Mountain Yellow-Legged From Species Information

Common Name: mountain yellow-legged frog (southern mountain yellow-legged frog) and Sierra Nevada mountain yellow-legged frog

Scientific Name: *Rana muscosa* and *Rana sierrae*

The mountain yellow-legged frog is a species complex made up of two species (Vredenburg et al. 2007), the Sierra Nevada yellow-legged frog (*Rana sierrae*) and the southern mountain yellow-legged frog (*Rana muscosa*).

Link to petition to list under the California Endangered Species Act and CDFG Status Review---text below is excerpted from these documents.

http://www.biologicaldiversity.org/species/amphibians/Sierra_Nevada_mountain_yellow-legged_frog/pdfs/2010-1-25_MYLF_CESA_petition%20.pdf

http://www.google.com/search?sourceid=navclient&aq=f&oq=California+Department+of+fish+and+game+yellow+legged+frog&ie=UTF-8&rlz=1T4ADRA_enUS374US375&q=California+Department+of+fish+and+game+yellow+legged+frog&gs_upl=0l0l0l12734lllllllllll0

The range of the mountain yellow-legged frog is restricted to montane regions of California and adjacent Nevada. Throughout this range, mountain yellow-legged frogs historically were found in lakes, ponds, marshes, meadows, and streams at elevations of 4,500-12,000 feet (1,370-3,660 m).

Historical Distribution

Rana sierrae was found from the Diamond Mountains (Plumas County, California) in the north, and south through the Sierra Nevada. On the west side of the Sierra Nevada, the southern limit of its range is the divide between the Middle Fork and South Fork of the Kings River (Monarch Divide, Cirque Crest, Mather Pass). On the east side of the Sierra Nevada, R. sierrae was found at least as far south as Independence Creek. *R. sierrae* occurred east of the Sierra Nevada at only a few localities, including a population on Mt. Rose (Nevada) and in the Glass Mountains south-east of Mono Lake (California). There are also reports that *R. sierrae* populations existed in the White Mountains (on the California-Nevada border) and in Fish Lake Valley (Nevada).

Rana muscosa was found from the southern Sierra Nevada to the Transverse and Peninsular Ranges in southern California. In the Sierra Nevada, *R. muscosa* occurred from the divide between the Middle Fork and South Fork of the Kings River (Monarch Divide, Cirque Crest, Mather Pass) south to at least Taylor Meadow in southern Tulare County. All known Sierran localities are on the west slope. An isolated population was present on Breckenridge Mountain in Kern County. In the Transverse and Peninsular Ranges, populations were found in the San Gabriel, San Bernardino, and San Jacinto

Mountains, and on Palomar Mountain. In these ranges, *R. muscosa* was found primarily in fast-flowing streams.

Current Distribution

Maps are available within the petition to list and CDFG response; however these are based on CNDDB queries. That database remains the single best source for distribution information at the local or project scale.

Existing populations of mountain yellow-legged frogs in the Sierra Nevada are restricted primarily to federally-managed national forests and national parks (USFWS 2003). In 2003, the U.S. Fish and Wildlife Service (USFWS) estimated that of the extant Sierra Nevada populations, 22 percent existed on national forest lands, although not all could be deemed breeding populations. USFWS (2003) also estimated populations within national park boundaries: In the national parks of the Sierra Nevada, there are 758 known sites with mountain yellow-legged-frogs, most of which occur within 59 different basins that have multiple breeding populations that are connected hydrologically, so that populations in each basin function as metapopulations. Within these 758 sites, 330 populations exist for which we have evidence of successful reproduction. These 758 sites represent 78 percent of extant populations in the Sierra as of 2003, with less than half of these populations showing evidence of successful reproduction. However, the USFWS estimates are not robust because the percentages represent the number of occupied sites, not the number of individuals present at each site, and the methods for estimating population numbers were not standardized (USFWS 2003).

Habitat Requirements

Mountain frogs have evolved to fill a very specific ecological niche. The species inhabits ponds, lakes, and streams at moderate to high elevations (Mullally and Cunningham, 1956). The species is usually associated with montane riparian habitats in lodgepole pine, yellow pine, sugar pine, white fir, whitebark pine, and wet meadow vegetation types (Zweifel 1955; Zeiner et al. 1988). Alpine lakes used by mountain yellow-legged frogs usually have margins that are grassy or muddy (Zweifel 1955), but they are not limited to this habitat. At lower elevations the frogs inhabit sandy or rocky shores (Zweifel 1955). Streams utilized vary from rocky, high gradient streams with numerous pools, rapids, and small waterfalls to those with marshy edges and sod banks (Zweifel 1955). However, the species seems to prefer streams of low gradient and slow or moderate flow, probably in order to avoid flood effects (Storer 1925; Stebbins 1951; Heller 1960). Reproduction also is not possible in high gradient streams, as tadpoles require slack water (R. Knapp, pers. comm., 2000). Very small, shallow streams are not frequently used (Mullally and Cunningham 1956), probably because they lack the water depth necessary for refuge and overwintering sites (Jennings and Hayes 1994); however, this habitat type will be used if there are large frog source populations nearby (V. Vredenburg, pers. comm., 2000).

Aquatic substrates utilized are highly variable, from plunge pool habitats to fine sand, rubble, and boulder substrate. In Nevada, the mountain yellow-legged frog has declined

dramatically in the last several decades (Bradford 1991; Bradford et al. 1994; Drost & Fellers 1996; Fellers & Drost 1993). Few if any of the Nevada populations of the species remain (Knapp, Pers. Comm., 2009). Adult mountain yellow-legged frogs are typically found sitting on rocks along the shoreline, usually where there is little or no vegetation (Wright and Wright 1949). Tadpoles are found primarily in near-shore shallows (Storer 1925; Vredenburg et al. 2005). Most frogs are seen on a wet substrate within 1 m of the water's edge. Both adults and larvae are most frequently found in areas with shallow water, partly because these are the warmest areas (Bradford 1983), and also because these areas provide refuge from fish predation (Jennings and Hayes 1994). Historically, some of the highest densities of frogs have been found at creek junctions with irregular banks and a variety of water depths, and at marshes on the edges of lakes (Mullally and Cunningham 1956).

There are some differences in the habitat characteristics of *R. mucosa* and *R. sierrae*. The geologic history of the Sierra Nevada is complex (House et al. 1998) and recent work on vertebrates in the area has shown that many species in the Sierran range show north to south phylogeographic breaks. The biogeographic break in the mountain yellow-legged frog, which occurs between the middle and south forks of the Kings River within Kings Canyon National Park is congruent with a pattern of fragmentation between northern and southern populations of co-distributed amphibian and reptilian species (Macey, et. al. 2001). The split in phylogeny of mountain yellow-legged frogs is congruent with genetic breaks between central and southern Sierra Nevada populations of other species including the toad *Bufo canorus* (Shaffer et al. 2000), the salamander *Ensatina eschscholtzii* (Moritz et al. 1992), the snake *Lampropeltis zonata* (Rodrıguez-Robles et al. 1999), and the newt *Taricha torosa* (Tan and Wake 1995). Combined data from study of these species suggests that the divergence was influenced by a common vicariant event (Macey, et. al. 2001).

Knapp et. al. (2003) created a regression model to decipher the effects of differing habitat parameters on presence or absence of mountain yellow-legged frogs. Results of the regression model created in the study show that five factors significantly contribute to the presence of mountain yellow-legged frogs, including water body depth, water body elevation, substrate composition, and lake isolation, and presence of trout. Water bodies occupied by larvae were deeper, had a greater percentage of the littoral zone dominated by silt, had more inlet streams, had more high-quality lakes within 1 km, and had a higher percentage of lakes in the drainage that were high quality. Provided that quality habitat exists, research found that the absence of fish appears to have the most significant effect on patch occupancy (Knapp et. al. 2003). Previous studies have noted that mountain yellow-legged frogs in the Sierra Nevada occupy very different habitats than those in southern California (lakes, ponds, and occasionally streams vs. exclusively streams, respectively) (Knapp et al. 2003).

The U.S. Geological Survey (USGS) began to monitor the remaining populations of mountain yellow-legged frogs in southern California in 2000 (Backlin et al., 2004). Scientists monitored the remaining southern California populations and conducted additional surveys for mountain yellow-legged frogs at historical locations and other

areas with suitable habitat from 2000 to 2003. Extensive surveys by the USGS, U.S. Forest Service (USFS), and California Department of Fish and Game (CDFG) revealed eight remaining populations in isolated headwater streams (Backlin et al. 2002). For these populations, researchers were able to determine very specific habitat parameters for the southern California populations:

All of the wetland locations with current MYLF populations are remote sections of creeks or creek tributaries that are periodically disconnected from their corresponding main waterway. All are similar in that they contain flowing water with pooling areas. All creeks also have year-round water (in at least some portion of the reach). Creek widths were generally narrow, between one and three meters across on average. Reach lengths occupied by frogs varied from about 250 m (Dark Canyon) to >5000 m (East Fork City Creek). The riparian widths ranged from 8–25 m with canyon walls typically rising steeply on either side (Figure 25). Creek gradients were highly variable, from 7–34% (rise over run). Bank and pool substrates consisted of varying percentages of soil, sand, gravel cobble or rock (Figure 25). Pools were 1–10 m long, 0.5–7 m wide, and 0.01–1.8 m deep. All pools had some type of structure in the form of bank overhangs, downfall sticks, and/or rocks that could function as refugia for the MYLF, but there was minimal aquatic vegetation in the pools. Water chemistry parameters were within the expected range for this species. Ranges correspond to measurements recorded from all sites and all survey periods combined. The most consistent water parameter between all sites was pH which generally measured about 7–8. Conductance ranged from about 80–675 µm while dissolved oxygen (D.O.) was variable (23–128%; Figure 27) likely because measurements were taken at different times of the year from one site to the next (i.e., we expect higher 22 D.O. readings when water is flowing faster. In late fall, water flow slows, which causes pools to become more stagnant and therefore have lower D.O. readings). The range of water temperatures during the summer (June through August) at MYLF sites was between 9.0 ºC and 30.3 ºC with an average summer water temperature of 14.6 ºC (Figure 27). Egg masses were found at three pools. Eggs were found between 3–30 (average 18) cm below the water surface, and water depths at the egg masses ranged from 7–40 (average 28) cm.

Southern California mountain yellow-legged frogs are diurnal (active during the daylight hours), highly aquatic frogs that occupy rocky and shaded streams with cool waters originating from springs and snowmelt (USFWS 2002). Water depth, persistence, and configuration (i.e., gently sloping shorelines and margins) appear to be important for mountain yellow-legged frogs, allowing for shelter from predators along shores or in deeper waters, and habitat for breeding, foraging, egg-laying, thermoregulation (to regulate the body temperature through behavior), and overwintering (Jennings and Hayes 1994). Backlin et al. (2004) describe both high site fidelity and movement distances of greater than 1 km.

Forest Management Impacts

(Searched “timber” on both petition to list and CDFG review with following results)

Land management practices on national forests such as timber harvest, road construction and fire suppression may have impacts on MYLF, however, there are no studies available investigating the potential impacts of forestry activities. MYLF occur primarily in roadless areas with little or no timber harvest or fire suppression activities, therefore forestry activities are not considered to be the primary stressors that have caused the observed rangewide declines.

Locally Applied Pesticides

National forests and private timberlands that adjoin national forest lands occasionally use pesticides and herbicides to control rodents, insects, fungi, noxious weeds, and brush. Hydropower facilities may use pesticides to control herbaceous growth along canals or reservoirs. The direct or synergistic effects of locally applied pesticides and herbicides on MYLF are unknown. Some level of risk of various pesticides to MYLF is suggested from studies conducted on other amphibian species, but no studies currently exist that directly evaluate the level of risk of these pesticides to MYLF. Most of the conifer plantations where herbicides are commonly used lie below the elevation range of the MYLF, although there are some plantations adjacent to lower elevation MYLF populations.