# Site Assessment for the California Red-Legged Frog

Battle Creek Salmon and
Steelhead Restoration Project
Shasta and Tehama Counties, California

*Submitted to:*

**Navigant Consulting, Inc.**

*In Association with:*

**U.S. Bureau of Reclamation**

*Submitted by:*

Jones & Stokes

**Sacramento, California**

March 2001

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# Restoration Project
# Shasta and Tehama Counties, California

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# Contents

Introduction ..... 1
Project Overview ..... 1
Background ..... 4
Species Account ..... 4
    Legal Status ..... 4
    Species Description ..... 4
    Reasons for Decline ..... 5
    Habitat Requirements ..... 5
Assessment Methods ..... 6
Results ..... 8
    North Battle Creek Feeder Diversion Dam ..... 8
    Eagle Canyon Diversion Dam ..... 8
    Wildcat Diversion Dam ..... 8
    Coleman Diversion Dam ..... 9
    Inskip Powerhouse ..... 9
    Inskip Penstock Junction Box ..... 9
    Lower Ripley Feeder ..... 10
    Inskip Diversion Dam ..... 10
    South Powerhouse ..... 10
    Soap Creek Diversion Dam ..... 11
    South Diversion Dam ..... 11
    Occurrence in the Project Area or Vicinity ..... 12
    Other Potential Habitat in the Project Area ..... 12
Conclusion ..... 13
References ..... 14
    Printed References ..... 14
    Personal Communication ..... 16

# Tables and Figures

**Table** **Page**

1. Survey Site Information and Distance Surveyed ..... 6
2. Summary of Habitat Suitability for the Red-Legged Frog at the Survey Sites ..... 13

**Figure** **Follows Page**

1. Location of the Battle Creek Salmon and Steelhead Restoration Project ..... 2
2. Sites within the Project Area That Were Assessed for their Suitability for California Red-Legged Frogs ..... 4
3. Representative Photographs of North Fork Battle Creek at the North Battle Creek Feeder Diversion Dam ..... 8
4. North Fork Battle Creek at the Eagle Canyon Diversion Dam ..... 8
5. North Fork Battle Creek at the Wildcat Diversion Dam ..... 8
6. Representative Photographs of South Fork Battle Creek at the Coleman Diversion Dam ..... 8
7. Representative Photographs of South Fork Battle Creek at the Inskip Powerhouse ..... 8
8. Eagle Canyon Canal at the Penstock Junction Box ..... 10
9. Ripley Creek at the Ripley Feeder ..... 10
10. Representative Photographs of South Fork Battle Creek at the Inskip Diversion Dam ..... 10
11. South Fork Battle Creek at the South Powerhouse ..... 10
12. Representative Photographs of Soap Creek at the Soap Creek Diversion Dam ..... 10
13. South Fork Battle Creek at the South Diversion Dam ..... 12
14. Representative Photographs of Potential Habitat within 1 Mile of the Project Area ..... 12

# Acronyms

| | |
|---|---|
| CALFED | CALFED Bay-Delta Program |
| CNDDB | California Natural Diversity Database |
| CNFH | Coleman National Fish Hatchery |
| DFG | California Department of Fish and Game |
| FERC | Federal Energy Regulatory Commission |
| Hydroelectric Project | Battle Creek Hydroelectric Project |
| Licensee | PG&E |
| red-legged frog | California red-legged frog |
| Restoration Project | proposed Battle Creek Salmon and Steelhead Restoration Project |
| USFWS | U.S. Fish and Wildlife Service |

# Site Assessment for the California Red-Legged Frog Battle Creek Salmon and Steelhead Restoration Project Shasta and Tehama Counties, California

## Introduction

This site assessment report for the California red-legged frog (*Rana aurora draytonii*), a species federally listed as threatened, was prepared for the Battle Creek Salmon and Steelhead Restoration Project (Restoration Project) to comply with U.S. Fish and Wildlife Service's (USFWS's) *Guidelines on Site Assessment and Field Surveys for California Red-Legged Frogs* (appendix A). The site assessment will be used by USFWS to determine the need for protocol-level field surveys for red-legged frogs. The U.S. Bureau of Reclamation (Reclamation) is the federal lead agency for the planning and implementation of the proposed Restoration Project, a major federal action. Reclamation is also responsible for ensuring National Environmental Protection Act (NEPA) compliance for this proposed federal action. The State Water Resources Control Board (SWRCB) is acting as the state lead agency to ensure compliance with the California Environmental Quality Act (CEQA) for the proposed Restoration Project.

## Project Overview

Declining salmonid populations in the Sacramento River system have resulted in the need to implement habitat restoration actions throughout the watershed to preserve and enhance current populations. Battle Creek, a tributary to the Sacramento River, presents 1 such restoration opportunity through the Restoration Project. This restoration effort is supported by directives from the following programs:

- Central Valley Project Improvement Act's Anadromous Fish Restoration Program;
- CALFED Bay-Delta Program's (CALFED's) California Bay-Delta Ecological Restoration Program;

- California's State Salmon, Steelhead Trout, and Anadromous Fisheries Program Act (California Senate Bill 2261, 1990);
- Central Valley Salmon and Steelhead Restoration and Enhancement Plan;
- Upper Sacramento River Fisheries and Riparian Habitat Management Plan (California Senate Bill 1086, 1989);
- National Marine Fisheries Service Proposed Recovery Plan for Sacramento River Winter-run Chinook Salmon;
- Restoring Central Valley Streams - A Plan for Action; and
- Steelhead Restoration Plan and Management Plan for California.

The Battle Creek watershed is located on the volcanic slopes of Mt. Lassen in northern California in Shasta and Tehama Counties (figure 1). Battle Creek stretches through remote, deep, shaded canyons and riparian corridors. The mountain stream is maintained by cold, spring-fed water with relatively high flows throughout the year. Before development in the watershed (described below), Battle Creek provided a contiguous stretch of prime habitat for anadromous chinook salmon and steelhead trout from its confluence with the Sacramento River upstream to natural barrier waterfalls. The decline of salmonid populations in the Sacramento River system in recent years has resulted in increased restoration efforts throughout the watershed to preserve and enhance current populations while addressing the needs of various stakeholders.

The purpose of the Restoration Project is to restore and enhance approximately 42 miles of habitat in Battle Creek plus an additional 6 miles of habitat in its tributaries while minimizing the loss of clean and renewable energy produced by the Pacific Gas and Electric Company (the Licensee) Battle Creek Hydroelectric Project, Federal Energy Regulatory Commission (FERC) Project 1121 (Hydroelectric Project). Habitat restoration and enhancement would enable safe passage for and facilitate the growth and recovery of naturally produced salmonids within the Sacramento River and its tributaries, including the Central Valley spring-run chinook salmon, state- and federally listed as threatened; the Sacramento River winter-run chinook salmon, state and federally listed as endangered; and the Central Valley steelhead, federally listed as threatened. The majority of this project will be accomplished through amendment of the FERC license for the Hydroelectric Project.

Fish habitat in Battle Creek has been affected primarily by the development of a privately owned hydroelectric project and a federal fish hatchery. The Hydroelectric Project was constructed within and adjacent to Battle Creek and its tributaries in the early 1900s. It consists of numerous small diversion dams and more than 40 miles of canals to support 5 powerplants. The Hydroelectric Project has been owned and operated by the Licensee since 1919 and was licensed by FERC in 1976. The Coleman National Fish Hatchery (CNFH), located downstream of the Hydroelectric Project, was constructed in the 1940s to mitigate for anadromous fish impacts associated with construction of Shasta Dam on the upper Sacramento River.

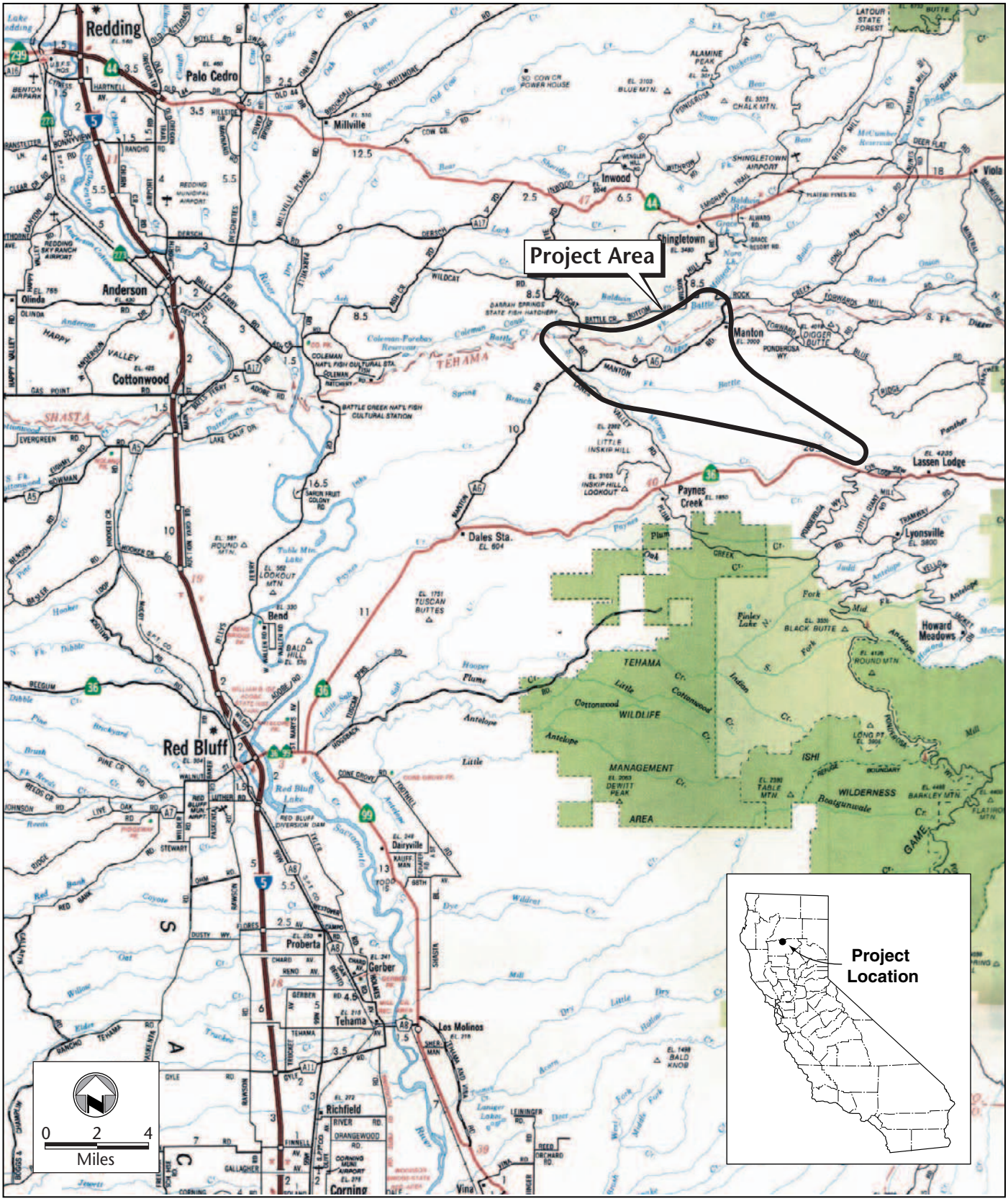


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**Figure 1**
**Location of the Battle Creek Salmon and Steelhead Restoration Project**

The Licensee is committed to work cooperatively to develop a cost-effective and equitable plan to address improvements for fish ladders, unscreened diversions, and inadequate streamflows for anadromous fishery habitat needs, including the removal and modification of some of its facilities. In June 1999, Reclamation entered into a Memorandum of Understanding with the National Marine Fisheries Service, the USFWS, the California Department of Fish and Game (DFG), and the Licensee to pursue a restoration plan for Battle Creek. Consequently, the federal/state interagency program known as CALFED provided $28 million in directed funding for the planning and implementation of the proposed Restoration Project. In addition to undertaking the proposed Restoration Project, USFWS is in the process of improving the CNFH intake structures and reevaluating its fish hatchery operations and has acquired CALFED funding for improvements to the CNFH seasonally operated fish barrier dam.

The proposed Restoration Project will involve restoration efforts at 11 sites along the North Fork and South Fork of Battle Creek (figure 2). These sites include the following:

- North Battle Creek Feeder Diversion Dam,
- Eagle Canyon Diversion Dam,
- Wildcat Diversion Dam,
- Coleman Diversion Dam,
- Inskip Powerhouse,
- Inskip Penstock Junction Box,
- Lower Ripley Creek Feeder,
- Inskip Diversion Dam,
- South Powerhouse,
- Soap Creek Feeder, and
- South Diversion Dam.

Each site listed above will be altered in some way to restore and enhance fisheries habitat along Battle Creek. Based on the 6 alternatives provided in the Notice of Preparation for the proposed Restoration Project, the dam at each site would be screened and laddered, or removed. In addition, hydropower facilities would be altered accordingly. A staging area and a means to gain access to each project site, i.e., an existing access road/trail or new access road/trail, would also be necessary to carry out construction activities.

# Background

The project area is within the historic range of the California red-legged frog (*Rana aurora draytonii*) (Jennings and Hayes 1994). Information about potential habitat in the project area, as well as California red-legged frog locality information, is important for determining the likelihood that the species will occur at the project site. A site assessment was conducted by Jones & Stokes to determine areas of suitable habitat for the California red-legged frog within the project area. This site assessment is the first step under USFWS's *Guidelines on Site Assessment and Field Surveys for California Red-Legged Frogs* (appendix A). After reviewing the site assessment, USFWS will determine if protocol-level field surveys are necessary. If necessary, surveys will be conducted to determine the presence or absence of the species. This report documents the results of the site assessment for California red-legged frogs.

# Species Account

## Legal Status

The California red-legged frog is 1 of 2 subspecies of the red-legged frog (*Rana aurora*) found on the Pacific Coast. USFWS designated the California red-legged frog as a threatened subspecies on June 24, 1996 (Federal Register 61:25813). Critical habitat for this species was proposed by USFWS on September 11, 2000 (Federal Register 65:54892). Several watersheds in the central portion of western Tehama County were proposed as designated critical habitat. This area of proposed critical habitat is approximately 10–15 miles south of the project area.

## Species Description

Historically, the California red-legged frog (red-legged frog) was commonly found from Redding, California, south to Baja California, including the Sierra Nevada and Coastal Ranges. Its current range is much reduced, with most remaining populations found in central California along the coast from Marin County south to Ventura County. Within its range, the red-legged frog breeds in lowland streams and wetlands, including livestock ponds. Red-legged frogs may also be found in upland habitats near breeding areas and along intermittent drainages connecting wetlands.

Red-legged frogs are highly aquatic and can reach 5 inches in snout–vent length. They can appear brown, gray, olive, or reddish from above with many small black flecks and larger irregular dark blotches. The back of the frog is bordered on each side by an often-prominent dorsolateral fold of skin between the eye and

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**Figure 2**
**Sites within the Project Area that were Assessed for their Suitability for California Red-Legged Frogs**

the hip. Their undersides are yellowish with red on the lower abdomen and underside of the hind legs. (Stebbins 1954, 1972).

## Reasons for Decline

The decline of the red-legged frog is attributable to a variety of factors. Large-scale commercial harvesting of red-legged frogs led to severe depletions of populations at the turn of the century (Jennings and Hayes 1985). Subsequently, exotic aquatic predators such as bullfrogs (*Rana catesbeiana*), crayfish (*Procambarus clarki*), and various species of fish became established and contributed to the continued decline of the species (Hayes and Jennings 1986). Habitat alterations such as conversion of land to agricultural and commercial uses, reservoir construction, off-road vehicle use, and abusive land-use practices (i.e., livestock grazing) threaten the remaining populations (Kauffman et al. 1983, Kauffman and Krueger 1984, Bohn and Buckhouse 1986, Jennings and Hayes 1994).

## Habitat Requirements

Red-legged frogs require cool water habitats, including pools, streams, and ponds with emergent and submergent vegetation (Storer 1925, Stebbins 1972). The highest densities of frogs are found in habitats with deepwater pools (at least 2.5 feet deep) with dense stands of overhanging willows and a fringe of tules or cattails (Hayes and Jennings 1988, Jennings 1988, Jennings and Hayes 1994). Juvenile frogs seem to favor open, shallow aquatic habitats with dense submergent vegetation. Although red-legged frogs can inhabit either ephemeral or permanent streams or ponds, populations probably cannot be maintained in ephemeral streams in which all surface water disappears (Jennings and Hayes 1994).

As adults, red-legged frogs are highly aquatic when active, but depend less on permanent water bodies than do other frog species (Brode and Bury 1984). Adults may take refuge during dry periods in rodent holes or leaf litter in riparian habitats. Although red-legged frogs typically remain near streams or ponds, marked and radio-tagged frogs have been observed to move more than 2 miles through upland habitat. These movements are typically made during wet weather and at night (U.S. Fish and Wildlife Service 2000).

Red-legged frogs typically lay their eggs in clusters around aquatic vegetation from December to early April. Eggs hatch in 6–14 days (Jennings 1988). Increased siltation of water bodies, which may occur during the breeding season, can cause asphyxiation of eggs and small larvae. Larvae undergo metamorphosis 3.5–7 months after hatching (Storer 1925, Wright and Wright 1949, Jennings and Hayes 1990). Recent information, however, indicates that larvae can take more than a year to complete metamorphosis (Fellers et al. 2000). Of the various life stages, larvae probably have the highest mortality rates; less than 1% of the eggs

laid reach metamorphosis (Jennings et al. 1992). Sexual maturity is normally reached at 3–4 years (Storer 1925, Jennings and Hayes 1985), and life expectancy is 8–10 years (Jennings et al. 1992).

The diet of red-legged frogs is highly variable. Larval red-legged frogs probably eat algae (Jennings et al. 1992). Hayes and Tennant (1985) found invertebrates to be the most common food item for juveniles and adults. Vertebrates such as Pacific tree frogs (*Hyla regilla*) and California deer mice (*Peromyscus californicus*) represented more than half of the food source for the larger frogs. Juvenile frogs are active diurnally and nocturnally, whereas adult frogs are largely nocturnal. Feeding activity most commonly occurs along the shoreline and on the surface of the water (Hayes and Tennant 1985).

# Assessment Methods

A Jones & Stokes wildlife biologist examined a topographic-based map of the project area and identified potential habitat (i.e., streams, springs, and ponds) for red-legged frogs within 1 mile of the project site. A records search of DFG's California Natural Diversity Database (CNDDB) (2000) was also conducted within a 5-mile radius of the project site. USFWS was contacted to discuss the project and to obtain information on red-legged frog observations in the area (Davis pers. comm.). Two biologists assessed the suitability of habitat for red-legged frogs at 11 sites within the project area on June 15 and 16, 2000 (figure 2). Table 1 provides information about each site and distances surveyed during the site assessment.

**Table 1.** Survey Site Information and Distance Surveyed

| Survey Site | Associated Drainage | Distance Surveyed |
|---|---|---|
| North Battle Creek Feeder Diversion Dam | North Fork Battle Creek | As far upstream and downstream as could be seen from the dam (approximately 500 feet each way) |
| Eagle Canyon Diversion Dam | North Fork Battle Creek | As far upstream and downstream as could be seen from the dam (approximately 100 feet each way) |
| Wildcat Diversion Dam | North Fork Battle Creek | As far upstream and downstream as could be seen from the dam (approximately 100 feet each way) |
| Coleman Diversion Dam | South Fork Battle Creek | 200 feet upstream and 200 feet downstream |
| Inskip Powerhouse | South Fork Battle Creek | As far upstream and downstream as could be seen from the powerhouse (approximately 500 feet each way) |
| Penstock Junction Box | Eagle Canyon Canal and South Inskip Canal | 200 feet upstream and 200 feet downstream |
| Lower Ripley Creek Feeder | Ripley Creek | 100 feet upstream and 100 feet downstream |
| Inskip Diversion Dam | South Fork Battle Creek | As far upstream and downstream as could be seen from above the dam (approximately 800 feet each way) |
| South Powerhouse | South Fork Battle Creek | 200 feet upstream and 200 feet downstream |
| Soap Creek Feeder | Soap Creek | 50 feet upstream and 100 feet downstream |
| South Diversion Dam | South Fork Battle Creek | 200 feet upstream, downstream surveyed from the dam (approximately 500 feet) |

The site assessment was based on habitat requirements described in USFWS' 1997 Guidance on Site Assessment and Field Surveys for California Red-Legged Frogs. To evaluate habitat suitability, the biologists assessed the potential of each site to support breeding, provide refuge, and support dispersal movements. The biologists attempted to survey 200 feet upstream and downstream from the water diversion structure at each site. In many cases, the banks were steep and heavily vegetated and could not be surveyed. In addition, the relatively fast flow of the creek in many areas made it dangerous to survey the creek banks. In these situations, the site was surveyed from 1 point (usually at the dam structure) and an assessment was made based on the appearance of the habitat as far upstream and downstream as could be seen.

Millseat Creek is located within 1 mile of the North Battle Creek Feeder Diversion Dam, and Digger Creek is located within 1 mile of Eagle Canyon Diversion Dam and North Battle Creek Feeder Diversion Dam. These 2 creeks were evaluated for their habitat suitability. Bailey Creek, Rock Creek, Spring Creek, Willow Springs, Macon Springs, and several unnamed ponds and springs are within 1 mile of the project site. These sites were not evaluated because they could not easily be accessed by road, the terrain in the area was steep and heavily vegetated, or they were on private property.

The biologists took notes on the characteristics of the creeks, topography, vegetation associated with the creeks, and amphibian species observed. Representative photographs of the survey areas were taken (figures 3–14).

# Results

For each of the 11 sites evaluated, characteristics of the site, the amphibian species observed, and an assessment of the habitat at the site to support red-legged frogs are described below.

## North Battle Creek Feeder Diversion Dam

North Fork Battle Creek at the North Battle Creek Feeder Diversion Dam is 30–50 feet wide and about 1–3 feet deep (figure 3). The banks are steep and contain large rocks and shrubby vegetation. The surrounding upland habitat, which consists of mixed oak woodland reaches almost to the creek banks. The stream is composed of run and riffle with a few backwater areas and no pools. No amphibians were observed during the site visit. The fast flow of the creek and lack of deep pools makes this area unsuitable breeding, refuge, or dispersal habitat for red-legged frogs.

# Eagle Canyon Diversion Dam

In the vicinity of the Eagle Canyon Diversion Dam, North Fork Battle Creek is approximately 50 feet wide and has a swift flow (figure 4). Steep canyon walls with California buckeye (*Aesculus californica*), oak (*Quercus* sp.), common fig (*Ficus carica*), and willow line the sides of the creek. Upstream of the dam, there is a large run of water, and downstream of the dam is continuous riffle. The upland habitat is mixed oak woodland. No amphibians were observed during the site visit. The fast flow of the creek and lack of deep pools make this area unsuitable breeding or dispersal habitat for red-legged frogs.

# Wildcat Diversion Dam

In the vicinity of the Wildcat Diversion Dam, North Fork Battle Creek is 50–75 feet wide and 2–5 feet deep (figure 5). The banks are moderately sloped and contain large rocks, grassy vegetation, and willows. The stream is composed of runs and riffles and has no pooled areas. The upland habitat is mixed oak woodland. No amphibians were observed during the site visit. The fast flow of the creek and lack of deep pools make this area unsuitable breeding, refuge, or dispersal habitat for red-legged frogs.

# Coleman Diversion Dam

South Fork Battle Creek near the Coleman Diversion Dam is approximately 50 feet wide with a moderately swift flow (figure 6). The creek consists mainly of riffles and runs with no pooled areas. One small shallow backwater area is present approximately 200 feet downstream of the dam. Upstream of the dam, the western side of the creek is steeply sloped and heavily vegetated. The eastern side of the creek is more gently sloped, and contains a large blackberry (*Rubus* sp.) thicket. Downstream of the dam, the western side of the creek is moderately sloped and is composed of a rock conglomerate with vegetation consisting of California wild grape (*Vitis californica*) and grasses. The eastern side of the creek is steeply sloped and consists mainly of rock conglomerate. The surrounding upland habitat consists of mixed oak woodland. Suckers (*Catostomus* sp.) and another unknown fish species were observed in the creek. No amphibians were observed. Because of the moderately swift flow and lack of deep-pooled areas, this section of South Fork Battle Creek does not provide suitable breeding, refuge, or dispersal habitat for red-legged frogs.

# Inskip Powerhouse

Inskip Powerhouse is located approximately 1,000 feet upstream of the Coleman Diversion Dam along South Fork Battle Creek. Upstream of the powerhouse, the creek consists of small riffles and 1 run with cobble bars and 1 long pool (figure

Upstream of the North Battle Creek Feeder Diversion Dam

Downstream of the North Battle Creek Feeder Diversion Dam

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**Figure 3**
**Representative Photographs of North Fork Battle Creek at the North Battle Creek Feeder Diversion Dam**

Figure 4. North Fork Battle Creek at the Eagle Canyon Diversion Dam

Figure 5. North Fork Battle Creek at the Wildcat Diversion Dam

Upstream of the Coleman Diversion Dam

Downstream of the Coleman Diversion Dam

Jones & Stokes

**Figure 6**
**Representative Photographs of South Fork Battle Creek at the Coleman Diversion Dam**

Downstream of the Inskip Powerhouse

Upstream of the Inskip Powerhouse

Jones & Stokes

**Figure 7**
**Representative Photographs of South Fork Battle Creek at the Inskip Powerhouse**

7). This area provides dispersal habitat for red-legged frogs but is not suitable for breeding or refuge. The western side of the creek has a steep slope, while the eastern side has a gentle slope. Vegetation consists of alder (*Alnus* sp.), willow (*Salix* sp.), and blackberry. The creek has a faster flow downstream of the powerhouse because of water input from the powerhouse (figure 7). This area provides dispersal habitat for red-legged frogs but is not suitable for breeding or refuge. Slope and vegetation downstream of the powerhouse is similar to that found upstream. The isolated pool upstream of the powerhouse appears shallow, has no emergent vegetation, and is not appropriate breeding habitat for red-legged frogs. The topographic features of the adjacent uplands are appropriate as dispersal habitat if red-legged frogs were present. However, the fast flow downstream of the powerhouse and near Coleman Diversion Dam is too swift to provide in-creek habitat for breeding, dispersal, or refuge.

## Inskip Penstock Junction Box

Eagle Canyon Canal and South Inskip Canal, located near the Inskip Penstock Junction Box, were evaluated for habitat suitability for red-legged frogs (figure 8). Water flow in the canals is very swift. Willows and blackberries cover portions of the steeply cut banks. The Inskip Penstock Junction Box area does not provide suitable breeding, refuge, or dispersal habitat for red-legged frogs. This area may become more suitable once the project is complete because water flow in these canals will be reduced.

## Lower Ripley Feeder

Ripley Creek near the Lower Ripley Feeder (figure 9) is 10–20 feet wide and has low flow. The banks are gently sloped and contain grassy vegetation, wild grape, and willows. The creek has areas of runs and several pooled areas containing emergent and submergent vegetation. The substrate in the creek consists of rock, cobble, and silt. Except for a deep pool next to the water control structure, the creek is shallow (up to 6 inches deep). No amphibians were observed.

A portion of Ripley Creek upstream of the Lower Ripley Feeder (figure 9) was also evaluated for its potential to support red-legged frogs. This portion of the creek is 4 feet wide and up to 1 foot deep with gently sloped banks covered by grassy vegetation. Many adult and larval bullfrogs were observed in this portion of the creek. A western pond turtle (*Clemmys marmorata*) was also observed here. Both of these areas of Ripley Creek provide suitable breeding, refuge, and dispersal habitat for red-legged frogs; however, the presence of bullfrogs decreases the suitability.

# Inskip Diversion Dam

South Fork Battle Creek near the Inskip Diversion Dam (figure 10) is approximately 40–50 feet wide with a large run and some riffles. Upstream of the dam, there is riparian vegetation on the northern side of the creek and a gravel bar on the southern side of the creek. Downstream of the dam, deeply cut bedrock with thick woodland vegetation extends to the stream banks. The fast flow and steeply cut banks near the dam make this portion of South Fork Battle Creek unsuitable breeding, refuge, and foraging habitat for red-legged frogs.

# South Powerhouse

In the vicinity of the South Powerhouse, South Fork Battle Creek is 50 feet wide and 4–8 inches deep (figure 11). The creek consists mainly of runs and some riffles with a cobble substrate. The creek has 1 small pool that is about 6 inches deep, but no emergent or submergent vegetation is present. The upland habitat is composed of mixed-oak woodland. One of the project alternatives proposes the construction of a retaining wall and gravel road downstream of the powerhouse. The road would begin at the powerhouse and end at the Inskip Diversion Dam (approximately 1,850 feet long). It is possible that the portion of the proposed road nearest to the powerhouse will require some fill material placed along approximately 150 feet of the northern bank. The proposed road will also require the installation of a box culvert placed across an existing tailrace channel that diverts water from the powerhouse to the creek. Water flow in this area is very swift and precludes the presence of red-legged frogs. The remainder of the road is 50–200 feet from the creek, primarily along the steep hillside to the north.

Two juvenile foothill yellow-legged frogs (*Rana boylii*) and many foothill yellow-legged frog tadpoles were observed in the creek adjacent to South Powerhouse. Two western aquatic garter snakes (*Thamnophis couchii*) were also observed in this area. Willows along portions of the banks provide some refuge habitat for red-legged frogs. If red-legged frogs occurred in this area, they might use the creek as a dispersal corridor or take refuge along the banks under the willows. However, because of the absence of deep pools with emergent vegetation, this section of South Fork Battle Creek does not have suitable breeding habitat for red-legged frogs.

# Soap Creek Diversion Dam

Upstream of the diversion dam, Soap Creek is 10–20 feet wide and is less than 1 foot deep (figure 12). The banks are moderately sloped and contain alder, Pacific blackberry (*Rubus ursinus*), poison oak (*Toxicodendron diversilobum*), and an unknown species of fern. The stream consists of riffles and runs with no pooled or backwater areas except at the front of the dam. The water is a bluish-gray color, and the substrate consists of cobble and rock. Downstream of the dam,

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**Figure 8**
**South Fork Battle Creek at the South Powerhouse**

Ripley Creek at the Lower Ripley Creek Feeder

Ripley Creek Upstream of the Water Control Structure

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**Figure 9**
**Representative Photographs of Ripley Creek in the Vicinity of the Lower Ripley Feeder**

Upstream of the Inskip Diversion Dam

Downstream of the Inskip Diversion Dam

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**Figure 10**
**Representative Photographs of South Fork Battle Creek at the Inskip Diversion Dam**

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**Figure 11**
**South Fork Battle Creek at the South Powerhouse[º]**

Upstream of the Soap Creek Diversion Dam

Downstream of the Soap Creek Diversion Dam

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**Figure 12**
**Representative Photographs of Soap Creek at the Soap Creek Diversion Dam**

there is 1 small pool with a small stream of water flowing from it. About 99% of the flow from this creek is diverted into a tunnel canal (South Battle Creek Canal) at the dam. One juvenile and 1 adult foothill yellow-legged frog were observed about 50 feet downstream of the dam in some small pools. Except for the pool at the dam, there are no deep pools that could provide breeding habitat near the Soap Creek Diversion Dam. Upstream of the dam, the canopy over the creek is dense, and the flow of the creek is moderately fast. Very little water was present downstream of the dam. For these reasons, Soap Creek near the dam does not provide suitable breeding, foraging, or refuge habitat for red-legged frogs.

## South Diversion Dam

Upstream of the South Diversion Dam (figure 13), South Fork Battle Creek consists of 2 forks that join at the dam. The banks of these forks are moderately steep to very steep. The western fork consists mainly of runs with some riffles, and the eastern fork is mainly 1 long riffle. The forks are each 20–30 feet wide and 6–12 inches deep. An island located between the 2 forks has low banks and many willows. Immediately downstream of the dam is a large pool with 2 backwater areas. This pool contains no emergent or submergent vegetation. Downstream of the pool, the creek changes to riffles, then runs. The banks are low to moderately sloped and contain large boulders, cobble, and willows. Downstream of the large pool, the creek is 10–30 feet wide and 6–12 inches deep. One juvenile foothill yellow-legged frog and 1 rough-skinned newt (*Taricha granulosa*) were observed approximately 100 feet upstream of the dam. The pool near the dam does not provide suitable breeding habitat for red-legged frogs because there is no emergent vegetation. Adjacent portions of the creek further upstream and downstream of the dam could provide suitable dispersal and refuge habitat within small isolated pools and along the creek edge.

## Occurrence in the Project Area or Vicinity

There were no NDDB records for California red-legged frogs within a 5-mile radius of the project area. USFWS did not provide any information regarding known locations of red-legged frogs near Battle Creek. The nearest red-legged frog occurrence is approximately 50 miles southwest of the project area in Tehama County. This occurrence was reported in 1986 at a farm reservoir approximately 24 miles west of Red Bluff (California Natural Diversity Database 2000, U.S. Fish and Wildlife Service 2000).

## Other Potential Habitat in the Project Area

Millseat Creek and Digger Creek were examined for their suitability for red-legged frogs. Millseat Creek is located within 1 mile of the North Battle Creek

Feeder Diversion Dam (figures 2 and 14a). Digger Creek is located within 1 mile of the Eagle Canyon Diversion Dam and the North Battle Creek Feeder Diversion Dam (figure 2). Millseat Creek and Digger Creek are both approximately 10–15 feet wide and less than 1 foot deep. The creeks had moderately swift flow and no pooled areas visible from road crossings. These creeks had 99% canopy, and their banks were heavily vegetated with willow, alder, blackberry, and grape. The absence of deep pools and basking areas and the presence of swift riffle flows make these creeks unsuitable breeding, dispersal, or refuge habitat for red-legged frogs.

The Cross Country Canal, located at the Volta 2 Powerhouse near the North Battle Creek Feeder Diversion Dam, was also examined for its suitability for red-legged frogs (figure 2). The canal is made of concrete, is devoid of vegetation, and therefore was determined to be unsuitable. Near the Volta 2 Powerhouse, however, a large area with standing water was observed (figure 14b). A small amount of submergent vegetation and invertebrates were observed in the water. This area provides marginal breeding habitat for red-legged frogs.

As mentioned previously, several creeks, ponds, and springs are within 1 mile of the project area. These sites were not evaluated or included in this site assessment because they could not easily be accessed by vehicle, the terrain in the area was steep and heavily vegetated, or because they were on private property.

# Conclusion

The 11 Battle Creek Salmon and Steelhead Restoration Project sites were evaluated for their potential to support red-legged frogs by providing suitable breeding, foraging, or refuge habitat. Table 2 provides a summary of habitat suitability at each site and at other potentially suitable areas within 1 mile of the project site. The area upstream of the Inskip Powerhouse and the adjacent uplands of the Inskip Powerhouse provide appropriate dispersal habitat for red-legged frogs. South Battle Creek near the South Powerhouse and South Battle Creek in the vicinity of the South Diversion Dam could provide dispersal and refuge habitat for red-legged frogs if they occur in the area. Only 1 of the sites, Lower Ripley Feeder, provides suitable breeding habitat, as well as dispersal and refuge habitat, for red-legged frogs. Ripley Creek contains pooled areas with emergent and submergent vegetation that provide suitable breeding habitat. However, larval and adult bullfrogs were observed in 1 of these pools, decreasing the habitat suitability for red-legged frogs. The remaining areas that were evaluated do not provide suitable breeding, dispersal, or refuge habitat for red-legged frogs.

Only 1 area within 1 mile of the project area that was evaluated provides marginal breeding habitat for red-legged frogs (at the substation powerhouse near the North Battle Creek Diversion Dam). No sightings of red-legged frogs have been recorded within a 5-mile radius of the project area. The nearest red-legged

South Diversion Dam

Jones & Stokes

**Figure 13**
**South Fork Battle Creek at the South Diversion Dam**

14a. Millseat Creek

14b. Canal Diversion Area near North Battle Creek Feeder Diversion Dam

Jones & Stokes

**Figure 14**
**Representative Photographs of Potential Habitat within 1 Mile of the Project Area**

frog observation is 50 miles from the project area. Based on the results provided in this assessment, it is unlikely that red-legged frogs occur in the project area.

**Table 2.** Summary of Habitat Suitability for Red-Legged Frogs at the Survey Sites

| | Habitat Suitability | | | |
|---|---|---|---|---|
| Survey Site | Breeding | Refuge | Dispersal | Notes |
| North Battle Creek Feeder Diversion Dam | no | no | no | creek has rapid flow |
| Eagle Canyon Diversion Dam | no | no | no | creek has rapid flow |
| Wildcat Diversion Dam | no | no | no | creek has rapid flow |
| Coleman Diversion Dam | no | no | no | moderately swift flow and lack of deep pools |
| Inskip Powerhouse | no | no | yes-upstream only | creek has rapid flow downstream of powerhouse |
| Penstock Junction Box | no | no | no | canals have very rapid flows |
| Lower Ripley Creek Feeder | yes | yes | yes | bullfrogs and a western pond turtle observed |
| Inskip Diversion Dam | no | no | no | creek has rapid flow |
| South Powerhouse | no | no | yes | lack of deep pools and emergent vegetation; foothill yellow-legged frogs observed |
| Soap Creek Diversion Dam | no | no | no | moderately swift flow upstream; almost no water present downstream; foothill yellow-legged frogs observed |
| South Diversion Dam | no | yes | yes | no emergent vegetation; foothill yellow-legged frog observed upstream of dam |
| Millseat Creek and Digger Creek | no | no | no | creeks have swift riffle flows and lack deep pools |
| Cross Country Canal | yes | no | no | marginal quality breeding habitat near substation |

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Appendix A

# U.S. Fish and Wildlife Service Guidelines on Site Assessment and Field Surveys for California Red-Legged Frogs

February 18, 1997
U.S. Fish and Wildlife Service
Guidance on Site Assessment and Field Surveys for California Red-legged Frogs

## I. Introduction

A final rule determining threatened status for the California red-legged frog under the Endangered Species Act of 1973, as amended (Act), was published on May 23, 1996 (61 *Federal Register* 25813) and became effective on June 24, 1996. Since then the United States Fish and Wildlife Service (Service) has received numerous requests from private and government entities for guidance in planning for the protection of the California red-legged frog at the sites of proposed developments or of other land use activities. This document provides guidance for two procedures to accurately assess California red-legged frog status in the vicinity of a project site: (1) an assessment of California red-legged frog locality records and potential California red-legged frog habitat in and around the project area; and (2) focused field surveys of aquatic habitats to determine whether California red-legged frogs are present. Both procedures may be recommended because California red-legged frogs are mobile and, during different life history stages or different seasons of the year, may occupy a variety of aquatic and upland habitats. Both procedures should be incorporated into any assessment of the potential effects of projects on California red-legged frogs, unless field surveys are determined to be unnecessary based on the site assessment (see "Interpreting the results of the site assessment" section).

Ongoing contact and discussions with the Service before, during, and after site assessments and field surveys are a crucial element of this guidance. Results of the site assessment and field survey should also be reported to the Service (see "Reporting the results" sections below); however, results of the site assessment should be reported prior to proceeding with field surveys. The addresses and phone numbers of the appropriate field office are provided in section V below.

## II. Site Assessment

Careful evaluation of the following information about California red-legged frogs and their habitats in the vicinity of projects or other land use activities is important because this information indicates the likelihood that California red-legged frogs may occur on the project site.

### Protocol

1. Is the project site within the range of the California red-legged frog?

Because knowledge of the distribution of the California red-legged frog is likely to change as new locality information becomes available, surveyors should contact the appropriate Service field office (see section V below) to determine if a project site is within the range of this species.

2. What are the known localities of California red-legged frogs within the project site and within 8 kilometers (km) (five miles) of the project boundaries?

The surveyor should consult the Natural Diversity Data Base (NDDB) maintained by the California Department of Fish and Game's Natural Heritage Division to determine known localities of California red-legged frogs. Information on the NDDB is attached to the end of this

document. Other information sources on local occurrences of California red-legged frogs should be consulted. These sources may include, but are not limited to, biological consultants, local residents, amateur herpetologists, resource managers and biologists from municipal, State, and Federal agencies, environmental groups, and herpetologists at museums and universities. The surveyor should report to the Service all known California red-legged frog localities within the project site and within 8 km of the project boundaries.

3. What are the habitats within the project site and within 1.6 km (one mile) of the project boundaries?

Describe the upland and aquatic habitats within the project site and within 1.6 km of the project boundaries. The aquatic habitats should be mapped and characterized (e.g. ponds vs. creeks; pool, riffle, rootball, vegetation) The information provided in section 4 of the attached appendix serves as a guide to the features that will indicate possible California red-legged frog habitat.

**Reporting the results of the site assessment.** Surveyors should prepare a report that includes the following: photographs of the project site, survey dates and times, names of surveyors, a description of the methods used, and a map of the site showing habitat as requested in section II(3) above. The report should include copies of those portions of the 7.5' topographic quads that contain the site and the area within 1.6 km of its boundaries. A list of California red-legged frog localities as requested in section II(2) above should be included. The report should be provided to the appropriate Service field office (see section V below).

**Interpreting the results of site assessment.** After completing elements 1-3 of the site assessment above, the appropriate Service field office should be contacted for technical assistance. Based on the information provided from the site assessment, the Service will provide guidance on how California red-legged frogs should be addressed, including whether field surveys are needed or whether incidental take authorization should be obtained through section 7 consultation or a section 10(a)(1)(B) permit pursuant to the Act. A protocol for field surveys is presented below.

## III. Field surveys

Frogs can be detected opportunistically in various habitats depending on weather and time of year. Aquatic sampling during the summer months is a reliable method of detecting frogs. Care should be taken to apply a level of effort and to use a style of surveying appropriate to the site. For instance, survey methods may differ according to habitat extent and type (e.g. deep pond, shallow pond, creek). In addition, field work should be conducted according to the best professional judgement of the surveyor (e.g. dogs should not be brought on surveys as they disturb frogs). The Service recommends that surveyors have field experience in the identification of California amphibians. The Service is willing to cooperate with surveyors who have specific needs not addressed by this field survey protocol and who may wish to propose alternative methods.

### Protocol

1. Surveys should be conducted between May 1 and November 1. These sampling dates were selected because they allow surveys to be conducted with minimal disturbance of breeding frogs,

eggs, or tadpoles during a period when frogs can be reliably detected.

2. All aquatic habitat identified during the site assessment should be surveyed four times, twice during the day and twice at night. Surveyors should wait at least twenty-four hours and possibly longer, to meet the environmental conditions described in section III(3) below, before repeating surveys at the same site.

3. Day-surveys should be conducted on clear, sunny days. Night-surveys should be conducted on warm, still nights between one hour after sunset and 12 midnight. Warm, still nights are preferable for surveying because the probability of observing frogs tends to decrease under cold, windy conditions. In some circumstances where safety issues preclude night-surveys, the Service can provide alternatives to the surveyor on a case-by-case basis to ensure that safe surveys are conducted.

4. Surveyors should work along the entire shore (either on the bank or in the water), visually scanning all shoreline areas in all aquatic habitats identified during the site assessment. This methodology should be applied to both day- and night-surveys. In the case of water bodies covered with floating vegetation such as duckweed, both the shoreline and surface of the water should be scanned. When wading, surveyors should take maximum care to avoid disturbing sediments, vegetation, and any visible larvae. When walking on the bank, surveyors should take care to not crush rootballs, overhanging banks, and stream side vegetation that might provide shelter for frogs.

5. When conducting night-surveys for eyeshine, flashlights and headlamps that use one 6-volt or four to six D-cell batteries are recommended. High-powered spotlights are prohibited to avoid harming frogs.

6. Although not required, photographs of frogs observed during field surveys may aid in verification of species identifications. Surveyors should limit photography to the extent necessary to document the presence of California red-legged frogs and should not attempt to photograph frogs if this is likely to disturb them.

**Reporting the results of field surveys.** Any information on California red-legged frog distribution resulting from field surveys should be sent to the Natural Diversity Data Base (NDDB) administered by the Natural Heritage program of the California Department of Fish and Game. Information about the NDDB is attached to the end of this document. Copies of the NDDB form should be mailed immediately to both the Service and CDFG.

Surveyors should also prepare a final report that includes the following: copies of all field notes, data sheets, photographs of the project site and of frogs observed, and a typed summary providing survey dates and times (both begin and end times), names of surveyors, temperature (water and air), wind speed, a description of the methods used, numbers and size classes of all amphibians observed, a map of the site showing survey locations, habitat and frog sightings, a copy of the NDDB form, and a description of possible threats to California red-legged frogs observed at the site. The report should be provided to the appropriate Service field office (see section V below).

**Interpreting the results of field surveys.** Based on the results of field surveys, the Service will provide guidance on how California red-legged frog should be addressed. If California red-legged

frogs are found, the Service will work with the project proponent through the section 7 or section 10(a)(1)(B) process to determine a further course of action, including the consideration of avoidance or minimization measures and whether incidental take authorization is needed. If frogs are observed but not identified to species, additional survey effort may be recommended. If the Service recommended that field surveys be conducted and if California red-legged frogs were not identified during these field surveys conducted according to this protocol, the Service will consider the California red-legged frog not to be present on the project site and will not recommend any further take avoidance or mitigation measures. The Service may question the results of field surveys conducted under this protocol for any of the following reasons: 1) if the appropriate Service field office was not contacted prior to field surveys being conducted; 2) if field surveys were conducted in a manner inconsistent with this protocol; 3) if field surveys were incomplete; or 4) if the reporting requirements, including submission of NDDB forms, were not fulfilled.

## IV. Statement on permitted activities.

This field survey protocol allows for conducting visual surveys for California red-legged frogs. Surveys following this protocol do not require a section 10(a)(1)(A) recovery permit pursuant to the Act. Activities that would require a section 10(a)(1)(A) recovery permit include: 1) any capture or handling of California red-legged frog adults, larvae, or eggs; 2) any activity intended to significantly modify the behavior of California red-legged frogs; 3) any activity that subjects California red-legged frogs to some environmental condition not naturally present (e.g. experiments designed to study a frog's response to heat, moisture, noise) other than low-level illumination for night surveys as described in section III(5); and 4) any survey methods not covered in this field survey protocol if any form of "take" would occur during such activities. All surveyors using this field survey protocol should make all possible efforts to avoid unintentionally disturbing California red-legged frogs or their habitat. Surveyors should direct inquiries about section 10(a)(1)(A) recovery permits to the Service's Regional Office (see section V below).

## V. Service Contacts

For project sites and land use activities in Santa Cruz, Monterey, San Benito, San Luis Obispo, Santa Barbara, and Ventura Counties, portions of Los Angeles and San Bernardino Counties outside of the Los Angeles Basin, and portions of Kern, Inyo and Mono Counties east of the Sierra Crest and south of Conway Summit, contact:

Ventura Field Office,
2493 Portola Road, Suite B
Ventura, California, 93003
(805/644-1766).

For project sites and land use activities in all other areas of the state south of the Transverse Ranges, contact:

Carlsbad Field Office
2730 Loker Avenue West
Carlsbad, California, 92008
(619/431-9440).

For project sites and land use activities in all other areas of the state, contact:

Sacramento Field Office
3310 El Camino Avenue, Suite 130
Sacramento, California 95821
(916/979-2725).

For information on section 10(a)(1)(A) recovery permits, contact:

Regional Office,
Eastside Federal Complex
911 N.E., 11th Avenue
Portland, Oregon 97232-4181
(503) 231-6241.