Attachment 1: Status and Life History of California Red-Legged Frog

1.1 Species Listing Status

The California red-legged frog (CRLF) was listed as threatened throughout its entire range on May 23, 1996 (61 FR 101 25813-25824) by the U.S. Fish and Wildlife Service (USFWS). A recovery plan addressing the CRLF was approved by the USFWS on May 28, 2002 (USFWS 2002).

On April 13, 2006, a Federal Register notice designating critical habitat for this species was published (71 FR 19243-19346). This critical habitat designation also included a special rule, under section 4(d) of the Endangered Species Act (ESA), exempting routine ranching activities from critical habitat protection. More information on critical habitat, including the special exemption rule, is included in Section 1.3.3.

1.2 Description and Taxonomy

The CRLF (see Figure 1.1) is one of two subspecies of the red-legged frog (*Rana aurora*) and is the largest native frog in the western United States (USFWS 2002). Baird and Girard first described this species after discovering it near San Francisco in 1852 (Storer 1925).

Figure 1.1. California red-legged frog. Image courtesy Marc P. Hayes, USFWS

Adult CRLFs are between 85-138 mm in length, from the tip of the snout to the rear of the vent. Juvenile CRLFs are between 40-84 mm in length and are similar in coloration, although somewhat lighter, than adults. Larval CRLFs are 14-80 mm in length and are generally blackish in color, gradually changing to brown with spots (Jennings et al. 1997). A Marin County study indicates that adult male CRLF body weight ranges from 59.0-94.0 g (Fellers and Guscio 2004). At Point Reyes National Seashore, Fellers (personal communication 2007) collected over 250 CRLFs (adults and juveniles) and determined that a direct correlation exists between CRLF length and body weight, described by the equation below:

$$BW = 0.7291 + 0.0981*L^3$$, where BW = body weight (g) and L= length (mm).

The range for male CRLFs (n=158) was 52-118 mm in length and 12.75-163 g in weight. The range for female CRLFs (n=91) was 50-131 mm in length and 8.7-238 g in weight.

1.3 Population Status and Distribution within California

The CRLF is endemic to California and Baja California (Mexico) and historically inhabited 46 counties in California, including the Central Valley and both coastal and interior mountain ranges (USFWS 1996). Its range has been reduced by about 70%, and the species currently resides in 22 counties in California (USFWS 1996). The species has an elevational range of near sea level to 1,500 meters (5,200 feet) (Jennings and Hayes 1994); however, nearly all of the known CRLF populations have been documented below 1,050 meters (3,500 feet) (USFWS 2002).

Populations currently exist along the northern California coast, northern Transverse Ranges (USFWS 2002), foothills of the Sierra Nevada (5-6 populations), and in southern California south of Santa Barbara (2 populations) (Fellers 2005a). CRLF populations located between Marin and Santa Barbara Counties are somewhat larger than most other populations (Jennings and Hayes 1994). A total of 243 streams or drainages are believed to be currently occupied by the species, with the greatest numbers in Monterey, San Luis Obispo, and Santa Barbara counties (USFWS 1996). Occupied drainages or watersheds that support CRLFs include all bodies of water (*i.e.*, streams, creeks, tributaries, associated natural and artificial ponds, and adjacent drainages), and habitats through which CRLFs can move (*i.e.*, riparian vegetation, uplands) (USFWS 2002).

The distribution of CRLFs within California can be addressed by considering four categories of location including recovery units, currently occupied core areas, designated critical habitat, and known occurrences of the CRLF reported in the California Natural Diversity Database (CNDBB) that are not included within core areas and/or designated critical habitat. A description of these areas is provided in Sections 1.3.1 through 1.3.4, and maps of CRLF distribution within each of the eight recovery units are presented in Section 1.3.5.

1.3.1. Recovery Units

Eight recovery units have been established by the USFWS for the CRLF. Recovery units reflect areas with similar conservation needs and population statuses, and therefore, similar recovery goals. The recovery unit is primarily an administrative designation, and land area within the recovery unit boundary is not exclusively CRLF habitat. These areas are considered essential to the recovery of the species, and the status of the CRLF "may be considered within the smaller scale of the recovery units, as opposed to the statewide range" (USFWS 2002). The eight units described for the CRLF are delineated by watershed boundaries defined by U.S. Geological Survey (USGS) hydrologic units and are limited to the elevational maximum for the species of 1,500 m above sea level. Additional detail on specific recovery units, including maps, is provided in Section 1.3.5.

1.3.2. Core Areas

Core areas are smaller areas within the recovery units that comprise portions of the species' historic and current range and have been determined by USFWS to be important in the preservation of the species. USFWS has designated 35 core areas across the eight recovery units to focus their recovery efforts for the CRLF. The core areas, which are distributed throughout portions of the historic and current range of the species, represent areas that allow for long-term viability of existing populations and reestablishment of populations within historic range. These areas were selected because they contain existing viable populations or they contribute to the connectivity of other habitat areas (USFWS 2002). Core area protection and enhancement are vital to the CRLF population and distribution throughout its range. While core areas are considered essential for recovery of the CRLF, core areas are not federally-designated critical habitat, although designated critical habitat is generally contained within these core recovery areas. It should be noted, however, that several critical habitat units are located outside of the core areas, but within the recovery units. For the purposes of this assessment, only currently occupied (post-1985) core areas are considered. Historically occupied sections of the core areas are not evaluated as part of this assessment because the USFWS Recovery Plan (USFWS 2002) indicates that CRLFs are extirpated from these areas.

The locations of all currently occupied core areas within each of the eight recovery units are depicted in Section 1.3.5 in Figures 1.2 through 1.10.

1.3.3. Critical Habitat

Critical habitat was designated for the CRLF on April 13, 2006 (USFWS 2006; 71 FR 19244-19346). Critical habitat was selected for the species based on areas: 1) that are occupied by CRLFs; 2) where source populations of CRLFs occur; 3) that provide connectivity between source populations; and 4) that are ecologically significant. Designation of critical habitat is based on habitat areas that provide essential life cycle needs of the species or areas that contain primary constituent elements (PCEs) (as defined in 50 CFR 414.12(b)). PCEs include, but are not limited to, space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing (or development) of offspring; and habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species. The designated critical habitat areas for the CRLF are considered to have the following PCEs that justify critical habitat designation (USFWS 2006):

1. Aquatic breeding habitat: standing bodies of fresh water (salinity < 7.0 parts per thousand) including: natural and manmade (stock) ponds, slow moving streams or pools within streams, other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest years.

2. Non-breeding aquatic habitat: fresh water habitats (as described in "aquatic breeding habitat") that may or may not hold water long enough for the frog to complete its lifecycle but provide for shelter, foraging, predator avoidance, and aquatic dispersal. Wetland habitats that meet these elements include, but are not limited to: plunge pools

within intermittent creeks, seeps, quiet water refugia during high water flows, and springs of sufficient flow to withstand summer dry period.

3. Upland habitat: upland areas within 200 ft of edge of riparian vegetation or dripline surrounding aquatic and riparian habitat and comprised of: grasslands, woodlands and/or wetland/riparian plant species providing shelter, forage, and predator avoidance for the frog. Upland areas may include structural features such as boulders, rocks, organic debris, small mammal burrows, and moist leaf litter.

4. Dispersal habitat: accessible upland or riparian dispersal habitat within designated units and between occupied locations within 0.7 mi of each other that allows for movement between such sites. Dispersal habitat includes natural and altered habitats such as agricultural fields that do not act as barriers to dispersal. Dispersal habitat does not include moderate to high density urban or industrial developments with large expanses of concrete or asphalt, nor reservoirs over 50 acres, nor other areas that do not contain features defined in "aquatic breeding habitat," "non-breeding aquatic habitat," or "upland habitat."

Critical habitat is defined in the ESA as the geographic area occupied by the species at the time of the listing where the physical and biological features necessary for the conservation of the species exist, and there is a need for special management to protect the listed species. Critical habitat may also include areas outside the occupied area at the time of listing if such areas are 'essential to the conservation of the species.' Critical habitat does not include certain areas where existing management is sufficient for CRLF protection. For the CRLF, all designated critical habitat units contain all four PCEs and were occupied by the CRLF at the time of listing.

USFWS has established adverse modification standards for designated critical habitat (USFWS 2006). Activities that may destroy or adversely modify critical habitat are those that alter the PCEs and jeopardize the continued existence of the species. For the CRLF specifically, these include, but are not limited to, the following:

(1) Significant alteration of water chemistry or temperature to levels beyond the tolerances of the CRLF that result in direct or cumulative adverse effects to individuals and their life-cycles.
(2) Significant increase in sediment deposition within the stream channel or pond or disturbance of upland foraging and dispersal habitat that could result in elimination or reduction of habitat necessary for the growth and reproduction of the CRLF by increasing the sediment deposition to levels that would adversely affect their ability to complete their life cycles.
(3) Significant alteration of channel/pond morphology or geometry that may lead to changes to the hydrologic functioning of the stream or pond and alter the timing, duration, water flows, and levels that would degrade or eliminate the CRLF and/or its habitat. Such an effect could also lead to increased sedimentation and degradation in water quality to levels that are beyond the CRLF's tolerances.
(4) Elimination of upland foraging and/or aestivating habitat or dispersal habitat.

(5) Introduction, spread, or augmentation of non-native aquatic species in stream segments or ponds used by the CRLF.
(6) Alteration or elimination of the CRLF's food sources or prey base (also evaluated as indirect effects to the CRLF).

The critical habitat designation includes a special rule exempting routine ranching activities associated with livestock ranching from incidental take prohibitions. The purpose of this exemption is to promote the conservation of rangelands, which could be beneficial to the CRLF, and to reduce the rate of conversion to other land uses that are incompatible with CRLF conservation.

1.3.3.1 Critical Habitat Special Exemption Rule

As part of the CRLF critical habitat designation, USFWS promulgated a special rule exempting routine ranching activities from take prohibitions under section 9 of the ESA. (USFWS 2006, 71 FR 19285-19290). USFWS reasoned that this exemption is of net benefit to the CRLF, overall, despite the potential for effects to a few individual CRLFs. Managed livestock activities, especially the creation of stock ponds, provide habitat for the CRLF. Maintenance of these areas as rangelands, rather than urban/suburban development or conversion to other uses, should ranching prove to be economically infeasible, is beneficial to CRLF populations.

Several of the specific exempted activities include situations where pesticides may be used in accordance with labeled instructions. Specific exemptions for rodent control and stock pond management/maintenance, and the reasoning behind each of the exemptions are provided below. The rule provides recommended best management practices, but does not require adherence to these practices by the landowner.

With respect to stock pond management and maintenance, chemical control of aquatic vegetation is allowed primarily because "it is unlikely that vegetation control would be needed during the breeding period, as the primary time for explosive vegetation control is during the warm summer months." USFWS recommends chemical control measures be used only "outside of the general breeding season (November through April) and juvenile stage (April through September) of the CRLF." Mechanical means are the preferred method of control. Pesticide applications for mosquito control are also allowed because of concerns associated with human and livestock health. Alternative mosquito control methods, primarily introduction of nonnative fish species, are deemed potentially more detrimental to the CRLF than chemical or bacterial larvicides. USFWS believes "it unlikely that [mosquito] control would be necessary during much of the CRLF breeding season," and that a combination of management methods, such as manipulation of water levels, and/or use of a bacterial larvicide will prevent or minimize incidental take.

The special exemption rule also applies to rodent control. According to USFWS, the use of rodenticides presents a low risk to CRLF conservation because the extent to which small mammal burrows are essential for the conservation of CRLF is unknown. No data are available to evaluate the potential effects of toxicant-treated grains (primarily anti-coagulants) on the CRLF. Grain is not a typical food item for the CRLF, but individuals may be indirectly exposed by consuming invertebrates which have ingested treated grain. In addition, there is a possibility

of dermal contact, especially when the grain is placed in the burrows. Athough placement of treated grain into the burrows is not prohibited for rodent control, USFWS recommends bait-station or broadcast application methods to reduce the probability of exposure. Use of burrow fumigants is also not prohibited, but the Service recommends "not using burrow fumigants within 0.7 mi (1.2 km) in any direction from a water body" suitable as CRLF habitat.

1.3.4 Other Known Occurrences from the California Natural Diversity Database (CNDDB)

The CNDDB provides location and natural history information on species found in California. The CNDDB serves as a repository for historical and current species location sightings. Information regarding known occurrences of CRLFs outside of the currently occupied core areas and designated critical habitat is considered in defining the current range of the CRLF. See: http://www.dfg.ca.gov/bdb/html/cnddb_info.html for additional information on the CNDDB.

1.3.5 CRLF Distribution Maps by Recovery Unit

The distribution of the CRLF, including currently occupied core areas (post-1985), designated critical habitat, and known occurrences reported in the CNDDB that are not included within occupied core areas and/or designated critical habitat, is depicted for all eight recovery units in Figure 1.2. Additional maps depicting the CRLF distribution within each of the eight recovery units are provided in Figures 1.3 through 1.10.

A summary of the currently occupied core areas and critical habitats that are included in each of the eight recovery units is provided in Sections 1.3.5.1 through 1.3.5.8.

Figure 1.2. CRLF Recovery Units

1. Sierra Nevada Foothills and Central Valley
2. North Coast Range Foothills and Western Sacramento River Valley
3. North Coast and North San Francisco Bay
4. South and East San Francisco Bay
5. Central Coast
6. Diablo Range and Salinas Valley
7. Northern Transverse Ranges and Tehachapi Mountains
8. Southern Transverse and Peninsular Ranges

Figure 1.2. CRLF Distribution within Recovery Units

Core Areas

1. Feather River
2. Yuba River- S. Fork Feather River
3. Traverse Creek/ Middle Fork/ American R. Rubicon
4. Cosumnes River
5. South Fork Calaveras River*
6. Tuolumne River*
7. Piney Creek*
8. Cottonwood Creek
9. Putah Creek – Cache Creek*
10. Lake Berryessa Tributaries
11. Upper Sonoma Creek
12. Petaluma Creek – Sonoma Creek
13. Pt. Reyes Peninsula
14. Belvedere Lagoon
15. Jameson Canyon – Lower Napa River
16. East San Francisco Bay
17. Santa Clara Valley
18. South San Francisco Bay
19. Watsonville Slough-Elkhorn Slough
20. Carmel River – Santa Lucia
21. Gablan Range
22. Estero Bay
23. Arroyo Grange River
24. Santa Maria River – Santa Ynez River
25. Sisquoc River
26. Ventura River – Santa Clara River
27. Santa Monica Bay – Venura Coastal Streams
28. Estrella River
29. San Gabriel Mountain*
30. Forks of the Mojave*
31. Santa Ana Mountain*
32. Santa Rosa Plateau
33. San Luis Ray*
34. Sweetwater*
35. Laguna Mountain

* Only currently occupied core areas are included in the map

1.3.5.1. Recovery Unit 1: Sierra Nevada Foothills and Central Valley

Recovery Unit 1 includes the western foothills and Sierra Nevada foothills to approximately 1,500 meters (5,000 feet) in elevation in the Central Valley hydrogeographic basin. As shown in Table 1.1 and depicted in Figure 1.3, there are five currently occupied core areas and four critical habitat units for the CRLF within Recovery Unit 1. Known occurrences of the CRLF have also been reported in the CNDBB in Butte, Calaveras, El Dorado, Nevada, Placer, Plumas, Stanislaus, and Yuba Counties.

Table 1.1. Currently Occupied Core Areas and Critical Habitat Units Within Recovery Unit 1: Sierra Nevada Foothills and Central Valley

Currently Occupied Core Areas (Core Area Number)	Critical Habitat Units
Feather River (1)	BUT-1A-B
Yuba River-S. Fork Feather River (2)	YUB-1
--	NEV-1*
Traverse Creek/Middle Fork American River/Rubicon (3)	--
Consumnes River (4)	ELD-1
East San Francisco Bay (partial)(16)	--

* Critical habitat units that are outside of core areas, but within recovery units.

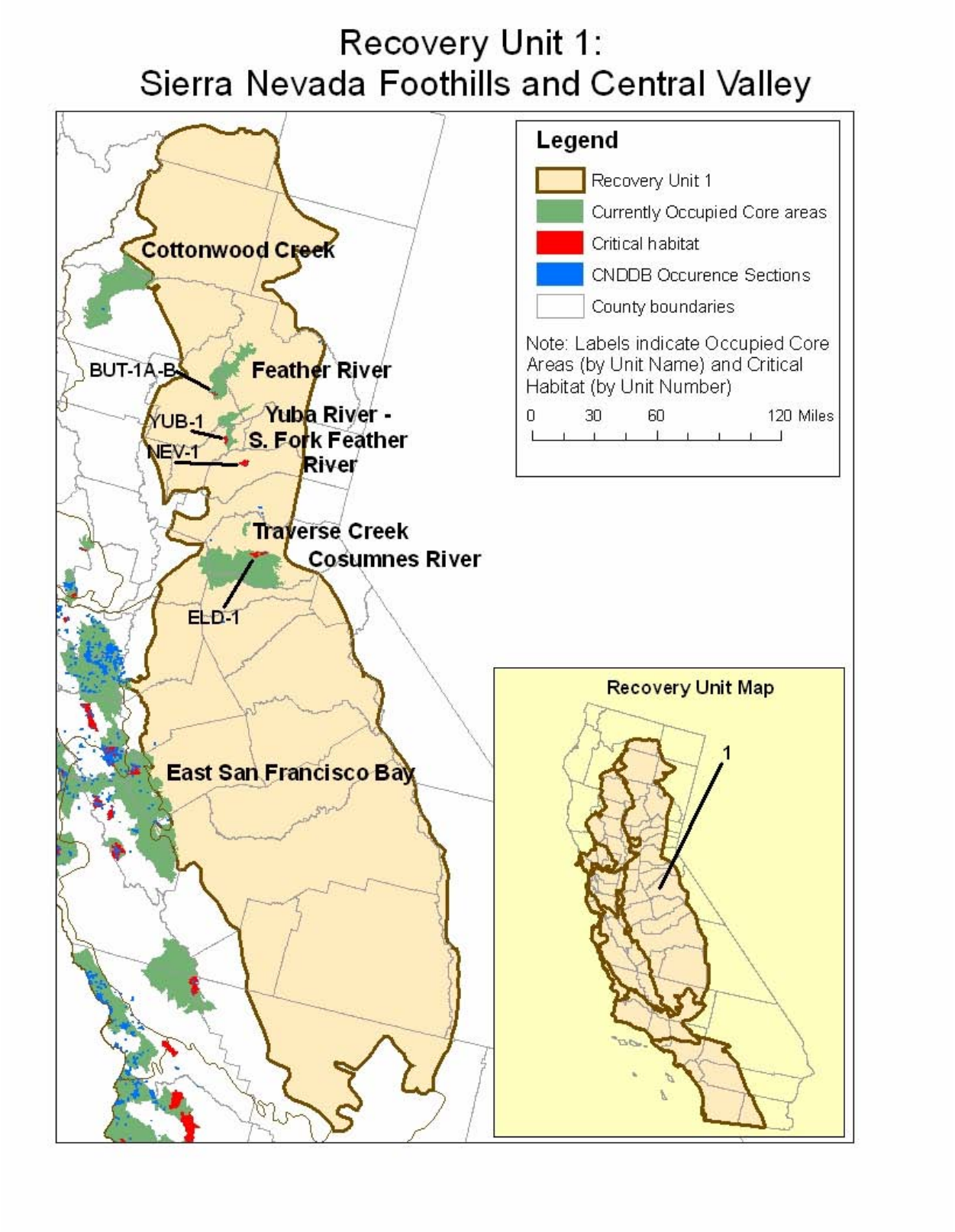


Figure 1.3. CRLF Distribution Within Recovery Unit 1: Sierra Nevada Foothills and Central Valley

1.3.5.2 . Recovery Unit 2: North Coast Range Foothills and Western Sacramento River Valley

Recovery Unit 2 includes the North Coast Range Foothills and Western Sacramento River Valley. As shown in Table 1.2 and depicted in Figure 1.4, there are four currently occupied core areas and no critical habitat units for the CRLF within Recovery Unit 2. Known occurrences of the CRLF have also been reported in the CNDBB in Marin and Tehama Counties.

Table 1.2. Currently Occupied Core Areas and Critical Habitat Units Within Recovery Unit 2: North Coast Range Foothills and Western Sacramento River Valley

Currently Occupied Core Areas (Core Area Number)	Critical Habitat Units
Cottonwood Creek (8)	--
Jameson Canyon – Lower Napa Valley (partial) (15)	--
Belvedere Lagoon (partial) (14)	--
Pt. Reyes Peninsula (partial) (13)	--

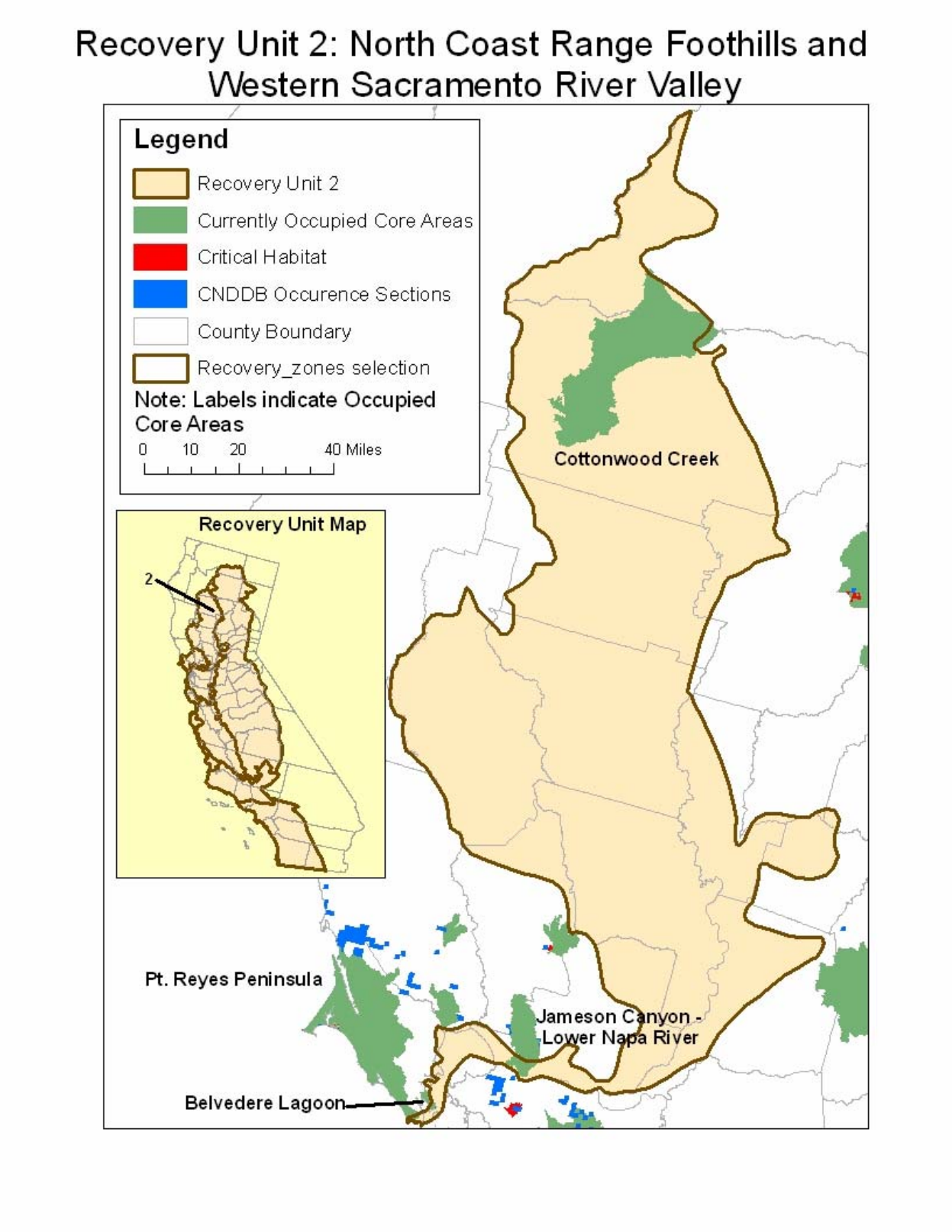


Figure 1.4. CRLF Distribution Within Recovery Unit 2: North Coast Range Foothills and Western Sacramento River Valley

1.3.5.3 . Recovery Unit 3: North Coast and North San Francisco Bay

Recovery Unit 3 includes the North Coast and North San Francisco Bay. As shown in Table 1.3 and depicted in Figure 1.5, there are six currently occupied core areas and four critical habitat units for the CRLF within Recovery Unit 3. Known occurrences of the CRLF have also been reported in the CNDBB in Marin, Napa, Solano, and Sonoma Counties.

Significant numbers of CRLFs occur in small coastal drainages, ponds, and man-made stock ponds near Point Reyes, and many areas near Mount Tamalpais and the Tiburon peninsula in Marin County support CRLF populations. Sonoma County supports breeding populations and occurrences have been reported in Solano County. However, most of the remaining known occurrences in Solano County are threatened by proposed land development. (USFWS 2002)

Table 1.3. Currently Occupied Core Areas and Critical Habitat Units Within Recovery Unit 3: North Coast and North San Francisco Bay

Currently Occupied Core Areas (Core Area Number)	Critical Habitat Units
Lake Berryessa Tributaries (10)	NAP-1
Upper Sonoma Creek (11)	--
Petaluma Creek-Sonoma Creek (12)	--
Pt. Reyes Peninsula (13)	MRN-1, MRN-2
Belvedere Lagoon (14)	--
Jameson Canyon-Lower Napa River (15)	SOL-1

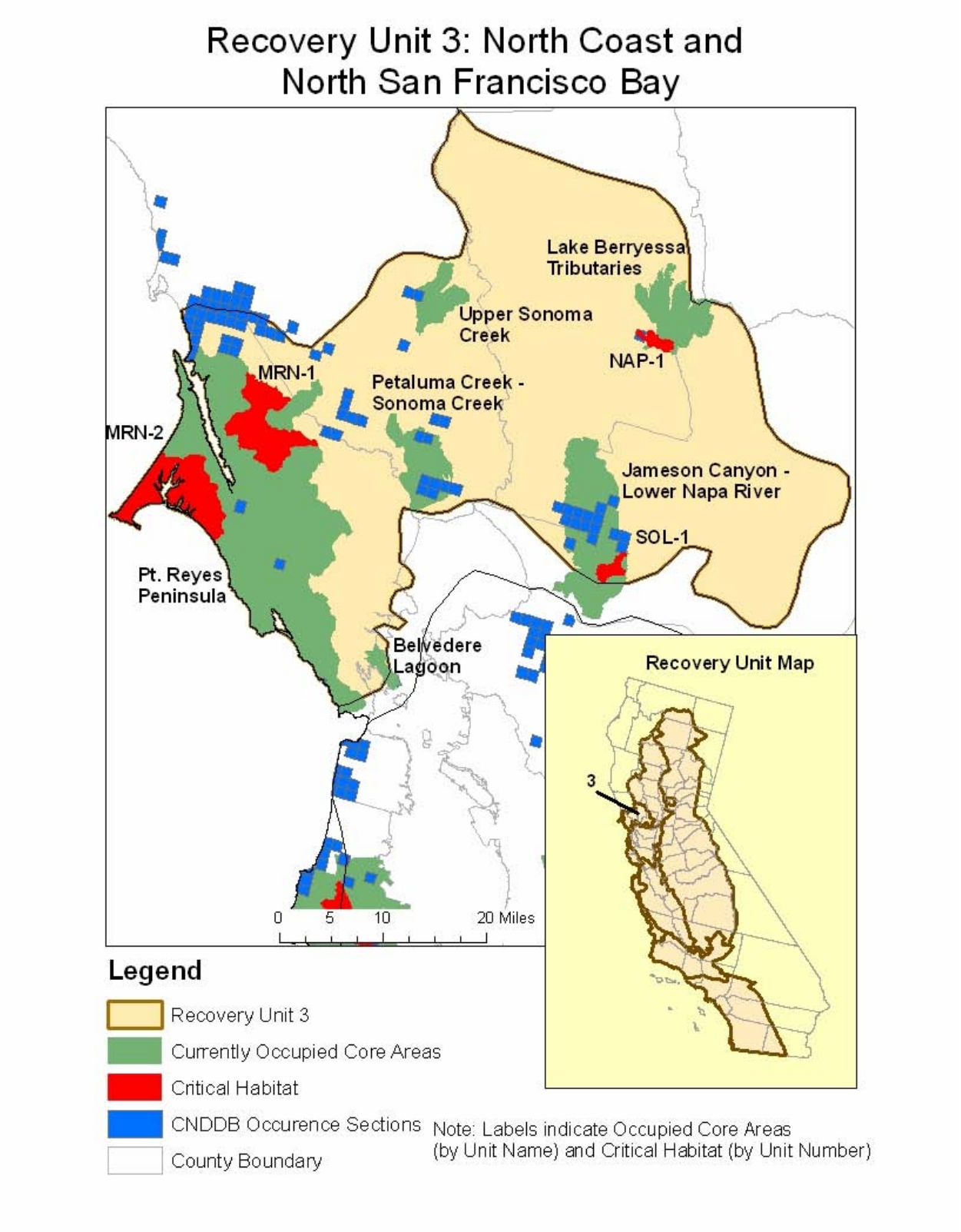


Figure 1.5. CRLF Distribution Within Recovery Unit 3: North Coast and North San Francisco Bay

1.3.5.4. Recovery Unit 4: South and East San Francisco Bay

Recovery Unit 4 includes South and East San Francisco Bay. As shown in Table 1.4 and depicted in Figure 1.6, there are two currently occupied core areas and six critical habitat units for the CRLF within Recovery Unit 4. Known occurrences of the CRLF have also been reported in the CNDBB in Alameda, Contra Costa, San Francisco, San Joaquin, San Mateo, Santa Clara, and Stanislaus Counties.

The majority of CRLF localities within Recovery Unit 4 are in Contra Costa and Alameda Counties; however, certain populations near urban areas seem to have been eliminated. Ponds and creeks in Simas Valley support CRLFs and sizeable breeding populations are found at Pine Creak, Sand Creek and Round Valley Creek. In eastern Contra Costa County, stockponds and mitigation wetlands have reproducing populations of CRLFs, with recent surveys recording nearly 3,000 individuals. (USFWS 2002)

Table 1.4. Currently Occupied Core Areas and Critical Habitat Units Within Recovery Unit 4: South and East San Francisco Bay

Currently Occupied Core Areas (Core Area Number)	Critical Habitat Units
--	CCS-1A*
East San Francisco Bay (partial) (16)	ALA-1A, ALA-1B, STC-1B
--	STC-1A*
South San Francisco Bay (partial) (18)	SNM-1A

* Critical habitat units that are outside of core areas, but within recovery units.

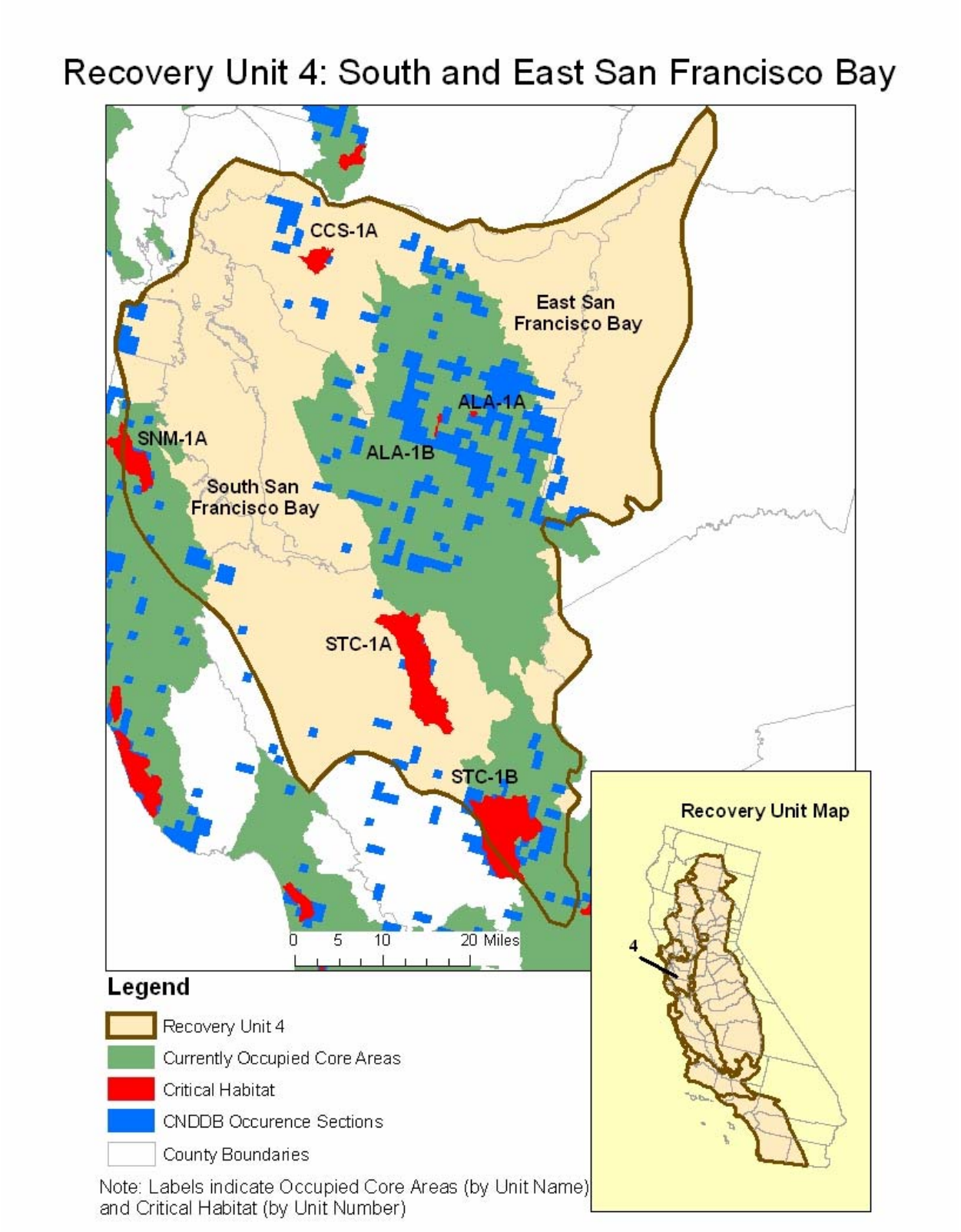


Figure 1.6. CRLF Distribution Within Recovery Unit 4: South and East San Francisco Bay

1.3.5.5. Recovery Unit 5: Central Coast

Recovery Unit 5 includes the central coast from San Francisco to Santa Barbara County. This area supports the greatest number of currently occupied drainages (USFWS 2002). As shown in Table 1.5 and depicted in Figure 1.7, there are six currently occupied core areas and six critical habitat units for the CRLF within Recovery Unit 5. Known occurrences of the CRLF have also been reported in the CNDBB in Monterey, San Luis Obispo, San Mateo, Santa Clara, and Santa Cruz Counties.

Many coastal streams, ponds and tributaries, as well as State Reserves, in San Mateo County support CRLFs. Almost all coastal drainages from the Santa Cruz/San Mateo County line south to Santa Cruz are occupied by CRLFs. CRLFs are widespread in Monterey County. This species is found in streams, stock ponds, dune ponds, and springs in San Luis Obispo County. (USFWS 2002)

Table 1.5. Currently Occupied Core Areas and Critical Habitat Units within Recovery Unit 5: Central Coast

Currently Occupied Core Areas (Core Area Number)	Critical Habitat Units
South San Francisco Bay (partial) (18)	SNM-1A, SNM-2C, SCZ-1
Watsonville Slough- Elkhorn Slough (partial) (19)	SCZ-2
Carmel River-Santa Lucia (20)	MNT-2
Estero Bay (22)	--
--	SLO-8*
Arroyo Grande Creek (23)	--
Santa Maria River-Santa Ynez River (24)	--

* Critical habitat units that are outside of core areas, but within recovery units.

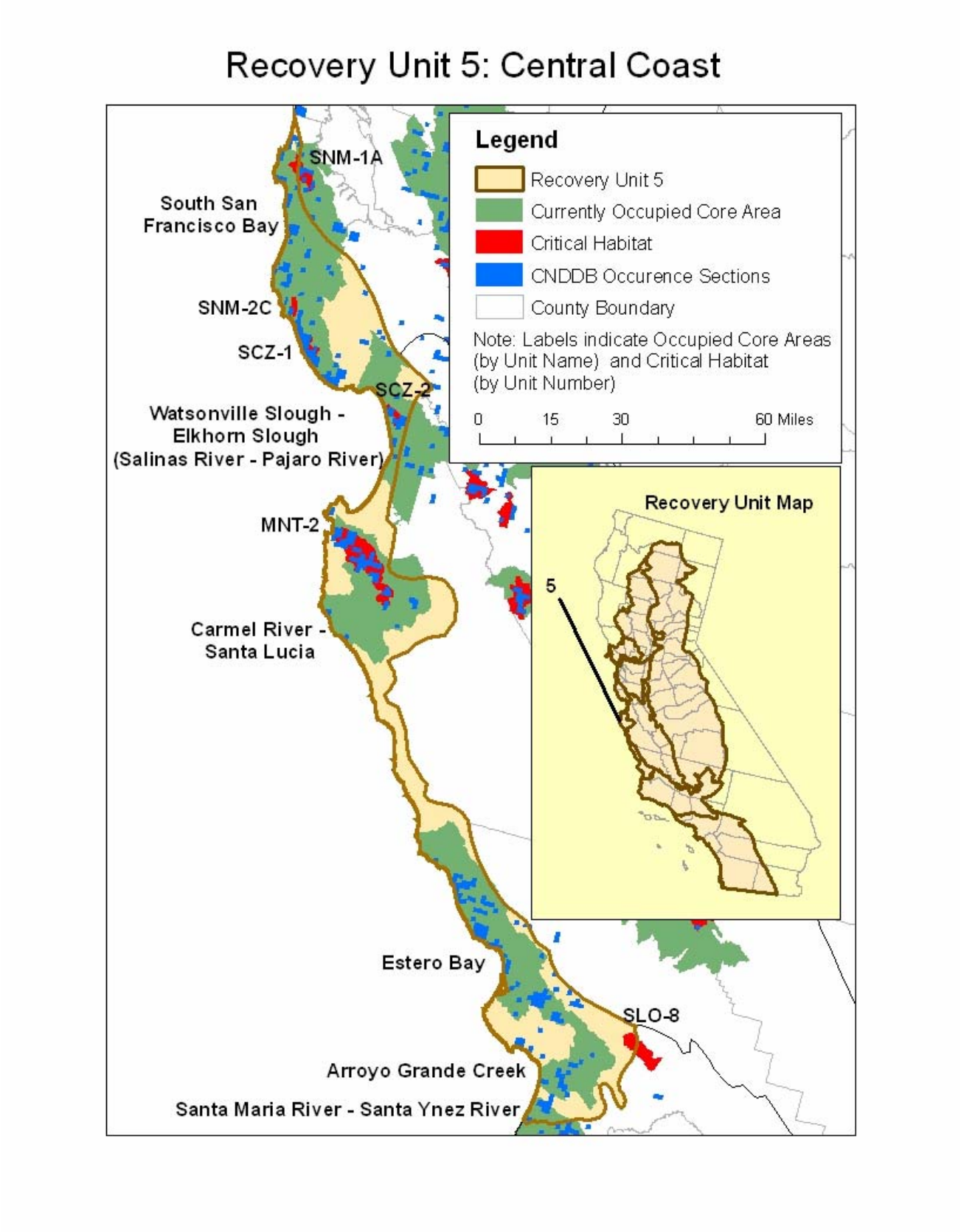


Figure 1.7. CRLF Distribution Within Recovery Unit 5: Central Coast

1.3.5.6. Recovery Unit 6: Diablo Range and Salinas Valley

Recovery Unit 6 includes the Diablo Range and Salinas Valley between the Salinas River system and the San Joaquin Valley. As shown in Table 1.6 and depicted in Figure 1.8, there are six currently occupied core areas and seven critical habitat units for the CRLF within Recovery Unit 6. Known occurrences of the CRLF have also been reported in the CNDBB in Fresno, Merced, Monterey, San Benito, San Luis Obispo, and Santa Clara Counties. CRLFs were once widespread in this region; however, no more than 10% of historic localities currently support this species (USFWS 2002).

Table 1.6. Currently Occupied Core Areas and Critical Habitat Units within Recovery Unit 6: Diablo Range and Salinas Valley

Currently Occupied Core Areas (Core Area Number)	Critical Habitat Units
East San Francisco Bay (partial) (16)	MER-1A-B, STC-1B
--	SNB-1*, SNB-2*
Santa Clara Valley (17)	--
Watsonville Slough- Elkhorn Slough (partial)(19)	MNT-1
Carmel River-Santa Lucia (partial)(20)	--
Gablan Range (21)	SNB-3
Estrella River (28)	SLO-1A-B

* Critical habitat units that are outside of core areas, but within recovery units.

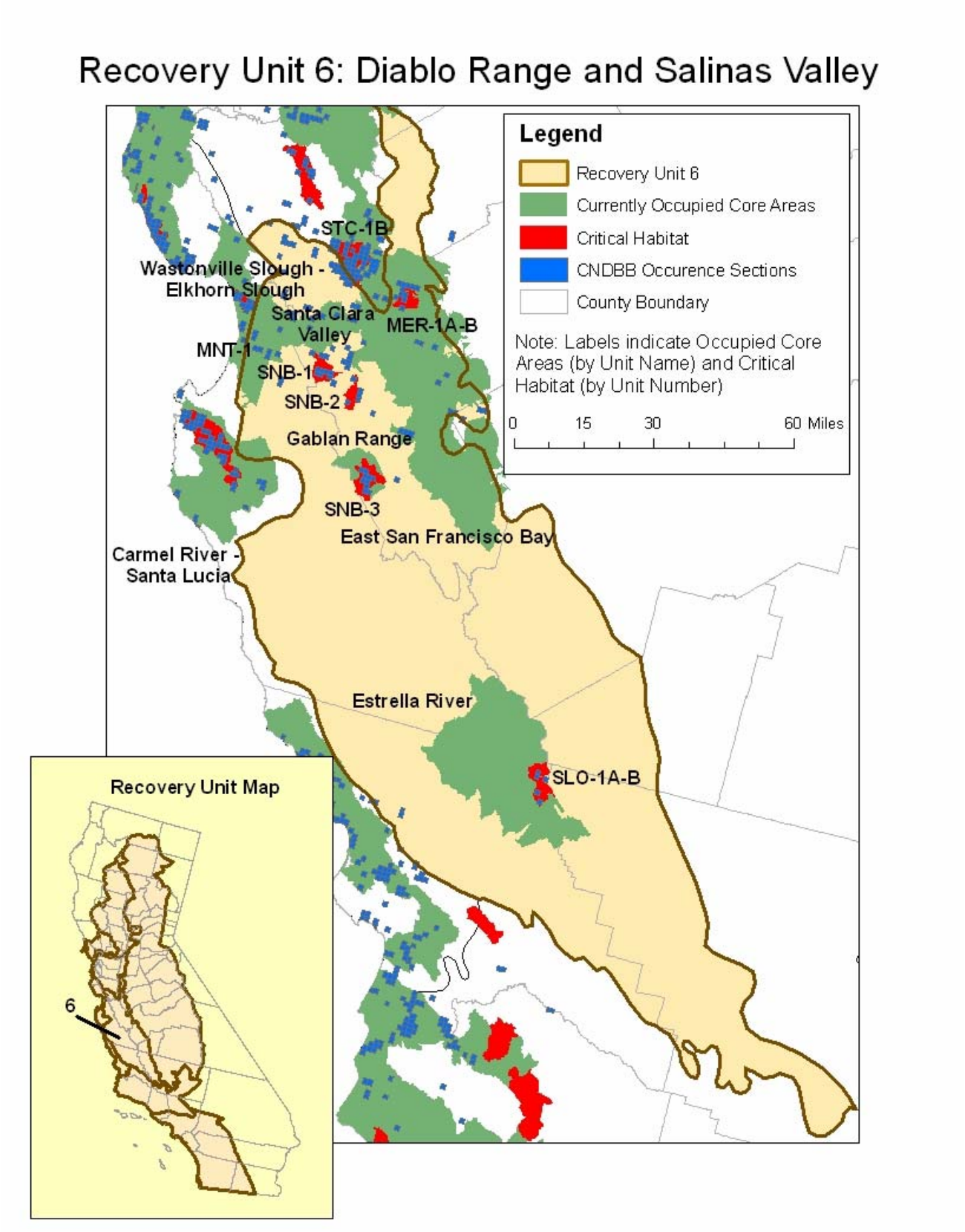


Figure 1.8. CRLF Distribution Within Recovery Unit 6: Diablo Range and Salinas Valley

1.3.5.7. Recovery Unit 7: Northern Transverse Ranges and Tehachapi Mountains

Recovery Unit 7 includes the Northern Transverse Ranges and Tehachapi Mountains. As shown in Table 1.7 and depicted in Figure 1.9, there are three currently occupied core areas and ten critical habitat units for the CRLF within Recovery Unit 7. Known occurrences of the CRLF have been reported in the CNDBB in Los Angeles, San Luis Obispo, Santa Barbara, and Ventura Counties.

Within Santa Barbara County, CRLFs are found on the Santa Maria River and in the lower drainage basin of San Antonio Creek, San Antonio Terrace, and San Antonio Lagoon. Much of this area is occupied by an Air Force base where CRLFs are found in dune swale ponds. The largest populations in this region are on upper Alamo Creek. In the lower Santa Ynez River Basin, populations are smaller and patchily distributed. While populations have declined in southern portions of the Los Padres National Forest, low numbers of CRLFs have persisted. CRLFs still exist on Santa Cruz Island, though it is not certain whether they are naturally-occurring or introduced. (USFWS 2002)

Table 1.7. Currently Occupied Core Areas and Critical Habitat Units Within Recovery Unit 7: Northern Transverse Ranges and Tehachapi Mountains

Currently Occupied Core Areas (Core Area Number)	Critical Habitat Units
--	SLO-8*
Santa Maria River-Santa Ynez River (24)	STB-4, STB-5, STB-7
Sisquoc River (25)	STB-1, STB-3
Ventura River-Santa Clara River (26)	VEN-1, VEN-2, VEN-3
--	LOS-1*

* Critical habitat units that are outside of core areas, but within recovery units.

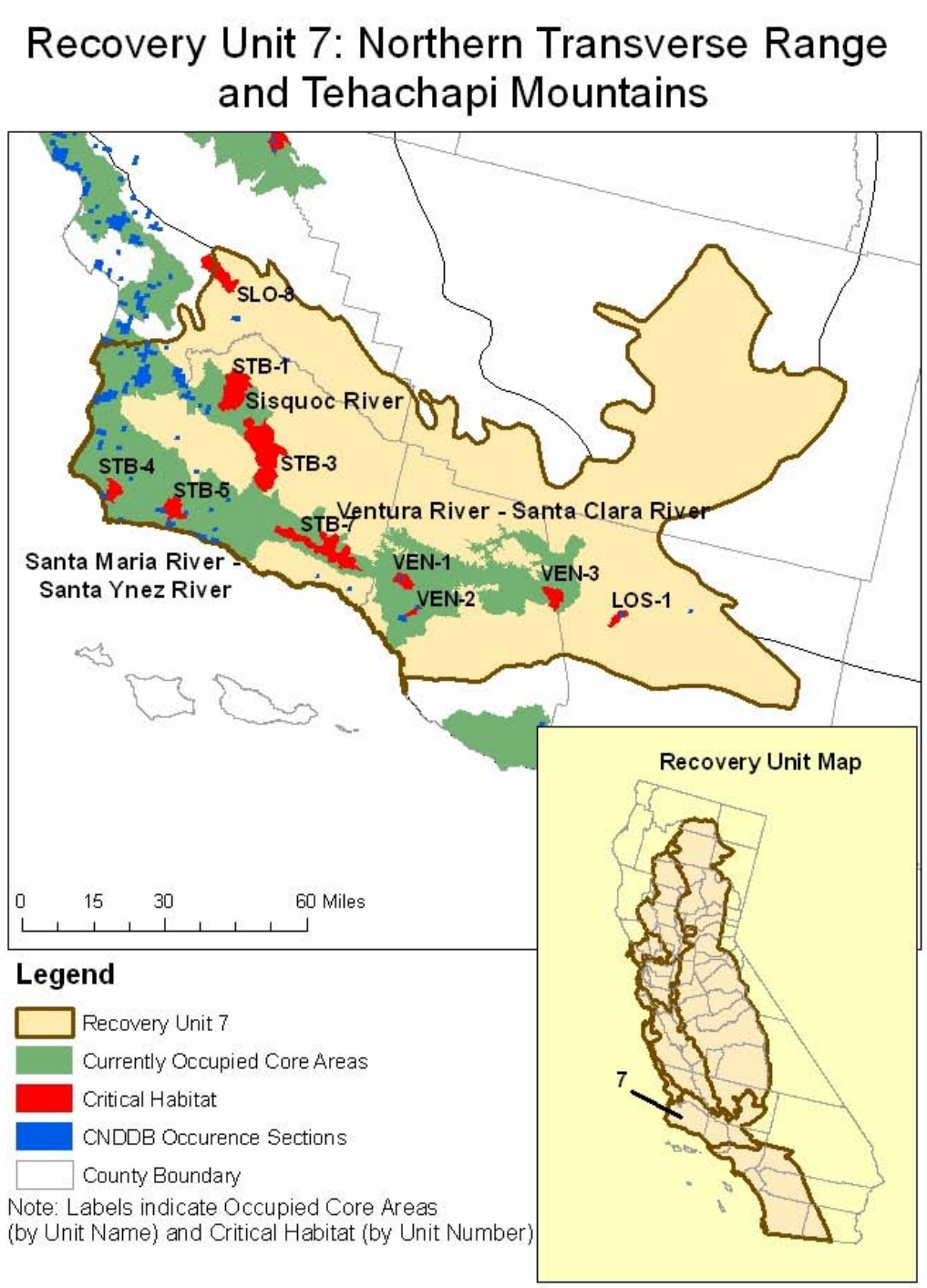


Figure 1.9. CRLF Distribution Within Recovery Unit 7: Northern Transverse Ranges and Tehachapi Mountains

1.3.5.8. Southern Transverse and Peninsular Ranges

Recovery Unit 8 includes the Southern Transverse and Peninsular Ranges. As shown in Table 1.8 and depicted in Figure 1.10, there are two currently occupied core areas and no critical habitat units for the CRLF within Recovery Unit 8. Known occurrences of the CRLF have also been reported in the CNDBB in Los Angeles, Riverside, San Bernardino, and Ventura Counties.

Historically, the CRLF was a common native frog in Los Angeles, San Bernadino, Orange, Riverside, and San Diego Counties. Populations have drastically declined in these areas. Until a sighting in 1999, CRLFs were considered extirpated from the Santa Monica Mountains. This population is estimated at 20-25 breeding adults. South of the Tehachapi Mountains, CRLFs are known in only a few locations, though historically, there were over 80 records from this region. Populations in Riverside and San Diego Counties have not been observed since the 1960s. Bullfrog introduction is blamed for population decline in Los Angeles and Riverside Counties. (USFWS 2002)

Table 1.8. Currently Occupied Core Areas and Critical Habitat Units Within Recovery Unit 8: Southern Transverse and Peninsular Ranges

Currently Occupied Core Areas (Core Area Number)	Critical Habitat Units
Santa Monica Bay-Ventura Coastal Streams (27)	--
Santa Rosa Plateau (32)	--

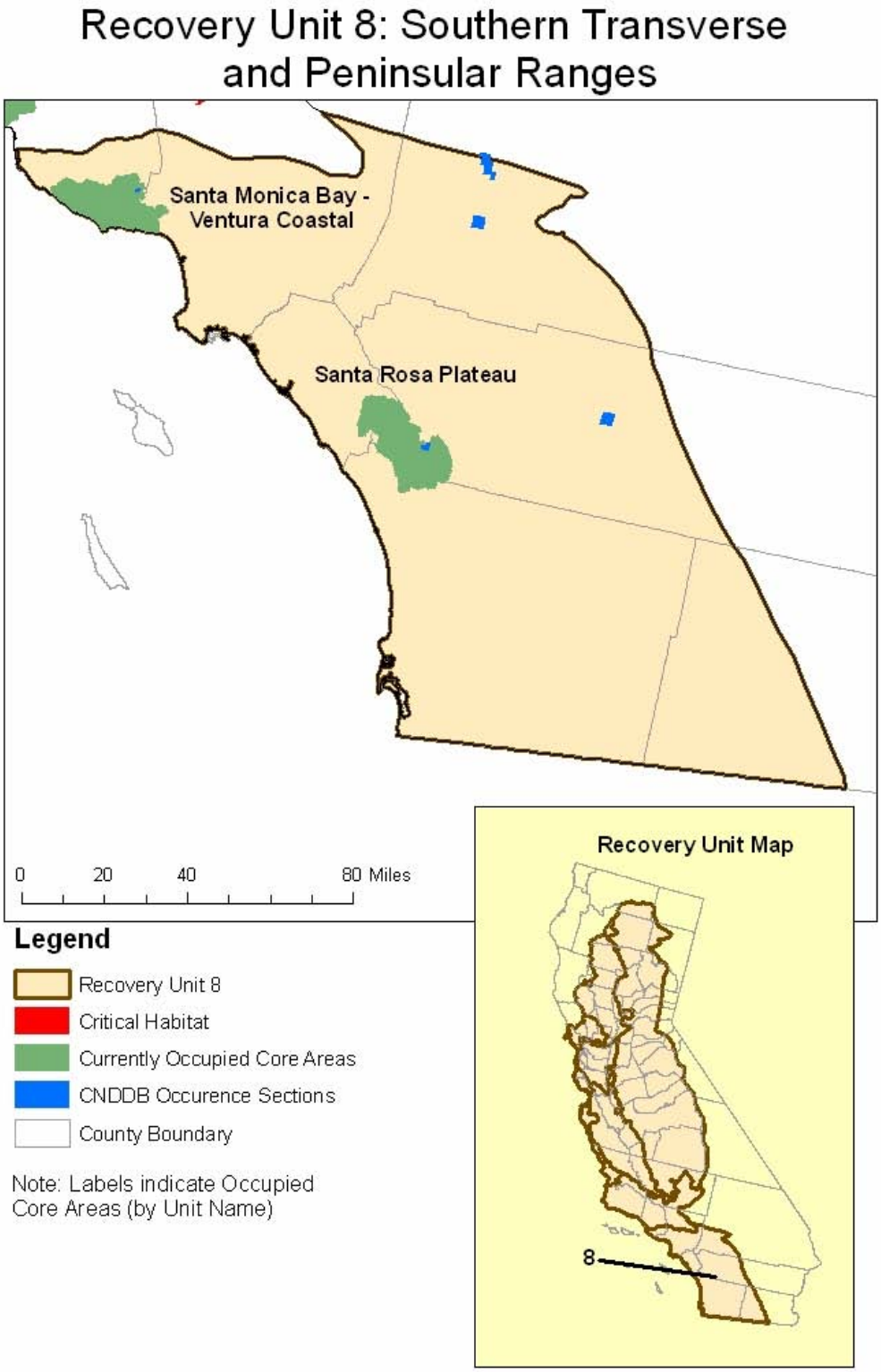


Figure 1.10. CRLF Distribution Within Recovery Unit 8: Southern Transverse and Peninsular Ranges

1.4 Habitat

Most CRLF populations have been documented below 1,050 m, although there are some historical sightings documented up to 1,500 m. CRLFs require aquatic habitat for breeding, but also use other habitat types, including riparian and upland areas, throughout their life cycle. CRLF use of their environment varies; they may complete their entire life cycle in a particular habitat or they may utilize multiple habitat types. Overall, populations are most likely to exist where multiple breeding areas are embedded within varying habitats used for dispersal (USFWS 2002). Generally, CRLFs utilize habitat with perennial or near-perennial water (Jennings et al. 1997), and dense vegetation close to water and shading water of moderate depth are habitat features that appear especially important for CRLF (Hayes and Jennings 1988).

Hayes and Jennings (1988) recorded occurrences from two sites in California, and found that CRLFs were primarily located in aquatic habitats with intermittent streams, which included some area with water at least 0.7 meters deep, had emergent or shoreline vegetation, and lacked introduced bullfrogs. Emergent vegetation consisted mainly of cattails (*Typha* spp.) and tules (*Scirpus* spp.), while shoreline vegetation was primarily composed of willows (*Salix* spp.). They report more findings of CRLFs at sites with native fish than those with introduced fish species. CRLFs were also more frequently recorded at sites influenced by a small drainage area (< 40 km^2), having a low slope, and with low-order streams (4^{th} or below).

Breeding sites include streams, deep pools, backwaters within streams and creeks, ponds, marshes, sag ponds (land depressions between fault zones that have filled with water), dune ponds, and lagoons. Breeding adults have been found near deep (0.7 m) still or slow moving water surrounded by dense vegetation (USFWS 2002). There is a long larval period and subsequent to hatching, larvae inhabit shallow (0.26-0.5 m) water adjacent to the main pond (Storer 1925). CRLFs are also found and breed in manmade waters, such as stock ponds, sewage treatment ponds, and artificial (concrete) pools without vegetation (Jennings, et al 1997). Data indicate that CRLFs do not frequently inhabit vernal pools, as conditions in these habitats generally are not suitable (Hayes and Jennings 1988).

CRLFs are more often found in habitats without introduced predators, such as centrarchid fish (*e.g.*, largemouth bass), green sunfish, bluegill, crayfish, and bullfrogs (Jennings et al. 1997; Hayes and Jennings 1988). CRLFs are largely restricted to freshwater or slightly brackish water (< 9.0% salinity). Juvenile CRLFs are active during the day and night, and may be found sunning themselves on floating vegetation, while adults are mainly nocturnal (Jennings et al. 1997).

In general, dispersal and habitat use depends on climatic conditions, habitat suitability, and life stage. Adults rely on riparian vegetation for resting, feeding, and dispersal. The foraging quality of the riparian habitat depends on moisture, composition of the plant community, and presence of pools and backwater aquatic areas for breeding. During wet periods, adults can be found to move long distances (1.6 km) between aquatic habitats (Jennings et al. 1997). Winter habitats vary with locality, but generally, CRLFs seek habitat where ponds do not freeze, and dispersal seems limited and rare (Storer 1925).

During dry periods, the CRLF is rarely found far from water, although it will sometimes disperse from its breeding habitat to forage and seek other suitable habitat under downed trees or logs, industrial debris, and agricultural features (UWFWS 2002). According to Jennings and Hayes (1994), CRLFs also use small mammal burrows and moist leaf litter as habitat. In addition, CRLFs may also use large cracks in the bottom of dried ponds as refugia; these cracks may provide moisture for individuals avoiding predation and solar exposure (Alvarez 2000).

1.5. Life History and Ecology

Information on the life history and ecology of the CRLF, including diet, reproduction, diseases, predators, and threats, is provided in Sections 1.5.1 through 1.5.5.

1.5.1. Diet

In general, larvae may graze on algae but they are rarely observed in the field; post-metamorphic CRLFs feed on a variety of invertebrates and grow rapidly; and adults feed on invertebrates, small fish, frogs, and small mammals (Jennings, et al 1997). Juveniles eat day and night, while sub-adults and adults feed primarily at night, corresponding to periods of activity (Hayes and Tennant 1985). Although the diet of CRLF aquatic-phase larvae (tadpoles) has not been specifically studied, it is assumed that their diet is similar to that of other frog species, with the aquatic-phase feeding exclusively in water and consuming diatoms, algae, and detritus (USFWS 2002).

Juvenile and adult CRLFs forage in aquatic and terrestrial habitats. The main food source for juvenile aquatic- and terrestrial-phase CRLFs is thought to be aquatic and terrestrial invertebrates found along the shoreline and on the water surface. Hayes and Tennant (1985) report, based on a study examining the gut content of 35 juvenile and adult CRLFs, that the species feeds on as many as 42 different invertebrate taxa. Most frequently encountered were: carabid (11) and tenebrionid (9) beetles; water striders (9); lycosid spiders (7); larval neuropterans (*e.g.*, alderflies) (7). Only large CRLFs ate large prey, suggesting that a greater range of prey sizes are available to larger frogs. For larger CRLFs, over 50% of the prey mass may consists of vertebrates such as mice, frogs, and fish, although aquatic and terrestrial invertebrates were the most numerous food items. This study reported no observations of attempts to capture prey underwater, suggesting that CRLFs forage primarily above water, although the authors note other data reporting that adults also feed under water. In addition, there is no information on the relative percentage of various food items in the diet of aquatic- and terrestrial-phase CRLFs.

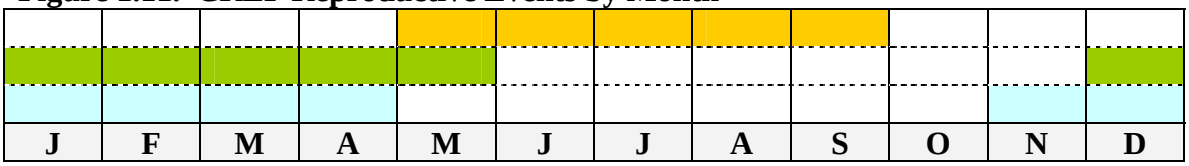
1.5.2. Reproduction

CRLFs breed primarily in ponds; however, they may also breed in quiescent streams, marshes, and lagoons (Fellers 2005a). According to the Recovery Plan (USFWS 2002), CRLFs breed from November through late April. Spawning generally occurs at night (Storer 1925). Peaks in spawning activity vary geographically; Fellers (2005b) reports peak spawning as early as January in parts of coastal central California. Male frogs call in small mobile groups of 3-7 individuals and females move towards males to initiate amplexus (copulatory position during which males fertilize eggs released by a female). After amplexus, females move to oviposition sites (Jennings

et al. 1997), where eggs are attached to emergent vegetation, such as bulrushes (*Scirpus* spp.) and cattails (*Typha* spp.) or roots and twigs, and float on or near the surface of the water (Hayes and Miyamoto 1984). Egg masses contain approximately 2000 to 6000 eggs ranging in size between 2 and 2.8 mm (Jennings and Hayes 1994). After oviposition, females move immediately to foraging sites, while males typically remain near the breeding site for a few weeks before moving to foraging areas (Jennings et al. 1997).

Embryos hatch 10 to 14 days after fertilization (Fellers 2005a) depending on water temperature. Egg predation is reported to be infrequent and most mortality is associated with the larval stage (particularly through predation by fish); however, predation on eggs by newts has also been reported (Rathburn 1998). Tadpoles require 11 to 28 weeks to metamorphose into juveniles (terrestrial-phase), typically between May and September (Jennings and Hayes 1994; USFWS 2002); tadpoles have been observed to over-winter (delay metamorphosis until the following year) (Fellers 2005b; USFWS 2002). Males reach sexual maturity at 2 years, and females reach sexual maturity at 3 years of age, depending on resource availability (Jennings et al. 1997); adults have been reported to live 8 to 10 years (USFWS 2002). Figure 1.11 depicts CRLF annual reproductive timing.

Figure 1.11. CRLF Reproductive Events by Month



Light Blue = **Breeding/Egg Masses**
Green = **Tadpoles (except those that over-winter)**
Orange = **Young Juveniles (sub-adults)**
Adults and juveniles can be present all year

1.5.3. Diseases

While pathogens and parasites have been linked to population declines in other frog species, there is limited research on how disease may affect the CRLF. It has been hypothesized that environmental factors, including radiation and air pollutants can cause a weakening of the CRLF immune system, making them more susceptible to disease. It is also hypothesized that introduced trout may carry diseases that attack and kill amphibian eggs and larvae. There is a noted high incidence of parasites in bullfrogs that coexist with the CRLF, though the parasites have not been documented in the CRLF.

Chytrid fungus (*Batrachochytrium dendrobatidis*) is found in numerous amphibian species whose populations are declining. Symptoms include deformed mouthparts in tadpoles, and most infected tadpoles die when they metamorphose. Chytrids are naturally occurring and widespread in the environment. They reproduce asexually by spores, and are likely spread in amphibian populations through water. Chytrid fungus was first identified in 1998 as the cause of boreal toad and other amphibian die-offs. In the Sierra Nevadas, the yellow-legged frog and the Yosemite toad have both been observed to be infected by a chytrid fungus. There are reports of CRLFs with chytrid fungus; however, the effect the chytrid fungus has on CRLF population

decline is unclear. The chytrid fungus has been suggested as key cause in the decline of amphibian populations worldwide (USFWS 2002).

1.5.4. Predators

Introduced bullfrogs, crayfish, and certain centrarchid fish species (*e.g.*, largemouth bass) have been a significant factor in the decline of the CRLF (Jennings et al. 1997). Habitat changes that are favorable for bullfrogs are generally unfavorable to CRLF, and researchers have noted declines in CRLF populations when bullfrogs coexist (Hayes and Jennings 1988). Bullfrogs also prey on CRLF and may have a competitive advantage because of larger size, more generalized food habits, an extended breeding season, and less predation on their larvae (unpalatable). Delayed metamorphasis has been observed in ponds with bullfrog tadpoles present (Hayes and Jennings 1988).

Native predators to the CRLF include: raccoons, great blue herons, American bitterns, black-crowned night herons, red-shouldered hawks, and garter snakes (Jennings et al. 1997). Natural predation could be exacerbated by the release of these species into riparian areas after capture from urban environments. Some native fish eat tadpoles. Rathbun (1998) has also noted newt predation on CRLF eggs and tadpoles.

1.5.5. Threats

The USFWS Recovery Plan (2002) lists the following threats to CRLF populations:

(1) The present or threatened destruction, modification, or curtailment of habitat or range
    a. curtailment of range and alteration, fragmentation, degradation, and loss of habitat
    b. urbanization
    c. agriculture
    d. impoundments and water management
    e. channelization and flood control
    f. mining
    g. livestock grazing and dairy farming
    h. recreation and off-road vehicles
    i. timber harvesting
(2) Overutilization for commercial, recreational, scientific, or education purposes
    a. exploitation
    b. scientific take
(3) Diseases and predation
    a. disease
    b. predation by introduced species
    c. predation by native species
(4) The inadequacy of existing regulatory mechanisms
(5) Other natural, or manmade factors affecting their continued existence
    a. drought
    b. contaminants

In summary, threats to the CRLF include: habitat loss or modification (*e.g*., agriculture, urbanization, grazing, mining), disease and predation, and predation and competition from nonnative species. Disease and predation have been discussed specifically above (Sections 1.5.3-1.5.4). Table 1.9 (below) lists the major threats to the CRLF by recovery unit (USFWS 2002). It should be noted, however, that threats to the CRLF associated with disease and fungal pathogens such as the chytrid fungus are not addressed in this table.

Table 1.9. Threats to and recovery status of CRLF per Recovery Unit

Recovery Unit	**Threat**	**Recovery Status**
1. Sierra Nevada Foothills and Central Valley	Ag, Li, Mi, Nn, Re, Ti, Ur, Wa	Low
2. North Coast Range Foothills and Western Sacremento River Valley	Ag, Li, Nn, Ti, Ur	Low
3. North Coast and North Francisco Bay	Li, Nn, Ur, Wa	High
4. South and East San Francisco Bay	Li, Nn, Ur, Wa	High
5. Central Coast	Ag, Li, Mi, Nn, Re, Ti, Ur, Wa	High
6. Diablo Range and Salinas Valley	Ag. Li, Mi, Nn, Re, Ur, Wa	Med
7. Northern Transverse Range and Tehachapi Mountains	Ag, Mi, Nn, Re, Wa	High
8. Southern Transverse and Peninsular Ranges	Ag, Li, Mi, Nn, Re, Ur, Wa	Low
Threats: Ag = Agriculture, Nn = Non-native species, Li = Livestock (cattle grazing and/or dairies), Mining = Mi, Re = Recreation, Ti = Timber, Ur = Urbanization, Wa = Water Management/Diversions/Reservoirs **Recovery Status:** Low: Few existing populations, high levels of threats and, in general, medium habitat suitability Med: Numerous existing populations, some areas of medium habitat suitability, high levels of threats High: Many existing populations, many areas of high habitat suitability, low to high levels of threats		

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