U.S. Fish and Wildlife Service Avoidance and Minimization Measures and National Marine Fisheries Service FEMA Emergency Consultation: FEMA-3592-EM-CA & DR-4699-CA

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U.S. Fish and Wildlife Service
Avoidance and Minimization Measures
FEMA Emergency Consultation: FEMA-3592-EM-CA & DR-4699-CA

May 23, 2023

The Service recommends the following measures to minimize potential effects to listed species or species of concern and their habitats. We recommend FEMA and any Incident Management Teams implement the following measures during the emergency response, unless precluded by the necessity to ensure public safety, worker safety, or the protection of property.

Any deviation from these measures and recommendations are acceptable when life or property is threatened. Under no circumstances should these measures obstruct an emergency response where human life or property is at stake. Safety is the prime directive in emergency situations. Only those measures that do not create a safety hazard should be employed. Likewise, "mission" or the purpose of the response to an emergency should not be compromised, and we defer to on-the-ground FEMA staff or their subcontractors, for response decisions.

Arcata Fish and Wildlife Office

General plant conservation measures

No work may occur within occupied habitat. If work has already occurred in occupied habitat further consultation will be necessary and monitoring and/or restoration/rehabilitation may be required. To determine where species are located use the California Natural Diversity Database, California Consortium of Herbaria Records, most recent 5yr reviews, and range maps found in species profiles on the U.S. Fish and Wildlife Service's Environmental Conservation Online System (https://ecos.fws.gov), as well as consulting with the local U.S. Fish and Wildlife Office. Note that the absence of visible plants in an area where a plant species was documented in a previous year is a likely indication that there may be a biologically meaningful soil seed bank in that area, and steps must be taken to avoid disruption of the intact soil as much as possible.

If work has been or will be conducted in occupied areas a restoration plan will need to be implemented. This plan should focus on reestablishing suitable/occupied habitat for a given species and reintroduce species if necessary. Only native species appropriate for the habitat should be used. Hydroseed should be avoided due to how often the mixes include inappropriate species.

If occupied areas have been worked in, surveys for at least 3 years should be conducted after to determine the effect to the listed plant species population.

Conduct Survey: A qualified biologist must conduct a survey for the listed species during the peak bloom period, within 1 year prior to commencement of project activities.

Surveys should follow the Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants (FWS 2000) and CDFW's Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities (CDFW 2018), or their most recent equivalents. Surveys should include mapping of occupied habitat. If surveys are not possible, the listed species will be assumed to be present in all suitable habitats in the project area.

Occupied areas may not be used for staging of equipment or any project related activities. If work is occurring near occupied habitat a buffer and fencing may need to be established to designate the area. The buffer distance may be dependent upon the project activities and proximity to occupied or suitable habitat.

Covered species:
beach layia (*Layia carnosa*)
Howell's spineflower (*Chorizanthe howellii*)
Kneeland Prairie penny-cress (*Thlaspi californicum*)
Mcdonald's rock-cress (*Arabis macdonaldiana*)
Menzies' wallflower (*Erysimum menziesii*)
Monterey clover (*Trifolium trichocalyx*)
western lily (*Lilium occidentale*)

Citations

California Department of Fish and Wildlife (CDFW). 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities.

US Fish and Wildlife Service. "Guidelines for conducting and reporting botanical inventories for federally listed, proposed, and candidate plants." Sacramento, CA (2000).

Coastal Distinct Population Segment of Pacific Marten (*Martes caurina*)

Breeding Season: March 1 to July 31

Work Window: August 1 to February 28 (February 29 if leap year)

Habitat Assessment: A habitat assessment will be conducted by a qualified biologist to determine whether suitable habitat (including breeding, denning, resting, or foraging) for the coastal marten occurs in the action area. If suitable habitat for the species is identified in the action area and the proposed project may affect suitable habitat that is not known to be occupied by the coastal marten, Arcata FWO will be contacted regarding the need for surveys according to FWS protocol and those surveys will be conducted, as appropriate. Otherwise, if the FWS Office agrees, the species will be assumed to be present in areas with suitable habitat. In general, this would include habitat such as mature, conifer-dominated forest overstory, dense, spatially extensive

shrub layer greater than 70%, stands with structural features, and stands with structural features.

Habitat Avoidance: Staging and temporary construction areas will be located outside of suitable habitat and will use existing roads and developed areas to the extent possible. All mature suitable habitat will be avoided. Suitable habitat includes maintenance of dense, ericaceous shrub layer at or above 70%.

Projects in Suitable Habitat: Marten occupancy surveys (using a Service-approved survey protocol and biologist) will be conducted from March 1 through July 31 to determine that the action area is occupied, or FEMA presumes marten occupancy without conducting surveys. In occupied or presumed occupied habitat, FEMA will adhere to the following conservation measures:

a. No suitable marten denning or resting habitat or potentially suitable marten den or rest trees will be removed or altered (i.e., to the extent the tree or habitat are no longer suitable for denning or resting) during the denning season (i.e., from 1 March through 15 September). Suitable marten habitat may be removed or altered outside the denning season (i.e., from 16 September through the following 28/29 February) provided the remaining habitat retains suitability for denning and resting after the removal or alteration. Habitat suitability includes maintenance of the dense, mesic shrub layer at or above 70 percent. Removal or alteration of known natal or maternal den trees (or more rare den structures such as rockpiles, snags, logs) at any time of year is not covered by this consultation.

b. No human activities (including use of drones) will occur within visual line-of-sight of 328 ft. (100 m) or less from a known natal or maternal den site. The 100-m visual disturbance distance may be reduced or eliminated through technical assistance with the Service if site-specific information suggests that ambient visual disturbance within the action area is already high enough to likely preclude species from denning within 100 m of the project footprint, or vegetation near the roadway is sufficiently dense to shield the view from habitat farther from the roadway.

Unoccupied Habitat: If protocol surveys determine that all suitable marten denning/resting habitat within the action area is considered unoccupied, suitable habitat may be removed or altered without seasonal restrictions provided the Service agrees that the habitat removal or alteration represents an “insignificant” action; based on whether the remaining habitat is still considered suitable for denning marten; including maintenance of the dense, mesic shrub layer at or above 70 percent.

Critical Habitat: FEMA must ensure that there are no “adverse effects” to proposed critical habitat within the action area. Because the Service has no specific quantitative thresholds, above which there would likely be an adverse effect to proposed critical habitat, FEMA must contact the Service to determine whether the proposed habitat removal or alteration would constitute an adverse effect to designated critical habitat. The Service considers removal or alteration of designated critical habitat that negatively

affects the primary constituent elements or the physical and biological features (for more recent critical habitat rules) of the habitat as an adverse effect.

Lotis Blue Butterfly (*Lycaeides argyrognomon lotis*)

Lead Biologist: Clint Pogue; Clint_Pogue@fws.gov

In areas within the range of the lotis blue butterfly (reference IPAC or ECOS), a survey must be conducted for the larval host plant, *Hosackia gracilis* prior to work. These surveys must be completed during the blooming period of the plant (approximately late March-late April) to maximize detectability. If *Hosackia gracilis* is present, then protocol-level surveys for the butterfly must be completed. If *H. gracilis* is not present, then work may be completed without impacts to lotis blue. Survey protocols can be acquired from AFWO staff.

Behren's Silverspot Butterfly (*Speyeria zerene behrensii*)

Lead Biologist: Clint Pogue; Clint_Pogue@fws.gov

In areas within the range of the Behren's silverspot butterfly (reference IPAC or ECOS), a survey must be conducted for the larval host plant, *Viola adunca* prior to work. These surveys must be completed during the blooming period of the plant (approximately April-June) to maximize detectability. If *Viola adunca* is present, then protocol-level surveys for the butterfly must be completed. If *V. adunca* is not present, then work may be completed without impacts to Behren's silverspot. However, if the work is within 4.25 miles of the boundaries of Manchester State Park, Point Arena Stornetta Unit Bureau of Land Management Lands, or Salt Point State Park, then consultation with the Service would be advisable.

If outside the 4.25-mile buffer previously mentioned, then the following measures could be applied for no effect:

- Map all violets (*Viola adunca*) in the project area and avoid crushing, trampling, or submersing violet plants.
- Buffer all violet patches by 20 feet to account for any undetected violets, larvae in transit between violet patches, and the potential accidental impacts of large turning radii of vehicles used for the project.
- Mark areas on the ground using construction fencing, pinflags, or other markers to indicate areas to be avoided.
- Avoid removing, destroying, or harming nectar plants. Some examples of native nectar plants include California aster, gum plant, Western goldenrod, pearly everlasting, and yarrow. Non-native nectar plants should be avoided as well and can include thistles, tansy ragwort, and cat's ear among others.
- If impacts to nectar plants cannot be avoided, technical assistance may be sought from FWS staff regarding proximity of known locations.
- If area is sufficiently far from known locations, seed may be collected from native nectar plants in the project vicinity and used to revegetate post construction.

- Post construction monitoring should occur and indicate that nectar density did not decline.
- Any ground-disturbing work adjacent to potential Behren's silverspot habitat (indicated by the presence of violets and/or high-quality nectar resources and/or high-quality coastal prairie natural community components) is not covered by these guidelines as the effects to the habitat have the potential to be long-lasting and could impede recovery of the species. In this situation, consultation with the FWS would be advisable.

Oregon Silverspot Butterfly (*Speyeria zerene hippolyta)*

Lead Biologist: Clint Pogue; Clint_Pogue@fws.gov

In areas within the range of the Oregon silverspot butterfly (reference IPAC or ECOS), a survey must be conducted for the larval host plant, *Viola adunca* prior to work. These surveys must be completed during the blooming period of the plant (approximately April-June) to maximize detectability. If *Viola adunca* is present, then protocol-level surveys for the butterfly must be completed. If *V. adunca* is not present, then work may be completed without impacts to Oregon silverspot. However, if the work is within 4.25 miles of Tolowa Dunes State Park or Lake Earl Wildlife Area boundaries, then consultation with the Service would be advisable.

If outside the 4.25-mile buffer previously mentioned, then the following measures could be applied for no effect:

- Map all violets (*Viola adunca*) in the project area and avoid crushing, trampling, or submersing violet plants.
- Buffer all violet patches by 20 feet to account for any undetected violets, larvae in transit between violet patches, and the potential accidental impacts of large turning radii of vehicles used for the project.
- Mark areas on the ground using construction fencing, pinflags, or other markers to indicate areas to be avoided.
- Avoid removing, destroying, or harming nectar plants. Some examples of native nectar plants include California aster, gum plant, Western goldenrod, pearly everlasting, and yarrow. Non-native nectar plants should be avoided as well and can include thistles, tansy ragwort, among others. If impacts to nectar plants cannot be avoided, technical assistance may be sought from FWS staff regarding proximity of known locations.
- If area is sufficiently far from known locations, seed may be collected from native nectar plants in the project vicinity and used to revegetate post construction.
- Post construction monitoring should occur and indicate that nectar density did not decline.
- Any ground-disturbing work adjacent to potential Oregon silverspot habitat (indicated by the presence of violets and/or high-quality nectar resources and/or high-quality coastal prairie natural community components) is not covered by

these guidelines as the effects to the habitat have the potential to be long-lasting and could impede recovery of the species. In this situation, consultation with the FWS would be advisable.

Western Bumble Bee (*Bombus occidentalis occidentalis)*

Candidate species being considered for 2022-2023

Lead Biologist: Laurel Goldsmith; Laurel_Goldsmith@fws.gov

Habitat Assessment: Bumble bees have three general annual needs that include: foraging habitat, nesting habitat, and overwintering habitat. Dispersal occurs primarily in spring by queens while searching for suitable nest sites (Goulson 2010). There is evidence that bumble bees can disperse relatively long distances, at least between 2.6 and 10 km from the colony of origin (Kraus et al. 2008, Stout and Goulson 2000, Lepais et al. 2010). Western bumble bees are found in a range of habitats, including mixed woodlands, farmlands, urban areas, montane meadows and into the western edge of the prairie grasslands (COSEWIC 2014).

Foraging habitat includes floral resources that produce pollen and nectar throughout the colony lifecycle (February – November). Floral resources should be protected, maintained, and enhanced (native pollen and nectar resources) throughout the entire colony lifecycle to avoid take. Projects should take special care to identify and manage monoculture crops, grazing, mowing, and weed control within or adjacent to foraging habitat. Bumble bees may also be reluctant to cross transportation corridors when foraging (Bhattacharya *et al.* 2003). Therefore, bumble bees need nesting and foraging habitat in proximity without dispersal barriers between them. If foraging resources are limited in an area, then any increase in forage availability and distribution may benefit the species.

Nesting and overwintering habitat includes underground nest sites, but bees also may use woody debris, snags, grass piles, sloped areas, loose soils, rodent burrows, bird nests, leaf litter, duff, rock piles, dead trees, hollow logs, nest boxes, and other suitable habitat structures as nesting and overwintering sites. Suitable structures for nesting and overwintering sites should be retained and provided within the project area. Artificial nest boxes should be consulted upon (see lead biologist for details).

General No Take Guidance: Any near-surface or subsurface disturbance of the ground is likely catastrophic for bumble bee colonies or overwintering queens. This includes mowing, fire, tilling, grazing, and planting. Specific areas should be large (this metric is still being defined, check with USFWS lead biologist for details) and free of these practices. It is important to retain landscape features that will support rodent burrows and populations. Mowing, fire, and grazing can be valuable tools for maintaining open, pseudo-meadow habitat if applied infrequently and over a reduced area. An entire action areas or site should not be treated at one time, and no more than 1/3 of an action area or site should not be treated per year. Identify and manage any near-surface or

subsurface disturbance of the ground. If nesting and overwintering resources are limited in an area, then any increase in structure availability and distribution may benefit the species.

- Mowing Actions and Management: Mowing should occur when bumble bees are dormant (winter) or inactive (dusk or at night). If mowing is essential, then consultation may be necessary (see lead biologist for details).
- Fire Actions and Management: Prescribed fire should only be used to burn a specific area once every 3-6 years. Burning should only occur from October – February. Only small sections should be burned at one time. No more than 1/3 of the action area or site should be burned each year. High intensity fires should be avoided. If fire actions and management are essential, then consultation may be necessary (see lead biologist for details).
- Grazing Actions and Management: Grazing should be applied carefully to manage successional processes and encourage growth and structure for foraging, nesting, and overwintering habitat. Grazing is typically beneficial at low to moderate levels and when applied for short periods of time to allow for site and area recovery. Local and historical conditions need to be assessed before projects are implemented. Grazing strategies should be developed and applied according to site characteristics and the type of livestock being used for grazing (see Conserving-Bumble bee publication from Xerces Society at https://www.xerces.org/publications/guidelines/conserving-bumble-bees and contact lead biologist for details). Grazing should only occur for a short period of time, providing an extended period for recovery (Note: timelines needed). Grazing should only occur on approximately 1/3 of the property each year. Exclosures and rotational grazing should be applied to allow community level recovery.
- Surface and Subsurface Disturbance Actions and Management:An identified proportion of the action area should remain permanently free to surface and subsurface disturbance (*e.g.,* tilling, drilling, *etc.*). Linear features that are free from disturbance, such as fence lines or hedgerows, may be important habitat and should be considered when reviewing actions.
- Insecticide Actions and Management. Less toxic alternatives actions should be considered when responding to potential invasive species concerns. Damage from potential invasive species should be quantified and confirmed before chemical treatments are applied. All chemicals should be reviewed for toxicity and harm to the focal species when being applied in the project area. Pesticides should not be used unless deemed essential. If insecticides actions and management are essential, then consultation may be necessary (see lead biologist for details).
- Commercial Bumble Bee and Honey Bee Actions and Management: Use of commercially reared bumble bees and honey bees should be minimized in or near natural areas where bumble bee occurs and where unique habitats occur (*e.g.,* natural meadows). If commercial bumble bee or honey bee actions and

management are essential, then consultation may be necessary (see lead biologist for details).

Survey and Monitoring: The presence and distribution of foraging, nesting and overwintering resources should be surveyed and mapped, and then a determination should be made if foraging habitat is within 500-800 m (0.3-0.5 mi) from nesting habitat. Surveys should be conducted using most recent approved protocol (see lead biologist for details).Presence of the species can be based on an observation of any bee (queen, worker, male). If a Queen is observed the nest can be assumed to be within a few kilometers (likely a few hundred meters) of the observation. When using photographs to document an occurrence, identification should be confirmed by an expert or USFWS lead biologist.
https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.916920/Bombus_occidentalis

References

Bhattacharya, M., R.B. Primack, and J. Gerwein. 2003. Are roads and railroads barriers to bumblebee movement in a temperate suburban conservation area? Biological Conservation 109(1):37-45.

COSEWIC. 2014. COSEWIC assessment and status report on the Western Bumble Bee *Bombus occidentalis*, *occidentalis* subspecies (*Bombus occidentalis occidentalis*) and the *mckayi* subspecies (*Bombus occidentalis mckayi*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 52 pp. https://speciesregistry.canada.ca/indexen.html#/documents?documentTypeId=18&sortBy=documentTypeSort&sortDirection=asc&pageSize=10.

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Hatfield, R., Jepsen, S., Mader, E., Black, S. H., and M. Shepheard. 2012. Conserving bumble bees. Guidelines for creating and managing habitat for America's declining pollinators. 3pp. Portland, OR: The Xerces Society for Invertebrate Conservation.

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Lepais, O., Darvill, B. E. N., O'connor, S., Osborne, J. L., Sanderson, R. A., Cussans, J., and Goulson, D. 2010. Estimation of bumblebee queen dispersal distances using sibship reconstruction method. *Molecular Ecology*, *19*(4), 819-831.

Schweitzer, D.F., N.A. Capuano, B.E. Young, and S.R. Colla. 2012. Conservation and management of North American bumble bees. NatureServe, Arlington, Virginia, and USDA Forest Service, Washington, D.C.

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Bay Delta Fish and Wildlife Office

Delta Smelt: Work within August 1-November 30 work window; Use vibratory hammer when driving piles to reduce noise effects; Use silt curtains

California Clapper Rail: Sept1-Jan31 work window; Avoid marsh habitats if possible; at least a 700-ft noise/visual buffer from habitat.

Project activities will be restricted to daylight hours 30 minutes after sunrise and 30 minutes before sunset.

Project activities should avoid high tides and periods when the marsh plain is inundated.

Salt Marsh Harvest Mouse: Avoid working within tidal marsh and pickleweed; Hand clear pickleweed if can't avoid.

Temporary removal of vegetation in work and access areas will reduce their attractiveness as habitat for salt marsh harvest mice.

- Preferably only non-motorized equipment (i.e. hand shears) will be used to remove the vegetation.
- The Service-approved biologist will walk a safe distance in front of vegetation removal equipment to ensure no salt marsh harvest mice are present.
- Vegetation removal shall move in a direction toward salt marsh harvest mouse habitat and continue in a uniform direction.
- Vegetation will be removed to bare ground or stubble no higher than 1 inch. Vegetation will be cut in at least two passes: with the first pass cutting vegetation at approximately half of its height above the ground (mid-canopy) and the next pass, or subsequent passes, cutting vegetation to ground-level or no higher than 1 inch.
- Cut vegetation should not be piled in the area where vegetation removal is taking place (what will be the exclusion area). It should be removed from the exclusion area as it is being cut, so that no standing or cut vegetation remains in the exclusion area when the fence is installed.

To prevent salt marsh harvest mice from moving through work and access areas during operations, temporary exclusion fencing will be placed around the defined work area prior to the start of construction/excavation activities and immediately after vegetation removal. The fence should be made of a non-textured material that does not allow salt marsh harvest mice to pass through or climb (such as Visqueen©), and the bottom should be buried to a depth of at least 4 inches so that animals cannot crawl under the fence. Fence height should be at least 12 inches higher than the highest adjacent

vegetation with a maximum height of 4 feet. Fence posts should be placed on the work area side (vegetation cleared side) of the fencing. The fencing shall be installed under the supervision of a Service-approved qualified biologist.

The Service-approved biologist will conduct daily surveys to ensure that the exclusion fencing is intact and that no mice have entered the project area.

Project activities will be restricted to daylight hours 30 minutes after sunrise and 30 minutes before sunset.

Project activities should avoid high tides and periods when the marsh plain is inundated.

Potential perches and wildlife cover (stacks of wood, pallets, and piles of debris) will be removed from the proposed project footprint as quickly as possible and as much as is feasible. If they cannot be removed in the short term, they will be covered with tarps and/or enclosed with exclusion fencing or modified with non-lethal anti-perch devices such as spike strips.

Prior to initiation of work activities within suitable habitat, the Service-approved biologist will survey the work area for the presence of salt marsh harvest mice and nests. Surveys will be repeated daily prior to the beginning of project activities at the proposed project site; one or more Service-approved biologists will survey the proposed project site to ensure it is clear of salt marsh harvest mice.

Soft Bird's-Beak & Suisun Thistle: Conduct special status plant surveys in the appropriate blooming period. Avoid work/placement/staging in intertidal/upland areas with suitable habitat, plants, and/or critical habitat

Antioch Dunes evening primrose; Contra Costa wallflower; and Lange's Metalmark butterfly. These species almost only occur on Antioch Dunes National Wildlife Refuge. Rare plant surveys, avoid occurrences/habitat, avoid work within areas containing Lange’s Metalmark butterfly host plants (Antioch Dunes naked-stem buckwheat); Dust and sediment containment.

General AMMs

1. For each activity, all construction personnel will participate in a worker environmental awareness program. Under this program, construction personnel will be informed about the
presence of listed species and habitats associated with the species and that unlawful take of
the animal or destruction of its habitat is a violation of the Act. Prior to construction activities, a qualified biologist approved by the Service will instruct all construction personnel
about: (1) the description and status of the western snowy plover; (2) the importance of its associated habitat; and (3) a list of measures being taken to reduce impacts on this

species during proposed project construction and implementation. A fact sheet conveying this information will be prepared for distribution to the construction crew and anyone else who enters the Project site. A member of the construction crew will be appointed and identified during the environmental
awareness program who will be the point of contact for any employee or contractor who might encounter a listed species. The representative's name and telephone number will be
provided to the Service prior to the initiation of any activities.

2. A Service-approved biological monitor will be present during all work activities in or immediately adjacent to habitat that could he occupied by federally listed species to look for
individuals that may be impacted by construction; activities are considered "immediately adjacent" to sensitive habitat if those activities could result in the physical disturbance of the
habitat or if individual listed species could move from that habitat into the proposed project area. The biologist will have stop-work authority if any individual of a federally listed species is detected in an area where it may be injured or killed by construction activities.

3. Use existing roads

Carlsbad/Palm Springs Fish and Wildlife Office

To the extent practicable, activities that are implemented or funded by FEMA should be conducted consistent with the Carlsbad Fish and Wildlife Service Field Office (CFWO) FEMA Programmatic Biological Opinion dated May 31, 2019. For ease of reference, we have repeated some of the most relevant general measures here (marked with an *). We have also included species specific measures for many of the species that were not addressed previously. Given our time constraints we were unable to address all of the listed species in the area, including Inyo California towhee and Mohavi tui chub. These species may also be impacted by the proposed emergency activities, but we do not have recommended species-specific avoidance and minimization measures at this time. If an emergency activity is likely to impact habitat for these species, we recommend that, to the extent practicable, FEMA coordinate with the U.S. Fish and Wildlife Service to discuss possible measures to avoid, minimize, and offset impacts. The following conservation measures are intended to avoid, minimize, and offset incidental take of listed species during emergency work activities for FEMA-3592-EM-CA & DR-4699-CA in areas under the jurisdiction of CFWO. This includes Imperial, Inyo, Kern, Orange, and San Bernardino Counties, and portions of Los Angeles County[1]. Please note that

[1] San Diego and Riverside Counties are also within the CFWO jurisdiction however they are not included in this request from FEMA. The following species were indluded in FEMA's request, however they only occur within these two counties, therefore they are not addressed further: San Diego thornmint (*Acanthomintha ilicifolia)*, San Diego ambrosia (*Ambrosia pumila*), Encintias baccharis (*Baccharis vanessae*), San Diego button celery (*Eryngium*

protection of health and human safety is of primary concern. Please take whatever actions are necessary to protect human health and safety.

General Conservation Measures

1. A biological monitor will monitor all construction-related activities with the potential to impact listed species to ensure that all feasible conservation measures are being implemented. The biological monitor will be familiar with the habitats, plants, and wildlife of the project area, and will be present while equipment is being used to ensure that issues relating to biological resources are appropriately and lawfully managed. The biological monitor will be provided with a copy of these measures. The contracts of the project biologist(s) will allow direct communication with the Service at any time regarding the project.*

2. Prior to any construction activities, the biological monitor will train all contractors and construction personnel on the biological resources associated with the project and ensure that training is implemented by construction personnel. At a minimum, training will include: 1) the purpose for resource protection; 2) a description of the federally listed species that may be within the project area and their habitats; 3) the conservation measures that should be implemented during project construction to avoid impacts to listed species, including strictly limiting activities, vehicles, equipment, and construction materials to the project footprint to avoid sensitive resource areas in the field; 4) environmentally responsible construction practices; 5) the protocol to resolve conflicts that may arise at any time during the construction process.*

3. If time allows, a habitat assessment will be conducted by the biological monitor to determine whether suitable habitat (including foraging, nesting, and dispersal) for listed bird species occurs in the action area. If suitable habitat for this species is identified in the action area and the proposed project may affect suitable habitat that is not known to be occupied by listed bird species, the Service will be contacted regarding the need for surveys according to Service protocol, and those surveys will be conducted, as appropriate.

4. If an active nest is detected during the survey, the following will apply to the extent feasible:

    a. An exclusionary buffer will be established around the nest. The buffer distance will be determined by the biological monitor considering several factors: presence of natural buffers (vegetation/topography), nest height, location of foraging territory, nature of the proposed activities, and baseline levels of noise and human activity. The buffer may range from 50 feet to over 300 feet in width. AND

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aristulatum var. *Parishii),* Coachella Valley milk-vetch (*Astragalus lentiginosus var. coachellae*), and Hermes copper butterfly (L*ycaena hermes*).

b. The biological monitor will monitor the nest during construction for signs of adverse effects including distress/disturbance. If adverse effects are detected, the biological monitor will provide recommendations to the project proponent to further avoid or minimize potential effects.

c. The biological monitor will continue to monitor the nest and determine when young have fledged. Once young have left the nest, the buffer and exclusion zone may be removed, and construction activities within these areas may resume.

5. Any dead specimens will be preserved in accordance with standard museum practices. All preserved specimens will be properly labeled and deposited with one of the designated depositories, including The California Academy of Sciences, San Francisco, California; the Santa Barbara Natural History Museum, Santa Barbara, California; the Los Angeles County Museum of Natural History, Los Angeles, California; or the San Diego Natural History Museum, San Diego, California.

6. California Natural Diversity Database forms will be completed, as appropriate, and submitted to the Biogeographic Data Branch, California Department of Fish and Game (CDFG), 1807 13th Street, Suite 202, Sacramento, California 95811 (also accessible online at http://www.dfg.ca.gov/biogeodata/cnddb), with copies submitted to the CFWO. Copies of the form can be obtained from the CDFG at the above address (telephone: 916-324-3812).

7. Avoid night work if feasible. If night work is necessary, night lighting will be of the lowest illumination necessary for human safety, selectively placed, shielded, and directed away from natural habitats.*

8. The project site will be kept as clear of debris as possible. All food-related trash items will be enclosed in sealed containers and regularly removed from the site. All spoils and material disposal will be disposed of properly.*

9. The project will avoid the use of galvanized/zinc coated pipe, which can be harmful to wildlife.

10. Erosion and sediment control devices used for the proposed project, including fiber rolls and bonded fiber matrix, will be made from biodegradable materials such as jute, with no plastic mesh, to avoid creating a wildlife entanglement hazard.*

11. Appropriate Best Management Practices (BMPs) for erosion and sediment control will be utilized to prevent sediment and construction debris from entering nearby streams, rivers, and watersheds.*

12. Project work will be completed as rapidly as possible to minimize potential disturbance to listed species.

13. Staging and temporary construction areas will be located outside of suitable habitat for listed species and will use existing roads and developed areas to the extent possible. Project impacts will be avoided or minimized in vegetation communities likely to be occupied by listed species, as determined by the biological monitor. All mature riparian vegetation (e.g., willows and cottonwoods) greater than 30 feet in height will be avoided to the maximum extent possible.*

14. If feasible, all equipment maintenance, staging, and dispensing of fuel, oil, coolant, or any other such activities will be restricted to staging areas. A Spill Prevention, Control, and Countermeasure plan will be prepared for hazardous spill containment. If it is infeasible to move large equipment (e.g., dredges and support craft, work skiffs, amphibious excavators) to staging areas for fueling, the below measures will be implemented as applicable to avoid impacts to wetlands:
    a. Drip pans and/or absorbent pads will be used during fueling operations.
    b. Equipment will be inspected for leaks and spills daily, and repairs will be made if necessary.
    c. Nozzles used in vehicle and equipment fueling will be equipped with an automatic shut-off to control drips. Fueling operations will not be left unattended.
    d. Adequate spill kits will be onsite; equipment fueling vehicles will be equipped with absorbent pads and spill kit material.
    e. All oilers and fuel truck operators will be trained to respond to a spill.
    f. If a noticeable spill occurs, the spill will immediately be contained, contaminated soil will be placed in barrels and removed from the site, and the spill will be documented and reported to the Service.

15. The spread of nonnative weeds during construction activities and revegetation efforts will be controlled. All vehicles will be cleaned and free of mud and debris prior to entering the action area, and all erosion and other sedimentation controls used during and after construction will be certified weed free, as applicable. Weed free hay, straw bales, or mulch maybe available through the California Interagency Noxious Weed Free Forage and Mulch Program (http://pi.cdfa.gov/weed/wff).*

16. The biological monitor will submit a final report to the lead agency's project biologist within 120 days of the completion of project construction that includes photographs of habitat areas that were to be avoided and other relevant summary information documenting that authorized impacts were not exceeded and that general compliance with conservation measures was achieved. The lead agency's project biologist will review the report and forward it to the Service.

17. Personnel should not bring dogs to the work site and should not feed wildlife on or adjacent to the work site.

18. If project activities are to be conducted at night, minimize night lighting during project activities by using shielded directional lighting pointed downward, thereby avoiding illumination of adjacent natural areas and the night sky.

Species-Specific Conservation Measures

Amargosa vole

1. If possible, a biomonitor familiar with Amargosa vole should be present during any ground disturbing activities that occur directly in Amargosa vole occupied habitat. Biomonitors should have the ability to demarcate buffer areas around high sensitivity habitat in order to minimize risk to Amargosa vole.

2. All footwear for work crews will be cleaned and sanitized to remove course dirt and debris (which could contain pathogens and parasites) between each site at every visit. A rigid brush will be used to remove organic material within shoe treads followed by spraying of boot treads with a disinfectant solution.

3. Removal of bullrush understory or general vegetation removal in vole habitat should be avoided. If vegetation removal is deemed necessary, the biomonitor will be present and will be allowed to scan vegetation for voles prior to vegetation removal.

4. Herbicides, rodenticides, and insecticides should not be used near or in vole habitat, including in areas that have the potential to runoff into vole habitat.

5. Heavy equipment or vehicles should not be operated within vole habitat if possible.

6. Water sources such as spring flows that feed into vole habitat will not be interrupted or redirected by recontouring, digging of trenches, etc.

Pacific pocket mouse

1. When possible, pre-activity surveys for PPM burrows will be conducted by a biologist with PPM experience (biomonitor) prior to ground disturbing activities with mechanical equipment or when thatch/vegetation is removed. Burrows will be clearly marked for avoidance during these activities. The biomonitor will establish a 10-foot buffer zone around PPM burrows and guide work within the buffer to avoid and minimize harm to PPM. Specifically:
    a. The biomonitor will mark the buffer areas with ribbon/tape so the workers are aware of the sensitive area.
    b. The biomonitor will map apparent PPM burrow locations and develop an action plan that details specific avoidance measures to be applied in each area. The most recent available PPM track tube and trapping survey data

will be provided to the biomonitor and workers to assist with development of the map and plan.

c. Workers will conduct all vegetation thinning and potentially ground-disturbing activity within the buffer areas only when a biomonitor is present to give avoidance and minimization guidance.
d. Leaf litter/duff and weeds will be cleared within the buffers as much as feasible using low soil-disturbance methods under the direction of a biomonitor to avoid crushing burrows.
e. Placement and use of a portable wood-chipper will be at the discretion of the biomonitor to ensure that vibration and noise effects will not impact PPM burrows. The location will be at least 100 feet from known occupied PPM locations (based on the most recent track tube and trapping surveys) and potential burrows marked during pre-treatment surveys.

2. Mowing and use of other wheeled equipment should be avoided, if feasible, during rainy and wet soil conditions when burrows may be more susceptible to collapse and impacts from vehicular and foot traffic. In general, work shall be avoided within 72 hours of 0.5 inches of rainfall unless a soil ecologist familiar with soil texture analysis has determined it to be sufficiently dry to support work activities without an increased risk of soil compaction.

3. Herbicide preparations must be mixed in areas well outside of where PPM are active.

Peninsular bighorn sheep

1. During any construction activities, if a sheep is seen within one mile of the activity, any work that could disturb the sheep will cease. For vehicle operations, this will entail stopping the vehicle until the sheep moves away. Vehicles may continue on at reduced speeds (10-15 miles per hour) once the sheep has moved away. For construction or maintenance activities, the biological monitor will request that work stop until the sheep moves out of the area. If, after three hours of the initial sighting, sheep do not move beyond one mile away from the project activity or vehicle, project personnel will retreat from the area in the direction from which they came.

2. All construction and maintenance in or adjacent to known sheep use areas that cannot be located elsewhere should be accomplished during the period that sheep are not likely to be using the area, if feasible. Sheep movements may vary seasonally and annually, depending on factors such as amount of rainfall that influence forage availability. Timing recommendations will be based on appropriate data.

3. Where it is not possible to avoid the time sheep are present as indicated above, FEMA will work with the Service and landowner to define the location of such facilities, staging areas, the number, route, speed, and types of vehicle access to

the facility allowed per day, and the time the facility will be in operation. FEMA personnel will reduce vehicle speeds to 25 miles per hour when driving in areas known to have sheep present at that time of year.

4. During the lambing season (January 1 to June 30), it is especially important to avoid disturbance to ewes and lambs. Vehicle activity will be restricted to the extent possible during those times in areas where there are lambs present.

5. During construction and maintenance of facilities, the minimum amount of personnel and equipment will be used to reduce the amount of activity. This may be adjusted if additional personnel and equipment will complete the work faster and thus reduce the time the disturbance is in effect.

6. Natural water sources available to sheep will be identified and avoided by all FEMA activities.

7. A qualified biologist knowledgeable about bighorn sheep should accompany all project-related activities. Although noise and disturbance from project activities may deter sheep from approaching the project area, the Biomonitor should have the authority to contact the Service if sheep are encountered within 1,500 feet (or as modified according to PBS-1 above) of the project work zones and to temporarily halt any and all project-related activities as long as sheep are present. The Biomonitor should implement the following measures:
    a. The Biomonitor should have the authority to issue temporary stop-work orders to allow bighorn sheep to move away from an active work zone on their own accord. The Biomonitor should notify immediately the Service point of contact to discuss the sheep observations and the need to stop work.
    b. For each day's planned project activities, the Biomonitor should inspect the work areas and habitat adjacent to work areas (using scopes or binoculars to search for sheep presence). The Biomonitor should monitor for sheep within a minimum of 1,500 feet from the project activity (up to 1 mile of the activity if feasible). The Biomonitor would remain onsite every day during all project activities and provide daily email reports to designated Service staff (see PBS-5 below) if sheep are observed.

8. The Biomonitor and onsite project manager should develop and implement a WEAP to inform project and enforcement personnel of the potential presence of bighorn sheep. Project personnel should be required to attend the WEAP and sign an acknowledgement of attendance and agreement to comply with the measures outlined in the WEAP. The WEAP should include the following: (a) photographs, descriptions, conservation status, and avoidance and minimization measures as outlined in this letter; (b) information on disease transmission from domestic livestock and footwear hygiene to prevent disease transmission to bighorn sheep; and (c) instructions to personnel to notify the Biomonitor

immediately of all sheep sightings, and what to do if they come across an injured or sick sheep, or a lamb that appears to be abandoned by it mother. In those cases, the worker should not approach or touch the animal, and notify the Biomonitor immediately; the Biomonitor will contact the Service point of contact.

9. During project activities, the Biomonitor should record on a daily basis any bighorn sheep encounters that occurred at the day's work site and how they were resolved. The Biomonitor should note where sheep are observed during project activities. Note gender, age, collar, ear tag, etc. using a reporting form such as the one included as an attachment to this document. The Biomonitor should report all bighorn sheep encounters by email weekly (each Friday) to the Palm Springs Fish and Wildlife Office.

10. The onsite project manager should encourage proper footwear hygiene to help prevent disease transmission from domestic animals to bighorn sheep. If workers have any potential contact with lands occupied by domestic sheep or goats (for example, at home, visiting a farm, attending a county fair, going to a petting zoo, etc.), they should disinfect their boots at an onsite boot disinfection station before going to a work zone in bighorn sheep habitat. Alternatively, personnel may be required to change their footwear so that contaminated boots are not used in work vehicles or in the work site.

11. The project's Lead Agency should collate and provide any reports of bighorn sheep observations by email to the Service point of contact. In addition to these observations, an assessment of project disturbance should be provided as well (i.e., number of acres/miles of disturbance caused by these activities). We also request any associated GIS files to document the locations of disturbance.

San Bernadino Merriam's kangaroo rat and *Stephens' kangaroo rat*

When ground disturbing actives are adjacent to SBKR/SKR habitat the following avoidance measures will be required to avoid impacts to SBKR/SKR individuals and habitat.

1. Prior to ground disturbing activities SBKR/SKR habitat, and burrow entrances will be marked with pin flags by a biologist with SBKR/SKR experience. These areas will be avoided, and no ground disturbing activities will be allowed within 25 feet of habitat and or burrow entrances.

2. Prior to ground disturbing activities, the limits of Project disturbance will be clearly marked with flagging or similar means. All personnel and mechanized equipment shall remain within designated Project disturbance areas (e.g., vehicle ingress and entry, grading site, staging areas, access roads, sites for temporary placement of construction materials and spoils). The disturbance area will be delineated with orange construction fencing or staking and flagging at a minimum

of 50-foot intervals, to clearly identify the limits of work and they will be maintained until work is complete.

3. All construction personnel shall receive worker environmental training, which shall include a discussion on SBKR/SKR habitat and the avoidance and minimization measures that are being implemented as part of the project. They will be provided the contact information of the biological monitor. A signature sheet will be maintained for those that have received the training.

4. Any uncapped pipes with an inside diameter of 1.5 inches or greater stored overnight within the construction site will be covered overnight.
    a. If not the pipes will be thoroughly inspected by a qualified biological monitor for the presence of SBKR before the pipe is used or moved in any way.
    b. If SBKR are discovered the biological monitor will relocate the animal(s) to suitable habitat outside of the exclusion fencing.

5. Rodenticides, herbicides, insecticides, or other chemicals that could potentially harm SBKR/SKR will not be used during the construction phase of the Project.

If work MUST occur in areas of SBKR habitat the follow minimization measures will be required in addition to the measures described above (excluding measure 1)

1. A qualified biological monitor, with SBKR/SKR experience, will be present during construction activities to ensure compliance with conservation measures.
    a. The biological monitor will have the authority to halt any and all construction activities if necessary to prevent unauthorized “take” of SBKR or another federally listed species under the ESA.
    b. The biological monitor will report any non-compliance with any required measures and/or conditions to the PSFWO within 24 hours.

2. Prior to ground disturbing activities, an SBKR/SKR exclusion fence will be installed around the disturbance area. The SBKR/SKR exclusion fence will be constructed to the following specification.
    a. An opaque, non-scalable barrier will be installed for the duration of project related activities. 30 to 36 inches high above ground with the bottom buried at least 12 inches deep with a 6-inch apron lying at 12 inches deep at a right angle.
    b. If site conditions prevent trenching or as agreed upon by the PSFWO a 24-inch apron can be installed fencing parallel to the ground and perpendicular to the fence in an “L” shape. The f will be flat on the ground weighed down by dirt or sandbags.
    c. No gaps greater than 0.5 inches will be allowed.

d. The biological monitor will supervise the installation of an SBKR exclusion fence. The biological monitor will ensure no burrows will be impacted by fence installation, by avoiding fence placement within five meters of burrow entrances.
e. The biological monitor or designated Project representative will inspect the exclusion fence at the end of each workday. Any opening in the fencing greater than 1 inch will be repaired before leaving the job site.
f. The biological monitor will supervise the removal of a SBKR/SKR exclusion fence to ensure no SBKR burrows are impacted by fence removal.

3. After the exclusion fence is installed but before the start of vegetation clearing and/or grading, the area inside of the fence will be trapped for SBKR by a qualified SBKR/SKR biologist. The biologist will trap inside the exclusion fence until two consecutive nights pass without an SBKR/SKR capture. All SBKR captured will either be released in the nearest suitable habitat or be held and translocated to a suitable Service-approved site according to a translocation plan. The decision to either translocate or immediately release captured SBKR/SKR will be made in discussion with the PSFWO.
    a. The translocation receiver site will be chosen prior to SBKR/SKR capture. The selected receiver site will provide suitable soils and vegetation and will be unoccupied or occupied at low numbers by SBKR/SKR and adjacent to occupied habitat to reduce competition from resident SBKR/SKR and avoid isolation of the translocated individuals.
    b. The Service will be provided with a habitat assessment of the potential receiver site in order to approve the site if found appropriate.
    c. SBKR/SKR will be released in the respective formations and distances from each other as their capture locations, and predator exclusion fencing will be constructed around the receiver site by a qualified biologist on the receiver site prior to release to exclude predators from the area.

Santa Catalina Island fox

1. Exclusionary fencing will be installed to prevent direct access into the construction site for SKR.

2. Mowing will be avoided during rainy periods when burrows may be more susceptible to collapse and impacts from vehicular foot traffic.

San Clemente loggerhead shrike

1. When possible, activities will occur between August 1 and December 31, which will avoid the loggerhead shrike nesting season.

2. A CFWO-approved biologist (Biological Monitor) will be on site during clearing/grubbing and weekly during project construction within 300 feet of loggerhead shrike habitat to ensure compliance with all conservation measures.

Yuma Ridgeway's Rail

1. Focused surveys for Yuma Ridgway's rail to be conducted where project features are within or immediately adjacent to marsh habitat. Surveys will be conducted using current Service protocols and/or methods approved by the Service.

2. If Yuma Ridgway's rails are detected within 500 feet of project activity locations, work within that 500-foot buffer will be rescheduled for after the breeding season. All habitat occupied will be avoided from February 16 to September 30 to ensure birds can fledge and find adjacent habitat.

3. Work being conducted outside the breeding season within that 500-foot buffer will have an approved biological monitor present to avoid adverse effects to this species. Additional avoidance and minimization measures may be developed and implemented if the biological monitor observes that effects are still occurring to non-breeding individuals.

Desert tortoise

1. A qualified biologist must possess appropriate education, training, and experience to conduct desert tortoise surveys.

2. Install temporary desert tortoise exclusion fencing around work areas. Conduct desert tortoise clearance surveys according to most recent Service protocols prior to project activities. Move desert tortoises out of harm's way.

3. Desert tortoises shall be handled by approved authorized biologists. Authorized biologist must possess the appropriate education, training, and experience to handle desert tortoises.

4. Within desert tortoise habitat, check under vehicles prior to moving the vehicle for desert tortoises.

5. No overnight hazards to desert tortoises (e.g., auger holes, trenches, pits, or other steep-sided depressions) shall be left unfenced or uncovered; such hazards shall be eliminated each day prior to the work crew leaving the site. If excavations cannot be covered, they will be constructed with escape ramps, following up-to-date design standards to facilitate and allow wildlife to exit. Any excavations will be inspected for desert tortoises by a biological monitor immediately before backfilling.

Mountain yellow-legged frog

1. To the extent feasible, project activities within or near mountain yellow-legged frog occupied habitat should avoid the breeding season (i.e., April-June).

2. A Service-approved biologist with mountain yellow-legged frog experience will conduct surveys for mountain yellow-legged frog immediately prior to project activities when within 50 feet of occupied habitat during each day of activities. The biologist will monitor all project activities within 50 feet of occupied habitat to ensure no mountain yellow-legged frogs enter the work areas or are subject to indirect effects. If mountain yellow-legged frogs are found that are subject to effects due to project activities, then they will be relocated to the nearest suitable habitat by the Service-approved biologist. During project activities, surveys, monitoring, or any time there is work conducted within or adjacent to mountain yellow-legged frog occupied habitat, all personnel will follow the recommendations in https://www.fws.gov/sites/default/files/documents/declining-amphibian-task-force-fieldwork-code-of-practice.PDF.

Desert Pupfish

1. Conduct pre-project surveys to assess species presence and spawning within or immediately adjacent to work areas. Surveys will be conducted by qualified biologists.

2. Implement capture and transport methods to minimize handling and stress as well as exposure to heat, low dissolved oxygen (DO), and crowding.

3. Identify of locations for release of captured desert pupfish.

Dehli Sands flower-loving fly

1. Habitat suitability for the Dehli Sands flower-loving fly should be initially assessed by the FEMA based on species range and soil type (I.e., Dehli series soils). If soils are present, these areas should be avoided to the extent feasible.

2. If suitable habitat is covered by a different soil type, efforts should be made to restore the site and remove the deposited soil.

El Segundo blue butterfly

1. When possible, project activities will occur outside of the flight season (mid-September and May 31st). For activities that require work within the flight season, the following measures will be implemented to minimize impacts to El Segundo blue butterfly:
    a. Hostplants will be censused within the project footprint;
    b. All hostplants, including a 2-foot buffer around their canopies, will be avoided where possible; and

c. All work will be conducted during daylight hours to allow adult butterflies to escape impacts.

2. Project personnel will avoid trampling El Sugundo butterfly host plant seacliff buckwheat (*Eriogonum parviflorum*), including the canopy of these species to avoid impacts to eggs and larvae and minimize impacts to pupae.

Palos Verdes blue butterfly (PVB)

1. When possible, activities will occur outside of the flight season (Mid-May to January 31). For activities that require work within the flight season, the following measures will be implemented to minimize impacts to PVB:
    a. Hostplants will be censused within the project footprint;
    b. All hostplants, including a 2-foot buffer around their canopies, will be avoided where possible; and
    c. All work will be conducted during daylight hours to allow adult PVB to escape impacts.

2. Project personnel will avoid trampling Palos Verdes blue butterfly host plants, deerweed (*Acmispon glaber*) and coast locoweed (*Astragalus trichopodus* var. *lonchus*), including the canopy of these species toa void impacts to eggs and larvae and minimize impacts to pupae.

General Measures for Plants

1. Habitat suitability for special status plants (including federally listed and proposed, and designated and proposed critical habitat) should be initially assessed by the FEMA based on species range and habitat characteristics (e.g., vegetation community, soil type, and elevation).
    a. If special status plants are likely to be present, conduct field surveys to determine species presence; the survey period will occur when nearby reference populations are in bloom, using known blooming periods and local blooming data as a guide.
    b. If special status plant species are discovered the species will be identified, flagged, and will be avoided, to the extent feasible. If the plants can not be avoided, they should be salvaged and replanted as close to the impact area as possible.

Habitat-Specific Conservation Measures

Vernal pools[2]

[2] Vernal pool consultation measures apply for the following species: California Orcutt grass, spreading navarretia.

1. Any activities adjacent to vernal pool habitat will be constructed to slope away from the extant pools to be avoided, to ensure that runoff from the project does not flow into the pools.

2. The project proponeant will temporarily fence (with silt barriers) the limits of project impacts (including construction staging areas and access routes) to prevent additional vernal pool impacts and prevent the spread of silt from the construction zone into adjacent vernal pools to be avoided. Fencing will be installed in a manner that does not impact habitats to be avoided. Temporary construction fencing will be removed upon project completion.

3. A monitoring biologist approved by the Agencies will be onsite during project construction within 500 feet of preserved/avoided habitat to ensure compliance with all conservation measures. The biologist must be knowledgeable of vernal pool species biology and ecology. The biologist will perform the following duties:
   a. Oversee installation of and inspect the fencing and erosion control measures within or up-slope of vernal pool habitat a minimum of once per week and daily during all rain events to ensure that any breaks in the fence or erosion control measures are repaired immediately;
   b. Periodically monitor the work area to ensure that work activities do not generate excessive amounts of dust;

4. Grading activities immediately adjacent to vernal pools will be timed to avoid wet weather, if feasible, to minimize potential impacts (e.g., siltation) to the vernal pools unless the area to be graded is at an elevation below the pools. To achieve this goal, grading adjacent to avoided pools will comply with the following:
   a. Grading will occur only when the soil is dry to the touch both at the surface and one inch below. A visual check for color differences (i.e., darker soil indicating moisture) in the soil between the surface and one inch below indicates the soil is dry.
   b. After a rain of greater than 0.2 inch, grading will occur only after the soil surface has dried sufficiently as described above, and no sooner than two days (48 hours) after the rain event ends.
   c. To prevent erosion and siltation from storm water runoff due to unexpected rains, Best Management Practices (i.e., silt fences) will be implemented as needed during grading.
   d. If rain occurs during grading, work will stop and resume only after soils are dry, as described above.
   e. Grading will be done in a manner to prevent run-off from entering preserved vernal pools.

5. If impacts to pools can not be avoided, prior to project construction, topsoil will be salvaged from the impacted vernal/road pools on site. Vernal pool soil (inoculum) will be collected when dry to avoid damaging or destroying fairy shrimp cysts and plant seeds. Hand tools (i.e., shovels and trowels) will be used to remove the first two inches of soil from the pools. Whenever possible, the trowel will be used to

pry up intact chunks of soil, rather than loosening the soil by raking and shoveling which can damage the cysts. The soil from each pool will be stored individually in labeled boxes that are adequately ventilated and kept out of direct sunlight in order to prevent the occurrence of fungus or excessive heating of the soil, and stored off-site at an appropriate facility for vernal pool inoculum. Inoculum from different source pools will not be mixed for seeding any restored pools. The collected soils will be spread out and raked into the bottoms of the restored pools. Topsoil and plant materials salvaged from the upland habitat areas to be impacted will be transplanted to, and/or used as a seed/cutting source for, the upland habitat restoration/creation areas to the maximum extent practicable as approved by the Agencies.

6. To ensure that the construction and operation of the project does not adversely affect the vernal pools on-site, monitoring will be conducted throughout the rainy season to determine whether the project is changing the hydrology of, or causing erosion and sediment delivery to, these vernal pools. Monitoring will occur during the construction of the project and for three years following project construction. In the event that sufficient rainfall to demonstrate adequate ponding does not occur during the three years following project construction, monitoring will continue in one-year increments, to a maximum of five years. A monitoring report will be submitted by September 1 following each monitoring season. The monitoring program will be described in the final vernal pool restoration/enhancement plan. If the monitoring detects impacts to the adjacent vernal pools from construction and/or operation of the proposed project (e.g., from changes in hydrology) within the monitoring period, the applicant will remediate.

<u>Restoration Measures</u>

Recommended conservation measures to offset incidental take of listed species during emergency work activities for FEMA-3591-EM-CA in areas under the jurisdiction of the Carlsbad Fish and Wildlife Service Field Office (CFWO):

1. Restoration of temporary and permanent impacts to listed species' habitat will occur in accordance with a restoration plan that is reviewed and approved by the CFWO prior to implementation of the proposed restoration. All temporary and permanent impacts will be restored with an assemblage of native species consistent the habitat affected and include host plants found in the vicinity of the action area.

2. All areas of temporary and permanent impact will be revegetated and restored with native species. These areas will be returned to original grade, as feasible. A 5-year plant establishment period will be conducted that will include exotic species removal and reapplication of seed as necessary. Temporary impact areas will be planted as soon as possible following re-grading after completion of construction to prevent encroachment by nonnative plants. The applicant will ensure that habitat

creation/restoration/enhancement does not include exotic plant species that may be invasive to native habitats. Exotic plant species not to be used include any species listed on the California Invasive Plant Council's (Cal-IPC) “Invasive Plant Inventory” List. This list includes such species as pepper trees, pampas grass, fountain grass, ice plant, myoporum, black locust, capeweed, tree of heaven, periwinkle, sweet alyssum, English ivy, French broom, Scotch broom, and Spanish broom. A copy of the complete list can be obtained from Cal-IPC’s web site at http://www.cal-ipc.org.

3. Any planting stock to be brought onto the project site for habitat creation/restoration/enhancement will be first inspected by a qualified pest inspector to ensure it is free of pest species that could invade natural areas, including but not limited to, Argentine ants (*Linepithema humile*), fire ants (*Solenopsis invicta*) and other insect pests. Any planting stock found to be infested with such pests will not be allowed on the project site or within 300 feet of natural habitats unless documentation is provided to the Agencies that these pests already occur in natural areas around the project site. The stock will be quarantined, treated, or disposed of according to best management principles by qualified experts in a manner that precludes invasions into natural habitats.

4. To the extent practicable, permanent and temporary impacts to listed species and their habitat will be offset through conservation and long-term management of habitat that is occupied by the same species that were impacted by the project. The specific location and acreage of habitat to be conserved will be identified in coordination with the Service.

Reno Fish and Wildlife Office

Note: RFWO does not provide AMM for the following species: cui-ui (*Chasmistes cujus*), Paiute cutthroat trout (*Oncorhynchus clarkii seleniris*), and Carson wandering skipper (*Pseudocopaeodes eunus obscurus*). Cui-ui do not occur in California (only in Nevada), Paiute cutthroat trout only occur in California; however, all occurrences are found deep within designated wilderness areas, and we are operating with the understanding that no emergency actions would occur in these areas. Carson wandering skipper is found in both California and Nevada; however, the California locations are only in Lassen County which is excluded from the emergency designation.

Species-Specific Conservation Measures

Webber’s Ivesia

In the event of any emergency activities occurring near *Ivesia webberi* (Webber’s ivesia) occupied habitat, avoid staging heavy equipment, other vehicles, and personnel in these areas. Avoid any ground disturbing activities in occupied and designated critical habitat (https://ecos.fws.gov/ecp/species/4682). Please contact us to ensure you have

the most up to date information about occupancy as new populations have been identified since the original listing and do not have designated critical habitat.

Fish Slough Milkvetch

In the event of any emergency activities occurring near *Astragalus lentiginosus* var. *piscinensis* (Fish Slough milkvetch) occupied habitat, avoid staging heavy equipment, other vehicles, and personnel in these areas. Avoid any ground disturbing activities in occupied and designated critical habitat (https://www.fws.gov/federal-register-file/designation-critical-habitat-astragalus-lentiginosus-var-piscinensis-fish). Please contact us to ensure you have the most up to date information about occupancy.

Sage grouse

Fully implement the appropriate project design features identified in the BLM greater sage-grouse land use plans (2015) and associated amendments (https://www.blm.gov/programs/fish-and-wildlife/sagegrouse/blm-sagegrouse-plans) and the Bishop BLM RMP (https://eplanning.blm.gov/public_projects/lup/70447/92777/111784/Bishop_RMP_ROD_1993_w_app_glossary_508.pdf).

Sierra Nevada bighorn sheep

SNBS #1: No helicopters or UAVs will be flown within 1 mile of a Sierra Nevada bighorn sheep herd unit boundary/critical habitat (https://ecos.fws.gov/ecp/species/3646) during the Sierra Nevada bighorn sheep lambing season (April 15-July 15) to avoid disturbance to Sierra Nevada bighorn sheep.

SNBS #2: Avoid activities within any herd unit boundary/critical habitat (https://ecos.fws.gov/ecp/species/3646) during the Sierra Nevada bighorn sheep lambing season (April 15-July 15) to avoid disturbance to Sierra Nevada bighorn sheep.

SNBS #3: All employees/contractors will adhere to (or reduce) vehicle speed limits on existing roads within 1 mile of any Sierra Nevada bighorn sheep herd unit boundary/critical habitat to reduce collision risk and disturbance of Sierra Nevada bighorn sheep.

SNBS #4: Except as provided in Measure 4a, outside of the Sierra Nevada bighorn sheep lambing season, helicopters and UAVs will fly above 1,640 feet within 1 mile of any Sierra Nevada bighorn sheep herd unit boundary/critical habitat to minimize disturbance to Sierra Nevada bighorn sheep.

a) If it is necessary for helicopters or UAVs to fly below 1,640 feet outside of the lambing period, attempt to contact California Department of Fish and Wildlife (CDFW) within 48 hours of the scheduled activity to determine if Sierra Nevada

bighorn sheep are in the area. All Sierra Nevada bighorn sheep are not collared. If Sierra Nevada bighorn sheep are in the area as indicated by CDFW, work will be rescheduled, if possible. If Sierra Nevada bighorn sheep are seen in the area after work has begun, work will be stopped and rescheduled, if possible.

Lahontan cutthroat trout (LCT)

LCT #1. Project activities in or adjacent to LCT occupied habitat will occur outside the spawning season (*i.e.*, March through July) to the extent feasible.

LCT #2. If a project includes the creation of an overflow or flood-bypass channel in a river or stream potentially supporting LCT, the design and construction of such a channel will allow fish passage out of the channel before waters dry up as the floodwater recedes.

LCT #3. In-channel work and channel diversion of live flow during project construction within occupied habitat for the LCT will be conducted in a manner to reduce potential impacts to rearing and migrating LCT. Dewatering will be used to create a dry work area and will be conducted in a manner that minimizes turbidity into nearby waters. To the extent practicable, water diversion and dewatering will include the following measures:

a) Heavy equipment will avoid flowing water other than temporary crossing or diverting activities.
b) Water pumped or removed from dewatered areas will be treated before its release so that it does not contribute turbidity to nearby waters.
c) Pump intakes will be provisioned with National Marine Fisheries Service-approved fish screening as outlined in the California Department of Fish and Wildlife Fish Screening Criteria and National Marine Fisheries Service Fish Screening Criteria for Anadromous Salmonids (https://media.fisheries.noaa.gov/dam-migration/southwest_region_1997_fish_screen_design_criteria.pdf).
d) Temporary culverts to convey live flow during construction activities will be of an adequate size as to not increase stream velocity and placed at stream grade.
e) Silt fences or mechanisms to avoid sediment input to the flowing channel will be erected adjacent to flowing water if sediment input to the stream may occur.

LCT #4. For projects that require fish rescue and relocation, a fish relocation plan will be developed in coordination with the Service.

LCT #5. Fish relocation will only be conducted by a fisheries biologist. The fisheries biologist will have knowledge and experience in LCT biology and ecology, fish/habitat relationships, and biological monitoring, and handling, collecting, and relocating LCT or other relevant experience. The biologist will relocate any stranded fish to an appropriate place depending upon the life stage of the fish and flow conditions in the vicinity. The biologist will note the number of individuals observed in the affected area, the number of individuals relocated, the approximate size of individuals, and the date and time of the

collection and relocation. One or more of the following methods will be used to capture LCT: electrofishing, dip net, seine, throw net, minnow trap, and hand.

Owens tui chub and Owens pupfish

OWENS #1. Project activities in or adjacent to Owens tui chub or Owens pupfish occupied habitat will occur outside the spawning season (*i.e*., late winter to early summer for Owens tui chub and spring through summer for Owens pupfish) to the extent feasible.
OWENS #2. If a project includes the creation of an overflow or flood-bypass channel in a river, stream, slough, or pond potentially supporting Owens tui chub or Owens pupfish, the design and construction of such a channel will allow fish passage out of the channel before waters dry up as the floodwater recedes.

OWENS #3. In-water work and water diversion of live flow during project construction within occupied habitat for the Owens tui chub or Owens pupfish will be conducted in a manner to reduce potential impacts to rearing Owens tui chub or Owens pupfish. Dewatering will be used to create a dry work area and will be conducted in a manner that minimizes turbidity into nearby waters. To the extent practicable, water diversion and dewatering will include the following measures:

a) Heavy equipment will avoid flowing water other than temporary crossing or diverting activities.
b) Water pumped or removed from dewatered areas will be treated before its release so that it does not contribute turbidity to nearby waters.
c) Pump intakes will be provisioned with National Marine Fisheries Service-approved fish screening as outlined in the California Department of Fish and Wildlife Fish Screening Criteria and National Marine Fisheries Service Fish Screening Criteria for Anadromous Salmonids (https://media.fisheries.noaa.gov/dam-migration/southwest_region_1997_fish_screen_design_criteria.pdf).
d) Temporary culverts to convey live flow during construction activities will be of an adequate size as to not increase stream velocity and placed at stream grade.
e) Silt fences or mechanisms to avoid sediment input to the flowing channel will be erected adjacent to flowing water if sediment input to the stream may occur.

OWENS #4. For projects that require fish rescue and relocation, a fish relocation plan will be developed in coordination with the Service.

OWENS #5. Fish relocation will only be conducted by a fisheries biologist. The fisheries biologist will have knowledge and experience in Owens tui chub or Owens pupfish biology and ecology, fish/habitat relationships, and biological monitoring, and handling, collecting, and relocating Owens tui chub or Owens pupfish or other relevant experience. The biologist will relocate any stranded fish to an appropriate place depending upon the life stage of the fish and flow conditions in the vicinity. Owens tui chub or Owens pupfish shall not be moved outside of their existing habitat. The biologist will note the number of individuals observed in the affected area, the number of

individuals relocated, the approximate size of individuals, and the date and time of the collection and relocation. One or more of the following methods will be used to capture Owens tui chub or Owens pupfish: dip net, seine, throw net, minnow trap, and hand.

OWENS #6. Avoid any work in designated critical habitat for Owens tui chub.

Sacramento Fish and Wildlife Office

General Conservation Measures

1. As much as feasible, follow construction best management practices and all general avoidance and minimization measures from the March 27, 2019, *Programmatic Formal Section 7 Consultation on Federal Emergency Management Agency's Disaster, Mitigation, and Preparedness Programs within the Sacramento Fish and Wildlife Office's Jurisdiction, California* (Service File Number 08ESMF00-2018-F-3331-1).
2. Select minimum recommendations include:
    a. To the maximum extent practicable, reduce the amount of disturbance at the work site to the absolute minimum necessary to accomplish the work.
    b. To prevent entrapment of listed species, all vertically sided holes or trenches will be covered at the end of the workday or have escape ramps built into the walls of the excavation. If pipes are stored onsite or in associated staging areas, they will be capped when not in use.
    c. All construction personnel will be given environmental awareness training before the start of construction by the project's environmental inspector or a biologist familiar with the biology of any listed species that may be present in the project area. The training will familiarize all construction personnel with the listed species that may occur onsite, their habitats, general provisions and protections afforded by the Act, measures to be implemented to protect these species, and the project boundaries.
    d. If a project involves activities that may result in take of a listed species, as defined by the Act, a biologist familiar with the biology of all species that may be encountered will be present onsite for all construction activities that occur within habitat for those species.

In addition to the general conservation measures above, implement the following species-specific conservation measures for all listed species that may be found within the work area.

Buena Vista Lake ornate shrew (shrew)

In addition to the general conservation measures above, including a biological monitor familiar with the biology of the shrew:

1. In suitable habitat for the shrew, all above-ground herbaceous vegetation will be cleared using hand tools. All leaf litter will be removed using rakes or similar

hand tools. All woody vegetation will be cut as closely to the ground as possible using hand tools, which can include chain saws. Vegetation will be removed immediately and stored away from shrew habitat. Such vegetation hand-removal efforts will be implemented in order to clearly detect shrews and will continue until it is reasonably certain that shrews can be detected within the cleared areas.

2. If a shrew is detected, work will cease immediately, and the shrew will be allowed to leave the work area. If the shrew does not leave the work area on its own, the biological monitor may attempt to capture and relocate the shrew outside of the work area only if waiting is not a reasonable alternative.

Fresno kangaroo rat, Giant kangaroo rat, and Tipton kangaroo rat (kangaroo rats)

In addition to the general conservation measures above, including a biological monitor familiar with the biology of the kangaroo rats:

1. Pre-construction surveys will be conducted by a biologist familiar with the biology of the kangaroo rats to identify kangaroo rat burrows or sign inside and within 50 feet of the work area.
2. In areas where kangaroo rat burrows or sign are present, work will not be allowed within 50 feet of any suitable burrow.
3. Destruction of kangaroo rat burrows should only occur if avoidance is not a reasonable alternative.

San Joaquin kit fox (kit fox)

In addition to the general conservation measures above:

1. As much as feasible, follow the U.S. Fish and Wildlife Service Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior To or During Ground Disturbance (January 2011).
2. Select minimum recommendations include:
    a. Pre-construction surveys will be conducted by a biologist familiar with the biology of the kit fox to identify known or potential kit fox dens inside and within 200 feet of the work area.
    b. Disturbance to all kit fox dens will be avoided to the maximum extent possible.
    c. Work will not be allowed within 50 feet of any potential den (any subterranean hole that has entrances of appropriate dimensions for which available evidence is insufficient to conclude that it is being used or has been used by a kit fox), 100 feet of any known den (any existing natural den or manmade structure that is used or has been used at any time in the past by a kit fox), or 200 feet of any natal/pupping den.
    d. Destruction of kit fox dens should only occur if avoidance is not a reasonable alternative. Destruction of the den should be accomplished by careful excavation under the supervision of a biologist familiar with the biology of the kit fox until it is certain that no kit foxes are inside. The den should be fully excavated, filled with dirt, and compacted to ensure that kit foxes cannot re-enter or use the den during the construction period. If at any point during excavation a kit fox is discovered inside the den, the animal should be allowed to escape before excavation resumes.

Riparian brush rabbit (rabbit) and riparian woodrat (woodrat)

In addition to the general conservation measures above, including a biological monitor familiar with the biology of the rabbit and the woodrat:

1. Pre-construction surveys will be conducted by a biologist familiar with the biology of the rabbit and woodrat to determine if the species or their nests or houses may be present in the work area.
2. During initial vegetation clearing activities, a biologist with demonstrated experience with safe handling and capture of rabbits and/or woodrats will be present in the work area. If a rabbit or woodrat is found within the work area, each individual will be encouraged by the biologist to move on its own by using non-contact hazing (e.g., walk toward, clap, make noise, beat ground with stick). If the individual does not move on its own, it may be captured by the biologist by netting or trapping and released.
3. In areas where nests or houses are present, work will not be allowed within 50 feet of any rabbit nest or woodrat house.
4. Destruction of rabbit nests or woodrat houses should only occur if avoidance is not a reasonable alternative. Destruction of the nest or house should be accomplished by careful disassembly under the supervision of a biologist familiar with the biology of the rabbit and/or woodrat until it is certain that no animals are inside. If at any point during disassembly a rabbit or woodrat is discovered, the animal should be allowed to escape before disassembly resumes.

Sierra Nevada red fox

Follow the general conservation measures above.

Fisher

In addition to the general conservation measures above:

1. As much as feasible, projects should not remove >0.5 acre patch of suitable habitat, and no more than 8 patches within a 0.5 mile segment (or 120 acre habitat area).
2. Ensure sufficient habitat exists post-project, including overhead cover, large diameter snags, large diameter down logs, large diameter live conifer and oak trees with decay such as broken tops or cavities, root masses, live branches, and multi-layered vegetation.
3. Leave a sufficient amount of low-growing shrubs within the border zone to reduce fragmentation, where it is safe to do so.
4. If feasible, avoid creating new permanent linear or otherwise continuous areas of open canopy in suitable fisher habitat.

In addition to the above, when conducting work within or directly adjacent (within 0.25 miles) to potential denning habitat:

1. Do not remove large live trees, >30 inches diameter at breast height (dbh) hardwoods or >35 inches dbh conifers, unless identified as hazard trees.
2. A biologist familiar with the biology of the fisher will assess trees in the work area for likelihood that they provide current fisher den/rest structure (e.g., according to

size, special features, etc.) and likely current den/rest structures will not be removed if possible.
3. Projects should not remove >0.25 acre patch of potential denning habitat, and no more than 8 patches within a 0.5 mile segment (or a 120 acre potential denning habitat patch).
4. As much as feasible, within a 60 acre cluster of potential denning habitat, at least an average of greater than one suitable den tree per acre and two suitable rest trees per acre should remain. Prioritize large trees with deformities, broken tops, large branches, and cavities for retention.

If it is necessary to conduct work within or directly adjacent to potential denning habitat during the denning season (March 1 – June 30), then in addition to the above measures:

1. Consider implementing measures that minimize potential disturbance to denning fishers. For example:
    a. Keep work short in duration – work within 0.5 mile segment (or 120 acre area) of a project area should be completed within 3 days if feasible.
    b. Prioritize noise-producing activities during the denning period to areas with high levels of human activities (e.g., in communities, along high traffic roads). Delay activities that produce consistent (i.e., multiple hours at a time) noise above ambient levels to as late in the denning period as possible.
    c. Use equipment that produces noise at or below ambient noise levels.
    d. Do not generate noise at night.
2. As much as feasible, do not remove trees >24 inches dbh, unless a biologist familiar with the biology of the fisher determines that a tree has no potential to be a natal or maternal fisher den.
3. For conifer snags greater than 35 inches dbh and hardwood snags greater than 27 inches dbh, consider hazard mitigation options other than complete removal (e.g., tops, side-trim, etc.) in order to preserve potential denning sites.
4. If it can be done safely, cut hazard trees as high as possible to leave a portion of the trunk (approximately 10-20 feet) standing, or leave 15-20 feet of the thickest part of the trunk on site as a large log, particularly if decay is evident.

<u>California Spotted Owl</u>

In addition to the general conservation measures above:

1. Follow the *Northern Spotted Owl Conservation Measures* in the March 27, 2019, *Programmatic Formal Section 7 Consultation on Federal Emergency Management Agency's Disaster, Mitigation, and Preparedness Programs within the Sacramento Fish and Wildlife Office's Jurisdiction, California* (Service File Number 08ESMF00-2018-F-3331-1).

<u>Blunt-nosed leopard lizard (lizard)</u>

In addition to the general conservation measures above, including a biological monitor familiar with the biology of the lizard:

1. Pre-construction surveys will be conducted by a biologist familiar with the biology of the lizard to identify lizard burrows or sign inside and within 50 feet of the work area.
2. In areas where lizard burrows or sign are present, work will not be allowed within 50 feet of any suitable burrow.
3. Destruction of lizard burrows should only occur if avoidance is not a reasonable alternative.

San Francisco garter snake (snake)

In addition to the general conservation measures above, including a biological monitor familiar with the biology of the snake:

1. A biologist familiar with the biology of the snake will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of snakes. If any snakes are detected and cannot possibly be avoided, work should stop until the snake leaves the work area on its own. The biologist may move the snake out of the work area only if waiting for the snake to leave on its own is not a reasonable alternative.

Foothill yellow-legged frog (frog)

In addition to the general conservation measures above, including best management practices for preventing erosion and sedimentation and a biological monitor familiar with the biology of the frog:

1. As much as feasible, follow the California Department of Fish and Wildlife *Considerations for Conserving the Foothill Yellow-Legged Frog* (2018).
2. Select minimum recommendations include:
    a. As much as feasible, work will be avoided in stream courses and riparian habitat.
    b. A biologist familiar with the biology of the frog will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of frogs. If any frogs are detected and cannot possibly be avoided, work should stop until the frog leaves the work area on its own. The biologist may move the frog out of the work area following current disinfection and handling protocols only if waiting for the frog to leave on its own is not a reasonable alternative.

Mountain yellow-legged frog, Sierra Nevada yellow-legged frog, and Yosemite toad (amphibians)

In addition to the general conservation measures above, including best management practices for preventing erosion and sedimentation and a biological monitor familiar with the biology of the amphibians:

1. As much as feasible, work will be avoided in stream courses, riparian habitat, wetlands, and meadows.
2. A biologist familiar with the biology of the amphibians will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of amphibians. If any amphibians are detected and cannot possibly be avoided, work should stop until the amphibian leaves the work area on its own. The biologist may move the amphibian out of the work area following current disinfection and handling protocols only if waiting for the amphibian to leave on its own is not a reasonable alternative.

<u>Kern Canyon slender salamander and Relictual slender salamander (salamanders)</u>

In addition to the general conservation measures above, including a biological monitor familiar with the biology of the salamanders:

1. A biologist familiar with the biology of the salamanders will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of salamanders. If any salamanders are detected and cannot possibly be avoided, work should stop, and the biologist may move the salamander out of the work area following current disinfection and handling protocols.

<u>Little Kern golden trout (trout)</u>

In addition to the general conservation measures above, including best management practices for preventing erosion and sedimentation:

1. As much as feasible, work will be avoided in stream courses.

<u>Kern primrose sphinx moth (sphinx moth)</u>

In addition to the general conservation measures above:

1. Pre-construction surveys will be conducted by a biologist familiar with the biology of the sphinx moth to identify suitable habitat for the sphinx moth within the work area.
2. As much as feasible, avoid work in sandy washes and removal of the sphinx moth's primary food plant, the sun cup or evening primrose (*Camissonia contorta*).

<u>Shasta crayfish (crayfish)</u>

In addition to the general conservation measures above, including best management practices for preventing erosion and sedimentation:

1. As much as feasible, work will be avoided in stream courses.

Perennial Plants

Common Name	**Scientific Name**
Baker's larkspur	*Delphinium bakeri*
Bakersfield cactus	*Opuntia treleasei*
Chinese Camp brodiaea	*Brodiaea pallida*
clover (Tidestrom's) lupine	*Lupinus tidestomii*
Coyote ceanothus	*Ceanothus ferrisae*
El Dorado bedstraw	*Galium californicum ssp. sierrae*
Franciscan manzanita	*Arctostaphylos franciscana*
Ione buckwheat	*Eriogonom apricum*
Ione manzanita	*Arctostaphylos myrtifolia*
Kenwood Marsh checker-mallow	*Sidalcea oregana ssp. valida*
Layne's butterweed	*Senecio layneae*
Napa bluegrass	*Poa napensis*
pallid manzanita	*Arctostaphylos pallida*
Pine Hill Ceanothus	*Ceanothus roderickii*
Pine Hill flannelbush	*Fremontodendron californicum ssp. decumbens*
Pitkin marsh lily	*Lilium pardalinum ssp. pitkinense*
Presidio manzanita	*Actostaphylos hookeri* var. *ravenii*
Red Hills vervain	*Verbena californica*
San Mateo woolly sunflower	*Eriophyllum latilobum*
Santa Clara Valley dudleya	*Dudleya setchellii*
Sonoma alopecurus	*Alopecurus aequalis var. sonomensis*
Stebbins' morning-glory	*Calystegia stebbinsii*
Tiburon Mariposa lily	*Calochortus tiburonensis*
Tiburon paintbrush	*Castilleja affinis ssp. neglecta*
white sedge	*Carex albida*
yellow larkspur	yellow larkspur (*Delphinium luteum*)

In addition to the general conservation measures above:

1. Pre-construction surveys will be conducted by a botanist familiar with the perennial plants to identify any occurrences of the plants within the work area.
2. As much as feasible, avoid impacting the perennial plants.
3. Plants may be salvaged or transplanted to appropriate habitat outside of the work area (with landowner permission) under the guidance of a botanist familiar with the perennial plants. Salvage or transplantation should only occur if avoidance is not a reasonable alternative.

In addition, for the Coyote ceanothus, Franciscan manzanita, Ione manzanita, and pallid manzanita:

1. Follow best management practices for preventing the spread of *Phytophthora*.

Annual Plants

Common Name	Scientific Name
California jewelflower	*Caulanthus californicus*
Clara Hunt's milk vetch	*Astragalus clarianus*
fountain thistle	*Cirsium fontinale var. fontinale*
Hartweg's golden sunburst	*Pseudobahia bahiifolia*
Keck's checker-mallow	*Sidalcea keckii*
Kern mallow	*Eremalche kernensis*
large-flowered fiddleneck	*Amsinckia grandiflora*
Marin dwarf-flax	*Hesperolinon congestum*
Mariposa pussypaws	*Caluptridium pulchellum*
Metcalf Canyon jewelflower	*Streptanthus albidus ssp. albidus*
palmate-bracted bird's beak	*Cordylanthus palmatus*
Pennell's bird's-beak	*Cordylanthus tenuis ssp. capillaris*
Presidio clarkia	*Clarkia franciscana*
San Francisco lessingia	*Lessingia germanorum*
San Joaquin adobe sunburst	*Pseudobahia peirsonii*
San Joaquin wooly-threads	*Monolopia congdonii*
San Mateo thornmint	*Acanthomintha obovata ssp. duttonii*
showy Indian clover	(*Trifolium amoenum*
Sonoma spineflower	*Chorizanthe valida*
Springville Clarkia	*Clarkia springvillensis*
Tiburon jewelflower	*Streptanthus niger*
Vine Hill clarkia	*Clarkia imbricata*
white-rayed pentachaeta	*Pentachaeta bellidiflora*

In addition to the general conservation measures above:

1. If work will occur during the typical growing period, pre-construction surveys will be conducted by a botanist familiar with the annual plants to identify any occurrences of the plants within the work area.
2. As much as feasible, avoid impacting the annual plants.
3. If present, seeds may be collected or included in post-construction revegetation under the guidance of a botanist familiar with the annual plants. Seed collection should only occur if avoidance is not a reasonable alternative.

Critical Habitats

In addition to the general conservation measures above, including a biological monitor familiar with the biology of the species for which critical habitat is present:

1. As much as feasible, avoid impacting any of the physical or biological features of the critical habitat.

Ventura Fish and Wildlife Office

California Condor

1. The PROJECT PROPONENT will temporarily halt project activities if any California condors are observed within the project area prior to the start of work. The PROJECT PROPONENT will allow the California condors to depart on their own before project activities resume. California condors that arrive in the project area or approach work crews while work is on-going will be hazed (additional details regarding hazing are described below). Work crews will inform the Forest Biologist (through the Project Manager) should any California condor-related work stoppages take place.
2. The PROJECT PROPONENT will stipulate garbage removal in all mechanical brush treatment contracts. Work crews involved in all project activities will remove all trash associated with this Project and ensure that it is disposed of properly.
3. The PROJECT PROPONENT will brief all personnel involved in implementing the Project on the importance of not leaving hazardous materials exposed and daily removal of all garbage fragments to maintain condor health.
4. Work crews will store all project materials, tools, hardware, equipment and all loose items in a manner that will prevent their removal or ingestion by California condors and other wildlife.
5. Work Crews will place all materials that are liquid, granular, or powder in sealed leak-proof containers and store in a manner that prevents access by California condors and other wildlife.
6. Work crews will keep all parked vehicles and equipment free of leaks.
7. The PROJECT PROPONENT will provide all workers at the project site with "condor hazing" training pursuant to the September 3, 2014 California Condor Recovery Program memo (Service 2014). If any California condors enter the project area while work activities are being conducted, the hazing measures would be implemented to avoid the possibility that California condors would become habituated to human activities or be harmed by project activities. Work crews will inform the Forest Biologist (through the Project Manager) should any California condor hazing take place.
    a. In circumstances where California condors are already present in the project area, and engaged in natural behaviors (roosting, foraging, etc.), the hazing protocol would not be implemented and California condors would be allowed to depart on their own, as discussed in the prior protective measure. Condors that come into the project area while work activities are taking place will be hazed.
8. For projects that have unavoidable adverse impacts to the California condor, mitigation is needed to compensate for impacts to this species. Mitigation would be undertaken in a strategic way such that it contributes to meeting recovery criteria or 5-year review recommendations. The amount of compensatory mitigation to offset a proposed project's impacts should be determined by assessing a project's level of impacts to the California condor. Compensatory mitigation refers to actions that support the permanent conservation, management, or restoration of habitat to ensure conservation benefits for the California condor.

Southern Sea Otter

1. A biologist, approved by the U.S. Fish and Wildlife Service (Service), will monitor activities to determine if southern sea otters are being disturbed. Monitoring will occur at all times when work is occurring (a) in water, or (b) onshore within 50 feet of tidal waters. The biological monitor will have the authority to stop project activities if southern sea otters approach or enter the exclusion zone (see measure 2) or if, in the professional judgment of the monitor, sea otters outside the exclusion zone display a significant and alarming reaction to construction or project activity. Biological monitoring will begin 0.5 hour before work begins and will continue until 0.5 hour after work is completed each day. Work will commence only with approval of the biological monitor to ensure that no southern sea otters are present in the exclusion zone.
2. An exclusion zone will be implemented at all times when work is occurring (a) in water, or (b) onshore within 50 feet of tidal waters. The radius of the exclusion zone will be a minimum of 33 feet to prevent the injury of southern sea otters from project activities. If project activities (e.g., pile driving) generate underwater noise, an exclusion zone will be implemented that includes all areas where underwater sound pressure levels are expected to reach or exceed 160 dB re 1 µPa. Project activities such as pile extraction or driving will not commence (or re-commence following a shutdown) until sea otters are not sighted within the exclusion zone for a 15-minute period.
3. To reduce the risk of potentially startling southern sea otters with a sudden intensive sound, the construction contractor will begin construction activities gradually each day by starting tractors or other heavy equipment one at a time.
4. If southern sea otters are present within the work area, they will be allowed to leave on their own volition (i.e., they will not be hazed).
5. In-water construction work will occur during daylight hours. If work is tidal dependent, it will occur within 1 hour before sunrise and 1 hour after sunset.
6. If the project activity includes the operation of vessels, vessels will reduce speed to 3 to 5 knots if sea otter(s) are visually observed in the vicinity of the vessel. Vessels will maintain a minimum distance of 50 yards from any sea otter whenever possible. Vessels will not be used to encourage sea otters to move.
7. If the project activity includes dredging operations within the southern sea otter's range, eelgrass and canopy kelp bed will be avoided. No dredging or dredge material placement will occur directly in sensitive habitats such as established eelgrass beds, hard-bottom reefs, or established canopy kelp beds. Vessels will drop and retrieve anchors vertically, utilize crown buoys for anchoring, will not drag anchors, and will avoid visible kelp bed canopy and eelgrass beds.
8. If the project activity includes dredging operations, dredging operations will include a 100-foot buffer around eelgrass beds. Additionally, dredging personnel will perform a pre-construction and post-construction eelgrass, canopy kelp, surfgrass, and rocky reef survey of the dredge footprint and immediate vicinity for each dredge cycle.
9. For projects that have unavoidable adverse impacts on southern sea otter, mitigation is needed to compensate for impacts to this species. Mitigation would be undertaken in a strategic way such that it contributes to meeting recovery criteria or 5-year

review recommendations. The amount of compensatory mitigation to offset a proposed project's impacts should be determined by assessing a project's level of impacts to southern sea otters and their habitat. Compensatory mitigation refers to actions that support the permanent conservation, management, or restoration of habitat to ensure conservation benefits for the southern sea otter.

Gambel's watercress (*Nasturtium gambelii*, formerly *Rorippa gambellii*)

1. The closest infrastructure to the known Gambel's watercress population is a culvert under Hwy 1, managed by the California Department of Transportation (Caltrans). FEMA will work in close coordination with the Service in the event this culvert or associated riparian habitat will be impacted. All work will occur outside of occupied Gambel's watercress habitat and a designated buffer area. FEMA will closely consider any potential for indirect work impacts including, but not limited, to alterations in hydrology and non-native species introduction.
2. FEMA will require that personnel use dedicated or decontaminated footwear and/or waders within riparian vegetation to prevent the introduction of non-native weed seeds. FEMA will require that personnel thoroughly clean and inspect all equipment, footwear, and work clothing daily to ensure that no foreign plant material enters Gambel's watercress habitat.

Lompoc yerba santa (*Eriodictyon capitatum*)

FEMA will utilize recent mapping updates made to the CNDDB, as depicted in the 2021 5-year review, to identify if work activities have the potential to impact occupied Lompoc yerba santa habitat. In the event occupied habitat is within the identified work areas, FEMA will work with the Service to minimize impacts through implementation of the general avoidance and minimization measures for sensitive vegetation or redesign/restrict work activities within occupied habitat.

Gaviota tarplant (*Deinandra increscens* ssp. *villosa*)

FEMA will utilize mapping updates made to the CNDDB in combination with the 2022 5-year review, to identify if work activities have the potential to impact occupied Gaviota tarplant habitat. In the event occupied Gaviota tarplant habitat is within the identified work areas, FEMA will work with the Service to minimize the potential for impacts through implementation of the general avoidance and minimization measures for sensitive vegetation or redesign/restrict work activities within occupied habitat.

General Avoidance and Minimization measures for sensitive vegetation

1. Prior to conducting any project activities, to the maximum extent possible, FEMA will require a qualified botanist to clearly mark federally listed species occupied habitat within the project site and the immediate area to prevent workers or equipment from adversely affecting species or habitats by damaging these areas during the project.
2. FEMA will restrict equipment maintenance and refueling to existing roads and paved areas.

3. FEMA will use certified weed-free materials (ie mulch) and coordinate with the Service on any hydroseeding for potential erosion control whenever applicable
4. FEMA will require project personnel to clean equipment prior to bringing them on site to prevent introduction of weeds. FEMA will require a Qualified Biologist, to conduct weed seed inspections on heavy equipment when brought on site from another watershed.

Mitigation recommendations: In the event that sensitive plant populations are impacted by work activities, FEMA will work to restore impacted habitat at a 1:1 ratio (habitat enhanced: habitat affected) to compensate for project-related disturbances. Enhancement activities may include coordination with the Service to promote occupied habitat augmentation and non-native weed removal with success monitoring for at least 3 years. Alternatively, FEMA may work with the Service to implement recommendations identified in the most recent 5-year reviews or recovery plans to help promote species recovery.

<u>California Tiger Salamander (*Ambystoma californiense*)</u>

1. Initial ground disturbing activities will be conducted during dry weather conditions to minimize the potential for encountering California tiger salamanders. The dry season is generally defined as July 1 to November 1.
2. Work will be conducted during daylight hours only, when amphibians are least likely to be moving aboveground.
3. Work should be postponed if chance of rain is greater than 70% based on the NOAA National Weather Service forecast or within 48 hours following a rain event greater than 0.1 inch. If work must occur during these conditions, a qualified biologist will conduct a clearance sweep of work areas prior to the start of work.
4. If an unpredicted rainfall event commences while construction activities are in progress, the applicant will suspend all work activities and equipment and personnel will be demobilized. Equipment may be moved to a designated staging area until work is allowed to resume. The designated area will be a hard surface devoid of small mammal burrows.
5. Trenches will be covered or have adequate means of escape (earthen ramps not more than 2:1 slope, wooden boards, etc.).
6. No equipment will be left on-site overnight outside of the designated areas, defined as those areas that are enclosed with silt fence or some other barrier designed to reasonably prevent wildlife from entering.
7. Work locations, access routes, and staging areas will be reviewed and clearly delineated by the project biologist with staking or flagging prior to mobilization.
8. All equipment will be staged at the maximum distance possible from riparian habitat or water body.
9. Refueling or maintenance of vehicles or equipment will not occur within 100 feet of any riparian habitat or water body.
10. Vehicles and equipment will be checked daily for leaks, and all vehicular fluid

spills will be contained and cleaned up immediately.

11. All construction-related vegetative debris (e.g., larger brush, tree limbs, tree trunks) will be hauled inside the designated area daily. Stockpiles of vegetative debris and tree mulch will be kept in a contained area inside the designated area, and intermittently hauled offsite for disposal.
12. All construction-related debris, particularly food-related debris, will be disposed of in the crew's vehicles and taken offsite, or in a closed receptacle that will not attract scavenger wildlife.
13. A Service-approved biological monitor will conduct daily pre-construction surveys within the construction zone prior to work beginning each day during preliminary grading and site preparation. Thereafter, site inspections will continued on a less frequent basis as determined by the biological monitor. The biological monitor will have the authority to halt construction if necessary to limit unanticipated adverse impacts to water quality, fish and wildlife, and habitats.
14. Small mammal burrows will be identified with stakes or pin flags so that they may be excavated prior to construction in that area. A 20-foot radius area will be fenced around each burrow or burrow complex to ensure that vehicles, equipment, and personnel avoid the area.
15. The approved biological monitor will present a Worker Environmental Awareness Program to the crew prior to the commencement of construction and to any new crew members prior to beginning work on the jobsite. The training will include this list of avoidance and minimization measures, and will describe the identification and natural history of listed species (with emphasis on California tiger salamander), regulatory context, and required measures to minimize or avoid incidental take of listed species.
16. The work area will be surrounded by a solid temporary exclusion fence (such as silt fence) that will be buried into the ground and extend at least three feet above the ground and buried to a depth of at least six (6) inches to exclude California tiger salamanders from entering the work area. The location of the fencing will be determined by a Service-approved biologist. The fencing will be installed during the dry conditions prior to rain events that may stimulate movement of California tiger salamanders. The fence will be inspected daily to assure that it is functioning properly to exclude California tiger salamanders from the work area. Ingress/egress will be temporarily sealed off overnight using a section of fence that is anchored to the ground (e.g., fire hose filled with sand or sand bags can be used to anchor the bottom of the fence or the bottom must be buried).
17. All boreholes will be completely backfilled by the end of each work day and not be left open overnight.
18. Prior to the start of construction, a Service-approved California tiger salamander biologist will conduct a preconstruction survey for these species within the project site. If any larvae of either species are found to be remaining within any bodies of water, the pond will not be impacted until the biologist can determine their development status. If the tadpole(s) are lacking any limb development and it is suspected that they may overwinter without metamorphosing, the Service will be consulted for further instructions on how to proceed. On-site ponds will not be impacted until the Service-approved biologist ensures there is no evidence of

larvae California tiger salamanders.

19. Rodent burrows will be avoided to the extent possible. If burrows cannot be avoided, burrow excavation may be performed using hand tools or via gentle excavation using construction equipment, under the direct supervision of a Service-approved biologist, until it is certain that the burrows are unoccupied. In lieu of burrow excavation, steel plates or plywood may also be utilized to protect small mammal burrows from ground disturbance. Plates and plywood will be removed nightly when a significant rain event is forecasted within 48 hours and will be removed if work is scheduled to cease for consecutive days. Any individuals encountered will be allowed to vacate the area on their own accord or relocated out of harm's way in accordance with Measure 20, below.
20. The Service-approved biologist will search all potential hiding spots for California tiger salamanders. If any life stage of the California tiger salamander is found and these individuals are likely to be killed or injured by work activities, the Service-approved biologist will be allowed sufficient time to move them from the site before work begins.
21. Any California tiger salamanders (or other wildlife) will be allowed to vacate the worksite on its own accord under the observation of a Service-approved biologist. If California tiger salamanders (or other wildlife) do not relocate on their own, or if they are in harm's way, they will be relocated out of harm's way to nearby suitable habitat, similar to that in which it was found, and outside the project area. California tiger salamanders will not be relocated, except by a Service-approved biologist. The Declining Amphibian Task Force Fieldwork Code of Practice will be implemented for all amphibian relocation activities.

    The Service-approved biologist will relocate any California tiger salamanders found within the project footprint to an active rodent burrow system located no more than 300 feet outside of the project area unless otherwise approved by California Department of Fish and Wildlife and the Service. The individual will be handled with clean and moistened hands. During relocation they will be placed in a clean, covered plastic container with a non-cellulose moistened sponge. Relocations will take place immediately; individuals will not be stored for lengthy periods or in heated areas. The relocation container will be kept out of direct sunlight.

    The relocated California tiger salamander will be monitored until it enters a burrow and is concealed underground. Relocation areas will be identified by the Service-approved biologist based upon best suitable habitat available. The Service-approved biologist will document both locations by photographs and GPS positions. The California tiger salamander will be photographed and measured (snout-vent) for identification purposes prior to relocation. All documentation will be provided to the Service and California Department of Fish and Wildlife within 24 hours of relocation.
22. For projects that have unavoidable adverse impacts to the California tiger salamander Santa Barbara DPS, mitigation is needed to compensate for impacts to this species. Mitigation would be undertaken in a strategic way such that it

contributes to meeting recovery criteria or 5-year review recommendations. The amount of compensatory mitigation to offset a proposed project's impacts should be determined by assessing a project's level of impacts to the California tiger salamander and its habitat. Compensatory mitigation refers to actions that support the permanent conservation, management, or restoration of habitat to ensure conservation benefits for the California tiger salamander Santa Barbara DPS.

Arroyo Toad

1. A habitat assessment will be conducted by a Service-approved biologist to determine whether suitable habitat for the arroyo toad occurs in the Action Area. If suitable habitat for this species is identified in the Action Area and the proposed project may affect suitable habitat that is not known to be occupied by the arroyo toad, the Ventura FWO will be contacted regarding the need for surveys according to USFWS protocol and those surveys will be conducted, as appropriate. Otherwise, if the Ventura FWO agrees, the species will be assumed to be present in areas with suitable habitat.
2. To minimize direct effects to breeding arroyo toads, all project activities within designated critical habitat, occupied habitat, or potential suitable habitat will occur outside the breeding season (i.e., the breeding season is March 15 - July 15 for arroyo toad). If the breeding season cannot be avoided and arroyo toads are found to occur within the Action Area, a Service-approved biologist will conduct daily surveys prior to project work within the Action Area until the beginning of the non-breeding season or project activities have ceased. If the breeding season cannot be avoided, a Service-approved biologist will conduct surveys no more than 48 hours prior to project work, if no arroyo toads of any life stages or clutches are found to occur within the Action Area, project activities may proceed.
3. If a project is located in designated critical habitat, occupied, or potential suitable habitat for the arroyo toad, a Service-approved Biologist must conduct preconstruction surveys no more than 48 hours prior to project work to determine if arroyo toads are present in the Action Area.
4. If project location is located in an occupied area, minimize work and avoid using heavy machinery from April 15 - October 1 when juvenile toads are known to occupy the bordering banks of suitable water features.
5. Monitor project activities in arroyo toad habitat using a Service-approved biological monitor with the authority to stop work. The biological monitor will search the Action Area daily for arroyo toads.
6. Implement a capture and relocation plan for arroyo toads on the project site using a Service-approved biologist(s). Biologists must follow the Declining Amphibian Task Force's Fieldwork Code of Practice to prevent the spread of pathogens.
7. Conduct environmental awareness training for all workers regarding the arroyo toad and other listed species in the Action Area. This training may be conducted by the biological monitor or Service-approved biologist, if present.
8. Prohibit domestic pets in the Action Area.
9. Control trash and waste to avoid attracting predators to the Action Area.

10. Stop work within 24 hours of a rain event (precipitation greater than 0.25 inches within a 24-hour period constitutes a rain event).
11. Limit project activities to daylight hours.
12. Remove all external oil, grease, dirt, plant parts, and mud from equipment prior to arriving at the Action Area and inspect all equipment before unloading at the Action Area.
13. Use designated staging areas more than 100 feet from riparian areas to perform vehicle maintenance and refueling. Conduct daily checks of equipment for leaks and correct problems before entering aquatic or riparian areas. Infiltrate as much runoff from these areas using permeable surfaces and infiltration ditches or basins in areas where groundwater contamination risk is low. Restore staging areas immediately following use. Effectively prevent access to the area once site restoration activities have been completed.
14. Clearly delineate work areas and access routes to reduce impacts to the surrounding area and use only existing transportation routes, as feasible.
15. Implement Best Management Practices to control erosion and sedimentation such as:
    a. Use temporary filters, berms, barriers, conveyances, or other materials to collect sediment and prevent it from entering surface waters.
    b. Accurately establish and preserve horizontal alignment for each stream-crossing structure, to assure that flows do not erode stream banks or shoreline. For project activities conducted within stream banks, ensure the stream channel alignment and depth is preserved in such a manner as to not cause the streambank or channel to erode.
    c. Restore the original surface of the streambed upon decommissioning the concrete crossing, when applicable.
    d. Keep excavated materials out of channels, floodplains, wetlands, and lakes.
    e. Install silt fences or other sediment –and-debris-retention barriers between the water body and construction material stockpiles and wastes.
    f. Remove all project debris from the creek and do not stockpile materials within the creek.
    g. Dispose of unsuitable material in approved waste areas. Ensure that project debris will not enter any waterway, and construction materials will not be stockpiled within 50 feet of the waterway.
    h. Stabilize decommissioned surfaces and other disturbed soil surfaces by retaining or reestablishing soil cover to 60 to 70 percent. Use certified weed-free straw where existing soil cover is insufficient. Stabilize work areas in an identical manner when the National Weather Service predicts a 30 percent or greater chance of precipitation (predicted precipitation greater than 0.25 inches within a 24-hour period).
16. Native woody riparian vegetation will not be cut or removed, except where needed to facilitate project implementation. Maintain vegetation where practicable to provide adequate shade for riparian habitat.
17. Implement procedures for containment and removal of any chemical spills (for example a Water Pollution Control and Prevention Plan). Use liners as needed to prevent seepage to groundwater. Remove residues, waste oil, and other

materials from the site and properly dispose of them. Hazardous materials must be stored at safe distances from riparian or aquatic areas within a designated location designed to contain spills. Report spills and initiate appropriate clean-up action in accordance with applicable State and Federal laws, rules, and regulation.

18. Restore all temporarily disturbed areas within the Action Area to pre-disturbance or better conditions immediately following completion of project activities. Effectively prevent access to the restored area once site restoration activities have been completed.
19. For projects that have unavoidable adverse impacts to arroyo toad, mitigation is needed to compensate for impacts to this species. Mitigation would be undertaken in a strategic way such that it contributes to meeting recovery criteria or 5-year review recommendations. The amount of compensatory mitigation to offset a proposed project's impacts should be determined by assessing a project's level of impacts to the arroyo toad and its habitat. Compensatory mitigation refers to actions that support the permanent conservation, management, or restoration of habitat to ensure conservation benefits for the arroyo toad.

<u>Unarmored Threespine Stickleback</u>

1. Prior to initiation of dewatering or sediment removal work, a qualified biologist should install 1/8 inch mesh block nets outside the impact areas and across the stream a minimum of 20 feet above and below the locations proposed for excavation. If widely separated sites are involved, more than one set of block nets should be placed to protect the work area. The nets should be installed on the first day of work and monitored thereafter for the duration of the work.
2. Prior to initiation of dewatering or sediment removal work, the applicant should hold an information session in order to inform maintenance and management personnel about unarmored threespine stickleback, including unarmored threespine stickleback protected status, proximity to the project site, avoidance/minimization measures to be implemented during the particular project, and the implications of violating ESA.
3. Once the block nets are secured, qualified biologist(s) should remove all unarmored threespine stickleback found between the block nets using a 1/8 inch seine and dip nets, and relocate unarmored threespine stickleback to suitable habitat downstream of the proposed project site.
4. The applicant should clearly flag the limits of construction areas to avoid or minimize impacts to adjacent riparian and upland habitat. Flagging should be no more than 50 feet apart and should be clearly visible to construction workers on the ground and to operators on heavy equipment.
5. If pumps are incorporated to assist in temporarily dewatering the site, intakes will be completely screened with no larger than 1/8- inch wire mesh to prevent unarmored threespine stickleback and other sensitive aquatic species from

entering the pump system. Pumps will release the additional water to a settling basin allowing the suspended sediment to settle out prior to re-entering the stream(s) outside of the isolated area. The form and function of all pumps used during the dewatering activities will be checked daily, at a minimum, by a qualified biologist to ensure a dry work environment and minimize impacts to unarmored threespine stickleback and its habitat.

6. The applicant should implement erosion and sedimentation control measures (e.g., silt fences, straw bales or wattles) in all areas where disturbed substrate may potentially wash into waters via rainfall or runoff, particularly around stockpiled material and at the downstream end of each project reach. Such measures should remain in place and be inspected periodically until the project is complete and exposed soils are stabilized. Diversion structures, sediment traps/basins and associated equipment (e.g., pumps, lines) should be maintained in optimal working condition for the entire duration of the preparation and construction periods.
7. A qualified biological monitor should remain onsite and observe for unarmored threespine stickleback and turbidity levels within the work areas during all creek dewatering activities, and should capture and relocate unarmored threespine stickleback to suitable habitat as necessary.
8. Prior to handling any unarmored threespine stickleback, the qualified biologist must ensure that their hands are free of sunscreen, lotion, or insect repellent.
9. Unarmored threespine stickleback that are captured must be out of water for the least amount of time possible. The ‘bagged’ portion of seines and nets will remain in the water until all unarmored threespine stickleback are removed, or gobies are transferred to a shallow container(s) of clean water taken from the survey site and placed in a location that will not result in exposure to extreme temperatures.
10. Any unarmored threespine stickleback exhibiting signs of physiological stress will be released immediately at the point of capture.
11. Individual unarmored threespine stickleback will be released as soon as possible, and as near as possible to points of capture.
12. If excavation of a given extent of a basin cannot be completed in one day, a new set or successive sets of block nets should be deployed each day, and subsequent surveys and capture/relocation performed accordingly. Fish released from one day’s work should not be released into areas projected to be excavated on successive days.
13. The applicant should provide a written summary of work performed (including biological survey and monitoring results), best management practices implemented (i.e., use of biological monitor, flagging of project areas, erosion and sedimentation controls) and supporting photographs of each stage. Furthermore, the documentation describing listed species surveys and re-location efforts (if appropriate) should include name of biologist(s), location and description of area surveyed, time and date of survey, all survey methods used, a

list and tally of all sensitive animal species observed during the survey, a description of the instructions/recommendations given to the applicant during the project, and a detailed discussion of capture and relocation efforts (if appropriate).

Tidewater Goby

1. Prior to initiation of dewatering or sediment removal work, a qualified biologist should install 1/8 inch mesh block nets outside the impact areas and across the stream a minimum of 20 feet above and below the locations proposed for excavation. If widely separated sites are involved, more than one set of block nets should be placed to protect the work area. The nets should be installed on the first day of work and monitored thereafter for the duration of the work.
2. Prior to initiation of dewatering or sediment removal work, the applicant should hold an information session in order to inform maintenance and management personnel about tidewater gobies, including tidewater goby protected status, proximity to the project site, avoidance/minimization measures to be implemented during the particular project, and the implications of violating the ESA.
3. Once the block nets are secured, qualified biologist(s) should remove all tidewater gobies found between the block nets using a 1/8 inch seine and dip nets, and relocate tidewater gobies to suitable habitat downstream of the proposed project site.
4. The applicant should clearly flag the limits of construction areas to avoid or minimize impacts to adjacent riparian and upland habitat. Flagging should be no more than 50 feet apart and should be clearly visible to construction workers on the ground and to operators on heavy equipment.
5. If pumps are incorporated to assist in temporarily dewatering the site, intakes will be completely screened with no larger than 1/8- inch wire mesh to prevent tidewater gobies and other sensitive aquatic species from entering the pump system. Pumps will release the additional water to a settling basin allowing the suspended sediment to settle out prior to re-entering the lagoon/stream(s) outside of the isolated area. The form and function of all pumps used during the dewatering activities will be checked daily, at a minimum, by a qualified biologist to ensure a dry work environment and minimize impacts to tidewater goby and its habitat.
6. The applicant should implement erosion and sedimentation control measures (e.g., silt fences, straw bales or wattles) in all areas where disturbed substrate may potentially wash into waters via rainfall or runoff, particularly around stockpiled material and at the downstream end of each project reach. Such measures should remain in place and be inspected periodically until the project is complete and exposed soils are stabilized. Diversion structures, sediment traps/basins and associated equipment (e.g., pumps, lines) should be maintained in optimal working condition for the entire duration of the preparation and construction periods.
7. A qualified biological monitor should remain onsite and observe for tidewater gobies and turbidity levels within the work areas during all creek dewatering

activities, and should capture and relocate tidewater gobies to suitable habitat as necessary.

8. Prior to handling any tidewater goby, the qualified biologist must ensure that their hands are free of sunscreen, lotion, or insect repellent.
9. Tidewater goby that are captured must be out of water for the least amount of time possible. The 'bagged' portion of seines and nets will remain in the water until all tidewater gobies are removed, or gobies are transferred to a shallow container(s) of clean water taken from the survey site and placed in a location that will not result in exposure to extreme temperatures.
10. Any tidewater goby exhibiting signs of physiological stress will be released immediately at the point of capture.
11. Individual tidewater gobies will be released as soon as possible, and as near as possible to points of capture.
12. If excavation of a given extent of a basin cannot be completed in one day, a new set or successive sets of block nets should be deployed each day, and subsequent surveys and capture/relocation performed accordingly. Fish released from one day's work should not be released into areas projected to be excavated on successive days.
13. The applicant should provide a written summary of work performed (including biological survey and monitoring results), best management practices implemented (i.e., use of biological monitor, flagging of project areas, erosion and sedimentation controls) and supporting photographs of each stage. Furthermore, the documentation describing listed species surveys and re-location efforts (if appropriate) should include name of biologist(s), location and description of area surveyed, time and date of survey, all survey methods used, a list and tally of all sensitive animal species observed during the survey, a description of the instructions/recommendations given to the applicant during the project, and a detailed discussion of capture and relocation efforts (if appropriate).

<u>Mount Hermon june beetle and Zayante band-winged grasshopper</u>

1) Prior to project activities a qualified biologist will provide pre-construction training for all on-site workers. Training will include identification of the Mount Hermon June beetle, Zayante band-winged grasshopper, and the conservation measures that are intended to minimize and avoid impacts to the species.
2) A qualified biologist, who is familiar with Zayante sandhills (sandhills) habitat, will be present during all activities that involve (vehicle) driving, cutting vegetation, or soil disturbing activities when in sandhills habitat. The biologist will oversee these activities to reduce or avoid impacts to federally listed species.
3) All vehicle tires and equipment will be cleaned prior to entering the site to avoid the spread of non-native vegetation.
4) A qualified biologist will monitor soil-disturbing activities. If any life stage of the Mount Hermon June beetle is observed, a Service-approved biologist will

capture and relocate the individual(s) outside of the construction area to intact sandhills habitat that supports appropriate soils and vegetation.

5) When excavating soil in sandhills habitat, the top 3 inches will be collected and stored until excavation activities are complete. When backfilling, stored topsoil will be redistributed on the over top of the excavated area.
6) To avoid impacts during the nymph and adult activity period of the Zayante band-winged grasshopper, work activities in potential Zayante band-winged grasshopper breeding habitat will not take place from June through mid-October, unless in coordination with the Service.
7) When practicable, ground disturbing activities will not be conducted during the adult activity period of the Mount Hermon June beetle (May 15 – August 15).
8) Sheets of plywood or similar material may be placed along access routes to protect sandhills habitat, if determined applicable by the qualified biologist.
9) Work areas will be delineated to ensure the minimum area necessary is disturbed.
10) Sand contaminated with grout or other materials will be hauled off-site.
11) If any life stage of the Mount Hermon June beetle or Zayante band-winged grasshopper is observed by anyone in an area that would be impacted, all work in that area will cease and the Service-approved biologist notified. The Service-approved biologist will capture and relocate the species to suitable habitat that would not be impacted.
12) For projects that have unavoidable adverse impacts on the MHJB or ZBWG and their habitats, mitigation is needed to compensate for impacts to these species. Mitigation would be undertaken in a strategic way such that it contributes to meeting recovery criteria or 5-year review recommendations. The amount of compensatory mitigation to offset a proposed project's impacts should be determined by assessing a project's level of impacts to the MHJB or ZBWG and their habitat. Compensatory mitigation, in this plan, refers to actions that support the permanent conservation, management, or restoration of habitat to ensure conservation benefits for the MHJB or ZBWG.

<u>Morro Bay Kangaroo Rat</u>

1. FEMA will site all impacts as far away from known and potential Morro Bay kangaroo rat habitat as possible.
2. If work cannot avoid Morro Bay kangaroo habitat, at least 30 days prior to ground-disturbing activities, FEMA will submit the names and credentials of biologists for approval to conduct the minimization measures outlined below. Excluding an emergency activity, no project activities will begin until the applicant has received notice from the Service that the biologists are approved to do the work.
3. A Service-approved biologist will conduct a biological resources training program for all construction workers and their contractors to minimize potential impacts to the Morro Bay kangaroo rat. Training will occur prior to initial ground disturbing activities and be repeated and as needed for new workers for the duration of the project covered by the permit. The training program will include a description of:

(1) important biological resources within the project site, specifically Morro Bay kangaroo that have potential to occur within or adjacent to work areas; (2) the applicable avoidance and minimization measures; (3) the roles and responsibilities of personnel; and (4) communication protocols if Morro Bay kangaroo are detected. *If a Morro Bay kangaroo rat is detected, FEMA will immediately (within one business day) contact the Ventura Fish and Wildlife Office for further guidance.*

4. Prior to ground disturbing activities, all grading limits and construction boundaries, including staging areas, parking, and stockpile areas, will be delineated and clearly marked in the field.
5. Personnel will limit their vehicle use to existing routes of travel or within delineated construction boundaries. Travelling off designated access roads will be prohibited.
6. FEMA will ensure their activities do not spread invasive plants (e.g., veldt grass, ice plant) that degrade habitat conditions for Morro Bay kangaroo rat.
7. To minimize the potential for road mortality, all hauling activities will be restricted to daylight hours, defined as the hours after sunrise and before sunset.
8. A Service-approved biologist will conduct pre-activity surveys within project disturbance boundaries immediately prior to the onset of any ground disturbance associated with the project to determine if any individuals of the Morro Bay kangaroo rat are present. The Service-approved biologist will monitor ground disturbing activities until all suitable habitats have been disturbed. Upon completion of initial ground disturbance, the biologist will periodically (minimum twice per week) visit the project site throughout the ground disturbing period to ensure that impacts to the project site are in compliance with the permit. Should any Morro Bay kangaroo rats be observed within harm's way, the animal will be allowed to vacate the area on its own accord*. If a Morro Bay kangaroo rat is detected, FEMA will immediately (within one business day) contact the Ventura Fish and Wildlife Office.*
9. Open pipe segments will be capped or sealed with tape (or equivalent material) nightly, or otherwise stored at least two feet above ground. Should a pipe segment become occupied by a Morro Bay kangaroo rat, the animal will be allowed to vacate the pipe on its own. *If a Morro Bay kangaroo rat is detected, FEMA will immediately (within one business day) contact the Ventura Fish and Wildlife Office for further guidance.*
10. When working in areas with a predominance of native plants, the upper layer of topsoil material (6 inches) will be segregated during excavations to preserve the seed bank. The preserved topsoil will be covered to protect it from erosion and invasion of non-native plants until completion of the activity, when the topsoil will be replaced over temporarily affected areas. Existing access roads are not subject to this measure.
11. Permanent outdoor lighting will be minimized and must be shielded by fixture design or other means to minimize illumination of surrounding areas. Light sources that do not attract insects (LED) must be used if outdoor lighting is necessary.

12. Temporarily disturbed areas will be restored and stabilized to reflect pre-existing contours and gradients to the extent practicable. Erosion and sediment controls (e.g., silt fences, fiber rolls, sandbags) will be installed, where necessary, utilizing weed-free materials in areas with a predominance of native plants. Where necessary, restored areas will be maintained and monitored, including weed removal (focused on noxious weeds and excluding non-native annual grasses). All planting and seeding will occur the first year after construction is complete, after the first significant rain event of the year (i.e., more than 0.20 inch of precipitation).
13. For projects that have unavoidable adverse impacts on the Morro Bay kangaroo rat, mitigation is needed to compensate for impacts to the species. Mitigation would be undertaken in a strategic way such that it contributes to meeting recovery criteria or 5-year review recommendations. The amount of compensatory mitigation to offset a proposed project's impacts should be determined by assessing a project's level of impacts to the Morro Bay kangaroo rat and their habitat. Compensatory mitigation, in this plan, refers to actions that support the permanent conservation, management, or restoration of habitat to ensure conservation benefits for the Morro Bay kangaroo rat.

<u>Morro Shoulderband Snail</u>

1. Retention of a Service-Approved Biologist: Prior to the commencement of any site preparation or issuance of grading and/or construction permits, the project proponent will provide documentation that a Service-approved biologist or biologist in possession of a valid recovery permit for Morro shoulderband snail has been retained. All actions associated with the avoidance measures discussed below will be conducted only by this approved biologist.
2. Pre-Activity Environmental Awareness Training: The approved biologist will conduct pre-activity Environmental Awareness Training for all personnel involved in site preparation or construction activities on site. The purpose of this training is to educate construction crews, field supervisors, and equipment operators about the status and presence of the species, grading and construction activity restrictions, any avoidance and minimization measures, and the ramifications of non-compliance. This training will be provided as many times as necessary to ensure each person working is informed.
3. Stop Work Authority: The approved biologist conducting surveys and monitoring activities will have the authority to immediately stop any work or activity if Morro shoulderband snails are detected and take any measures necessary to avoid species take. The Ventura Fish and Wildlife Office (VFWO) will be notified of any "stop work" order as soon as reasonably possible. The stop work order will remain in effect until the issue has been resolved.
4. Site Preparation and Construction Timing: If possible, conduct all project-related vegetation removal, grubbing, and/or grading and subsequent construction activities to the dry season (June 1 - October 15) when Morro shoulderband snails are most likely aestivating and unlikely to migrate into work areas. Additional avoidance measures will be implemented if work must be conducted

during the wet season or during wet weather throughout the year, including heavy fog that wets the ground.

5. Grubbing and Grading Monitoring: The approved biologist will be present daily to monitor vegetation clearing and stripping of the surface soil layer. The monitoring will include the necessary halting of any grubbing and/or vegetation removal so that a thorough inspection of any and all native and non-native vegetation, especially ice plant, veldt grass, and coastal dune scrub species, can be conducted to detect the presence of Morro shoulderband snails. It should be noted that the pre-activity surveys for Morro shoulderband snail will require adequate time to conduct careful vegetation removal and inspection to search for individuals of all age classes, especially within perennial veldt grass culms and iceplant and other native and non-native vegetation and anthropogenic surfaces.
6. Pre-Activity Surveys: During the dry season the approved biologist will conduct pre-activity surveys of the entire project site no more than 48 hours prior to the initiation of work. During the wet season or wet weather, the approved biologist will conduct pre-activity surveys immediately prior to the daily resumption of work, even after vegetation removal
7. Morro Shoulderband Snail Capture and Relocation: If any Morro shoulderband snail are detected during vegetation and grading or pre-activity surveys, the approved biologist will capture them and store them in an insulated container with native moist soil and vegetation from the project site until they can be relocated within 8 hours to a suitable safe location on conserved land.
8. Morro Shoulderband Snail Barrier: Prior to any soil disturbance and/or vegetation removal, 2 to 3-foot tall silt fencing will be installed around the perimeter of the proposed project area by the approved biologist. The purpose of this fencing is to define the work area and restrict the movement of Morro shoulderband snails into the work area during site preparation and construction activities. The fencing will be monitored by the Service-approved biologist to ensure its operation and effectiveness as part of each site visit. Any necessary repairs will be made immediately. The fencing must be removed by an approved biologist at the conclusion of the proposed project.
9. Exclusionary Fencing: Prior to any soil disturbance and/or vegetation removal and in addition to the barrier fence described above, the approved biologist will install exclusionary fencing to prevent disturbance of areas within the project area that have not been thoroughly inspected by the approved biologist. This fencing will consist of a 4 or 5-foot tall plastic orange safety fence supported by metal T-posts or wooden stakes. As with the barrier fence, the condition of the exclusionary fencing will be monitored to ensure its efficacy and any repairs made immediately.
10. Reporting: The approved biologist responsible for the Morro shoulderband snail monitoring activities will submit a report documenting the details of all monitoring and relocation efforts. These reports will include, at a minimum, details related to the pre-activity surveys and their results, any non-compliance events, pictures of the work area, dates of environmental awareness training(s) and a list of all attendees, and any injury or mortality of Morro shoulderband snails.

11. Deposition of Injured or Killed Morro Shoulderband Snails: As part of consultation following the emergency response and pursuant to 50 CFR 402.14(i)(1)(v), upon locating dead or injured Morro shoulderband snails, the approved biologist must send notification by telephone and electronically in writing to the Ventura Fish and Wildlife Office (805-644-1766) and FW8venturasection7@fws.gov within 3 working days of the discovery. The notification must include the date, time, and location of the carcass, a photograph, the cause of death or injury if known, and any other pertinent information.
    The approved biologist must take care in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state. The approved biologist must transport injured Morro shoulderband snails to a qualified veterinarian. Should any treated animals survive, the approved biologist must contact the Service regarding the final disposition of the animal(s). The remains of any dead Morro shoulderband snails must be placed with educational or research institutions holding the appropriate State and Federal permits, such as the Santa Barbara Natural History Museum (Contact: Paul Collins, Santa Barbara Natural History Museum, Vertebrate Zoology Department, 2559 Puesta Del Sol, Santa Barbara, California 93460, (805) 682-4711, extension 321), or any other repository designated in writing by the Service.
12. For projects that have unavoidable adverse impacts on Morro shoulderband snails, mitigation is needed to compensate for impacts to this species. Mitigation would be undertaken in a strategic way such that it contributes to meeting recovery criteria or 5-year review recommendations. The amount of compensatory mitigation to offset a proposed project's impacts should be determined by assessing a project's level of impacts on Morro shoulderband snails and their habitat. Compensatory mitigation refers to actions that support the permanent conservation, management, or restoration of habitat to ensure conservation benefits for the Morro shoulderband snail.

<u>Ohlone tiger beetle</u>

1. Prior to construction activities taking place, a Service-approved biologist will conduct a training session for all construction personnel. Training should include, but is not limited to: identification of OTB and its habitat, and procedures to follow in case OTB are found on the project site.
2. At least 30 days before the onset of construction activities, FEMA will submit the name(s) and credentials of biologists to the Service who will conduct activities specified in the following measures. Only Service-approved biologists may conduct project-related avoidance and mitigation measures for OTB.
3. Prior to project activities taking place within potential OTB habitat that contains the appropriate soil type (Watsonville loam), a Service-approved biologist will survey for OTB larval burrows. If larval burrows cannot be avoided, FEMA will contact the Service for guidance.

4. If construction is scheduled during the OTB adult activity period (January through May) within suitable habitat, a Service-approved biologist will monitor the construction site concurrent with project activities to determine if OTB are present. If an adult OTB is found on the soil surface, it will be relocated and released by the entomologist outside of the impact area on the soil surface.
5. Existing access routes will be used during construction activities. When a new route is necessary in terrestrial habitats characterized by Watsonville loams and occupied by the OTB, staff will identify a route that avoids larval burrows and causes the least amount of ground disturbance.
6. Dust can clog the spiracles of adult beetles and larvae, the latter of which are active throughout much of the year. Appropriate dust control measures, such as periodically wetting down the work areas, will be used as necessary for any project-related activities that generate dust. Care will need to be exercised to avoid saturating areas supporting life stages of the OTB.
7. OTB adults and larvae prefer patches of bare to sparsely vegetated soil within coastal prairie grassland habitat. Revegetation of disturbed portions of the project area at locations known to support the OTB will use only grasses and forbs indigenous to the coastal terrace prairie habitat. Also, weed control will be part of the revegetation activities. Dense ground covers, weed matting, aggregate, and mulch can degrade habitat conditions and will not be used.
8. If an OTB is found, work that may impact the species must stop immediately and the Service-approved biologist notified. The biologist will remove the beetle from the construction site and will relocate it to suitable habitat outside of the impact area. The biologist will then re-inspect the site. Construction may resume when the biologist ensures that no more beetles occur in the construction site.
9. Within 1 working day of finding dead or injured beetles on the construction site, the Service-approved biologist will notify the Service at the Ventura Field Office via electronic mail. Notification in writing shall include, at a minimum, the date, time, and location of the specimen and information about the conditions under which it was found.
10. New drainage features will avoid altering hydrologic conditions within OTB habitat.
11. For projects that have unavoidable adverse impacts on the OTB and its habitats, mitigation is needed to compensate for impacts to these species. Mitigation would be undertaken in a strategic way such that it contributes to meeting recovery criteria or 5-year review recommendations. The amount of compensatory mitigation to offset a proposed project's impacts should be determined by assessing a project's level of impacts to the OTB and its habitat. Compensatory mitigation, in this plan, refers to actions that support the permanent conservation, management, or restoration of habitat to ensure conservation benefits for the OTB.

<u>Marsh sandwort (Arenaria paludicola), Coastal dunes milk-vetch (Astragalus tener var. titi), Gambel's watercress (Nasturtium gambelii) and Scott's valley polygonum (Polygonum hickmanii)</u>

If these species are within the proposed action area and cannot be entirely avoided, please contact the Ventura FWS office as soon as possible.

For all remaining federally listed species:

Listed-Plants

No work may occur within any habitat occupied by federally listed plant species. If work has already occurred in occupied habitat, further consultation will be necessary and monitoring, habitat restoration, and other remedial efforts may be required. To determine where federally listed plant species are located, we recommend you query the California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database, California Consortium of Herbaria Records, most recent 5-year status reviews from the U.S. Fish and Wildlife Service (Service), and other range maps found in species profiles on the Service's Environmental Conservation Online System (https://ecos.fws.gov), as well as consulting with the local Service Office.

If federally listed plant species were previously observed or known to occur within the project limits, (or were previously documented onsite within any of the resources mentioned above), or are known to occur within proximity to the project site, or the project site contains suitable habitat or designated critical habitat for federally listed plant species, we recommend that you conduct comprehensive floristic surveys within the appropriate blooming periods for all potentially occurring species onsite. The floristic survey efforts should be conducted in accordance with the pertinent (Service, CDFW, and California Native Plant Society [CNPS]) survey protocols and guidelines (Service 1996; CDFW 2018; CNPS 2001). Floristic surveys must be conducted by a qualified botanist, and in certain circumstances prior approval of qualified personnel by the Service may be required. Please note that federally listed annual plant species may not always be present above ground in any given year, unless environmental conditions are favorable for seed germination, growth, and development. If federally listed annual plant species are not observed onsite during floristic surveys, they may still be present as a dormant seedbank. Therefore, multiple years of surveys may be required and potential project-related effects to seedbanks of these species must be considered. If project implementation is delayed, floristic survey efforts may need to be repeated. And we also recommend that you plan to conduct floristic surveys for federally listed plant species during the spring and summer/ (appropriate blooming periods) in the year immediately prior to the start of construction. If floristic surveys are not possible, the listed plant species will be assumed to be present in all suitable habitats within the project area.

Once the location(s) and distribution of federally listed plant species and their habitat(s) is known and mapped, based on the results of floristic survey efforts, we recommend that all potential direct and indirect effects of the project be avoided. If this baseline is established early on enough in the project planning and design process, certain project elements can be altered, reconfigured, or amended to achieve complete avoidance.

Project adjustments and re-design efforts should be conducted in coordination with the Service to ensure that total avoidance is achieved.

If avoidance is not feasible, use of specific preventative and minimization measures is required. Examples of these types of measures include (but are not limited to) environmental awareness training for all project personnel, delineation of sensitive rare plant habitat areas, construction monitoring, seed and soil collection, stockpiling, and re-distribution, decontamination of tools and equipment to prevent and minimize the spread of nonnative, invasive weeds, and individual plant translocations (please refer to attached general-listed plant conservation measures). Whenever feasible, actual prevention and avoidance measures are project and species specific and will be developed in coordination with the Service. For example, setback distances and other buffers are dependent on the specific project activities and proximity to occupied or suitable habitats. Similarly, certain project components may require additional Service coordination and approvals, such as in-stream work if aquatic, listed plant species are present. Depending on the nature of the work and the species affected, elements like discharge locations, dewatering plans, bank stabilization design, locations and design of bridge abutments and pilings, and sources of rock, imported sand and soils, etc.

If work has been or is required in areas occupied by federally listed plant species, a comprehensive restoration plan will need to be developed and implemented in coordination with the Service. The plan should focus on restoring the listed plant species habitat back to the preconstruction (or improved beyond that) conditions and re-establishing the affected species within the affected areas. Other re-introduction efforts may also be necessary in additional adjacent areas, depending on the magnitude of the effects. Only native plant species appropriate for the habitat should be used and these should be of local genotypes sourced from local suppliers to the maximum extent practicable. Seeding efforts and/or installation of container plantings may be necessary. Restoration plans will also include success criteria and monitoring and reporting requirements. Monitoring and reporting components typically occur for a minimum of three to five consecutive years, or until all of the established success criteria are achieved. However, these requirements will depend on the particular species and habitat(s) affected and the nature of the project and effects.

Citations

California Department of Fish and Wildlife (CDFW). 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities.

California Native Plant Society (CNPS) 2001. Botanical survey guidelines.

US Fish and Wildlife Service. "Guidelines for conducting and reporting botanical inventories for federally listed, proposed, and candidate plants." Sacramento, CA (2000).

General-listed plant conservation measures

Biologist Qualifications:

- A Service-approved biologist will conduct protocol-level surveys before any activities begin.
- Prior to conducting biological surveys or monitoring related to the project and/or avoidance and minimization measures identified herein, each biologist will submit their qualifications to the Service for approval at least 30 days in advance.
- A Service-approved biologist familiar with federally listed plants (see Appendix A) should be present at all times while work is being conducted. This Service-approved biologist will ensure that no federally listed plants are present in work areas or where heavy equipment travels.
- FEMA/the applicant must request Service approval of any qualified biologists they wish to survey for federally listed plants pursuant to this biological opinion. Such requests must be in writing and be received by the Ventura Fish and Wildlife Office at least 30 days prior to any such activities being conducted. No project activities can begin until FEMA/the applicant has received written approval from the Service that the biologists are qualified and approved to conduct the work. (Be advised that possession of a 10(a)(1)(A) permit for the covered species does not substitute for the implementation of this measure. A section 10(a)(1)(A) recovery permit is limited to any act otherwise prohibited by section 9 of the Act for scientific purposes or to enhance the propagation or survival of the affected species. Authorization of Service-approved biologists is valid for this project only.)

Training:

- A Service-approved biologist/biological monitor will present a Worker Environmental Awareness Program to the crew prior to the commencement of construction and to any new crewmembers prior to beginning work on the jobsite. The training will include this list of avoidance and minimization measures and will describe the identification and natural history of federally listed species, regulatory context, and required measures to minimize or avoid incidental take of listed species.
- Before any activities begin on a project, a Service-approved biologist will conduct a training session for all construction personnel. At a minimum, the training will include a description of federally listed plants and their habitats, the specific measures for the current project that are being implemented to conserve federally listed plants, and the boundaries within which the project may be accomplished. Brochures, books, and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.
- All operators of vehicles, equipment, and machinery that are operated onsite are to receive training per a Service-approved program to avoid federally listed plants. Training logs will be kept for all staff.
- The construction crew will be educated on the avoidance measures to be taken.

Surveys/Monitoring:

- Service-approved biologists will conduct protocol-level pre-activity surveys.
- A Service-approved biological monitor will conduct daily pre-construction surveys within the construction zone prior to work beginning each day during preliminary grading and site preparation. Thereafter, site inspections will continue on a less frequent basis as determined by the biological monitor. The biological monitor will have the authority to halt construction if necessary to limit unanticipated adverse impacts to water quality, fish and wildlife, and habitats.
- FEMA/the applicant will conduct pre-construction surveys for rare plants during the blooming period prior to initiating all construction-related activities. If any federally listed plant species are observed in the action area, FEMA/the applicant will avoid the individual plants and contact the Service before any further work in that area occurs. Note that the absence of visible plants in areas where a plant species was observed in previous years is a likely indication that there may be a biologically meaningful soil seed bank in those areas, and steps must be taken to avoid disruption of the intact soil as much as possible.
- Before initiating the proposed project, a Service-approved biologist will conduct a survey to appropriately demarcate with flagging and/or fencing the limits of areas occupied by federally listed plants. Any project related activities to be undertaken within said areas will adhere to the avoidance and minimization measures identified for each component of the project as discussed below.
- A qualified biologist will be present on-site during construction activities to ensure that no specimens will be impacted.
- Pre-project plant surveys will be conducted in all areas that have habitat suitable to support any of the listed plant species identified above. The surveys will be conducted at the appropriate time of the year during the blooming periods for each species to the extent practicable while allowing the project to be completed prior to its target completion date. If any plants resembling a listed species are found that are not flowering, such that a positive identification cannot be made, they will be avoided. Listed plant species found in project areas will be fenced off and protected from clearing activities. Additionally, FEMA/the applicant will notify us and obtain guidance on how to further protect any listed plants observed.
- FEMA/the applicant will monitor effectiveness of the avoidance and minimization measures.

Equipment:

- No equipment will be left on site overnight outside of the designated areas. Designated areas are defined as those areas that are enclosed with silt fence or some other barrier designed to reasonably prevent wildlife from entering.
- Tools, equipment, and clothing will be inspected for plant material (including seeds or plant parts that can sprout vegetatively, such as English ivy stems), mud, and dirt before transport to or arrival at the site.
- Tools, equipment, and clothing must be weed-free and clean before arrival at the site and will be cleaned off-site at a designated location.
- Work locations, access routes, and staging areas will be reviewed and clearly delineated by the project biologist with staking or flagging prior to mobilization.

- All refueling, maintenance, and staging of equipment and vehicles will occur at least 100 feet from any federally listed plants or their habitat.
- Vehicles and equipment will be checked daily for leaks, and all vehicular fluid spills will be contained and cleaned up immediately.
- No equipment will be operated within the immediate vicinity of the project site without a biologist to survey the path of travel before the equipment continues.

Restoration:

- Project sites will be re-vegetated with an assemblage of native riparian, wetland, and upland vegetation suitable for the area. Locally collected plant materials will be used to the extent practicable. Invasive, exotic plants will be controlled to the maximum extent practicable. This measure will be implemented in all areas disturbed by activities associated with the project, unless the Service and FEMA/the applicant determine that it is not feasible or practical.
- Habitat contours will be returned to their original configuration at the end of project activities. This measure will be implemented in all areas disturbed by activities associated with the project, unless FEMA/the applicant determines that it is not feasible or that modification of the original contours would benefit the federally listed plants and the FEMA/the applicant has the Service's approval.
- Nonnative vegetation will not be used for restoration/landscaping.
- Restoration efforts will use only local plant materials.
- FEMA/the applicant will use certified weed-free seed for restoration projects and for burned area emergency rehabilitation.

Waste/Trash/Excess Disposal:

- All construction-related vegetative debris (e.g., larger brush, tree limbs, tree trunks) will be hauled inside the designated area daily. Stockpiles of vegetative debris and tree mulch will be kept in a contained area inside the designated area, and intermittently hauled offsite for disposal.
- Dispose of contaminated debris such as soil with weed seeds or material contaminated with herbicides at a contaminated materials location such as a landfill or decontamination facility; or, contain it securely in sealed plastic bags, remove off-site, and dispose of it in a way to avoid spreading contaminated materials.

Other Activities:

- Ground disturbance will not begin until written approval is received from the Service that project biologist(s) are qualified to conduct the work.
- Install and maintain signs, barriers, or other protective measures to avoid negative impacts to federally listed plants.
- The number of access routes, size of staging areas, and the total area of the activity will be limited to the minimum necessary to achieve the project goals. Environmentally Sensitive Areas will be delineated to confine access routes and construction areas to the minimum area necessary to complete construction and minimize the impact to federally listed plants and habitat; this goal includes

locating access routes and construction areas outside of wetlands and riparian areas to the maximum extent practicable.

- If FEMA/the applicant determines the use of herbicides is necessary for their project, they will coordinate further with the Service to develop suitable avoidance and minimization measures for herbicide use for their project.
- Before brush removal in areas occupied by federally listed plants, Service-approved biologists and field-trained technicians will flag standing individuals or groups of individuals for avoidance. A limited number of live outlier individuals may be cut where their removal will facilitate access for scanning equipment into otherwise unoccupied habitat. Standing dead individuals will be allowed to be cut; however, the cut plants including any senescent inflorescences that may contain seeds will remain on site at their original location, or relocated to other suitable habitat for the species, as determined by a Service-approved biologist.
- Brush cutting in occupied areas will be done manually, using handsaws, pruners, chain saws, bow saws, etc., by personnel specifically field-trained to carry out these avoidance and minimization measures. Reasonable care will be undertaken not to damage or cause further mortality of standing live individuals during the brush cutting or when moving cut brush to temporary stockpiles.
- All existing specimens of federally listed plants will be clearly marked with fencing or flagging.
- No clearing activities will occur in areas where listed plant species are identified during pre-project surveys. Plants closely resembling listed species will be avoided unless they can be positively identified as a non-protected species (e.g., non-flowering *Dudleya* species).
- The appropriateness of a buffer zone around individuals and habitat for federally listed plants will be determined on a site-by-site basis with input from the Service and FEMA/the applicant. Buffer width, effect of project design on hydrology, connectivity with other occurrences or habitat, movement of pollinators, and other factors affecting these species and habitats will be considered.
- FEMA/the applicant will not use nonnative plants or vegetation for landscaping. Any deviations will require approval by the Service prior to installation.
- FEMA/the applicant will prevent or minimize introduction of invasive nonnative plants and animals into key federally listed plants habitats and stream courses or bodies of water.
- FEMA/the applicant will implement a weed-free certification program for hay, straw, mulch, or other erosion control material as it becomes available.

Federally listed plants for which the Ventura Fish and Wildlife Office is the species lead office.

Common Name	**Scientific Name**
Hoffmann's rockcress	(*Arabis* [*Boechera*] *hoffmannii*)
Santa Rosa Island manzanita	(*Arctostaphylos confertifolia*)
Morro manzanita	(*Arctostaphylos morroensis*)
marsh sandwort	(*Arenaria paludicola*)
Braunton's milk-vetch	(*Astragalus brauntonii*)
Ventura marsh milk-vetch	(*Astragalus pycnostachyus* var.

Common Name	Scientific Name
	lanosissimus)
coastal dunes milk vetch	(*Astragalus tener* var. *titi*)
island barberry	(*Berberis pinnata* ssp. *insularis*)
soft-leaved paintbrush	(*Castilleja mollis*)
Ben Lomond spineflower	(*Chorizanthe pungens* var. *hartwegiana*)
Monterey spineflower	(*Chorizanthe pungens* var. *pungens*)
Scotts Valley spineflower	(*Chorizanthe robusta* var. *hartwegii*)
robust spineflower	(*Chorizanthe robusta* var. *robusta*)
Chorro Creek bog thistle	(*Cirsium fontinale* var. *obispoense*)
La Graciosa thistle	(*Cirsium scariosum* var. *loncholepis*)
Pismo clarkia	(*Clarkia speciosa* ssp. *immaculata*)
island rush-rose	(*Crocanthemum* [*Helianthemum*] *greenei*)
Gaviota tarplant	(*Deinandra increscens* ssp. *villosa*)
Vandenberg monkeyflower	(*Diplacus vandenbergensis*)
marcescent dudleya	(*Dudleya cymosa* ssp. *marcescens*)
Santa Monica Mtns dudleya	(*Dudleya cymosa* ssp. *ovatifolia* [*including* ssp. *agourensis*])
Santa Cruz Island dudleya	(*Dudleya nesiotica*)
Conejo dudleya	(*Dudleya parva* [*abramsi* ssp. *parva*])
Santa Barbara Island liveforever	(*Dudleya traskiae*)
Verity's dudleya	(*Dudleya verityi*)
Indian Knob mountainbalm	(*Eriodictyon altissimum*)
Lompoc yerba santa	(*Eriodictyon capitatum*)
Menzies' wallflower	(*Erysimum menziesii*)
Ben Lomond wallflower	(*Erysimum teretifolium*)
island bedstraw	(*Galium buxifolium*)
Monterey gilia	(*Gilia tenuiflora* ssp. *arenaria*)
Hoffmann's slender-flowered gilia	(*Gilia tenuiflora* ssp. *hoffmannii*)
Santa Cruz cypress	(*Hesperocyparis abramsiana*)
Gowan cypress	(*Hesperocyparis goveniana*)
Santa Cruz tarplant	(*Holocarpha macradenia*)
Santa Lucia purple amole	(*Hooveria purpurea* var. *purpurea*)
Camatta Canyon amole	(*Hooveria purpurea* var. *reducta*)
Nipomo Mesa lupine	(*Lupinus nipomensis*)
Clover (Tidestrom's) lupine	(*Lupinus tidestromii*)
Santa Cruz Island bushmallow	(*Malacothamnus fasciculatus* var. *nesioticus*)
island malacothrix	(*Malacothrix indecora*)
Santa Cruz Island malacothrix	(*Malacothrix squalida*)
Gambel's watercress	(*Nasturtium gambelii*)
Lyon's pentachaeta	(*Pentachaeta lyonia*)
island phacelia	(*Phacelia insularis* var. *insularis*)
Yadon's piperia	(*Piperia yadonii*)
Scotts Valley polygonum	(*Polygonum hickmanii*)

Common Name	Scientific Name
Hickman's potentilla	(*Potentilla hickmanii*)
California seablite	(*Suaeda californica*)
Santa Cruz Island fringepod	(*Thysanocarpus conchuliferus*)
Monterey clover	(*Trifolium trichocalyx*)

Smith's blue butterfly

1. If possible, avoid damage or removal of seacliff buckwheat (*Eriogonum parvifolium*) or coast buckwheat (*Eriogonum latifolium*) plants (buckwheat host plants), which are essential components of Smith's blue butterfly habitat.
2. If possible avoid work between June 1 and September 30, when Smith's blue butterfly adults, eggs, and larvae may be present. Pupae may be present throughout the year but are immobile and unlikely to be present far from seacliff buckwheat or coast buckwheat plants.
3. Ensure that only Service-approved biologists will participate in capture, handling, and monitoring of the Smith's blue butterfly, in all of its life stages, and the handling of buckwheat plants.
4. Ensure that ground disturbance for maintenance or project activities will not begin within stands of buckwheat until a Service-approved biologist is on site.
5. For maintenance work or project activity within stands of buckwheat, a Service-approved biologist will survey the work site no more than 30 days before the onset of ground disturbance. If any life stage of the Smith's blue butterfly or its buckwheat host plants is found and is likely to be killed or injured by work activities, the approved biologist will be allowed sufficient time to relocate buckwheat host plants, duff, and/or soil, from the site before work activities begin. The buckwheat host plants, duff, and/or soil will be hand removed and placed as close as possible to, but not on, living buckwheat host plants of the same species. The Service-approved biologist will relocate the buckwheat host plants, duff, and/or soil the shortest distance possible to a location that contains suitable habitat and will not be affected by activities associated with the proposed project. The Service-approved biologist will maintain detailed records of the number of seacliff buckwheat plants that are moved and location information (latitude and longitude and shapefiles) for both the removal and relocation sites.
6. If dust control with a water truck is necessary, avoid water overspray onto buckwheat plants outside the immediate work area to avoid damaging host plants or injuring or killing all life stages of Smith's blue butterfly.

7. Work vehicles should maintain speeds of 10 miles per hour or less in the work areas to avoid collision with Smith's blue butterfly adults between June 1 and September 30, and to avoid excess dust deposition on host plants throughout the year.
8. Before any maintenance or project activity work begins within stands of buckwheat, a Service-approved biologist will provide training to all field personnel. At a minimum, the training will include a description of the Smith's blue butterfly and its habitat, the specific measures that are being implemented to conserve the Smith's blue butterfly, and boundaries within which the project may

be accomplished. Brochures, books, and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.

9. A Service-approved biologist will be present at the work site for maintenance or project activity within stands of buckwheat until all Smith's blue butterflies and seacliff or coast buckwheat plants that are at risk due to project activities have been removed, workers have been instructed, and disturbance to habitat has been completed. After this time, FEMA may designate a person to monitor on-site compliance with all minimization measures. The Service-approved biologist will ensure that this monitor receives the training outlined in measure 8 and in the identification of the Smith's blue butterfly and its host plant, seacliff buckwheat. If the monitor or the Service-approved biologist recommends that work be stopped because the Smith's blue butterfly or seacliff or coast buckwheat would be affected to a degree that exceeds the levels anticipated by the Service during the review of the proposed action, they will notify the resident engineer (the engineer that is directly overseeing and in command of construction activities) immediately. The resident engineer will either resolve the situation by eliminating the unanticipated effect(s) immediately or require that all actions causing these effects be halted. If work is stopped, the Service will be notified as soon as is reasonably possible.
10. An assemblage of native species that includes seacliff and/or coast buckwheat, as appropriate depending on project location, will be used for revegetation of project sites. When possible, locally-collected host plant seeds and locally-propagated host plant seedlings will be used. Seacliff and/or coast buckwheat seeds or plants will only be placed outside areas where vegetation control activities may occur, such as within 10 feet of roadsides. The spread of invasive weeds during revegetation efforts will be controlled.
11. The number of access routes, size of staging areas, and the total area of the activity will be limited to the minimum necessary to achieve the project goal. Environmentally Sensitive Areas will be established to confine access routes and construction areas to the minimum area necessary to complete construction and minimize the impact to Smith's blue butterfly and seacliff or coast buckwheat.
12. Ensure that best management practices are implemented according to the most current approved guidelines to control erosion and sedimentation during and after project implementation. Under the California Interagency Noxious Weed Free Forage and Mulch Program (http://pi.cdfa.gov/weed/wff), California is taking steps to make noxious weed-free hay and straw widely available. Under this program, weed-free hay and straw bales would be used for erosion control measures when they become available.
13. For projects that have unavoidable adverse impacts on Smith’s blue butterfly or its habitat, mitigation is needed to compensate for impacts on this subspecies. Impacts are characterized not only by direct impacts on Smith’s blue butterfly individuals or host buckwheat plants but also by allowing infestation of invasive species at disturbed sites from lack of revegetation with local natives and weed control. Mitigation would be undertaken in a strategic way such that it contributes to meeting recovery criteria or 5-year review recommendations. The amount of compensatory mitigation to offset a proposed project’s impacts should be

determined by assessing a project's level of impacts on Smith's blue butterflies and their habitat. Compensatory mitigation refers to actions that support the permanent conservation, management, or restoration of habitat to ensure conservation benefits for the Smith's blue butterfly.

Santa Cruz long-toed salamander (SCLTS), Foothill yellow-legged frog (FYLF)

1. FEMA will site all impacts as far away from known and potential SCLTS, FYLF breeding habitats and avoid ground disturbance within upland habitat of the Santa Cruz long-toed salamander.
2. FEMA will constrain project impacts to the smallest area possible to reduce areal extent of habitat impacts.
3. At least 30 days prior to ground-disturbing activities, FEMA will submit the names and credentials of biologists for approval to conduct the minimization measures outlined below. Excluding an emergency activity, no project activities will begin until the applicant has received notice from the Service that the biologists are approved to do the work.
4. A Service-approved biologist will conduct a biological resources training program for all construction workers and their contractors to minimize potential impacts to the SCLTS, FYLF. Training will occur prior to initial ground disturbing activities and be repeated and as needed for new workers for the duration of the project covered by the permit. The training program will include a description of: (1) important biological resources within the project site, specifically SCLTS, FYLF that have potential to occur within or adjacent to work areas; (2) the applicable avoidance and minimization measures; (3) the roles and responsibilities of personnel; and (4) communication protocols if SCLTS, FYLF are detected.
5. A Service-approved biologist will periodically review and monitor ground disturbing activities and and will be responsible for ensuring that conditions of approval are being enforced and that success criteria are being met. Except for emergency situations, a Service-approved biologist will have the authority to halt project activities if permit requirements and conditions are not being met.
6. Prior to ground disturbing activities, all grading limits and construction boundaries, including staging areas, parking, and stockpile areas, will be delineated and clearly marked in the field.
7. Personnel will limit their vehicle use to existing routes of travel or within delineated construction boundaries. Travelling off designated access roads will be prohibited.
8. To minimize the potential for road mortality, all hauling activities will be restricted to daylight hours, defined as the hours after sunrise and before sunset.
9. Prior to moving vehicles or equipment, personnel will look under the vehicles or equipment for the presence of SCLTS, FYLF. If a SCLTS, FYLF or any other wildlife species is observed, the vehicle will not be moved until the animal has vacated the area on its own accord or has been relocated out of harm's way in accordance with Measure 11.
10. A Service-approved biologist will conduct pre-activity surveys within project disturbance boundaries immediately prior to the onset of any ground disturbance

associated with the project to determine if any individuals of the SCLTS, FYLF are present. The Service-approved biologist will monitor ground disturbing activities until all suitable habitats have been disturbed. Upon completion of initial ground disturbance, the biologist will periodically (minimum twice per week) visit the project site throughout the ground disturbing period to ensure that impacts to the project site are in compliance with the permit. After any periods of rain, a Service-approved biologist will conduct daily pre-activity surveys to ensure SCLTS, FYLF have not migrated into the work area prior to ground disturbing activities resuming. No construction work will be initiated until a Service-approved biologist determines that the work area is clear of SCLTS, FYLF Should any SCLTS, FYLF be observed within harm's way, the animal will be allowed to vacate the area on its own accord or be relocated in accordance with Measure 11.

11. SCLTS, FYLF will be allowed to vacate project areas on their own accord under the observation of a Service-approved biologist. If any SCLTS, FYLF do not relocate on their own, or if they are in harm's way, they will be relocated out of harm's way to nearby suitable habitat, similar to that in which it was found, and outside the project area. Only a Service-approved biologist will relocate SCLTS, FYLF.
    a) A Service-approved biologist will relocate any SCLTS, FYLF found within the project footprint to suitable aquatic or upland habitat outside the project footprint but within the watershed unless otherwise approved by the Service. The individuals will be handled with clean and wet hands. During relocation they will be placed in a clean, covered plastic container with a wet non-cellulose sponge. Captured individuals will be relocated immediately; individuals will not be stored for lengthy periods or in heated areas. The relocation container will be kept out of direct sunlight.
    b) A Service-approved biologist will monitor relocated SCLTS, FYLF until they are deemed safe in the relocation area by the biologist. Relocation areas will be identified by the Service-approved biologist based on the best suitable habitat available. The Service-approved biologist will document both the capture site and the relocation site by photographs and GPS positions. Individuals will be photographed and measured (snout-vent) for identification purposes prior to relocation.
12. Exclusionary silt fencing (or other suitable fence material) will be installed at the discretion of a Service-approved biologist to minimize the potential for SCLTS, FYLF to enter the worksite. Exclusionary fencing will be maintained for the duration of the project. If a SCLTS, FYLF or other wildlife species is observed within an enclosed worksite, a portion of the fencing will be removed to allow the individual to vacate the area on its own. Alternatively, the animal may be relocated out of harm's way in accordance with Measure 11.
13. Concurrent with the activities taking place in aquatic habitats of the SCLTS, FYLF, a Service-approved biologist will conduct pre-construction surveys and capture and relocate individuals that are at risk of injury or mortality.
14. If SCLTS, FYLF larvae are observed in areas to be impacted, all larvae will be captured and relocated to areas not affected by work activities. If SCLTS, FYLF

egg masses are found, the Service-approved biologist will contact the Service immediately for guidance.

15. All steep-walled earthen holes and open trenches 6 inches deep or greater will be covered each night or provided with escape ramps to prevent entrapment of SCLTS, FYLF. Excavations will be inspected for animals each morning, prior to any work in or around them, and before they are backfilled.
16. If a work area is to be dewatered by pumping, intakes will be completely screened with mesh not larger than 0.2 inch to prevent SCLTS, FYLF from entering the pump system.
17. All construction and sediment control fencing will be inspected each workday during construction activities to ensure they are functioning properly.
18. Steep-walled excavations (e.g., trenches) that may act as pitfall traps will be inspected for wildlife at least once per day and immediately before backfilling. In lieu of daily inspections (weekends, etc.), exclusionary fencing, covers, ramps, or similar measures will be taken to prevent wildlife entrapment.
19. Open pipe segments will be capped or sealed with tape (or equivalent material) nightly, or otherwise stored at least two feet above ground. Should a pipe segment become occupied by a SCLTS, FYLF or any other wildlife species, the animal will be allowed to vacate the pipe on its own or will be removed and relocated in accordance with Measure 11.
20. If construction activities must occur during the rainy season, permittees will not work during rain events (less than 0.20 inch), or during the 24 hours after these events, to the extent practicable. If work must occur 24 hours prior to significant rain events (less than 0.20 inch), or during the 24 hours after these events, a Service-approved biologist will conduct a pre-activity survey to ensure that the work area is clear (refer to Measure 10 above).
21. When working in areas with a predominance of native plants, the upper layer of topsoil material (6 inches) will be segregated during excavations to preserve the seed bank. The preserved topsoil will be covered to protect it from erosion and invasion of non-native plants until completion of the activity, when the topsoil will be replaced over temporarily affected areas. Existing access roads are not subject to this measure.
22. Permanent outdoor lighting will be minimized and must be shielded by fixture design or other means to minimize illumination of surrounding areas. Light sources that do not attract insects (LED) must be used if outdoor lighting is necessary.
23. Temporarily disturbed areas will be restored and stabilized to reflect pre-existing contours and gradients to the extent practicable. Erosion and sediment controls (e.g., silt fences, fiber rolls, sandbags) will be installed, where necessary, utilizing weed-free materials in areas with a predominance of native plants. Where necessary, restored areas will be maintained and monitored, including weed removal (focused on noxious weeds and excluding non-native annual grasses). All planting and seeding will occur the first year after construction is complete, after the first significant rain event of the year (i.e., more than 0.20 inch of precipitation).

24. Upon locating individuals of the SCLTS, FYLF that may be dead or injured as a result of project-related activities, notification will be made that same day to the Service's Ventura Field Office.
25. For projects that have unavoidable adverse impacts on the SCLTS, FYLF and their habitats, mitigation is needed to compensate for impacts to these species. Mitigation would be undertaken in a strategic way such that it contributes to meeting recovery criteria or 5-year review recommendations. The amount of compensatory mitigation to offset a proposed project's impacts should be determined by assessing a project's level of impacts to the SCLTS, FYLF and their habitat. Compensatory mitigation, in this plan, refers to actions that support the permanent conservation, management, or restoration of habitat to ensure conservation benefits for the SCLTS, FYLF.

California Red-Legged Frog

To avoid and minimize project impacts to the California red-legged frog and consequently minimalize the amount of compensatory mitigation required for a project the Ventura Field Office expects project proponents to incorporate the standard avoidance and minimization measures listed below into their project descriptions.

1. Only Service-approved biologists would participate in activities associated with the capture, handling, and monitoring of California red-legged frogs.
2. Ground disturbance would not begin until written approval is received from the Service that project biologist(s) are qualified to conduct the work.
3. A Service-approved biologist would survey the project site no more than 48 hours before the onset of work activities. If any life stage of the California red-legged frog is found and these individuals are likely to be killed or injured by work activities, the approved biologist would be allowed sufficient time to move them from the site before work begins. The Service-approved biologist would relocate the California red-legged frogs the shortest distance possible to a location that contains suitable habitat and that would not be affected by activities associated with the proposed project. The relocation site should be in the same drainage to the extent practicable. The project proponent would coordinate with the Service on the relocation site prior to the capture of any California red-legged frogs.
4. Before any activities begin on a project, a Service-approved biologist would conduct a training session for all construction personnel. At a minimum, the training would include a description of the California red-legged frog and its habitat, the specific measures that are being implemented to conserve the California red-legged frog for the current project, and the boundaries within which the project may be accomplished. Brochures, books, and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.

5. A Service-approved biologist would be present at the work site until all California red-legged frogs have been relocated out of harm's way, workers have been instructed, and disturbance of habitat has been completed. After this time, the sponsoring agency or project proponent may designate a person to monitor on-site compliance with all minimization measures. The Service-approved biologist will ensure that this monitor receives the training outlined in measure 4 above and in the identification of California red-legged frogs. If the monitor or the Service-approved biologist recommends that work be stopped because California red-legged frogs would be affected in a manner not anticipated by the sponsoring agency, project proponent, or the Service during review of the proposed action, they would notify a project supervisor immediately. The project supervisor would either resolve the situation by eliminating the adverse effect immediately or require that all actions causing these effects be halted. If work is stopped, the Service would be notified as soon as possible.
6. During project activities, all trash that may attract predators would be properly contained, removed from the work site, and disposed of regularly. Following construction, all trash and construction debris would be removed from work areas.
7. All refueling, maintenance, and staging of equipment and vehicles would occur at least 60 feet from riparian habitat or water bodies and in a location from where a spill would not drain directly toward aquatic habitat (e.g., on a slope that drains away from the water). The monitor would ensure contamination of habitat does not occur during such operations. Prior to the onset of work, the project proponent would ensure that a plan is in place for prompt and effective response to any accidental spills. All workers would be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.
8. Habitat contours would be returned to their original configuration at the end of project activities. This measure would be implemented in all areas disturbed by activities associated with the project, unless the Service and the project proponent determine that it is not feasible or modification of original contours would benefit the California red-legged frog.
9. The number of access routes, size of staging areas, and the total area of the activity would be limited to the minimum necessary to achieve the project goals. Environmentally Sensitive Areas would be delineated to confine access routes and construction areas to the minimum area necessary to complete construction, and minimize the impact to California red-legged frog habitat; this goal includes locating access routes and construction areas outside of wetlands and riparian areas to the maximum extent practicable.

10. Work will be scheduled for times of the year when impacts to the California red-legged frogs would be minimal. For example, work that would affect pools that may support breeding or dry season aquatic refuge will take place between May 1 and July 31, to the maximum extent practicable, in order to avoid the breeding season of the California red-legged frog (November 1 to April 30) and to maintain aquatic habitat for California red-legged frogs through the driest portions of the year (August 1 to September 30). If work must occur during the breeding season, the project proponent would implement the following measures as well:
    a. No work would occur during or 24 hours after any rain event to minimize impacts to dispersing and breeding California red-legged frogs. A rain event is considered any precipitation resulting in 0.1 inch or greater of precipitation. A Service-approved biologist would survey the project site immediately before resuming project activities.
    b. The project proponent would conduct project activities no earlier than 30 minutes after sunrise and no later than 30 minutes before sunset each day.
    c. The project proponent would survey the project area daily before activities begin and monitor all project activities using a Service-approved biologist
11. The project proponent would cover dirt or sand piles left overnight with tarps or plastic to prevent California red-legged frogs from sheltering in the material. All holes and trenches would be inspected each morning by a biological monitor. A Service-approved biologist would relocate any California red-legged frogs found in a hole or trench.
12. To control sedimentation during and after project implementation the project proponent would implement best management practices outlined in any authorizations or permits issued under the authorities of the Clean Water Act that it receives for the specific project. If best management practices are ineffective, the project proponent would attempt to remedy the situation immediately, in coordination with the Service.
13. If a work site is to be temporarily dewatered by pumping, intakes would be completely screened with mesh not larger than 0.2 inch to prevent California red-legged frogs from entering the pump system. Water would be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any diversions or barriers to flow would be removed in a manner that would allow flow to resume with the least disturbance to the substrate. Alteration of the stream bed would be minimized to the maximum extent possible; any imported material would be removed from the stream bed upon completion of the project.
14. Unless approved by the Service, water would not be impounded in the course of project activities in a manner that may attract California red-legged frogs.

15. A Service-approved biologist would permanently remove any individuals of non-native species, such as bullfrogs (*Rana catesbeiana*), signal and red swamp crayfish (*Pacifastacus leniusculus; Procambarus clarkii*), and centrarchid fishes from the project area, to the maximum extent possible. The Service-approved biologist would be responsible for ensuring his or her activities are in compliance with the California Fish and Game Code.
16. To ensure that diseases are not conveyed between work sites by the Service-approved biologist, the fieldwork code of practice developed by the Declining Amphibian Populations Task Force would be followed at all times.
17. Project sites would be re-vegetated with an assemblage of native riparian, wetland, and upland vegetation suitable for the area. Locally collected plant materials would be used to the extent practicable. Invasive, exotic plants would be controlled to the maximum extent practicable. This measure would be implemented in all areas disturbed by activities associated with the project, unless the Service and the sponsoring agency determine that it is not feasible or practical.
18. The project proponent will avoid the use of herbicides as the primary method used to control invasive, exotic plants; however, if the project proponent and the Service determine that the use of herbicides is the only feasible method for controlling invasive plants at a specific project site, the project proponent will implement the following additional protective measures for the California red-legged frog:
    a. The project proponent will not use herbicides during the breeding season for the California red-legged frog.
    b. The project proponent will conduct surveys for the California red-legged frog in areas where herbicides would be applied, immediately prior to the start of any herbicide use. If found, a Service-approved biologist will relocate the California red-legged frogs to suitable habitat far enough from the project area that no direct contact with herbicides would occur.
    c. Any use of glyphosate or glyphosate-based products will be done without polyoxyethyleneamine (POEA) surfactants. Formulations that lack a surfactant include Rodeo® and Aquamaster®, which have been approved by the U.S. Environmental Protection Agency (EPA), through their registration process, for aquatic use.
    d. The project proponent will apply all herbicides at half the maximum rate indicated on the product label, and must maintain a Hazard Quotient of less than or equal to 1. Hazard Quotients can be determined using the Herbicide Risk Charts in the California Invasive Plant Council and Pesticide Research Institute's Best Management Practices (download at https://www.cal-ipc.org/ resources/library/

publications/herbicidesandwildlife, see pp. 22-32). For assessing risk to amphibians, small birds are used as a surrogate for amphibians in terrestrial phase, and fish as a surrogate for amphibians in egg and larval phase (in accordance with EPA risk assessments). The Hazard Quotient must be less than or equal to 1 for both surrogates.

e. The project proponent will cut and haul out giant reed (*Arundo donax*) and other similar invasive plants by hand and paint the stems with glyphosate or glyphosate-based products, such as Aquamaster® or Rodeo®.
f. Licensed and experienced personnel or a licensed and experienced contractor will use a hand-held sprayer for foliar application of Aquamaster® or Rodeo® where large monoculture stands of non-native vegetation occur at an individual project site.
g. The project proponent will take all precautions to ensure that no herbicide is applied to native vegetation. The project proponent will not apply foliar spray applications when wind speeds exceed 12 miles per hour and will use directed sprayers with low-pressure, large droplet nozzles.
h. The project proponent will not apply herbicides on or near open water surfaces (no closer than 60 feet from open water) unless approved by the Service.
i. The project proponent will not apply herbicides within 48 hours of a predicted (greater than 50 percent chance forecast) significant rain event (0.2 inch or greater with 24-hour period). The National Weather Service 72-hour forecast must be consulted for the project area. (https://www.wpc.ncep.noaa.gov/kml/kmlproducts.php#qpf).
j. Application of all herbicides will be done by qualified personnel or contractors to ensure that overspray is minimized, that all application is made in accordance with label recommendations (with the one exception of applying at half the maximum application rate, as indicated above in measure 18d), and with implementation of all required and reasonable safety measures. A safe dye will be added to the mixture to visually denote treated sites. Application of herbicides will be consistent with the EPA's Office of Pesticide Programs, Endangered Species Protection Program county bulletins found at: https://www.epa.gov/endangered-species.
k. The project proponent will store, pour, and refill all herbicides, fuels, lubricants, and equipment at least 60 feet from riparian habitat or water bodies in a location where a spill would not drain directly toward aquatic habitat. The action agency will require the project proponent to ensure that contamination of habitat does not occur during such operations. Prior to the onset of work, the action agency will ensure that the project proponent

has a plan in place for a prompt and effective response to accidental spills. The applicant will inform all workers of the importance of preventing spills and of the appropriate measures to take should a spill occur.

Attachment 2 - Emergency Endangered Species Act (ESA) Section 7 Consultation and Magnuson-Stevens Fishery and Management Act Consultation Response for California Severe Winter Storms, Flooding, Landslides, and Mudslides (FEMA-3592-EM-CA) & California Severe Winter Storms, Straight-line winds, Flooding, Landslides, and Mudslides (DR-4699-CA)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

Refer to NMFS No: INQ-2023-00120

Scott Fletcher
Acting Environmental Officer, FEMA Region 9
Federal Emergency Management Agency
U.S. Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, California 94607-4052

Re: Emergency Endangered Species Act (ESA) Section 7 Consultation and Magnuson-Stevens Fishery and Management Act Consultation Response for California Severe Winter Storms, Flooding, Landslides, and Mudslides (FEMA-3592-EM-CA) & California Severe Winter Storms, Straight-line winds, Flooding, Landslides, and Mudslides (DR-4699-CA)

Dear Mr. Fletcher;

On May 5, 2023, NOAA's National Marine Fisheries Service (NMFS) received the Federal Emergency Management Agency's (FEMA) request to initiate emergency consultation under Section 7 of the Endangered Species Act (ESA) (16 U.S.C. 1531 *eq. seq*.) for emergency work performed in response to Emergency Declaration FEMA-3592-EM-CA for severe winter storms, flooding, landslides, and mudslides that occurred in California beginning on March 9, 2023; and for emergency work performed in response to Disaster Declaration DR-4699-CA for severe winter storms, straight-line winds, flooding, landslides, and mudslides that occurred in California beginning on February 21, 2023. Emergency actions anticipated by FEMA include, but are not limited to, actions to avoid or minimize imminent loss of life or property, life-saving storm response operations, community needs for survivor assistance, local/Tribal government assistance, mutual aid, emergency protective measures, debris clearance, and identifying recovery needs and long-term assistance programs.

FEMA's May 5, 2023, letter indicates FEMA's proposed actions include reimbursement of applicants (grantees and/or subrecipients) for eligible costs in affected counties in California for emergency work performed in response to Emergency Declaration FEMA-3592-EM-CA and Disaster Declaration DR-4699-CA. FEMA's May 5, 2023, letter also indicates that FEMA will have Environmental Specialists in the field supporting the Preliminary Damages Assessment (PDA) teams and they will have an opportunity to inform potential grantees and subrecipients of best management practices, avoidance and minimization measures (AMMs), or NMFS' recommendations to minimize the effects of emergency response operations on listed species and designated critical habitat.

Enclosed is a table with ESA-listed species and designated critical habitat in affected counties in California under the jurisdiction of NMFS (Table 1). Additionally, there are areas within the

affected counties in California identified as Essential Fish Habitat (EFH) for various federally-managed fish species pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1855[b]) (Table 2). For more information on listed species, designated critical habitat, and EFH in affected counties in California, please refer to the NOAA Fisheries Protected Resources Application (https://www.fisheries.noaa.gov/resource/map/protected-resources-app) and the NOAA Fisheries Essential Fish Habitat Mapper (https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper).

Many of the emergency actions identified in FEMA's May 5, 2023, letter for Emergency Declaration FEMA-3592-EM-CA and Disaster Declaration DR-4699-CA are addressed in the September 25, 2018, NMFS Programmatic Biological Opinion and EFH Response for FEMA's Disaster, Mitigation, and Preparedness Programs (PBO). The September 25, 2018, PBO is intended to cover many of the typical recurring disaster response actions funded by FEMA that adversely affect listed species and designated critical habitat in California, and allow for FEMA to effectively and promptly respond to disasters. NMFS recommends FEMA use the AMMs in Section 1.3.9 of the September 25, 2018, PBO for this emergency declaration. Section 1.3.9 includes 31 AMMs ranging from measures to minimize the effects of construction activities to design standards for bank stabilization projects. FEMA's Environmental Specialists in the field should encourage potential grantees and subrecipients to incorporate appropriate measures and design elements into their projects.

For emergency response actions that meet the PBO's suitability criteria, we recommend FEMA follow the process for ESA and MSA Compliance (Section 1.3.6) and the Monitoring and Reporting Requirements (Section 1.3.10) detailed in the September 25, 2018, PBO. The following are key measures for the protection of listed species, designated critical habitat, and EFH from the September 25, 2018, PBO that are likely to apply to emergency declarations FEMA-3592-EM-CA and DR-4699-CA:

1. For projects that have the potential to cause erosion and introduce sedimentation into waters, wetlands, and riparian areas supporting listed species, the applicant would prepare an Erosion Control Plan. The Erosion Control Plan would detail the erosion and sedimentation prevention measures required (AMM-1: Erosion and Sedimentation Prevention Measures).
2. If bank stabilization activities, such as the placement of rock slope protection, are necessary, then such stabilization would contain bioengineering or design elements suitable for supporting riparian vegetation, and would be constructed to minimize erosion downstream potential. The use of gabions for streambank stabilization is prohibited. In areas that support juvenile salmonid rearing, bank stabilization projects would incorporate habitat enhancement features such as wood, boulders, and vegetation for habitat complexity to the extent feasible (AMM-2: Bank Stabilization).
3. The applicant would, to the maximum extent practicable, reduce the amount of disturbance at a site to the absolute minimum necessary to accomplish the project (AMM-13: Work Area Designation to Minimize Disturbance).
4. When working on stream banks or floodplains, disturbance to existing grades and vegetation would be limited to the actual site of the project and necessary access routes. Placement of all roads, staging areas, and other facilities would avoid and limit

disturbance to stream bank or stream channel habitat as much as possible (AMM-14: Access Routes and Staging Areas).

5. All new or replacement bridges and culverts on anadromous-fish-bearing streams would be designed in accordance with the most current NMFS fish passage guidelines. All new stream crossings in EFH or habitat for covered anadromous fish must be able to allow passage of adult and juvenile life stages of the species (AMM-21: Bridge and Culvert Design).
6. Contractors would exercise every reasonable precaution to protect listed species, their critical habitat, and EFH from construction byproducts and pollutants, such as construction chemicals, fresh cement, saw-water, or other deleterious materials in accordance with federal, state, and local permitting (AMM-22: Water Quality Protection).
7. For projects that require revegetation of stream and river banks as a result of woody riparian vegetation removal during construction activities FEMA would require the applicant to prepare and implement a revegetation plan that includes information regarding monitoring for success. Revegetation plantings would be replaced at a 3:1 ratio with an 80% planting survival within 5 years of the plantings (AMM-24: Revegetation of Stream Banks).
8. In tidally influenced estuarine and marine areas that are designated as EFH and/or may support listed species, disturbance to habitat below mean higher high water would be limited to the maximum extent possible (AMM-26: Work below Mean Higher High Water).
9. If pumping is necessary for channel diversion, the pump intakes would be provisioned with NMFS-approved fish screening as outlined in California Department of Fish and Wildlife Fish Screening Criteria and NMFS Fish Screening Criteria for Anadromous Salmonids (AMM-29: Fish Screening Criteria).
10. For emergency actions that require in-water work in areas supporting black abalone, pre-construction surveys for the species would be conducted if there is potential for the construction to result in injury or mortality of the species. The survey would be conducted by a qualified Biologist who has experience in visually identifying black abalone in the field and characterizing habitat parameters important for black abalone persistence no more than 30 days preceding the onset of in-water construction. The results of the preconstruction survey would be documented in a report prepared by the Biologist and submitted to NMFS for approval, and Cal OES would be copied on the submittal.

    Black abalone encountered during pre-construction surveys would be reported to NMFS. If NMFS so directs, isolated black abalone (>2 meters [6.6 feet] apart from another black abalone) encountered during the pre-construction survey would be relocated to a pre-determined, NMFS-selected intertidal area containing suitable habitat. The relocation area would be as close as possible to the collection site to minimize handling time. Black abalone relocation would be performed by a qualified Biologist and would adhere to the handling protocol described for black abalone in the Protocols for Black Abalone Collection, Transport, and Holding (See Enclosure 1). Should a group (two or more black abalone within 2 meters [6.6 feet] of one another) of black abalone be encountered within 12.2 meters (40 feet) of the project footprint, repositioning the project footprint to avoid

black abalone would be considered. If repositioning the project footprint is not feasible and if NMFS so directs, groups of black abalone may be relocated to a pre-determined, NMFS-selected intertidal area following the handling protocol described for white abalone (AMM-18: Pre-construction Surveys and Relocation of Black Abalone) and the Protocols for Black Abalone Collection, Transport, and Holding (See Enclosure 1).

In addition to AMM-18 from the PBO, we recommend the following measures for black abalone:

- Conduct preconstruction surveys using the methods and best practices identified in Abalone Survey Guidelines (See Enclosure 2).
- If materials are to be deposited on the seaward side of Highway 1, the selected site should be a sufficient distance from rocky intertidal habitat to minimize possible negative effects to adjacent rocky intertidal habitat. Coordinate with the NMFS WCR Long Beach Office (black abalone recovery coordinator) to determine if the site has the potential to negatively affect adjacent rocky intertidal habitat and to develop appropriate minimization measures as needed.
- Implement measures to prevent and minimize introduction of materials (e.g., sediment, debris) into the marine environment during construction operations, to avoid negative effects on black abalone, kelp, and suitable habitat (rocky intertidal and shallow subtidal habitat).
- Implement measures to minimize turbidity (e.g., turbidity curtains) to minimize possible negative effects to surrounding kelp, black abalone, and suitable habitat.
- Only NMFS-approved, experienced biologists may conduct black abalone collection, handling, and relocation activities.
- If black abalone are encountered during pre-construction surveys, coordinate with the NMFS WCR Long Beach office (black abalone recovery coordinator) to determine whether to relocate the abalone to suitable rocky intertidal habitat or bring the abalone into captivity. Additional monitoring and reporting requirements will be determined in coordination with NMFS WCR.

The September 25, 2018, PBO does not address ESA-listed species of marine mammals and sea turtles. For listed marine mammals and sea turtles we recommend the following measures:

1. Monitor area at least 100 meters surrounding project areas where ESA-listed marine mammals and sea turtles may be present. If any ESA-listed marine mammals or sea turtles are spotted within this area, activities should cease as soon as safely possible to avoid or minimize the risk of direct contact with project activities and impacts, when feasible. Activities should not proceed until the animals have been observed to leave the area or until at least 15 minutes have passed since their last sighting.
2. If any activities involve the generation of high levels of in-water sound (e.g., pile-driving), monitoring and shut-down procedures may need to be across a larger area commensurate with thresholds for avoiding harassment or injury for any marine mammals under the Marine Mammal Protection Act. Level B harassment may occur when exposed to underwater noise above root-mean-square (RMS) received levels of 120 dB re 1 µPa for continuous (e.g., vibratory pile driving, drilling) and 160 dB re 1 µPa for

non-explosive, impulsive (e.g., impact pile driving) or intermittent (e.g., scientific, non-tactical sonar) sources. For additional guidance, please refer to the NOAA Fisheries Marine Mammal Acoustic Technical Guidance.

3. If any ESA-listed marine mammals or sea turtles are observed in the vicinity of project activities, information about the species, number, and behavior of animals observed should be documented.

As soon as practicable after the emergency is under control, actions under consideration for funding by FEMA that may adversely affect NMFS listed species or designated critical habitat should be submitted to NMFS pursuant to the PBO's implementation procedures or as individual ESA consultation requests. For actions completed during the emergency response, we request FEMA prepare a post-project assessment report. At a minimum, the report should include the following:

1. A description of the construction activity performed;

2. A description of all of the measures implemented to avoid adverse effects to listed species, designated critical habitat, and essential fish habitat;

3. Pre (if available) and post color photographs of the site;

4. Report any observations of listed species during the emergency project;

5. A description of the amount of in-water, bank, and riparian habitat affected by the emergency action;

6. Measures to compensate for the project's adverse effects to listed species, designated critical habitat, and essential fish habitat;

7. Information about the species, number, and behavior of any ESA-listed marine mammals and sea turtles observed in the vicinity of project activities; and

8. Any information about black abalone presence and relocation that occurs during project activities as determined in coordination with NMFS WCR.

The above measures and AMMs identified in the PBO, when implemented, should minimize the adverse effects of emergency response operations on NMFS listed species, designated critical habitat, and EFH. Please contact Dereka Chargualaf at 707-575-6088 or Dereka.Chargualaf@noaa.gov if you have any questions related to these comments or would like additional information.

Sincerely,

Gary Stern
San Francisco Bay Branch Chief
North-Central Coast Office

Enclosures (2)

cc: Adam Klatzker, FEMA Region IX (adam.klatzker@fema.dhs.gov)
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Table 1: ESA-listed species and designated critical habitat in affected counties in California under the jurisdiction of NMFS

Species	ESA Status	Critical Habitat
Black abalone *(Haliotis cracherodii)*	endangered (74 FR 1937; January 14, 2009)	critical habitat (76 FR 66806; October 27, 2011)
White abalone (*Haliotis sorenseni)*	endangered (66 FR 29046; June 28, 2001)	N/A
California Coastal (CC) Chinook salmon ESU *(Oncorhynchus tshawytscha)*	threatened (70 FR 37160; June 28, 2005)	critical habitat (70 FR 52488; September 2, 2005)
Central California Coast (CCC) coho salmon ESU (*O. kisutch*)	endangered (70 FR 37160; June 28, 2005)	critical habitat (64 FR 24049; May 5, 1999)
Central California Coast (CCC) steelhead DPS (*O. mykiss*)	threatened (71 FR 834; January 5, 2006)	critical habitat (70 FR 52488; September 2, 2005)
Central Valley (CV) spring-run Chinook salmon ESU (*O. tshawytscha*)	threatened (70 FR 37160; June 28, 2005)	critical habitat (70 FR 52488; September 2, 2005)
Central Valley steelhead DPS *(O. mykiss)*	threatened (71 FR 834; January 5, 2006)	critical habitat (70 FR 52488; September 2, 2005)
North American green sturgeon Southern DPS (*Acipenser medirostris*)	threatened (71 FR 17757; April 7, 2006)	critical habitat (74 FR 52300; October 9, 2009)
Northern California (NC) steelhead DPS *(O. mykiss)*	threatened (71 FR 834; January 5, 2006)	critical habitat (70 FR 52488; September 2, 2005)
Sacramento River (SR) winter-run Chinook salmon ESU *(O. tshawytscha*)	endangered (70 FR 37160; June 28, 2005)	critical habitat (58 FR 33212; June 16, 1993)

Species	ESA Status	Critical Habitat
South-Central California Coast (S-CCC) steelhead DPS (*O. mykiss*)	threatened (71 FR 834, January 5, 2006)	critical habitat (70 FR 52488; September 2, 2005)
Southern California (SC) steelhead DPS *(O. mykiss)*	endangered (71 FR 834, January 5, 2006)	critical habitat (70 FR 52488; September 2, 2005)
Southern DPS eulachon *(Thaleichthys pacificus)*	threatened (75 FR 13012; March 18, 2010)	critical habitat (76 FR 65324; October 20, 2011)
Southern Oregon/Northern California Coast (SONCC) coho salmon ESU *(O. kisutch)*	threatened (70 FR 37160; June 28, 2005)	critical habitat (64 FR 24049; May 5, 1999)
Leatherback Sea Turtle *(Dermochelys coriacea)*	endangered (35 FR 8491; June 3, 1970)	critical habitat (77 FR 4169; February 27, 2012)
North Pacific Ocean DPS Loggerhead Sea Turtle *(Caretta caretta)*	endangered (76 FR 58868; October 24, 2011)	N/A
East Pacific DPS Green Turtle *(Chelonia mydas)*	threatened (81 FR 20057; May 6, 2016)	N/A
Mexico DPS Humpback Whale *(Megaptera novaeangliae)*	threatened (81 FR 62259; October 11, 2016)	critical habitat (86 FR 21082; May 21, 2021)
Central America DPS Humpback Whale	threatened (81 FR 62259; October 11, 2016)	critical habitat (86 FR 21082; May 21, 2021)
Blue Whale *(Balaenoptera musculus)*	endangered (35 FR 18319; December 2, 1970)	N/A
Fin Whale (*Balaenoptera physalus)*	Endangered (35 FR 8491; June 2, 1970)	N/A
Western North Pacific DPS Gray Whale *(Eschrichtius robustus)*	Endangered (35 FR 8491; June 2, 1970)	N/A

Species	ESA Status	Critical Habitat
Southern Resident (SR) DPS Killer Whales *(Orcinus orca)*	endangered (70 FR 69903; November 18, 2005)	Critical habitat (71 FR 69054; November 29, 2006)
Guadalupe Fur seal *(Arctocephalus townsendi)*	threatened (50 FR 51252; January 15, 1986)	N/A
Western DPS Stellar Sea Lion *(Eumetopias jubatus)*	endangered (62 F 24345; May 5, 1997)	N/A

Table 2: Essential Fish Habitat in affected counties in California under the jurisdiction of NMFS

Coastal Pelagic Species FMP
Highly Migratory Species FMP
Pacific Coast Salmon FMP
Pacific Coast Groundfish FMP

Attachment 3 - NMFS WCR Abalone Survey Guidelines Version 1

NMFS WCR Abalone Survey Guidelines
Version 1
Version Date: July 28, 2021

Purpose

The purpose of this document is to provide information on standard methods and procedures for conducting intertidal and subtidal surveys for abalone presence, abundance, and habitat. These methods and procedures may be modified depending on the specific conditions at each monitoring site and the specific needs of each project.

We recommend coordinating with the NMFS West Coast Region (WCR) Protected Resources Division (PRD) on the specifics of your project and abalone survey plan.

California Abalone Species

Seven species of abalone occur along the California coast. Table 1 summarizes the common and scientific name, geographic range, depth range, and status under the Federal Endangered Species Act (ESA) for each species (also see Attachment C: Species Identification Resources).

Table 1: Abalone species along the California coast, including the common and scientific name, geographic range, depth range, and Federal ESA status.

Common Name	Scientific Name	Geographic Range[1]	Depth Range[1, 2]	Federal ESA Status
Black abalone	*Haliotis cracherodii*	Point Arena, CA, to Bahía Tortugas and Isla Guadalupe, Mexico	From high intertidal to 6 meters (m) depth.	Endangered
White abalone	*H. sorenseni*	Point Conception, CA, to Punta Abreojos, Mexico	From 5 to 60 m depth (most common from 25 to 30 m).	Endangered
Green abalone	*H. fulgens*	Point Conception, CA, to Bahía de Magdalena, Mexico	From low intertidal to 20 m depth.	None[3]
Pink abalone	*H. corrugata*	Point Conception, CA, to Bahía Tortugas, Mexico	From low intertidal to 60 m depth; primarily found at 6 to 25 m depth.	None[3]
Pinto abalone	*H. kamtschatkana* (including *H. k. assimilis*)	Sitka, AK, to Punta Eugenia (possibly to Bahía Tortugas), Mexico	From low intertidal to 6 m depth in northern portion of range, and to 40 m depth in southern portion.	None[3]
Red abalone	*H. rufescens*	Sunset Bay, Oregon, to Bahía Tortugas, Mexico	From high intertidal to at least 30 m depth.	None
Flat abalone	*H. walallensis*	British Columbia to La Jolla, CA	From 6 m to 21 m depth.	None

[1] Geographic and depth range descriptions: black abalone (VanBlaricom et al. 2009), white abalone (66 FR 29054, May, 29, 2001), green abalone (Cox 1960, 1962), pink abalone (Cox 1960, 1962), pinto abalone (NMFS 2014), red abalone (Cox 1960, 1962; CDFG 2005), flat abalone (Cox 1960, 1962; CDFG 2005).
[2] Depth range descriptions: For the purposes of this document, we define the high intertidal by Mean Higher High Water (MHHW) and the low intertidal by Mean Lower Low Water (MLLW); however, we note that the species may occur above these levels depending on the site due to swell, waves, and other factors that affect tide height.
[3] NMFS considers this to be a species of concern for which there is some uncertainty regarding status and threats. This species is not currently listed and does not receive protection under the ESA.

Background Information

Prior to conducting surveys, gather existing information on abalone and abalone habitat within the project area. "Project area" refers to the area within which the project activities will take place, as well as the area affected by the project activities.

Maps: For intertidal surveys, develop a map depicting the project area and existing natural and man-made rocky habitat (e.g., rip rap, rock slope placement). For subtidal surveys, develop a map depicting the project area, depth contours (at 10m intervals), and bottom habitats within the project area.

Abalone data: Identify, gather, and summarize available information on the historical and recent presence, abundance, density, and distribution of abalone within the project area and surrounding region. Potential sources of information include:

- MARINe (marine.ucsc.edu): maintains data for long-term rocky intertidal monitoring at sites throughout the North American west coast. Specific data may be requested.
- CDFW: abalone fisheries data and abalone survey data.
- NMFS WCR PRD contacts for data and for local abalone and habitat experts:
    - White abalone: Melissa Neuman (Melissa.Neuman@noaa.gov)
    - Black abalone: Susan Wang (Susan.Wang@noaa.gov)

Best Practices

The following best practices must be implemented to avoid effects on abalone and their habitat:

- Personnel: Surveys must be conducted by personnel with abalone field monitoring experience.
- Do not remove abalone from the substrate.
- Limit contact with the abalone (e.g., to a few seconds).
- Avoid touching living tissues, such as the mantle.
- Use non-destructive survey methods (i.e., do not overturn rocks; do not disturb the habitat and biological community).
- Limit trampling in the intertidal: wear soft-soled shoes and avoid stepping on vulnerable species, such as mussels.
- Limit disturbance in the subtidal: avoid contact with the bottom habitat.

Intertidal Survey Methods

Rocky intertidal surveys should be conducted during negative daytime low tides, when sea conditions (e.g., swell) are safe for field work. We recommend to conduct whole site surveys at low tide; a -1 foot low tide (or lower) is ideal. Sites may be divided into segments delineated by natural breaks in the habitat (e.g., a change in exposure or rock type, a sandy beach, an inaccessible section of shoreline). Within each segment, all appropriate rocky intertidal habitat should be searched for abalone, including crevices, cracks, and the underside of boulders.

Data collection

All abalone observed should be identified to species. In addition to the species, the following data should be recorded for each individual abalone observed. See the sample Black Abalone Survey Datasheet (A-1 in Attachment A: Intertidal Survey Data Sheets).

- Survey site information including date, site name, latitude, and longitude.
- Shell length to the nearest 10 mm, measured using calipers or visually estimated with a ruler.
- Nearest neighbor distance (distance to another abalone of the same species).
- Habitat type (e.g., crevice, crack, under boulder, open horizontal, open vertical).
- Location within the survey segment.
- Photographs, especially if there is uncertainty regarding species identification.

Critical Habitat Evaluation

In areas designated as critical habitat for black abalone, evaluate the quality of the critical habitat using the Black Abalone Critical Habitat Evaluation Criteria, Table, and Form (A-2 in Attachment A: Intertidal Survey Data Sheets). These evaluation sheets may also be used to assess areas that are not designated as critical habitat, to inform our understanding of the habitat quality within the project area.

Subtidal Survey Methods

Area-based, band transect surveys are used to estimate abalone presence, abundance, and density. The size, orientation, and number of baseline transects would be determined by the specific needs of the project and the area potentially affected by the project. Ideally, one or more 50-100 meter baseline transects are laid out for reference within the potentially affected area. Then, 25-50 meter transects running perpendicular to either side of the baseline are established. The number of transects and transect separation along the baseline will depend on the number of dive teams.

Divers search approximately 3-6 meters on each side of a transect. Divers swim side by side with about one arm's length separating them with the diver closest to the transect tape maintaining approximately one arm’s length from the transect tape. The length of the baseline and perpendicular transects line may be established based on: (a) a fixed length; (b) a fixed depth range, with transect length varying depending on the steepness of the slope; or (c) the extent of rocky substrate offshore.

Divers should use non-invasive survey methods to find abalone by inspecting all hard surfaces, rocky substrate surfaces, and rock/sand interface areas without overturning rocks or disturbing other seafloor substrates. Non-invasive survey methods may result in an underestimate of abalone abundance because cryptic, pre-emergent individuals may not be observed. However, using non-invasive methods would minimize disturbance to the habitat and to abalone.

Data collection

All abalone observed should be identified to species. In addition to the species, the following data should be recorded for each survey conducted. See the sample Subtidal Abalone Population

Assessment and Habitat Characterization Data Sheets (Attachment B: Subtidal Survey Data Sheets).

- Survey site information including date, site name, latitude, and longitude.
- Transect information including site name, baseline transect length and heading, perpendicular transect length and heading, and search time.
- White abalone shell length to the nearest 10 mm (measured using calipers or visually estimated with a ruler).
- Shell length or counts for all other abalone species.
- Distance from the transect line.
- Side of the transect line where observed.
- Name of the diver making the observation.
- Nearest neighbor distance (distance to another abalone of the same species), if possible.
- Habitat characterization.
- Shell species identification and sizes.
- Photographs, especially if there is uncertainty regarding species identification.

Note any aggregations of two or more individuals and the distance between individuals. A nearest neighbor search may be performed. The specifics of such a search (e.g., the distance that should be searched) would vary depending on the project. Other data to be recorded for each transect include the estimated visibility, the overall habitat or bottom type, and the start depth and end depth for each transect.

Survey Report

Provide a survey report to the NMFS WCR PRD. If the report will be made available to the public, then we recommend removing any sensitive information (e.g., specific locations of observed abalone) prior to public release. The survey report should include the following information:

- A description and map of the area surveyed;
- The survey date, time, and conditions (e.g., low tide, swell), and a list of personnel;
- A description of the survey methods;
- An evaluation of the habitat quality;
- Data on abalone and/or shells observed: number, species, location, shell length, habitat, nearest neighbor distance, and photos;
- A description of other biota in the survey area (e.g., algae, invertebrate community);
- Any photos of the habitat and abalone observed; and
- Any factors that affected the survey and the ability to search thoroughly for abalone.

References

The following references were consulted to develop this document. These references provide additional details on survey methods and applications:

California Department of Fish and Game (CDFG). 2005. Abalone recovery and management plan. Prepared by the CDFG Marine Region and adopted by the California Fish and Game Commission on December 9, 2005. Sacramento, CA. 363 pp.

Cox, K. W. 1960. Review of the Abalone of California. California Fish and Game 46(4): 381–406.

Cox, K. W. 1962. California Abalones, Family Haliotidae. California Department of Fish and Game Fish Bulletin 118: 1-133.

Engle, J. 2008. Unified monitoring protocols for the Multi-Agency Rocky Intertidal Network. Prepared under Minerals Management Service Cooperative Agreement No. 14-35-0001-30761. U.S. Department of the Interior, Minerals Management Service, Pacific OCS Region, Camarillo, California. 84 pp.

NMFS. 2014. Status review report for Pinto Abalone (*Haliotis kamtschatkana*). Prepared by the Pinto Abalone Status Review Team for the NMFS West Coast Region, Long Beach, CA. 264 pp.

Tierra Data Inc. 2007. White abalone (*Haliotis sorenseni*) survey for Surface Ship Radiated Noise Management (SSRNM) cable installation at Naval Auxiliary Landing Field (NALF), Wilson Cove, San Clemente Island, California. Prepared for Naval Facilities Engineering Command Southwest, San Diego, CA. 14 pp.

VanBlaricom, G., M. Neuman, J. Butler, A. DeVogelaere, R. Gustafson, C. Mobley, D. Richards, S. Rumsey, and B. Taylor. 2009. Status Review Report for Black Abalone (*Haliotis cracherodii* Leach, 1814). NMFS Southwest Region, Long Beach, CA. 135 pp.

Attachment A: Intertidal Survey Data Sheets

A-1 Black Abalone Survey Datasheet
A-2 Black Abalone Critical Habitat Evaluation Criteria, Table, and Form

Black abalone survey datasheet

Date:_____ Start time: _____ End time: _____

Site:_____ Data recorder: _____

Low tide time/height: _____ General weather: _____

*Microhabitat (e.g., crevice, open vertical/horizontal rock, algal cover, etc.). Notes can include photo number, aggregations, nearest neighbor number, etc.

#	Size (mm)	Nearest neighbor distance	Microhabitat	Latitude	Longitude	Notes

Black abalone critical habitat evaluation criteria and table **Date:**

Table 1: Complete for each site sampled, to inform your scoring of each critical habitat feature (see CH Evaluation Form on next page)

Critical habitat feature	Criteria	Score	Comments
Rocky substrate	% of habitat composed of consolidated rock that is equivalent (shape, composition, rugosity) to natural rock in the area		
	% of rocky substrate in mid- or low intertidal zone		
	% or rocky substrate composed of large boulders ≥ 1m diameter		
Food resources	% of substrate covered with bacterial or diatom films		
	% substrate covered in crustose coralline algae		
	Presence/absence of *M. pyrifera*		
	Presence/absence of *E. menziesii*		
	Presence/absence of *N. leutkeana*		
Juvenile settlement habitat	% cover of crustose coralline		
	% cover of biogenic structures		
	Presence/absence of adults		
Suitable water quality	Water temperature, on average between 12-25˚C (Yes or No)		
	Salinity between 30-35ppt, on average (Yes or No)		
	pH between 7.5-8.5, on average (Yes or No)		
Suitable nearshore circulation patterns	Capacity for larval retention: How much of the adjacent near shore environment contains visible offshore kelp bed (%)?		
	Is the stretch of coast typically an area of retention or advection? Or does it change seasonally or unpredictably?		

Black Abalone Critical Habitat Evaluation Form

Date: _____ Time:_____ to _____ Low tide: _____(ft) at _____(hr)

Surveyors: _____

Swell/surge: _____ Wind: _____ Additional notes:_____

_____

Complete the following table for each site, using the scoring guidance (Table 2)

SiteName	Critical habitat feature	Score	Comments/Notes
Site 1	Rocky substrate		
	Food resources		
	Juvenile settlement habitat		
	Water quality		
	Nearshore circulation patterns		
	Overall value of critical habitat		
Site 2	Rocky substrate		
	Food resources		
	Juvenile settlement habitat		
	Water quality		
	Nearshore circulation patterns		
	Overall value		

Black Abalone Critical Habitat Evaluation Scoring Guidance

Critical habitat feature	Scoring guidance
Rocky substrates within the appropriate tidal range (MHHW to 6 m depth relative to MLLW)	Good (3) = Good to excellent rocky habitat, e.g., rocky benches formed from consolidated rock or large boulders (≥ 1 m in diameter) with deep cracks and crevices.
	Fair (2) = Fair to good rocky habitat, e.g., rocky benches or large boulders with shallow cracks and crevices.
	Poor (1) = Poor to fair rocky habitat, e.g., bedrock without cracks and crevices.
	Unsuitable (0) = No rocky substrate is present; or rocky substrate is present but not within the appropriate tidal range.
Food resources (bacterial and diatom films, crustose coralline algae, detrital macroalgae)	Good (3) = Food resources are abundant and in good to excellent condition.
	Fair (2) = Food resources are moderately abundant and in fair to good condition.
	Poor (1) = Food resources are present but not abundant and are in poor to fair condition.
	Absent (0) = Food resources are not present in any measurable quantity.
Juvenile settlement habitat (crustose coralline algae and crevices or cryptic biogenic structures)	Good (3) = Juvenile settlement habitat is present and in good to excellent condition.
	Fair (2) = Juvenile settlement habitat is present and in fair to good condition.
	Poor (1) = Juvenile settlement habitat is present and in poor to fair condition.
	Absent (0) = Juvenile settlement habitat is not present in any measurable quantity.
Suitable water quality (salinity, pH, temperature, and other chemical characteristics)	Good (3) = Water quality is in good to excellent condition for black abalone.
	Fair (2) = Water quality is in fair to good condition for black abalone.
	Poor (1) = Water quality is in poor to fair condition for black abalone.
	Not suitable = Water quality is not suitable for black abalone.
Suitable nearshore circulation patterns (e.g., retain gametes, larvae for fertilization and settlement in suitable habitat)	Good (3) = Nearshore circulation patterns are good to excellent.
	Fair (2) = Nearshore circulation patterns are fair to good.
	Poor (1) = Nearshore circulation patterns are poor to fair.
	Not suitable = Nearshore circulation patterns are not suitable.
Overall value of area as critical habitat for black abalone	High = Contains a majority of high quality habitat features for multiple life stages and has a high likelihood of promoting conservation of black abalone.
	Medium = Contains a majority of medium quality habitat features for multiple life stages and has a moderate likelihood of promoting conservation of black abalone.
	Low = Contains a majority of low quality habitat features for multiple life stages and has a low likelihood of promoting the conservation of black abalone.
	Very low = Habitat features are not likely to support black abalone.

Attachment B: Subtidal Survey Data Sheets

B-1 Subtidal Abalone Population Assessment Survey – Site Data Sheet
B-2 Abalone Population Assessment Survey – Transect Data Sheet
B-3 White Abalone Population Assessment Survey – Live Abalone Vitals
B-4 Abalone Population Habitat Characterization Survey Data Sheet

Subtidal Abalone Population Assessment Survey - Site Data

Sheet will be kept in wheelhouse to get site location data

Date	*site*	*Latitude*	*Longitude*	*notes*

Abalone Population Assessment Survey - Transect Data

Search time - record the time searched or the start and end time on your bottom timer

Distance: number of meters covered along tape,

Bold items should be filled in prior to dive.

Diver: ______________________ ***Buddy: ______________________***

		Baseline		*Transect*			
	site	*Heading*	*Length*	*Meter Mark*	*Heading*	*Length (m)*	*Search time*

White Abalone Population Assessment Survey - Live Abalone Vitals

Species: Red-R, Pink-P, Green-G, White-W, Black-B, Pinto-Th

Size - for species other than white abalone, measure first 5 encountered count the rest

Location for white abalone only

Meter Mark - location is meter mark on tran:

Offset - location is estimated distance from transect (M)

Diver: _____ *Date:* _____

TRANSECT INFO			ABALONE LOCATION		ABALONE INFO			
Date	Site	Baseline M	M Mark	Offset (m)	Species	Sizes or Numbers	Depth (ft)	Substrate Type

Abalone Population Habitat Characterization Survey

Site: _____ *Max Depth (ft): _____*

Date: _____ *Lead Diver: _____* *Dive Partner(s): _____*

Protocol - everything except urchins

0=ABSENT, none present.

1=RARE, <5 individuals observed or present over <25% of the site.

2=COMMON, 5-15 individuals observed or present over 25-50% of the site.

3=MODERATELY ABUNDANT, 16-30 individuals observed or present over 50-75% of the site.

4=ABUNDANT, > 30 indidivuals or present over >75% of the site.

Note: for abalone place total counted for each species during survey

Protocol - urchins (0 = none present)

1=requires searching to find

2=patches of 20-30 animals associated with crevices

3=patches of urchins and "mobile" individuals

4=urchin barren

Transect Information (Meter Mark/Heading)

ALGAE				
				Macrocystis pyrifera
				Eisenia arborea
				Pterygophora californica
				Laminaria farlowii
				Pelagophycus porra
				Agarum/Dictyoneuropsis
				Sargassum horneri
				Foliose red algae
				Articulated coralline algae
				Encrusting coralline algae
INVERTEBRATES				
				Strongylocentrotus purpuratus
				Strongylocentrotus franciscanus
				Encrusting invertebrates
				(sponges, byrozoans, tunicates etc.)
				Pycnopodia
RELIEF estimate percent cover (must = 100%)				
				High (relief >1m)
				Low (relief <1m)
SUBSTRATE estimate percent cover (must = 100%)				
				Boulder
				Bedrock
				Cobble (easy to move with one hand)
				Sand (finger goes to atleast one knuckle)
ROCK TYPE estimate percent cover (must equal 100%)				
				Smooth (like sand stone)
				Rough (like volcanic rock)
QUALITY OF ABALONE HABITAT (Excellent, Fair or Poor)				
				"White Abalone Habitat"
				"Other species of Abalone Habitat"

Shell Sizes	
Species	*Size (mm)*

Attachment C: Species Identification Resources

C-1 California Abalone Species Identification Guide (NMFS 2017)

C-2 Black Abalone Identification Guide by Oriana Poindexter, Pelagic Projects, version date: May 17, 2021.

C-3 White Abalone Identification Guide by Oriana Poindexter, Pelagic Projects, version date: May 17, 2021.

Note: Additional abalone identification guides may be found at:
http://www.orianapoindexter.com/id-guides

Abalone are marine snails, with one shell, an anterior head, and a large, muscular foot.

Abalone are found worldwide. In the U.S., there are seven species ranging from Alaska to Baja California.

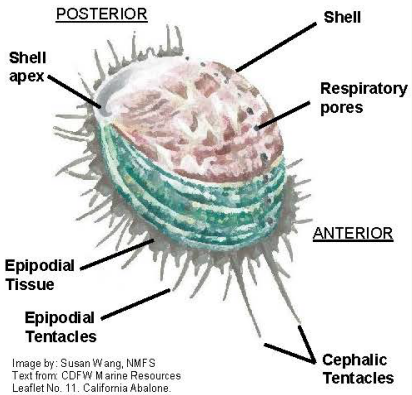


Image by: Susan Wang, NMFS
Text from: CDFW Marine Resources Leaflet No. 11. California Abalone.

TWO SPECIES OF ABALONE ARE PROTECTED UNDER THE U.S. ENDANGERED SPECIES ACT: WHITE ABALONE AND BLACK ABALONE

White Abalone *Haliotis sorenseni*

STATUS: Endangered

ID Features: The epipodium is tan and pebbly in appearance; the sole of the foot is orange. The shell is deep, thin, and oval. There are 3-5 open pores, edges elevated above the surface.

SIZE: To 10 inches, commonly 5-8 inches.

RANGE: Point Conception, California, to Punta Abreojos, Baja California. Mostly found at the Channel Islands.

HABITAT: Subtidal zone from 80 down to at least 200 feet. Commonly in open, exposed areas.


Photo credit: Bill Hagey, Pisces Design

Black Abalone *Haliotis cracherodii*

STATUS: Endangered

ID Features: The epipodium and tentacles are black and smooth. The shell surface is black or dark blue, and smooth (usually not covered with encrusting organisms). There are 5-9 open pores, flush with the shell surface.

SIZE: To at least 7.75 inches, commonly 5-6 inches.

RANGE: Mendocino County, California, to southern Baja California.

HABITAT: Intertidal and shallow subtidal zones down to 18 feet. Sometimes dense and stacked on top of one another in undisturbed areas.


Photo credit: Susan Wang, NMFS

Red Abalone *Haliotis rufescens*

STATUS: Not listed


Photo credit: California Department of Fish and Wildlife (CDFW)

ID Features: Epipodium is usually black, or a barred black and cream color pattern. The surface of the epipodium is smooth and broadly scalloped along the edge. The tentacles are black. The shell surface is generally brick red, and the inside edge is often red. There are 3-4 open pores, moderately elevated above the shell surface.

SIZE: To 12.3 inches, commonly 6-8 in. World's largest abalone.

RANGE: Sunset Bay, Oregon, to Bahia Tortugas, Baja California.

HABITAT: North of Point Conception, intertidal zone and subtidally down to at least 60 feet. In the south, subtidal zone to at least 100 feet.

Green Abalone *Haliotis fulgens*

STATUS: NMFS Species of Concern

ID Features: The epipodium is mottled cream and brown, with tubercles scattered on the surface and a frilly edge. Tentacles are olive green. The shell is usually brown and its surface is marked with many low, flat-topped ribs which run parallel to the pores. There are 5-7 open pores, edges elevated above the surface. A groove often parallels the outer edge of the line of pores.

SIZE: To 10 inches, but generally smaller.

RANGE: Point Conception, California, to Bahia Magdalena, Baja California.

HABITAT: Intertidal zone and subtidally down to at least 30 feet. Commonly in crevices where surfgrass and algal cover are dense.


Photo credit: Derek Stein, CDFW

Pink Abalone *Haliotis corrugata*

STATUS: NMFS Species of Concern

ID Features: The epipodium is mottled black and white with many tubercles on the surface and a lacey edge. The foot is yellow to light orange. Tentacles are black. The shell is thick and marked with wavy corrugations (often covered by encrusting organisms). There are 2-4 open pores, edges are strongly elevated above the surface.

SIZE: To 10 inches, individuals over 7 inches now rare.

RANGE: Point Conception, California, to Santa Maria Bay, Baja California.

HABITAT: Subtidal zone from 20 down to at least 120 feet. Commonly in beds of giant kelp.


Photo credit: Ian Taniguchi, CDFW

Pinto Abalone *Haliotis kamschatkana*

STATUS: NMFS Species of Concern

ID Features: The epipodium is a mottled pale yellow to dark brown color, with a pebbly appearing surface and lacey edge. Tentacles are yellowish brown, or occasionally green, and thin. The shell, while variable, is irregularly mottled and narrow, and may be marked with prominent ribs interspersed with narrow ones. There are 3-6 open pores, edges elevated above the surface. A groove often parallels the line of pores. There are northern and southern forms, once considered subspecies.

SIZE: To 6 inches, commonly 4 inches or smaller.

RANGE: Sitka, Alaska to Bahia Tortugas, Baja California.

HABITAT: Intertidal zone and subtidally down to at least 80 feet. Commonly on open rock surfaces in the southern portion of the range.


Photo credit: Josh Bouma, Puget Sound Restoration Fund

Flat Abalone *Haliotis walallensis*

STATUS: Not listed

ID Features: The epipodium is mottled yellowish and brown, with a pebbly appearing surface and lacey edge. Tentacles are greenish and slender. The shell is flattened, narrow, and marked with low ribs. There are 5-6 open pores, edges moderately elevated above the surface.

SIZE: To 7 inches, commonly under 5 inches.

RANGE: British Columbia, Canada, to San Diego, California.

HABITAT: Subtidal zone from 20 down to at least 70 feet.


Photo credit: Scott Groth, Oregon Department of Fish and Wildlife

Black Abalone

Haliotis cracherodii

Black abalone are identified by their blackish-blue shell and jet-black epipodium and tentacles. The shells are smooth with a pearly white interior, little to no muscle scar, and sparse algal growth.

There are five to nine open respiratory pores, flush with the shell surface. Black abalone live from the intertidal zone to 20 ft deep, where they shelter in crevices between boulders.

POPULATION STATUS
Endangered [1]

MAXIMUM SIZE
Up to 8 inches [3]

LIFESPAN
Up to 30 years [1]

DEPTH RANGE
Intertidal to 20 feet [4]

GEOGRAPHIC RANGE
Point Arena, CA to Bahia Tortugas, MX. [4]

SHELL COLORS
Blackish-blue, sometimes faded. Smooth texture.[3]

BODY COLORS
Body, epipodium and tentacles jet black. [3]

PREFERRED HABITAT
Coastal and offshore island intertidal areas, found on exposed rocky shores with deep crevices.[2]

HARVEST INFORMATION
Recreational & commercial wild harvest is prohibited. [1]

Adult black abalone at the NOAA Southwest Fisheries Science Center.

Black abalone sheltering in a crevice at low tide in Central California.
Images: Oriana Poindexter, unless noted otherwise.

Associated Algal Species [2]

Giant Kelp
Macrocystis pyrifera

Feather Boa Kelp
Egregia menzisii

Bull Kelp
Nereocystis leutkeana

REFERENCES
1 74 FR 1937.
2 76 FR 66806.
3 Cox, 1962.
4 Neuman et al., 2010.

National Marine Sanctuary Foundation

National Marine Sanctuaries Channel Islands

NOAA Fisheries

Pelagic Projects

White Abalone

Haliotis sorenseni

White abalone can be identified by their beige, lace-like tentacles and epipodium, and 3 to 5 open respiratory pores. The shells are reddish, lightweight with pearly interiors and no muscle scar.

In the wild, white abalone are very well camoflauged by encrusting organisms and algae, making their tentacles, epipodium, and open pores the most reliable characteristics for identification.

POPULATION STATUS
Endangered [5]

MAXIMUM SIZE
Up to 9 inches [7]

LIFESPAN
30 to 40 years [1, 10]

DEPTH RANGE
15 to 200 feet [9]

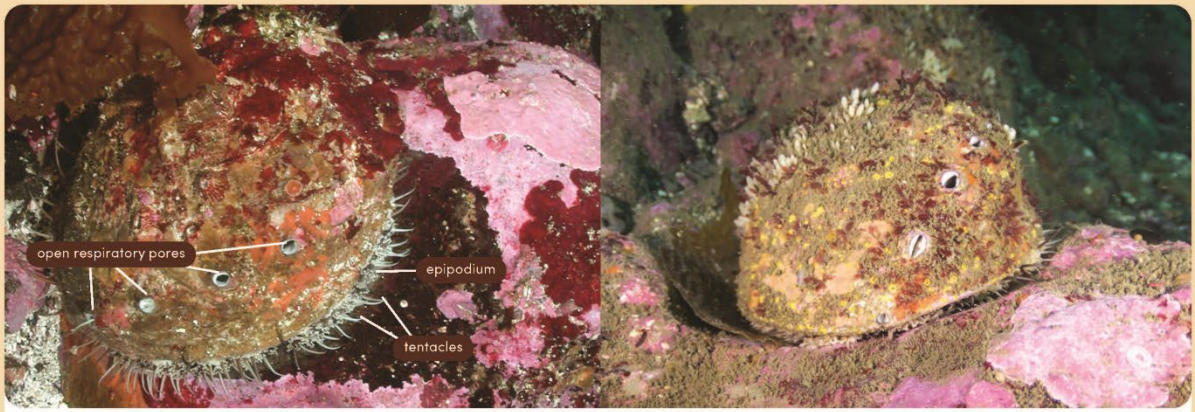
GEOGRAPHIC RANGE
Point Conception, CA to Punta Abreojos, Baja California, MX. [6]

SHELL COLORS
Variable when encrusted. Reddish brown with spiral ribbing if cleaned. [4]

PREFERRED HABITAT
Require rocky substrate. Live on rocky reefs, solitary outcrops in kelp forests, near sand-rock interface where drift algae accumulates. [3, 8]

BODY COLORS
Body yellow, orange traces.
Tentacles & epipodium beige, lace-like. [4]

HARVEST INFORMATION
Recreational & commercial wild harvest is prohibited. [5]



Adult white abalone in the wild. *Image: NOAA/SWFSC.*

Adult white abalone in 60 feet of water off San Diego, CA.
Images: Oriana Poindexter, unless noted otherwise.

Associated Algal Species [2, 3]


Giant Kelp
Macrocystis pyrifera


Oar Weed
Laminaria farlowii
Image: UC Berkeley Herbarium


Fringed Sieve
Agarum fimbriatum
Image: centralcoastkelpweekly.org


Dulse
Palmaria spp.


Rhodymenia spp.


'CCA'
Corallina spp.


Lithothamnion spp.
Image: NOAA/SWFSC

REFERENCES

1 Andrews et al., 2013.
2 Burton et al., 2008.
3 Butler et al., 2006.
4 Cox, 1962.
5 66 FR 29046.
6 Hobday & Tegner, 2001.
7 Howorth, 1987.
8 Lafferty et al., 2004.
9 Stierhoff et al., 2012.
10 Tutschulte, 1976.

National Marine Sanctuary Foundation

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Attachment 4 - Protocols for Black Abalone Collection, Transport, and Holding

Protocols for Black Abalone Collection, Transport, and Holding

Developed by NMFS West Coast Region
Version date: December 2021

Sources:

- Draft OSPR Black Abalone Contingency Plan (2013)
- Mud Creek Translocation Protocol (2020)
- White Abalone Recovery Plan (2008)

The purpose of this protocol is to establish best practices to minimize the risk of injury and mortality during the collection, transport, and holding of black abalone. This document is not meant to serve as a how-to manual. Instead, the intent is to manage the risks involved with collection, transport, and holding in order to minimize stress and maximize survival of abalone during this process. Most of the content comes from the collection, transport, and holding protocols in the appendices to the white abalone recovery plan (2008). This protocol has been adapted to apply to black abalone and other abalone species that inhabit the rocky intertidal area of the California coast.

Collection of abalone from the wild must be covered under a state broodstock collecting permit (issued only to registered aquaculturists in California; see California Fish and Game Code Section 5521.6) or a state scientific collecting permit, both issued by the California Department of Fish and Wildlife (CDFW). A federal permit or authorization is also required for species listed under the federal Endangered Species Act (i.e., white abalone and black abalone). These permits include specific stipulations such as where abalone may be collected, how many, and how they may be collected.

Abalone Collection Methods

Great care must be taken to avoid cutting the soft parts of abalone during removal from the substrate. Although abalone can move, they typically adhere to rocky substrate with their large muscular foot. When disturbed, the abalone will use its foot to pull the shell down tightly against the rock substrate for protection. Once in this defensive position it is very difficult to remove the abalone without injuring it.

Black abalone are generally found and most accessible in the intertidal zone, typically in habitat with exposure to surf. Collection of submerged black abalone during high tide is

unlikely to be a viable approach in most situations. Collection at low tide using an abalone iron or similar tool will likely be necessary.

Only those with experience should try to remove abalone from the substrate. The rocky substrate may be uneven and the risk of injury to abalone is high, both from nicks or cuts to the foot muscle tissue and chipping of the shell. To minimize stress and trauma to the abalone during collection, we suggest the following methods and considerations:

Abalone iron and other tools: Abalone irons are the traditional tools used to remove abalone from the rock substrate. Alternate tools (e.g., a plastic kitchen spatula, blunted butter knife, or other tool with a wide blade and thin profile) may also be used and may help to minimize cuts and trauma. For smaller abalone, tools with a thinner profile may be needed. Note, however, that alternate tools may cause as much or more injury to abalone as traditional abalone irons and require care and experience in use to minimize injuries. The use of alternate tools should be discussed with agencies during the decision-making process. With any tool that is used, the collector should take great care and adhere to the following guidelines to minimize injuries to abalone.

> **Approach:** Abalone are sensitive to motion and changes in light. Approach an abalone slowly and do not cast a shadow so that the abalone does not go into a defensive posture (tighter adherence to substrate).
>
> **Point of insertion for the abalone iron or tool:** *The abalone iron or other tool should be inserted along the sides or back of the shell to avoid injury to the head and anterior portion of the foot.* Look for an area of rock that is smooth and free of crevices so that the tool does not cut into the foot where it has been inserted.
>
> **Handling of the abalone iron or tool:** Hold the iron or tool with the concave side down. Press the tip of the iron or tool against the rock substrate and slide quickly forward into a gap between the shell and the substrate. Still pressing downward, slide the iron or tool 2-4” under the shell. Quickly pull upward on the handle end of the iron or tool to pop the abalone off the substrate. This entire motion should be done quickly. The element of surprise is essential. If the iron or tool is inserted too slowly the abalone will clamp down and, in the resulting struggle, the abalone will invariably sustain damage to the foot.

When not to use the abalone iron or tool: When the abalone is in a normal resting posture, the shell will be raised 0.25 – 0.5” above the rocky substrate with the epipodium protruding from beneath the shell. Small tentacles protrude from the epipodium and provide the abalone with a sense of touch. When the abalone is

disturbed, the epipodium will be withdrawn and the shell pulled down against the rock. In this position, it is almost impossible to pry the abalone off the rock without injury. *If an abalone remains clamped down to the rock, leave it rather than attempt to pry it off.*

Anesthetics: John Hyde at the SWFSC La Jolla Lab has successfully used 2-3% ethanol in seawater as an anesthetic for black abalone. He found that it generally takes 5-10 minutes before it causes them to fall off but they often loosen up quicker. The Hyde lab has also used 25% ethanol squirted with a syringe near their respiratory pores to irritate the abalone and get them to loosen their grip, making it easier to slide a spatula under their foot and pop them off the substrate.

Sea stars: Divers have had success collecting wild white abalone for broodstock using a seastar to minimize injury. Divers place one arm of the sea star on the abalone's shell to provoke the abalone to move and allow divers to more easily pull the abalone off the rock without injury. This approach may work for black abalone; however, initial trials in the field were not successful (black abalone were about 100mm in shell length and simply clamped down more tightly to the substrate; personal observation, S. Wang, February 2020).

Procedures Following Removal

Following collection, place the abalone in a cooler for transport. Line the cooler with wet towels/rags or foam rubber and cover the abalone with a wet towel. Do not put the abalone in water in the coolers, because they may use up all of the available oxygen and die. A typical cooler (e.g.,150 qt) can hold about 50 to 100 abalone (small to large adults). Ideally, put fewer abalone per cooler to allow room for movement.

Use of an Artificial Substrate: Use an artificial substrate to minimize the number of times that an abalone needs to be removed from a surface. A thin piece of plastic or a blade of kelp can act as a portable substrate for the abalone. Once the abalone is removed from the rock it can be placed directly on the plastic or kelp and placed in the cooler. Abalone can also be placed in separate mesh bags to keep them from adhering to the ice chest and to each other.

Seawater Temperature: Note the seawater and/or ambient temperature where the abalone are collected (in advance if possible) and match the temperature in the ice chest to this temperature, plus or minus 2°C.

Holding abalone during transport: There are several options for holding and maintaining abalone during transport to a holding facility. Temperature control is essential and should be kept within two degrees of the temperature at the collection site. The temperature of black abalone held out of water for more than a few hours should be cold, e.g. 8-12°C.

A cooler with gel packs is an effective, simple, and inexpensive method to hold and transport abalone for holding times of up to 24 hours. Both juvenile and adult abalone from hatcheries are routinely transported in this manner. The primary objective is to keep the animals cool and moist.

Equipment:

- Coolers
- Gel packs: enough to cover the bottom of each cooler (about 4-6 per cooler)
- Newspaper (to wrap the gel packs)
- Moistened towels/rags or foam rubber: enough to cover the abalone (about 2-4 per cooler)
- 13-gallon plastic bags: one per cooler
- Kelp (optional): to cover the newspaper-wrapped gel packs
- Oxygen tank and regulator (optional): to fill plastic bags with oxygen if transport will be greater than 12 hours

Prepare gel packs: Frozen gel packs are used for cooling but should never come into direct contact with the abalone. Wrap individual gel packs with newspaper to avoid extremely low temperatures followed by thawing of the gel. To wrap each gel pack, start with 6 – 8 sheets of newspaper. Fold the newspaper lengthwise so that it is one inch longer than the gel pack. Wrap the newspaper around the gel pack so that the two ends are open. Fasten the newspaper in place with packing tape. To ensure that only the ends of the gel pack provide cooling keep the newspaper dry. Used in this manner the gel pack will last 24 to 30 hours. The ratio of abalone weight to gel pack weight should be 2.5:1, that is, 2.5 pounds of abalone for every one pound of frozen gel pack (wrapped in newspaper).

Prepare cooler: Remove any excess water in the coolers, because if kept in water, the abalone may use up all of the oxygen and die. Place gel packs on the bottom of the cooler standing on edge against the walls. Place a large plastic bag (13 gallons or more) in the cooler. Place slightly moistened absorbent material, such as foam rubber or moistened towels or rags in the bottom of the plastic bag

to absorb excess water from the abalone. To ensure the towels/rags are clean and free of detergent, soak them in bleach and rinse with fresh water prior to reusing. If available, a layer of kelp on top of the absorbent material will give the abalone something to adhere to and provide moisture.

Recommended transport times: For short transport times (8-12 hours) leave the bag open at the top to allow air into the bag. For transport times over 12 hours, fill the bags with oxygen and then seal the bags. When properly packed, abalone can be transported without water for 24 hours with 100% survival. To minimize stress, keep transport times to a few hours.

Tagging and Data Acquisition

Tags: Abalone from different sites should be kept separate throughout transport to the holding facility and during holding. During initial transport, label the coolers/bags with the site name and date of collection. Once at the holding facility, separate abalone from different sites, i.e., in separate tanks or tagged to distinguish individuals from different sites. This allows for consideration of the collection location and genetic structure of different populations when reintroducing the abalone to the wild. Different types of tags include:

Floy tags: The best example of a long-lasting tag is a Floy tag that can be fixed to the abalone shell with super glue gel. Retention may not be 100%, but is very good and animals can be double-tagged as a way to mitigate for tag loss (pers. comm. with Jim Moore, Bodega Marine Laboratory, on March 15, 2011).

PIT tags: Another long-lasting tag is a PIT tag. PIT tags can be attached (a) to the outer surface of the shell using epoxy; or (b) under the edge of the shell with Corafix adhesive. When attached to the shell with epoxy, the abalone does not need to be removed from the substrate. A drill may be used to make a small indentation on the shell to place the PIT tag and then cover it with marine epoxy. Some tag loss occurs over time. When attached under the shell, the tag becomes permanent as it is covered with nacre. Some tag loss may occur before the tag is encased in nacre. To tag under the shell the abalone must be removed from the substrate. Ideally the tag is placed as far away from the growing edge, close to the body as possible. To achieve this placement, gently push down the mantle, add a small amount of Corafix adhesive, put the PIT tag in the adhesive

and hold the tagged section under seawater until the adhesive is cured (Corafix is cured in seawater) making sure the mantle does not get stuck to the adhesive.

Shell notching: Notching the shell with a Dremel tool is another long-lasting tag. Shell notching should be done prior to applying other tags, to avoid smudging the adhesive. The size of the abalone will dictate the size of the notch. Make a distinctive notch approximately 2-5 mm wide, or two separate 2 mm notches spaced at least 5 mm apart. Other options include engraving the shell with triangles or other symbols. Take care to avoid the head, respiratory pores, and mantle.

Stainless steel washers: Another long-lasting tag is a stainless steel washer (approximately ⅝ inches in diameter) that has been stamped with an identifying number (Haaker et al., 1986). The tag is held in place with stainless steel wire by passing the wire through the top-most respiratory pores and through the tag. The wires are then twisted together so that the wire is tight against the shell and does not move. Trim the excess wire and bend the end against the shell so there is no sharp projection. Disadvantages include irritation to the abalone from the wires and wearing down of the wires if the abalone moves a lot (pers. comm. with Aaron Hovis and Chris Plante, AoP, on 22 November 2010).

Zip ties: Multi-colored zip ties are easy to attach and less likely to fall off (pers. comm. with Aaron Hovis and Chris Plante, Aquarium of the Pacific (AoP), on 22 November 2010). A base color (e.g., white) zip tie is passed through the top-most respiratory pores. Then, zip ties of different colors may be attached to the base color zip tie to create color-coded tags.

Data Acquisition: The following data should be recorded for each collection: the date, site name, GPS location of the site, names of people involved in the collection, tag ID, and any other relevant details. Data on the abalone (e.g., shell length, total weight, sex) should be collected in the laboratory, which provides a more stable and clean environment for sampling.

Holding Facilities and Conditions

Abalone may be held in captivity for varying lengths of time. If the goal is to reintroduce them back into the wild as soon as possible, abalone may only be held for one to several days. In other cases, abalone may be held for months to years. The holding

period will depend on several factors, including the health of the abalone, the time needed for recovery from any injuries, the severity of effects on habitat (e.g., from a spill, landslide, or other sedimentation event), and the level of clean-up or habitat restoration/recovery needed.

Upon arrival at the holding facility, all newly acquired abalone should be quarantined to examine their health and gonad condition, collect data, and collect a tissue sample. These procedures are necessary to ensure newly acquired abalone are healthy and to protect those abalone that are already in the facility from exposure to disease and parasites. The following are best practices and methods for holding black abalone and minimizing stress during quarantine, health and gonad examinations, tissue sample collection, and shell examinations (e.g., for boring organisms).

Quarantine: All newly acquired abalone should be held separately from those already in the facility for at least three months. This will provide enough time to assess the new abalone for the presence of potential disease agents. During the quarantine period, all equipment should be washed with 100 ppm chlorine and rinsed with seawater after use in the new abalone tanks.

> Note: Technicians should observe good husbandry practices and wash hands in freshwater before and after working in each tank, as well as use separate tools for each tank system.

Health Examination: Record the health of each abalone to provide a baseline for determining the cause of death if the abalone dies in captivity. Upon arrival at the holding facility, assess the health of the abalone, collect a tissue sample for genetic analysis, and record data on the shell length, weight, and sex of each abalone. Examine the soft tissues of the foot and epipodia for any nicks, cuts, or abrasions. Note any injuries on a data sheet with the abalone tag number, date, and location of collection. Also note information about the appearance of the shell. For example, a sharp edge indicates that the animal has recently grown vs a rounded edge, which indicates that some time has passed since the shell grew. Note the extent of fouling of the shell. Document the presence and % coverage of Cliona sponge and polydorid polychaetes and count the number of boring clams.

Gonad Examination: Assess the gonad index (GI) of each abalone. Several methods have been developed to measure gonad ripeness. Uki and Kikuchi (1982) developed a convenient scale (see table below). In some cases, the abalone will very effectively

resist moving the body mass to observe the gonad. In those cases, record “gonad could not be observed.”

Gonad Ranking	Description of Gonad and Spawning Activity
0	No gonad observed. Not possible to determine sex. Abalone will not spawn.
1	Small volume of gonad observed. Possible to determine sex of abalone by gonad color. Males have a light tan or creamy colored gonad; females have a darker gonad from brown to green in color. Abalone will not spawn.
2	Larger volume of gonad. Easy to distinguish sexes. Gonad bulk visible. Abalone may spawn.
3	Volume of gonad quite large, may extend below the lower plane of the shell. Abalone will probably spawn.

Tissue sampling: Collect a tissue sample from each newly acquired abalone. Tissue samples will provide valuable information about population structure and genetic diversity. A non-lethal tissue sampling method involves clipping a piece of one of the abalone’s many epipodial tentacles. While this sampling method poses minimal risk to the abalone, it should only be carried out by someone skilled in handling abalone.

The method is as follows: With a pair of tweezers, grasp the end of one of the epipodial tentacles on the sides or posterior of the animal. While gently pulling the tentacle taut, cut the tentacle 1 – 2 mm from its base. Place the tentacle in a microfuge tube with 1-2 ml of a high salt buffer 5XNET, pH 8 solution. Seal the top of the tube and record the animal number, location, and date on the tube label. Refrigerate the tube. This buffer will preserve the DNA in the sample indefinitely.

> **Materials needed:** A pair of tweezers, a nail clipper, 4 plastic containers (50 ml each) with tops ; 10 plastic droppers; 50 microfuge tubes; and 100 ml buffered 5XNET, pH 8 solution, composed of 2.5 Molar NaCl, 0.25 Molar EDTA, and 0.25 Molar Tris pH 8.

Detection of the Agent of Withering Syndrome: The agent of withering syndrome (WS-RLP, or, more recently CaXc, for *Candidatus Xenohaliotis* californiensis) is thought

to be present in all abalone populations from Mexico to north-central California. The CaXc infection status of captive populations can be efficiently assessed by PCR analysis of feces collected from holding units. Contact Blythe Marshman at the CDFW Shellfish Health Laboratory (blythe.marshman@wildlife.ca.gov, 707 875-2066) for a current protocol and to arrange shipping the samples to a testing laboratory.

Holding Conditions: Conditions under which abalone are held should mimic day to day and seasonal variations in the natural habitat. Consider water temperatures, dissolved oxygen, feeding, waste removal, bacteria, lighting conditions, and handling methods.

Water Temperature: The SWFSC Hyde Lab holds black abalone between 11-15°C. We must consider the effect of temperature on the occurrence of withering syndrome. In red abalone, withering syndrome is exacerbated or even induced in animals infected with WS-RLP when held at water temperatures greater than 16°C.

Dissolved Oxygen: Dissolved oxygen should be at or within 10% of saturation. Aeration can be used to both provide oxygen and water movement within the holding tank.

Feeding: Consider the following regarding the types of feed used, the frequency of feeding, amount of feed consumed, and treatment of the kelp:

Feed Types: The dietary preferences of black abalone are not clearly understood. *Laminaria* sp., *Egregia* sp. and *Macrocystis* sp. probably make up a large portion of the diet but, in general, abalone consume many different kinds of macroalgae, including a variety of red, green and brown algal species. Abalone of many species grow very well on a diet of dulse (*Palmaria mollis*), which is more nutritious than kelps (Burton et al. 2008). Diet will likely depend on availability (e.g., black abalone held at the SWFSC La Jolla lab are generally fed *Macrocystis* sp., pers. comm. with Kathy Swiney, Nov 24, 2020).

Frequency of feeding: Feed the abalone once or twice a week depending upon the rate of consumption and stability of the food source/availability.

Quantity of Feed: Black abalone are not aggressive feeders and should be fed ad libitum. Most feeding may take place at night. Measure the quantity of feed consumed to assess the health of the

abalone. One of the first signs of withering syndrome is loss of appetite.

Kelp treatment (*applicable only if the abalone have been OTC treated and are held in UV irradiated seawater*): Prior to feeding abalone, rinse kelp in fresh water for one minute followed by vigorous rinsing with UV filtered sea water. This will remove unwanted epibionts and may also reduce the introduction of pathogenic bacteria, such as the agent of withering syndrome.

Water Flow and Aeration: Flowing water provides aeration while removing solid and dissolved waste products. Water flows should be sufficient to provide and maintain good water quality conditions (temperature, oxygen, ammonia, suspended solids). In most tank systems, aeration should also be provided to provide additional oxygenation and emergency oxygenation in case of water flow failure. In some farm systems aeration is provided on a period basis, e.g. on five minutes every half hour.

Waste Removal: A byproduct of protein metabolism, the ammonium ion (NH3-N), is extremely toxic to abalone. Solid waste should be prevented from accumulating on the tank bottom since this can quickly turn anaerobic and produce toxic ammonia compounds. This can be achieved by using a small pump to recirculate water within the tank. If the holding tank is not self-cleaning (i.e., waste is not being filtered automatically), then waste should be removed with a siphon daily.

Handling Methods: Abalone must be handled with great care to avoid stress, nicks, and cuts. To reduce injuries, only people skilled in the handling of abalone should move the abalone. If abalone are held in plastic or fiberglass tanks, a thin metal or plastic kitchen spatula can be an effective tool to quickly remove abalone from a tank. Insert the tool from the rear or sides of the animal, never under the head. Anesthesia may also be used to minimize injury when handling the abalone. Exposure to 2-3% ethanol in seawater for 5-10 minutes, or squirting 25% ethanol with a syringe near their respiratory pores can help the abalone loosen their grip on the substrate.

Processing of Dead and Moribund Animals: All animals that are found dead or moribund (unresponsive, unable to attach to tank walls) must be processed as instructed by CDFW in order to maximize the amount of genetic and health information obtainable, dependent upon the resources available. If possible, formalin fixation of the gut tissues is preferred if supplies, training, and safety protocols are available. If not,

freezing the entire abalone (at -20°C or cooler for subsequent processing by CDFW) will provide less information, but allow for determination of the presence and severity of infection with the agent of withering syndrome, CaXc. Sampling should be coordinated with the CDFW Shellfish Health Laboratory (Point of contact: Blythe Marshman, blythe.marshman@wildlife.ca.gov, 707 875-2066).

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