proximity to roosting and foraging habitat and location relative to daily movement patterns between roosting and foraging sites. This performance standard may be accomplished through any combination of the following, with preference given to alignment of lines and removal, relocation, or undergrounding of existing lines.

- Design the transmission line alignment to minimize risk. When locating powerlines, choose specific site locations that are in low risk zones or outside of the Greater Sandhill Crane Winter Use Area.
- Remove, relocate or underground existing lines. Reduce the number of existing lines in risk zones to offset placement of new lines in risk zones. Prioritize elimination or reduction of existing lines and avoidance of new lines in the highest risk zones. Undergrounding existing and new lines is the most effective means for achieving the standard and should be the initial measure implemented.

- Install bird strike diverters on existing and new lines in risk zones. For installation of diverters on existing lines, prioritize lines in the highest risk zones. (Bird diverters will be required on all new lines.)
- Manage habitat to shift cultivated land roost site locations away from risk zones created by new transmission lines. This can be accomplished by not flooding past or current roosting sites located in the vicinity of the new transmission line, thereby eliminating the sites' attractiveness as roosting habitat; and establishing new roost site equal or greater in size at new location in a lower risk zone but within 1 mile of the affected site. The relocated roost site will be established prior to commencement of the wintering season that occurs prior to construction of new transmission lines. The existing roost site will be flooded during the wintering season prior to construction; it will not be flooded during the wintering season that occurs during the year construction begins. A wildlife agency–approved, qualified biologist familiar with crane biology and experienced with crane habitat management will design the new roost site and direct implementation of the roost site establishment.
- Final transmission line design will be determined in coordination with the wildlife agencies and the approved/qualified crane biologist to achieve the performance standard and ensure the measures described herein are incorporated.

Powerline Plan and Analysis

Prior to powerline construction, the approved/qualified crane biologist will coordinate with the Implementation Office to develop a plan for achieving the performance standard (no net increase in bird strike hazard to greater sandhill crane populations in the Plan Area) using a combination of the measures described above. The plan will include an analysis, using the method described in Attachment 5.J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*, to demonstrate that this standard has been met. The plan and analysis will be subject to review and approval by the wildlife agencies prior to its implementation. Powerline construction will be implemented consistent with this plan.

Required Measures

Consistent with, and in furtherance of, the performance standard of no net increase in bird strike risk to greater sandhill cranes in the Plan Area, the following measures will also be implemented to minimize bird strike hazard. While any combination of the measures described under *Performance Standard*, above, may be implemented to meet the powerline performance standard, all of the following measures are required.

- During the final powerline design process, undergrounding of new permanent powerlines north of Glannvale Tract will be comprehensively evaluated with respect to cost, operational risks, bird strike risks, and other relevant factors.
- Upon approval by the power providers, bird diverters will be installed on all new temporary and permanent powerlines, following Avian Power Line Interaction Committee protocols. This may contribute toward meeting the performance standard of no net increase in crane bird strike hazard (described above). Powerlines will avoid all crane roost sites within the Stone Lakes National Wildlife Refuge project boundary. Permanent powerlines will avoid crane roost sites.

- New permanent powerlines will avoid all areas with a bird strike risk index of 1.0 or greater as shown on Figure 2, Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*.
- Use of construction equipment greater than 50 feet in height will be minimized to the extent practicable in light of project schedule and cost and logistical considerations.

See also *AMM30 Transmission Line Design and Alignment Guidelines*.

3.C.2.20.1.3 Effects on Greater Sandhill Crane Foraging and Roosting Habitat Resulting from CM1 Water Facilities and Operation

The following measures will be implemented to avoid and minimize effects on greater sandhill crane resulting from implementation of the final design of the water conveyance features (*CM1 Water Facilities and Operation*).

Foraging Habitat

- Minimize direct loss of foraging habitat. CM1 final design will minimize construction-related loss of greater sandhill crane foraging habitat to the extent practicable.
- Minimize construction-related noise effects on foraging habitat. The Implementation Office will minimize the area of crane foraging habitat to be affected during the day (from 1 hour after sunrise to 1 hour before sunset) by construction noise exceeding 50 dBA L_{eq} (1 hour)[3]. Construction-related noise levels will be estimated prior to commencement of construction using the methods described in Attachment 5J.D, *Indirect Effects of Construction of the BDCP Conveyance Facility on Greater Sandhill Crane*, incorporating site-specific information related to equipment to be used and existing noise barriers such as levees. Artificial noise barriers may be installed to decrease noise levels at foraging habitat below 50 dBA L_{eq} (1 hour). However, the visual effects of noise barriers on sandhill cranes are unknown; therefore, all other options to reduce noise will be implemented before installing noise barriers in close proximity to crane habitat.
- Enhance foraging habitat to avoid loss of foraging values that could otherwise result from unavoidable noise-related effects. The Implementation Office will enhance 0.1 acre of foraging habitat for each acre of foraging habitat to be indirectly affected within the 50 dBA L_{eq} (1 hour) construction noise contour. The enhanced foraging habitat will be established prior to the impact and will be maintained until the construction causing the indirect noise effect is completed. The enhanced habitat will consist of corn fields that will not be harvested, and will be managed to maximize food availability to greater sandhill cranes. A management plan for the enhanced habitat will be completed prior to establishing the habitat, in coordination with a biologist with at least 5 years of experience managing greater sandhill crane habitat on cultivated lands, or experience directing such management. The enhanced habitat will be located outside the construction-related 50 dBA L_{eq} (1 hour) noise contour and within 1 mile of the affected habitat.

[3] 50 decibels averaged over a 1-hour period.

Roosting Habitat

Preconstruction surveys will be conducted for greater sandhill crane roost sites within 0.75 mile of the construction area boundary. Surveys will be conducted during the winter prior to project implementation, over multiple days within the survey area by a qualified biologist with experience observing the species. Alternatively, roost sites within 0.75 mile of the construction area boundary can be identified by a qualified greater sandhill crane biologist familiar with roost sites in the Plan Area. If a greater sandhill crane roost site is located within 0.75 mile of the construction area boundary, then to the extent practicable, nighttime (1 hour before sunset to 1 hour after sunrise) project activities will be relocated to maintain a 0.75-mile nondisturbance buffer. If this is not practicable, the following measures will be implemented to avoid and minimize effects on roosting greater sandhill cranes.

- Avoid direct construction-related loss of roost sites. Activities will be designed to avoid direct loss of crane roost sites. This can be accomplished by siting activities outside identified crane roost sites or by relocating the roost site if it consists of cultivated lands (roost sites that consist of wetlands rather than cultivated lands will not be subject to relocation). A cultivated land roost site can be relocated by not flooding the site where the impact will occur during years when construction will occur and by establishing a new roost site equal or greater in size at a new location away from the disturbance (outside the 50 dBA L_{eq} [1 hour] noise contour) but within 1 mile of the affected site. The relocated roost site will be established prior to construction activities affecting the original roost site. A qualified biologist familiar with crane biology and experienced with crane habitat management will design the new roost site and direct implementation of the roost site establishment.

- Avoid and minimize construction-related noise effects on roost sites. Activities within 0.75 mile of crane roosting habitat will reduce construction noise during nighttime hours (from 1 hour before sunset to 1 hour after sunrise) such that construction noise levels do not exceed 50 dBA L_{eq} (1 hour) at the nearest temporary or permanent roosts during periods when the roost sites are available (flooded). This can be accomplished by limiting construction activities that could result in noise levels above 50 dBA L_{eq} (1 hour) at the roost site to day time only (from 1 hour after sunrise to 1 hour before sunset); siting nighttime project activities at a sufficient distance from crane roost sites to ensure that construction noise levels do not exceed 50 dBA L_{eq} (1 hour) at the roost site; relocating cultivated land roost sites as described above; and/or installing noise barriers between roost sites within the 50 dBA L_{eq} (1 hour) contour and the primary construction noise source areas, such that construction noise levels at the roost site do not exceed 50 dBA L_{eq} (1 hour). The installation of noise barriers will be used only if the first three options cannot be implemented to the extent that noise levels do not exceed 50 dBA L_{eq} (1 hour) at the roost site.

- If the roost site to be indirectly affected within the 50 dBA L_{eq} (1 hour) noise contour is a wetland site rather than cultivated land, then the existing wetland site will not be removed. A new, cultivated land roost site will be temporarily established at a new location away from the disturbance (outside the 50 dBA L_{eq} (1 hour) noise contour) but within 1 mile of the affected site, at a ratio of 1 acre created for each acre of roost site within the 50 dBA L_{eq} (1 hour) noise contour. The new roost site will be established prior to commencement of the wintering season that occurs prior to construction of new powerlines affecting the original roost site, and will be maintained until the activities creating the indirect disturbance are completed. A qualified biologist familiar with crane biology and experienced with crane habitat management will design the new roost site and direct implementation of the roost site establishment.

3.C.2.20.1.4 Measures to Avoid and Minimize Potential Effects from Lighting and Visual Disturbance

The Implementation Office will implement the following measures to avoid and minimize potential lighting and visual effects that could result from construction or operation and maintenance.

- Route truck traffic to reduce headlight impacts in roosting habitat.
- Install light barriers to block the line-of-sight between the nearest roosting areas and the primary nighttime construction light source areas.
- Operate portable lights at the lowest allowable wattage and height, while in accordance with the National Cooperative Highway Research Program's *Report 498: Illumination Guidelines for Nighttime Highway Work.*
- Screen all lights and direct them down toward work activities and away from the night sky and nearby roost sites.
- Limit the number of nighttime lights used to the greatest extent practicable in light of worker safety requirements.
- Install a visual barrier along portions of access routes where screening would prevent excessive light spill toward roost sites from truck headlights being used during nighttime construction activities. These visual barriers will meet the following performance criteria: The visual barrier will be a minimum of 5 feet high and will provide a continuous surface impenetrable by light. This height may be obtained by installing a temporary structure, such as fencing (e.g., chain link with privacy slats) or a semipermanent structure, such as a concrete barrier (e.g., a roadway median barrier or architectural concrete wall system) retrofitted with an approved visual screen, if necessary, to meet the required height. These barriers will not be installed immediately adjacent to crane foraging habitat, and placement will be coordinated with a qualified crane biologist approved by the wildlife agencies.

3.C.2.20.1.5 Staten Island Performance Standard

Because of the density of greater sandhill cranes wintering on Staten Island and the importance of Staten Island to the existing population of the greater sandhill crane in the Plan Area, the final placement of conveyance facilities and RTM at this site will be minimized to the extent practicable, except where the use of RTM on the island affirmatively contributes to the sustainability of the population. BDCP-related construction will not result in a net decrease in crane use on Staten Island as determined by deriving greater sandhill crane use days for the entire winter period.[4] This standard will be achieved through some combination of the following (and including the above required avoidance and minimization measures for CM1).

- Minimize and/or shift the footprint of activities on Staten Island. The RTM footprint identified on Staten Island is a worst-case scenario. It is expected that the RTM footprint on Staten Island

[4] Expected loss of crane use will be estimated by using data on crane use days/acre by habitat type on Staten Island from past studies and future monitoring before construction begins (using averages among available years). These will be used to predict the number of lost crane use days within the footprint of the habitat loss and within the 50 dBA L_{eq} (1 hour) construction noise contour. Preproject crane surveys will provide additional data on crane use day densities per habitat type to improve the prediction. Use day densities will be used to guide decisions regarding crop habitat needed to be maintained on Staten Island to maintain this performance standard during construction.

will need to be reduced substantially from shown on the current conveyance facility footprint in order to meet the Staten Island performance standard. Some combination of the following measures will be implemented to achieve this reduction.

  - Stockpile RTM higher than 6 feet to reduce the amount of land affected by RTM stockpiles.
  - Remove RTM from Staten Island periodically during construction to minimize the RTM footprint.
  - Stage the storage and reuse of RTM such that the size of the storage area is minimized at any given time.
  - Reduce RTM storage areas and associated activities during the crane wintering season.
  - Prioritize placement of facilities and RTM in areas of low crane use. For example, the very northern end of Staten Island is an area of low crane use that would be a high priority for placement of facilities and RTM.

- Minimize noise, lighting, and visual disturbances during construction (See measures described above for CM1).
- Minimize construction activity and RTM storage during the crane wintering season to the extent practicable.
- Supplemental feeding/foraging habitat enhancement. The enhanced habitat will consist of corn fields that will not be harvested, and will be managed to maximize food availability to greater sandhill cranes. A management plan for the enhanced habitat will be completed prior to establishing the habitat, in coordination with a qualified crane biologist (with at least 5 years of experience managing greater sandhill crane habitat on cultivated lands, or experience directing such management). The enhanced habitat will be located outside the construction-related 50 dBA L_{eq} (1 hour) noise contour and within 1 mile of the affected habitat.
- Maintain flooding and irrigation capacity. Stage CM1 activities on Staten Island such that they do not disrupt flooding and irrigation to the extent that greater sandhill crane habitat will be reduced during the crane wintering season.
- In determining any long-term uses of RTM on Staten Island, priority will be given to uses that are consistent with the sustainability of greater sandhill crane habitat on the island. RTM will be moved off the island after short-term use or storage unless a determination is made that long-term use of the RTM on Staten Island will not be detrimental to the crane population on the island.

Prior to construction on Staten Island, the qualified, wildlife agency–approved crane biologist will coordinate with the Implementation Office to develop a strategy for achieving the Staten Island performance standard using a combination of the measures described above, and prepare a plan based on the final construction design on Staten Island that includes all avoidance and minimization measures necessary for achieving the performance standard. This plan will be subject to review and approval by the wildlife agencies prior to its implementation. All avoidance and minimization measures will be in place, consistent with the plan, prior to project construction on Staten Island.

3.C.2.21 AMM21 Tricolored Blackbird

Prior to implementation of covered activities, a qualified biologist with experience surveying for and observing tricolored blackbird will conduct a preconstruction survey to establish use of marsh

habitat by tricolored blackbird colonies. Surveys will be conducted in suitable habitat within 1,300 feet of proposed construction areas. Three surveys will be conducted within 15 days of construction with one of the surveys within 5 days of the start of construction. The CDFW Suisun Marsh Unit tracks tricolored blackbird colonies yearly in Suisun Marsh as part of the UCD/USFWS tricolored blackbird portal project; these records will also be searched. If active tricolored blackbird nesting colonies are identified, minimization requirements and construction monitoring will be required.

Covered activities must avoid active tricolored blackbird nesting colonies and associated habitat during the breeding season (generally March 15–July 31). Avoidance measures will include relocating covered activities away from the nesting colonies and associated habitat to the maximum extent practicable. AMMs will be incorporated into the project design and other portions of the application package prior to submission for coverage under the BDCP.

Projects should be designed to avoid construction activity to the maximum extent practicable up to 1,300 feet, but not less than a minimum of 250 feet, from an active tricolored blackbird nesting colony. This minimum buffer may be reduced in areas with dense forest, buildings, or other habitat features between the construction activities and the active nest colony, or where there is sufficient topographic relief to protect the colony from excessive noise or visual disturbance as determined by a biologist experienced with tricolored blackbird.

Covered activities potentially affecting a nesting colony will be monitored by a qualified biologist to verify that the activity is not disrupting the colony. If it is, the activity will be modified, as practicable, by either delaying construction until the colony abandons the site or until the end of the breeding season, whichever occurs first, temporarily relocating staging areas, or temporarily rerouting access to the construction site. Implementation Office technical staff will coordinate with the fish and wildlife agencies and evaluate exceptions to the minimum nondisturbance buffer distance on a case-by-case basis.

3.C.2.22 AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo

Preconstruction surveys of potential breeding habitat for the Suisun song sparrow, yellow-breasted chat, least Bell's vireo, and western yellow-billed cuckoo will be conducted within 500 feet project activities. At least five surveys will be conducted in suitable habitats within 30 days of the onset of construction, with the last within 3 days of the onset of construction, by a qualified biologist with experience surveying and observing these species and familiar with their vocalizations.

If an active nest site is present, a 250-foot nondisturbance buffer will be established around chat nest sites and a 500-foot nondisturbance buffer around least Bell's vireo, Suisun song sparrow, and western yellow-billed cuckoo nest sites during the breeding season (generally, late February through late August for yellow-breasted chat, least Bell's vireo, and western yellow-billed cuckoo, and early April through late August for Suisun song sparrow).

Disturbance to previous least Bell's vireo nesting sites (for up to 3 years since known nest activity) will also be avoided during the breeding season unless the disturbance is to maintain public safety. Least Bell's vireo uses previous nesting sites, and disturbance during the breeding season may preclude birds from using existing unoccupied nest sites.

The required buffer may be reduced in areas where barriers or topographic relief are sufficient protect the nest from excessive noise or other disturbance. Implementation Office technical staff will

coordinate with the fish and wildlife agencies and evaluate exceptions to the minimum nondisturbance buffer distance on a case-by-case basis.

If occupied nests are identified, a qualified biologist will monitor construction activities in the vicinity of all active yellow-breasted chat, least Bell's vireo, western yellow-billed cuckoo, and Suisun song sparrow nests to ensure that covered activities do not affect nest success.

3.C.2.23 AMM23 Western Burrowing Owl

This AMM incorporates survey, avoidance, and minimization guidelines taken primarily from CDFW's *Staff Report on Burrowing Owl Mitigation* (California Department of Fish and Game 2012). Also see AMM37 for measures to avoid and minimize recreation-related effects on this species.

Western burrowing owl habitat surveys will be required where burrowing owl habitat (or sign) is encountered within and adjacent to (within 150 meters) a proposed project area. Species surveys in suitable habitat are required in both breeding and nonbreeding seasons. If the project site falls within potential burrowing owl habitat, a qualified biologist will survey the project area and map areas with burrows (i.e., areas of highest likelihood of burrowing owl activity) and record all burrows that may be occupied (as indicated by tracks, feathers, egg shell fragments, pellets, prey remains, cast pellets, whitewash, or decoration) on the project site. This mapping will be conducted while walking transects throughout the entire project footprint, plus all accessible areas within a 150-meter radius of the project footprint. The centerlines of these transects will spaced 7 to 20 meters apart and will vary in width to account for changes in terrain and vegetation that can preclude complete visual coverage of the area. For example, in hilly terrain with patches of tall grass, transects will be closer together, while in open areas with little vegetation they can be 20 meters apart. Surveyors will stop at least every 100 meters along each transect to scan the entire visible area for presence of burrowing owls.

This methodology is consistent with the current accepted survey protocol for this species (California Burrowing Owl Consortium 2012). The Implementation Office may update this protocol during the permit term, based on changes to the accepted protocol, with the concurrence of CDFW and USFWS. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas.

If burrowing owls or suitable burrowing owl burrows are identified during the habitat survey, and if the project does not fully avoid direct and indirect impacts on the suitable habitat, preconstruction surveys will be required. Prior to any ground disturbance related to covered activities, a qualified biologist will conduct preconstruction surveys in areas identified in the habitat surveys as having suitable burrowing owl burrows. The purpose of the preconstruction surveys is to document the presence or absence of western burrowing owls on the project site. Preconstruction surveys may be conducted up to 14 days before construction. Suitable habitat is fully avoided if the project footprint does not impinge on a designated nondisturbance buffer around the suitable burrow. For occupied burrowing owl nest burrows, this nondisturbance buffer could range from 50 to 500 meters (Table 3.C-4) depending on the time of year and the level of disturbance based on current guidelines (Scobie and Faminov 2000). Construction of the water conveyance facilities and construction-related restoration activities that involve heavy equipment would be expected to constitute medium to high levels of disturbance for the species. However, buffer size may be reduced based on existing vegetation, human development, and land use, after consultation with CDFW (California Burrowing Owl Consortium 2012).

Table 3.C-4. Recommended Restricted Activity Dates and Setback Distances by Level of Disturbance for Burrowing Owls

Location	Time of Year	Level of Disturbance (meters)		
		Low	Medium	High
Nesting Sites	April 1–August 15	200	500	500
Nesting Sites	August 16–October 15	200	200	500
Nesting Sites	October 16–March 31	50	100	500
Source: Scobie and Faminov 2000				

Breeding season surveys (February 1–August 31) will consist of four visits, and will include at least one survey between 15 February and April 15, and a minimum of three surveys, at least 3 weeks apart, between April 15 and July 15, with at least one visit after June 15. Surveys conducted during the nonbreeding season (September 1–January 31) will consist of at least four surveys, spread evenly over the nonbreeding season. To maximize the likelihood of detecting owls, the preconstruction survey will last a minimum of 3 hours. The survey will begin 1 hour before sunrise and continue until 2 hours after sunrise (3 hours total) or begin 2 hours before sunset and continue until 1 hour after sunset. All owls observed will be counted and their location will be mapped.

If evidence of western burrowing owls is found during the breeding season (February 1–August 31), the project proponent will avoid all nest sites that could be disturbed by project construction during the remainder of the breeding season or while the nest is occupied by adults or young (occupation includes individuals or family groups foraging on or near the site following fledging). Avoidance will include establishment of a 50- to 500-meter nondisturbance buffer around nests. Construction may occur outside of the nondisturbance buffer. Construction may occur inside of the disturbance buffer, during the breeding season, if the nest is not disturbed and the project proponent develops an avoidance, minimization, and monitoring plan that will be reviewed by the Implementation Office and the fish and wildlife agencies prior to project construction based on the following criteria.

- The Implementation Office and the fish and wildlife agencies approve of the avoidance and minimization plan provided by the project proponent.
- A qualified biologist monitors the owls for at least 3 days prior to construction to determine baseline nesting and foraging behavior (i.e., behavior without construction).
- The same qualified biologist monitors the owls during construction and finds no change in owl nesting and foraging behavior in response to construction activities.
- If there is any change in owl nesting and foraging behavior as a result of construction activities, these activities will cease within the nondisturbance buffer. Construction cannot resume within the buffer until the adults and juveniles from the occupied burrows have moved out of the project site.
- If monitoring indicates that the nest is abandoned prior to the end of nesting season and the burrow is no longer in use by owls, the nondisturbance buffer may be removed. If necessary because the burrow cannot be avoided by construction activity, the biologist will excavate and collapse the burrow to prevent reoccupation after receiving approval from the fish and wildlife agencies.

If evidence of western burrowing owl is detected during the nonbreeding season (September 1–January 31), the project proponent will establish a 50- to 500-meter nondisturbance buffer around occupied burrows as determined by a qualified biologist. Construction activities outside of this buffer are allowed. Construction activities within the disturbance buffer are allowed, if the following criteria are met to prevent owls from abandoning important overwintering sites.

- A qualified biologist monitors the owls for at least 3 days prior to construction to determine baseline foraging behavior (i.e., behavior without construction).
- The same qualified biologist monitors the owls during construction and finds no change in owl foraging behavior in response to construction activities.
- If there is any change in owl nesting and foraging behavior as a result of construction activities, these activities will cease within the buffer.
- If the owls are gone for at least 1 week, the project proponent may request approval from the Implementation Office that a qualified biologist excavate and collapse usable burrows to prevent owls from reoccupying the site, if the burrow cannot be avoided by construction activities. After all usable burrows are excavated, the buffer will be removed and construction may continue.

Monitoring must continue as described above for the nonbreeding season as long as the burrow remains active.

During construction, the nondisturbance buffers will be established and maintained, if applicable. A qualified biologist will monitor the site consistent with the requirements described above to ensure that buffers are enforced and owls are not disturbed. The biological monitor will also conduct training of construction personnel on the avoidance procedures, buffers, and protocols in the event that a burrowing owl flies into an active construction zone.

The passive relocation of owls has been used in the past in the Plan Area to remove and exclude owls from active burrows during the nonbreeding season. Exclusion and burrow closure will not be conducted during the breeding season and will not be proposed until all possible avoidance and minimization measures are considered. If passive relocation is deemed necessary and is approved by the fish and wildlife agencies, a burrowing owl exclusion plan will be developed with consultation from CDFW biologists, and methodology will be designed as described in the species monitoring guidelines (California Burrowing Owl Consortium 2012). This may include the installation of one-way doors in burrow entrances by a qualified biologist during the nonbreeding season. These doors will be in place for 48 hours, and monitored twice daily to ensure owls have left the burrow, after which the biologist will excavate the burrow to prevent reoccupation. Burrows will be excavated using hand tools. During excavation an escape route will be maintained at all times. This may include inserting an artificial structure such as piping into the burrow to prevent collapsing until the entire burrow can be excavated and it can be determined that no owls are trapped inside the burrow. Other methods of passive relocation, based on best available science, may be approved by the fish and wildlife agencies. Artificial burrows will be used where burrowing owls must be excluded from existing burrows if such artificial burrows can be created less than 100 meters from the existing burrows on lands that are protected as part of the reserve system, or on Stone Lakes National Wildlife Refuge lands (in coordination with the refuge manager).

3.C.2.24 AMM24 San Joaquin Kit Fox

No take authorization for injury or death to San Joaquin kit fox individuals is provided by the BDCP due to the rarity of the species in the Plan Area. To avoid direct effects of covered activities on San Joaquin kit fox, the following measures will be implemented. This AMM was based on USFWS's *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox prior to or during Ground Disturbance* (U.S. Fish and Wildlife Service 2011). Also see AMM37 for measures to avoid and minimize recreation-related effects on this species.

San Joaquin kit fox surveys will only be required for projects (including but not limited to establishment of trails and other recreational facilities) occurring within suitable habitat as identified from the habitat modeling and by additional assessments conducted during the planning phase of construction and restoration projects. A qualified biologist will conduct a field evaluation to identify suitable breeding or denning habitat for kit fox for all covered activities that occur in noncultivated lands in Conservation Zone 8. If the project overlaps with, or is within 250 feet of suitable kit fox habitat, preconstruction surveys will be required.

Within 14 to 30 days prior to ground disturbance related to covered activities, a qualified biologist with experience surveying for and observing the species will conduct a preconstruction survey in areas identified by the habitat assessment as being suitable breeding or denning habitat. The biologist will survey the project footprint and the area within 250 feet beyond the footprint to identify known or potential San Joaquin kit fox dens. Adjacent parcels under different land ownership will not be surveyed unless access is granted within the 250-foot radius. The biologists will conduct these searches by systematically walking 30- to 100-foot-wide transects throughout the survey area; transect width will be adjusted based on vegetation height and topography (California Department of Fish and Game 1990). The biologist will conduct walking transects such that 100% visual coverage of the project footprint is achieved. Dens will be classified in one of the following four den status categories.

- **Potential den.** Any subterranean hole within the species' range that has entrances of appropriate dimensions for which available evidence is sufficient to conclude that it is being used or has been used by a kit fox. Potential dens comprise any suitable subterranean hole or any den or burrow of another species (e.g., coyote, badger, red fox, or ground squirrel) that otherwise has appropriate characteristics for kit fox use. If a potential den is found, the biologist will establish a 50-foot buffer using flagging.
- **Known den.** Any existing natural den or artificial structure that is used or has been used at any time in the past by a San Joaquin kit fox. Evidence of use may include historical records; past or current radiotelemetry or spotlighting data; kit fox sign such as tracks, scat, and/or prey remains; or other reasonable proof that a given den is being or has been used by a kit fox.
- **Natal or pupping den.** Any den used by kit foxes to whelp and/or rear their pups. Natal/ pupping dens may be larger with more numerous entrances than dens occupied exclusively by adults. These dens typically have more kit fox tracks, scat, and prey remains in the vicinity of the den and may have a broader apron of matted dirt and/or vegetation at one or more entrances. A natal den, defined as a den in which kit fox pups are actually whelped but not necessarily reared, is a more restrictive version of the pupping den. In practice, however, it is difficult to distinguish between the two; therefore, for purposes of this definition, either term applies. If a natal den is discovered, a buffer of at least 200 feet will be established using fencing.

- **Atypical den.** Any artificial structure that has been or is being occupied by a San Joaquin kit fox. Atypical dens may include pipes, culverts, and diggings beneath concrete slabs and buildings. If an atypical den is discovered, the biologist will establish a 50-foot buffer using flagging.

The biologist will flag all potential small mammal burrows within 50 feet of the project site to alert biological and work crews of their presence. Disturbance to all San Joaquin kit fox dens will be avoided, to the extent possible. Limited destruction may be allowed, if avoidance is not a reasonable alternative, provided the following procedures are observed.

- If a suitable San Joaquin kit fox den is discovered in the project footprint, the den will be monitored for 4 days by a USFWS- and CDFW-approved biologist using a tracking medium or an infrared beam camera to determine if the den is currently being used.
- Unoccupied dens will be destroyed immediately to prevent subsequent use. The den will be fully excavated by hand, filled with dirt, and compacted to ensure that San Joaquin kit foxes cannot reenter or use the den during the construction period.
- If an active or natal or pupping den is found, USFWS and CDFW will be notified immediately. The den will not be destroyed until the pups and adults have vacated and then only after further coordination with USFWS and CDFW.
- If kit fox activity is observed at the den during the initial monitoring period, den use will be actively discouraged, as described below, and monitoring will continue for an additional 5 consecutive days from the time of the first observation to allow any resident animals to move to another den. For dens other than natal or pupping dens, use of the den can be discouraged by partially plugging the entrance with soil such that any resident animal can easily escape. Once the den is determined to be unoccupied it may be excavated under the direction of the biologist. Alternatively, if the animal is still present after 5 or more consecutive days of plugging and monitoring, the den may have to be excavated by hand when, in the judgment of a biologist, it is temporarily vacant (i.e., during the animal's normal foraging activities). If at any point during excavation a kit fox is discovered inside the den, the excavation activity will cease immediately and monitoring of the den, as described above, will be resumed. Destruction of the den may be completed when, in the judgment of the biologist, the animal has escaped from the partially destroyed den.
- Construction and operational requirements from *Standardized Recommendations for Protection of the San Joaquin Kit Fox prior to or during Ground Disturbance* (U.S. Fish and Wildlife Service 2011) or the latest guidelines will be implemented.
- If suitable dens are identified in the project footprint or within a 250-foot buffer, exclusion zones around each den entrance or cluster of entrances will be demarcated. The configuration of exclusion zones will be circular, with a radius measured outward from the den entrance(s). No covered activities will occur within the exclusion zones. Exclusion zone radii for atypical dens and suitable dens will be at least 50 feet and will be demarcated with four to five flagged stakes. Exclusion zone radii for known dens will be at least 100 feet and will be demarcated with staking and flagging that encircle each den or cluster of dens but do not prevent access to the den by the foxes.
- Written results of the surveys will be submitted to USFWS within 5 calendar days of the completion of surveys and prior to the beginning of ground disturbance and/or construction activities likely to affect San Joaquin kit foxes.

3.C.2.25 AMM25 Riparian Woodrat and Riparian Brush Rabbit

AMMs for riparian woodrat and riparian brush rabbit will only be required for projects occurring within suitable habitat as identified from the habitat modeling and by additional assessments conducted during the planning phase of construction or restoration projects. A qualified biologist will conduct a field evaluation of suitable habitat for both species for all covered activities that occur within Conservation Zone 7. One known population of riparian brush rabbit occurs in the Plan Area (in Conservation Zone 7); no known populations of riparian woodrat occur in the Plan Area. If the project does not fully avoid effects on suitable habitat, the following measures will be required.

- Assess habitat suitability for both species and, if habitat is considered potentially occupied and cannot be avoided, conduct protocol-level surveys according to the USFWS (no date [b]) *Draft Habitat Assessment Guidelines and Survey Protocol for the Riparian Brush Rabbit and the Riparian Woodrat*.
- If occupied riparian woodrat or riparian brush rabbit habitat is present in project site, redesign project to the extent possible to avoid occupied habitat. Design tidal natural communities restoration projects (CM4 *Tidal Natural Communities Restoration*) to completely avoid permanent or temporary loss of occupied riparian brush rabbit and riparian woodrat habitat. If occupied riparian woodrat or riparian brush rabbit habitat is present in the construction facility corridor, consider reducing the corridor width to avoid occupied riparian habitat and, if feasible, tunnel beneath the occupied riparian corridor.
- If occupied riparian woodrat or riparian brush rabbit habitat cannot be avoided, avoid mortality through implementation of a trapping and relocation program. Develop the program in coordination with USFWS, and relocate to site approved by USFWS prior to construction activities.
- Floodplain restoration projects will be designed to minimize the removal of mature oaks in areas providing suitable habitat for the riparian woodrat.
- To the extent feasible, a 250-foot nondisturbance buffer will be established between project activities and potentially occupied habitat.

3.C.2.26 AMM26 Salt Marsh Harvest Mouse and Suisun Shrew

Where suitable salt marsh harvest mouse or Suisun shrew habitat has been identified within a work area or within 100 feet of a work area where ground-disturbing activities will occur (e.g., at a levee breach or grading location, including restoration and ground breaking for management and enhancement activities), ground disturbance will be limited to the period between May 1 and November 30 to avoid destroying nests with young. Prior to ground-disturbing activities, vegetation will first be removed with nonmechanized hand tools (e.g., goat or sheep grazing, or in limited cases where the biological monitor can confirm that there is no risk of harming salt marsh harvest mouse or Suisun shrew, hoes, rakes, and shovels may be used) to allow salt marsh harvest mouse and Suisun shrew to passively move out of the location. Vegetation will removed under supervision of a CDFW- and USFWS-approved biological monitor familiar with salt marsh harvest mouse and Suisun shrew. If a mouse of any species is observed within the areas of vegetation removal, it will be allowed to leave the project area on its own. Vegetation removal will start at the edge farthest from the salt marsh and work its way towards the salt marsh. This method of removal provides cover for

salt marsh harvest mouse and Suisun shrew and allows them to move towards the salt marsh as vegetation is being removed.

Tidal restoration work will be scheduled to avoid extreme high tides (6.5 feet or above, as measured at the Golden Gate Bridge) to allow for salt marsh harvest mouse and Suisun shrew to more easily move to higher grounds.

3.C.2.27 AMM27 Selenium Management

It is currently unknown whether the effects of increased residence time, and thus potential increases in selenium bioavailability, associated with restoration-related conservation measures will lead to adverse effects on fish and wildlife, potentially including covered species. This measure requires a process to identify and evaluate potentially feasible actions for the purpose of minimizing conditions that promote bioaccumulation of selenium in restored areas.

The Implementation Office or its designees will perform the following actions.

- Before ground-breaking activities associated with site-specific restoration occur, the Implementation Office will retain a qualified water quality specialist, wildlife biologist, or fisheries biologist with expertise in selenium management to develop a comprehensive selenium monitoring and management plan. The plan will evaluate site-specific restoration conditions and include design elements that minimize any conditions that could be conducive to increases of bioavailable selenium in restored areas. As part of the plan, the qualified specialist will assess whether, in light of site-specific conditions, the proposed restoration project could cause potentially significant increases in bioavailable selenium due to increased residence time for suspended selenium within inundated portions of the restoration area. If any such potentially significant effects are identified, the plan will include a mitigation plan that includes measures to reduce levels of bioavailable selenium such that the affected water body (or portion of a water body) would not be expected to cause measurably higher body burdens in aquatic organisms. The design elements will be integrated into site-specific restoration designs based on site conditions, community type (tidal marsh, nontidal marsh, floodplain), and potential organic forms of selenium in water. Specific approaches that are intended to minimize or mitigate for potential increases in selenium bioavailability at future restoration sites may include the following.
    - Minimize bioavailable selenium concentrations associated with anoxic or near-anoxic conditions by reducing the amount of organic material at a restoration site. In some case, this measure could limit the amount of carbon the restoration sites supply to the Delta, thereby limit the restoration benefit intended under the biological goals and objectives. In these cases, the measure should be implemented in such a way as to not reduce the benefits to the Delta ecosystem provided by restoration areas.
    - Manage vegetation and water levels to reduce bioavailable selenium concentrations and bioaccumulation, as feasible.
- Define adaptive management strategies that can be implemented to monitor and minimize, as feasible, actual post-restoration bioavailable selenium concentrations in the water, and if necessary, bioaccumulation of selenium. The adaptive management strategies could be applied where site conditions indicate a high probability of selenium bioaccumulation and effects on covered species.

- For each restoration project under *CM4 Tidal Natural Communities Restoration*, a project-specific selenium monitoring and management plan will be developed and will incorporate all of the following management measures or include an explanation of why a particular measure cannot be incorporated.
    - A brief review of predicted changes in water residence time at assessment locations in the Delta, expected changes in bioavailable selenium concentrations, and possible changes in bioaccumulation by fish and aquatic invertebrates.
    - A determination if sampling for characterization of selenium concentrations in biota and/or postrestoration monitoring is warranted.
    - A plan for conducting the sampling for selenium, if characterization sampling is recommended. To cover any sampling or monitoring, the project-specific plan will also include a quality assurance/quality control program specifying sampling procedures, analytical methods, data review requirements, and data management and reporting procedures.

This mitigation provides specific tidal natural communities restoration design elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats. Consequently, this mitigation would be implemented as part of the tidal natural communities restoration design schedule.

3.C.2.28 AMM28 Geotechnical Studies

Detailed subsurface investigations will be performed at the locations of the water conveyance alignment and facility locations and at material borrow areas. The main geotechnical issues in the Delta include stability of canal embankments and levees, liquefaction of Delta soils (particularly loose, saturated sands), seepage through coarse-grained soils, settlement of embankments and structures, subsidence, and soil-bearing capacity. The work to be performed will include a subsurface investigation program to provide the information required to support the design and construction of the water conveyance facilities. Appropriate geotechnical investigations will be conducted to identify the types of soil avoidance or soil stabilization measures that should be implemented to ensure that the facilities are constructed to withstand subsidence and settlement and to conform to applicable state and federal standards. The geotechnical investigation will also include a small-scale environmental screening to assess the presence or absence of dissolved gases, which will help guide the tunnel ventilation design and disposal considerations for excavated materials and tunnel cuttings.

Site-specific geotechnical studies are expected to include the following, as appropriate.

- Assess liquid limit (i.e., the moisture content at which a soil passes from a solid to a liquid state) and organic material on soil samples collected during site-specific field investigations to determine site-specific geotechnical properties.
- Drill and sample soil borings, cone penetration, and other *in situ* tests, slug tests, aquifer/pumping tests, and test pits to evaluate the subsurface conditions.
- Install wells and monitor groundwater elevations for use in liquefaction evaluation and dewatering requirements.

- Perform geotechnical laboratory testing on selected soil samples to evaluate engineering properties of the soils encountered in the borings.
- Prepare geotechnical data reports to document the results of the subsurface investigations, geotechnical baseline reports to describe expected construction conditions, and geotechnical interpretive reports to specify design and construction recommendations. Recommendations will be made based on the conclusions of these reports.

3.C.2.29 AMM29 Design Standards and Building Codes

The Implementation Office will ensure that the standards, guidelines, and codes listed below (or the most current applicable version at the time of implementation), which establish minimum design criteria and construction requirements for project facilities, will be followed by the BDCP engineers. The BDCP engineers will also follow any other standards, guidelines, and code requirements, not listed below, that are promulgated during the detailed design and construction phases and during operation of the water conveyance facilities. The Implementation Office will also ensure that the design specifications are properly executed during construction. The minimum design and construction requirements act as performance standards for engineers and construction contractors. Because the design and construction parameters of these codes and standards are intended to reduce the potential for structural damage or risks to human health due to the geologic and seismic conditions that exist within the Plan Area and the surrounding region, as well as climate change, an uncontrolled release of water, a flood event, and accidents during construction, their use is considered an environmental commitment of the Implementation Office. These standards, guidelines, and codes include the following.

- California Code of Regulations, Title 8.
- DWR Division of Flood Management FloodSAFE Urban Levee Design Criteria, May 2012.
- State of California Sea-Level Rise Task Force of the Coastal and Ocean Working Group of the California Climate Action Team, Sea-Level Rise Interim Guidance Document, 2010.
- U.S. Army Corps of Engineers (Corps, CESPK-ED-G), Geotechnical Levee Practice, SOP EDG-03, 2004.
- USACE Design and Construction of Levees, EM 1110-2-1913, 2000.
- USACE Engineering and Design—Structural Design and Evaluation of Outlet Works, EM 1110-2-2400, 2003.
- USACE Slope Stability, EM 1110-2-1902, 2003.
- USACE Engineering and Design—Settlement Analysis, EM 1110-1-1904, 1990.
- USACE Engineering and Design—Design of Pile Foundations, EM 1110-2-2906, 1991.
- U.S. Department of the Interior and U.S. Geological Survey Climate Change and Water Resources Management: A Federal Perspective, Circular 1331.

3.C.2.30 AMM30 Transmission Line Design and Alignment Guidelines

The location and design of the proposed new transmission lines will be conducted in accordance with electric and magnetic field guidance adopted by the California Public Utility Commission (2006) *EMF Design Guidelines for Electrical Facilities*. The guidelines describe the routine magnetic field reduction measures that all regulated California electric utilities will consider for new and upgraded transmission line and transmission substation construction.

The alignment of proposed transmission lines will be designed to avoid sensitive terrestrial and aquatic habitats when siting poles and towers, to the maximum extent feasible. Lines will be co-located where feasible, when such co-location would minimize effects on greater sandhill cranes and other sensitive resources. In cases where this is not feasible, the Implementation Office will ensure that impacts are minimized to the greatest degree feasible, and disturbed areas will be returned as near as reasonably and practically feasible to preconstruction conditions, by reestablishing surface conditions through carefully grading, reconstructing features such as irrigation and drainage facilities, and replanting vegetation and crops and/or compensating farmers for crops losses. Temporary transmission lines will be designed to avoid removal of wetted acres of vernal pools and alkali seasonal wetlands. Transmission lines will avoid greater sandhill crane roost sites as described in AMM20.

Further, tower and pole placement will avoid existing structures to the extent feasible. Where poles or towers are to be constructed in agricultural areas, the following BMPs will be implemented, as applicable and feasible.

- Use single-pole structures instead of H-frame or other multiple-pole structures to reduce the potential for land impacts and minimize weed encroachment issues.
- Locate new transmission lines along existing transmission line corridors to the extent feasible.
- Use special transmission designs to span existing irrigation systems or, if necessary, reconfigure the irrigation system at the utilities' expense, if feasible.

3.C.2.31 AMM31 Noise Abatement

In addition to the underwater sound control and abatement plan (AMM9), DWR and contractors hired to construct any components of the water conveyance facilities will implement a noise abatement plan to avoid or reduce potential in-air noise impacts related to construction, maintenance, and operations. As applicable, the following components will be included in the plan.

3.C.2.31.1 Construction and Maintenance Noise

- To the extent feasible, the contractor will employ best practices to reduce construction noise, particularly during daytime and evening hours (7:00 a.m. to 10:00 p.m.) such that construction noise levels do not exceed 60 dBA L_{eq} (1 hour) at the nearest residential land uses.
- Limit construction during nighttime hours (10:00 p.m. to 7:00 a.m.) such that construction noise levels do not exceed 50 dBA L_{max}[5] at the nearest residential land uses.

[5] L_{max} is the maximum sound level measured for a given interval of time.

- Limit pile driving to daytime hours (7 a.m. to 6 p.m.).
- In the event that construction noise during nighttime hours exceeds 50 dBA L_{max}, the construction contractor will cease nighttime construction activity in the area until sound-attenuating mitigation measures, such as temporary sound walls, are implemented, such that nighttime construction noise is reduced to a level of 50 dBA L_{max} or lower.
- Employ preventive maintenance including practicable methods and devices to control, prevent, and minimize noise.
- Route truck traffic to reduce construction noise impacts and traffic noise levels on noise-sensitive resources.
- To the extent feasible, schedule construction activities so that the loudest noise events, such as blasting, occur during peak traffic commute hours.
- Limit offsite trucking activities (e.g., deliveries, export of materials) to minimize impacts.
- See also AMM20 for requirements related to noise for projects in the Greater Sandhill Crane Winter Use Area.

3.C.2.31.2 Operation Noise

Pump station facilities will be designed and constructed such that facility operation noise levels do not exceed 50 dB L_{eq} during daytime and evening hours (7:00 a.m. to 10:00 p.m.) and 45 dBA L_{eq} during nighttime hours (10 p.m. to 7 a.m.). Acoustical measures such as terrain shielding, pump enclosures, and acoustical building treatments will be incorporated into the facility design to meet this performance standard.

3.C.2.32 AMM32 Hazardous Materials Management

The Implementation Office will ensure that each BDCP contractor responsible for construction of a BDCP facility or project will develop and implement a hazardous materials management plan (HMMP) before beginning construction. It is anticipated that multiple HMMPs will be prepared for the overall BDCP construction activities, each taking into account site-specific conditions such as hazardous materials present onsite and known historical site contamination. A database on historical instances of contamination and results of any field inspections regarding the presence of hazardous chemicals will be maintained. The HMMPs will provide detailed information on the types of hazardous materials used or stored at all sites associated with the water conveyance facilities (e.g., intake pumping plants, maintenance facilities); phone numbers of applicable city, county, state, and federal emergency response agencies; primary, secondary, and final cleanup procedures; emergency-response procedures in case of a spill; and other applicable information. The HMMPs will include appropriate practices to reduce the likelihood of a spill of toxic chemicals and other hazardous materials during construction and facilities operation and maintenance. A specific protocol for the proper handling and disposal of hazardous materials will be established before construction activities begin and will be enforced by the Implementation Office.

The HMMPs will include, but not be limited to, the following measures or practices.

- Fuel, oil, and other petroleum products will be stored only at designated sites.

- Hazardous materials containment containers will be clearly labeled with the identity of the hazardous materials contained therein, handling and safety instructions, and emergency contact.
- Storage, use, or transfer of hazardous materials in or near wet or dry streams will be consistent with California Fish and Game Code (Section 5650) and/or with the permission of CDFW.
- Material Safety Data Sheets will be made readily available to the contractor's employees and other personnel at the work site.
- The accumulation and temporary storage of hazardous wastes will not exceed 90 days.
- Soils contaminated by spills or cleaning wastes will be contained and removed to an approved disposal site.
- Hazardous waste generated at work sites, such as contaminated soil, will be segregated from other construction spoils and properly handled, hauled, and disposed of at an approved disposal facility by a licensed hazardous waste hauler in accordance with state and local regulations. The contractor will obtain permits required for such disposal.
- Emergency spill containment and cleanup kits will be located at the facility site. The contents of the kit will be appropriate to the type and quantities of chemical or goods stored at the facility.

3.C.2.33 AMM33 Mosquito Management

To aid in mosquito management and control during construction of project facilities, the Implementation Office will consult with appropriate mosquito and vector control districts. Consultation will occur before the sedimentation basins, solids lagoons, and the intermediate forebay inundation area become operational. Once these components are operational, the Implementation Office will consult again with the mosquito and vector control districts to determine if mosquitoes are present in these facilities, and implement mosquito control techniques as applicable. These techniques will include, but not be limited to, the following.

- Test for mosquito larvae during the high mosquito season (June through September).
- Introduce biological controls, such as mosquito fish, to sedimentation basins, solids lagoons, and the intermediate forebay inundation area.
- Introduce physical controls (e.g., discharging dewatered water more frequently or increasing circulation) to sedimentation basins, solids lagoons, and the intermediate forebay inundation area.
- To aid in vector management and control, the construction contractors, with Implementation Office approval, will develop mosquito management plans, in consultation with appropriate mosquito and vector control districts, for designing and planning restoration and conservation activities. These include the districts of Alameda County, Contra Costa, Sacramento-Yolo, San Joaquin County, and Solano County. Consultation will include, but not be limited to, reviews of mosquito management plans and BMPs to be implemented at the restoration sites, reviews of proposed mosquito monitoring efforts at restoration sites, and assistance with monitoring efforts where feasible. The Central Valley Joint Venture's *Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands* (Kwasny et al. 2004) and other guidelines will be used to help design appropriate restoration and conservation features to the extent feasible consistent with the biological goals and objectives. The mosquito management plans

will address wetland design considerations, water management practices, vegetation management, biological controls, and wetland maintenance. BMPs will include, but not be limited to, the following.

- Implement delayed or phased fall flooding—phased flooding involves flooding habitat throughout the fall and winter in proportion to wildlife needs and takes into consideration other wetland habitat that may be available in surrounding areas.
- Implement rapid fall flooding.
- Maintain stable water levels.
- Circulate water.
- Use deep initial flooding.
- Apply subsurface irrigation.
- Use water sources with mosquito predators for flooding.
- Drain irrigation water into ditches or other water bodies with abundant mosquito predators.
- Employ vegetation management practices to reduce mosquito production in managed wetlands (e.g., mowing, burning, discing of vegetation that serves as mosquito breeding substrate).
- Design wetlands and operations to be inhospitable to mosquitoes.
- Implement monitoring and sampling programs to detect early signs of mosquito population problems.
- Use biological agents such as mosquito fish to limit larval mosquito populations.
- Use larvicides and adulticides, as necessary. If larvicides and adulticides are used, the effects of these chemicals would need to be evaluated and a monitoring program established to evaluate effects, if any, that application would have on macroinvertebrates and associated covered fish and wildlife species.

Implementation of these BMPs will reduce the likelihood that BDCP operations will require an increase in abatement activities by local mosquito vector and control districts.

3.C.2.34 AMM34 Construction Site Security

All security personnel will receive environmental training similar to that of onsite construction workers so that they understand the environmental conditions and issues associated with the various areas for which they are responsible at a given time. Security operations and field personnel will be given the emergency contact phone numbers of environmental response personnel for rapid response to environmental issues resulting from vandalism or incidents that occur when construction personnel are not onsite. Security operations will also maintain a contact list of backup support from city police, county sheriffs, California Highway Patrol, water patrols (such as the Contra Costa County Marine Patrol), helicopter response, and emergency response (including fire departments, ambulances/emergency medical technicians). The appropriate local and regional contact list will be made available to security personal by the Implementation Office, as will the means to make that contact via landline phones, cell phones, or radios.

3.C.2.35 AMM35 Fugitive Dust Control

The Implementation Office will implement basic and enhanced control measures at all construction and staging areas to reduce construction-related fugitive dust. Although the following measures are outlined in the Sacramento Metropolitan Air Quality Management District's California Environmental Quality Act guidelines, they are required for the entirety of the construction area, including areas within the Bay Area Air Quality Management District San Joaquin Valley Air Pollution Control District and Yolo Solano Air Quality Management District, and are sufficient to address fugitive dust control requirements of these three districts. The Implementation Office will ensure the project commitments are appropriately implemented before and during construction, and that proper documentation procedures are followed. The Implementation Office will take steps to ensure that the following measures will be implemented to the extent feasible to control dust during general construction activities.

- Apply water to all exposed surfaces as reasonably necessary to prevent visible dust from leaving work areas. Increase frequency during especially dry or windy periods or in areas with a lot of construction activity. Exposed surfaces include (but are not limited to) soil piles, graded areas, unpaved parking areas, staging areas, and access roads.
- Cover or maintain at least 2 feet of freeboard space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that will be traveling along freeways or major roadways should be covered.
- Use wet power vacuum street sweepers to remove any visible trackout mud or dirt onto adjacent public roads at least once a day. Use of dry power sweeping is prohibited.
- Limit vehicle speeds on unpaved roads to 15 miles per hour.
- All roadway, driveway, sidewalk, and parking lot paving should be completed as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders, or other reasonable mitigation measures are used.
- Water exposed soil with adequate frequency for continued moist soil; however, do not overwater to the extent that sediment flows off the site.
- Suspend excavation, grading, and/or demolition activity when wind speeds exceed 20 miles per hour.
- Install wind breaks (e.g., plant trees, solid fencing) on windward side(s) of construction areas.
- Plant vegetative ground cover (fast-germinating native grass seed) in disturbed areas as soon as possible after construction is completed. Water appropriately until vegetation is established.
- Install wheel washers for all exiting trucks, or wash off all exiting trucks and equipment before leaving the site.
- Treat site accesses to a distance of 100 feet from the paved road with a 6- to 12-inch layer of wood chips, mulch, or gravel to reduce generation of road dust and road dust carryout onto public roads.
- Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person will respond and take corrective action within 48 hours. The phone number of the district will also be visible to ensure compliance.

3.C.2.36 AMM36 Notification of Activities in Waterways

Similar to the requirements specified in the barge operations plan (AMM7), fish rescue and salvage plan (AMM8), and underwater sound control and abatement plan (AMM9), before in-water construction or maintenance activities begin, the Implementation Office will ensure notification of appropriate fish and wildlife agency representatives when these activities could affect water quality or aquatic species. The notification procedures will follow stipulations included in applicable permit documents for the construction operations. However, in general, the notification information will include site location(s), schedules, and work activities. Information on detours would include site-specific details regarding any temporary partial channel closures, including contacting the U.S. Coast Guard, boating organizations, marina operators, city or county parks departments, and the California Department of Pesticide Regulation, where applicable.

3.C.2.37 AMM37 Recreation

The following avoidance and minimization measures will be implemented for recreational use within the reserve system. For additional conditions related to recreational use, see *CM11 Natural Communities Enhancement and Management* (Chapter 3, Section 3.4, *Conservation Measures*). Rare exceptions to the measures listed below will be considered and approved by the Implementation Office and the fish and wildlife agencies on a case-by-case basis. Exceptions will be approved only if they are consistent with the biological goals and objectives. Any exceptions will be clearly identified in the recreation plan described in CM11.

3.C.2.37.1 General Recreation-Related Avoidance and Minimization

The following measures are related to construction of trails and other recreational facilities.

- Trails will be sited and designed with the smallest footprint necessary to cross through the instream area. Trails will be designed to avoid any potential for future erosion. New trails that follow stream courses will be sited outside the riparian corridor. Trails that follow stream courses will have designated stream access points for fishing if allowed.
- Construction of trails and other recreation amenities in riparian areas will be limited to outside the breeding season for nesting birds.
- The recreational facility will be designed to avoid the removal of riparian vegetation or wetlands.
- The number and length of trails that parallel the edge of the riparian forest and tidal marsh will be limited unless located sufficiently away from those communities to minimize disturbance and allow use of open habitats by edge-dependent species. When adjacent to riparian or tidal marsh communities, trails will be on the top of a levee or behind the top of bank except where topographic, resource management, or other constraints or management objectives make this not feasible or undesirable.
- New trails in vernal pool or alkali seasonal wetland complexes and grasslands with stock ponds will be sited at least 250 feet from wetland features, or may be sited closer based on the site's microtopography to ensure the trail does not adversely affect the local watershed surrounding a wetland feature. Existing trails may be used in the vicinity of vernal pools and alkali seasonal wetland features provided they are maintained to prevent erosion and do not encroach into the wetland features.

- Existing access routes and levee roads will be used, if available, to minimize impacts of construction in special-status species habitats and riparian zones.
- Trails in areas of moderate or difficult terrain and adjacent to a riparian zone will be composed of natural materials or will be designed (e.g., a bridge or boardwalk) to minimize disturbance and need for drainage structures, and to protect water quality.

The following measures are related to siting recreation facilities in relation to biological resources.

- Recreational uses in the reserve system will be designed to minimize impacts on biological resources.
- Recreation will only be allowed where it is compatible with the biological goals and objectives.
- Recreational use and impacts will be monitored by the Implementation Office to ensure that uses do not substantially and adversely affect covered species. If any use is found to have substantial adverse effects on covered species, that use will be discontinued until adjustments in the use can be made to reduce or eliminate impacts.
- Allowable recreational uses will be controlled and restricted by area and time to minimize impacts on natural communities and covered species and to ensure that the biological goals and objectives. For example, trails will be closed during and immediately following heavy rains and annually winterized to minimize erosion and sedimentation.
- Activities will be allowed in keeping with the ecological needs of the given habitat. Any off-trail activities and other active recreation not listed as allowed in CM11 (e.g., outdoor sports, geocaching), unless otherwise authorized by the Implementation Office, are prohibited. Recreational uses will be allowed only during daylight hours and designated times of the year (i.e., limited seasonal closures to protect sensitive covered species; see below for specific examples) unless authorized through a use permit (i.e., backpacking). Exceptions may be made for educational groups and events that are guided by an Implementation Office staff person or docent approved by the Implementation Office.
- New staging areas will be developed to the extent feasible in areas within reserves that are already disturbed and not suitable for habitat restoration, and that do not contribute to the biological goals and objectives. Sites at the edges of reserves will be chosen over sites on the interior of reserves.
- No motorized vehicles will be allowed in reserves, except on designated recreational access roads and for use by the reserve manager staff or with the prior approval of the reserve manager (e.g., contractors implementing BDCP actions such as habitat restoration and monitoring, grazing tenants, fire-suppression personnel, and maintenance contractors). For reserves under conservation easements, vehicle use will be allowed as part of the regular use of the land (e.g., agricultural operations, permanent residents, utilities, police and fire departments, other easement holders), as specified in the easement.
- When compatible with the biological goals and objectives, dogs may be allowed during daylight hours in designated reserves or in designated areas of reserves, but only on leash. Leash law restrictions will be strictly enforced by reserve managers and staff because of the potential impact of dogs on covered species such as San Joaquin kit fox, western burrowing owl, California red-legged frog, and California tiger salamander. Leash enforcement may include citations and fines. Dogs used for herding purposes by grazing lessees or for hunting must be under verbal control and have proof of vaccination.

- Picnic areas will be operated during daylight hours only. No irrigated turf or landscaping will be allowed in picnic areas. To the extent feasible, picnic areas will be located on the perimeter of reserves and will be sited in already disturbed areas. No private vehicles will be allowed in picnic areas, unless the picnic area is at a staging area and except for limited special events approved by the Implementation Office. Maintenance and emergency vehicles will be permitted access to picnic areas.
- Backpack camps will be limited to use by no more than 25 people at each site. In coordination with the reserve manager, the Implementation Office will monitor use and maintenance of backpack camps and may implement a reservation and permitting process for use of backpack camps.
- Public collecting of native species will be prohibited within reserves.
- Introduction of domestic or feral animals, including cats, ducks, fish, reptiles, and any exotic nonnaturalized species, is prohibited within the reserves to prevent interference with and mortality of native species, except by the reserve manager for management purposes (e.g., livestock for grazing or dogs for livestock control or protection).
- Recreational uses will be controlled using a variety of techniques including fences, gates, clearly signed trails, educational kiosks, trail maps and brochures, interpretive programs, and patrol by land management staff.
- Construction of recreational facilities within reserves will be limited to those structures necessary to directly support the authorized recreational use of the reserve. Existing facilities will be used where possible. Facilities that support recreation and that may be compatible with the reserve include parking lots (e.g., small gravel or paved lots), trails (unpaved or paved as required by law), educational and informational kiosks, up to one visitor center located in a disturbed or nonsensitive area, and restroom facilities located and designed to have minimal impacts on habitat. Playgrounds, irrigated turf, off-highway vehicle trails, and other facilities that are incompatible with the biological goals and objectives will not be constructed.
- Signs and informational kiosks will be installed to inform recreational users of the sensitivity of the resources in the reserve, the need to stay on designated trails, and the danger to biological resources of introducing wildlife or plants into the reserve.
- When compatible with the biological goals and objectives, recreation plans for reserves adjacent to existing conservation lands (non-BDCP) will try to ensure consistency in recreational uses across open-space boundaries to minimize confusion for the public. Reserves adjacent to existing conservation lands (non-BDCP) with different recreational uses will provide clear signage to explain these differences to users that cross boundary lines. The Implementation Office will be responsible for securing and signing reserve boundaries.

3.C.2.37.2 Measures Specific to Natural Communities and Covered Species

3.C.2.37.2.1 Grassland, Alkali Seasonal Wetland Complex, and Vernal Pool Complex Natural Communities

The following measures will be implemented to avoid and minimize effects on covered species in the grassland, alkali seasonal wetland complex, and vernal pool complex natural communities.

- **San Joaquin kit fox.** New trails will be prohibited within 250 feet of active kit fox dens. Trails will be closed within 250 feet of active natal/pupping dens until young have vacated, and within 50 feet of other active dens. No dogs will be allowed on properties with active kit fox populations. Rodent control will be prohibited even on grazed or equestrian-access areas with kit fox populations.
- **Western burrowing owl.** New trails will be prohibited within 250 feet of active western burrowing owl nests. If an owl pair nests within 250 feet of an active trail, Implementation Office staff will consult with the fish and wildlife agencies to determine the appropriate action to take. Actions may include prohibiting trail use until young have fledged and are no longer dependent on the nest. Leash laws will be enforced. Rodent control will be prohibited even on grazed or equestrian-access areas with burrowing owl populations, except where necessary to protect important infrastructure.
- **California red-legged frog, California tiger salamander.** New trails will be prohibited within 100 feet of wetlands and streams that provide suitable habitat for covered amphibians, unless topography or other landscape characteristics shield these trails from the covered species habitat or a lack of effect of the trail on the species can be otherwise demonstrated.
- **Plants (brittlescale, Carquinez goldenbush, delta button celery, heartscale, San Joaquin spearscale).** New trails will avoid populations of these species. Trails will be closed if they would potentially affect populations.
- **Vernal pool and alkali seasonal wetland crustaceans and plants.** No new trail construction will be allowed in vernal pool or alkali seasonal wetland features.

3.C.2.37.2.2 Riparian Natural Community

The following measures will be implemented to avoid and minimize effects on covered species in the riparian natural community, in addition to the general measures related to riparian areas described in Section 3.C.2.1.37.1.

- **Least Bell's vireo, yellow-breasted chat, western yellow-billed cuckoo**. Construction in and near riparian areas will be limited to outside of the breeding season.
- **Swainson's hawk, white-tailed kite.** Construction in and near riparian areas will be limited to outside of the breeding season. During breeding season, trails will be closed within 600 feet of active nests.
- **Plants (delta mudwort, delta button celery, Delta tule pea, Mason's lilaeopsis, side-flowering skullcap, slough thistle, Suisun marsh aster).** New trails will avoid populations of these species. Trails will be closed if they would potentially affect populations. Fishing areas will be designated to focus public use along waterways.

3.C.2.37.2.3 Cultivated Lands

The following measures will be implemented to avoid and minimize effects on covered species on cultivated lands.

- **Swainson's hawk.** Construction within 600 feet of potential nest trees will be limited to outside of the breeding season. During the breeding season, trails will be closed within 600 feet of active nests.

- **Greater sandhill crane roost sites.** Construction will be limited to spring and summer (outside of the crane wintering season). No hunting will be allowed at sites with temporary or permanent crane roosts. Where feasible, no fall or winter hunting will be allowed on adjacent fields. Recreation on sites with crane roosts will be limited to public roadways and overlook areas. No pets will be allowed onsite.

3.C.2.37.2.4 Managed Wetlands

The following measures will be implemented to avoid and minimize effects on covered species in the managed wetland natural community, in addition to the general measures related to wetlands described in Section 3.C.2.1.37.1.

- **Greater sandhill crane (on sites within Greater Sandhill Crane Winter Use Area where wetlands are managed specifically for crane).** Construction will be limited to spring and summer (outside of the wintering season). No hunting will be allowed at sites with temporary or permanent crane roosts. Where feasible, no fall or winter hunting will be allowed on adjacent fields. Recreation on sites with crane roosts will be limited to public roadways and overlook areas. No pets will be allowed onsite.
- **California black rail, California clapper rail.** Construction in and near suitable habitat will be limited to outside of the breeding season. Trails will be limited to levees. No pets will be allowed onsite during the breeding season and leash laws will be enforced outside of the breeding season (excluding hunting activities).
- **Salt marsh harvest mouse.** Trails will be limited to levees. Leash laws will be enforced (excluding hunting activities).

3.C.2.37.2.5 Tidal Brackish Emergent Wetlands and Tidal Freshwater Emergent Wetland Natural Communities

The following measures will be implemented to avoid and minimize effects on covered species in the tidal brackish emergent wetland and tidal freshwater emergent wetland natural communities, in addition to the general measures related to wetlands described in Section 3.C.2.1.37.1.

- **California black rail, California clapper rail.** Construction in and near suitable habitat will be limited to outside of the breeding season. Trails will be limited to levees and upland areas. No pets will be allowed onsite during the breeding season, and leash laws will be enforced outside of the breeding season (excluding hunting activities).
- **Suisun song sparrow.** Trails will be limited to levees or upland areas. No pets will be allowed onsite during the breeding season, and leash laws will enforced outside of the breeding season (excluding hunting activities).
- **Salt marsh harvest mouse.** Trails will be limited to levees or upland areas. No pets will be allowed onsite during the breeding season, and leash laws will be enforced outside of the breeding season (excluding hunting activities).
- **Plants (delta mudwort, Delta tule pea, Mason's lilaeopsis, soft bird's-beak, Suisun marsh aster, Suisun thistle).** New trails will avoid populations of these species. Trails will be closed if they would potentially affect populations. Fishing areas along sloughs will be designated to focus public use along waterways.

3.C.2.37.2.6 Nontidal Perennial Aquatic and Nontidal Freshwater Emergent Wetland Natural Communities Natural Communities

The following measures will be implemented to avoid and minimize effects on covered species in the nontidal perennial aquatic and nontidal freshwater emergent wetland natural communities, in addition to the general measures related to wetlands described in Section 3.C.2.1.37.1.

- **Tricolored blackbird.** New trails will be prohibited within 100 feet of wetlands that provide suitable habitat for breeding tricolored blackbirds, unless topography or other landscape characteristics shield these trails from the habitat or a lack of effect of the trail on the species can be otherwise demonstrated. Leash laws will be enforced. Trails will be closed within 250 feet of active nesting colonies until it can be demonstrated that the nesting cycle has completed.
- **Giant garter snake.** New trails will be prohibited within 100 feet of nontidal wetlands that are restored for giant garter snake, unless topography or other landscape characteristics shield these trails from the habitat or a lack of effect of the trail on the species can be otherwise demonstrated. Leash laws will be enforced. Rodent control will be prohibited on adjacent grassland uplands, except where necessary to protect important infrastructure.

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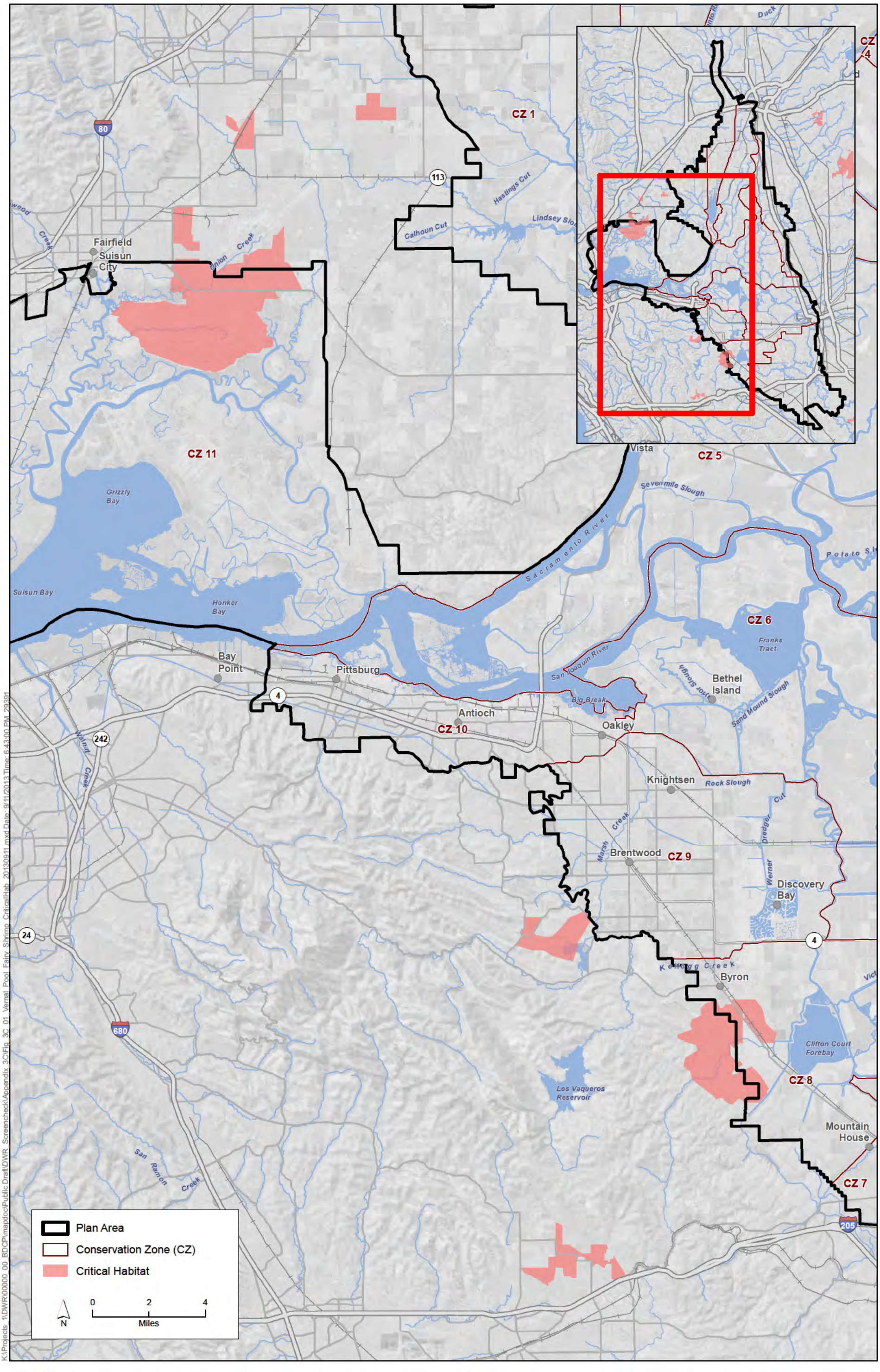

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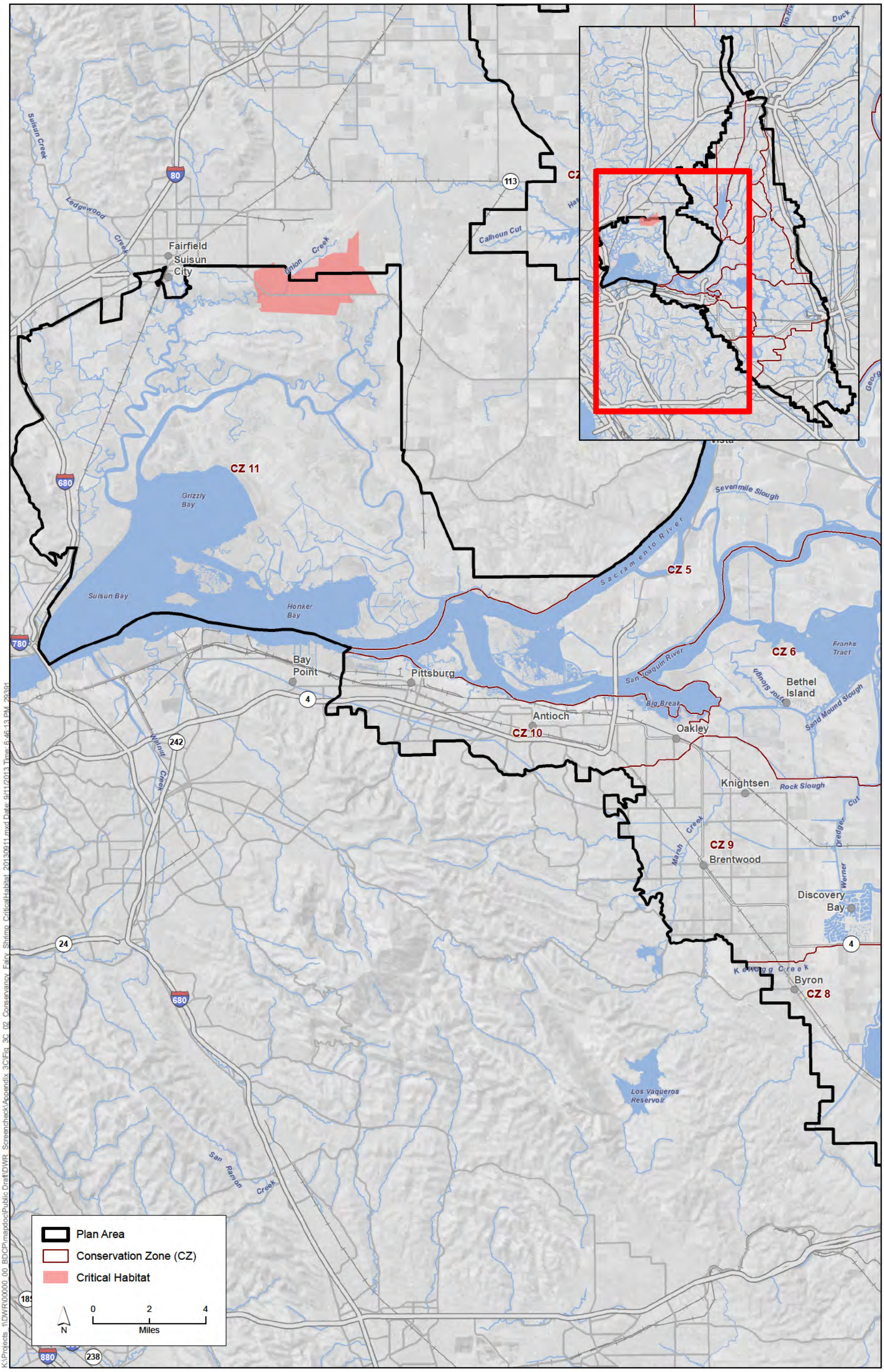
GIS Data Source: Conservation Zones, SAIC 2012;
Critical Habitat, USFWS 2012.

Figure 3.C-1
Vernal Pool Fairy Shrimp Critical Habitat



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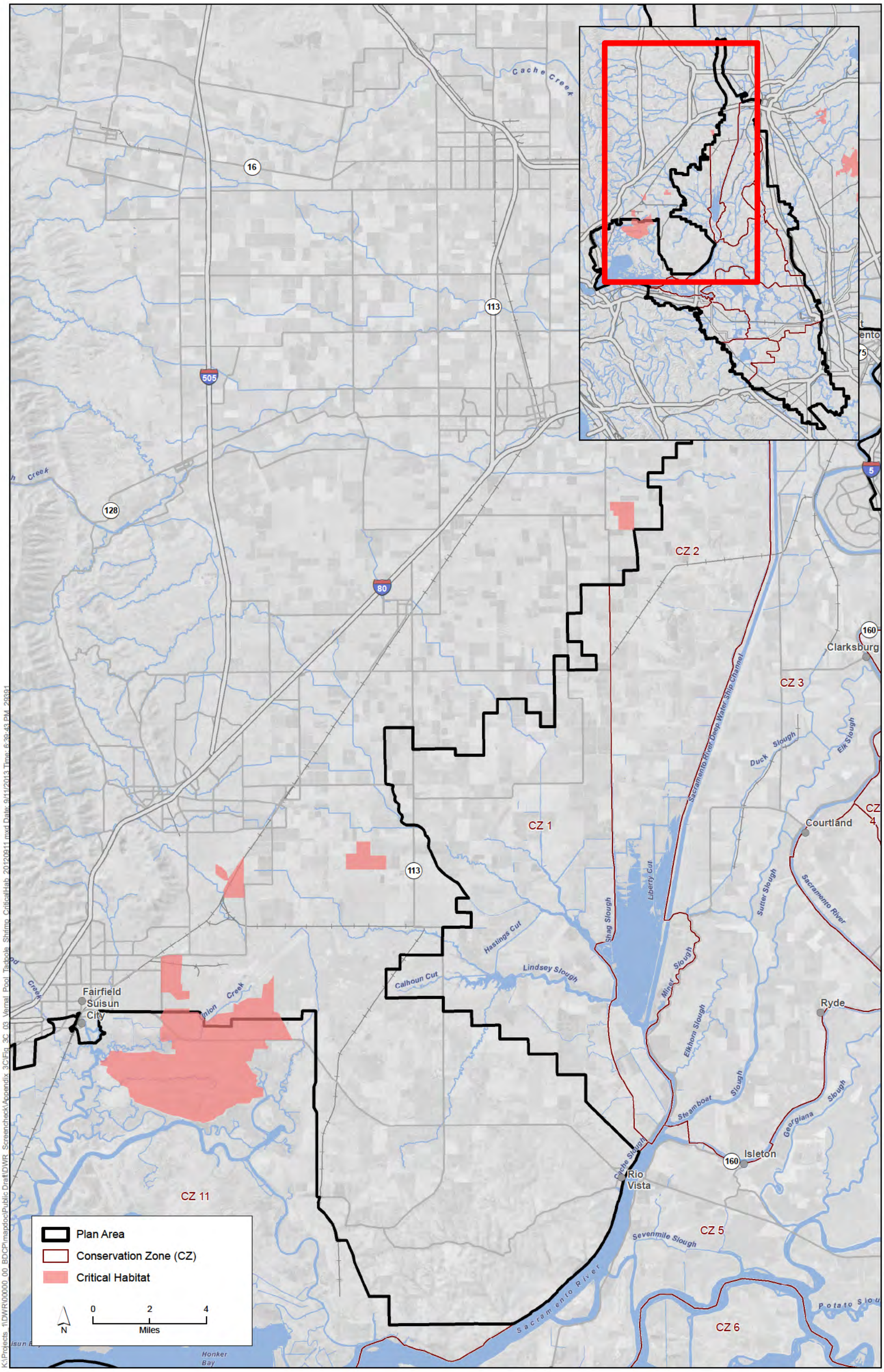
GIS Data Source: Conservation Zones, SAIC 2012; Critical Habitat, USFWS 2012.

Figure 3.C-2
Conservancy Fairy Shrimp Critical Habitat



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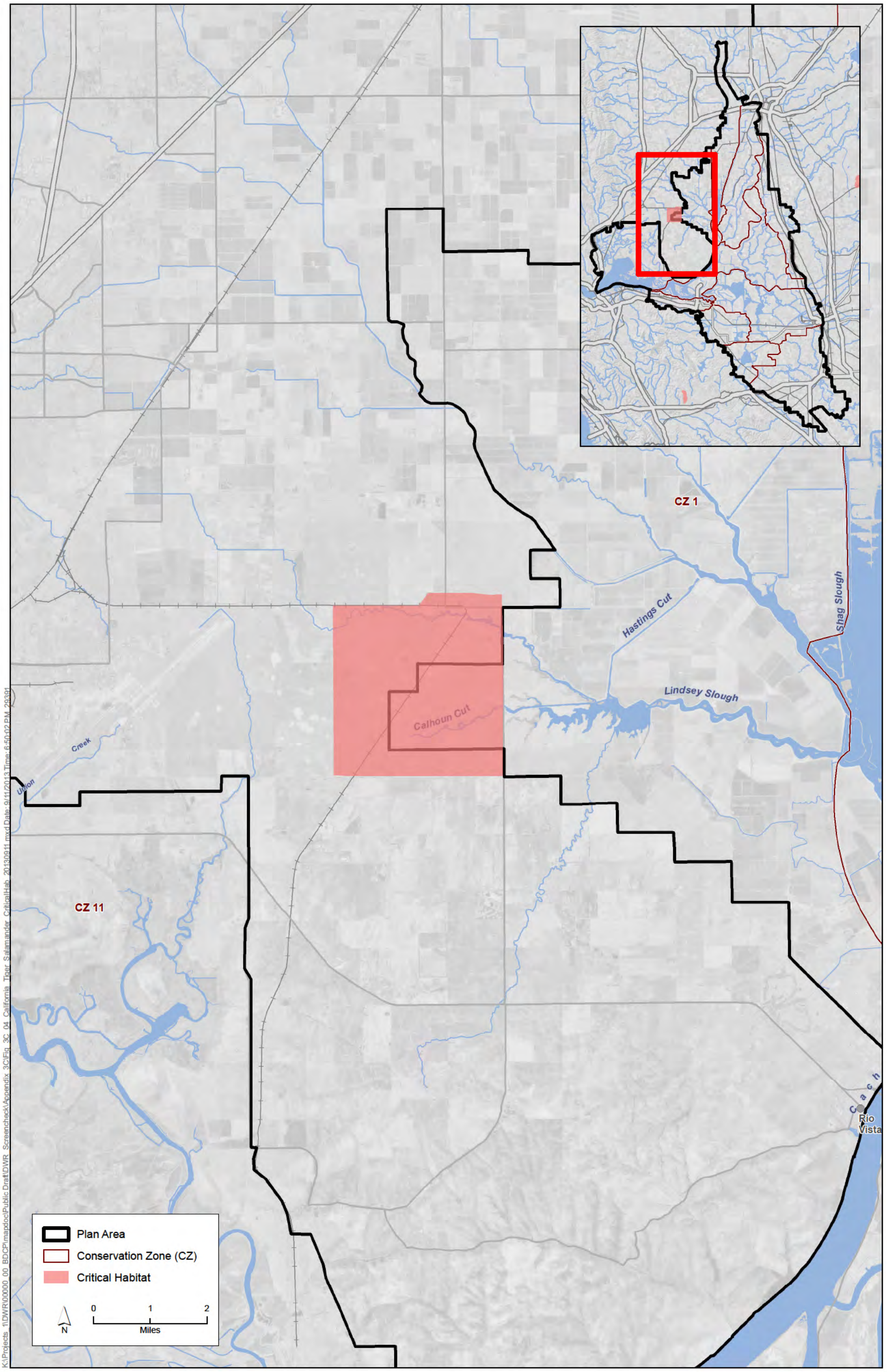
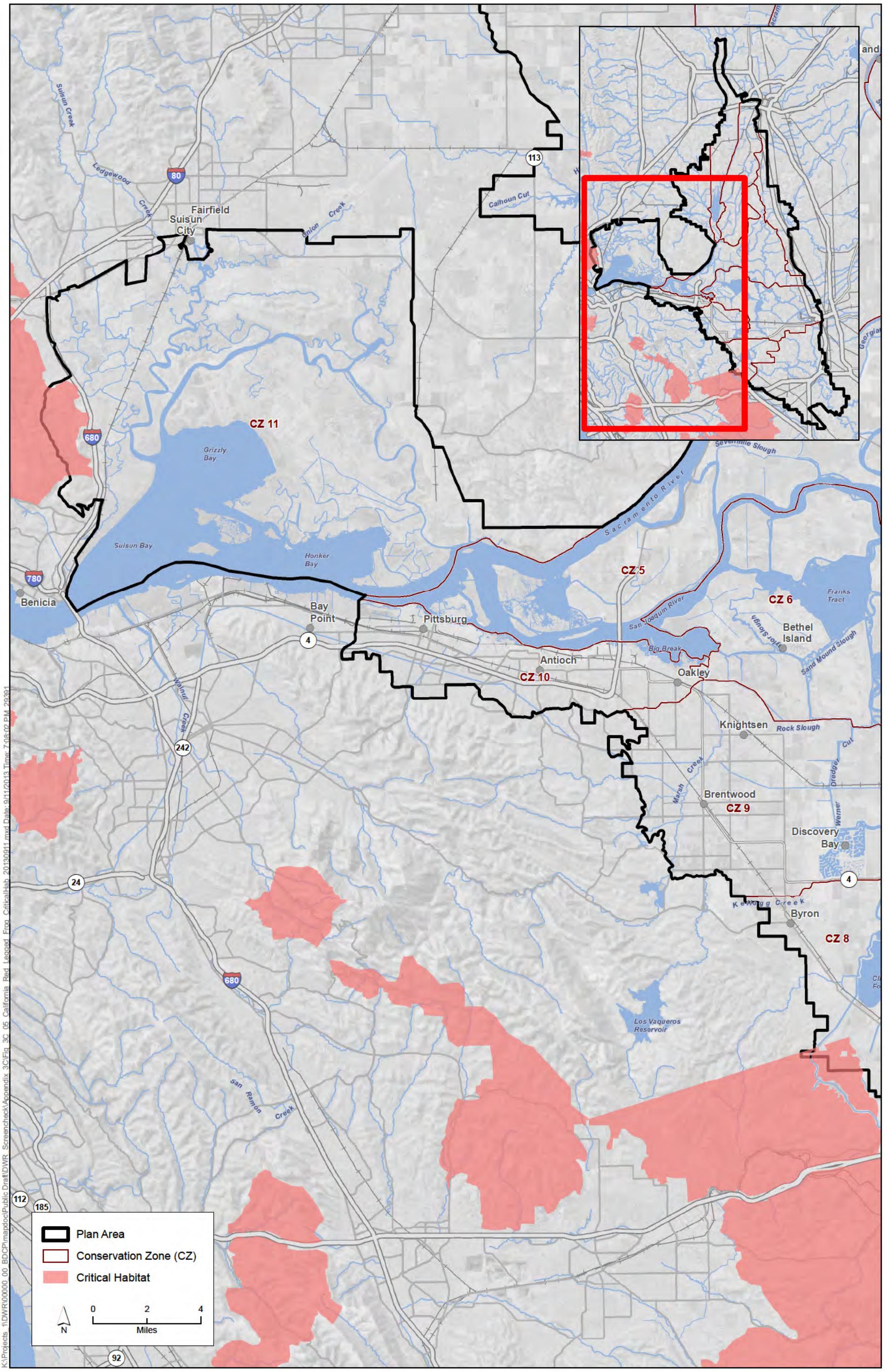
GIS Data Source: Conservation Zones, SAIC 2012;
Critical Habitat, USFWS 2012.

Figure 3.C-3
Vernal Pool Tadpole Shrimp Critical Habitat



GIS Data Source: Conservation Zones, SAIC 2012;
Critical Habitat, USFWS 2012.

Figure 3.C-4
California Tiger Salamander Critical Habitat



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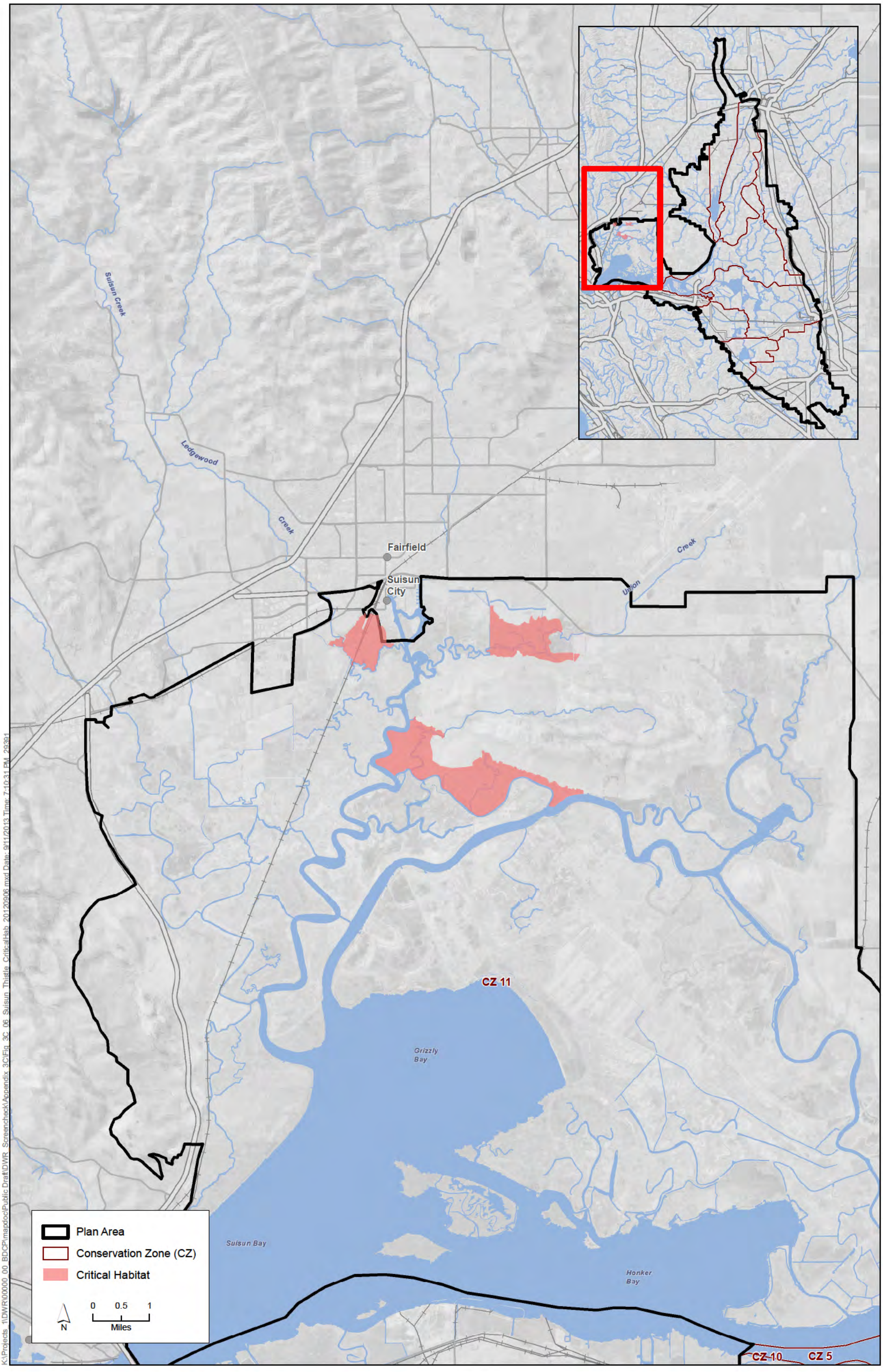
GIS Data Source: Conservation Zones, SAIC 2012;
Critical Habitat, USFWS 2012.

Figure 3.C-5
California Red-Legged Frog Critical Habitat



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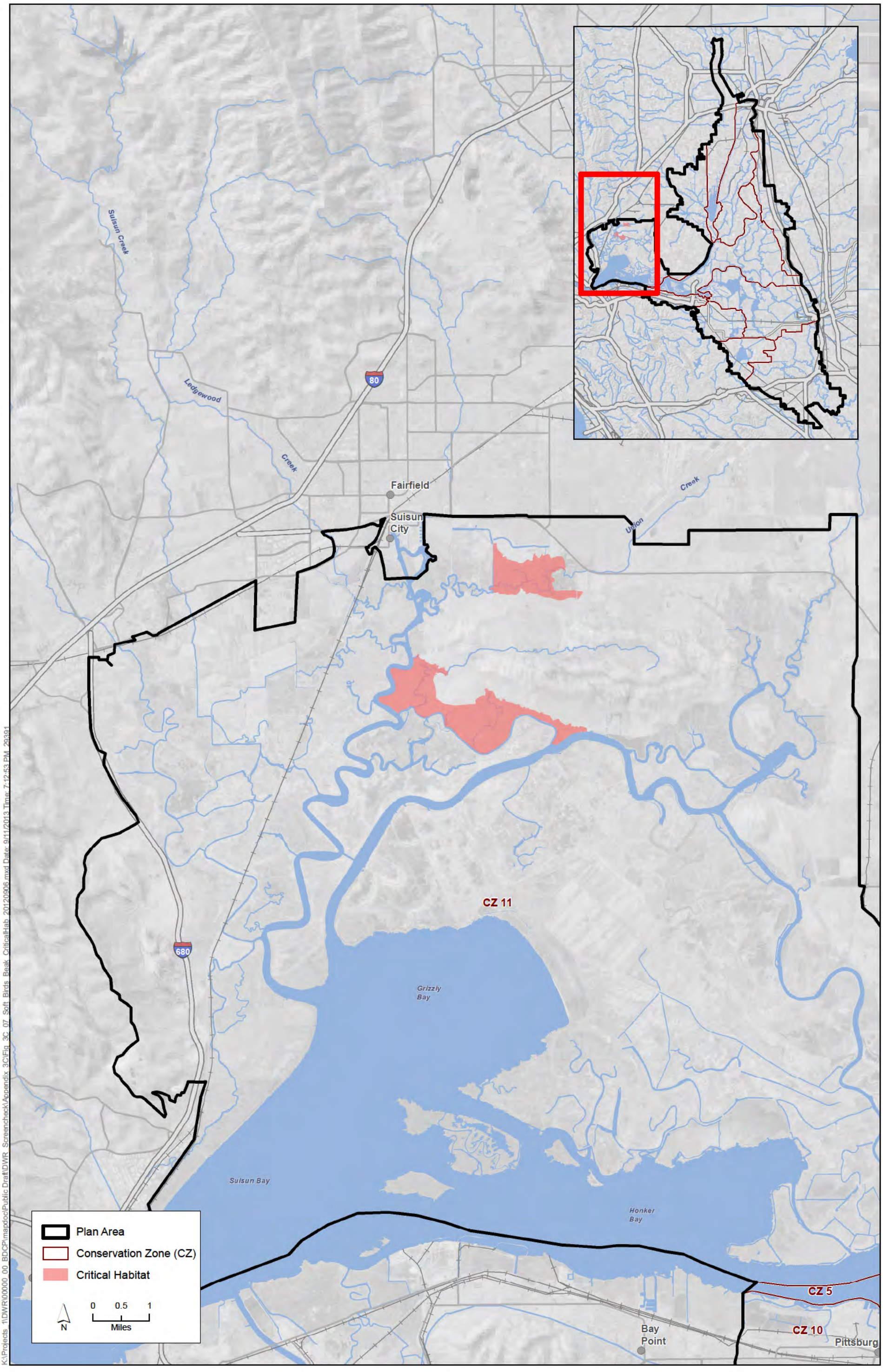
GIS Data Source: Conservation Zones, SAIC 2012;
Critical Habitat, USFWS 2012.

Figure 3.C-6
Suisun Thistle Critical Habitat



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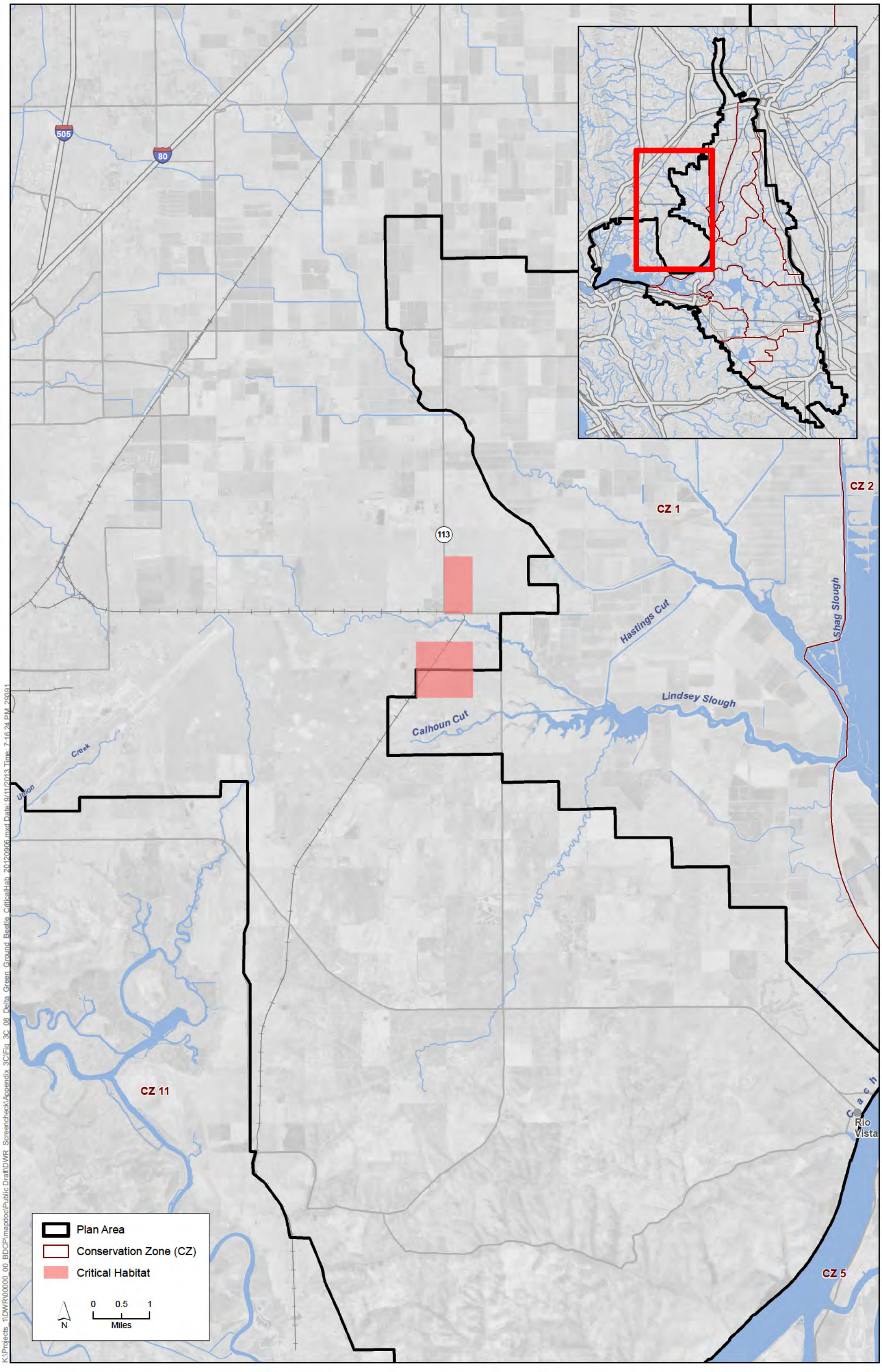
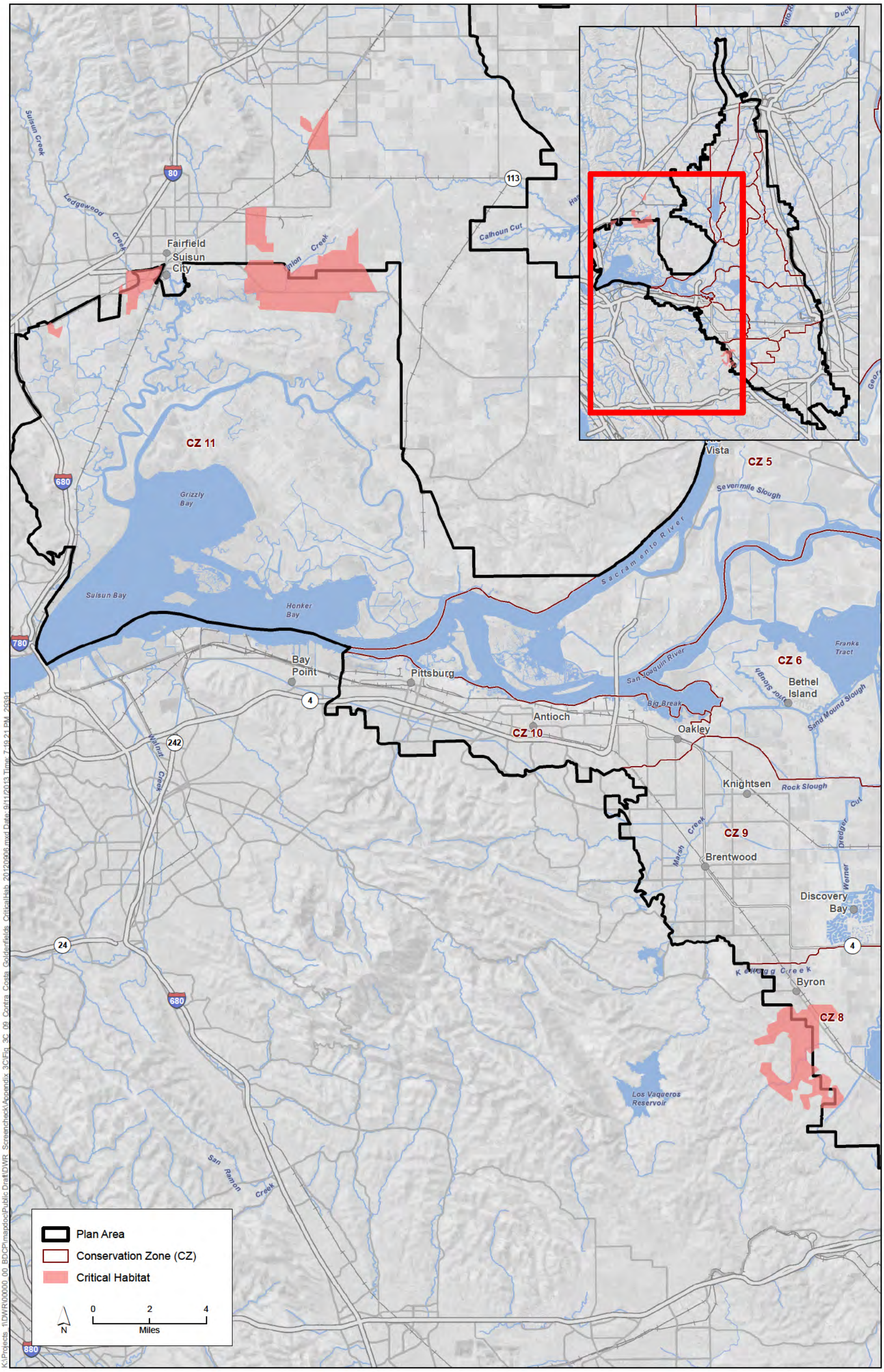
GIS Data Source: Conservation Zones, SAIC 2012;
Critical Habitat, USFWS 2012.

Figure 3.C-7
Soft Bird's-Beak Critical Habitat



GIS Data Source: Conservation Zones, SAIC 2012;
Critical Habitat, USFWS 2012.

Figure 3.C-8
Delta Green Ground Beetle Critical Habitat



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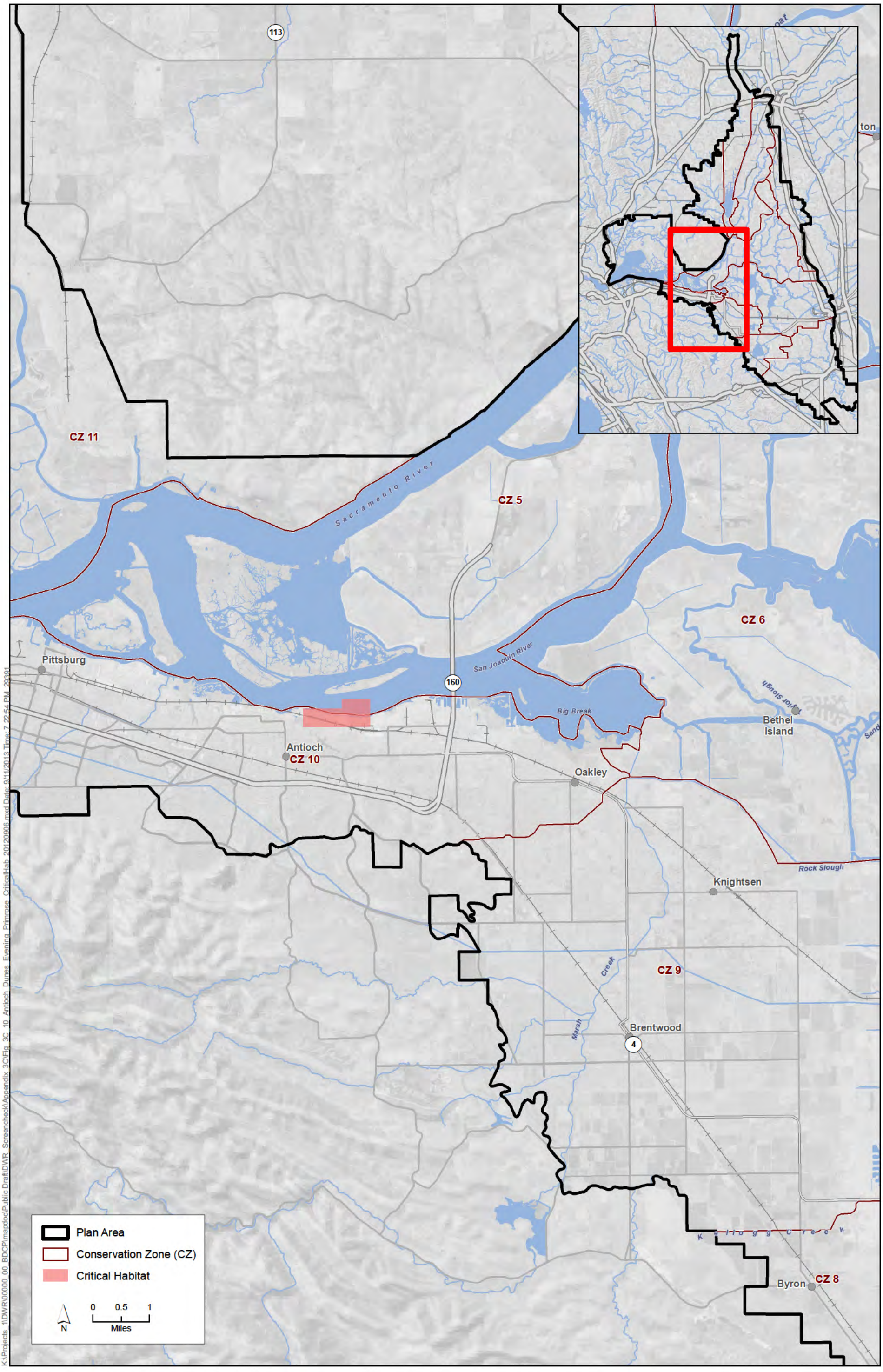
GIS Data Source: Conservation Zones, SAIC 2012; Critical Habitat, USFWS 2012.

Figure 3.C-9
Contra Costa Goldfields



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GIS Data Source: Conservation Zones, SAIC 2012;
Critical Habitat, USFWS 2012.

Figure 3.C-10
Antioch Dunes Evening Primrose Critical Habitat