Targeted Supplemental Environmental Assessment For the Salmon Creek Large Wood Structures and Gilardi Ranch Riparian Planting Project

The National Oceanic and Atmospheric Administration's Community-based Restoration Program (CRP) is administered within the National Marine Fisheries Service's Office of Habitat Conservation, under the authority of the Fish and Wildlife Coordination Act, 16 U.S.C. 661, as amended by the Reorganization Plan No. 4 of 1970 and the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006. The CRP proposes to provide financial assistance to a habitat restoration activity entitled "Salmon Creek Large Wood Structures and Gilardi Ranch Riparian Planting Project," through the NOAA Restoration Center (RC) by the American Recovery and Reinvestment Act of 2009 (ARRA).

The ARRA provides that "[a]dequate resources within this bill must be devoted to ensuring that applicable environmental reviews under the National Environmental Policy Act are *completed on an expeditious basis and that the shortest existing applicable process under the National Environmental Policy Act shall be utilized*." Pub. L. 111-5, § 1609(b) (emphasis added). In accordance with CEQ guidance, as clarified, concise EAs may be used by federal agencies when there is consensus that there are not unresolved conflicts concerning alternative uses of available resources. In these cases, NOAA may consider the proposed action and proceed without consideration of additional alternatives. Accordingly, the analysis in this TSEA analyzes the potential impacts of the preferred alternative and the no action alternative.

Purpose and Need for Action

The purpose of the proposed action is to increase Coho Salmon (*Oncorhynchus kisutch*) and Steelhead Trout (*O. mykiss*) survival by increasing valuable rearing habitat in Salmon Creek (in the Bodega Valley reach), which drains directly into the Pacific Ocean in coastal central California. The overall objective of the proposed action is to increase salmonid and other aquatic species survival through installation of large wood habitat structures and riparian revegetation which will improve habitat complexity.

After reviewing the proposed project, we determined that the action described below falls within the scope and effect of activities analyzed in the February 6, 2002 Programmatic Environmental Assessment (PEA) for the Community-based Restoration Program Implementation Plan and the June 23, 2006 Supplement (SPEA), except for impacts related to the Endangered Species Act (ESA). The PEA and the SPEA are incorporated by reference into this targeted supplemental environmental assessment (TSEA).[1] A formal ESA section 7 consultation was initiated by the NOAA Restoration Center (RC) with the U.S. Fish and Wildlife Service (USFWS), Sacramento Office (USFWS) on March 25th, 2010 due to potential adverse impacts to the California Red-legged Frog (*Rana draytonii aurora*) and California freshwater shrimp (*Syncharis pacifica*). A Biological Opinion (BiOp) was issued by the USFWS on August 18th, 2010. After reviewing the BiOp, NOAA prepared this TSEA to evaluate the intensity of effects of the proposed action on the California Red-legged Frog and the California freshwater shrimp NOAA RC staff determined that this project was likely to adversely affect federally endangered Central California Coast (CCC) Coho Salmon or federally threatened CCC Steelhead Trout or their

[1] Copies of the PEA and SPEA can be found at http://www.habitat.noaa.gov/partners/granteeresources.html

critical habitat and included this project under the RC's programmatic Biological Opinion. The effects of the proposed project on CCC Coho and CCC Steelhead are within the scope and effects of activities analyzed in the PEA and SPEA.

This Targeted Supplemental Environmental Assessment (TSEA) tiers to and incorporates by reference the above referenced PEA and SPEA in accordance with 50 C.F.R. §1502.20 and NAO 216-6, subsection 5.09a. The TSEA also incorporates the BiOp's evaluations and determinations by reference. This TSEA level of review is conducted in accordance with the implementation procedures described in the SPEA and appropriately focuses on consideration of effects to species listed under the Endangered Species Act, 16 U.S.C. 1531 et seq. Beyond consideration of site-specific effects to the listed species, our review of the proposed action has not revealed any substantial changes in the proposed action or new potentially significant adverse effects to other elements of the human environment which would require additional review in the TSEA or supplementation of the pre-existing NEPA documents.

Alternatives Considered

I. *No Action Alternative*

Under the no-action alternative, the NOAA RC would not fund the proposed project to increase and enhance habitat, and Salmon Creek's habitat conditions would continue to decline resulting in a less favorable environment for all species that use this reach of stream.

II. *Preferred Alternative*

Under the preferred alternative, NOAA RC would provide financial assistance for a project designed to improve habitat conditions for aquatic species in mainstem Salmon Creek near the hamlet of Bodega on a working livestock ranch (Gilardi Ranch). The proposed project will include: (1) installation of 10 instream large wood habitat structures; (2) aquatic and riparian habitat enhancement through revegetation along mainstem Salmon Creek with native riparian trees and shrubs; and (3) installation of a pipeline to supply water to a trough on the north side of Salmon Creek. The components of the project are discussed more thoroughly below.

Instream Large Wood Structures

Log and root wad structures will be placed at 10 locations. The structures will consist of species that naturally occur in the watershed, such as recycled Coast redwood (*Sequoia sempervirens*), Douglas fir (*Pseudotsuga menziesii*), and bay (*Umbellularia californica*) root wads, some with trunks attached, boulders, and tree tops anchored appropriately. Installation of these structures will allow for habitat feature development and increased channel complexity and cover. Installation locations were selected to maintain undercut banks, increase pool depths and bar heights, and improve spawning gravels.

Construction and anchoring techniques that will be used are described in the CDFG *California Salmonid Stream Habitat Restoration Manual* (CDFG 1998). High-quality boulders will be used to prevent fracturing under stress, and the large wood will be attached to the boulders using 1-inch all thread. All structures will be oriented in such a fashion as to maximize habitat complexity and long-term functionality.

Heavy equipment will mostly work from top of bank; in-channel work will be kept to a minimum. Silt fencing will be installed around the work areas, as appropriate. When feasible, the structures will be constructed on site in sections and moved into place with an excavator to minimize the amount of time and area of in-channel disturbance. Care will be taken to ensure that they are as natural looking as possible, with all anchoring materials carefully hidden from sight. Any exposed soil will be covered with coconut fiber blanket and seeded with native species following construction. The instream area of disturbance will be approximately 0.13 acre.

Riparian Habitat Enhancement

Revegetation work will occur along mainstem Salmon Creek and an ephemeral gully feeding into the creek. Along mainstem Salmon Creek, 320 trees and shrubs will be planted on the upper and middle banks, and 300 trees, shrubs, and rushes will be planted along the upper, middle, and lower banks of the ephemeral gully. Planting native vegetation will improve forested riparian buffer function by increasing buffer width, vegetation density, species complexity, and functional diversity in areas that have minimal cover and/or lack a multi-age, diverse canopy. Plantings will also increase canopy cover to shade exposed sections of the stream and promote long-term large wood recruitment.

Native plantings will include a variety of locally adapted riparian and wetland species, including large deciduous trees, understory shrubs, and herbaceous plants. The plant list contains a number of species targeted at beneficial insects (e.g., native butterflies, bees, wasps, etc.) and nectar and fruit foraging birds. The area of riparian vegetation enhancement is approximately 1.25 acres.

Pipeline

To facilitate water conservation on the Gilardi Ranch, a below-ground pipeline will be installed to connect the ranch water distribution system on the south side of Salmon Creek to a livestock trough on the north side. Installation of the pipeline will help to reduce demand on near-channel, shallow wells within the project reach of Salmon Creek. An existing ford crossing of the creek will be used as the pipeline route. The pipeline will be constructed using 1-inch diameter or smaller schedule 40 PVC pipe, and will be placed in a trench measuring a minimum of 24 inches in depth through the ford approaches and across the stream bed. If the stream is flowing, the site will be dewatered according to the procedures described below. If no surface flow is present, pumps will be kept at the excavation site to remove any silt-laden subsurface water that might enter the trench. This water will be pumped to an infiltration site away from any surface water body. The trench will be kept open for the minimum time required for pipeline construction, and will be backfilled with compacted native fill. Native streambed material will be placed on top of the backfilled trench to recapture the original configuration of the streambed to the greatest extent possible. A maximum total area of approximately 0.01 acre of streambed and banks will be temporarily disturbed by pipeline installation.

Access and Storage of Construction Materials

The project will utilize existing roadways to and from the site. Several of the instream sites and planting areas on the right (north) bank of Salmon Creek may be accessed from the adjoining

property where permission to enter has been secured, however, it may be necessary to establish a stream crossing site (see description below). Equipment access and placement of woody structures will result in temporary disturbance to a maximum of 0.5 acre of grazed pasture. Construction equipment and materials (e.g., tanks, large logs, root wads, rock) will be stored on site in an area (not to exceed 0.5 acre) of grazed pasture. The number of access routes, number and size of staging areas, and the total area of the activity will be limited to the minimum necessary to achieve the project goal. Routes and boundaries will be clearly demarcated, and these areas will be outside riparian and wetland areas. Where impacts occur in staging areas and access routes, restoration will occur as identified in the measures below.

Construction Schedule and Equipment

Instream habitat structures will be installed during summer low-flow conditions between October 15, 2010 and October 31, 2010. Plantings along mainstem Salmon Creek will occur during the late fall and winter of 2010. Equipment to be used will include a medium-size excavator (e.g., JD 135 or larger), front-end loader (e.g., JD 544 or larger), work trucks, and a small, one-man jumping jack compactor. This project has been covered by Nationwide Permits from the US Army Corps of Engineers. The NOAA Restoration Center is the lead action agency and consulted with both NMFS and USFWS on this project. The Army Corps used their consultations to satisfy their consultation requirements under section 7 of the ESA.

Stream Crossing

During project construction, it may be necessary for heavy equipment to cross Salmon Creek within the project reach to gain access to large wood structure sites and to transport wood and other materials to staging areas. Should crossing be necessary, the pipeline installation site where there is an existing ford crossing with rocked approaches will be used as the crossing site. To protect the streambed, pairs of concrete blocks will temporarily be placed on the streambed at intervals across the stream, and steel plate or an equivalent will be attached to the top of the blocks as a temporary running surface. Blocks will be placed on dry streambed, above the line of flowing water. The total volume of fill (concrete blocks) to be temporarily placed in the streambed (if necessary) will be less than 0.5 cubic yard and will impact less than 0.001 acre.

Dewatering Plan

Although instream work to install woody structures will occur during low-flow conditions, dewatering may occur, if needed, to minimize discharge of silt-laden water into Salmon Creek. If only isolated pools are present, they will be pumped out, as necessary. If dewatering is necessary, temporary cofferdams or similar diversion structures will be constructed at the upstream and downstream ends of the work area.

Similarly, it is likely that the creek at the crossing site will be dry, or that streamflow will have decreased so that only isolated pools are left at the time of work. However, should streamflow be present, Salmon Creek may be dewatered at the crossing site if necessary to minimize the discharge of fine sediment into the stream. If dewatering is necessary, temporary cofferdams or similar diversion structures will be constructed upstream and downstream of the ford crossing, and streamflow will be conveyed around or through the crossing site and returned to the stream.

Cofferdams will be constructed using sandbags and/or river-run gravel, and plastic sheeting, and will be placed at appropriate locations to minimize disturbance to the aquatic environment. Typically, placement of a cofferdam at a riffle crest is not advisable as water tends to flow subsurface at these locations. The preferred site for a cofferdam is in a pool tail-out or glide, leaving two-thirds to three quarters of the pool volume upstream of the cofferdam.

If minimal surface flow is present and underground seepage is not a problem, water may be diverted through the cofferdam and around the work area by a gravity-fed pipe. The diversion pipe will consist of appropriately sized plastic HDPE or ABS pipe or similar material, and will be placed along the channel bottom. Plastic flex pipe or flexible hose may also be used; PVC pipe will be avoided. The pipe inlet will be screened with a setback fence to avoid velocity entrapment, and both the inlet and outlet of the diversion pipe will be screened so aquatic and terrestrial organisms do not enter the pipe.

If water must be pumped around the work area, an approved, screened pump intake will be utilized. Pump intakes will be placed in large, perforated intake basins to allow water to be drawn into the pump while protecting aquatic organisms. Both the outside of the intake basin and the pump intake itself will be screened to ensure that aquatic organisms are not pulled into the pump.

Throughout construction, a sump pump of adequate capacity may be needed to remove subsurface flow that enters the crossing area, especially if the upstream cofferdam must be located at a riffle crest. If needed, sump pumps may be powered by a generator or other external power source, and will be properly screened. Any turbid water within the crossing site will be pumped to an infiltration site away from the active stream channel.

All gravity pipe and pump intake screens, intake basin screens and setback screens will consist of 3/32-inch (2.4 millimeter) mesh, in accordance with *Juvenile Fish Screen Criteria for Pump Intakes* (NOAA 1996). Any on-site material used for the equipment crossing or for dewatering will be returned to the stream channel at the end of construction; off-site materials will be removed from the site. The stream will be returned to its natural flow and bed conditions upon project completion.

Affected Environment

The affected environment includes the 2,400 linear feet of Salmon Creek in the project reach where the installation of large woody structures is proposed, 1.25 acres of the associated riparian corridor where riparian planting is proposed, and approximately 1 acre of grazed pastureland that will be used for equipment access and staging. The action area is located on the Valley Ford USGS quadrangle (38.3427° N, 122.96°W; T6N, R10W). The middle portion of Salmon Creek is characterized by fair riparian canopy and fair to poor instream complexity. California Red Legged Frogs and their habitat are found throughout the watershed and California Freshwater Shrimp and their habitat are found on the mainstem of Salmon Creek and not on the tributaries. The 2400 linear foot project reach is characteristic of much of the middle portion of mainstem Salmon Creek.

Environmental Effects

I. *No Action Alternative*
Under the no-action alternative, NOAA CRP would not fund the proposed grant. Other agencies would still have the option to fund this project; however, the need for coastal habitat restoration is great, and fewer important projects would be funded if NOAA did not fund the project type outlined in the preferred alternative. The no-action alternative would result in no short-term, minor construction related impacts to California Red Legged Frogs, California Freshwater Shrimp, Coho Salmon or Steelhead Trout. The no-action alternative would result in no net increase in instream habitat complexity that would benefit all of these species and would not result in long term habitat benefits to this watershed.

II. *Preferred Alternative*
The BiOp issued by the USFWS concluded that the proposed action is not likely to jeopardize the continued existence of the federally endangered California freshwater shrimp or the federally threatened California Red-legged frog. The USFWS based its conclusion on the temporary nature of adverse effects to listed species, the expected long-term benefits, and the fact that the proposed project includes conservation measures designed to minimize effects to listed species. The measures designed to minimize or avoid effects to listed species are discussed below.

General Measures

(1) The project limits will be clearly marked on the final design drawings and work confined within those boundaries. Prior to construction, the site supervisor, project engineer, and a Service-approved biologist will meet on site to agree upon and flag project boundaries.

(2) All staging, maintenance, and storage of construction equipment will be conducted in a location and manner that will prevent potential runoff of petroleum products into adjacent aquatic habitats. Oil-absorbent and spill-containment materials will be on site at all times. All workers will be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.

(3) All project-related vehicle movement and parking will be restricted to existing roads and pullouts. A 15-mile-per-hour speed will be observed. Foot and vehicle traffic will be restricted to the designated work area; construction-related traffic outside of the work area will be prohibited.

(4) A preconstruction training session will be provided for construction crew members by a Service-approved biologist(s). The training will be comprised of a discussion of the sensitive biological resources within the project area and the potential presence of special-status species including California red-legged frog and California freshwater shrimp. This will include a discussion of special-status species' habitats, protection measures to ensure species are not impacted by project activities, permit conditions, project boundaries, and penalties for noncompliance. If new construction personnel are added to the project, they will receive the appropriate training before starting work.

(5) To avoid potential losses to breeding birds, work areas will be surveyed by a qualified biologist within 2 to 5 days prior to commencement of construction. If active nests or behavior indicative of nesting birds are encountered, those areas plus a 50-foot buffer for small songbirds (e.g., song sparrow), and 150 feet for larger species (e.g., raptors, owls, etc.) designated by the biologist will be avoided until the nests have been vacated.

(6) A Service-approved biologist and/or trained monitor will monitor the site immediately before each day's work begins during installation of the instream habitat structures to ensure that no sensitive biological resources are present, that water quality standards are being met, and that excessive sediment and/or debris are not entering downstream aquatic habitats.

(7) For installation of the instream structures, current habitat conditions will be evaluated for each individual site by a Service-approved biologist prior to construction to determine if dewatering will be necessary. Conditions to be evaluated include stream flow and water depths, habitat complexity, and presence of special-status and other aquatic species. Structures will be allowed to be installed without dewatering by carefully lowering them into place if it is determined that minimal bank work will occur and aquatic species can be effectively protected through relocation and/or the use of blocking seines. Under most conditions, lowering of large structures slowly into the water is likely to cause fewer disturbances to the aquatic environment than dewatering. If installation will be too disruptive in the presence of water, dewatering will be required.

(8) Excavated trenches greater than one foot in depth will be covered with boards or other appropriate materials or backfilled with dirt at the end of each working day. If trenches remain open overnight, earthen escape ramps will be constructed every 200 feet. Prior to commencing construction activities each workday, trenches shall be thoroughly inspected for animals.

(9) All riparian plantings will be installed above the current water level and with the use of hands tools (e.g., shovels, trowels, etc.); workers will not be allowed to enter the water. All holes will be filled at the end of the each working day. If holes remain open over night, they will be covered with a board to prevent animals from falling in them and thoroughly inspected for animals prior to commencing work.

(10) Plant materials native to the watershed and regional rock will be used in the construction of habitat structures.

(11) The stream will be returned to its natural flow upon project completion.

(12) If any listed species are found dead or mortally injured, the biologist will place the specimens in labeled plastic bags, temporarily store them on ice, and immediately notify the Service by telephone.

(13) No pesticides, herbicides, or fertilizers will be used.

(14) All trash that may potentially attract predators (e.g., food) will be properly stored and removed at the end of the day. Following construction, all trash and construction debris will be removed.

(15) A complete record of all fish and wildlife species observed will be kept and provided to the Service CDFG, NOAA Fisheries, and other regulatory agencies, as required.

(16) No pets will be permitted within the work area to prevent harassment, injury, or mortality to listed species or their habitat.

California Red-legged frog

(1) At least 15 days prior to the onset of activities, the name(s) and credentials of biologists who will conduct California red-legged frog relocation activities will be submitted to the Service. No project activities will begin until proponent has received written approval from the Service that the biologist(s) is qualified to conduct the work.

(2) A USFWS-approved (Service approved) biologist will survey the work site two weeks before the onset of activities. If any California red-legged frogs are found, the Service will be contacted and the Service-approved biologist will be allowed sufficient time to move any animal(s) from the work site before work activities begin. The animal(s) shall be moved to a safe location outside the work area in an area that will remain undisturbed throughout the project. California red-legged frogs will be translocated to appropriate habitat for their life cycle. The biologist will monitor any translocated animal until it is determined that it is not imperiled by predators or other dangers. Only Service-approved biologists will participate in activities associated with the capture, handling, and monitoring of California red-legged frogs.

(3) The Service-approved biologist will be on site during initial ground disturbance activities for the installation of the instream habitat structures to monitor for the presence of California red-legged frog and perform relocation activities. The Service-approved biologist will be present at the work site until such time as all removal of California red-legged frogs, instruction of workers, and habitat disturbance have been completed. After this time, the contractor or permittee will designate a person to monitor on-site compliance with all measures. This biological monitor will be approved by the Service and the Service-approved biologist. The Service-approved biologist shall ensure that this individual receives training outlined in measure 4 above and in the identification of California red-legged frogs.

(4) If a California red-legged frog or any animal that construction personnel believes may be one of these species, is encountered during project construction, all work that could result in direct injury, disturbance, or harassment of the individual animal will immediately cease and the Service-approved biologist will move the California red-legged frog to a safe nearby location and monitor it until he/she determines that the animal(s) are not imperiled by predators, or other dangers. In the case of trapped animals (e.g. in a ditch or trench), escape ramps or structures should be installed immediately to allow the animal(s) to escape, or the Service should be contacted for advice.

(5) A Service-approved biologist will permanently remove any individuals of exotic species, such as bullfrogs (*Rana catesbeiana*), crayfish, and centrarchid fishes, from within the project area to the maximum extent possible. The proponent or proponent's representative will have the responsibility to ensure that their activities are in compliance with the California Fish and Game Code.

(6) Tightly woven fiber netting or similar material shall be used for erosion control or other purposes at the project to ensure that California red-legged frogs do not get trapped. Plastic mono-filament netting (erosion control matting), rolled erosion control products or similar material shall not be used at the project site because California red-legged frogs and other species may become entangled or trapped in it.

California Freshwater Shrimp

(1) At least 15 days prior to the onset of activities, the name(s) and credentials of biologists who will conduct California freshwater shrimp relocation activities will be submitted to the Service. No project activities will begin until proponent has received written approval from the Service that the biologist(s) is qualified to conduct the work.

(2) No riprap will be placed on the creek banks.

(3) Immediately prior to installation of the instream habitat structures or installation of water diversion structures, the Service-approved biologist will survey for California freshwater shrimp. If California freshwater shrimp are present in the immediate work area the following procedures will be used:

> (a) California freshwater shrimp will be captured by hand-held nets [e.g., heavy-duty aquatic dip nets (12" D-frame net) or small minnow dip nets] and relocated out of the work area in the net or placed in buckets containing stream water and then moved directly to the nearest suitable habitat in the same branch of the creek. Suitable habitat will be indentified prior to capturing California freshwater shrimp to minimize holding time. Suitable habitat is defined as creek sections that will remain wet over the summer and where banks are structurally diverse with undercut banks, exposed fine root systems, overhanging woody debris, or overhanging vegetation. No California freshwater shrimp will be placed in buckets containing other aquatic species.
>
> (b) Once the Service-approved biologist has determined that all shrimp have been effectively relocated, barrier seines or exclusion fencing will be installed to prevent shrimp from moving back in, as appropriate. After the biologist(s) has removed all shrimp, the work area will be dewatered, as necessary, and the habitat structures installed.
>
> (c) Only Service-approved biologists will participate in the capture, handling, and monitoring of California freshwater shrimp. The Service-approved biologist will report the number of captures, releases, injuries, and mortalities to the Service within 30 days of project completion. If take exceeds the levels anticipated in this biological opinion, work will stop immediately and the Service will be notified within one working day.

(4) Following installation of any water diversion structures, and prior to the placement of fill, a Service-approved biologist will perform surveys for any shrimp trapped in the project area. If shrimp are found to be present, the protocol for relocation described in measure 3 above will be followed.

Dewatering Plan

A Service-, CDFG-, and NMFS-approved biologist will be on site to oversee installation and

decommission of water diversion structures and to conduct aquatic organism relocation. Prior to dewatering, the biologist will encourage aquatic organisms to move downstream with the aid of weighted seines and place barrier seines to seal the dewatering area. Once the barriers are in place, cofferdams will be constructed within the sealed area (immediately upstream of the downstream barrier and vice versa). When the cofferdams are in place, the biologist will make his/her best effort to relocate aquatic organisms remaining within the dewatering area as the water surface elevation begins to drop. Aquatic organisms will be relocated to suitable habitat up-and/or downstream of the dewatering area. Release sites will contain suitable cover and foraging habitat, as well as natural barriers that are likely to preclude the movement of relocated organisms back into the dewatering area. All aquatic organisms will be kept in 5-gallon buckets of cool, fresh, aerated water, and will be released shortly after capture. Handling will be kept to a minimum.

Amount or Extent of Take

The conservation measures proposed as part of the project substantially reduce, but do not eliminate, the potential for incidental take of listed species. The USFWS determined the following regarding the amount or extent of anticipated take:

California Red-legged frog

USFWS estimated that all California red-legged frogs inhabiting the 2.39-acre project area (includes the 1.25-acre riparian planting area, the 0.14-acre of in-stream work, and the 1-acre of access routes and staging areas) will be subject to incidental take in the form of harm, harassment and capture; and one (1) California red-legged frog will be subject to incidental take in the form of death or injury.

California freshwater shrimp

USFWS estimated that all individuals within the 0.14 acre will be subject to incidental take in the form of harm, harassment and capture; and fifteen (15) California freshwater shrimp will be subject to incidental take in the form of death or injury.

Ultimately, the project would result in temporary adverse effects to listed species and would result in long-term benefits to listed species including increased habitat quality and complexity.

List of Agencies/Persons Consulted

Stephanie Jentsch, Ryan Olah
U.S. Fish and Wildlife Service, Sacramento California Fish and Wildlife Office

Jon Ambrose
NOAA Fisheries, Protected Resources Division, Santa Rosa, California

Attachment – USFWS' August 18, 2010 Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In Reply Refer To:
81420-2010-F-0522-1

AUG 18 2010

Mr. Patrick J. Rutten
NOAA Restoration Center
Attn: Joe Pecharich
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Region
777 Sonoma Ave., Room 219-A
Santa Rosa, California 95404-6528

Subject: Biological Opinion on the Proposed Salmon Creek Large Wood Structures and Gilardi Ranch Riparian Planting Project in Sonoma County, California

Dear Mr. Rutten:

This letter is in response to the U.S. National Oceanic and Atmospheric Administration's (NOAA) March 22, 2010, request for section 7 consultation with the U.S. Fish and Wildlife Service (Service) on the effects of the proposed Salmon Creek Large Wood Structures and Gilardi Ranch Riparian Planting Project in Sonoma County, California (proposed action). Your request for formal consultation was received by this office on March 25, 2010. At issue are the proposed action's potential effects on the threatened California red-legged frog (*Rana draytonii*) and the endangered California freshwater shrimp (*Syncharis pacifica*). The Service concurs with your determination that the proposed action may adversely affect the California red-legged frog and the California freshwater shrimp. Critical habitat has been designated for the California red-legged frog, but none occurs within the action area. This biological opinion is issued under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*) (Act).

This document was prepared based on: (1) information provided in NOAA's March 22, 2010, letter; (2) the March 2010 *USFWS Biological Assessment, Save Our Salmon: Salmon Creek Habitat Rehabilitation Program Salmon Creek Large Wood Structures and Gilardi Ranch Riparian Planting Project* and attached conceptual plans prepared by Prunuske Chatham, Inc. for Gold Ridge Resource Conservation District (GRRCD); (3) a June 15, 2010, memo prepared by GRRCD describing the proposed Equipment Crossing and Dewatering Plan; (4) a visit to the project site on May 26, 2010, attended by the Service and representatives from NOAA, GRRCD, California Department of Fish and Game (CDFG), and Prunuske Chatham, Inc; and (5) other information available to the Service.

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Consultation History:

March 25, 2010:	The Service received NOAA's request for consultation and associated attachments.
May 26, 2010:	Site visit attended by CDFG, GRRCD, NOAA, Prunuske Chatham, Inc., and the Service. It was determined that a stream crossing, not previously included in the project description, could be required for project construction.
June 15, 2010:	The Service received a memo from GRRCD via electronic mail with the subject *Save Our Salmon (SOS) – Salmon Creek Habitat Rehabilitation Program Instream Large Wood Structure Component, Mainstem Salmon Creek (Gilardi Reach) Equipment Crossing and Dewatering Plan.*
July 28, 2010:	The Service sent a draft project description to GRRCD for review.
August 4, 2010:	The Service received a revised project description from GRRCD.

Description of the Proposed Action

Background

The proposed Salmon Creek Large Wood Structures and Gilardi Ranch Riparian Planting Project is part of a larger salmonid habitat restoration effort entitled "Save Our Salmon – The Salmon Creek Habitat Rehabilitation Program" that is being administered by the GRRCD. The Save Our Salmon program is a multi-stakeholder, multi-faceted, watershed-wide effort to address the decline of salmonid runs in Salmon Creek, a tributary to the Pacific Ocean in western Sonoma County, and to implement an integrated, effective restoration strategy.

Within the Salmon Creek watershed, coho salmon (*Oncorhynchus kisutch*) runs have virtually disappeared in the last 10 years, and the steelhead population is dwindling. The CDFG has stated that Salmon Creek is a fully restorable salmonid stream (CDFG 2004), and it is part of CDFG's annual coho broodstock program. On December 14, 2008, CDFG, with help from community residents, local ranchers, GRRCD, and other agency staff, released approximately 500 adult coho salmon into Salmon Creek. The fish were selected from two genetic strains from neighboring watersheds in an attempt to recreate the likely genetic composition of the historic fishery.

The purpose of the proposed action is to improve habitat conditions for aquatic species in mainstem Salmon Creek near the hamlet of Bodega on a working livestock ranch (Gilardi Ranch). The proposed action will include: (1) installation of 10 instream large wood habitat structures; (2) aquatic and riparian habitat enhancement through revegetation along mainstem Salmon Creek with native riparian trees and shrubs; and (3) installation of a pipeline to supply water to a trough on the north side of Salmon Creek.

Instream Large Wood Structures

Log and root wad structures will be placed at 10 locations. The structures will consist of species that naturally occur in the watershed, such as recycled Coast redwood (*Sequoia sempervirens*), Douglas fir (*Pseudotsuga menziesii*), and bay (*Umbellularia Californica*) root wads, some with trunks attached, boulders, and tree tops anchored appropriately. Installation of these structures will allow for habitat feature development and increased channel complexity and cover. Installation locations were selected to maintain undercut banks, increase pool depths and bar heights, and improve spawning gravels.

Construction and anchoring techniques that will be used are described in the CDFG *California Salmonid Stream Habitat Restoration Manual* (CDFG 1998). High-quality boulders will be used to prevent fracturing under stress, and the large wood will be attached to the boulders using 1-inch all thread. All structures will be oriented in such a fashion as to maximize habitat complexity and long-term functionality.

Heavy equipment will mostly work from top of bank; in-channel work will be kept to a minimum. Silt fencing will be installed around the work areas, as appropriate. When feasible, the structures will be constructed on site in sections and moved into place with an excavator to minimize the amount of time and area of in-channel disturbance. Care will be taken to ensure that they are as natural looking as possible, with all anchoring materials carefully hidden from sight. Any exposed soil will be covered with coconut fiber blanket and seeded with native species following construction. The instream area of disturbance will be approximately 0.13 acre.

Riparian Habitat Enhancement

Revegetation work will occur along mainstem Salmon Creek and an ephemeral gully feeding into the creek. Along mainstem Salmon Creek, 320 trees and shrubs will be planted on the upper and middle banks, and 300 trees, shrubs, and rushes will be planted along the upper, middle, and lower banks of the ephemeral gully. Planting native vegetation will improve forested riparian buffer function by increasing buffer width, vegetation density, species complexity, and functional diversity in areas that have minimal cover and/or lack a multi-age, diverse canopy. Plantings will also increase canopy cover to shade exposed sections of the stream and promote long-term large wood recruitment.

Native plantings will include a variety of locally adapted riparian and wetland species, including large deciduous trees, understory shrubs, and herbaceous plants. The plant list contains a number of species targeted at beneficial insects (e.g., native butterflies, bees, wasps, etc.) and nectar and fruit foraging birds. The area of riparian vegetation enhancement is approximately 1.25 acres.

Pipeline

To facilitate water conservation on the Gilardi Ranch, a below-ground pipeline will be installed to connect the ranch water distribution system on the south side of Salmon Creek to a livestock

trough on the north side. Installation of the pipeline will help to reduce demand on near-channel, shallow wells within the project reach of Salmon Creek. An existing ford crossing of the creek will be used as the pipeline route. The pipeline will be constructed using 1-inch diameter or smaller schedule 40 PVC pipe, and will be placed in a trench measuring a minimum of 24 inches in depth through the ford approaches and across the stream bed. If the stream is flowing, the site will be dewatered according to the procedures described below. If no surface flow is present, pumps will be kept at the excavation site to remove any silt-laden subsurface water that might enter the trench. This water will be pumped to an infiltration site away from any surface water body. The trench will kept open for the minimum time required for pipeline construction, and will be backfilled with compacted native fill. Native streambed material will be placed on top of the backfilled trench to recapture the original configuration of the streambed to the greatest extent possible. A maximum total area of approximately 0.01 acre of streambed and banks will be temporarily disturbed by pipeline installation.

Access and Storage of Construction Materials

The project will utilize existing roadways to and from the site. Several of the instream sites and planting areas on the right (north) bank of Salmon Creek may be accessed from the adjoining property where permission to enter has been secured, however, it may be necessary to establish a stream crossing site (see description below). Equipment access and placement of woody structures will result in temporary disturbance to a maximum of 0.5 acre of grazed pasture. Construction equipment and materials (e.g., tanks, large logs, root wads, rock) will be stored on site in an area (not to exceed 0.5 acre) of grazed pasture. The number of access routes, number and size of staging areas, and the total area of the activity will be limited to the minimum necessary to achieve the project goal. Routes and boundaries will be clearly demarcated, and these areas will be outside riparian and wetland areas. Where impacts occur in staging areas and access routes, restoration will occur as identified in the measures below.

Construction Schedule and Equipment

Instream habitat structures will be installed during summer low-flow conditions between June 15, 2010 and October 31, 2010. Plantings along mainstem Salmon Creek will occur during the late fall and winter of 2010. Equipment to be used will include a medium-size excavator (e.g., JD 135 or larger), front-end loader (e.g., JD 544 or larger), work trucks, and a small, one-man jumping jack compactor.

Stream Crossing

During project construction, it may be necessary for heavy equipment to cross Salmon Creek within the project reach to gain access to large wood structure sites and to transport wood and other materials to staging areas. Should crossing be necessary, the pipeline installation site where there is an existing ford crossing with rocked approaches will be used as the crossing site. To protect the streambed, pairs of concrete blocks will temporarily be placed on the streambed at intervals across the stream, and steel plate or an equivalent will be attached to the top of the blocks as a temporary running surface. Blocks will be placed on dry streambed, above the line of flowing water. The total volume of fill (concrete blocks) to be temporarily placed in the streambed (if necessary) will be less than 0.5 cubic yard and will impact less than 0.001 acre.

Dewatering Plan

Although instream work to install woody structures will occur during low-flow conditions, dewatering may occur, if needed, to minimize discharge of silt-laden water into Salmon Creek. If only isolated pools are present, they will be pumped out, as necessary. If dewatering is necessary, temporary cofferdams or similar diversion structures will be constructed at the upstream and downstream ends of the work area.

Similarly, it is likely that the creek at the crossing site will be dry, or that streamflow will have decreased so that only isolated pools are left at the time of work. However, should streamflow be present, Salmon Creek may be dewatered at the crossing site if necessary to minimize the discharge of fine sediment into the stream. If dewatering is necessary, temporary cofferdams or similar diversion structures will be constructed upstream and downstream of the ford crossing, and streamflow will be conveyed around or through the crossing site and returned to the stream.

Cofferdams will be constructed using sandbags and/or river-run gravel, and plastic sheeting, and will be placed at appropriate locations to minimize disturbance to the aquatic environment. Typically, placement of a cofferdam at a riffle crest is not advisable as water tends to flow subsurface at these locations. The preferred site for a cofferdam is in a pool tail-out or glide, leaving two-thirds to three quarters of the pool volume upstream of the cofferdam.

If minimal surface flow is present and underground seepage is not a problem, water may be diverted through the cofferdam and around the work area by a gravity-fed pipe. The diversion pipe will consist of appropriately sized plastic HDPE or ABS pipe or similar material, and will be placed along the channel bottom. Plastic flex pipe or flexible hose may also be used; PVC pipe will be avoided. The pipe inlet will be screened with a setback fence to avoid velocity entrapment, and both the inlet and outlet of the diversion pipe will be screened so aquatic and terrestrial organisms do not enter the pipe.

If water must be pumped around the work area, an approved, screened pump intake will be utilized. Pump intakes will be placed in large, perforated intake basins to allow water to be drawn into the pump while protecting aquatic organisms. Both the outside of the intake basin and the pump intake itself will be screened to ensure that aquatic organisms are not pulled into the pump.

Throughout construction, a sump pump of adequate capacity may be needed to remove subsurface flow that enters the crossing area, especially if the upstream cofferdam must be located at a riffle crest. If needed, sump pumps may be powered by a generator or other external power source, and will be properly screened. Any turbid water within the crossing site will be pumped to an infiltration site away from the active stream channel.

All gravity pipe and pump intake screens, intake basin screens and setback screens will consist of 3/32-inch (2.4 millimeter) mesh, in accordance with *Juvenile Fish Screen Criteria for Pump Intakes* (NOAA 1996). Any on-site material used for the equipment crossing or for dewatering will be returned to the stream channel at the end of construction; off-site materials will be

removed from the site. The stream will be returned to its natural flow and bed conditions upon project completion.

A Service-, CDFG-, and NMFS-approved biologist will be on site to oversee installation and decommissioning of water diversion structures and to conduct aquatic organism relocation. Prior to dewatering, the biologist will encourage aquatic organisms to move downstream with the aid of weighted seines and place barrier seines to seal the dewatering area. Once the barriers are in place, cofferdams will be constructed within the sealed area (immediately upstream of the downstream barrier and vice versa). When the cofferdams are in place, the biologist will make his/her best effort to relocate aquatic organisms remaining within the dewatering area as the water surface elevation begins to drop. Aquatic organisms will be relocated to suitable habitat up-and/or downstream of the dewatering area. Release sites will contain suitable cover and foraging habitat, as well as natural barriers that are likely to preclude the movement of relocated organisms back into the dewatering area. All aquatic organisms will be kept in 5-gallon buckets of cool, fresh, aerated water, and will be released shortly after capture. Handling will be kept to a minimum. All handling and relocation of listed species will follow the procedures outlined in the Conservation Measures section below.

Dust, Erosion, Sediment, and Hazardous Materials Control

The proposed action will employ a number of Best Management Practices, as required by the North Coast RWQCB, to protect water quality and sensitive resources. Practices may include, but are not limited to, the use of oil-free anchoring hardware and vegetable oil to lubricate the hand-held power tools, off-site power-washing of construction equipment to be used within and adjacent to the stream channel to remove petrochemical residues, presence of erosion control and spill containment materials on site, daily inspection of vehicles, etc. If epoxy is used, it will be set up before it makes contact with the water.

Monitoring and Reporting

A Service-approved 5-year monitoring plan will be developed that will include a discussion of restoration techniques, time of year for monitoring, identifiable success criteria, and remedial actions if success criteria are not achieved. An annual report will be submitted to the Service.

Conservation Measures

The applicant proposes to implement the following measures to minimize the proposed action's effects to the California red-legged frog and California freshwater shrimp:

General Measures

1. The project limits will be clearly marked on the final design drawings and work confined within those boundaries. Prior to construction, the site supervisor, project engineer, and a Service-approved biologist will meet on site to agree upon and flag project boundaries.

2. All staging, maintenance, and storage of construction equipment will be conducted in a location and manner that will prevent potential runoff of petroleum products into adjacent aquatic habitats. Oil-absorbent and spill-containment materials will be on site at all times. All workers will be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.

3. All project-related vehicle movement and parking will be restricted to existing roads and pullouts. A 15-mile-per-hour speed will be observed. Foot and vehicle traffic will be restricted to the designated work area; construction-related traffic outside of the work area will be prohibited.

4. A preconstruction training session will be provided for construction crew members by a Service-approved biologist(s). The training will be comprised of a discussion of the sensitive biological resources within the project area and the potential presence of special-status species including California red-legged frog and California freshwater shrimp. This will include a discussion of special-status species' habitats, protection measures to ensure species are not impacted by project activities, permit conditions, project boundaries, and penalties for noncompliance. If new construction personnel are added to the project, they will receive the appropriate training before starting work.

5. To avoid potential losses to breeding birds, work areas will be surveyed by a qualified biologist within 2 to 5 days prior to commencement of construction. If active nests or behavior indicative of nesting birds are encountered, those areas plus a 50-foot buffer for small songbirds (e.g., song sparrow), and 150 feet for larger species (e.g., raptors, owls, etc.) designated by the biologist will be avoided until the nests have been vacated.

6. A Service-approved biologist and/or trained monitor will monitor the site immediately before each day's work begins during installation of the instream habitat structures to ensure that no sensitive biological resources are present, that water quality standards are being met, and that excessive sediment and/or debris are not entering downstream aquatic habitats.

7. For installation of the instream structures, current habitat conditions will be evaluated for each individual site by a Service-approved biologist prior to construction to determine if dewatering will be necessary. Conditions to be evaluated include stream flow and water depths, habitat complexity, and presence of special-status and other aquatic species. Structures will be allowed to be installed without dewatering by carefully lowering them into place if it is determined that minimal bank work will occur and aquatic species can be effectively protected through relocation and/or the use of blocking seines. Under most conditions, lowering of large structures slowly into the water is likely to cause fewer disturbances to the aquatic environment than dewatering. If installation will be too disruptive in the presence of water, dewatering will be required.

8. Excavated trenches greater than one foot in depth will be covered with boards or other appropriate materials or backfilled with dirt at the end of each working day. If trenches remain open overnight, earthen escape ramps will be constructed every 200 feet. Prior to

commencing construction activities each workday, trenches shall be thoroughly inspected for animals.

9. All riparian plantings will be installed above the current water level and with the use of hands tools (e.g., shovels, trowels, etc.); workers will not be allowed to enter the water. All holes will be filled at the end of the each working day. If holes remain open over night, they will be covered with a board to prevent animals from falling in them and thoroughly inspected for animals prior to commencing work.

10. Plant materials native to the watershed and regional rock will be used in the construction of habitat structures.

11. The stream will be returned to its natural flow upon project completion.

12. If any listed species are found dead or mortally injured, the biologist will place the specimens in labeled plastic bags, temporarily store them on ice, and immediately notify the Service by telephone.

13. No pesticides, herbicides, or fertilizers will be used.

14. All trash that may potentially attract predators (e.g., food) will be properly stored and removed at the end of the day. Following construction, all trash and construction debris will be removed.

15. A complete record of all fish and wildlife species observed will be kept and provided to the Service CDFG, NOAA Fisheries, and other regulatory agencies, as required.

16. No pets will be permitted within the work area to prevent harassment, injury, or mortality to listed species or their habitat.

California Red-legged frog

1. At least 15 days prior to the onset of activities, the name(s) and credentials of biologists who will conduct California red-legged frog relocation activities will be submitted to the Service. No project activities will begin until proponent has received written approval from the Service that the biologist(s) is qualified to conduct the work.

2. A Service-approved biologist will survey the work site two weeks before the onset of activities. If any California red-legged frogs are found, the Service will be contacted and the Service-approved biologist will be allowed sufficient time to move any animal(s) from the work site before work activities begin. The animal(s) shall be moved to a safe location outside the work area in an area that will remain undisturbed throughout the project. California red-legged frogs will be translocated to appropriate habitat for their life cycle. The biologist will monitor any translocated animal until it is determined that it is not imperiled by predators or other dangers. Only Service-approved biologists will

participate in activities associated with the capture, handling, and monitoring of California red-legged frogs.

3. The Service-approved biologist will be on site during initial ground disturbance activities for the installation of the instream habitat structures to monitor for the presence of California red-legged frog and perform relocation activities. The Service-approved biologist will be present at the work site until such time as all removal of California red-legged frogs, instruction of workers, and habitat disturbance have been completed. After this time, the contractor or permittee will designate a person to monitor on-site compliance with all measures. This biological monitor will be approved by the Service and the Service-approved biologist. The Service-approved biologist shall ensure that this individual receives training outlined in measure 4 above and in the identification of California red-legged frogs.

4. If a California red-legged frog or any animal that construction personnel believes may be one of these species, is encountered during project construction, all work that could result in direct injury, disturbance, or harassment of the individual animal will immediately cease and the Service-approved biologist will move the California red-legged frog to a safe nearby location and monitor it until he/she determines that the animal(s) are not imperiled by predators, or other dangers. In the case of trapped animals (e.g. in a ditch or trench), escape ramps or structures should be installed immediately to allow the animal(s) to escape, or the Service should be contacted for advice.

5. A Service-approved biologist will permanently remove any individuals of exotic species, such as bullfrogs (*Rana catesbeiana*), crayfish, and centrarchid fishes, from within the project area to the maximum extent possible. The proponent or proponent's representative will have the responsibility to ensure that their activities are in compliance with the California Fish and Game Code.

6. Tightly woven fiber netting or similar material shall be used for erosion control or other purposes at the project to ensure that California red-legged frogs do not get trapped. Plastic mono-filament netting (erosion control matting), rolled erosion control products or similar material shall not be used at the project site because California red-legged frogs and other species may become entangled or trapped in it.

California Freshwater Shrimp

1. At least 15 days prior to the onset of activities, the name(s) and credentials of biologists who will conduct California freshwater shrimp relocation activities will be submitted to the Service. No project activities will begin until proponent has received written approval from the Service that the biologist(s) is qualified to conduct the work.

2. No riprap will be placed on the creek banks.

3. Immediately prior to installation of the instream habitat structures or installation of water diversion structures, the Service-approved biologist will survey for California freshwater

shrimp. If California freshwater shrimp are present in the immediate work area the following procedures will be used:

a. California freshwater shrimp will be captured by hand-held nets [e.g., heavy-duty aquatic dip nets (12" D-frame net) or small minnow dip nets] and relocated out of the work area in the net or placed in buckets containing stream water and then moved directly to the nearest suitable habitat in the same branch of the creek. Suitable habitat will be indentified prior to capturing California freshwater shrimp to minimize holding time. Suitable habitat is defined as creek sections that will remain wet over the summer and where banks are structurally diverse with undercut banks, exposed fine root systems, overhanging woody debris, or overhanging vegetation. No California freshwater shrimp will be placed in buckets containing other aquatic species.

b. Once the Service-approved biologist has determined that all shrimp have been effectively relocated, barrier seines or exclusion fencing will be installed to prevent shrimp from moving back in, as appropriate. After the biologist(s) has removed all shrimp, the work area will be dewatered, as necessary, and the habitat structures installed.

c. Only Service-approved biologists will participate in the capture, handling, and monitoring of California freshwater shrimp. The Service-approved biologist will report the number of captures, releases, injuries, and mortalities to the Service within 30 days of project completion. If take exceeds the levels anticipated in this biological opinion, work will stop immediately and the Service will be notified within one working day.

4. Following installation of any water diversion structures, and prior to the placement of fill, a Service-approved biologist will perform surveys for any shrimp trapped in the project area. If shrimp are found to be present, the protocol for relocation described in measure 3 above will be followed.

Analytical Framework for the Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on three components: (1) the *Status of the Species* and *Environmental Baseline*, which evaluates the species' range-wide condition, the factors responsible for that condition, and the survival and recovery needs; and evaluates the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the listed species; (2) the *Effects of the Action*, which determines the direct and indirect effects of the proposed Federal action and the effects of any interrelated or interdependent activities on these species; and (3) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on them.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the California red-legged frog's and California freshwater shrimp's current status, taking into account any cumulative effects, to

determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of these listed species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the listed species, and the role of the action area in the survival and recovery of the listed species as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the purposes of the effects assessment, the action area includes the 2,400 linear feet of Salmon Creek in the project reach where the installation of large woody structures is proposed, 1.25 acres of the associated riparian corridor where riparian planting is proposed, and approximately 1 acre of grazed pastureland that will be used for equipment access and staging. The action area is located on the Valley Ford USGS quadrangle (38.3427° N, 122.96°W; T6N, R10W).

Status of Species and Environmental Baseline

California red-legged frog

Listing Status: The California red-legged frog was listed as a threatened species on May 23, 1996 (61 FR 25813). Critical Habitat was designated for this species on April 13, 2006 (71 FR 19244) and revisions to the critical habitat designation were published on March 17, 2010 (75 FR 12816). At this time the Service recognized the taxonomic change from Rana aurora draytonii to Rana draytonii. A recovery plan was published for the California red-legged frog on September 12, 2002 (Service 2002).

Description: The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949), ranging from 1.5 to 5.1 inches (3.81 to 12.95 centimeters) in length (Stebbins 2003). The abdomen and hind legs of adults are largely red, while the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color. Dorsal spots usually have light centers (Stebbins 2003), and dorsolateral folds are prominent on the back. Larvae (tadpoles) range from 0.6 to 3.1 inches (1.52 to 7.87 centimeters) in length, and the background color of the body is dark brown and yellow with darker spots (Storer 1925).

Distribution: The historic range of the California red-legged frog extended from the vicinity of Elk Creek in Mendocino County, California, along the coast inland to the vicinity of Redding, Shasta County, California, and southward to northwestern Baja California, Mexico (Fellers 2005; Jennings and Hayes 1985; Hayes and Krempels 1986). The California red-legged frog was historically documented in 46 counties but the taxa now remains in 238 streams or drainages within 23 counties, representing a loss of 70 percent of its former range (Service 2002). California red-legged frogs are still locally abundant within portions of the San Francisco Bay

area and the Central California Coast. Isolated populations have been documented in the Sierra Nevada, northern Coast, and northern Transverse Ranges. The species is believed to be extirpated from the southern Transverse and Peninsular ranges, but is still present in Baja California, Mexico (CDFG 2010).

Status and Natural History: California red-legged frogs predominately inhabit permanent water sources such as streams, lakes, marshes, natural and manmade ponds, and ephemeral drainages in valley bottoms and foothills up to 4,921 feet (1,500 meters) in elevation (Jennings and Hayes 1994, Bulger et al. 2003, Stebbins 2003). However, California red-legged frogs also have been found in ephemeral creeks and drainages and in ponds that have minimal riparian and emergent vegetation. California red-legged frogs breed between November and April in still or slow-moving water often with emergent vegetation, such as cattails (Typha spp.), tules (Scirpus spp.) or overhanging willows (Salix spp.) (Hayes and Jennings 1988). California red-legged frogs have paired vocal sacs and vocalize in air (Hayes and Krempels 1986). Female frogs deposit egg masses on emergent vegetation so that the egg mass floats on or near the surface of the water (Hayes and Miyamoto 1984). California red-legged frogs breed from November through March with earlier breeding records occurring in southern localities (Storer 1925). Individuals occurring in coastal drainages are active year-round (Jennings et al. 1992), whereas those found in interior sites are normally less active during the cold season.

During other parts of the year, habitat includes nearly any area within 1-2 miles (1.6-3.2 kilometers) of a breeding site that stays moist and cool through the summer (Fellers 2005). According to Fellers (2005), this can include vegetated areas with coyote brush (Baccharis pilularis), California blackberry thickets (Rubus ursinus), and root masses associated with willow and California bay (Umbellularia californica) trees. Sometimes the non-breeding habitat used by California red-legged frogs is extremely limited in size. For example, non-breeding California red-legged frogs have been found in a 6 foot (1.8-meter) wide coyote brush thicket growing along a tiny intermittent creek surrounded by heavily grazed grassland (Fellers 2005). Sheltering habitat for California red-legged frogs is potentially all aquatic, riparian, and upland areas within the range of the species and includes any landscape features that provide cover, such as existing animal burrows, boulders or rocks, organic debris such as downed trees or logs, and industrial debris. Agricultural features such as drains, watering troughs, spring boxes, abandoned sheds, or hay stacks may also be used. Incised stream channels with portions narrower and depths greater than 18 inches (46 centimeters) also may provide important summer sheltering habitat. Accessibility to sheltering habitat is essential for the survival of California red-legged frogs within a watershed, and can be a factor limiting frog population numbers and survival.

California red-legged frogs do not have a distinct breeding migration (Fellers 2005). Adult frogs are often associated with permanent bodies of water. Some frogs remain at breeding sites year-round, while others disperse to neighboring water features. Dispersal distances are typically less than 0.5-mile (0.8-kilometers), with a few individuals moving up to 1-2 miles (1.6-3.2 kilometers) (Fellers 2005). Movements are typically along riparian corridors, but some individuals, especially on rainy nights, move directly from one site to another through normally inhospitable habitats, such as heavily grazed pastures or oak-grassland savannas (Fellers 2005).

In a study of California red-legged frog terrestrial activity in a mesic area of the Santa Cruz Mountains, Bulger et al. (2003) categorized terrestrial use as migratory and non-migratory. The latter occurred from one to several days and was associated with precipitation events. Migratory movements were characterized as the movement between aquatic sites and were most often associated with breeding activities. Bulger reported that non-migrating frogs typically stayed within 200 feet (60 meters) of aquatic habitat 90 percent of the time and were most often associated with dense vegetative cover, i.e., California blackberry, poison oak (Toxicodendron diversilobum) and coyote brush. Dispersing frogs in northern Santa Cruz County traveled distances from 0.25-mile (0.4-kilometers) to more than 2 miles (3.2 kilometers) without apparent regard to topography, vegetation type, or riparian corridors (Bulger et al. 2003).

In a study of California red-legged frog terrestrial activity in a xeric environment, Tatarian (2008) noted that a 57 percent majority of frogs fitted with radio transmitters in the Round Valley study area in eastern Contra Costa County stayed at their breeding pools, whereas 43 percent moved into adjacent upland habitat or to other aquatic sites. This study reported a peak seasonal terrestrial movement occurring in the fall months associated with the first 0.2-inch (0.5-centimeter) of precipitation and tapering off into spring. Upland movement activities ranged from 3 to 233 feet (1 to 71 meters), averaging 80 feet (24 meters), and were associated with a variety of refugia including grass thatch, crevices, cow hoof prints, ground squirrel burrows at the base of trees or rocks, logs, and man-made structures such as a downed barn door; others were associated with upland sites lacking refugia (Tatarian 2008). The majority of terrestrial movements lasted from 1 to 4 days; however, one adult female was reported to remain in upland habitat for 50 days (Tatarian 2008). Upland refugia closer to aquatic sites were used more often and were more commonly associated with areas exhibiting higher object cover, e.g., woody debris, rocks, and vegetative cover. Subterranean cover was not significantly different between occupied upland habitat and non-occupied upland habitat.

California red-legged frogs are often prolific breeders, laying their eggs during or shortly after large rainfall events in late winter and early spring (Hayes and Miyamoto 1984). Egg masses containing 2,000 to 5,000 eggs are attached to vegetation below the surface and hatch after 6 to 14 days (Storer 1925, Jennings and Hayes 1994). In coastal lagoons, the most significant mortality factor in the pre-hatching stage is water salinity (Jennings et al. 1992). Eggs exposed to salinity levels greater than 4.5 parts per thousand resulted in 100 percent mortality (Jennings and Hayes 1990). Increased siltation during the breeding season can cause asphyxiation of eggs and small larvae. Larvae undergo metamorphosis 3½ to 7 months following hatching and reach sexual maturity 2 to 3 years of age (Storer 1925; Wright and Wright 1949; Jennings and Hayes 1985, 1990, 1994). Of the various life stages, larvae probably experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings et al. 1992). California red-legged frogs may live 8 to 10 years (Jennings et al. 1992). Populations can fluctuate from year to year; favorable conditions allow California red-legged frogs to experience extremely high rates of reproduction and thus produce large numbers of dispersing young and a concomitant increase in the number of occupied sites. In contrast, California red-legged frogs may temporarily disappear from an area when conditions are stressful (e.g., during periods of drought, disease, etc.).

The diet of California red-legged frogs is highly variable and changes with the life history stage. The diet of larval California red-legged frogs is not well studied, but is likely similar to that of other ranid frogs, feeding on algae, diatoms, and detritus by grazing on the surface of rocks and vegetation (Fellers 2005; Kupferberg 1996a, 1996b, 1997). Hayes and Tennant (1985) analyzed the diets of California red-legged frogs from Cañada de la Gaviota in Santa Barbara County during the winter of 1981 and found invertebrates (comprising 42 taxa) to be the most common prey item consumed; however, they speculated that this was opportunistic and varied based on prey availability. They ascertained that larger frogs consumed larger prey and were recorded to have preyed on Pacific chorus frogs (Pseudacris regilla), three-spined stickleback (Gasterosteus aculeatus) and, to a limited extent, California mice (Peromyscus californicus), which were abundant at the study site (Hayes and Tennant 1985, Fellers 2005). Although larger vertebrate prey was consumed less frequently, it represented over half of the prey mass eaten by larger frogs suggesting that such prey may play an energetically important role in their diets (Hayes and Tennant 1985). Juvenile and subadult/adult frogs varied in their feeding activity periods; juveniles fed for longer periods throughout the day and night, while subadult/adults fed nocturnally (Hayes and Tennant 1985). Juveniles were significantly less successful at capturing prey and all life history stages exhibited poor prey discrimination, feeding on several inanimate objects that moved through their field of view (Hayes and Tennant 1985).

Metapopulation and Patch Dynamics: The direction and type of habitat used by dispersing animals is especially important in fragmented environments (Forys and Humphrey 1996). Models of habitat patch geometry predict that individual animals will exit patches at more "permeable" areas (Buechner 1987; Stamps et al. 1987). A landscape corridor may increase the patch-edge permeability by extending patch habitat (La Polla and Barrett 1993), and allow individuals to move from one patch to another. The geometric and habitat features that constitute a "corridor" must be determined from the perspective of the animal (Forys and Humphrey 1996).

Because their habitats have been fragmented, many endangered and threatened species exist as metapopulations (Verboom and Apeldom 1990; Verboom et al. 1991). A metapopulation is a collection of spatially discrete subpopulations that are connected by the dispersal movements of the individuals (Levins 1970; Hanski 1991). For metapopulations of listed species, a prerequisite to recovery is determining if unoccupied habitat patches are vacant due to the attributes of the habitat patch (food, cover, and patch area) or due to patch context (distance of the patch to other patches and distance of the patch to other features). Subpopulations on patches with higher quality food and cover are more likely to persist because they can support more individuals. Large populations have less of a chance of extinction due to stochastic events (Gilpin and Soule 1986). Similarly, small patches will support fewer individuals, increasing the rate of extinction. Patches that are near occupied patches are more likely to be recolonized when local extinction occurs and may benefit from emigration of individuals via the "rescue" effect (Hanski 1982; Gotelli 1991; Holt 1993; Fahrig and Merriam 1985). For the metapopulation to persist, the rate of patches being colonized must exceed the rate of patches going extinct (Levins 1970). If some subpopulations go extinct regardless of patch context, recovery actions should be placed on patch attributes. Patches could be managed to increase the availability of food and/or cover. Movements and dispersal corridors likely are critical to California red-legged frog population dynamics, particularly because the animals likely currently persist as metapopulations with

disjunct population centers. Movement and dispersal corridors are important for alleviating over-crowding and intraspecific competition, and also they are important for facilitating the recolonization of areas where the animal has been extirpated. Movement between population centers maintains gene flow and reduced genetic isolation. Genetically isolated populations are at greater risk of deleterious genetic effects such as inbreeding, genetic drift, and founder effects. The survival of wildlife species in fragmented habitats may ultimately depend on their ability to move among patches to access necessary resources, retain genetic diversity, and maintain reproductive capacity within populations (Hilty and Merenlender 2004; Petit et al. 1995; Buza et al. 2000).

Most metapopulation or meta-population-like models of patchy populations do not directly include the effects of dispersal mortality on population dynamics (Hanski 1994; With and Crist 1995; Lindenmayer and Possingham 1996). Based on these models, it has become a widely held notion that more vagile species have a higher tolerance to habitat loss and fragmentation than less vagile species. But models that include dispersal mortality predict exactly the opposite: more vagile species should be more vulnerable to habitat loss and fragmentation because they are more susceptible to dispersal mortality (Fahrig 1998; Casagrandi and Gatto 1999). This prediction is supported by Gibbs (1998), who examined the presence-absence of five amphibian species across a gradient of habitat loss. He found that species with low dispersal rates are better able than more vagile species to persist in landscapes with low habitat cover. Gibbs (1998) postulated that the land between habitats serves as a demographic "drain" for many amphibians. Furthermore, Bonnet et al. (1999) found that snake species that use frequent long-distance movements have higher mortality rates than do sedentary species.

Threats: Habitat loss, non-native species introduction, and urban encroachment are the primary factors that have adversely affected the California red-legged frog throughout its range. Several researchers in central California have noted the decline and eventual local disappearance of California and northern red-legged frogs in systems supporting bullfrogs (Rana catesbeiana) (Jennings and Hayes 1990; Twedt 1993), red swamp crayfish (Procambarus clarkii), signal crayfish (Pacifastacus leniusculus), and several species of warm water fish including sunfish (Lepomis spp.), goldfish (Carassius auratus), common carp (Cyprinus carpio), and mosquitofish (Gambusia affinis) (Moyle 1976, Barry 1992, Hunt 1993, Fisher and Schaffer 1996). This has been attributed to predation, competition, and reproduction interference. Twedt (1993) documented bullfrog predation of juvenile northern red-legged frogs (Rana aurora), and suggested that bullfrogs could prey on subadult northern California red-legged frogs as well. Bullfrogs may also have a competitive advantage over California red-legged frogs. For instance, bullfrogs are larger and possess more generalized food habits (Bury and Whelan 1984). In addition, bullfrogs have an extended breeding season (Storer 1933) during which an individual female can produce as many as 20,000 eggs (Emlen 1977). Furthermore, bullfrog larvae are unpalatable to predatory fish (Kruse and Francis 1977). Bullfrogs also interfere with California red-legged frog reproduction by taking adult male California red-legged frogs out of the breeding pool. Both California and northern red-legged frogs have been observed in amplexus (mounted on) with both male and female bullfrogs (Jennings and Hayes 1990; Twedt 1993; Jennings 1993). Thus bullfrogs are able to prey upon and out-compete California red-legged frogs, especially in sub-optimal habitat.

The urbanization of land within and adjacent to California red-legged frog habitat has also effected California red-legged frogs. These declines are attributed to channelization of riparian areas, enclosure of the channels by urban development that blocks dispersal, and the introduction of predatory fishes and bullfrogs. Diseases may also pose a significant threat, although the specific effects of disease on the California red-legged frog are not known. Pathogens are suspected of causing global amphibian declines (Davidson et al. 2003). Chytridiomycosis and ranaviruses are a potential threat to the red-legged frog because these diseases have been found to adversely affect other amphibians, including the listed species (Davidson et al. 2003; Lips et al. 2006). Mao et al. (1999 cited in Fellers 2005) reported northern red-legged frogs infected with an iridovirus, which was also presented in sympatric threespine sticklebacks in northwestern California. Ingles (1932a, 1932b, and 1933 cited in Fellers 2005) reported four species of trematodes from red-legged frogs, but he later synonymized two of them, i.e.found them to be the same as the other two. Non-native species, such as bullfrogs and non-native tiger salamanders that live within the range of the California red-legged frog have been identified as potential carriers of these diseases (Garner et al. 2006). Human activities can facilitate the spread of disease by encouraging the further introduction of non-native carriers and by acting as carriers themselves (i.e., contaminated boots, waders or fishing equipment). Human activities can also introduce stress by other means, such as habitat fragmentation, that results in the listed species being more susceptible to the effects of disease.

Status of the Species: The recovery plan for red-legged frogs identifies eight Recovery Units (Service 2002). The establishment of these Recovery Units is based on the Recovery Team's determination that various regional areas of the species' range are essential to its survival and recovery. The status of the red-legged frog will be considered within the smaller scale of Recovery Units as opposed to the overall range. These Recovery Units are delineated by major watershed boundaries as defined by U.S. Geological Survey hydrologic units and the limits of the range of the California red-legged frog. The goal of the draft recovery plan is to protect the long-term viability of all extant populations within each Recovery Unit. Within each Recovery Unit, core areas have been delineated and represent contiguous areas of moderate to high red-legged frog densities that are relatively free of exotic species such as bullfrogs. The goal of designating core areas is to protect metapopulations that, combined with suitable dispersal habitat, will allow for the long term viability within existing populations. This management strategy will allow for the recolonization of habitat within and adjacent to core areas that are naturally subjected to periodic localized extinctions, thus assuring the long-term survival and recovery of red-legged frogs.

Environmental Baseline

Based on reported occurrences from the California Natural Diversity Database (CNDDB), California red-legged frogs are known to occur within the Salmon Creek watershed and have been documented within 2 miles of the action area (CDFG 2010). Salmon Creek within the action area provides suitable non-breeding aquatic habitat for this species but lacks features such as backwaters with emergent vegetation that would provide suitable breeding habitat. Riparian habitat and grazed pastures within the action area provide suitable upland foraging, refugia, and dispersal habitat. Based on known occurrences within the watershed, the presence of suitable habitat for California red-legged frogs within the action area, and the biology and ecology of the species, the likelihood of their occurrence within the action area is relatively high.

California Freshwater Shrimp

The California freshwater shrimp was listed as an endangered species on October 31, 1988 (Service 1988). A detailed account of this species' taxonomy, biology, and ecology is presented in the *Recovery Plan for the California Freshwater Shrimp* (Service 1998).

The California freshwater shrimp is a decapod crustacean of the family Atyidae. The Atyidae includes four species in the United States including *Syncaris pasadenae*, which inhabited streams of southern California, is presumed extinct, and *Syncaris pacifica* (California freshwater shrimp), the only representative of this genus in the United States. According to Eng (1981), California freshwater shrimp adults are generally less than 2 inches in postorbital length (from eye orbit to tip of tail). Based on individuals collected in October, Eng (1981) described females ranging between 1.26-1.77 inches in length and males from 1.14-1.52 inches in length. The California freshwater shrimp's coloration is variable. Juvenile and adult males are translucent to nearly transparent (Martin and Wicksten 2004) with small surface and internal color-producing cells (chromatophores) clustered in patterns to disrupt their body outlines. Females are similar in coloration, but have been known to be brown or purple (Eng 1981; Martin and Wicksten 2004). Both sexes can darken or lighten their color, but females have this ability to a larger degree (Service 1998). Undisturbed shrimp move slowly and are virtually invisible on submerged leaf and twig substrates and among fine, exposed, live tree roots along undercut stream banks.

The Californa freshwater shrimp feeds upon fine particulate organic matter (Anderson and Cummins 1979; Eng 1981; Goldman and Horne 1983). They reach sexual maturity at the end of their second summer, and reproduction appears to occur once a year. Based upon the reproductive physiology and behavior of other marine and freshwater shrimp, the male probably transfers and fixes a sperm sac to the female after her last molt, before autumn. Serpa (1991) reported that most adult females in Huichica Creek were bearing eggs by November. Females produce relatively few eggs, generally, 50 to 120 (Hedgpeth 1968; Eng 1981). No information is available on the percentage of juveniles that reach reproductive maturity.

The California freshwater shrimp has only been found in low elevation (less than 380 feet) and low gradient (generally less than 1 percent) streams (Service 1998). It is generally found in stream reaches where banks are structurally diverse with undercut banks, exposed fine root systems, overhanging woody debris, or overhanging vegetation (Eng 1981; Serpa 1986 and 1991). Excellent habitat conditions for this animal involve streams 12 to 36 inches in depth with live roots along undercut banks (greater than 6 inches) with overhanging stream vegetation and vines (Serpa 1991). Such microhabitats may provide protection from high velocities and sediment loads associated with high stream flows. Where this species is present in two connecting watercourses, smaller tributaries generally support greater numbers of shrimp than their larger receiving streams. With the exception of Yulupa Creek, California freshwater shrimp have not been found in stream reaches with boulder and bedrock bottoms. High velocities and turbulent flows in such reaches may hinder the animal's upstream movement. A National Park Service (NPS) and U.S. Geological Survey (USGS) study examining the habitat requirements of California freshwater shrimp in Lagunitas and Olema creeks found that shrimp typically used areas with overhanging vegetation, emergent vegetation, and fine roots where they occurred in conjunction with low water current velocities and sandy substrate, such as in edge

habitat of glides and pools, leading them to conclude that California freshwater shrimp may require these key habitat variables together in one place in order to persist for prolonged periods (Martin et al. 2009).

Habitat preferences apparently change during late spring and summer months. Eng (1981) rarely found California freshwater shrimp beneath undercut banks in summer; submerged leafy branches were the preferred summer habitat. In Lagunitas Creek, Marin County, individuals were found in a wide variety of trailing, submerged vegetation (Li 1981). Highest concentrations of this species were in reaches with adjacent vegetation comprised of stinging nettles (*Urtica* species), grasses, blackberry (*Rubus* species), and mint (*Mentha* species). None were caught from cattails (*Typha* species), cottonwood (*Populus fremontii*), or California laurel. Serpa (personal communication with the Service, 1994 cited in Service 1998) noted that populations were proportionally correlated with the quality of summer habitat provided by trailing terrestrial vegetation. However, during summer low flows, California freshwater shrimp have been found in apparently poor habitat such as isolated pools with minimal cover. In such streams, opaque waters may allow the animal to escape predation and persist in open pools (Serpa 1991). Further research is needed to determine if both winter and summer habitat needs to be provided within the same location or if California freshwater shrimp can move between areas containing either winter or summer habitat (Service 1998).

The California freshwater shrimp has evolved to survive a range of stream and water temperature conditions characteristic of small, perennial coastal streams. However, no data are available for defining the optimum temperature and stream flow regime for the species or the limits it can tolerate. The animal appears to be able to tolerate warm water temperatures (greater than 73° Fahrenheit) and low flow conditions that are detrimental or fatal to native salmonids. Although largely absent from existing streams, large, complex organic debris dams may have been prevalent in streams supporting California freshwater shrimp populations. These structures may have been important feeding and refugial (resting) sites. Such structures are known to collect detritus (debris formed by the decomposition of plants and animals (i.e., food)) as well as leaf litter, which can be later broken down by microbial activity and invertebrates into fine particulate matter (Triska *et al.* 1982). In addition, debris dams may offer shelter during high flow events and reduce displacement of invertebrates (Covich *et al.* 1991). Some debris dams may break apart during high flow events and allow California freshwater shrimp to disperse periodically and maintain genetic connections among populations.

The California freshwater shrimp is assumed to have been common historically in perennial freshwater streams within Marin, Sonoma, and Napa counties. The species has been observed in 23 streams within these counties (Service 2007) and can be separated into four general geographic regions: (1) tributary streams in the lower Russian River drainage, (2) coastal streams flowing to the Pacific Ocean, (3) streams draining into Tomales Bay, and (4) streams flowing southward to San Pablo Bay. Many of these streams contain shrimp populations that are now isolated from each other. Huichica Creek is located in the geographic region in which streams flow southward to San Pablo Bay and its habitat value was qualitatively rated as excellent in the 1980's (Serpa 1986). Populations in Salmon and Lagunitas Creeks were rated good to excellent due to the relatively high numbers of sampled shrimp over a relatively long distance. Populations on Stemple, Green Valley, Austin, Walker, and Yulupa Creeks and Napa

River were rated extremely poor to fair poor due to limited distribution and low numbers of sampled shrimp. No ratings are available for Atascadero Creek, Redwood Creek, Olema Creek, and Laguna de Santa Rosa due to insufficient information. In addition to the 17 streams noted in the recovery plan (Service 1998), the species is now known from "Bud Creek" in Sonoma County (L. Serpa. The Nature Conservancy, personal communication with the Service, 2006), Fallon Creek in Marin County, Franz Creek in Sonoma County (Martin and Wicksten 2004; Serpa 2002), Ebabias Creek in Sonoma County (B. Cox, California Department of Fish and Game, personal communication with the Service, 2006), Cheda Creek in Marin County (Fong 2004), an unnamed tributary of Huichica Creek in Napa County (L. Serpa, The Nature Conservancy, personal communication with the Service, 2006), and an additional unconfirmed record in the Napa River near the confluence of Sulphur Creek, approximately 8.5 miles south of the existing record at the confluence of the Napa River with Garnett Creek (Natural Resources Management 2006).

Distribution of California freshwater shrimp populations within streams is not expected to be static because of habitat changes from natural or manmade forces. Distribution may expand or contract depending upon conditions within streams. For example, long-term drought conditions may have resulted in more discontinuous populations in Huichica Creek (Serpa 1991). A recovery objective for the California freshwater shrimp is the gradual removal of unnatural barriers to dispersal and restoration of natural habitat conditions (Service 1998). These measures are expected to expand California freshwater shrimp distribution beyond its existing range. Existing California freshwater shrimp distribution in streams is not continuous, and the species often occupies only short reaches of the stream (Service 1998). However, entire streams are considered habitat for the species because it disperses between areas of good habitat.

Threats to the California freshwater shrimp include viticulture operations, irrigation diversions, sewage, bank protection measures, migration barriers (e.g., culverts, bridge footings/sills, and grade control structures), urban residential/commercial development, and introduced predators (Service 1998). Introduced fish may affect shrimp distribution significantly through predation. Common carp, which dislodge and consume invertebrates from plants and silty bottoms through their rooting activities (Moyle 1976), occur in Stemple Creek (Serpa 1986). Introduced sunfish (*Lepomis cyanellus*) and mosquitofish are also likely California freshwater shrimp predators (Service 1998). Williams (1977) found no coexistence between mosquitofish and atyids in Hawaiian streams. Because of the relatively recent introduction of these fish, the California freshwater shrimp main defensive characteristic (cryptic coloration) may not be sufficient to reduce their risk of predation. Like the endangered crustacean, many introduced fish can persist under relatively poor water quality conditions in the absence of natural predators such as juvenile steelhead (*Oncorhynchus mykiss*). Additionally, several native fish species also prey on the shrimp. Results from stomach content analysis from a study on habitat requirements in Lagunitas and Olema creeks found that prickly sculpin (*Cottus asper*) and riffle sculpin (*Cottus gulosus*) prey on the California freshwater shrimp (Saiki 2006).

The California freshwater shrimp has a relatively low fecundity, is believed to reproduce only once a year, and requires over one year to reach sexual maturity (Service 1998). It has no known resistant or dormant life stage that would allow it to survive a toxic event such as a chemical spill.

Objectives in the California freshwater shrimp's recovery plan include protection of existing populations, removal of threats to these populations, and enhancement of habitat for native aquatic species within its historic range, and the development and implementation of watershed plans. Several watershed management and/or enhancement plans have been developed, primarily by local Resource Conservation Districts (RCD). Watershed plans exist for the Tomales Bay Watershed including Lagunitas Creek, Olema Creek, Walker Creek, Keys Creek, and Stemple Creek (Tomales Bay Watershed Council 2003), Laguna de Santa Rosa including Santa Rosa and Blucher Creeks (Honton and Sears 2006), Sonoma Creek including Yulupa Creek (Southern Sonoma County RCD 2004), the northern Napa River including Garnett Creek (Koehler 2002), and Huichica Creek (L. Sharp, Napa County RCD, personal communication with the Service, 2006).

A number of restoration projects undertaken by the Bay Institute, through the Students and Teachers Restoring a Watershed (STRAW) program, have been implemented to improve habitat for the shrimp since 1993; these projects have focused on removing exotic vegetation, planting native species, erecting livestock exclusion fencing, and installing cattle bridges (L. Rogers, The Bay Institute, personal communication with the Service, 2006). To date, the STRAW project has completed approximately 185 projects restoring over 50,000 linear feet of stream bank. The Service's Partners for Fish and Wildlife program has provided some funding for these restoration efforts; in these instances contracts for the continued management of the properties for the benefit of wildlife are in place, but the contracts will eventually expire and do not represent long term protection (D. Strait, Fish and Wildlife biologist, Service, personal communication 2006).

To date, Lagunitas Creek is the only stream inhabited by the California freshwater shrimp with long term population data. According to information from Serpa (2002) shrimp populations in Lagunitas Creek increased from 1994 through 2000 from approximately 1,465 individuals to 4,407 respectively. The increase followed an increase in linear feet of pool habitat within the creek. However, an unpublished report from Quinlan (2006) provides additional population data in Lagunitas Creek from 2000-2004, in which the number of individuals decreased from approximately 4,400 to 2,100 respectively, which was inversely related to an increase in mean stream width.

Environmental Baseline

Salmon Creek is one of 23 streams known to support the California freshwater shrimp (Service 2007). The recovery plan (Service 1998) rates the Salmon Creek population as good to excellent due to the relatively high numbers of sampled individuals over a relatively long distance (182 shrimp over 11.9 miles). Within Salmon Creek, California freshwater shrimp have been reported from approximately 2.25 miles upstream of the estuary to just north of Bodega Road at Freestone, including from within the project reach (CDFG 2010). Suitable breeding and summer habitat is present within the action area and recent sampling found individuals present within the project reach (B. Cox, California Department of Fish and Game, personal communication with the Service, 2010).

Effects of the Proposed Action

California Red-legged Frog

The proposed Salmon Creek Large Wood Structures and Gilardi Ranch Riparian Planting Project will result in temporary effects (including temporary loss of habitat and increased disturbance) to non-breeding aquatic habitat for California red-legged frog provided by Salmon Creek and upland refugia, foraging, and dispersal habitat provided by the Salmon Creek riparian corridor and adjacent pastures. This will result in direct and indirect effects to the species. Although adverse short-term effects to the California red-legged frog will occur, the proposed action will likely result in an overall net benefit to the frog by increasing aquatic habitat diversity, increasing forested riparian buffer width, vegetation density, species complexity, and functional diversity along Salmon Creek.

Placement of large woody structures, pipeline installation, and associated dewatering activities will cause the temporary loss of approximately 0.14 acre of aquatic habitat for California red-legged frog and could result in the direct mortality, injury, or harassment of individuals present in the habitat areas affected when work is conducted. Placement of large woody structures into the creek could trap or crush frogs resulting in injury or mortality and use of large and small construction equipment for installation of woody structures could disturb, collapse, or crush animal burrows resulting in injury or mortality. Use of large equipment and vehicles within the action area may also result in the death or injury of the threatened amphibian through vehicle strikes. If water pumps are used, injury or mortality may occur if frogs become entrained or trapped in pumps. Work activities that temporarily disturb habitat may harass individuals by causing them to leave the work area which could subject individuals to increased potential for predation, desiccation, and competition for food and shelter. Conducting awareness training for employees, conducting preconstruction surveys for California red-legged frogs, having a Service-approved biologist present at the work site to prevent injury to California red-legged frogs and move them to a safe location, minimizing the number and size of access routes and staging areas, screening pump intakes, and returning the stream to its natural flow and bed conditions upon project completion will minimize these effects.

Planting of trees, shrubs, and rushes along the upper, middle, and lower banks of the mainstem Salmon Creek and along an ephemeral gully will result in temporary disturbance to 1.25 acres of riparian habitat. Equipment access and staging will result in temporary disturbance to up to 1 acre of grazed pastureland. Because all riparian plantings will be installed using hands tools (e.g., shovels, trowels, etc.) and no grading will take place, impacts to riparian habitat will be minimal and the risk of injury or mortality to California red-legged frogs will be relatively low. However, increased human presence within the project area will increase disturbance to the animals and will likely displace individuals from the planting area, potentially exposing displaced individuals to increased levels of predation and decreasing their ability to find required resources such as food and shelter as they move along the Salmon Creek corridor. Conducting awareness training for employees, conducting preconstruction surveys for California red-legged frogs, and having a Service-approved biologist present at the work site to prevent injury to frogs and move them to a safe location will minimize these effects.

Although surveys for California red-legged frogs and the presence of an on-site biological monitor will reduce the likelihood of injury caused by ground disturbing activities within the work area, capturing and handling these animals to remove them from a work area may result in harassment and harm. Stress, injury, and mortality may occur as a result of improper handling, containment, and transport of individuals

Disturbance to the stream channel caused by installation of woody structures and dewatering activities would likely mobilize soil and debris and cause increased siltation and decreased water quality downstream. Hazardous substances from leaking equipment could also result in decreased water quality. Contaminated equipment and workers could introduce or spread nonnative invasive plant species, which would diminish vegetative cover and riparian habitat utilized by California red-legged frogs. Implementing best management practices for erosion control, ensuring efforts to avoid the introduction of invasive species are implemented, reducing the area to be disturbed to the minimum necessary, and conducting work during the dry season will minimize these effects.

California Freshwater Shrimp

The proposed action will result in temporary effects to habitat for California freshwater shrimp and could have adverse effects on shrimp through mortality, injury, harassment, and harm of individuals. Although the installation of woody structures within the project reach will result in adverse short-term effects to their habitat in the project reach, it is expected to result in an overall increase in habitat complexity, provide summer habitat for California freshwater shrimp, and potentially improve the quality of winter refugia habitat at sites where low-quality winter habitat currently exists.

Installation of large woody structures will result in the temporary loss of 0.14 acre of habitat for California freshwater shrimp and could result in permanent effects to areas of overhanging vegetation and undercut banks with fine roots that provide winter refugia habitat. Because installation sites were selected to minimize effects to areas with stable undercut banks with sufficient horizontal depth to provide refuge from high velocity flows, impacts to winter refugia habitat were minimized. Where effects to winter refugia habitat will occur, it is anticipated that installation of structures may ultimately improve habitat quality.

Placement of large woody structures, pipeline installation, and associated dewatering activities could result in the direct mortality, injury, or harassment of individuals present in the habitat areas affected when the work is conducted. Placement of structures into the creek could trap or crush individuals resulting in injury or mortality. Decreased water quality caused by placement of structures could result in mortality of shrimp trapped within work areas. Relocating individuals to suitable habitat outside of work areas, excluding them from work areas using blocking seines and exclusion fencing, dewatering work areas as necessary, having a biological monitor on site to ensure impacts are minimized, and performing work during the dry season when water flows are reduced will minimize these effects.

Temporary dewatering may harm the California freshwater shrimp by preventing movement upstream and downstream for the duration of the project and injury or mortality may occur if

individuals become entrained or trapped in water pumps. If water pumps are used, entrainment will be minimized by installing mesh screening over water intakes. Although relocating individuals to habitat outside of areas to be dewatered will reduce the likelihood of mortality and injury within the work area, capturing and handling these animals may result in the harassment and harm of these individuals. Stress, injury, and mortality may occur as a result of improper handling, containment, and transport of individuals.

Disturbance to the channel would likely mobilize soil and debris and cause increased siltation downstream. This siltation could alter the quality of the habitat to the extent that use by individuals of the species is precluded. Shrimp may also experience reduced health or increased mortality as a result of equipment leaking hazardous substances into the creek and increased sediment due to erosion. Implementing best management practices for erosion control and reducing the area to be disturbed to the minimum necessary should decrease the amount of sediment that is washed downstream as a result of project activities.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The Service is not aware of any non-federal actions currently planned for the area surrounding the proposed action. However, numerous activities that could negatively impact California red-legged frogs and California freshwater shrimp in and near the project area could result from private actions that may occur without consultation with or authorization by the Service. The action area lies within a working ranch and effects from ranching activities could include reduction of riparian vegetation, degraded water quality, increased water temperatures, and bank erosion resulting from cattle grazing and reduced stream flows resulting from impoundments or water diversions.

The global average temperature has risen by approximately 0.6 degrees Celsius during the 20th Century (IPPC 2001, 2007; Adger *et al* 2007). There is an international scientific consensus that most of the war74ming observed has been caused by human activities (IPPC 2001, 2007; Adger *et al.* 2007), and that it is "very likely" that it is largely due to manmade emissions of carbon dioxide and other greenhouse gases (Adger *et al.* 2007). Ongoing climate change (Anonymous 2007; Inkley *et al.* 2004; Adger *et al.* 2007; Kanter 2007) likely imperils several listed species including the California red-legged frog and the California freshwater shrimp and the resources necessary for their survival. Since climate change threatens to disrupt annual weather patterns, it may result in a loss of their habitats and/or food sources, and/or increased numbers of their predators, parasites, and diseases. Where populations are isolated, a changing climate may result in local extinction, with range shifts precluded by lack of habitat.

Conclusion

After reviewing the current status of the California red-legged frog and the California freshwater shrimp; the environmental baseline for the action area; the effects of the proposed Salmon Creek Large Wood Structures and Gilardi Ranch Riparian Planting Project, and the cumulative effects; it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of these listed species. We base this conclusion on the temporary nature of adverse effects to listed species, the implementation of conservation measures to minimize effects to listed species, and the expected long-term benefits to listed species resulting from the proposed action including increased habitat quality and complexity.

INCIDENTAL TAKE STATEMENT

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

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

Amount or Extent of Take

<u>California Red-legged frog</u>

The Service anticipates incidental take of the California red-legged frog will be difficult to detect or quantify because it is unlikely an injured or dead specimen will be found due to the elusive nature of this species, its size, and cryptic appearance. However, the level of incidental take of this animal can be anticipated by the effects to cover, foraging, and breeding habitat. Conservation measures proposed in the *Description of the Proposed Action* in this biological opinion will substantially reduce, but do not eliminate, the potential for incidental take of this listed species. The Service, therefore, anticipates incidental take of the California red-legged

frog will result from the proposed project. Due to the difficulty in quantifying the number of frogs that will be taken as a result of the proposed action, all California red-legged frogs inhabiting the 2.39-acre project area within the action area (this includes the 1.25-acre riparian planting area, the 0.14-acre of in-stream work, and the 1-acre of access routes and staging areas) will be subject to incidental take in the form of harm, harassment and capture; and one (1) California red-legged frog will be subject to incidental take in the form of death or injury. Upon implementation of the Reasonable and Prudent Measures, incidental take associated with the Salmon Creek Large Wood Structures and Gilardi Ranch Riparian Planting Project will become exempt from the prohibitions described under section 9 of the Act.

California Freshwater Shrimp

The Service expects that incidental take of the shrimp will be difficult to detect or quantify. The aquatic nature, cryptic coloration, secretive habits, and small body size of the species make the finding of a dead specimen unlikely; losses may be masked by seasonal fluctuations in numbers or other causes; and the species occurs in habitat that makes them difficult to detect. Due to the difficulty in quantifying the number of shrimp that will be taken as a result of the proposed action, the Service estimates that all individuals within the 0.14 acre will be subject to incidental take in the form of harm, harassment and capture; and fifteen (15) California freshwater shrimp will be subject to incidental take in the form of death or injury. Upon implementation of the following reasonable and prudent measures, incidental take of shrimp associated with the proposed Salmon Creek Large Wood Structures and Gilardi Ranch Riparian Planting Project in the form of harm, harassment, pursuit, capture, injury, or mortality will become exempt from the prohibitions described under section 9 of the Act.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the California red-legged frog or the California freshwater shrimp.

Reasonable and Prudent Measure

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize the effect of take on the California red-legged frog and California freshwater shrimp:

> NOAA through the applicant shall fully implement all of the Conservation Measures as described in the Description *of the Proposed Action* of this biological opinion.

Terms and Conditions

To be exempt from the prohibitions of Section 9 of the Act, the applicant shall ensure compliance with the following terms and conditions, which implement the reasonable and prudent measure-- described above. These terms and conditions are nondiscretionary.

The following terms and conditions will implement the Reasonable and Prudent Measure described above:

1. The applicant shall minimize the potential for harm, harassment, injury, and death of federally listed wildlife species resulting from project related activities including implementation of the Conservation Measures in this biological opinion.

2. If requested, during or upon completion of construction activities, the on-site biologist, and/or a representative from the applicant's agency or the Service-approved biologist shall accompany Service personnel on an on-site inspection of the project area(s) to review project effects to California red-legged frogs and California freshwater shrimp and their habitats.

3. The applicant shall ensure compliance with the *Reporting Requirements* of this biological opinion.

Reporting Requirements

The Service must be notified within one (1) business day of the finding of any injured California red-legged frog or California freshwater shrimp, or any unanticipated damage to their habitats associated with the proposed project. Injured frogs must be cared for by a licensed veterinarian or other qualified person such as the Service-approved biologist. Notification should include the date, time, and precise location of the individual/incident clearly indicated on a USGS 7.5 minute quadrangle and other maps at a finer scale, as requested by the Service, and any other pertinent information. Dead individuals must be sealed in a zip-lock® plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it. The bag containing the specimen must be frozen in a freezer located in a secure area. The Service contact persons are the Division Chief, Endangered Species Program at the Sacramento Fish and Wildlife Office (916) 414-6600, and the Resident Agent-in-Charge of the Service's Law Enforcement Division, 2800 Cottage Way, Room W-2928, Sacramento, California 95825, at (916) 414-6660.

The applicant shall submit a post-construction compliance report prepared by the on-site biologist to the Sacramento Fish and Wildlife Office within sixty (60) calendar days of the date of the completion of construction activity. This report shall detail (i) dates that construction occurred; (ii) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the California red-legged frog and California freshwater shrimp, if any; (v) occurrences of incidental take of any listed species, if any; (vi) documentation of employee environmental education; and (vii) other pertinent information.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can

be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases. The Service requests notification of the implementation of any conservation recommendations in order to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats. We propose the following conservation recommendations:

1. NOAA should assist the Service in implementing recovery actions identified in the *Recovery Plan for the California Red-legged Frog* (Service 2002) and *Recovery Plan for the California freshwater shrimp* (Service 1998).

2. NOAA should encourage or require the use of appropriate locally collected California native species in revegetation and habitat enhancement efforts.

3. NOAA should encourage fisheries restoration efforts to include development of habitat features that will benefit California freshwater shrimp.

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

REINITIATION--CLOSING STATEMENT

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

If you have questions concerning this biological opinion on the Salmon Creek Large Wood Structures and Gilardi Ranch Riparian Planting Project, please contact Stephanie Jentsch or Ryan Olah at the letterhead address, at telephone number (916) 414-6600, or email Stephanie_Jentsch@fws.gov or Ryan_Olah@fws.gov.

Sincerely,

for Susan K. Moore
Field Supervisor

cc:
Greg Martinelli and Adam McKanny, California Department of Fish and Game, Yountville, CA
John Green, Gold Ridge Resource Conservation District, Occidental, CA

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