



Native Ranid Frogs in California

Many recent declines and extinctions of native amphibians have occurred in certain parts of the world ([Wake 1991](#); [Wake and Morowitz 1991](#)). All species of native true frogs have declined in the western United States over the past decade ([Hayes and Jennings 1986](#)). Most of these native amphibian declines can be directly attributed to habitat loss or modification, which is often exacerbated by natural events such as droughts or floods (Wake 1991). A growing body of research, however, indicates that certain native frogs are particularly susceptible to population declines and extinctions in habitats that are relatively unmodified by humans (e.g., wilderness areas and national parks in California; [Bradford 1991](#); [Fellers and Drost 1993](#); [Kagarise Sherman and Morton 1993](#)). To understand these declines, we must document the current distribution of these species over their entire historical range to learn where they have disappeared.

by
Mark R. Jennings
*National Biological
Service*

In 1988 the California Department of Fish and Game commissioned the California Academy of Sciences to conduct a 6-year study on the status of the state's amphibians and reptiles not currently protected by the Endangered Species Act. The study's purpose was to determine amphibians and reptiles most vulnerable to extinction and provide suggestions for future research, management, and protection by state, federal, and local agencies ([Jennings and Hayes 1993](#)). This article describes the distribution and status of all native true frogs in California as determined by the California Fish and Game study.

Status

All species studied have suffered declines in distribution and abundance, largely because of habitat loss or modification from farming, grazing, logging, urban development, suppression of brush fires, and flood-control or water-development projects. The species have also been affected by the widespread introduction of vertebrate and invertebrate aquatic predators.

Northern Red-legged Frog (*Rana aurora aurora*)

This frog, restricted to lower elevations (300 m [984 ft]) of the north coast region of California (Fig. 1), has disappeared from about 15% of its historical range in California. It is not in danger of extinction in the state.

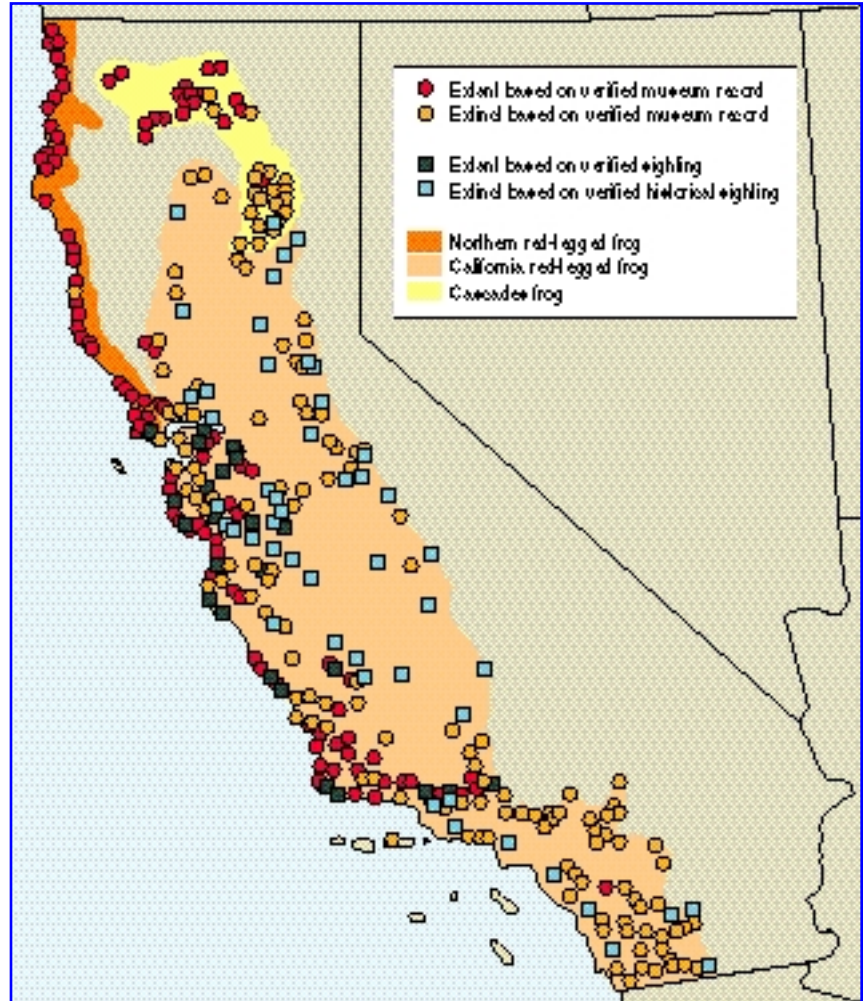


Fig. 1. Historical and current distribution of the northern red-legged frog, California red-legged frog, and Cascades frog in California based on 2,068 museum records and 302 records from other sources. Dots indicate locality records based on verified museum specimens. Squares indicate locality records based on verified sightings (e.g., field notes, photographs, published papers). Red dots and green squares denote localities where native frogs are extant. Gold dots and blue squares indicate where native frogs are presumed extinct. Figure modified from Jennings and Hayes (1993).

California Red-legged Frog (*R.a. draytonii*)

This frog was originally found over most of California below 1,524 m (500 ft) and west of the deserts and the Sierra Nevada crest (Fig. 1). Although the California red-legged frog has now disappeared from about 75% of its historical range in the state, around the turn of the century it was abundant enough to support an important commercial fishery in the San Francisco fish markets ([Jennings and Hayes 1984](#)). California red-legged frogs have almost completely disappeared from the Central Valley and southern California since 1970 and are currently proposed for listing as endangered by the U.S. Fish and Wildlife Service ([Federal Register 1994](#)).

Cascades Frog (*R. cascadae*)

Northern red-legged frog (*Rana aurora aurora*). Courtesy M.R. Jennings, NBS



The Cascades frog was originally found in northern California above 230 m (755 ft; Fig. 1), where it was historically very abundant. Since the mid-1970's, the species extensively declined, disappearing from about 50% of its range in the state. No habitat loss hypothesis adequately explains why this frog survived with current land-use practices for over 50 years before its decline. It is still abundant in California only in the northern third of its range on lands under federal ownership.

Foothill Yellow-legged Frog (*R. boylei*)

This frog was originally found over most of California below 1,829 m (6,000 ft), west of the deserts and the Sierra-Cascade crest (Fig. 2). In many locations before 1970, populations contained hundreds of individuals ([Zweifel 1955](#)), but the frog has now completely disappeared from southern California and from about 45% of its historical range over the entire state. Most populations were apparently healthy until the mid-1970's, when a population crash occurred in southern California and the Sierra

Nevada foothills after several years of severe floods and drought, which may have been responsible for the declines, although it is not certain. Because this species was an important component of the food web in many streamside ecosystems, its loss has probably negatively affected several organisms, such as garter snakes (*Thamnophis* spp.), which historically relied upon it as a major food source.

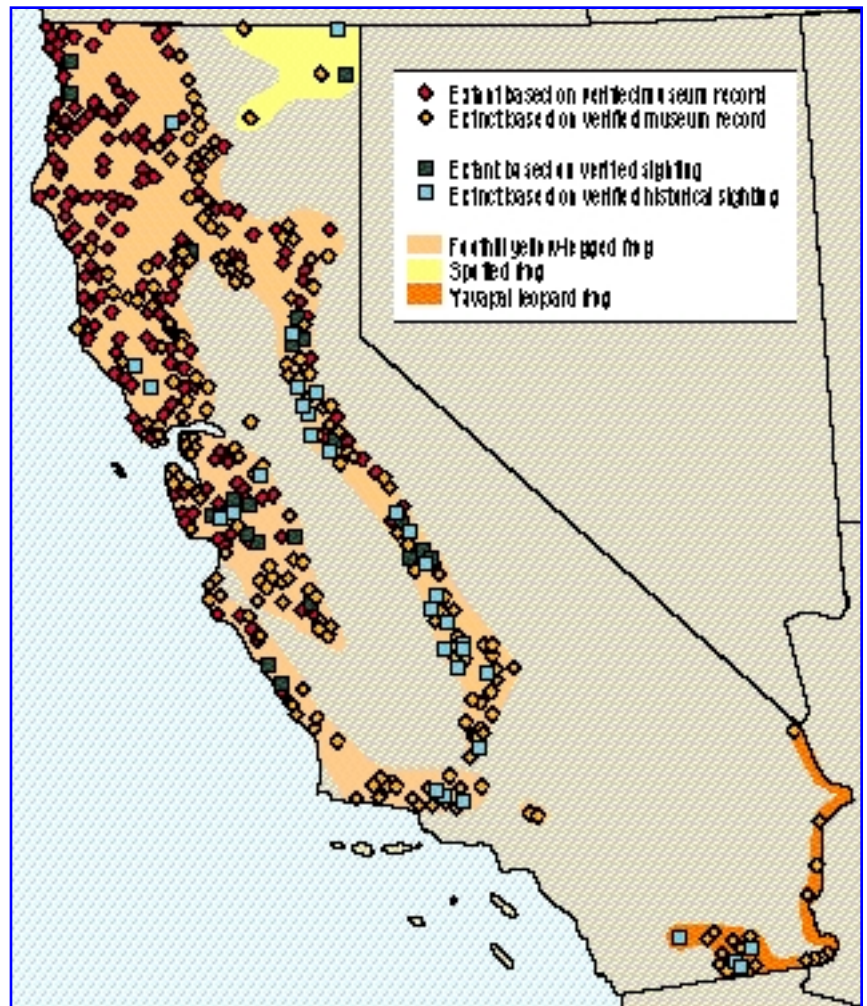


Fig. 2. Historical and current distribution of the foothill yellow-legged frog, spotted frog, and Yavapai leopard frog in California based on 3,316 museum records and 171 records from other sources. Dots indicate locality records based on verified museum specimens. Squares indicate locality records based on verified sightings (e.g., field notes, photographs, published papers). Red dots and green squares denote localities where native frogs are extant. Gold dots and blue squares indicate where native frogs are presumed extinct. Figure modified from Jennings and Hayes (1993).

Spotted Frog (*R. pretiosa*)

The spotted frog was historically recorded only from scattered localities in the extreme northeastern part of California below 1,372 m (4,500 ft), where it was apparently restricted to large marshy areas filled by warmwater (more than 20°C [68°F]) springs (Fig. 2). It has now disappeared from about 99% of its range, and is only known from one location in the state. It appears to be on the verge of extinction in California.

Yavapai Leopard Frog (*R. yavapaiensis*)

This frog was originally found along the Colorado River and in the Coachella Valley of southeastern California (Fig. 2). It has not been seen in the state since the mid-1960's and now seems to be extinct at all sites examined. This leopard frog has been replaced in California by the introduced bullfrog (*R. catesbeiana*) and the Rio Grande leopard frog (*R. berlandieri*), which are able to thrive in human-modified reservoirs and canals in the Yavapai leopard frog's original range ([Jennings and Hayes 1994](#)).

Mountain Yellow-legged Frog (*R. muscosa*)

This species was historically abundant in the Sierra Nevada at elevations largely above 1,829 m (6,000 ft), and also in the San Gabriel, San Bernardino, and San Jacinto mountains of southern California above 369 m (1,210 ft; Fig. 3). The mountain yellow-legged frog has disappeared from about 50% of its historical range in the Sierra Nevada and about 99% of its historical range in southern California. Some researchers believe that the widespread introduction of non-native trout into high-elevation lakes is the major reason for the decline of this species in the Sierra Nevada ([Bradford 1989](#); [Bradford et al. 1993](#)). The species, however, experienced massive die-offs in many parts of its range during the 1970's (Bradford 1991) after several years of severe floods and drought, and continues to decline in relatively pristine areas such as wilderness areas and national parks.

Such observations indicate that present land-management practices of setting aside large tracts of land for the "protection of biodiversity" may not be adequate for ensuring the continued survival of this species. Already, the loss of this frog over large areas has negatively affected organisms such as the western terrestrial garter snake (*Thamnophis elegans*), which relied upon it as a major food source ([Jennings et al. 1992](#)). To keep these populations from extinction, resource managers may need to initiate active management efforts for mountain yellow-legged frogs (such as fish eradication programs in selected high-elevation lakes, fencing of riparian zones to exclude livestock grazing, and relocating hiking trails and campgrounds away from sensitive riparian habitats).

Northern Leopard Frog (*R. pipiens*)

This frog was historically recorded from scattered localities below 1,981 m (6,500 ft) in the eastern part of California (Fig. 3). Some populations were introduced into the state within the past 100 years (Jennings and Hayes 1993), most around the turn of the century (Storer 1925). This species has disappeared from about 95% of its range in California and is now found only in one national wildlife refuge near the Oregon border. Most localities where this frog was historically found have not changed appreciatively during the past 50 years, so the reasons for the species' decline and disappearance remain a mystery.

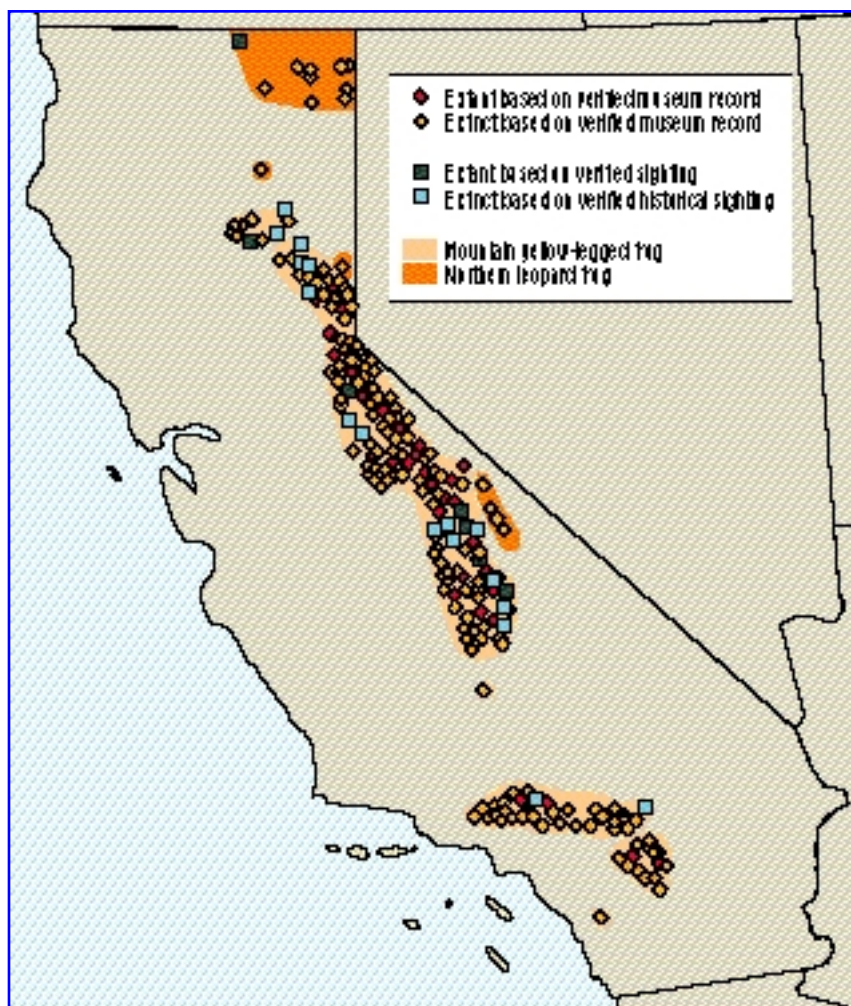


Fig. 3. Historical and current distribution of the mountain yellow-legged frog, and presumed native populations of the northern leopard frog in California based on 2,565 museum records and 673 records from other sources. Dots indicate locality records based on verified museum specimens. Squares indicate locality records based on verified sightings (e.g., field notes, photographs, published papers). Red dots and green squares denote localities where native frogs are extant. Gold dots and blue squares indicate where native frogs are presumed extinct. Figure modified from Jennings and Hayes (1993).

**For further
information:**

Mark R. Jennings
National Biological
Service
Alaska Science Center
Piedras Blancas Field
Station
PO Box 70
San Simeon, CA 93452

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