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This letter is in response to the Angeles National Forest Williamson Rock Scoping Letter. We present an overview of our work on the mountain yellow-legged frog and our data that is specific to the Little Rock Creek adjacent to the Williamson Rock Recreation Area.

The U. S. Geological Survey (USGS) has been annually monitoring the mountain yellow-legged frog (*Rana muscosa* - MYLF) across its southern California range from 2001 through present (Backlin et al. 2014). Representatives from USGS participated in the working group and development of the Angeles and San Bernardino National Forests, Mountain Yellow-legged Frog Conservation Assessment and Strategy. This document outlined future goals to stabilize and increase MYLF populations across these forests including; continued monitoring, assessing the genetic structure of the frogs, and conducting restoration.

USGS has monitored the MYLF at Little Rock Creek and eight other extant populations in southern California annually from 2000-present. During these monitoring surveys, data was collected including; age class, marking frogs, GPS locations recorded, disease screening, tissue samples, recreational use, introduced aquatic species, and many other metrics.

Our monitoring data show a dramatic increase in the number of adult MYLF within the upper reach of Little Rock Creek beginning in 2007 and continuing through 2013, see Figure 1. Our data indicate that this trend is not associated with any environmental changes, i.e. rainfall, temperature. MYLF egg masses are difficult to detect as they are laid under water often attached to the underside of rocks shortly after snow melt. The MYLF egg masses we have detected in Little Rock Creek since 2001 have all been located in upper Little Rock Creek, see Figure 2. If these egg masses or resulting tadpoles are damaged through disturbance, it will impact recruitment throughout the entire Little Rock Creek population, including the downstream areas.

Additionally, the USGS just published the population trends study on all remaining populations in southern California from 2001-2009 (Backlin et al. 2014). This paper shows that only two of the remaining populations are showing any evidence of recovery and over this period of study two additional populations critically collapsed to effective extirpation. This study shows how sensitive these remaining few populations are to both stochastic and deterministic impacts and have very little resiliency for perturbations due to their critically small population sizes.

Disease screening consisted of swabbing MYLF for the amphibian chytrid fungus (*Batrachochytrium dendrobatidis*). Through this disease monitoring we tested 138 MYLF for the presence of this pathogen. Only two MYLF tested positive for chytrid fungus infection from 2001-2013. Due to the low number of

infected MYLF, there is no evidence that disease is a driver in any population trends at Little Rock Creek. To attempt to build resiliency in the southern California populations, several adaptive management actions were taken consistent with the Mountain Yellow-legged Frog Conservation Assessment and Strategy. One of these actions was the restoration for the MYLF that began in Little Rock Creek in 2002. This project removed non-native trout to allow the expansion of the existing MYLF population upstream. The project took place downstream of Williamson Rock below a historic fish barrier in lower Little Rock Creek, see Figure 2. Historically there were no trout present in the creek near Williamson Rock at any point in the recent past and they are not native to this watershed; therefore the increase of MYLF at upper Little Rock Creek are not a direct result of the trout removal program. Increases in the lower Little Rock Creek are due to dispersal of frogs from the upper reach into the now fishless lower reach, in response to this action.

USGS collaborated with other researchers to use the tissue samples collected to evaluate the southern California MYLF evolutionary history using mtDNA and microsatellite analysis (Schoville et al. 2011). The results of this analysis showed five distinct evolutionary groups, one in the Sierra Nevada, two in the San Gabriel Mountains, one in the San Bernardino Mountains, and one in the San Jacinto Mountains. This informed the decision to attempt to maintain three conservation units in southern California, one for each mountain range. Specifically, the Little Rock Creek population is unique in that it contains haplotypes in a shared clade with the Sierra Nevada frogs, as well as haplotypes in the southern California clade. This is the only population that shows this signature of mixed heritage.

MYLF are extremely endangered with less than 200 adults persisting in the wild and Little Rock Creek represents a large portion (possibly >30%) of the remaining frogs in southern California. This population is critical to the future of this species in southern California and the recovery of the frogs seen after the 2005 was well documented and is extremely important to the recovery of this species. Any management action that would put this recovery at risk should be addressed very conservatively and well monitored for impacts.

Below are proposed actions identified in the scoping letter. Under each proposed action we provide comments.

Implement long-term and seasonal closures

- If the site re-opens, we recommend enforcement of strict adherence to the staging area and the Long Trail with monitoring of use to ensure user compliance. Since 2006, we have direct observations of climbers using the Williamson Rock area despite the Closure Order. We feel that even if a small percentage of users violate the proposed stream closure, it will have a significant impact on the MYLF population recovery. During the open recreation period (August 16 – December 31) MYLF adults, juveniles, newly metamorphosed frogs, and tadpoles will all be in the stream. All of these life stages are sensitive to stream disturbances especially the newly metamorphosed frogs and tadpoles which are easily trampled in this small stream.
- Based on our captive breeding of the MYLF over the past seven years, we have learned that this species is extremely sensitive to slight changes in water chemistry. With the low flows found in the upper section of Little Rock Creek, the introduction of even the smallest amount of a foreign toxic substance can potentially alter the stream's water chemistry to levels capable of negatively impacting MYLF. Substances of concern include sunscreen, lotions, and increases in nitrogen loads to the stream from human waste.
- Our data shows the locations of MYLF detected in Little Rock Creek from 2001 – 2013, see Figure 3. According to the maps provided in the scoping letter, we have concerns there will be direct impacts to MYLF at both the stream crossing of the Long Trail and Little Rock Creek and at the proposed staging area as MYLF have been detected at or near both locations.
- We recommend monitoring the soft physical barrier (e.g. cable barrier bolted/anchored into rock at

stream banks) for the use of birds that may use this as a perch to forage on MYLF. Possibly the use of cameras with motion sensors to aid with monitoring. These should be signed indicating that disturbance of monitoring equipment will result in closure of the site.

- There is evidence in other ranid frogs that recreation too close to stream habitats causes a behavioral shift in the frogs that interferes with normal basking and foraging behavior (Rodríguez-Prieto and Fernández-Juricic 2005). An appropriate buffer may need to be determined to minimize human disturbance on MYLF.
- We recommend no dogs in the Williamson Rock area.
- We recommend day use only, no overnight use of the Williamson Rock area.

Pacific Crest National Scenic Trail bridge

- We recommend appropriate measures to reduce the amount of sedimentation during construction and placement of the bridge.
- We recommend incorporating signage about MYLF natural history and the importance of staying out of the creek.

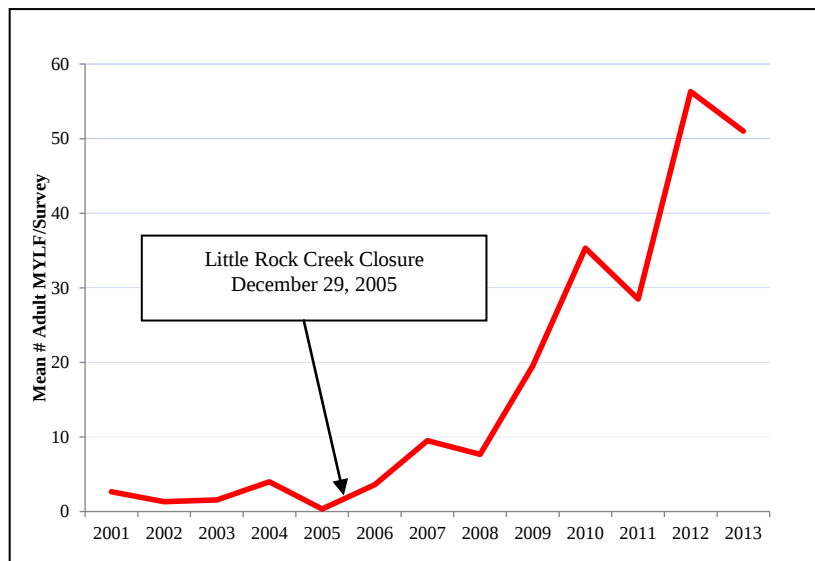


Figure 1. Mean number of adult MYLF detected per survey at upper Little Rock Creek annually from 2001- 2013.

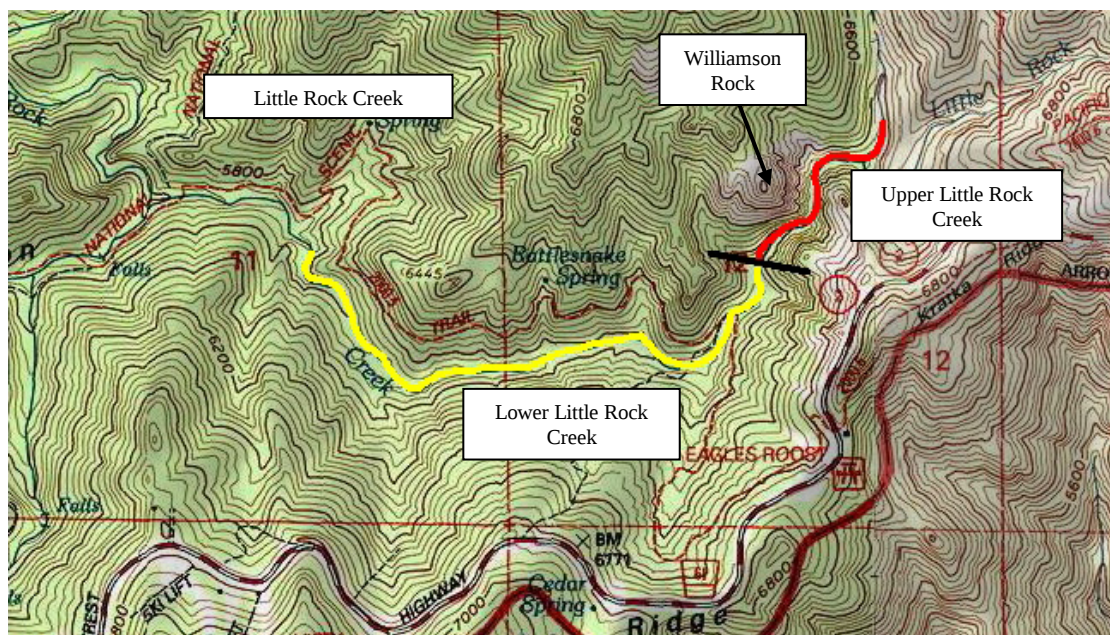


Figure 2. Little Rock Creek showing the two distinct reaches (Upper and Lower) dividing the management areas. The lower reach indicates the non-native fish removal restoration site and the upper reach indicates the Williamson Rock area that has been historically fish free, and where egg masses are deposited.

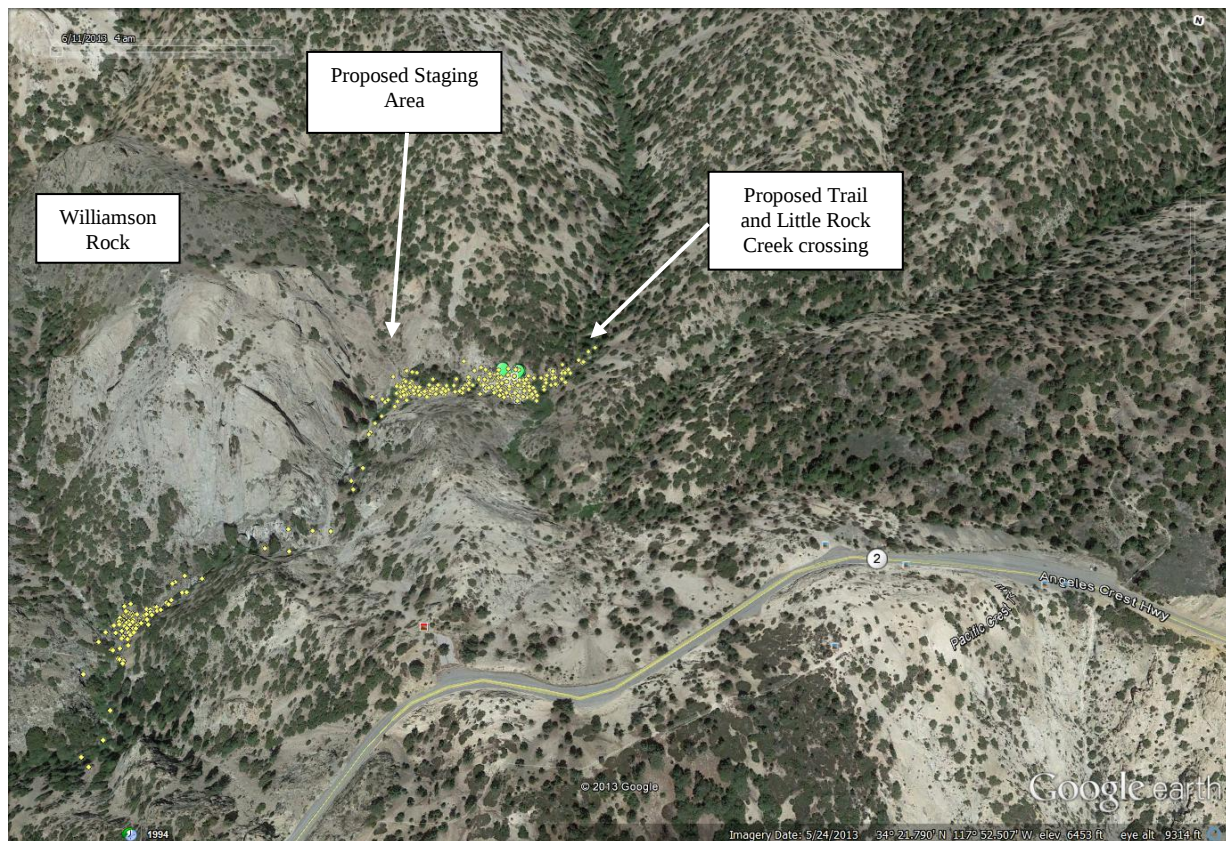


Figure 3. Yellow dots represent all MYLF detections at upper Little Rock Creek from 2001-2013. Note the detections near the proposed staging area and creek crossing of the proposed Long Trail. The green balloons represent the only four MYLF egg masses detected at Little Rock Creek from 2001-2013. The greatest density of frogs in the canyon based on this >10 year study is between the proposed staging area and the Long Trail creek crossing.

References

- Backlin, A.R., C.J. Hitchcock, E.A. Gallegos, J.L. Yee, and R.N. Fisher. 2014. The precarious persistence of the endangered Sierra Madre yellow-legged frog *Rana muscosa* in southern California, USA. *Oryx*.
- Rodríguez-Prieto, I. and E. Fernández-Juricic. 2005. Effects of direct human disturbance on the endemic Iberian frog *Rana iberica* at individual and population levels. *Biological Conservation* 123:1-9.
- Schoville, S.D., T.S Tunstall, V.T. Vredenburg, A.R. Backlin, E. Gallegos, D.A. Wood, and 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*, 144:2031-2040.