Sites Terrestrial Species Federal Agency Coordination Meeting
Agenda and Action Items

Date: November 11, 2019 **Location:** 2800 Cottage Way, Sacramento, CA

Time: 1:00p.m. – 3:00 p.m.

Leader:	Ellen Berryman	**Recorder:**	Ellen Berryman

Purpose: Sites BA, Terrestrial coordination with Federal Agencies

Invitees:

Dan Cordova ☐	Lauren Sullivan ☐	Ellen Berryman ☐
Monique Briard ☐	Jelica Arsenijevic ☐	John Spranza ☐
		Ian Boyd ☐

Outstanding Actions

Action/Decision	Status	Notes
Decide whether need to conference on longfin smelt/foothill yellow legged frog	In progress	Need to re-visit when BA is in full swing again, to see whether these species have been proposed for listing, or proposed listing is imminent.
For each species or group of species, determine whether surveys should be conducted and if so, how will they be used (e.g., NLAA determinations?). Also discuss timing.	In progress	To discuss with each species group we address.
Lauren to send may affect/no effect table to NWR for review	In progress	
Dan will review and provide comments on the plants and vernal pool inverts. FWS will closely review the materials provided on plants and vernal pool inverts but rather then providing detailed tracked changes, they will let us know if there's anything missing that we should add.	In progress	Dan provided comments on vernal pool inverts that can be applied to plants and other species.
ICF to continue looking for viable mitigation options for the listed plant species in case they are found and cannot be avoided.	In progress	

Agenda:

Discussion Topic

1. Introductions, review meeting topics

2. Notes from last meeting

BOR written comments on vernal pool shrimp (and any additional FWS verbal comments)

3. Feedback on cuckoo excerpts

4. Feedback on CRLF excerpts

5. Meeting schedule

Sites Terrestrial Species Federal Agency Coordination Meeting
Agenda and Action Items

Date: October 29, 2019 **Location:** 2800 Cottage Way, Sacramento, CA

Time: 1:00p.m. – 3:00 p.m.

Leader:	Ellen Berryman	**Recorder:**	Ellen Berryman

Purpose: Sites BA, Terrestrial coordination with Federal Agencies

Attendees:

Dan Cordova ☒
Monique Briard ☐
Mike Jerico ☒
Steven Emmons ☒
Lauren Sullivan ☒
Jelica Arsenijevic ☐
Andrea (Lee) Bartoo ☒
Mike Carpenter ☒
Ellen Berryman ☒
John Spranza ☐
Ian Boyd ☐

Actions

Action/Decision	Status	Notes
Ellen to check on Ian's availability Sept. 23rd and 24th, and reschedule the cuckoo meeting.	DONE	Meetings re-scheduled (see latest)
Revisit may affect/no effect table at 10/29 meeting	DONE	See notes below
Decide whether need to conference on longfin smelt/foothill yellow legged frog	In progress	Need to re-visit when BA is in full swing again, to see whether these species have been proposed for listing, or proposed listing is imminent.
For each species or group of species, determine whether surveys should be conducted and if so, how will they be used (e.g., NLAA determinations?). Also discuss timing.	In progress	To discuss with each species group we address.
Lauren to send may affect/no effect table to NWR for review	In progress	
Dan will review and provide comments on the plants and vernal pool inverts. FWS will closely review the materials provided on plants and vernal pool inverts but rather then providing		

detailed tracked changes, they will let us know if there's anything missing that we should add.	
ICF to continue looking for viable mitigation options for the listed plant species in case they are found and cannot be avoided.	
Ellen will revise schedule, check with Ian, and then re-circulate.	In progress

Discussion Topic	**Notes**
Introductions, review meeting topics	Kellie Berry says no known projects in the area for cumulatives. Will need to coordinate later.
1. May Affect/No Effect Species	Discussed possibility of Colusa grass – need to look into more, discuss in table. Pools too flashy. May need to re-do IPAC check if too far in the future. **ACTION:** Lauren will send to refuges for their view.
2. Plants	Use what Lauren from refuges sent to update any info that might be missing. Approach of treating all habitat as occupied but saying that mitigation will only be for areas later determined to be occupied is okay with FWS and BOR. Need to keep looking for mitigation opportunities for the two listed plant species in case they're found and can't be avoided.
3. Vernal Pool Branchiopods	**Action:** Dan will review and provide comments on the vernal pool sections (as well as plants). Need to make sure to incorporate the AMMs from geotech where applicable. **Action:** FWS will closely review the materials provided but rather then providing detailed tracked changes, they will let us know if there's anything missing that we should add. The created pools on the refuge – haven't found listed species in the pools. Be mindful of those created pools, even though they're south of the road. Identify where pools are and make sure to consider indirect impacts. The pools at the refuge have not been inoculated, but refuges will keep us in the loop if inoculate. Approach of treating all habitat as occupied but saying that mitigation will only be for areas later determined to be occupied is okay with FWS and BOR.
4. Meeting schedule	The team re-adjusted the project schedule based on everyone's availability. **ACTION:** Ellen will make sure the schedule works with Ian and then re-circulate.

LIST OF DECISIONS FROM PRIOR MEETINGS:

1. From 10/1/2019 meeting:
    a. Put all fish, wildlife, and plants in the may affect/no effect table in the appendix and don't need to describe all the no-effect species in the Intro chapter, just reference the table in the appendix.
    b. (from Dan) Make sure the no effect/may affect table has parallel construction with similar findings, terminology (may be an issue if several different people worked on the table).
    c. (from Lauren) Create two different may-affect columns – one for the construction area and one for operation (flows). Then if either column is "may affect", it's a may affect finding for the BA.
    d. (from Lauren) LBV not expected to be of in Yolo Bypass for the Sites project, and the project wouldn't affect other LBV in Delta.
    e. (from Lauren) -Snowy plover that stops over in the action area is not the listed coastal population segment – no effect on the listed population.
    f. Project description and lack of available detail for some project components – some of which will not be available prior to the completion of the biological opinion. In the BA project description, state the level of design and we specify where uncertainty is (e.g., size, location of components) but put sideboards around it, such as specifying that maintenance buildings will be within given footprint. The BA can also specify that some components of the project may change and re-initiation will not be required unless it changes effects on the species (use re-initiation language from BOs). Also, in some cases we can say project description can change in a certain way upon USFWS approval (or concurrence that effects do not differ from what was analyzed in the biological opinion.
2. From 10/29/2019 meeting.
    a. Elaborate on Colusa grass in no effect/may affect table
    b. Need to make sure to incorporate the AMMs from geotech BA where applicable.
    c. Okay to treat all suitable habitat as occupied for the BA but to state that only occupied habitat will be mitigated.

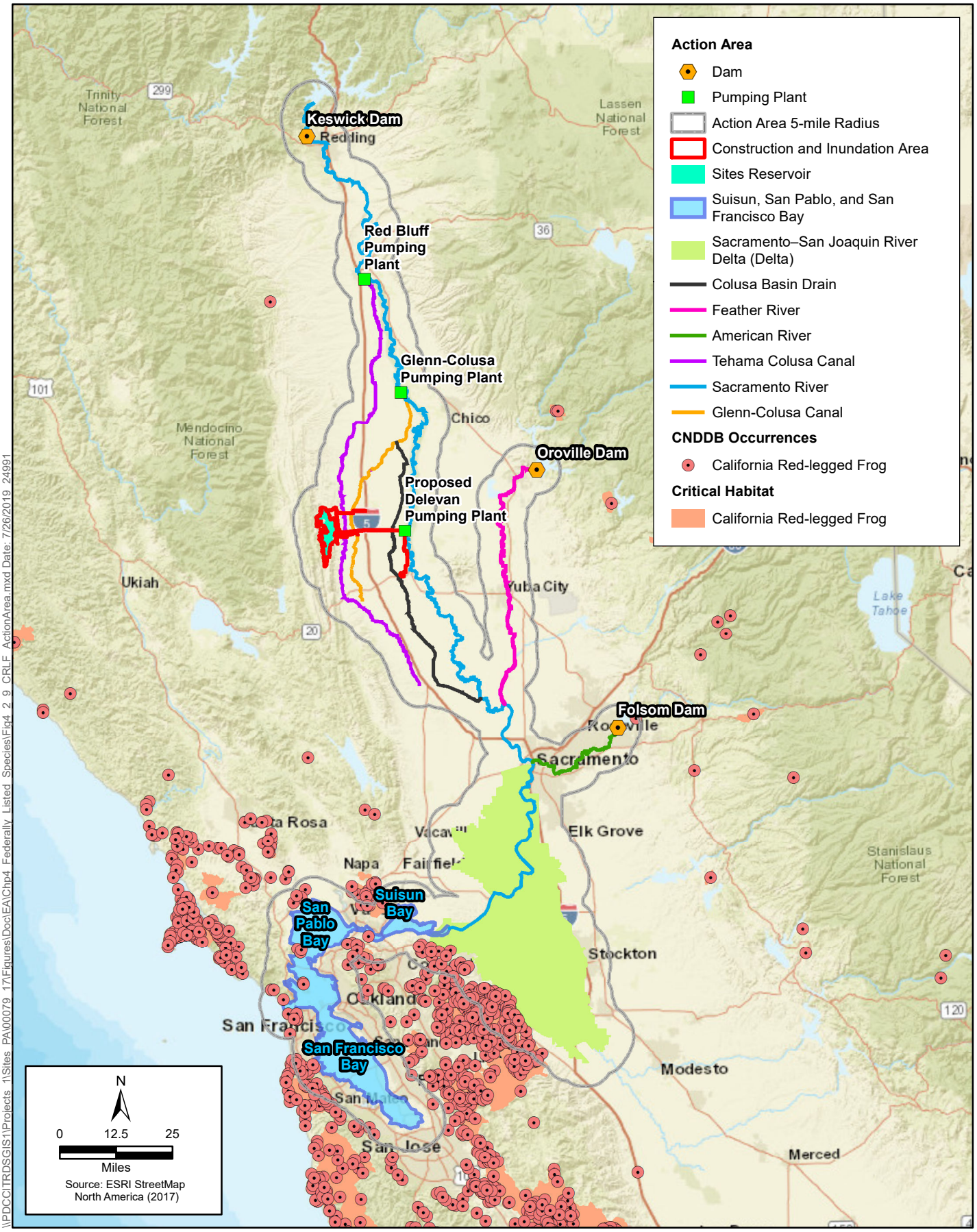

Figure 4.2-9
California Red-legged Frog Occurrences and Action Area

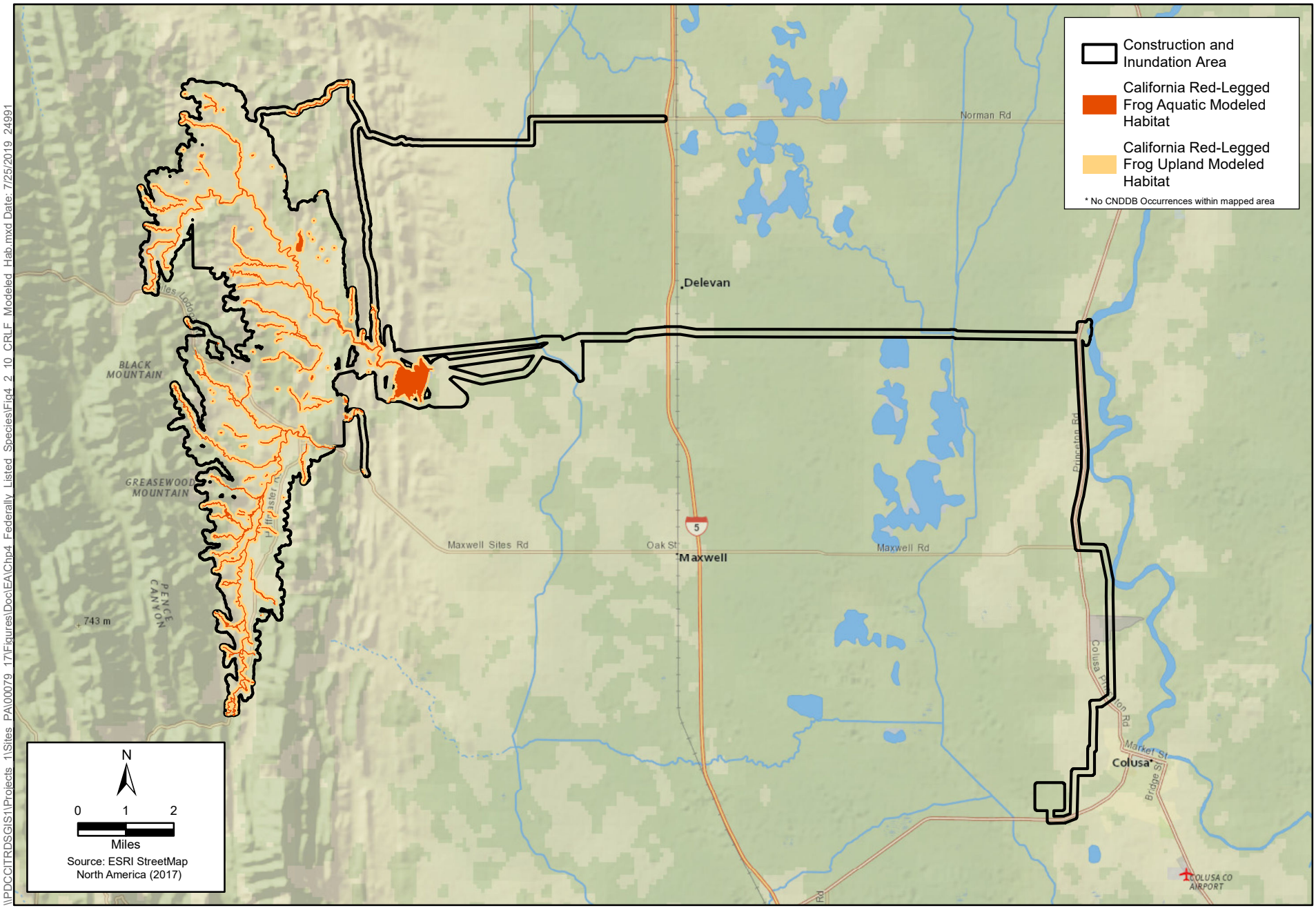

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Figure 4.2-10
California Red-Legged Frog Modeled Habitat

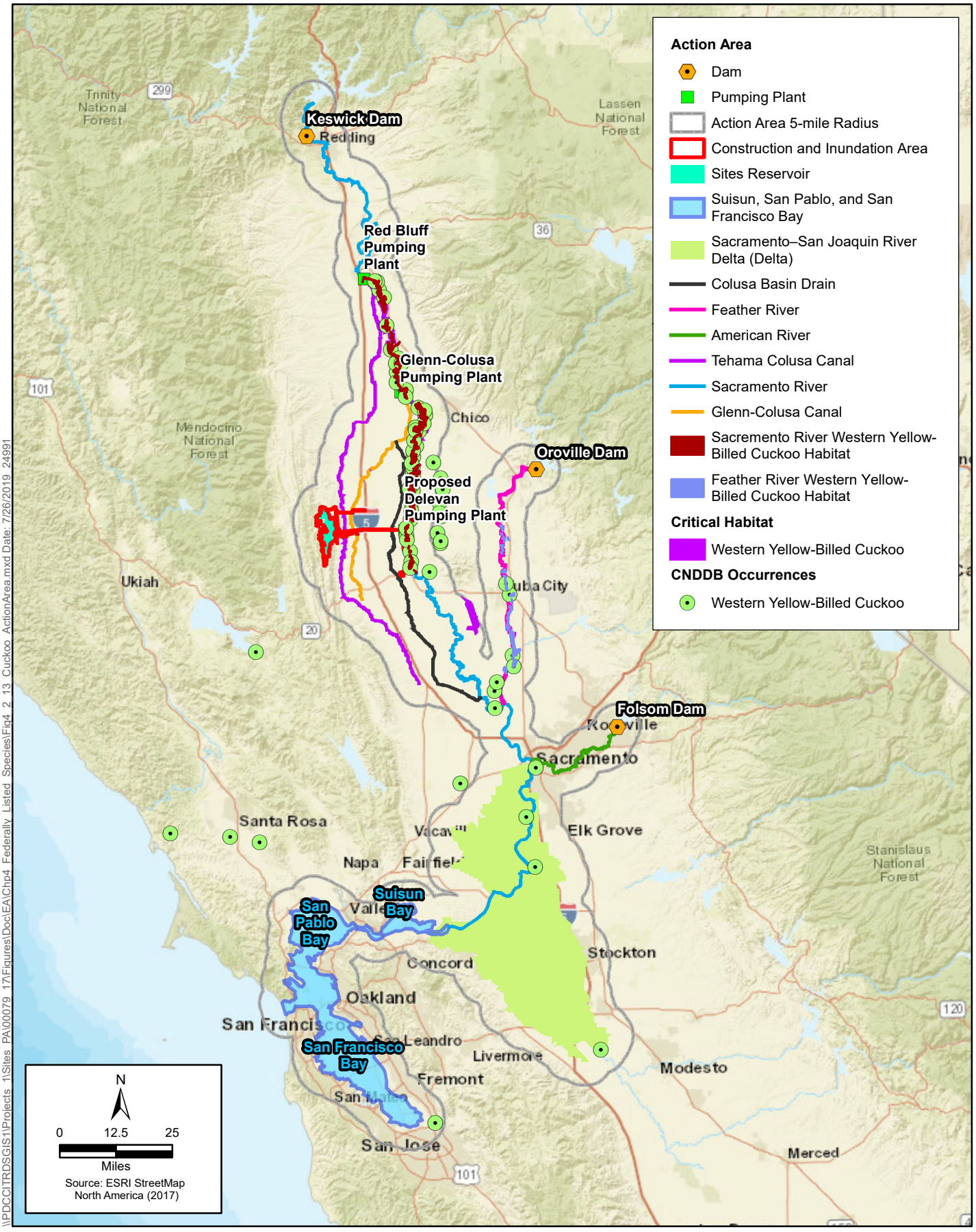

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Figure 4.2-13
Western Yellow-billed Cuckoo Occurrences and Action Area

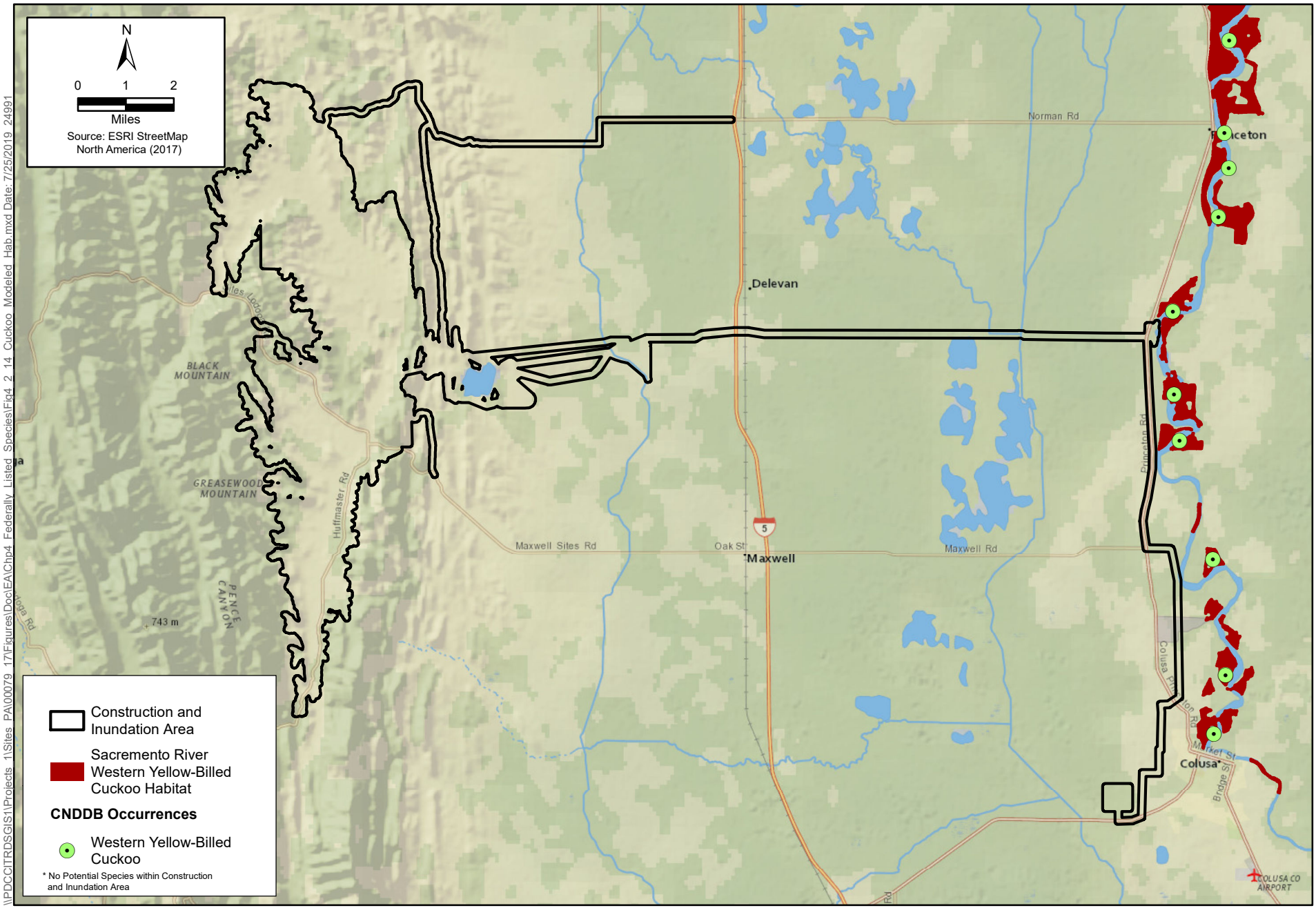

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Figure 4.2-14
Western Yellow-billed Cuckoo Modeled Habitat

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-per-hour 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] of 3.0 square feet per cubic feet per second, and a nominal maximum approach velocity[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.

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[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.

[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.

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.

Commented [BE1]: This is from the Maxwell BA but the amount of affected CRLF modeled habitat is enormous – mostly because we had to add 300 feet of adjacent upland to all those narrow intermittent streams. We should find a way to reduce the mitigation demand – either by only mitigating for habitat found to be occupied, or by coming up with alternatives to the 3:1, in negotiation with USFWS.

Commented [BE2R1]: Also, this measure is very preliminary and will need to be developed further in coordination with the Authority and USFWS.

Existing Information for Vernal Pool Branchiopods

Conservancy Fairy Shrimp

4.2.2.1 Endangered Species Act Listing Status

Conservancy fairy shrimp was listed as endangered throughout its range on September 19, 1994 (59 FR 48136–48153). In its 5-year review of the species issued in June 2012, USFWS recommended that the species remain listed as endangered (USFWS 2012:28).

4.2.2.2 General Life History and Habitat Requirements

Conservancy fairy shrimp primarily occurs in large turbid vernal pools (playa pools) that remain inundated much longer than do typical vernal pools, often into summer (Eriksen and Belk 1999:88; USFWS 2012:3). Conservancy fairy shrimp has been found in vernal pools on a variety of landforms, geologic formations, and soil types (USFWS 2005:II-183) and within a wide elevation range (16 to 5,577 feet) (Eriksen and Belk 1999:88). Conservancy fairy shrimp rarely co-occurs with vernal pool fairy shrimp and California fairy shrimp (*Linderiella occidentalis*) and generally greatly outnumbers these species when they do co-occur (Eriksen and Belk 1999:89).

Similar to other vernal pool branchiopods, Conservancy fairy shrimp is adapted to the environmental conditions of its ephemeral vernal pool habitats. These adaptations include the ability of fairy shrimp cysts to remain dormant in the soil when vernal pool habitats are dry. Fairy shrimp are also able to complete their lifecycle (from cyst hatching to reproducing) within the relatively short time period when vernal pools are inundated with water (USFWS 2005:II-195). Differences in the rate of maturation and reproduction of vernal pool branchiopods are thought to be the result of variations in water temperature (Helm 1998:134).

For the purpose of assessing the distribution of habitat for Conservancy fairy shrimp in the action area, the species model included seasonal wetlands mapped using remote imagery and a 250-foot upland buffer. Features were removed from the model if they did not show obvious signs of pooling in the winter and spring or if they did show signs of pooling and saturation year round or into late summer, which would not be conducive to the species life history.

4.2.2.3 Historical and Current Distribution and Abundance

USFWS's *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* recognizes that, although the historical distribution vernal pool fairy shrimp is unknown, Conservancy fairy shrimp was probably found in suitable vernal pool habitats throughout much of the Central Valley and southern coastal regions of California (USFWS 2005:II-181). Except for one population along the Central Coast in Ventura County, all current locations of Conservancy fairy shrimp are in the Central Valley. USFWS has identified 10 Conservancy fairy shrimp populations: (1) Vina Plains, Butte and Tehama Counties; (2) Sacramento NWR, Glenn County; (3) Mariner Ranch, Placer County; (4) Yolo Bypass Wildlife Area, Yolo County; (5) Jepson Prairie, Solano County; (6) Mapes Ranch, Stanislaus County; (7) University of California, Merced area, Merced County; (8) the State Route 165 area, Merced County; (9) Sandy Mush Road, Merced County; and (10) Los Padres National Forest, Ventura County (USFWS 2012:3).

4.2.2.4 Occurrence in the Action Area

Modeled habitat for Conservancy fairy shrimp, seasonal wetlands, is present in the grasslands around and to the west of Funks Reservoir, in the action area (Figures 4.2-5, 4.2-6). The likelihood of Conservancy fairy shrimp occurring in the action area is low because there are no large, deep pools characteristic of habitat for this species. There are no known occurrences in the action area. There are no protocol-level survey reports documenting whether or not this species is present, however. Of the 43 known occurrences of Conservancy fairy shrimp range-wide, one is within 5 miles of the action area (Figure 4.2-6, CDFW 2019).

Commented [DC1]: This should be detailed. E.g. how much of the area is suitable habitat? How was it determined?

This section should state that surveys will need to be conducted to determine presence. This discussion should include factors that may affect access and timing of surveys.

The information in this section has to be detailed enough to support an effects analysis and determination.

Ultimately this needs to tie into a "picture" of how important the action area is for the species and how the species may use it.

4.2.2.5 Limiting Factors, Threats, and Stressors

The loss and modification of vernal pool habitat have been and continue to be the primary threats to the Conservancy fairy shrimp (USFWS 2012:14). Historically, the primary causes of vernal pool habitat loss were conversion to agriculture and water conveyance and storage projects. More recently, vernal pool habitat loss has resulted from widespread urbanization (USFWS 2005:I-18). Vernal pool habitat also has been altered and degraded as a result of changes in natural hydrology, invasive species, incompatible grazing regimes, infrastructure projects, recreational activities, erosion, climatic and environmental change, and contamination (USFWS 2005:I-16–17).

Human disturbances and changes in land use practices can alter the hydrology of vernal pools and result in changes in the timing, frequency, and duration of inundation, which can create conditions that make vernal pools unsuitable for vernal pool species (USFWS 2005:I-20).

4.2.2.6 Recovery

Conservancy fairy shrimp are included in USFWS's *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005).

The overall goals of the recovery plan are to achieve and protect in perpetuity self-sustaining populations of each species in the recovery plan, delist the 20 federally listed plant and animal species, and ensure the long-term conservation of the 13 species of special concern. The actions needed to meet the goals of the recovery plan are as follows:

- Protect habitat within core areas, vernal pool regions, and all other areas that contribute to recovery, as appropriate.
- Refine areas for vernal pool conservation by conducting GIS, remote sensing, and other analyses.
- Restore habitat where needed and adaptively manage vernal pool conservation areas.
- Develop and implement standardized survey and monitoring protocols to determine success in meeting recovery criteria.
- Conduct research necessary to refine management techniques and recovery criteria.
- Develop and implement cooperative programs and partnerships by establishing regional recovery implementation working groups.
- Develop and implement participation programs in the form of outreach and education.

The action area overlaps the San Joaquin Valley Vernal Pool Region but is not located within any core areas.

Commented [DC2]: This should be the beginning of a discussion involving more detail regarding the overlap. This section will be used in the effects analysis on whether the action may affect recovery of the species.

4.2.2.7 *Critical Habitat*

Critical habitat for Conservancy fairy shrimp was designated on August 6, 2003 (68 FR 46684 46867) and consists of a total of eight disjunct units that constitute approximately 250,000 acres. The critical habitat units are located in Tehama and Butte Counties, Solano County, Glenn County, Stanislaus County, Merced County, and Ventura County. The action area overlaps critical habitat for conservancy fairy shrimp south of the Travis Air Force Base in the city of Fairfield.

Commented [DC3]: This seems to be talking about a different "action area" that is mentioned in 4.2.2.4 above.

This section should provide enough detail for an analysis of project effects to critical habitat, PCEs, etc.

Vernal Pool Tadpole Shrimp

4.2.2.1 *Endangered Species Act Listing Status*

Commented [DC4]: This numbering repeats the first species section.

Vernal pool tadpole shrimp was listed as endangered throughout its range on September 19, 1994 (59 FR 48136–48153). In its 5-year review of the species, USFWS recommended that the species remain listed as endangered (USFWS 2007b:37). On May 25, 2011, USFWS announced that it was initiating a new 5-year review to determine if the species should remain listed as endangered. The 5-year review has not yet been published.

4.2.2.2 *General Life History and Habitat Requirements*

Vernal pool tadpole shrimp occurs in a variety of seasonal habitats, including vernal pools and other seasonal pools, ponded clay flats, roadside ditches, and stock ponds (Helm 1998:132; Rogers 2001:1002). Habitats where vernal pool tadpole shrimp have been observed range in size from clear, vegetated vernal pools of less than 25 square feet to winter lakes of more than 80 acres (Helm 1998:133). Vernal pool tadpole shrimp produces cysts (eggs) that lie in the soil until the next winter rains trigger the eggs to hatch (USFWS 2007b:3).

In the laboratory, vernal pool tadpole shrimp eggs collected from dry pond sediments at the end of summer hatched in 17 days (Ahl 1991:137). In a study using large plastic pools to simulate natural vernal pools, Helm found that vernal pool tadpole shrimp reached maturity in an average of 38 days following hatching, and reproduced an average of 54 days after hatching (Helm 1998:133). Differences in water temperature, which strongly effects the growth rates of aquatic invertebrates, may cause variation in rates of growth and maturation (USFWS 2005:II-206). During the wet season, vernal pool tadpole shrimp can produce additional eggs that hatch without going through a dormant period (Ahl 1991:137).

Although vernal pool tadpole shrimp is adapted to seasonal habitats, it has a relatively long lifespan compared with other large branchiopods (USFWS 2005:II-206). In Helm's study, vernal pool tadpole shrimp lived an average of 143 days. The long lifespan of vernal pool tadpole shrimp is attributed to its ability to tolerate drying pool conditions and warm water (Helm 1998:133, 135). Vernal pool tadpole shrimp feeds on both living organisms, such as fairy shrimp and other invertebrates, and on detritus (USFWS 2007c).

To assess the distribution of habitat for vernal pool tadpole shrimp in the action area, the species model included seasonal wetlands mapped using remote imagery and a 250-foot upland buffer. Features were removed from the model if they did not show obvious signs of pooling in the winter and spring or if they did show signs of pooling and saturation year round or into late summer, which would not be conducive to the species life history.

4.2.2.3 Historical and Current Distribution and Abundance

The historical range of vernal pool tadpole shrimp likely consisted of the Central Valley and Central Coast regions of California (USFWS 2005:II-204). Currently, vernal pool tadpole shrimp occurs sporadically in the Central Valley from Shasta County to northwestern Tulare County and the San Francisco Bay Area (USFWS 2007b:II-204–205, 2005:4). The greatest number of vernal pool tadpole shrimp occurrences is in Sacramento County (USFWS 2007b:4).

4.2.2.4 Occurrence in the Action Area

Potentially suitable habitat for vernal pool fairy shrimp, seasonal wetlands, is present in the grasslands around and to the west of Funks Reservoir, in the action area. There is one occurrence of vernal pool tadpole shrimp in the action area where the Delevan Pipeline intersects the Delevan NWR. This occurrence is attributed to a specific pool that was discovered as occupied by vernal pool tadpole shrimp in 1994. There are another four vernal pool tadpole shrimp occurrence within 5 miles of the Delevan Pipeline, in the Sacramento NWR north of the action area (CDFW 2019) Figures 4.2-5 and 4.2-6 show the distribution of occurrences around the action area and modeled habitat in the construction and inundation area.

Commented [DC5]: This should be detailed. E.g. how much of the area is suitable habitat? How was it determined?

The information in this section has to be detailed enough to support an effects analysis and determination.

Ultimately this needs to tie into a "picture" of how important the action area is for the species and how the species may use it.

4.2.2.5 Limiting Factors, Threats, and Stressors

Conversion of vernal pool habitat to agricultural uses and urban development was identified as the primary threat to vernal pool tadpole shrimp in 1994 (59 FR 48136–48153). The largest continuing threats to vernal pool tadpole shrimp are habitat loss and modification as a result of urban development, agricultural conversion, altered hydrology, and inappropriate land management (USFWS 2007b:16). Vernal pool habitat has also been altered and degraded as a result of invasive species, incompatible grazing regimes, infrastructure projects, recreational activities, erosion, climatic and environmental change, and contamination (USFWS 2005:I-16–17). Modification of surrounding uplands that alter vernal pool hydrology may also result in habitat loss (59 FR 48136–48153).

Human disturbances and changes in land use practices can alter the hydrology of vernal pools and result in changes in the timing, frequency, and duration of inundation, which can create conditions that make vernal pools unsuitable for vernal pool species (USFWS 2005:I-20).

Climate change is anticipated to contribute to extended drought conditions, which could change the length of inundation of vernal pool tadpole shrimp habitats. The larger, deeper pools that provide habitat for vernal pool tadpole shrimp should hold water during dry years; however, these types of pools, especially on protected lands, are limited. Drought conditions can cause pools to fail to inundate or dry up before reproduction is complete, resulting in limited or no reproductive success. Climate change could also result in conditions in which increased winter precipitation and runoff result in longer periods and greater frequency of inundation. The additional inundation can convert seasonal habitat into more permanently flooded habitat that is more suitable for invasive species such as bullfrogs and mosquitofish (USFWS 2007b:35).

4.2.2.6 Recovery

Vernal pool tadpole shrimp are included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005). The overall goals of the recovery plan are to achieve and protect in perpetuity self-sustaining populations of each species in the recovery plan, delist the 20 federally listed plant and animal species, and ensure the long-term conservation of the 13 species of special concern. The actions needed to meet the goals of the recovery plan are as follows:

- Protect habitat within core areas, vernal pool regions, and all other areas that contribute to recovery, as appropriate.
- Refine areas for vernal pool conservation by conducting GIS, remote sensing, and other analyses.
- Restore habitat where needed and adaptively manage vernal pool conservation areas.
- Develop and implement standardized survey and monitoring protocols to determine success in meeting recovery criteria.
- Conduct research necessary to refine management techniques and recovery criteria.
- Develop and implement cooperative programs and partnerships by establishing regional recovery implementation working groups.
- Develop and implement participation programs in the form of outreach and education.

The action area overlaps the San Joaquin Valley Vernal Pool Region, but is not located within any core areas.

Commented [DC6]: This should be the beginning of a discussion involving more detail regarding the overlap. This section will be used in the effects analysis on whether the action may affect recovery of the species.

4.2.2.7 Critical Habitat

Critical habitat for vernal pool tadpole shrimp was designated on February 10, 2006 (71 FR 7118–7316). The action area overlaps critical habitat for vernal pool tadpole fairy shrimp south of the Travis Air Force Base in the city of Fairfield.

Commented [DC7]: Not same action area as mentioned above in 4.2.2.4

Vernal Pool Fairy Shrimp

Commented [DC8]: The comments in the above section should be applied to the other species in this chapter.

4.2.2.8 Endangered Species Act Listing Status

Vernal pool fairy shrimp was listed as threatened throughout its range on September 19, 1994 (59 FR 48136-48153). In its 5-year review of the species, USFWS recommended that the species remain listed as threatened (USFWS 2007a:47). On May 25, 2011, USFWS announced that it was initiating a new 5-year review to determine if the species should remain listed as threatened. The 5-year review has not yet been published.

4.2.2.9 General Life History and Habitat Requirements

Similar to other vernal pool branchiopods, vernal pool fairy shrimp are adapted to the environmental conditions of its ephemeral vernal pool habitats. These adaptations include the ability of fairy shrimp cysts to remain dormant in the soil when vernal pool habitats are dry. Fairy shrimp are also able to complete their lifecycle (from cyst hatching to reproducing) within the relatively short time period when vernal pools are inundated with water (USFWS 2005:II-195).

Vernal pool fairy shrimp commonly inhabit vernal pools or vernal pool-like habitats, typically in grassland landscapes. Most commonly, vernal pool fairy shrimp are found in vernal pools or vernal swales in unplowed grasslands (Eng et al. 1990:257). The chemical composition of the habitat and temperature variations resulting from pools filling at different times, and the distribution of pools along altitudinal and longitudinal gradients, are the most important factors in determining the distribution of different species of fairy shrimp (including vernal pool fairy shrimp) and their appearance from year to

year (Eng et al. 1990:273; USFWS 2007a:5). Vernal pool fairy shrimp sometimes occur in other wetlands that provide habitat characteristics similar to those of vernal pools; these other wetlands include alkaline rain pools, rock outcrop pools, and some disturbed and constructed sites, including tire ruts, ditches, and puddles (59 FR 48136–48153, September 16, 1994; Eriksen and Belk 1999:93; Helm 1998:129–130; USFWS 2007a:24, 58). Occupied habitats range in size from 6-square-foot puddles to pools exceeding 24 acres (Eriksen and Belk 1999:93). Vernal pool fairy shrimp are not found in riverine, marine, or other permanent waters (USFWS 2007a:4). Suitable pools must stay inundated long enough for the shrimp to complete their life cycle.

Vernal pool fairy shrimp matures very quickly and is able to have multiple clutches of eggs per lifespan (Eriksen and Belk 1999:93). In a study using large plastic pools to simulate natural vernal pools, Helm found that vernal pool fairy shrimp reached maturity in an average of 18 days following hatching, and reproduced an average of 40 days after hatching. Differences in the rate of maturation and reproduction of vernal pool branchiopods are thought to be the result of variations in water temperature (Helm 1998:133–134).

For the determining presence or absence of vernal pool fairy shrimp, the species model included seasonal wetlands mapped using remote imagery and 250 feet of upland habitat surrounding vernal pools (250 feet is a standard default measure used in vernal pool branchiopod habitat models to capture surrounding uplands and address potential indirect effects). Seasonal wetlands were removed from the model if they did not did not show obvious signs of pooling in the winter and spring or if they did show signs of pooling and saturation year round or into late summer, which would not be conducive to the species life history.

4.2.2.10 Historical and Current Distribution and Abundance

Vernal pool fairy shrimp is known to occur in a wide range of vernal pool habitats in the southern and Central Valley areas of California, and in two vernal pool habitats in Jackson County, Oregon (USFWS 2005:II-192). The species is currently found in fragmented habitats across the Central Valley of California from Shasta County to Tulare and Kings Counties, in the central and southern Coast Ranges from Napa County to Los Angeles County, and inland in western Riverside County (USFWS 2005:II-193, 2007a:17). The historical distribution of vernal pool fairy shrimp likely matched the historical distribution of vernal pools in California's Central Valley and southern Oregon. Although the current range is similar to the historic range, remaining populations are much more fragmented and isolated than prior to widespread agricultural land conversion (USFWS 2005:II-192).

4.2.2.11 Occurrence in the Action Area

Modeled habitat for vernal pool fairy shrimp, seasonal wetlands, is present in the grasslands around and to the west of Funks Reservoir, in the action area. There are no California Natural Diversity Database (CNDDB) element occurrences for vernal pool fairy shrimp in the action area. There is one CNDDB element occurrence for vernal pool fairy shrimp within 5 miles of the action area (CDFW 2019). Figures 4.2-5 and 4.2-6 show the distribution of occurrences around the action area and modeled habitat in the construction and inundation area.

4.2.2.12 Limiting Factors, Threats, and Stressors

Conversion of vernal pool habitat to agricultural uses and urban development was identified as the primary threat to vernal pool fairy shrimp in 1994 (59 FR 48136–48153). The largest continuing threats to vernal pool fairy shrimp are habitat loss and modification of habitat as a result of urban development, agricultural conversion, and infrastructure construction, especially along the edge of urban areas (USFWS

2007a:27). Vernal pool habitat has also been altered and degraded as a result of changes in natural hydrology, invasive species, incompatible grazing regimes, infrastructure projects, recreational activities, erosion, climatic and environmental change, and contamination (USFWS 2005:I-16–17). Modification of surrounding uplands that alter vernal pool hydrology may also result in habitat loss (59 FR 48136–48153).

Human disturbances and changes in land use practices can alter the hydrology of vernal pools and result in changes in the timing, frequency, and duration of inundation, which can create conditions that make vernal pools unsuitable for vernal pool species (USFWS 2005:I-20).

Drought and climate change have the potential to affect vernal pool fairy shrimp populations. Drought conditions can cause pools to fail to inundate or dry up before reproduction is complete, resulting in limited or no reproductive success (USFWS 2007a:44). Climate change is anticipated to result in changes in vernal pool inundation patterns and temperature regimes that could negatively affect vernal pool fairy shrimp. Increased variability in precipitation and loss of soil moisture from evaporation and transpiration could result in reduced water depth and inundation or changes in pool temperatures that affect cyst hatching or the ability of vernal pool fairy shrimp to complete its lifecycle (USFWS 2007a:45).

4.2.2.13 Recovery

Vernal pool fairy shrimp are included in USFWS's *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005).

The overall goals of the recovery plan are to achieve and protect in perpetuity self-sustaining populations of each species in the recovery plan, delist the 20 federally listed plant and animal species, and ensure the long-term conservation of the 13 species of special concern. The actions needed to meet the goals of the recovery plan are as follows:

- Protect habitat within core areas, vernal pool regions, and all other areas that contribute to recovery, as appropriate.
- Refine areas for vernal pool conservation by conducting GIS, remote sensing, and other analyses.
- Restore habitat where needed and adaptively manage vernal pool conservation areas.
- Develop and implement standardized survey and monitoring protocols to determine success in meeting recovery criteria.
- Conduct research necessary to refine management techniques and recovery criteria.
- Develop and implement cooperative programs and partnerships by establishing regional recovery implementation working groups.
- Develop and implement participation programs in the form of outreach and education.

The action area overlaps the San Joaquin Valley Vernal Pool Region but is not located within any core areas.

4.2.2.14 Critical Habitat

Critical habitat for vernal pool fairy was designated on February 10, 2006 (71 FR 7118–7316). The action area overlaps critical habitat for vernal pool fairy shrimp south of the Travis Air Force Base in the city of Fairfield.

Effects on Vernal Pool Branchiopods

Geotechnical Investigations

This section describes the effects of geotechnical activities associated with the Proposed Action on federally listed vernal pool branchiopods (Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp).

The vernal pool branchiopods may be present in seasonal wetlands that occur in the action area. Geotechnical investigations would completely avoid any effects on vernal pool branchiopods or their habitat with the implementation of the *Avoidance of Occupied Habitat for Geotechnical and Geophysical Work* conservation measure described in Chapter 2, Section 2.5.3.4, *Vernal Pool Branchiopods Conservation Measures*, which would require that no geotechnical boring or excavation work be conducted within 250 feet of any vernal pool branchiopod habitat identified during pre-activity surveys and mapping. Implementation of *Avoidance and Minimization Specific to Geotechnical Exploration* described in Section 2.5.3.1, *General Conservation Measures*, would ensure that water from aquifer and well testing would be placed into tankers and 55-gallon drums, respectively, and would not be discharged in uplands or wetlands within the action area. Implementation of the *Conduct Biological Resources Awareness Training* conservation measure, described in Section 2.5.3.1, would ensure that the proposed activities do not affect these species by making workers aware of the species habitat requirements and the need to avoid the species habitat.

Construction

This section describes the effects of construction of the Proposed Action on federally listed vernal pool branchiopods (Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp).

Direct Effects

Potential Injury or Mortality

Vehicles and heavy equipment used at the construction sites could injure or kill vernal pool brachiopods or their eggs or cysts, particularly as a result of heavy machinery driving through vernal pools, if individuals are present within the construction footprint. Implementation of *Avoidance of Occupied Habitat* in Section 2.5.3.4 would require that temporary work, staging, and access areas for construction activities be located at least 250 feet from vernal pool branchiopod habitat; therefore, no injury or mortality of these species would result in areas that are temporarily affected.

There are no conservation measures to avoid or minimize these effects where habitat would be removed permanently in the construction and inundation area.

Permanent Habitat Loss

Modeled habitat for vernal pool branchiopods, seasonal wetlands, is present in the grasslands around and to the west of Funks Reservoir, in the action area. An estimated 57 acres of federally listed vernal pool branchiopod modeled habitat overlaps with the construction and inundation area, and construction of the Proposed Action would permanently remove this habitat. As described under *Minimization of Habitat Disturbance* 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.

Commented [PA9]: Discussion is applicable to Conservancy fairy shrimp, vernal pool tadpole shrimp and vernal pool fairy shrimp

Commented [DC10]: What if this isn't possible? We could ensure it during the current round of geotech since it was a relatively small effort.

Commented [DC11]: New changes to Section 7 of the ESA combines direct and indirect effects. Therefore, there is no need to have two different sections. However, if it makes the document better or shorter, there is no reason we can't separate them.

Commented [DC12]: This section should also discuss mortality due to changes in hydrology to/within pools.

Commented [DC13]: Here we need to quantify…or provide the methodology that will be used to quantify…. the extent of take. This might be approached by including all individuals and cysts within occupied pools

Commented [DC14]: We should reference any efforts that will be made to verify presence/absence and tie that into a discussion on how this acreage may change.

Commented [DC15]: This seems like it would be more appropriate for project planning to minimize the footprint. The workers will adhere to the plans and CMs

As described in Chapter 4, Conservancy fairy shrimp has a very low likelihood of being present in the action area. Thus, the likelihood of the Proposed Action affecting the species is low. Although vernal pool fairy shrimp and vernal pool tadpole shrimp have a greater likelihood of being present and affected by the Proposed Action, surveys in the action area have not resulted in observations of this species. There are no critical habitat or important recovery areas for these three listed species in the action area.

As described under *Avoidance of Occupied Habitat* in Section 2.5.3.4, *Vernal Pool Branchiopods Conservation Measures*, activities with flexible locations would avoid occupied habitat.[1] The Authority would offset unavoidable loss of occupied habitat complexes, including indirect effects within 250 feet of pools, through habitat restoration, protection, and management as described in under *Compensation for Unavoidable Loss of Habitat* in Section 2.5.3.4.

Temporary Habitat Loss

Habitat loss could 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. For the purpose of this effects assessment, all habitat loss is quantified as permanent and described in the preceding section 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.

Even though this assessment treats temporary habitat loss as permanent loss for the purpose of quantifying impacts, measures would be in place to minimize temporary habitat loss. As described under *Avoidance of Occupied Habitat* in Section 2.5.3.4, temporary disturbance areas would be located within the permanent disturbance footprint, such as the reservoir inundation area, where possible. Where temporary work, staging, and access areas for construction activities are located outside the permanent footprint, they would be at least 250 feet from occupied vernal pool branchiopod habitat, thus avoiding temporary habitat loss for the species.[1]

Indirect Effects

Indirect effects are effects that are reasonably certain to result from the Proposed Action but would occur later in time.

Disturbance from Recreation

The proposed recreation areas have a footprint that represents the total project 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 vernal pool branchiopod habitat and injury or mortality of individuals through crushing by humans, pets, or recreational vehicles. Including the entire recreation areas in the permanent disturbance footprint accounts for these ongoing impacts.

[1] If one season wetland feature in a complex is found to be occupied by a listed branchiopod species, the entire complex of seasonal wetlands would be deemed occupied by that species.

Commented [DC16]: We can't really say this since no serious efforts have been taken to survey the action area.

Commented [DC17]: I'm not sure what this paragraph is trying to say. I recommend deleting.

Commented [DC18]: This needs to be quantified.

The point of this section is to provide enough information to accurately assess take

Commented [DC19]: If the strategy remains to assume all habitat loss is permanent, get rid of this header. This approach should be approached at the beginning of the Permanent Habitat Loss section.

Commented [DC20]: This does need to be quantified. For areas like this, we should be able to come up with a reasonable acreage based on the reservoir footprint and existing roads,etc.

Commented [DC21]: I recommend against this approach. See below

Commented [DC22]: Not always the case. Even so, restoration of construction roads and staging areas is beneficial and can count towards offsetting adverse effects

Commented [DC23]: If the strategy remains to assume all habitat loss is permanent, we should stop mentioning "temporary" loss after the strategy is explained at the beginning of the section.

Commented [DC24]: This is another reason why we shouldn't categorize all habitat loss as permanent. It gets confusing when we bring it up again.

Commented [DC25]: Just because people camp in undesignated areas doesn't mean it should be in the action area.

Commented [DC26]: Include altered hydrology

Operation

~~The Authority~~Reclamation does not anticipate any operational effects of the Proposed Action on the federally listed vernal pool branchiopods (Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp).

General Conservation Measures and Avoidance and Minimization Measures

General Terrestrial 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~~ project 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-per-hour 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-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-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.

Commented [PA27]: Discussion is applicable to Conservancy fairy shrimp, vernal pool tadpole shrimp and vernal pool fairy shrimp

Commented [DC28]: The trainer only needs to be qualified. Leaving the language as-is reduces options for trainers and can increase costs.

Commented [DC29]: The engineers should also have this training to better understand the requirements

Commented [DC30]: This should mirror a standard swppp measure for no fueling within x-feet of water and remove "frog or snake aquatic habitat"

Commented [DC31]: Should mirror swppp measure

Commented [DC32]: This should be included in a "Reporting" section.

Commented [DC33]: This measure needs a re-do. Should be species specific (for chytrid fungus) and doesn't apply to vpb. Not sure why it's here.

- 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.
- Qualified 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~~

Commented [DC34]: There should be more detail in this. Such as when the areas will be flagged, who will be responsible to maintain. Will sensitive habitats be identified as such, etc.
Also, there should be a reference to the current geotech measures below.

Commented [DC35]: These should be pasted in from the completed geotech consultation BO. Some of the measures below are not specific to the geotech component.

Commented [DC36]: For what? If this measure is in other measures, why is it repeated here? Or are those the species specific measures?

Commented [DC37]: This numbering doesn't follow the numbering in this section.

Commented [DC38]: This repeats what was up above.

~~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.~~

Formatted: List Bullet, Space Before: 0 pt

Commented [DC39]: Repeats measure above

Commented [DC40]: This was stated previously, partially. Ensure repeats are avoided

Commented [DC41]: This should be in a reporting section

Commented [DC42]: Not specific to geotech

Commented [DC43]: In the current geotech BO the disturbance areas are defined in the project description. This isn't really written as something implementable or enforceable. CMs need to be.

Commented [DC44]: Doesn't the first measure negate the need for this? The geotech work description should copy what is in the existing BO. This allows for movement

- 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[2] of 3.0 square feet per cubic feet per second, and a nominal maximum approach velocity[3] 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.~~1. ~~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

[2] *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.

[3] *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.

Commented [DC45]: Consider creating an "In-water Work" conservation measures section. It seems there was more in the current geotech measures than this.

Commented [DC46]: repeat

Commented [DC47]: this seems contrary to the previous strategy to consider all disturbance as permanent.

Needs to be addressed

Commented [DC48]: When writing the BA, remember that the consultation is between Reclamation and FWS. WE can commit only to measures where Reclamation maintains discretionary involvement or control

This wording should be "Temporarily disturbed areas will be restored…"

Authority must utilize native plant species appropriate to the area and will control the spread of invasive plant species.

Vernal Pool Branchiopods Avoidance and Minimization Measures

The following measures will be implemented to avoid and minimize impacts on federally listed vernal pool branchiopods including vernal pool fairy shrimp, Conservancy fairy shrimp, and vernal pool tadpole shrimp.

VPB-CM1: Avoidance of Occupied Habitat for Geotechnical and Geophysical Work

- At least two weeks prior to any ground disturbing activities a USFWS approved biologist will ground truth the land cover mapping within geotechnical and geophysical work areas and staging areas, including areas within 250 feet, to confirm the presence or absence of habitat suitable for vernal pool branchiopods. All suitable branchiopod habitat will be mapped in the field using a GPS with submeter accuracy and will be used to update the land cover mapping. Surveys will be conducted in accordance with "Survey Guidelines for the Listed Large Branchiopods", from May 2015, or current survey protocols.
- Unless otherwise approved by the USFWS, geotechnical boring activities will fully avoid effects on vernal pool branchiopods and their habitat. Full avoidance requires a minimum 250-foot no-disturbance buffer around all suitable habitat potentially supporting vernal pool branchiopods.
- Geophysical activities will not take place in suitable vernal pool branchiopod habitat. All geophysical lines will avoid going through pools that represent potential suitable habitat for these species. Unless otherwise approved by the USFWS, a biological monitor will be present when geophysical work occurs within 250 feet of suitable vernal pool branchiopod habitat. The monitor will ensure that the contractor complies with these avoidance buffers.

VPB-CM2: Surveying of Suitable Habitat

A qualified biologist with a Federal permit to conduct sampling for listed vernal pools branchiopods will complete surveys of the seasonal wetlands in the construction and inundation area prior to project construction to determine whether the species are present. The qualified biologist will record the locations of any seasonal wetlands supporting listed branchiopods found using a GPS unit. Following the surveys, the qualified biologist will identify which of the seasonal wetland features are occupied by each species: an entire complex of seasonal wetland features is considered occupied if the species is found in one or more of those features.

VPB-CM3: Avoidance of Occupied Habitat

Design temporary work areas and any other activities with flexible locations to avoid occupied habitat of the listed branchiopods by at least 250 feet if located outside the permanent disturbance footprint.

Commented [DC49]: Weed out repeats and organize entire CM section better

Compensatory Mitigation

VPB-CM4: Compensation for Unavoidable Loss of Habitat

Commented [BE50]: This measure is very preliminary and will need to be developed further in coordination with the Authority and USFWS.

Directly affected occupied vernal pool branchiopod habitat will be offset by either purchasing restoration/creation credits at conservation bank (at 1:1) or by restoring/creating habitat at non-bank site approved by the USFWS (at 2:1), and by protecting habitat at either a conservation bank (at 2:1) or at a

non-bank site approved by the USFWS (at 3:1). Indirectly affected occupied vernal pool branchiopod habitat will be offset by protecting habitat at either a conservation bank (at 2:1) or at a non-bank site approved by the USFWS (at 3:1).

Commented [DC51]: Expecting NO indirect effects on refuge. We shouldn't be planning mitigation for effects we don't' expect.

Western Yellow-billed cuckoo

Existing Information

4.2.2.1 Endangered Species Act Status

USFWS listed the western distinct population segment (DPS) of the yellow-billed cuckoo (*Coccyzus americanus occidentalis*) (western yellow-billed cuckoo or cuckoo) as threatened on November 3, 2014 (79 FR 59992). On June 18, 2018, USFWS announced that it was initiating a 5-year status review to determine if the DPS should remain listed as threatened (83 FR 28251).

4.2.2.2 General Life History and Habitat Requirements

Western yellow-billed cuckoos prefer open woodlands near watercourses with clearings and low, dense, scrubby vegetation (Hughes 2015). In California, breeding habitat frequently consists of willows (Salix spp.) and Fremont cottonwoods (Populus fremontii) (Halterman et. al 2015:4). In southern California, cuckoos breed in desert riparian woodlands with willow, Fremont cottonwood, alder (Alnus sp.), walnut (Juglans sp.), box elder (Acer negundo), and dense mesquite (Prosopis spp.). Nests are primarily in willow, Fremont cottonwood, and mesquite. Nest sites are often within dense foliage provided by broad-leafed deciduous hardwoods. Nests are typically on a horizontal branch or vertical fork of a tree or large shrub 3 to 18 feet above the ground, but have been found up to 100 feet above the ground. (Hughes 2015). Along the Sacramento River nests have rarely been found in prune, English walnut, and almond orchards (Laymon 1998).

Western yellow-billed cuckoos require large blocks of riparian habitat for breeding (78 FR 61633). Patch size was found to be the most important habitat variable to predict presence of western yellow-billed cuckoos on the Sacramento River (Girvetz and Greco 2009). Large patch sizes (50 to 100 acres, with a minimum width of 328 feet) are typically required for cuckoo occupancy (Riparian Habitat Joint Venture 2004). However, cuckoos can occupy a minimum patch size of 37 acres (Dettling et al. 2015). Patch width and the distance between patches can also be important in determining potential cuckoo occupancy; multiple studies have found that the minimum patch width and maximum gap width for potential occupancy are both 100 meters (Girvetz and Greco 2009; Dettling et al. 2015).

Western populations of yellow-billed cuckoos begin arriving on breeding grounds during mid- to late May. Western yellow-billed cuckoos form pairs during mid-June or later and breed from June to August, with a peak from mid-July to early August (Hughes 2015). Breeding is restricted to the middle of summer, presumably because of a seasonal peak in large insect abundance (Rosenberg et al. 1982:270–271). To accommodate this, development of young is very rapid, with a breeding cycle of 17 days from egg-laying to fledging of young. Young can typically fly at about 3 weeks of age (Hughes 2015). Clutch size is typically two or three eggs (Hughes 2015) and usually there is one brood per year (Ehrlich et al. 1988:286). Two or even three broods are possible in years with a good food supply (Layman 1998). Although western yellow-billed cuckoos usually raise their own young, they are facultative brood parasites, meaning they occasionally lay their eggs in nests of other western yellow-billed cuckoos or of other bird species (Hughes 2015). During late summer, the cuckoos begin migrating south to their wintering grounds, and most have left the breeding grounds by mid-September (78 FR 61632; October 3, 2013).

Western yellow-billed cuckoos primarily feed on caterpillars, grasshoppers, katydids, and other large insects. Foraging habitat consists of open areas, woodland, orchards, and adjacent streams (Hughes 2015).

Cottonwoods are used extensively for foraging and are an important component of foraging habitat (78 FR 61634; October 3, 2013).

Little is known about western yellow-billed cuckoo migratory habitat. Cuckoos may be found in a variety of vegetation types during migration, which suggests that the habitat needs of the cuckoo during migration are not as restricted as the habitat needs during the breeding season. Western yellow-billed cuckoos may also be found in smaller riparian patches during migration than those in which cuckoos typically nest (78 FR 61634).

4.2.2.3 Historical and Current Distribution and Abundance

Western yellow-billed cuckoo is a neotropical migrant bird that winters in South America and breeds mostly in North America (Hughes 2015). The historical breeding range of western yellow-billed cuckoo in California extended from San Diego County along the coast through San Francisco Bay to Sonoma County, the San Joaquin and Sacramento Valleys from Kern County to Shasta County, and many outlying sites in Siskiyou, Inyo, San Bernardino, and Imperial Counties. Breeding is now restricted to isolated locations along South Fork Kern River, lower Colorado River, and Sacramento River (Hughes 2015). The estimated breeding population in California is currently 40 to 50 pairs (78 FR 61639; October 3, 2013). Restoration of more than 6,000 acres of riparian forest along the Sacramento River has increased the amount of potential habitat for western yellow-billed cuckoo; however, the population of cuckoos along the river was estimated to be less than 30 pairs based on surveys conducted in 2012 and 2013 (Dettling et. al 2014:13–14).

4.2.2.4 Occurrence in the Action Area

There is suitable nesting habitat near the eastern end of the construction and inundation area where the action area intersects the Sacramento River (Figure 4.2-14). This area was mapped as potential habitat by Dettling et al. 2015. There are 10 records of western yellow-billed cuckoo occurrences within a 5-mile radius of the action area (CDFW 2019) (Figure 4.2-13). The closest CNNDB record (from 2012) is located approximately 0.35 miles northeast of the action area, on the east bank of the Sacramento River and within the habitat mapped by Dettling et al. 2015. A small portion of the action area along the Sacramento River is located in proposed critical habitat for western yellow-billed cuckoo.

Commented [BE1]: Note - This information focuses on the construction and inundation area. We will need to revise to describe cuckoo occurrence in other parts of the action area including downstream.

4.2.2.5 Limiting Factors, Threats, and Stressors

In 2013, when the western yellow-billed cuckoo was proposed for listing, the California population was less than 1 percent of its estimated historical population size (78 FR 61637). The primary factors leading to the decline of western yellow-billed cuckoo are riparian habitat loss and degradation. Viable populations of cuckoo cannot be maintained without ongoing recruitment and maturation of vegetation within large expanses of riparian habitat. Alteration of hydrology from dams, levees, bank stabilizations, water diversions, channelization, and river flow management that is inconsistent with natural hydrological patterns has resulted in the loss, modification, and degradation of riparian habitat (78 FR 61643). Another past and current contributor to riparian habitat loss is conversion of riparian areas for agricultural crops and livestock grazing. Impacts of livestock grazing on riparian habitat include introduction of nonnative plants, soil compaction, decreases in plant species diversity that result in changes in the structure and composition of riparian vegetation, and may decrease habitat suitability for western yellow-billed cuckoo (78 FR 61648).

Climate change may affect western yellow-billed cuckoo directly through physiological stress and through changes in the availability and distribution of habitat. In California, climate change is generally predicted to result in a warmer and drier climate, with less frequent and more severe precipitation events

that, depending on site conditions, may negatively affect western yellow-billed cuckoo habitat. Rivers are anticipated to have more winter flooding and reduced summer stream flows. Persistent drought would cause a decrease in the amount of surface ground water available to sustain and regenerate riparian forests, increased fire frequency, and the spread of nonnative plan species. Drought could also adversely affect food availability by disrupting the synchrony of nesting cuckoos and their food resources (78 FR 61653).

For the purpose of assessing the distribution of western yellow-billed cuckoo in the action area, the species model included riparian areas identified through aerial imagery with a minimum patch size of more than 37 acres and with minimum patch widths of 100 meters and maximum gap widths of 100 meters.

4.2.2.6 Recovery

No recovery plan has been published for this species.

4.2.2.7 Critical Habitat

Critical habitat was proposed on August 15, 2014 (79 FR 48547). A final rule designating critical habitat has not been published. The Primary Constituent Elements (PCEs) of proposed yellow-billed cuckoo critical habitat are those habitat elements within designated critical habitat units that provide sufficient riparian habitat for breeding, non-breeding, territorial, dispersing and migrating yellow-billed cuckoo and to yellow-billed cuckoo throughout their range, and provide those habitat components essential for conservation of the subspecies. USFWS proposed the following PCEs for cuckoo critical habitat:

PCE 1: Riparian woodlands. Riparian woodlands with mixed willow and cottonwood vegetation, mesquite-thorn forest vegetation, or a combination of these that contain habitat for nesting and foraging in contiguous or nearly contiguous patches that are greater than 325 feet (100 meters) in width and 200 acres (81 hectares) or more in extent. These habitat patches contain one or more nesting groves, which are generally willow-dominated, have above average canopy closure (greater than 70 percent), and have a cooler, more humid environment than the surrounding riparian and upland habitats.

PCE 2: Adequate prey base. Presence of a prey base consisting of large insect fauna (for example, cicadas, caterpillars, katydids, grasshoppers, large beetles, dragonflies) and tree frogs for adults and young in breeding areas during the nesting season and in post-breeding dispersal areas.

PCE 3: Dynamic riverine processes. River systems that are dynamic and provide hydrologic processes that encourage sediment movement and deposits that allow seedling germination and promote plant growth, maintenance, health, and vigor (e.g. lower gradient streams and broad floodplains, elevated subsurface groundwater table, and perennial rivers and streams). This allows habitat to regenerate at regular intervals, leading to riparian vegetation with variously aged patches from young to old.

Proposed critical habitat Unit 2: CA-2 Sacramento River, Colusa, Glenn, Butte, and Tehama Counties overlaps with the action area. The critical habitat unit in located along the Sacramento River in the action area from Red Bluff to Colusa.

Effects

This section describes the effects of geotechnical investigations on western yellow-billed cuckoo.

4.2.2.1 Geotechnical Investigations

Direct Effects

Proposed geotechnical activities would avoid disturbance of riparian forest habitat suitable for yellow-billed cuckoo. Geotechnical activities for the Delevan Pumping Plant and in the Sacramento River may take place near suitable yellow-billed cuckoo nesting habitat along the eastern bank of the Sacramento River. Depending on the time of year that these activities would take place, and whether yellow-billed cuckoo is present in the vicinity during the geotechnical activities, yellow-billed cuckoo in the vicinity of these activities could be affected by noise, visual disturbance from human presence, and vibrations associated with the geotechnical testing. These disturbances could disrupt normal migrating, foraging, and breeding behaviors.

Helicopters would likely be used for subsurface geotechnical investigations in areas with limited road access. Helicopter activity such as landing, taking off, and flying over cuckoo foraging and breeding territories could disrupt normal cuckoo behaviors such as courtship, nest building, egg and nestling incubation, and foraging. However, because no helicopters would be used where suitable cuckoo habitat is present along the Sacramento River, helicopter use is not anticipated to affect this species.

Implementation of the conservation measures would avoid effects on yellow-billed cuckoo by avoiding direct disturbance of suitable habitat for the species, as described in Chapter 2, Section 2.5.3.1, General Conservation Measures, and Section 2.5.3.7, Western Yellow-billed Cuckoo Conservation Measures. The Geotechnical Investigations conservation measure in Section 2.5.3.7 includes avoiding activities within 500 feet of occupied western yellow-billed cuckoo habitat from May 15 through September 30, pre-activity surveys to identify if yellow-billed cuckoo is present within the work area, establishing a no-disturbance buffer if active nests are discovered, and biological monitoring in the vicinity of all active cuckoo nests to ensure that construction activities do not affect nest success. Avoidance and Minimization Specific to Geotechnical Exploration in Section 2.5.3.1 includes routing helicopter routes to avoid potential or known yellow-billed cuckoo nest locations. With the implementation of conservation measures, geotechnical investigations would completely avoid adverse effects on yellow-billed cuckoo.

Indirect Effects

Geotechnical and geophysical investigations would avoid disturbance of western yellow-billed cuckoo habitat, and indirect effects of geotechnical investigations are not anticipated.

4.2.2.2 Construction

Direct Effects

Potential Injury or Mortality from Construction Activities

Various construction activities could result in injury or mortality of western yellow-billed cuckoo if they take place within occupied habitat. The construction footprint, however, is 380 feet from the nearest modeled western yellow-billed cuckoo. Therefore, the project would avoid direct construction-related injury or mortality of individuals in the construction zone.

Other Potential Construction-Related Disturbance

Construction activities associated with the Delevan Pipeline, the Delevan Pipeline Intake/Discharge Facilities, and other facilities within the Delevan Pipeline Complex would generate noise levels between 80 and 85 dBA at a 50-foot distance, but would attenuate to approximately 55 dBA at 0.5 mile (Sites Project Authority and Bureau of Reclamation 2017:27-22). Construction of the Delevan Pipeline Complex facility would also require the use of a vibratory pile driver to install a cofferdam in the

Sacramento River. Noise modeling results indicate that noise levels from installation of the cofferdam would be approximately 58 dBA at 0.3 mile. Generation of mechanical noise that takes place during the cuckoo nesting season could alter normal breeding and foraging behaviors, resulting in nest abandonment or nest failure. Additionally, studies suggest that migrating birds will avoid noisy areas during migration (McClure et al. 2013). 60 dBA is the standard noise threshold for birds (Dooling and Popper 2007) that is applied during the nesting season, when birds are more vulnerable to behavioral modifications that can lead to nest failure. This effect would be minimized by reducing noise in the vicinity of yellow-billed cuckoo habitat as described in Section 2.5.3.1, *Terrestrial Species Conservation Measures, and* Section 2.5.3.7 *Western Yellow-billed Cuckoo Conservation Measures*. *Minimization of Noise Related Effects* in Section 2.5.3.7 would include surveys for yellow-billed cuckoo within the 60 dBA noise contour around the construction footprint during the period from June 1 through September 14, and if the species is found, limiting noise to less than 60 dBA where the bird occurs until it has left the area. This measure also includes re-routing construction traffic away from cuckoo migratory habitat to reduce construction noise impacts.

Construction activities in the visual line-of-sight of cuckoo nests and night lighting could potentially affect yellow-billed cuckoos. Nighttime construction work may occur on an as needed basis. While there is little data on effects of night lighting on this species, studies show that other bird species are attracted to artificial lights and this may disrupt their behavioral patterns or cause collision-related fatalities (Van Doren et al. 2017, Furuya 2017, Gauthreaux and Belser 2006). Disruption of normal behaviors could make individuals more susceptible to predation, result in impairment of feeding or breeding behaviors, or reduction of reproductive success. To minimize this effect, the Authority would screen all lights and direct them away from habitats, as described in Chapter 2, Section 2.5.3.1, *General Conservation Measures*, under *Minimize Effects of Lighting.* With this measure in effect, residual lighting effects on yellow-billed cuckoo are not expected to result in take of the species.

Permanent Habitat Loss

The construction and inundation components of the Proposed Action would not result in any permanent habitat loss for western yellow-billed cuckoo.

Commented [BE2]: Note to reader – there is some riparian that would be removed along the Sacramento River at the Delevan Intake but it fell out in the habitat model because of the patch size requirement. Some may argue that with it's proximity to suitable habitat, the patch size shouldn't apply here and the riparian *should* be counted as cuckoo habitat. It would be around 9 acres of habitat loss.

Temporary Habitat Loss

The construction and inundation components of the Proposed Action would not result in any temporary habitat loss for western yellow-billed cuckoo.

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 and associated facilities could attract Common ravens (*Corvus corax*), American crows (*Corvus brachyrhynchos*), California scrub jay (*Aphelocoma californica*), magpies, and accipiters that prey upon cuckoo nests.

Degradation of cottonwood riparian habitat as a result of invasion by salt cedar (*Tamarisk* sp.) and giant reed (*Arundo donax*) is also a problem in the cuckoo's range. Along the Sacramento River, domestic fig (*Ficus carica*) and black walnut (*Juglans nigra*) have become a dominate tree species; these species provide poor foraging opportunities and do not offer suitable nest sites for yellow-billed cuckoo (Laymon 1998). Other nonnative species of concern in the cuckoo's range include cheatgrass (*Bromus tectorum*),

giant salvinia (*Salvinia molesta*), water milfoil (*Myriophyllum spicatum*), and parrot's feather (*M. aquaticum*) (Halterman et al. 2015). The Authority would minimize the spread of invasive plant species through the implementation of the *Invasive Plant Species* conservation measure in Section 2.5.3.1, *General Conservation Measures*.

Disturbance from Recreation

Recreation activities associated with the newly constructed recreation areas would not affect yellow-billed cuckoo because these areas are not located within or near known occupied areas or suitable cuckoo habitat. Recreation activities would take place more than 10 miles west of known yellow-billed cuckoo occurrences (California Department of Fish and Wildlife 2019).

Critical Habitat

The Primary Constituent Elements (PCEs) of proposed yellow-billed cuckoo critical habitat are described in Section 4.2.10.7, *Critical Habitat.* The PCEs for this species are those habitat elements within designated critical habitat units that provide sufficient riparian habitat for breeding, non-breeding, territorial, dispersing, and migrating yellow-billed cuckoo and to yellow-billed cuckoo throughout their range, and provide those habitat components essential for conservation of the yellow-billed cuckoo. The modeled habitat for western yellow-billed cuckoo in the action area corresponds with these PCEs.

The action area is located within proposed critical habitat Unit 2: CA-2, Sacramento River, Colusa, Glenn, Butte, and Tehama Counties. The footprint for the Delevan Pipeline Intake/Discharge Facilities overlaps with 9.2 acres of critical habitat Unit 2, but there are no habitat patches within this area large enough to support western yellow-billed cuckoo, based on Dettling et al. (2015). Therefore, the affected area does not provide the necessary components to support the species or its PCEs, and western yellow-billed cuckoo critical habitat would not be affected by construction of the Proposed Action.

Commented [BE3]: See comment above. We may need to count this as habitat.

4.2.2.3 Operation

Direct Effects

Potential Disturbance from Maintenance Activities

Noise and lighting in the vicinity of the reservoir and associated structures could disturb western yellow-billed cuckoo behavioral patterns within suitable habitat if the species is present. To minimize this effect, the Authority would screen all lights and direct them away from habitats, as described in in Section 2.5.4.X, *Yellow-billed Cuckoo Conservation Measures*. With this measure in effect, residual lighting effects on yellow-billed cuckoo are not expected to adversely affect the species.

Downstream Hydrologic Effects

***[Note:** ICF is coordinating with USFWS and the consultant team to develop a methodology for assessing downstream hydrologic effects on western yellow-billed cuckoo.]*

Commented [BE4]: Placeholder for future analysis.

Indirect Effects

There would be no anticipated indirect effects on western yellow-billed cuckoo from operation beyond the effects described above.

Critical Habitat

***[Note:** ICF is coordinating with USFWS and the consultant team to develop a methodology for assessing downstream hydrologic effects on western yellow-billed cuckoo.]*

Commented [BE5]: Placeholder for future analysis.

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-per-hour 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-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-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] of 3.0 square feet per cubic feet per second, and a nominal maximum approach velocity[2] of 0.33 feet per second.
  - Screen face material consisting of the following dimensions:

[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.

[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.

- 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

YBCC-CM1: Geotechnical Investigations

Geotechnical boring and geophysical investigations will be sited outside of western yellow-billed cuckoo habitat [patches of riparian habitat 50 acres or larger (Halterman et al. 2015)]. To minimize disturbance on nearby nesting wester yellow-billed cuckoo, the following measures will be implemented.

- Prior to geotechnical boring and geophysical investigations taking place between May 15 through September 1, all suitable yellow-billed cuckoo habitat within 1,200 feet of work areas will be surveyed for individuals or active nests. Surveys conducted in accordance with "A Natural History Summary and Survey Protocol for the Western Distinct Population Segment of the Yellow-billed Cuckoo" from April 2015, or as updated.
- If an active nest is found within the area surveyed, a no disturbance buffer will be established to ensure that activities do not disrupt normal nesting behaviors. Buffers will be determined by the biologists in consultation with USFWS and CDFW and will depend on the level of noise or disturbance, line-of-sight between the nest and the disturbance, ambient levels of noise and other disturbances, and other topographical or artificial barriers.
- In addition to the buffers, the following measures will be implemented if an active nest is found within 1,200 feet of the work areas.
    - Located, store, and maintain equipment as far as reasonably possible from suitable yellow-billed cuckoo habitat.
    - Minimize noise.
    - Screen all lights and direct them down tower work activities away from cuckoo habitat. A biological monitor will ensure that lights are properly directed at all times.
    - Operate portable lights at the lowest allowable wattage and height to achieve construction activities.
- Geotechnical and geophysical activities will be avoided within 500 feet of occupied yellow-billed cuckoo habitat from May 15 through September 30. Occupied habitat will be determined based on surveys conducted.

YBCC-CM2: Habitat Avoidance

Temporary construction areas, staging areas, and access roads with flexible locations will be located to avoid disturbance of western yellow-billed cuckoo suitable habitat with a buffer of at least 500 feet between the activity and the habitat. Locate, store, and maintain portable and stationary equipment as far as possible from suitable western yellow-billed cuckoo habitat.

YBCC-CM3: Timing for Unavoidable Habitat Removal

Where habitat removal is unavoidable within the construction and inundation area, the Authority will remove the habitat during the period of Mid-September through late May, outside the species' breeding season.

YBCC-CM4: Minimization of Effects Related to Human Activity in the Vicinity of Construction

The Authority will implement the following measures for project components within 500 feet of western yellow-billed cuckoo habitat.

- Prior to construction, all suitable western yellow-billed cuckoo habitat within 500 feet of the activity will be surveyed in accordance with "A Natural History Summary and Survey Protocol for the Western Distinct Population Segment of the Yellow-billed Cuckoo", from April 2015, or as updated.
- 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 500-foot no-disturbance buffer will be established around nest sites during the breeding season (generally, late February through late August).
- The required no-disturbance buffer may be reduced in areas where barriers or topographic relief are sufficient to protect the nest from excessive noise or other disturbance. Sites Authority will coordinate with USFWS and evaluate exceptions to the minimum no-disturbance 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 western yellow-billed cuckoo nests to ensure that covered activities do not affect nest success.

YBCC-CM5: Minimization of Noise Related Effects

If construction is to occur within 1,200 feet of western yellow-billed cuckoo habitat during the period of from June 1through September 14, the following measures will be implemented to avoid noise effects on migrating western yellow-billed cuckoos.

- Prior to the construction, a noise expert will create a noise contour map showing the 60 dBA noise contour specific to the type and location of construction to occur in the area.
- During the western yellow-billed cuckoo breeding season, a USFWS-approved biologist will survey any suitable nesting habitat for yellow-billed cuckoos within the 60 dBA noise contour on a daily basis during a two-week period prior to construction. While construction is occurring within this work window, the USFWS-approved biologist will conduct daily surveys in any suitable habitat where construction related noise levels could exceed 60 dBA (A-weighted decibel) L_{eq} (1 hour). If a yellow-billed cuckoo is found, sound will be limited to 60dBA in the habitat being used until the USFWS-approved biologist has confirmed that the bird has left the area.
- Construction vehicle and equipment traffic will be re-routed as necessary to reduce construction noise impacts on cukoo migratory habitat. Route truck traffic in order to reduce construction noise impacts and traffic noise levels within 1,200 feet of suitable western yellow-billed cuckoo migratory habitat during migration periods.
- Employ preventive maintenance including practicable methods and devices to control, prevent, and minimize noise.
- Limit trucking activities (e.g., deliveries, export of materials) to the hours of 7:00 a.m. to 10:00 p.m.

Compensation

YBCC-CM6: Compensation for Unavoidable Loss of Habitat

Commented [BE6]: This measure is very preliminary and will need to be developed further in coordination with the Authority and USFWS.

Where identified and delineated yellow-billed cuckoo habitat cannot be avoided, compensation for the permanent loss of the habitat will occur at a rate of 3:1 for suitable riparian and upland habitat. An estimated [TBD] acres of yellow-billed cuckoo habitat will be permanently affected. To offset this effect

the Authority will restore [TBD] acres of western yellow-billed cuckoo habitat in proposed critical habitat Unit 2.