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Foothill Yellow-legged Frog Podcast and “Meet the Scientists” *Rana boylei*

In this podcast we wade into the issue of dams and biodiversity with two biologists sampling the DNA of this threatened frog in order to save it.

Transcript

Ari: From the Encyclopedia of Life, this is One Species at a Time. I’m Ari Daniel Shapiro.

We’re in Northern California, in the Alameda Creek on the eastern side of San Francisco Bay where it doesn’t feel like San Francisco at all. It’s warm, it’s sunny, and not at all urban. Jennifer Dever is a geneticist at the University of San Francisco. She’s wading ankle-deep into the creek, and she can’t help but smile.

Dever: Ever since I was a child, this is all I wanted to do is walk along creeks and hike along rivers. And the fact that I get to do this today: it’s really fabulous.

Ari: Dever’s looking for *Rana boylei*, or foothill yellow legged frogs. Biologist Sarah Kupferberg is helping out. At the moment, all they’re finding is tadpoles. Lots of tadpoles.

Kupferberg: Okay, got it.

Ari: How do you catch a tadpole?

Kupferberg: With your hands!

Dever: Yeah, they’ll just swim right into your hands if you’re kinda patient, just put your hand in the right spot.

Kupferberg: Yeah, touch their tail and they’ll swim right into your other hand.

Ari: The duo quickly captures about a dozen tadpoles.

All these tadpoles, they're a good sign...that the creek's healthy. That the water's flowing just right. Because this portion of the Alameda Creek isn't controlled by a dam. But the situation's much worse down-creek below the Calaveras dam, and actually in many other rivers regulated by dams. A large water release can be disastrous for these frogs. Sarah Kupferberg.

Kupferberg: The frogs are pretty choosy: they'll find a rock that's kind of sheltered from flow to place their eggs. But if the volume of water comes up and it's moving too swiftly, the whole clutch can get detached from the rock.

Ari: The water can also wash away tadpoles. Or, sometimes a dam is used to hold water, and so the river height drops. If this happens after the frogs have laid their eggs...

Kupferberg: The eggs can be left high and dry, and be stranded.

Ari: Foothill yellow legged frogs have been wiped out from half of their historic range in California. It's an area that now contains 800 dams.

Kupferberg: Now the populations are just hanging on by a thread. The sizes are very small, the numbers are very few.

Ari: How few frogs are there? Well, that's where Jennifer Dever comes in. You see, she collects DNA from the toes and tails of frogs and tadpoles in rivers all over northern California. And then she returns here, to her genetics lab at the University of San Francisco. Dever reaches into the fridge where she stores her samples and pulls out a tray with about a hundred little tubes.

Dever: Each one of these tubes represents a distinct frog. Its DNA is stored in here.

Ari: Dever looks to see how similar the DNA is between different individuals. The more varied the DNA, the bigger the population in a particular river. That's better for the frogs. Here's one way of thinking about it.

Dever: If all of the shirts in your closet are short-sleeved white T-shirts, that's gonna be great if you're going to the beach and it's gonna be a hot day. But what happens when the fog rolls in? You're gonna be pretty cold.

Ari: Especially in San Francisco.

Dever: Especially in San Francisco. So it's nice to be able to have a jacket to put on or a sweatshirt.

Ari: The same goes for genetic diversity. The idea is that having options – having frogs that differ from one another genetically – gives the population a kind of resilience. So that if things do change in the environment, at least some of the frogs will survive.

And what Dever's found is that in rivers with dams, compared to those without, the frogs are more similar genetically. That means fewer frogs. Less resilient populations.

But Dever and Kupferberg aren't suggesting eliminating the dams. They want to see dam operators mimic the natural ups and downs of the water level, an approach the San Francisco Public Utilities Commission is taking with Alameda Creek. It's a solution aimed at balancing the needs of both people and the ecosystem.

Ari: Back at Alameda Creek, the tadpoles cruise around our submerged feet. Biologist Sarah Kupferberg wants to be sure that places like this are around for a very long time, both for us and for the frogs.

Kupferberg: It's not like the rumpus room where you make a mess. You know, it's this really special place. It's kind of like your parlor where you bring company and you show them – it's where you keep all your nice things and your treasures are displayed on the mantelpiece. I don't know, I feel like, I feel like it's my living room.

Ari: And changing how dams release water could give the foothill yellow legged frog – just one treasure among many – what it needs to make a comeback.

Meet the Scientist

Meet scientists Sarah Kupferberg and Jennifer Dever who were featured in the Foothill Yellow-legged frog podcast:



From left to right: Sarah Kupferberg and Jennifer Dever in the field.

Where do you work?

Sarah: In the Department of Integrative Biology at the University of California, Berkeley.

Jennifer: The University of San Francisco as a Professor of Biology.

What do you study?

Sarah: I am a stream ecologist focused on the connections between physical conditions in rivers and biological processes, specifically the interplay among flow regime, channel morphology, thermal regime, and the food webs that amphibian populations are part of.

Jennifer: My research is focused in conservation genetics to better manage threatened wildlife using molecular tools - especially amphibian and reptile populations.

What are three titles you would give yourself?

Sarah: earthling (or maybe waterling), mom, tadpole wrangler

Jennifer: biologist, biology professor, wildlife enthusiast

What do you like to do when you are not working?

Sarah: I care for my family and I read -- I've been revisiting literature from middle school when I was the ages my son and daughter are now.

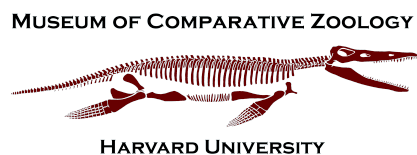
Jennifer: I enjoy listening to music, hiking and eating good food.

What do you like most about science?

Sarah: I love the freedom to follow my curiosity, the creativity involved in designing field experiments, and the time spent observing animals and plants. I am especially lucky to work with sharp-as-tacks colleagues and interact with smart students who teach me new things.

Jennifer: Science is my avenue to teach others to better appreciate nature. I also enjoy the challenges science.

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