Mountain Lakes Research Group 2024 Newsletter

University of California Sierra Nevada Aquatic Research Laboratory

Using science to solve management challenges in California's Sierra Nevada lake ecosystems, with a focus on recovering endangered mountain yellow-legged frogs

PC: Georgia Lattig

The Mountain Lakes Research Group 2024 field season was busier than ever. We reintroduced 625 zoo-reared mountain yellow-legged (MYL) frogs, translocated 130 wild-caught adult frogs, and collected close to 900 tadpoles for zoo rearing and future reintroduction to the wild. We monitored reintroduced and translocated populations at more than 50 sites to better understand the dynamics of population establishment. And our efforts are working. From our recent Nature Communications publication (covered in USA Today and Science News), we are happy to share that MYL frogs in Yosemite have adapted to live with the fungal pathogen *Batrachochytrium dendrobatidis* (*Bd*), and we are leveraging that evolution to facilitate recovery on a landscape scale. By reintroducing *Bd*-resistant frogs into habitats they formerly occupied, we can reestablish MYL frogs in the presence of *Bd* across their historical range. Indeed, when we look at a map of our reintroduction sites, we are working towards species recovery from northern Yosemite to south of Mount Whitney in the Golden Trout Wilderness. But there is more work to do. Read on for field season highlights, a funding overview, and a dedication to our research partners and field staff who make MYL frog recovery possible.

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2024 Highlights

Reintroductions. We reintroduced **625 adult frogs** in 2024. We released frogs into 12 different lakes, including two new sites, spread across Yosemite, Kings Canyon, and Sequoia National Parks and the Inyo and Sierra National Forests. These frogs were collected as tadpoles from populations that are persisting with the often lethal chytrid fungus, and were reared to adulthood at the Oakland and San Francisco Zoos. Frog transport was facilitated by agency and zoo partners.

Translocations. We translocated **130 adult frogs** in 2024 to five sites in Yosemite, including one new site. In translocations, we catch wild adult frogs from *Bd*-persistent populations that are large enough to sustain the removal of adults, and move these frogs directly to other lakes. In 2024, we paired each translocation with a reintroduction in an experiment to compare these two recovery techniques. We know that both techniques work to reestablish frog populations, so pairing them provides both a research opportunity and a practical chance to put more frogs into recovering lakes.

Collections. In preparation for 2025 and 2026 reintroductions, we and our partners collected **884 tadpoles** at six sites in Yosemite and Kings Canyon National Parks and the Inyo National Forest. Under the diligent care of our zoo partners, many of these tadpoles are now adult frogs ready for release in 2025.

RIBBiTR and LTREB. As members of the National Science Foundation-funded Resilience Institute Bridging Biological Training and Research (RIBBiTR), we collaborate with biologists and educators across nine universities to understand resilience to disease in amphibian populations. As part of the NSF Long Term Research in Environmental Biology program (LTREB), we document and quantify long-term changes in MYL frog populations in response to the chytrid fungus. We are able to do this because of the longevity of our research program (30 years!). Connected to RIBBiTR and LTREB projects, we collected almost **500 samples** from frogs in 2024 to learn more about frog immune defenses and how frog genetics affect the ability of frogs to persist with the amphibian chytrid fungus.
In addition, we and our RIBBiTR collaborators organized, hosted, and taught an international amphibian disease workshop at SNARL to help train the next generation of integrative biologists and amphibian conservationists.

The Numbers

625 frogs reintroduced

130 frogs translocated

884 tadpoles collected

178 lakes surveyed

6182 adult MYL frogs observed during visual surveys

3211 subadult MYL frogs observed during surveys

52,000 MYL frog tadpoles observed during surveys

1984 skin swab samples collected

491 immunology/genetic samples collected

7 weather stations deployed and collected

>1100 survey hours

14 night surveys conducted

6 seasonal technicians

3 permanent employees

4 publications

(number of high elevation leave-no-trace hacky sack games not quantified)


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Wishlist


100 PIT tags to track individual frogs ($165)


2 PIT tag readers ($650 per reader)


Pay the rent for our office & lab spaces at SNARL for one month ($995)


Immunize frogs at the Oakland Zoo ($3000)


Fund a field technician for the summer ($12,500)


Cover an entire field season of MLRG frog disease testing ($16,000)


Purchase a second qPCR machine, which allows us to provide at-cost disease testing for agencies and academics ($24,000)


Cover an entire field season ($100,000 - yes, we dream big)

Supporting Mountain Lakes Research

Our frog research and recovery work are 100% grant and gift funded. Over the past five years, we have thrived on research grants from the National Science Foundation (NSF), the US Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), and the National Park Service (NPS). We benefit from gifts from the Yosemite Conservancy (YC) and Sequoia Parks Conservancy (SPC), and we have developed relationships with a small number of generous private donors. Over the past twelve months, we have cumulatively received some of our largest private gifts to date - a truly great honor to know that our work has reached the eyes and ears of individuals who support frog recovery and science training. Private gifts cover standard programmatic costs and also provide flexibility to cover finite projects or unforeseen costs like equipment failure.

At its peak, this portfolio allowed us to accelerate frog recovery in ways we never expected and to grow our project personnel to include talented hard working scientists committed to wildlife wellbeing, ecosystem integrity, and unquenchable curiosity. Times change. Our funding levels and opportunities are subject to decisions made by individuals, economic trends, and/or political landscapes. By maintaining relationships with our diverse group of partnering agencies, conservancies, and friends, we hope our funding can remain relatively stable if/when certain sources of funding become unavailable.

As we say every year: if you are in a position to make choices or recommendations about where people or organizations can direct their dollars, and you or your organization value biodiversity, conservation, ecosystem integrity, and endangered species recovery, please keep in mind the needs and productivity of our research and recovery program. We provide an excellent return on investment, if your metrics include number of young scientists trained or number of frogs and frog populations living across the Sierra Nevada.

We also suggest this: share with people in your network your own love of the Sierra, its flora and fauna, and the importance of the connections between them and all of us. Contact your US Senator or Rep about supporting protected lands and the people who work to conserve or preserve them. Inspire others to invest in or vote for the future of this mountain range that we rely on for water, recreation, and well-being.

In 2024, our approximately $300,000 annual budget was funded by grants from NSF, USFWS, NPS, and CDFW; and gifts from YC, SPC, and private individuals and their employers' donation matching programs. If you would like to join our support network, start with our Wish List to see what your donation could cover. **To make a financial contribution, please contact Tom (tcsmith@ucsb.edu) or Roland (roland.knapp@ucsb.edu), and Jessica Ajao at the Earth Research Institute (proposals@eri.ucsb.edu).** UCSB is a non-profit organization; some donations may be eligible for employer-matching; overhead on your gifts is relatively low (6%). Nearly all of your dollars will be used to train the next generation of conservation biologists and to continue critical frog recovery actions.

Acknowledgements.

Our work would not be possible without our agency, zoo, and university partners. A tremendous thank you to our collaborators and friends at the San Francisco and Oakland Zoos, Yosemite and Sequoia and Kings Canyon National Parks, Inyo and Sierra National Forests, California Department of Fish and Wildlife, and U.S. Fish and Wildlife Service for their dedication to amphibian conservation and joint efforts in permitting, planning, funding, and field work. Additional thanks to Carol Blanchette and many other staff at the UC Santa Barbara Natural Reserve System, and our administrative support from UCSB Earth Research Institute.

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Field Staff Thanks. We ask a lot of our seasonal field technicians, requiring them to be both rigorous field biologists and experienced mountain athletes. We specifically thank our summer field technicians **Allie Chipman, Sage Kruleski, Parker Land, Georgia Lattig, Forest Peri, and Leonie Walderich** for their flexibility, hard work, positive team-oriented energy, and remarkably clean data; **John Imperato, Kira Miller, and Juyung Yoo** for sharing their alumni expertise in the field; and **Sam Lapp, Hannah Nossan, Cannon Mallory**, and our other RIBBiTR collaborators for their research to support amphibian resilience and disease, and their efforts to mentor the next generation of integrative and conservation biologists.