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REPTILES JULY 2014
Surveying the Sierra Nevada

Sierra Nevada yellow-legged frog (Rana sierrae)
A frog expert answers the call to monitor anurans in the rugged mountain range.

Get paid to go herping in California? It sounded too good to be true, but that’s what the ad said. Officially, the position was titled "biotechnician," described as working for the U.S. Forest Service to conduct surveys on Yosemite toad (Anaxyrus canorus) and Sierra Nevada yellow-legged frog (Rana sierrae) populations. To me, it meant the perfect summer job, climbing mountains in California and catching frogs, all the while contributing to an important study.

Amphibians around the world are disappearing, with local populations vanishing and entire species going extinct. Yosemite toads and mountain yellow-legged frogs are no exception. Their populations have declined dramatically in the recent past. In some cases, this appears to be related to disease, including Batrachochytrium dendrobatidis (the infamous chytrid fungus thought to be responsible for many recent amphibian extinctions), but introduced trout, cattle grazing, pollution and human recreational activities have also been noted as reasons for their decline. To monitor both of these endangered amphibians, the U.S. Forest Service began conducting Yosemite toad and mountain yellow-legged frog surveys in 2002. This would be my summer job.
Small pools of water were scattered about the meadow, interrupting grass and occasional patches of corn lily.

Toad Training

"I’ve got one!" the crew leader yelled. We all gathered around. Between her fingers, she held a plump male Yosemite toad, uniformly olive green in color. It was the first week out, and we were being taught protocol for conducting surveys. The toad squirmed in an attempt to escape while we were shown how to accurately sex, measure and photograph the species.

Sexing Yosemite toads is a cinch. Females have intricate dark blotches over a light-colored background, giving them a sort of reticulated pattern, while males are a solid brown to olive color. Our other two tasks, holding a ruler to their belly and taking photos of the captured individual, were not as easy to accomplish while the toads tried to wriggle free of our grasp.

Small pools of water were scattered about the meadow, interrupting grass and occasional patches of corn lily. Yosemite toads breed in these waterholes in late spring. During the rest of the year, they live mysterious lives, hidden from view in the forests that surround their wet meadow breeding sites.

After several minutes of searching, Lucas, a senior crew member, flagged me over to one of the puddles.

“How many tadpoles do you think are in there?” he asked, pointing at a black toad tadpole swimming around the edge of the pool.

I peered in, trying to make a quick estimate. “20, 30, 50... maybe 100?”

The pool was small, and the only tadpoles I could see were in the shallowest part, scattered sparingly around the edge. I stepped into the water to get a better look. As I did so, the water bubbled with life as tadpoles emerged from hiding. I tried to recount, and reality hit me. There could be thousands of tadpoles in this single waterhole, what about the other two hundred we would survey this week? This summer was not going to be all fun and games.

While the goal was to learn protocol for collecting data on the Yosemite toad, we inevitably turned up an assortment of other herps during training. Mountain garter snakes (Thamnophis elegans) were numerous, feasting on the Pacific chorus frog (Pseudacris regilla) tadpoles that seemed to inhabit every body of water.
The various water bodies of Sierra Nevada.

Long-toed salamander (Ambystoma macrodactylum) eggs and larvae were also discovered on the underside of submerged driftwood, though the secretive adults could not be found.

The species I most wanted to see though, the other target species of the monitoring project, was missing from our training site. I wouldn’t be introduced to the increasingly rare Sierra Nevada yellow-legged frog until several weeks later.

Shallow Lake

I washed off the grimy layer of dust, oil and dried sweat that builds on a person’s face when they have been living outdoors, then jumped into the mountain lake. The cold water hit me as if I were a live power line.

“No wonder it takes yellow-legged frogs three years to complete metamorphosis!” I thought to myself while climbing out of the frigid water.

Mountain garter snake (Thamnophis elegans)

The lower the water temperature, the slower a tadpole’s metabolism and the longer they remain aquatic. Yellow-legged frogs are built for this harsh, high-altitude environment. Their tadpoles take advantage of the summer months by moving to the warm shallows near the edge of deep lakes. Tadpoles then overwinter in their depths. Adults are tough too, breeding immediately after ice melt and thriving on the
One of the sites the author and crew camped.

extreme climatic conditions of the Sierras. In order to survey these rugged frogs, I too would need to step up to the plate and tolerate the freezing water and intense sun of their mountain home.

June had ended, and I still had not found a single yellow-legged frog this summer. My surveying partner told me today would be the day because we were headed to Shallow Lake. Contrary to the name of the site, there were multiple lakes to survey and none of them were shallow. The water of Shallow Lake was free of introduced trout, which meant there would be a good chance of finding yellow-legged frogs.

We set out the morning after arrival. All bodies of water had to be checked for frogs, so we decided to start from the most distant one and work our way back toward camp. Using both hands to climb up white granite boulders, I wondered how there could possibly be frogs at this far-off lake we were headed to. Yellow-legged frogs have strong legs and webbed feet, well-adapted to swimming.

but climbing? How could frogs make it up here?

I approached the lake slowly. Stopping knee-deep in the cold water, I started my stopwatch and began walking the shoreline to scan for frogs. Within moments, I heard the sound I was waiting for—plop! Before I had time to even think “frog,” a big yellow-legged evaded my survey and swam to the depths of the lake for safety. Now fully alert, I continued the search. On the other side of the lake I saw another, this time before it saw me. Lurging forward with my net, I jumped after the frog and caught it with one swoop. I now was formerly introduced to our second target species. Success!

Hawksbeak Peak

Nearing the end of the summer, I had become comfortable with backcountry life. My government-issued tent had grown to be as much of a home as any apartment or house I had lived in. There was one last site to survey before returning home to Wisconsin, and I was told it would be climactic because a particularly large population of Sierra Nevada yellow-legged frogs lived there.

I was also told this last trip would start with the longest hike of the summer. With less than 10 hours before sunset and more than 15 miles to hike, there would be little time for breaks. Far
in the distance, I could see the gray tip of Hawksbeak Peak, our destination. Out of eyesight were a series of meadow lakes near the base of the mountain, strung together by deep carving channels. This meadow would be our survey site.

I hiked quickly, forcing myself to ignore my innate impulse to chase after movement I saw in my peripheral vision. I hiked alongside alligator lizards scurrying through leaf litter, *Scoloporus* clinging to granite and rushed past trailside ponds, where garter snakes made ripples in water. It was important to get to Hawksbeak Peak before sunset.

We arrived at sunset. Deep in the backcountry, we set up camp on a boulder far from any trail. Although physically exhausted, my mind was racing, eager to view the important yellow-legged frog population the next morning.

At first light, I unzipped the tent door, then put on my water shoes, grabbed my net and joined my partner to plan our route. Navigating with compass and GPS, we made our way toward the large meadow that was said to be yellow-legged frog-central. Hiking at a less-urgent pace than the previous day, my partner Katie suddenly stopped.

"Look!" She pointed to the ground. Coiled loosely on a patch of dirt was an elegant little snake I had wanted to see the whole summer—a rubber boa (*Charina bottae*). I took some photographs, admired the docile serpent, and then continued on.

We entered the meadow and followed a deep channel to a water hole to begin surveying. The steep, grassy pond side exploded with movement as startled frogs leaped into the water. As fast as the frogs leapt, my net hit the water to chase after them.

Although there seemed to be thousands of Sierra Nevada yellow-legged frogs around us, the population did not look healthy. Eerily white carcasses of frogs were found throughout the survey, likely victims of the chytrid fungus this population was known to be infected with.

The good news, however, was that alongside the weak and dead frogs, I also saw many individuals acting normal, completely healthy and well-fit at evading my net. Perhaps this population can cope with chytrid for one more season. **REPTILES**

**DEVIN EDMONDS** spent another two summers surveying amphibians in the Sierra following this first field season. He now resides in Madagascar, where he coordinates the amphibian conservation activities of the community-run organization, Mila Uganda.

Dead frogs and toads were found, possibly because of the infamous chytrid fungus, but many healthy individuals were also observed.