

## Publication Brief for Resource Managers

**Release:**  
August 2011

**Contacts:**  
Adam Backlin  
Robert Fisher

**Email:**  
[abacklin@usgs.gov](mailto:abacklin@usgs.gov)  
[rfisher@usgs.gov](mailto:rfisher@usgs.gov)

**Phone:**  
714-508-4702  
619-225-6422

USGS Western Ecological Research Center | San Diego Field Station | 4165 Spruance Road, Suite 200, San Diego, CA 92101

# Southern California Mountains Each Have Unique Lineage of Endangered Yellow-Legged Frogs

Less than 200 known wild adults remain of the southern California mountain yellow-legged frog (*Rana muscosa*), a distinct population segment federally listed as endangered. A study published in *Biological Conservation* has determined low levels of genetic variation within each remaining population and evidence of historic genetic bottlenecks.

University of California-Berkeley, USGS and San Francisco State University researchers used mitochondrial and microsatellite DNA data to assess the current genetic structure of all *Rana muscosa* populations and the historic population connectivity of those in southern California.

Analyses confirmed that *R. muscosa* consists of two distinct clades: one exclusive to the San Gabriel, San Bernardino and San Jacinto mountain ranges (the one already listed as endangered), and one shared between the southern mountain ranges and the Sierra Nevada.

DNA data also suggests that the southern California clade can be split into seven distinct populations. Glacial expansion and retreat during the Pleistocene likely created a high degree of historical isolation within and among the San Gabriel, San Bernardino and San Jacinto mountain ranges, and the seven populations can be further assigned to three unique genetic lineages corresponding to each mountain range.

*R. muscosa* has declined by >93% across its range, even in national parks and national forests, and they are extinct from >99% of historically occupied sites in southern California. Captive breeding programs with Fresno Chaffee, Los Angeles and San Diego zoos appear promising. Continuing genetic studies will facilitate reintroduction and translocation plans to maintain *Rana muscosa* populations in southern California, while ensuring the integrity of unique genetic lineages.

### Management Implications

- *R. muscosa* consists of two distinct genetic groups: one exclusive to the San Gabriel/San Bernardino/San Jacinto mountain ranges, and the other shared between those mountain ranges and the Sierra Nevada.
- Within the southern California DPS, conservation efforts may have to be directed at maintaining populations in each mountain range separately.
- A translocation program may be necessary to bring breeding frogs into contact to avoid further inbreeding, with precautions to maintain the seven distinct populations that remain.

#### THIS BRIEF REFERS TO:

Schoville, S.D., T.S. Tunstall, V.T. Vredenburg, A.R. Backlin, E. Gallegos, D.A. Wood, R.N. Fisher. 2011. Conservation Genetics of Evolutionary Lineages of the Endangered Mountain Yellow-Legged Frog, *Rana muscosa* (Amphibia: Ranidae), in Southern California. *Biological Conservation*. doi: 10.1016/j.biocon.2011.04.025

<http://www.werc.usgs.gov/sandiego>

<http://www.werc.usgs.gov/ProductDetails.aspx?ID=4309>

<http://armi.usgs.gov>



The Southern California DPS of the mountain yellow-legged frog is federally listed as endangered. Photo: Adam Backlin/USGS