

**Results of the California Red-Legged Frog
(*Rana aurora draytonii*) Site Assessment and
Protocol-level Surveys in the Proposed
BART Warm Springs Extension Project Area
in the City of Fremont**

Prepared for:

San Francisco Bay Area Rapid Transit District (BART)
800 Madison Street - Lake Merritt Station
Oakland, CA 94604-2688
Contact: Richard C. Wenzel, Project Director
510/287-4950

Submitted to:

U. S. Army Corps of Engineers
San Francisco District

Prepared by:

Jones and Stokes
2600 V Street, Suite 100
Sacramento, CA 95818
Contact: Brian Zettle
916/503-6681

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Introduction

The California red-legged frog (*Rana aurora draytonii*) (CRLF) has the potential to occur in the regional area of the San Francisco Bay Area Rapid Transit (BART) Warm Springs Extension (WSX) Project in Fremont, California. BART requested that Jones & Stokes determine areas of suitable habitat for California red-legged frog within the project area and, if recommended by U. S. Fish and Wildlife Service (USFWS), conduct protocol-level surveys to determine the presence or absence of the species.

Jones & Stokes biologist Jeff Wingfield conducted an initial site assessment of the project area on May 14 and 15, 2002. During this assessment, Mr. Wingfield identified potential habitat for CRLF within the 5.4-mile project corridor. Following this initial site assessment USFWS biologist Don Hankins was contacted to discuss both the proposed project and California red-legged frog (Don Hankins pers. comm.). On June 5, 2002, Mr. Hankins commented that CRLF have been recorded in urban waterways in the project region, and although the open water habitat within the project area is surrounded by urban development, it would be impossible to make a determination of presence or absence without BART conducting protocol level surveys.

As a result of this conversation, Jones & Stokes biologist Brian Zettle conducted a secondary site assessment for California red-legged frog to determine habitat suitability (including the presence of potential breeding habitat and dispersal corridors) within the potential habitat areas originally identified by Mr. Wingfield. Based on his assessment, Mr. Zettle and Brook Vinnedge then conducted protocol level surveys in areas that Mr. Zettle determined suitable for CRLF breeding or dispersal. The following report documents the results of both site assessments and the protocol-level surveys.

Project Location and Background

The proposed BART WSX Project would be located entirely within the City of Fremont in the East Bay region of the San Francisco Bay Area. Fremont is the southernmost city in the southwestern portion of Alameda County. The city is bounded by the San Francisco Bay to the west, the foothills and mountains of the Diablo Range to the east, the cities of Union City and Hayward to the north, and the City of Milpitas in Santa Clara County to the south. (Figure 1-map of project site and general survey area). There are four ecological communities present in the project area. These include ruderal forb grasslands and agricultural fields, open water habitats, forested and emergent seasonal wetlands, and residential landscaped areas.

Mr. Gary Beeman of Beeman & Associates conducted a site assessment on February 25, 2002, for California red-legged frog at the Fremont Grade Separation project area (north of Paseo Padre Parkway) in Fremont, California (Beeman 2002). Since the Proposed Project area encompasses this survey area, the results of the Fremont Grade Separation California red-legged frog site assessment were reviewed. Mr. Beeman determined that the two (interconnecting) flood control channels north of Paseo Padre Parkway contain suitable habitat for California red-legged frog. At the time of Mr. Beeman's assessment, both the north and south channels

contained water; however, at the time of Jones & Stokes's site assessment the northern channel was mostly dewatered and only the southern channel contained water.

SPECIES DESCRIPTION

Legal Status

California red-legged frog is one of two subspecies of red-legged frog (*Rana aurora*) found on the Pacific Coast. The USFWS designated California red-legged frog as a threatened subspecies on June 24, 1996.

Physical Description

The red-legged frog is a large, brown to reddish-brown amphibian with prominent dorsolateral folds and diffuse, moderate-sized, dark brown to black spots that sometimes have light centers (Jennings and Hayes 1994). It has a dark mask bordered by a whitish jaw stripe. The distribution of red pigment is highly variable but is usually restricted to the belly and the undersurface of the thighs, legs, and feet.

Distribution

The species was once common from Redding, south to Baja California, including the Sierra Nevada and Coast Ranges. Its current range is greatly reduced and most remaining populations are found in central California along the Pacific Coast from Marin County, south to Ventura County. Within its range, red-legged frog breeds in lowland streams and wetlands, including livestock ponds. Red-legged frog may also be found in upland habitats near breeding areas and along intermittent drainages connecting wetlands.

Reasons for Decline

The decline of red-legged frog is attributable to a variety of factors. From the late-1800s to mid-1900s, the species' distribution was substantially reduced by the conversion of millions of acres of wetland habitat to agricultural uses in the Central Valley and elsewhere. Large-scale commercial harvest for food during this period probably also had a detrimental effect (Jennings and Hayes 1994). Continued recent declines are attributed to ongoing loss of wetland and stream habitat (especially from dam construction and water management activities) and introduction of non-native predators and competitors, including bullfrogs (*Rana catesbeiana*), crayfish (*Procambarus clarki*), and fish (Jennings and Hayes 1994).

Habitat Requirements

The red-legged frog requires coldwater pond habitats (e.g., pools, streams, and ponds) with emergent and submergent vegetation (Storer 1925, Stebbins 1972). Habitats with the highest densities of frogs are deepwater pools (at least 2.5 feet deep) with dense stands of overhanging willows (*Salix* sp.) and a fringe of tules (*Scirpus* sp.) or cattails (*Typha* sp.) (Hayes and Jennings 1988, Jennings 1988, Jennings and Hayes 1994). Juvenile frogs seem to favor open, shallow aquatic habitats with dense submergent vegetation.

As adults, red-legged frogs are highly aquatic when active, but depend less on permanent water bodies than do many 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, recent information suggests that they are capable of moving 1 mile or more into upland habitats or through ephemeral drainages.

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 that 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). Of the various life stages, larvae probably have the highest mortality rates; less than 1% of the eggs laid survive to reach metamorphosis (Jennings et al. 1992). Sexual maturity is normally reached at 3–4 years of age (Storer 1925, Jennings and Hayes 1985), and red-legged frogs may live 8–10 years (Jennings et al. 1992).

The diet of red-legged frogs is highly variable. Larvae probably eat algae (Jennings et al. 1992). In a study by Hayes and Tennant (1985), invertebrates were found to be the most common food item for juveniles and adults. Vertebrates, such as Pacific tree frogs (*Pseudacris [Hyla] regilla*) and California deer mice (*Peromyscus californicus*), represented more than half of the prey mass eaten by larger frogs. Whereas adult frogs were found to be largely nocturnal, juvenile frogs were active both diurnally and nocturnally. Feeding activity probably occurs along the shoreline and on the surface of the water (Hayes and Tennant 1985).

METHODS

Site Assessment Methods

Initially, a Jones & Stokes biologist conducted a record search of the DFG California Natural Diversity Database (CNDDDB 2002), and examined topographic maps and aerial photographs to identify potentially suitable habitat for the California red-legged frog within 5 miles of the project site.

Jones & Stokes biologist Jeff Wingfield conducted a site assessment for California red-legged frog habitat on May 14 and 15, 2002. The biologist walked meandering transects throughout the length of the 5.4-mile project corridor gathering information to assess habitat suitability for California red-legged frog.

After speaking with Mr. Hankins of USFWS, a Jones & Stokes biologist conducted a secondary site assessment at five locations within the project corridor: Tule Pond, New Marsh, Lake Elizabeth, Mission Creek and at the flood control channels north of Paseo Padre Parkway. During this assessment biologists evaluated habitat suitability by assessing the site's potential to support breeding or foraging frogs, provide refuge, or support dispersal. The resulting determination was based on habitat requirements described in *Guidance on Site Assessment and Field Surveys for California Red-Legged Frogs* (U.S. Fish and Wildlife Service 1997).

All suitable habitat areas were mapped (at a scale of 1 inch = 600 feet). Suitable habitat was categorized as “breeding and dispersal habitat” or “dispersal habitat” only, based on the attributes of the site. Representative photographs of the survey areas were taken (Figure 2).

Protocol Survey Methodology

Based on the site assessment, selected sites were surveyed for the presence of California red-legged frog. Biologists conducted red-legged frog surveys following the USFWS protocol (dated February 18, 1997). The protocol consists of four surveys: two day surveys and two night surveys, to be conducted between May 1 and November 1. Surveys were conducted between June 10-14, 2002 at three locations within the project corridor: New Marsh, Mission Creek and the flood control channel north of Paseo Padre Parkway.

During the surveys Jones and Stokes wildlife biologists, Brian Zettle and Brook Vinnedge, surveyed the entire shore of all the water areas that were accessible by foot and visually scanned all shoreline areas during both day and night surveys. Binoculars (10X40) were used to search areas that were not accessible by foot. Night surveys were conducted for eye shine using flashlights powered by one 6-volt battery.

RESULTS

Site Assessment

Based on a review of topographic maps, previous site assessments conducted in the area, and field investigations, biologists identified five sites to evaluate for California red-legged frog habitat suitability. These sites included Tule Pond, New Marsh, Lake Elizabeth, Mission Creek, and an interconnecting flood control channel north of Paseo Padre Parkway. The following is a detailed description of the habitat conditions at the five sites and information on known California red-legged frog occurrences in the project region.

Lake Elizabeth

Lake Elizabeth is a human-made lake approximately 83 acres in size. Lake Elizabeth was created between May 1968 and April 1969. The shoreline is concrete and riprap-lined to prevent erosion, and a narrow band of cattails and bulrush grow in small patches along a portion of the shoreline. In the southern portion of the lake is an island with arroyo willow (*Salix lasiolepis*) cover. Surrounding Lake Elizabeth is Fremont Central Park, which contains a paved pedestrian walkway, ornamental vegetation, ball fields, and maintained turf (non-native grassland habitat of limited value). The lake is currently being dredged in order to remove silt and several large temporary dewatering ponds were created in the open area on the north end of the lake. Lake Elizabeth was eliminated as a potential California red-legged frog site since it is a human-made lake with concrete and riprap banks and contains no suitable upland habitat.

Tule Pond

Tule Pond is not considered suitable breeding or dispersal habitat for California red-legged frog. Tule Pond is a flood control basin for local urban runoff approximately 6 acres in size. It is located adjacent to and south of Walnut Avenue. This pond is flooded only during the wet season and contains an artificial (burlap-like) mat covering the bottom of the pond. The pond is densely vegetated with cattail, bulrush and willow. The surrounding upland habitat has a cover of rip-gut grass, wild barley and coyote brush. Large eucalyptus trees are also in the area.

On June 10, 2002, there was approximately 6 inches of standing water in a small (4 feet by 3 feet) pool at the northern end of Tule Pond. The pooled water was located where the culvert comes from under Walnut Avenue into the north end of the pond. The water quality at this location appeared to be highly polluted. The remainder of the pond was dewatered, with isolated, shallow puddles of water and damp soils. Hundreds of Pacific treefrog metamorphs were observed at Tule Pond during the field investigation. Jennings and Hayes (1994) report that although California red-legged frogs can occur in ephemeral streams or ponds, it is unlikely that populations can be maintained in areas where all surface water disappears. Upon thorough investigation, biologists determined that Tule Pond lacks deeper, open water areas for oviposition, dries out early in the season, and is isolated from other suitable California red-legged frog habitat; therefore, it is not considered suitable habitat to support California red-legged frog. Protocol-level surveys were not conducted at Tule Pond.

New Marsh

Suitable breeding habitat for California red-legged frog is present in New Marsh (Figure 2). New Marsh is a human-made pond at the north end of Elizabeth Lake, created in 1986 as a retention basin for park runoff. During the survey, maximum water depth was estimated to be 1 to 3 feet due to the large amount of silt making up the substrate. Submergent and emergent vegetation (cattail and bulrush), which are important components of California red-legged frog habitat, were present around the margin of the pond. However, the upland area around the pond included a regularly maintained grass lawn associated with the landscaping of the park, ruderal and developed areas with sidewalk and Lake Elizabeth, and newly created disposal ponds for silt dredged from Lake Elizabeth. This pond is hydrologically isolated from other water features in the area. Bullfrogs (*Rana catesbiana*) were heard calling at this site. The presence of bullfrogs, as predators and competitors for food resources, and the lack of suitable upland habitat for hibernacula and dispersal reduce the suitability of the habitat to support California red-legged frog.

Mission Creek

Suitable dispersal habitat for California red-legged frog is present in Mission Creek (Figure 2). Mission Creek is a historic creek that once meandered from the Diablo Range east of the project area into the San Francisco Bay. This creek has been channelized and currently runs around Lake Elizabeth and through Central Park in Fremont. Mission Creek near Lake Elizabeth contains dense and somewhat degraded riparian habitat. Dominant vegetation includes willow and cottonwood, which provides an abundant amount of shade and cover. A few small flooded portions of the creek, outside of the riparian forest, support cattail, watercress, bulrush, knotweed

and alkali bulrush. The portion of Mission Creek between the Southern Pacific and Western Pacific Railroad (north and east of the project corridor) is highly disturbed and primarily vegetated with non-native herbaceous species.

Within the project corridor Mission Creek does not contain suitable CRLF breeding habitat because it lacks deep water pools, contains a high degree of silt, and lacks open water or only partially shaded areas with dense submergent vegetation for larvae and juvenile frogs. Maximum water depth was estimated to be approximately 12 inches and the substrate consisted of a 6-8 inch layer of mud and silt. However, the creek may provide suitable dispersal habitat for the California red-legged frog. Pacific treefrogs (*Hyla regilla*) were heard calling at Mission Creek.

Flood Control Channels North of Paseo Padre Parkway

Two flood control channels located north of Paseo Padre Parkway provide suitable dispersal habitat for the California red-legged frog (Figure 2). The flood control channels are surrounded by urban development including Southern Pacific Railroad tracks and Fremont Central Park to the west, Western Pacific Railroad tracks and residential development to the east, Paseo Padre Parkway to the south, and the SFWD Irvington Pump Station to the north. The channels are hydrologically connected to Mission Creek. The northern arm of the channel was mostly dewatered, but contained a dense layer of emergent vegetation. The southern arm of the channel is culverted under Paseo Padre Parkway and connects to the northern channel; however, this channel contains flowing water and does not contain a dense mat of emergent vegetation. Pockets of riparian vegetation line both channels. Neither channel provides suitable breeding habitat because of the lack of deeper pools. Crayfish and mosquito fish were observed in the southern channel. Both channels provide suitable dispersal habitat for California red-legged frog; however, the presence of exotic predators and development of the surrounding area further reduces the suitability of the habitat to support California red-legged frog.

Occurrence in the Project Vicinity

There are no known localities of California red-legged frog within the project corridor. There are two known localities within 5 miles of the project corridor. One adult and one juvenile California red-legged frog were found on July 30, 1996 approximately one mile east of the southern terminus of the project area (3.5 kilometers southeast of Lake Elizabeth) in Agua Caliente Creek south of Mission Boulevard. The second was recorded in May 1999, approximately 3 miles northwest of the northern terminus of the project area (6.5 kilometers northwest of Lake Elizabeth). The individual California red-legged frog was observed in a densely vegetated canal in Union City (CNDDDB 2002).

Survey Results

Jones & Stokes conducted protocol-level surveys at three sites (New Marsh, Mission Creek, and the flood control channel north of Paseo Padre Parkway) within the project corridor. Survey dates and weather conditions during the surveys at the three sites are provided in Table 1. No California red-legged frogs were located at the three survey sites. Adult bullfrogs were observed in New Marsh, and crayfish and mosquito fish were observed in the flood control

channel north of Paseo Padre Parkway. The presence of these exotic predators increases competition for food resources as well as the potential for predation. Other predators observed in the project area include raccoon (tracks) and skunks (observed). The presence of these species also increases the potential of predation on California red-legged frog and further reduces the habitat suitability for California red-legged frog to occur at these three sites.

Critical Habitat

Designated critical habitat for California red-legged frog occurs approximately 3 miles (5 kilometers) east of the project study area, but not within the project area.

CONCLUSIONS

New Marsh provides potential breeding habitat for California red-legged frog, while Mission Creek and the flood control channel north of Paseo Padre Parkway provide potential dispersal habitat for California red-legged frog. However, based on the protocol-level survey results, lack of recorded sightings of California red-legged frog in the project area, and extensive urban development and recreational activity occurring throughout the project area the potential for California red-legged frog to occur in the BART WSX project corridor is considered low.

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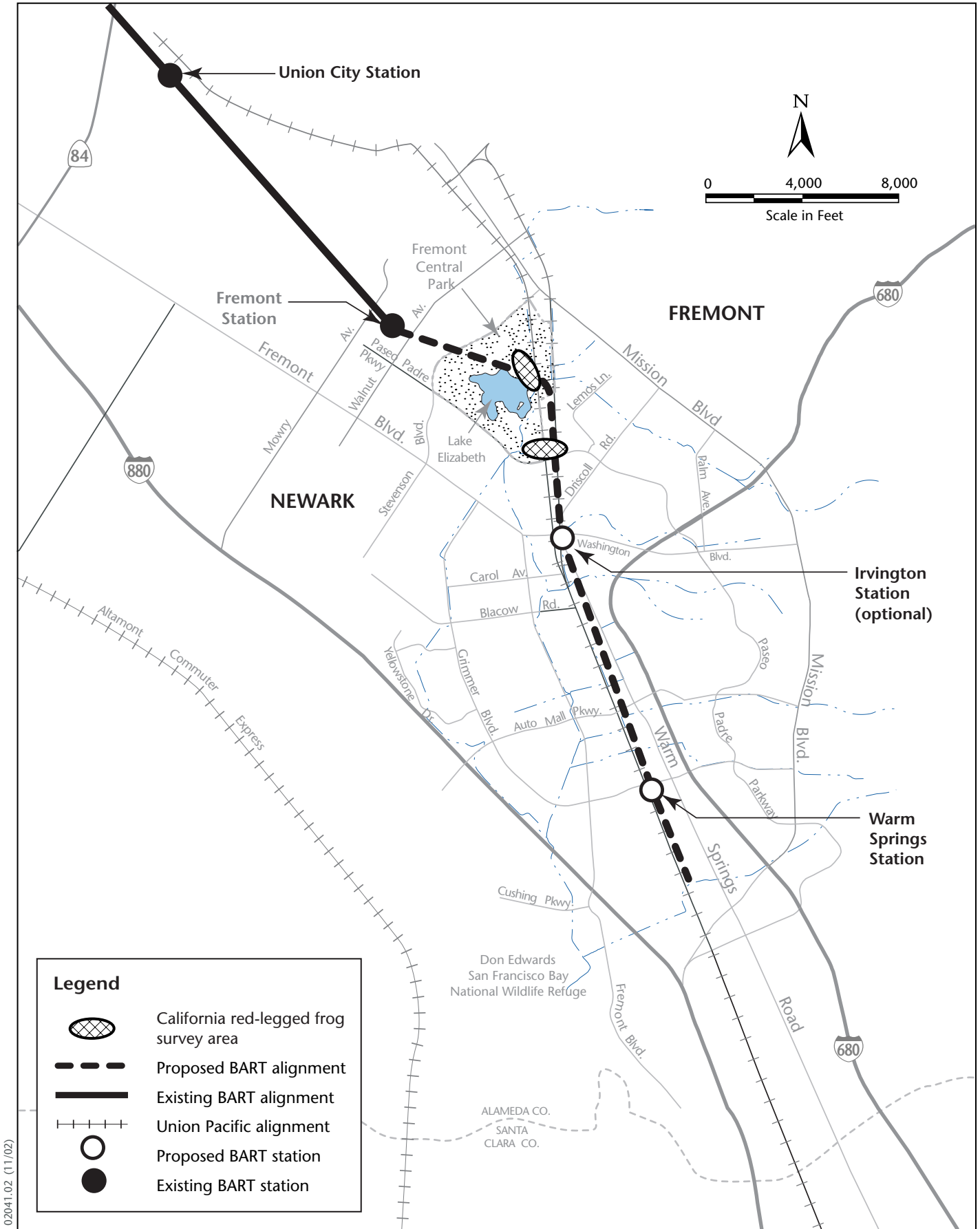
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Table 1. Survey Date and Weather Conditions during the California Red-legged Frog Surveys for BART WSX

Survey Date	Survey Duration	Cloud Cover	Wind Speed (mph)	Air Temperature (°F)	Water Temperature (°F)	Comments
June 10, 2002	1100–1400	0%	0–1	90	64	Bullfrogs calling at New Marsh. Pacific treefrogs calling at Mission Creek. Crayfish and mosquito fish observed in flood control channel.
June 11, 2002	1200–1400	0%	1–2	90	63	Crayfish and mosquito fish observed in flood control channel.
June 12, 2002	2100–2230	0%	0–1	65	63	Bullfrogs calling at New Marsh. Pacific treefrogs calling at Mission Creek.
June 13, 2002	2100–2230	90%	1–2	63	64	Bullfrogs calling at New Marsh. Pacific treefrogs calling at Mission Creek.

Note: Weather conditions are not separated by site due to the similarities of all three sites during each survey.



020411.02 (11/02)

Source: Jones & Stokes 2002.

Figure 1
Map of Project Site and General Survey Area for the Red-legged Frog



Mission Creek



Mission Creek

020411.02 (11/02)

Source: Jones & Stokes 2002.

Figure 2 (continued)



Flood control channel north of Paseo Padre Parkway

020411.02 (6/02)

Source: Jones & Stokes 2002.

Figure 2 (continued 2)



New marsh



New marsh

020411.02 (6/02)

Source: Jones & Stokes 2002.

Figure 2
Representative Photographs of
the Three Survey Sites