# California Red-Legged Frog

## Existing Information

### Endangered Species Act Status

California red-legged frog was listed as a threatened species by USFWS on May 23, 1996 (61 FR 25813).

### General Life History and Habitat Requirements

California red-legged frog inhabits marshes, streams, lakes, ponds, and other, usually permanent, sources of water that have dense riparian vegetation (Stebbins 2003:225). California red-legged frog primarily breeds in ponds and less frequently in pools within streams (Thomson et al. 2016:103). Breeding occurs from November through April, and red-legged frogs typically lay their eggs in clusters around aquatic vegetation (USFWS 2002:16). Larvae undergo metamorphosis from July to September, 3.5 to 7 months after hatching (66 FR 14626).

California red-legged frogs often disperse from breeding sites to various aquatic, riparian, and upland estivation habitats during the summer (66 FR 14628); however, it is common for individuals to remain in the breeding area year-round (66 FR 14628; Bulger et al. 2003:93; Fellers and Kleeman 2007:278). Adults may take refuge during dry periods in rodent holes or leaf litter in riparian habitats (USFWS 2002:14). Within riparian areas, microhabitats utilized by California red-legged frogs include blackberry thickets, logjams, and root tangles (Fellers and Kleeman 2007:278).

California red-legged frog travels through a variety of upland habitat types (e.g., grassland, riparian, woodlands) to reach breeding and nonbreeding sites, upland refugia and foraging habitats, or new breeding locations (Bulger et al. 2003:90-91; Fellers and Kleeman 2007:275-276). Frogs typically travel much shorter distances between aquatic and upland refugia and foraging habitats than when dispersing between breeding and nonbreeding aquatic habitats (Bulger et al. 2003:89, 91). In one study, 90% of radio-tagged California red-legged frogs that did not make overland movements (i.e., nonmigrating frogs) were found within 200 feet (60 meters) of aquatic habitat throughout the year; the farthest movement was 427 feet (130 meters) from water and was in response to summer rain (Bulger et al. 2003:87-88). In another study, a radio-tagged California red-legged frogs moved at least 0.9 mile (1 kilometer) and up to 1.7 mile (2.8 kilometers) over several months during the breeding season (Fellers and Kleeman 2007:277-278).

For the purpose of assessing the distribution of habitat for California red-legged frog in the action area, the species model included ponds, reservoirs, perennial streams, intermittent streams identified through aerial imagery as aquatic habitat, and grassland within 300 feet of modeled aquatic habitat as upland habitat. Modeled habitat was restricted only to areas west of the canals running north to south to Funks Reservoir, because the remaining areas consist of agricultural lands on the valley floor that are unsuitable for this species.

### Historical and Current Distribution and Abundance

Historically, the California red-legged frog occurred in coastal habitat from Point Reyes National Seashore in Marin County and inland from the vicinity of Redding, Shasta County, southward along the interior Coast Ranges and Sierra Nevada foothills to northwestern Baja California, Mexico (Storer 1925:235-236:95). California red-legged frog is still locally abundant in portions of the San Francisco Bay Area and the Central Coast. However, only isolated populations have been documented elsewhere within the species’ historical range, including the Sierra Nevada, northern Coast Ranges, and northern Transverse Ranges (USFWS 2017b).

### Occurrence in the Action Area

California red-legged frog is considered extirpated from the valley floor (USFWS 2002), which constitutes the portion of the action area generally east of Funks Reservoir. The areas of grassland surrounding and to the west of Funks Reservoir provides potentially suitable dispersal and upland habitat for California red-legged frog. Several streams, including Funks Creek, and multiple ponds provide suitable aquatic habitat for California red-legged frog (Figure 4.2-10). Potentially suitable upland habitat consists of areas within 300 feet of suitable aquatic habitat, and potentially suitable dispersal habitat consists of all land cover types within 1 mile of aquatic habitat.

Although there are no CNDDB records of California red-legged frog within 50 miles of the action area (California Department of Fish and Wildlife 2019) (Figure 4.2-9), there is an occurrence in Glenn County depicted in the species account in California Amphibian and Reptile Species of Special Concern (Thomson et al. 2016). The species was not detected during surveys conducted within the Sites Reservoir project area from 1997 to 2001; however, surveys were not conducted during the breeding season, and not all properties were accessible at time of the surveys (Brown and Yip 2000; CDFG 2003a).

### Limiting Factors, Threats, and Stressors

California red-legged frog has been extirpated from approximately 70 percent of its historical range, with severe declines primarily in the Central Valley and southern California (USFWS 2002:1, 17). Loss and degradation of habitat from conversion of lands to agricultural and urban uses, overgrazing, mining, recreation, and timber harvesting have contributed to the decline of populations of California red-legged frog. Urbanization often fragments habitat and creates barriers to dispersal, which can expose frogs to increased risk of predation (USFWS 2002:17). Pesticides, herbicides, and other agrochemicals are toxic to various life stages of ranid frogs (Hayes and Jennings 1986:497). Exotic predatory fish and bullfrogs also pose significant threats to California red-legged frogs. Because of their larger size, more varied diet, and longer breeding season, bullfrogs depredate and out-compete California red-legged frogs (USFWS 2002:24). The creation of reservoirs through dam construction in the Central Valley and southern California has directly eliminated, fragmented, or isolated populations of California red-legged frogs (USFWS 2002:19). Smaller impoundments and water diversions can also preclude or inhibit dispersal and reduce high flows typically needed to maintain deep holes in streams (USFWS 2002:19), which provide important breeding and nonbreeding habitat for red-legged frogs (Fellers and Kleeman 2007:279).

### Recovery

USFWS published the *Recovery Plan for the California Red-legged Frog* (*Rana aurora draytonii*) on May 28, 2002 (USFWS 2002). The objective of the recovery plan is to reduce threats and improve the population status of the California red-legged frog sufficiently to warrant delisting. USFWS identified the following actions to achieve the recovery plan objective.

* Protect known populations and reestablish populations.
* Protect suitable habitat, corridors, and core areas.
* Develop and implement management plans for preserved habitat, occupied watersheds, and core areas.
* Develop land use guidelines.
* Gather biological and ecological data necessary for conservation of the species.
* Monitor existing populations and conduct surveys for new populations.
* Establish an outreach program.

The action area overlaps four recovery units: Sierra Nevada Foothills and Central Valley, North Coast Range Foothills and Western Sacramento River Valley, North Coast and North San Francisco Bay, and South and East San Francisco Bay(USFWS 2002).

### Critical Habitat

Critical habitat for California red-legged frog was designated on April 13, 2006 (71 FR 19244–19346) and a revised designation was published on March 17, 2010 (75 FR 12816–12959). This revised critical habitat consists of 1,636,608 acres across 48 units in California from Butte County to Los Angeles County. The action area overlaps with designated critical habitat unit SOL-1: Sky Valley in southwestern Solano County (75 FR 12816–12959).

## Effects

This section describes the effects of geotechnical investigations on California red-legged frog.

### Geotechnical Investigations

#### Direct Effects

No geotechnical activities would take place in California red-legged frog aquatic habitat but activities would take place in upland habitat. The Proposed Action could result in the injury, mortality, or disturbance of California red-legged frog in areas of upland habitat. California red-legged frogs could be injured or crushed by equipment working in upland habitat or by vehicles traveling though the action area. Fuel or oil spills from equipment into aquatic habitat could also cause the injury or mortality of California red-legged frog. Vibrations from equipment and presence of human activity during the Proposed Action activities may also disturb frogs within the action area. The disturbance could reduce foraging efficiency, potentially resulting in decreased fitness or increased dispersal time away from cover and making individuals more vulnerable to predators.

Geotechnical investigations in upland habitat would be minimized, any unavoidable activities in upland habitat would not result in substantial ground disturbance, and most or all of the geotechnical activities would be conducted in areas treated in the *Construction* section as permanently lost habitat. Geophysical activities would require the placement in the ground of pins that are approximately 4 to 6 inches long and would be used for conducting surface seismic refraction testing. This test would require the placement of geophones on the pins to record vibrations in the ground that are created by a sledgehammer or weight drop. Typically, no other ground disturbance results from such tests; however, loose soil may be removed by shovel to a depth of approximately 3 inches to provide adequate contact for the geophones. If present, California red-legged frogs in the area during vegetation pruning, placement of pins, and any digging could be injured or killed. If present, California red-legged frogs in the vicinity of the surface seismic refraction could be disturbed by vibrations associated with the testing, which could disrupt normal behaviors and increase energy expenditures.

The geophysical work would also include ERI/ERT surveys, which require the placement of half-inch diameter stainless steel electrodes 4 to 6 inches into the ground and running a current through a wire on the ground surface at 50-foot intervals. The electrical current in the wire would vary from 10 mA to about 500 mA at approximately 400 volts DC. If present, California red-legged frogs could be injured or killed if they were to come into contact with the pins underground or with the wire on the surface when electrified.

Helicopters landing and taking off during the placement of the boring machines and related equipment at geotechnical boring work areas near California red-legged frog habitat could disrupt normal behaviors of California red-legged frogs, such as basking, dispersal, and breeding, if frogs are occupying aquatic or upland habitat in or near these work areas. These effects would happen over a period of days in a given area and be of short duration and, therefore, Reclamation does not anticipate that helicopters would substantially affect this species.

The geotechnical borings and geophysical activities would also take place in grassland areas that are considered to be potential California red-legged frog dispersal habitat (areas within 1 mile of potential aquatic habitat), but these areas would only be considered dispersal habitat during wet weather in the fall and winter. If these activities are implemented during this time period and frogs are dispersing through work areas, the movement of work vehicles and equipment, grading, and other activities could result in injury or mortality of California red-legged frogs. These activities also could result in the temporary disturbance of dispersal habitat for days to week.

The Authority would avoid the potential for injury and mortality by requiring the completion of pre-activity surveys to identify occupied habitat and the use of a biological monitor, as described in Chapter 2, Section 2.5.3, *Terrestrial Species Conservation*. The biological monitor would ensure no California red-legged frogs are present in work areas immediately prior to vegetation removal, ground disturbance, or the placement of equipment. The monitor also would ensure that the placement of pins avoids burrows and cracks and that frogs and other wildlife do not come into contact with the test wires while they are charged. The conservation measures also require avoidance of ground disturbance and vegetation removal during or within 24 hours following a rain event.

Implementation of the conservation measures would ensure that adverse effects on red-legged frog habitat are minimized. These measures, described in Section 2.5.3, involve relocating work areas away from suitable aquatic habitat, making workers aware of the species habitat requirements and the need to avoid the species habitat, avoiding effects on water quality in the species’ aquatic habitat, and requiring that temporarily disturbed areas are restored to pre-activity conditions.

#### Indirect Effects

Geotechnical and geophysical investigations are not expected to have any indirect effects on California red-legged frog because of the temporary nature of the action, the minimal area of temporary disturbance, and the implementation of conservation measures to avoid indirect effect.

### Construction

#### Direct Effects

##### Potential Injury or Mortality from Construction Activities

Various construction activities could result in injury or mortality of California red-legged frogs. Vehicles and heavy equipment used at the construction sites could injure or kill California red-legged frogs, particularly as a result of heavy machinery crushing small burrows or crevices in the topsoil, if individuals are present within the construction footprint. California red-legged mortality from vehicles and heavy equipment is more likely 24 hours following a rain event and during nighttime construction. This effect would be most likely during site clearing (up to several days at each location) because, thereafter, California red-legged frogs would be more apparent (e.g., in bare ground) and these areas would be monitored to minimize the potential for California red-legged frog to enter the work area. Chapter 2, Section 2.5.3.1, *General Conservation Measures,* and Section 2.5.3.5, *California Red-legged Frog Conservation Measures,* identify measures to minimize the risk of California red-legged frogs being injured or killed from construction vehicles and heavy equipment. These measures include preconstruction surveys, providing monitors who can move frogs out of harm’s way, imposing speed limits, and inspection beneath vehicles and equipment before use.

California red-legged frogs could also be injured or killed as a result of being trapped in open construction trenches and deep holes. This effect would be minimized by covering trenches and pits, or creating ramps to allow frogs to escape, as described in *Trenches and Pits* in Section 2.5.3.1. Trenches and pits that don’t have ramps will be covered with tarps or boards that will have their edges covered such that no frogs or other wildlife can crawl beneath the cover material (e.g., placing sandbags along the edges).

California red-legged frogs could be injured or killed as a result of exposure to contaminants associated with construction activities, such as spilled fuels. The Authority would minimize the risk of injuring or killing California red-legged frogs in this manner by following the conservation measures specified in Section 2.5.3.1*.* These measures include maintaining vehicles and machinery to prevent leaks of fuels, lubricants, or other fluids, and preventing construction personnel from servicing or refueling vehicles, construction equipment, or motorized tools within 300 feet of potentially suitable California red-legged frog habitat.

California red-legged frogs could also be injured or killed as a result of the spread of contaminants or pathogens (e.g., chytrid fungus) from construction monitors or other personnel entering aquatic habitat. The Authority would avoid this effect by requiring all personnel entering federally list species aquatic habitat for any reason to follow established decontamination procedures as described in *Decontamination* in Section 2.5.3.1*.*

Although measures would be applied to minimize the risk of injuring or killing California red-legged frogs during construction, some potential remains for individuals to be injured or killed, particularly if individuals are in crevices or other hidden areas and go undetected.

##### Other Potential Construction-Related Disturbance

Potential construction-related effects on California red-legged frogs may also include disruption of behavior and movement due to noise, visual disturbance, vibration from equipment, or general presence of humans. Disruption of behavior could make individuals more susceptible to predation, impairment of feeding or breeding behavior, or reduction in survivability or reproductive fitness as a result of stress and excess energy expenditure.

##### Permanent Habitat Loss

An estimated 483 acres of California red-legged frog modeled aquatic habitat and 5,265 acres of modeled upland habitat overlap with the construction and inundation area. As described in Section 2.5.3.1, *General Conservation Measures*, workers would confine ground disturbance and habitat removal to the smallest area necessary to facilitate construction activities.

An estimated 224 acres of the 483 acres of affected modeled aquatic habitat consists of Funks Reservoir. Although Funks Reservoir is included in the California red-legged frog model for aquatic habitat, the habitat quality is marginal (large reservoir occupied by bullfrogs and regularly disturbed) and the likelihood of California red-legged frogs using this area is low. Expansion of the reservoir would render this marginal habitat even less suitable for the species.

An estimated 203 acres of the affected modeled aquatic habitat consists of intermittent streams, and another estimated 56 acres consists of ponds that would either be inundated by the new reservoir or removed for facility construction. Additionally, 5,267 acres of uplands within 300 feet of aquatic habitat would be affected by construction and inundation. Most of these affected uplands are associated with the network of narrow intermittent streams mapped in the western portion of the construction and inundation area. These areas would be permanently lost as habitat for California red-legged frog, although there is no known population of the species in the area, and so it is uncertain whether the species uses this habitat.

The Authority would offset the effects of permanent California red-legged frog habitat loss through habitat restoration or protection as described in Section 2.5.3.5, *California Red-legged Frog Conservation Measures,* under *Compensation for Unavoidable Loss of Habitat.*

##### Temporary Habitat Loss

Some of the habitat loss would result from development and use of temporary access roads, work areas, and staging areas that would be restored to pre-construction conditions when construction is complete. Where possible, temporary disturbance areas would be located within the permanent disturbance footprint, such as the reservoir inundation area. For the purpose of this assessment, all habitat loss is treated as permanent and described in the preceding paragraph because (a) not all work areas have been identified (the permanent impact footprint was extended by 100 feet to ensure temporary habitat loss is subsumed within the permanent impact calculations); and (b) the temporary disturbance would typically last multiple years, in which case USFWS would normally treat these effects as permanent.

#### Indirect Effects

Indirect effects are effects that are reasonably certain to result from the Proposed Action but which would occur later in time. Some indirect effects of the Proposed Action are described in Section X, *Operational Effects on Terrestrial Species* rather than this section*.*

##### Predation and Invasive Species

The new reservoir could attract bullfrogs that could outcompete or prey on California red-legged frogs and render surrounding aquatic areas unsuitable for the species.

##### Disturbance from Recreation

Recreation activities associated with the newly constructed recreation areas could affect California red-legged frog include boating, camping, picnicking, fishing, swimming, and hiking. The proposed recreation areas have a footprint that represents the total area within which land-based recreation could occur. Although the entire recreation area footprints are included within the permanent habitat loss areas analyzed under Direct Effects, only approximately 15 percent of each footprint would experience a permanent loss of habitat as a result of the construction of facilities such as boat ramps, picnic areas, roads, restroom facilities, and campgrounds. The remainder of the acreage could experience indirect impacts of constructing the recreation facilities from activities such as hiking, camping in undesignated areas, firewood collection, fuelbreak and vegetation maintenance, and off-road vehicle or mountain bike use. These activities could result in additional loss or degradation of California red-legged frog habitat; injury or mortality of frogs through encounters with humans, pets, or recreational vehicles; and disruption of normal feeding, breeding, or sheltering behavior. Including the entire recreational areas in the permanent disturbance footprint accounts for these ongoing impacts.

##### Traffic-Related Mortality

Increased access and human use in the vicinity of the new reservoir would likely lead to increased traffic, which could result in injury or mortality of California red-legged frogs crossing roads. The traffic could also result in an impediment to California red-legged frog dispersal.

### Operation

#### Direct Effects

##### Potential Injury or Mortality

Dredging in the newly constructed reservoir or the forebay could result in injury or mortality of California red-legged frogs, although the likelihood of this effect is very low because the species is not likely to occur in these permanently inundated water features that are likely to support bullfrogs and predatory fish.

##### Potential Disturbance from Maintenance Activities

Noise and lighting in the vicinity of the reservoir structures could disturb California red-legged frog behavioral patterns within suitable habitat in the vicinity if the species is present. Implementation of *Minimize Effects of Lighting* in Section 2.5.6.1, *General Conservation Measures*, would minimize the lighting effects.

##### Downstream Hydrologic Effects

Downstream changes in hydrology as a result of the Proposed Action are not expected to affect California red-legged frog.

#### Indirect Effects

##### Predation and Invasive Species

Distribution of new invasive species from one area to another as a result of water diversion would be an indirect operational effect of the Proposed Action. If exotic predatory fish species are introduced into the reservoir or forebays, the fish could prey on California red-legged frogs. The likelihood of this effect on the species is low, however, because the reservoir and forebays are not likely to provide suitable habitat for California red-legged frog due to the size and duration of these water bodies, which renders the habitat more suitable for predators and competitors (e.g., bullfrogs) than for California red-legged frog.

## General Conservation Measures and Avoidance and Minimization Measures

### General Terrestrial Species Conservation Measures

#### G-CM1: Conduct Biological Resources Awareness Training

Prior to the start of ground-disturbing work (including vegetation clearing, grading, and equipment staging), a USFWS-approved biologist will conduct a mandatory biological resources awareness training for all construction personnel. This training will cover sensitive biological resources. The training will cover the natural history, appearance (using representative photographs), and legal status of species, regulatory protections, penalties for noncompliance, benefits of compliance, as well as the avoidance and minimization measures to be implemented. Participants will be required to sign a form that states they have received and understand the training. The Sites Authority will maintain the record of training and make it available to agencies, upon request. If new construction personnel are hired for the Project, the contractor will ensure that the new personnel receive the mandatory training before starting work.

#### G-CM2: Treatment of Vehicles, Equipment, Hazardous Materials, and Dust

Construction vehicles will observe the posted speed limit on hard-surfaced roads and a 10 mile-per­hour speed limit on unpaved roads during travel within habitat for federally listed species. Construction vehicles and equipment will restrict off-road travel to the designated construction areas. Construction vehicles and equipment left on-site overnight will be thoroughly inspected each day for snakes and frogs (both underneath the vehicle and in open cabs) before they are moved. All construction equipment will be maintained to prevent leaks of fuels, lubricants, or other fluids. To prevent possible resource damage from hazardous materials such as motor oil or gasoline, construction personnel will not service or refuel vehicles, construction equipment, or motorized tools within 300 feet of potentially suitable frog or snake aquatic habitat. Gravel roadways, staging areas, and other applicable areas will be sprayed with water as needed to minimize dust during construction activities, particularly in the vicinity of listed species habitat such as elderberry shrubs.

#### G-CM3: Relocation Plan

The Sites Authority will work with USFWS to develop a relocation plan in case of the event that a biological monitor will need to move a California red-legged frog or giant garter snake. The relocation plan will be finalized prior to the start of construction activities. This plan will include instructions for trapping, handling, and transporting the individual animals; specifications of locations to release non-injured individuals; and reporting protocols. The relocation plan will also include instructions on where to take injured individuals for veterinary care.

#### G-CM4: Notification

The Sites Authority will notify USFWS within 24 hours in the event that a federally listed species becomes injured or killed at a construction site.

#### G-CM5: Trenches and Pits

All trenches and pits left open overnight will be covered by plywood boards or a similar rigid material to prevent wildlife from falling into them. Dirt will be shoveled around all the edges of the plywood or other material prevent animals from crawling under it. In cases where trenches or pits cannot be covered, a section of the trench or pit will be partially backfilled to create an earthen ramp with a 3:1 slope to allow wildlife to escape from the trench or permit. All trenches and pits will be inspected by the biological monitor before they are backfilled.

#### G-CM6: Decontamination

The Sites Authority will follow USFWS-approved decontamination protocols prior to any staff (biologists, surveyors, construction workers), equipment, tools, or vehicles entering action area waters or moist soils associated with waters in order to minimize the spread of pathogens. At a minimum, these measures will include the following:

* All organic matter should be removed from boots and vehicle tires and all other surfaces that have come into contact with water or potentially contaminated sediments. Cleaned items should be rinsed with clean water before leaving each study site.
* Boots and hands, etc. should be scrubbed with either a 75% ethanol solution, a bleach solution (0.5 to 1.0 cup per 1.0 gallon of water), Quat-128™ (1:60), or a 6% sodium hypochlorite 3 solution. Equipment should be rinsed clean with water between work areas. Cleaning equipment in the immediate vicinity of a pond or wetland should be avoided (e.g., clean in an area at least 100 feet from aquatic features). Care should be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.
* Used cleaning materials (liquids, etc.) should be disposed of safely, and if necessary, taken back to a facility proper disposal. Used disposable gloves should be retained for safe disposal in sealed bags.

#### G-CM7: Minimization of Habitat Disturbance

The Sites Authority will limit habitat disturbance to the minimal area necessary to facilitate construction. The boundaries of the disturbance areas (including staging, access, and construction areas), will be clearly marked and construction personnel and equipment will be confined within the delineated boundaries.

#### G-CM8: Avoidance and Minimization Specific to Geotechnical Exploration

General restrictions and guidelines that will be followed by personnel are listed below. The project foreman will be responsible for ensuring that crew members adhere to these guidelines and restrictions.

* No less than 1 week prior to mobilization, the Project geologist, drilling foreman, and agency-approved biologist will conduct a joint pre-geotechnical explorations survey. This team will review the site location and drilling plan and coordinate in the field the final locations of the borehole and geophysics lines, and the extent of the ground surface preparations (if any) at each bore location. The team will also confirm means of access by geotechnical studies personnel, and coordinate in the field the final means of transportation and route of transportation for accessing the locations.
* Biologists approved by USFWS and CDFW will conduct pre-construction surveys prior to the initiation of activities and will monitor these activities. Details are provided in Conservation Measures 4, 6, 7, and 8.
* Personnel driving vehicles will observe the posted speed limit on paved roads and a 10 mile-per-hour speed limit on unpaved roads during travel in the work area.
* Helicopter flights will follow designated routes to avoid potential and known nest locations for raptors, such as Swainson’s hawk, bald eagle, and golden eagles, and other special-status avian species, such as yellow-billed cuckoo. The timing of helicopter use (i.e., landing/take off and equipment delivery) will be adjusted based on the results of special-status/nesting bird surveys. Restrictions would be developed based on site specific conditions (e.g., proximity and status of the nest, baseline noise conditions, topography) and would include limiting flight times outside of periods of high activity (e.g., morning and dusk) and outside of sensitive nesting periods, such as egg incubation.
* All food-related trash will be disposed of in closed containers and removed from the work area daily during the work period. Personnel will not feed or otherwise attract fish or wildlife to the work site.
* No pets or firearms will be allowed in the work areas.
* Sites will follow USFWS-approved decontamination protocols prior to any staff (biologists, surveyors, geotechnical investigation workers), equipment, tools, or vehicles entering action area waters or moist soils associated with waters in order to minimize the spread of pathogens. At a minimum, these measures will include the following:
* All organic matter should be removed from boots and vehicle tires and all other surfaces that have come into contact with water or potentially contaminated sediments. Cleaned items should be rinsed with clean water before leaving each study site.
* Boots and hands, etc. should be scrubbed with either a 75% ethanol solution, a bleach solution (0.5 to 1.0 cup per 1.0 gallon of water), Quat-128™ (1:60), or a 6% sodium hypochlorite 3 solution. Equipment should be rinsed clean with water between work areas. Cleaning equipment in the immediate vicinity of a pond or wetland should be avoided (e.g., clean in an area at least 100 feet from aquatic features). Care should be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.
* Used cleaning materials (liquids, etc.) should be disposed of safely, and if necessary, taken back to a facility proper disposal. Used disposable gloves should be retained for safe disposal in sealed bags.
* All equipment will be maintained to prevent leaks of fuels, lubricants, or other fluids.
* Temporary signs, staking, or flagging will be used to identify sensitive biological resources and project personnel will be advised to avoid disturbance of these areas. These areas will be identified during pre-activity surveys. Signs, staking, and flagging will be inspected by the biological monitor on a daily basis.
* Any worker who inadvertently injures or kills a sensitive species or finds one dead, injured, or entrapped will immediately report the incident to the project foreman, who will immediately report the incident to the Authority. The Authority will provide oral notification to the USFWS Sacramento Endangered Species Office and the local CDFW warden or biologist within 1 working day. The Authority will follow up with written notification to USFWS and CDFW (if necessary) within 5 working days.
* Vehicles and equipment left on-site overnight will be thoroughly inspected each day for wildlife (both underneath the vehicle and in open cabs) before they are moved. To prevent possible resource damage from hazardous materials such as motor oil or gasoline, personnel will not service or refuel vehicles, equipment, or motorized tools within 300 feet of potentially suitable California red-legged frog or giant garter snake aquatic habitat.
* Maintain equipment and materials necessary for cleanup of accidental spills onsite. Clean up accidental spills and leaks immediately and dispose of properly.
* Limit clearing of vegetation and scraping or digging of soil to the minimal area necessary to facilitate geotechnical and geophysical activities.
* In the event that any of the geotechnical or geophysical work areas need to moved or additional locations are needed, then these areas will be reviewed for sensitive biological resources applying the same methodology as described in this Biological Assessment, which includes a process for adjusting the locations to avoid and minimize effects on sensitive biological resources. The same conservation measures described here will apply to these locations to assure that effects are avoided and minimized. Sites will notify UFWS and CDFW on any new or relocated work areas in a brief letter report with a map prior to work beginning at these locations.
* If no suitable upland disposal location is located nearby (i.e., one that would not result in discharges to sensitive biological resources including habitat of listed aquatic or semi-aquatic species) investigation-derived groundwater generated during field activities will be placed into water tanks and/or 55-gallon drums and disposed of offsite in an area without sensitive biological resources. Disposal of this water in either uplands near the investigation site or in offsite locations will be completed in accordance with Order R5-2016-0076-01 for Limited Threat Discharges to Surface Water or *General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality* 2003-003-DWQ, as applicable.
* If water drafting (pumping from the Sacramento River or other waterways in the action area) is needed, then and all intakes used to draft water will be screened to protect special-status fish and special-status amphibians, including eggs, larvae, and adults, from being entrained with water being pumped from the waterway. Screens will be installed, operated, and maintained according to applicable CDFW and NMFS fish screening criteria for salmonid fry (California Department of Fish and Game 2002a; National Marine Fisheries Service 1997). Fish screens meeting CDFW and NMFS criteria to protect salmonid fry have the following specifications:
* A minimum effective screen area[[1]](#footnote-1) of 3.0 square feet per cubic feet per second, and a nominal maximum approach velocity[[2]](#footnote-2) of 0.33 feet per second.
* Screen face material consisting of the following dimensions:
* Perforated plate: screen openings shall not exceed 3/32 inch (2.38 millimeters), measured in diameter.
* Profile bar: screen openings shall not exceed 0.0689 inch (1.75 millimeters) in width.
* Woven wire: screen openings shall not exceed 3/32 inch (2.38 millimeters), measured diagonally (e.g., 6 to 14 mesh).
* Screen material with a minimum of 27 percent open area.

#### G-CM9: Miscellaneous Measures

1. All food-related trash will be disposed of in closed containers and removed from the construction area daily during the construction period. Construction personnel will not feed or otherwise attract fish or wildlife to the construction site.
2. No pets or firearms will be allowed in the construction area.

#### G-CM10: Restoration of Temporarily Disturbed Area

The Authority will restore temporarily disturbed areas to pre-project conditions within a year after the activity causing habitat disturbance is completed. When restoring temporarily-impacted habitat, the Sites Authority must utilize native plant species appropriate to the area and will control the spread of invasive plant species.

#### G-CM11: Minimize Effects of Lighting

For all construction lighting and permanent lighting associated with facilities, the Authority will shield the lights and direct them away from adjacent habitat 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.

#### G-CM12: Invasive Plant Species

To minimize the spread of nonnative, invasive plant species from the action area, the Authority 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 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 Project 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.

### Species Specific Avoidance and Minimization Measures

#### CRLF-CM1: Geotechnical Activities

Geotechnical activities will minimize effects on California red-legged frog habitat by locating work areas away from suitable habitat. The biological monitor (described in CRLF-CM4: *Biological Monitoring*) will ensure no California red-legged frogs are present in work areas immediately prior to vegetation removal, ground disturbance, and the placement of equipment. The monitor will would ensure that the placement of pins avoids burrows and cracks and that frogs and other wildlife do not come into contact with the test wires while they are charged. Geotechnical activities will also avoid ground disturbance and vegetation removal during or within 24 hours following a rain event.

#### CRLF-CM2: Site Assessment and Field Surveys

A USFWS-approved biologist will conduct a site assessment and field surveys for California red-legged frog prior to the start of construction using the methods described in USFWS (2015).

#### CRLF-CM3: Avoidance of Aquatic Habitat

Design temporary work areas and any other activities with flexible locations to avoid aquatic California red-legged frog habitat by 50 feet.

#### CRLF-CM4: Biological Monitor

A USFWS-approved biological monitor will be present during all ground-disturbing activities and during any activities involving heavy equipment within 300 feet of potentially suitable California red-legged frog aquatic habitat. If a California red-legged frog moves into the disturbance area, all personnel including the biological monitor will have the authority to stop construction activities until appropriate corrective measures have been completed or the biological monitor determines that the frog will not be harmed. The biological monitor will permit the frog to move out of the disturbance area on its own. Should a California red-legged frog need to be moved a biologist with a 10(a)(1)(A) permit will trap and relocate the individual to the area designated in a USFWS-approved relocation plan for the species.

#### CRLF-CM6: Recreation

Develop site specific guidelines for recreation activities to reduce or eliminate impacts to the California red-legged frog where these activities pose an on-going threat to habitat quality (USFWS 2002).

#### CRLF-CM7: Water Flow Regimes

Develop and implement guidelines for maintaining adequate water flow regimes, particularly in California red-legged frog habitats downstream of impoundments, water diversions, and residential or industrial developments (USFWS 2002).

## Compensation

### CRLF-CM5: Compensation for Unavoidable Loss of Habitat

Permanent loss of California red-legged frog habitat will be compensated by applying a 3:1 ratio (3 acres created or protected:1 acre lost). Compensatory mitigation will include a management and monitoring plan that will consider the threats and needs of the California red-legged frog.

1. *Effective screen area* - the total submerged screen area, excluding major structural members, but including the screen face material. The minimum *effective screen area* is calculated by dividing the maximum screened flow by the allowable approach velocity. [↑](#footnote-ref-1)
2. *Approach velocity* - the vector component of velocity that is perpendicular to the vertical projection of the screen face, calculated by dividing the maximum screened flow by the effective screen area. An exception to this definition is for end-of-pipe cylindrical screens, where the *approach velocity* is calculated using the entire effective screen area. [↑](#footnote-ref-2)