Hey to all you fish enthusiasts out there. Whether you're an avid angler or just curious about fish, we'd like to welcome you to fish of the week, your audio almanac of all the fish. It's Monday, July 25 2022. And this year, we're excited to take you on a week by week tour of fish across the country with guests from all walks of life. I'm Katrina Liebich with the US Fish and Wildlife Service in Alaska,

and I'm Guy Eroh. This week we're going to be covering speckled day specifically those in the Long Valley.

We're very pleased to welcome our guests we've got Kaylan Hager, who's a fish and wildlife biologist with our Reno, Nevada office. And we've got Rosa Cox, who's a native fish biologist with the California Department of Fish and Wildlife. So welcome you two!

Thank you for having us.

Thank you.

So Guy, I don't think we've done a dace species before have we?

No, we haven't. We've done some other minnows. Some other small sort of non game fish and dace always kind of get me there. It's a name sort of similar to like the chubs and the basses is where it doesn't necessarily mean anything in particular, but it's one of a fish from any number of genre, but they're generally you know, these smaller freshwater sort of cyprinid/lucicid-type species, but I haven't had the chance to actually interact with a ton of dace. So I'm really excited to learn more about this species.

So I guess Yeah, I'm kind of curious how this species, the speckled dace, and the variety we're talking about today...How do those fit in specifically, what dace?

Yeah, this species, Rhinichthys osculus, is in the genus Rhinichthys, which I always have a hard time pronouncing, and these are the riffle daces. There are eight species currently represented in North America, including one extinct species. Riffle daces are widespread throughout North America, but the speckled days is actually one of the most widespread dispersant fish in western North America, Long Valley speckled dace in particular, is a sub species that has not yet been recognized as a sub species. So right now, Long Valley speckled dace is part of this larger distributed species that actually ranges from British Columbia all the way down to Mexico. With the onset of genetics, we have really started paying attention to smaller populations. And the population we're talking about today, this is isolated to a very small portion of the Eastern Sierra that just north of the Owens Valley. And we're really just talking about this fish that exists in one small basin,and has been isolated from other populations for a significant amount of time.

So Kaylan, if we were to head to the place where the Long Valley speckled dace lives, what kind of landscape would we see? And also, if we had this fish in hand, could you describe kind of what we what we'd see what does it look like?

Yeah, so currently Long Valley Speckled Dace exist at the Whitmore Marsh. So it's mostly covered in three-square bulrush. And it's pretty heavily encroached there. But you still have a nice channel of water that outflows into two distinct pools, where we recently just did some surveys. The water coming out is about 89 degrees from the spring head and the gradient stays pretty warm throughout it. Long Valley Speckled Dace are 80 to 110 millimeters, which is about three to four inches. It's kind of a dusky olive color, and then get their name because they have black splotches and spots throughout their whole entire body. And they will have reddish tint to their fins, and the males will have kind of reddish lips as well. So it's kind of distinguishing for that species.

And I've got a picture here in my screenshot, but kind of has like a downturn, frown face.

Yeah, very cartoonish face as well.

Yeah, so we actually only currently have two populations of Long Valley Speckled Dace in the world. One is at Whitmarsh which Kaylan already mentioned. And the other is that a very, very small managed refuge pond at a research station down in Bishop's so the pond is only 40. By 40 feet, it supports a population of probably three to 4000 fish. And that is our source population for any kind of management efforts we do or restoration efforts we do.

Real quick, what temperature did you say that this spring was coming out at?

89 degrees Fahrenheit

That sounds very warm. What is that near the thermal kind of tolerance for this species because that seems high.

So the fish don't actually persist in the upper part of the marsh, they really do much better in the lower parts of the marsh where we get much more cooling from environmental influences. So we like we have traps throughout that marsh in the past and they will actually be found in the upper reaches of the marsh where it is very warm, but they don't seem to spend a lot of time there. So they seem to be foraging specifically there and then not necessarily reproducing there or even overnighting there right so there'll be moving in and out of the hot water in that particular habitat.

Could one of you kind of describe the geological history and like hydrology of the larger area. I mean, this is a very specific spot that we've talked about, but just kind of that, you know, where was this fish historically? How did the geology and just water movement in this landscape, I know it's a desert habitat. But how did that shape kind of where these fish were and are today?

Because desert fish are in arid climates, we're looking at really generally fairly isolated bodies of water in the current age. And as such, you get high levels of endemism in these habitats. You can kind of think of them as similar to the Galapagos Islands, they're islands of water within a very dry system, a dry area, so you get...turns out fish kind of do need water to move around. It might be a shock to you and your listeners [laughs]. But if you get these isolated bodies of water, in these desert environments, you do get high levels of speciation and separation from each other. That's really cool. What's

interesting about speckled dace in particular, in this area is that recent genetic data indicates that there has been actually more recent hybridization between all these populations in the Death Valley system than with our other desert fish like pup fish, and tui chub. And part of that might be that these are just cool stream dwelling desert fish, and they actually are capable of inhabiting headwater streams that say, our pup fish don't inhabit, and so they seem to have actually moved around surprisingly, more often than you'd expect for these desert arid regions. Long Valley speckled dace actually seem to be much more isolated and much more differentiated from the rest of the speckled dace in the Death Valley system, which we're talking about Amargosa speckled dace, Owens Valley speckled dace, Ash Meadows speckled dace, Oasis Valley speckled dace. All of those fish seem much more related to each other, even though they're spread out over a much larger geographic range than say, The Long Valley dace from the Owens Valley speckled dace. So Long Valley is actually just perched above the Owens Valley. It's like 30 miles away from Bishop, California. And in Bishop we have that one speckled dace. And yet in Long Valley, we're looking at a much more differentiated population of speckled dace then say, Owen's Valley speckled dace are from the actually Death Valley speckled dace where they're separated by a distance of more than 200 300 miles.

So out of curiosity, how much time are we talking about these fish being separated from one another, and kind of evolving on their own sort of trajectory.

Long Valley is formed by a volcanic eruption 760,000 years ago. And just really fascinating because it created this big caldera that is relatively isolated from other valleys in the region. So I've seen people argue that Long Valley Speckled Dace could have been isolated from Owen's Valley Speckled Dace as early as 760,000 years ago as a result of the eruption. But I've also heard arguments that, you know, it really actually probably happened much more recently, due to increasing basically steepness in the connecting waterways, right? So as erosion out of Long Valley happened, or as Long Valley drained, and erosion occurred in the river drainage, and we got an increasing gradient that might have prohibited colonization of Owens Valley Speckled Dace back up into long valley. And as such, that would have been a much more recent process than 760 thousand years ago.

The Long Valley Speckled Dace hasn't formally been described yet. It has been recognized as an individual population, because there's not any differentiated delineated species that can result in issues with management, right?

It seems like it is a pretty plastic species as well, depending on the habitat where it is, you get all these different forms, and that seems to muddy the water even more and figuring out, you know, what is the same species? What's the difference between what's a sub species within and what's just a different form within that same sub species?

Right? And you know, why that actually really begs the question, why do we care what a species is and how it's delineated? And really, from my perspective, we really, truly care because species are the unit at which we manage, right? So conservation efforts really matter for fish, when we can delineate what a species is, and where it's, you know, geographically isolated. So with formal recognition will come like additional ability and resources for conservation and management.

You brought up the importance of getting these populations to the species level for management. But I've talked to a lot of managers and one of the things that they think is really important, is being able to actually look at a fish and distinguish it from another, you know, species. And if you can't tell sort of by looking at it, and the fish can reproduce with one another, it's hard to justify, in their opinion that such a thing as a different species. So I'm curious, are there physical differences between these populations that can kind of contribute to your justification and calling them different species or subspecies?

That's a good question. speckled dace kind of identity crisis in 1896. They were thought to be 10, that in 1974, there they said it was one. And then 2002 they said one was seven subspecies, and countless papers. By the time I finished the sentences there's probably already one published saying that something different, but one thing has remained true is that long valley speckled dace, since they could do genetic analysis has been considered to be distinct enough than the rest of them. Physically, like, morphologically difference is there, it's very minute. Like you have a different lateral, more lateral line scales and less lateral line pores. But if you were to handle it, just the average person handling that it'd be very hard to discern between the two, but genetically, they vary higher than any other speckled dace.

Yeah. And that I mean diversity's importance to resilience over time. And we're talking about a landscape and an area of the US where water is a scarce resource. There's a lot of folks that need to use it for different things. So maybe we can talk a little bit about what has kind of maybe threatened these fish, is it water only? Is it other species that have come in? Is it land use?

Yeah, so typical to a lot of desert systems, a two big risks for these fish are loss of habitat by diversion and loss of habitat due to introduction of non native predatory fish. Really, the big one is predators, you know, these fish evolved without any native predators. And so with the introduction of non natives in the early 20th century, we're looking at a really incredible reduction in range that went pretty quickly. And unfortunately, that actually creates some complications with finding refuge habitat for them for management, you know, we are actively searching for isolated ponds, isolated streams isolated to get hot springs that we can maybe translocate them into and establish new populations. But unfortunately, long valley is just such a small geographic area to begin with, that those opportunities don't really exist within its state of drainage.

So the major kind of management techniques here, you've got the translocation piece, and then what about like habitat restoration? Is that a big player in this?

Yeah, so a lot of the water in Long Valley is actually very connected to the main drainage, the main Owens river system. And so it makes it very impossible to like to do restoration such that we could introduce long valley speckled dace would involve eradicating fish that we don't have the ability to eradicate. But I do think that illustrates just how limited our options are in the basin. There are a few more options outside of basin. But yeah, and I think, you know, the restoration process really does involve just collaborating with agencies collaborating with partners. You know, dealing with, like US Fish and Wildlife Service has been really critical in helping try to restore habitat and find alternative habitats. Options are limited.

Are there things people can do to help conserve these fish or things they can think about what their own water use, or consumer choices, anything like that?

Yeah, so I was thinking about this a lot recently. And I really do think that the, the main thing that people can do to contribute to conserving native desert fish in general, it's just simply not releasing pet fish into waters. You know, we deal with introductions of goldfish a lot. You know, people spend time out here in the beautiful outdoors, and they see a beautiful poem that looks perfect for their pet fish. And when they move, it just makes sense to release it, and then let it be free. And that is that actually poses significant problems for desert fish conservation in general. And you know, we've had multiple of non-natives Simply because people were releasing aquarium fish into the waters. And that applies to, you know, turtles. I'm sure people are familiar with red eared sliders in the West, they're nonnative and invasive. And I think yeah, I think that's honestly the easiest step that people can take is educate folks on not releasing pet fish. There are a lot of other options for getting rid of unwanted pets that include donating to pet stores or you know, finding someone else to take care of them or you know, humanely euthanizing them.

That's interesting you mentioned those two because even up here in Anchorage, we had goldfish and sliders and I think that's pretty I mean, goldfish is something we want to cover in the future here but that's a pretty a pretty big issue I think.

I really like desert fish they seem just yeah. They're, they're very cool. And you just wouldn't expect to, I guess just look at these habitats and know that there's so much diversity out there. But do you think there's any possibility of kind of interesting the public in these desert fishes that are native versus some of the fish that have been introduced? I mean, I know there's a whole micro fishing community coming online. And I don't know, I just think they're, they're very cool. And people just may not know too much about them.

Yeah, I recently just discovered micro fishing, that's I saw someone catch a speckled dace with like a size 16 hook versus even smaller is really impressive, I didn't know you can do that. So that might be something that I might dabble into an advocate for. It's hard to get advocacy groups for fish like these, because when you have water that needs to go to these fish, but water that needs to be used for other issues, they can be seen as a competing interest. As Mark Twain said, "in the American West, whiskey is for drinking and water is for fighting." So you have to really walk that line between of conservation and recovery and also being able to fulfill the utilitarian need for that water. But the advocacy of these fish should be supported on just how unique they are. And they evolved to fill these niches that another species didn't. So they're very unique and very rare. And they're there for a reason. And they couldn't be a keystone indicator for that ecosystem.

I would love to see fish heads out there get really invested in these cryptic desert species. But I think a lot of it's just going to come down to how much we can sell the importance of native fish to ecosystem services and ecosystems in general. And I do want to mention that we have several Indigenous tribes out here that are very invested in native species, especially pup fish, but speckled dace are one of those texts that that they also are pay a lot of attention to. And I think that increasing local awareness of all of our endemic species in general, could create a group of people who are excited about advocacy.

But you know, I really don't know about the logistics of creating a tourism industry on fish that can fit in the palm of my hand. And well, our tourism.

A lot of the people who would be interested, I think they listen to this podcast. So maybe this will help spark that. If someone was going to try and make a trip out there and wanted to target some of these dace, what kind of equipment would they use? You mentioned those really small 16 and higher hooks, but what kind of you know, bait might you throw on there? That's the most convincing whether these things eaten in the wild?

That's a great question. speckled dace are relatively omnivorous. You know, for our native fish, they are not by Severus, they are targeting bugs, but they actually also plant matter and algae. I don't know how you fish for something with algae.

I bet Guy could. I bet you could catch something

Mayfly or midge or caddisfly. You gotta get a real small, the macroinvertebrate population was really, really, really healthy out when we did the surveys. But we caught the same fish three times. So if the macroinvertebrates are an indicator of the health of the overall population, then that is it's encouraging. They're just very hard to get to in that three square gold rush.

The majority of native fish are protected. So they're illegal to possess. And I think that actually goes for fishing for them as well. You can't fish for Owens pup fish, they're fully protected. They're federally endangered, you can't fish for native tui chub although we have introgressed to check that you absolutely can fish for in the majority of their region. Because those aren't protected. So there are different populations that are variably protected. And you basically if you're going to go fishing for something or even try to keep something you really should be fully educated on its protections and how endangered they are.

Yes, I've loved this conversation. I wish we'd had it a couple weeks ago, I would have definitely added long valley and Owens basin to my California trip. I'm really regretting I didn't now.

You'll just have to come back.

Yeah, one of these days.

All right. we hope everybody gets out there and enjoys all the fish and those desert cryptic fishes need love too.

Thanks for listening to fish of the week. My name is Katrina Liebich And my co host is Guy Eroh. Our production partner for the series is Citizen Racecar. Produced and story edited by David Hoffman. Production Management by Gabriela Montequin. Post production by Alex Brower. Fish of the Week! is a production of the US Fish and Wildlife Service, Alaska Region Office of External Affairs. We honor thank and celebrate the whole community, individual tribes, states, our sister agencies, fish enthusiast,

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