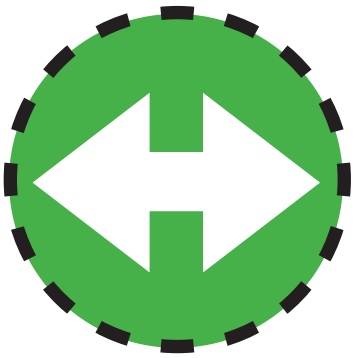
Measuring the Health of the Mountain: A Report on Mount Tamalpais' Natural Resources (2016)
(Chapter 13 excerpts)

ONE TAM

CALIFORNIA RED-LEGGED FROG

Rana draytonii



Condition: Good

Trend: No Change

Confidence: Moderate

WHY IS THIS RESOURCE INCLUDED?

Amphibians are good indicators of freshwater wetland condition because they are relatively long-lived and breed and rear in wetland and aquatic sites. Their sensitivity to changes in hydrology and precipitation, as well as susceptibility to pollutants and toxins makes them excellent indicators of ecosystem health.

The California red-legged frog was federally listed as a threatened species in 1996, and Mt. Tam is part of a core area identified by the U.S. Fish and Wildlife Service for the recovery of the species. The National Park Service (NPS) and their partners have been working to improve trail systems, construct ponds and wetlands for breeding frogs, and restore native vegetation at Muir Beach. The NPS and U.S. Geological Survey (USGS) conduct egg mass surveys and non-breeding season surveys for larvae, juveniles, and adults. California red-legged frog egg masses are large (fist-sized) and laid attached to vegetation in relatively shallow waters close to shore. Hence, they are relatively easy to find and document, allowing for high confidence in abundance estimates.

OVERALL CONDITION

Now eliminated from 70% of their former range, California red-legged frogs are primarily found in coastal drainages from Marin County south to San Simeon. Within the One Tam area of focus, they are known to live at Muir Beach and in the Olema Creek Watershed. We do not have enough data to know the current status of the Olema Creek watershed population. However, the population at Muir Beach has increased thanks to stream restoration, breeding pond creation, and reintroduction of egg masses. There are no current observations of a breeding population in the east side of the Bolinas Lagoon Watershed, where California red-legged frogs once lived. Little information is available about the status of California red-legged frogs in the eastern and southern portions of the One Tam area of focus.

DESIRED CONDITIONS

As recommended by U.S. Fish and Wildlife Service's recovery plan the goal is to have the long-term population trend of California red-legged frogs unchanged or increasing.

STRESSORS

Invasive Species: Non-native American bullfrogs (*Lithobates catesbeianus*) and non-native fish prey on California red-legged frogs and compete with them for resources. Bullfrogs are present at several sites within the Olema Creek Watershed but are not found in the Redwood Creek Watershed. Historic data indicate presence of non-native crayfish and introduced fish at the ponds in Olema Creek Watershed within One Tam area of focus.

Habitat Loss: A large freshwater/brackish 25-acre lagoon complex once present at Muir Beach in the mid-1850s was lost due to historical land use changes. Some of this habitat has been replaced by recently created off-channel ponds and backwater areas at the site. In addition to ponds and wetlands, California red-legged frogs also use creek channels as non-breeding rearing habitat. A high frequency of dry creek downstream of diversions was noted in the 1980s, 1990s, and early 2000s. Water diversions are present in the Redwood Creek Watershed, although the magnitude is likely reduced through the enaction of conservation measures by the Muir Beach Community Services District and cessation of pumping for agriculture.

Disease: Chytrid fungus (*Batrachochytrium dendrobatidis*) causes a potentially lethal disease in amphibians called chytridiomycosis, which has caused worldwide amphibian population declines. Chytrid fungus is present on Mt. Tam, but so far it does not seem to be affecting California red-legged frogs.

Climate Change: Climate change models predict warmer temperatures, more variable rainfall, and rising sea levels. Changes in temperature and precipitation patterns may decrease the distribution of the deep, calm pools California red-legged frogs need for breeding. Such conditions are likely to decrease survival of egg masses and tadpoles, and increase uncertainty in breeding from year to year. Increased frequency and elevation of high tides could also raise salinity levels in low-lying breeding habitat. The Bolinas Lagoon site is particularly sensitive to this threat.

METRICS AND GOALS

Metric	Condition Goal(s)	Status
Metric 1 Presence in suitable breeding habitats	Number and percent occupancy trend is unchanged or increasing for at least a 15-year period, which is approximately four to five generations of the California red-legged frog.	
Metric 2 Number of egg masses observed during breeding surveys	Annual abundance of egg masses is unchanged or increasing for at least a 15-year period, which is approximately four to five generations of the California red-legged frog	
Metric 3 Number of sites occupied by non-native predators	• No breeding sites occupied by non-native predators • No non-native predators in wetland and aquatic sites within one mile of California red-legged frog breeding sites	

INFORMATION GAPS

Climate Change: It is not known how climate change may affect California red-legged frogs, though higher temperatures and/or changes in precipitation patterns may increase drying of breeding ponds and sea level rise may increase salinity in lower floodplain habitats.

Population Variables: Factors affecting the abundance and vital rates (e.g., survival, recruitment, population) are poorly understood.

Stream Data: Though data about California red-legged frogs in pond breeding habitats are available, similar breeding data for streams is lacking throughout the One Tam area of focus.

Eastern and Southern One Tam Area: There are no current observations of California red-legged frogs within this area. However, low-lying freshwater marshes (e.g., Arroyo Corte Madera del Presidio) and streams may not have been surveyed with sufficient frequency. Bay-fringing marshes in nearby areas of Tiburon and San Rafael have recent sightings of California red-legged frogs. Better inventory data are needed in potentially suitable breeding habitat for the species.

Olema Creek: Consistent monitoring data from Olema Creek California red-legged frog breeding sites is needed to better understand their condition and trends in the One Tam area of focus.