How a tiny fish is helping Utah and the West tackle big questions about the Colorado River's future

Charismatic is hardly the best word to describe the humpback chub, a fish with a frowny eel face jammed onto a sport fish body in a way that suggests evolution has a sense of humor. Nor did tastiness build a fan base for this "trash fish" across its natural habitat throughout the Colorado River Basin. But, in 1973, the humpback chub became famous by winning federal protection under the Endangered Species Act.

Researchers in the Grand Canyon now spend weeks at a time, several times a year, monitoring humpback chub, which has become central to an ecosystem science program with implications for millions of Westerners who rely on Colorado River water.

Dennis Harris, who guides an electrofishing boat for a research contractor, is part of the science crew that briefed me last year at the world's largest known humpback chub hangout, just below the confluence of the Little Colorado River with the Colorado in Arizona. He spun a yarn about

what fish say upon their return to home waters — how they survived an alien abduction:

“They scooped me up in a net and took me to the mother ship and stuck me with a piece of glass and probed my genitals and brought me back here,’” Harris said, throwing his head back and splaying his arms to imitate fish stunned by the electric current.

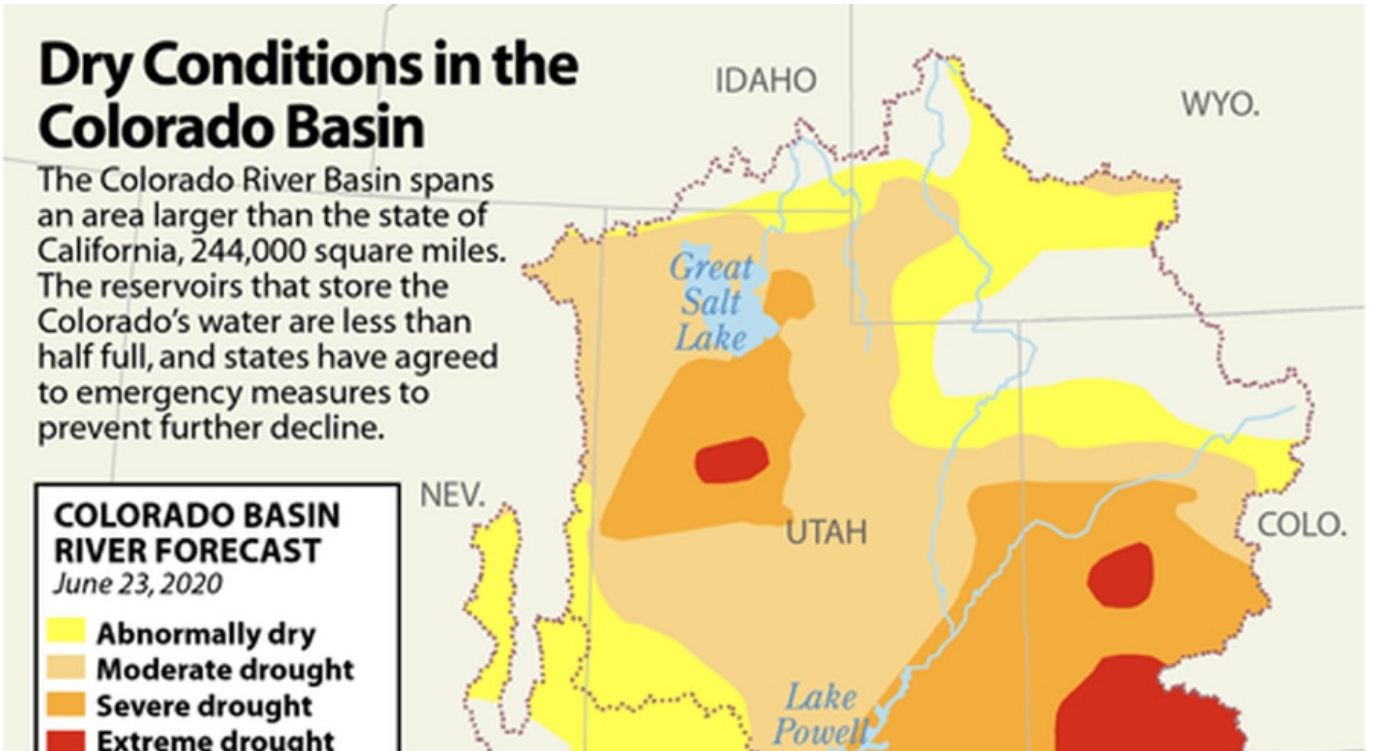
“And all their friends go, ‘Yeah, right.’”

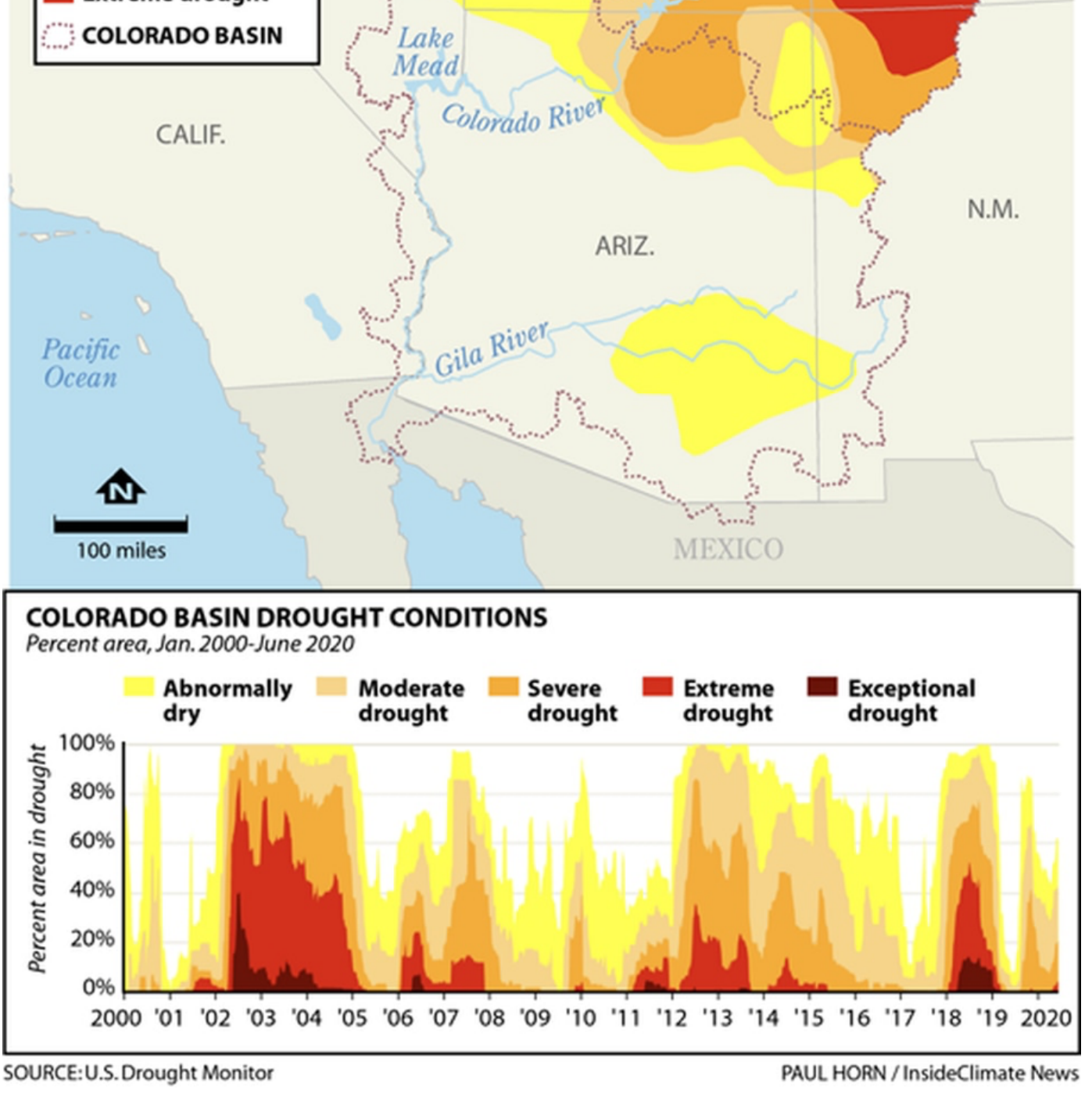
(Judy Fahys | InsideClimate News) Dennis Harris, part of the research team monitoring juvenile humpback chub last spring in Grand Canyon National Park, imitates how native fish respond to electrofishing, a nonlethal capture technique. The scientific teams stun fish with electricity so they can be counted, measured and tagged in an experience likened to "alien abduction" for the fish.

Funny as that sounds, the humpback chub's experience is surprisingly meaningful now — as its river habitat deep in the iconic, redrock canyon becomes the subject of new scrutiny. New negotiations about the Colorado's future begin later this year in a world that has fundamentally changed since foundational water agreements were drawn up, back when the river was flush and the entire basin was treated like a giant network of irrigation ditches.

Now, nearly a century after the original Colorado River Compact was forged, river stakeholders also find themselves in alien terrain as they try to reconcile an old management scheme with new realities, such as tribal rights, environmental protection and, especially, climate change.

'The pie is getting smaller'





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About 40 million people in seven states, including Utah, and Mexico rely on the Colorado for irrigation, drinking and even hydropower. Most of the water is used in agriculture to irrigate more than 5.5 million acres.

Meanwhile, the Colorado is shrinking. Average river flows have dropped 19% over the past century. About half the

decline is blamed on global warming, and scientists project that unchecked climate change could nearly triple flow reductions by the century's end. Basin tribes, meanwhile, want to tap into allocations they haven't been able to use because they lack means to store and pipe the water.

And thanks to research mandated by the 1992 Grand Canyon Protection Act, the fate of the chub and the canyon ecology are factors that will also need to be considered in the yet-to-be-scheduled negotiations. Ultimately, all parties are worried about losing their share of the Colorado River, of going home with partly empty buckets because there's just not enough water to go around.

"The pie is getting smaller," said Jack Schmidt, director of the Utah State University's Center for Colorado River Studies, noting that more users sharing less water increases pressure to revamp water agreements.

To understand what he means, here's a quick primer on Colorado River allocations beginning with the term "acre-feet." It's roughly the water needed to fill a football field a foot deep or about 326,000 gallons.

Under original agreements, including the Colorado River Compact, Schmidt's "pie" amounted to 17.5 million acre-feet of water, which has proved to be an overestimation of "average" flows because the calculation was made when

the river was unusually full. So over the past two decades, due in part to climate change and drought, the size of that pie has shrunk to an average annual flow of about 12.5 million acre-feet. In short, the pie is about a third smaller on average than when water users divvied up the river.

“People have to come to terms with the fact that they can’t keep the size of that [accustomed] slice when the whole pie is getting smaller,” said Schmidt.

(screenshot) Jack Schmidt, director of Utah State University's Center for Colorado River Studies, says climate change is one of the factors that will affect future uses of the Colorado River. Climate change, tribal rights and environmental health are factors relevant to upcoming river management talks.

Having once led the humpback chub “alien abductions” and the rest of the scientific program at the U.S. Geological Survey’s Grand Canyon Monitoring and Research Center, Schmidt is now studying how climate change might affect

not just the endangered fish species and the basin environment overall but also traditional river flows and hydropower output. Although he says environmental concerns in the canyon typically have been “an afterthought” in how the river is managed, he hopes the research becomes central during upcoming negotiations.

Opportunities to tinker with river management plans are coming up fast.

Water rights: a dramatic struggle

(Judy Fahys | InsideClimate News) The U.S. Geological SurveyÕs Grand Canyon Research and Monitoring Center runs three trips...

The U.S. Interior Department must begin updating plans for managing the river, and convene all the states that rely on it, by year’s end under the Colorado River Interim Guidelines, one of the agreements that determine how much water is allocated for each stakeholder to use or develop.

Like everything about Colorado River management, it’s legally complex and controlled by a deeply entrenched power structure involving the seven basin states, the federal Bureau of Reclamation and established users in agriculture and municipalities that have assigned positions in the line to the spigot — spots known as “water rights.” Dry as it might sound, it’s dramatic stuff, grist for a neo-noir thriller like the

1974 film, "Chinatown."

But even the guidelines, which were implemented in 2007, have fallen short in the new, drier West. Last year, Congress approved a pair of Drought Contingency Plans, requiring varying levels of conservation to be implemented, state by state, whenever water levels sank too low at Lake Powell or Lake Mead, the ginormous storage reservoirs for Colorado River water. Both lakes dropped to emergency levels within months.

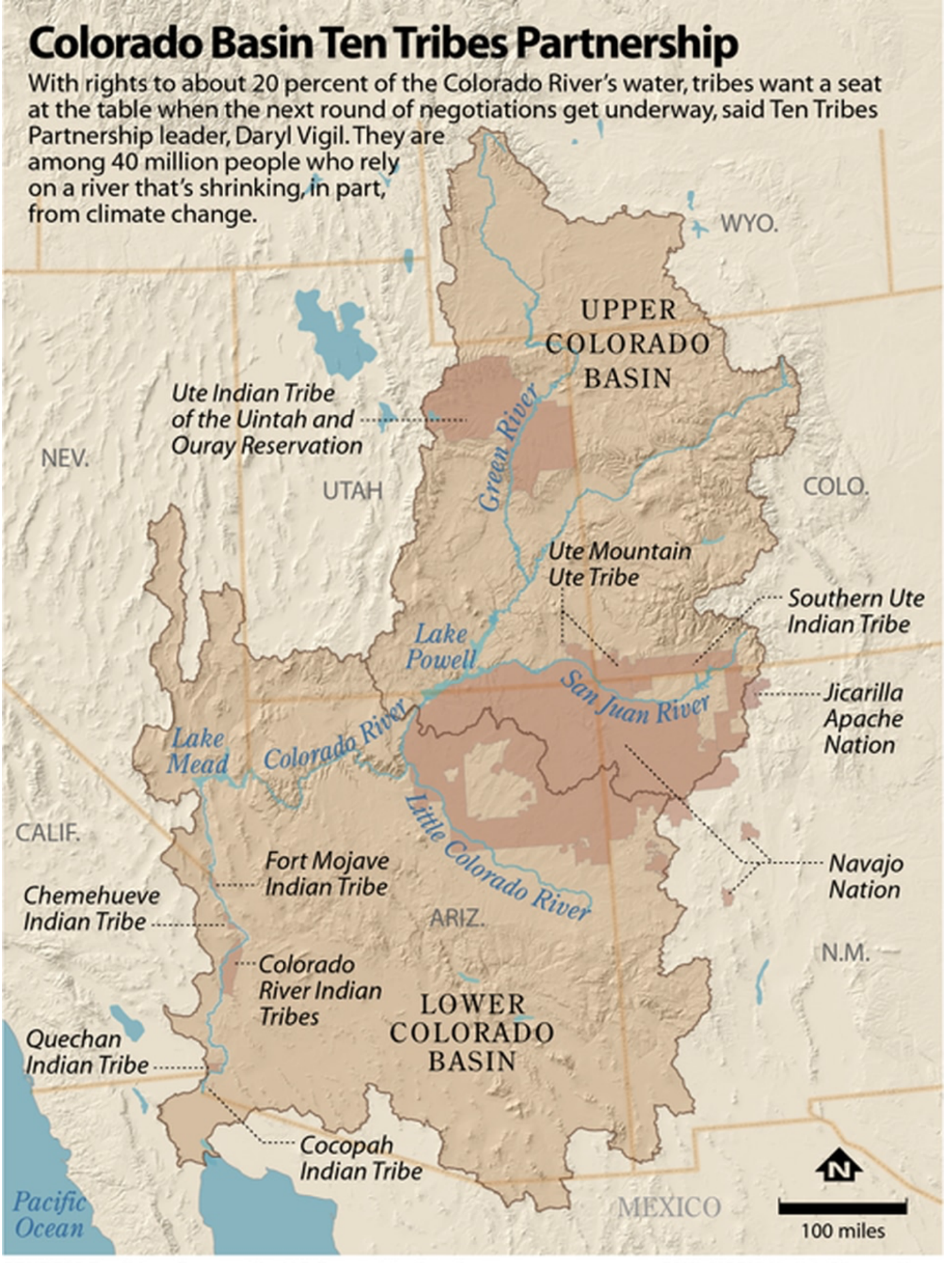
The original compact guarantees certain water volumes to the lower basin states — Arizona, Nevada and California. The upper basin states — Utah, Wyoming, Colorado and New Mexico — historically haven't used all of their allocations but plan to develop theirs, too. For example, Utah is pressing forward with a multibillion-dollar Lake Powell pipeline project to funnel 86,000 acre-feet halfway across the state to the fast-growing southwestern part of the state. A diversion of water from the Utah-Wyoming border to Colorado's populous Front Range — killed and resurrected so many times it's called the "zombie pipeline" — would use 55,000 acre-feet.

Still, Schmidt said: "I am actually very hopeful. I believe that climate change and the real need to renegotiate agreements have brought us together."

The role of global warming as a motivator for revisiting the water allocations probably can't be overstated. The average temperature in the Southwest has already risen twice as fast as the global average and future temperatures are projected to increase as much as 9.5 degrees Fahrenheit by 2100.

Climate change is just one reason Daryl Vigil, water director for the Jicarilla Apache Nation and interim director of the Ten Tribes Partnership, is determined to see tribes at the table in the next round of negotiations. He says the 29 basin tribes have priority rights to about 20% of the Colorado River's water but were snubbed by current users from past Colorado River talks.

"The system is going to protect itself, to perpetuate what it already does because it benefits those who already are doing OK," he said. "Familiar story, right?"



SOURCES: Ten Tribes Partnership; U.S. Dept. of the Interior

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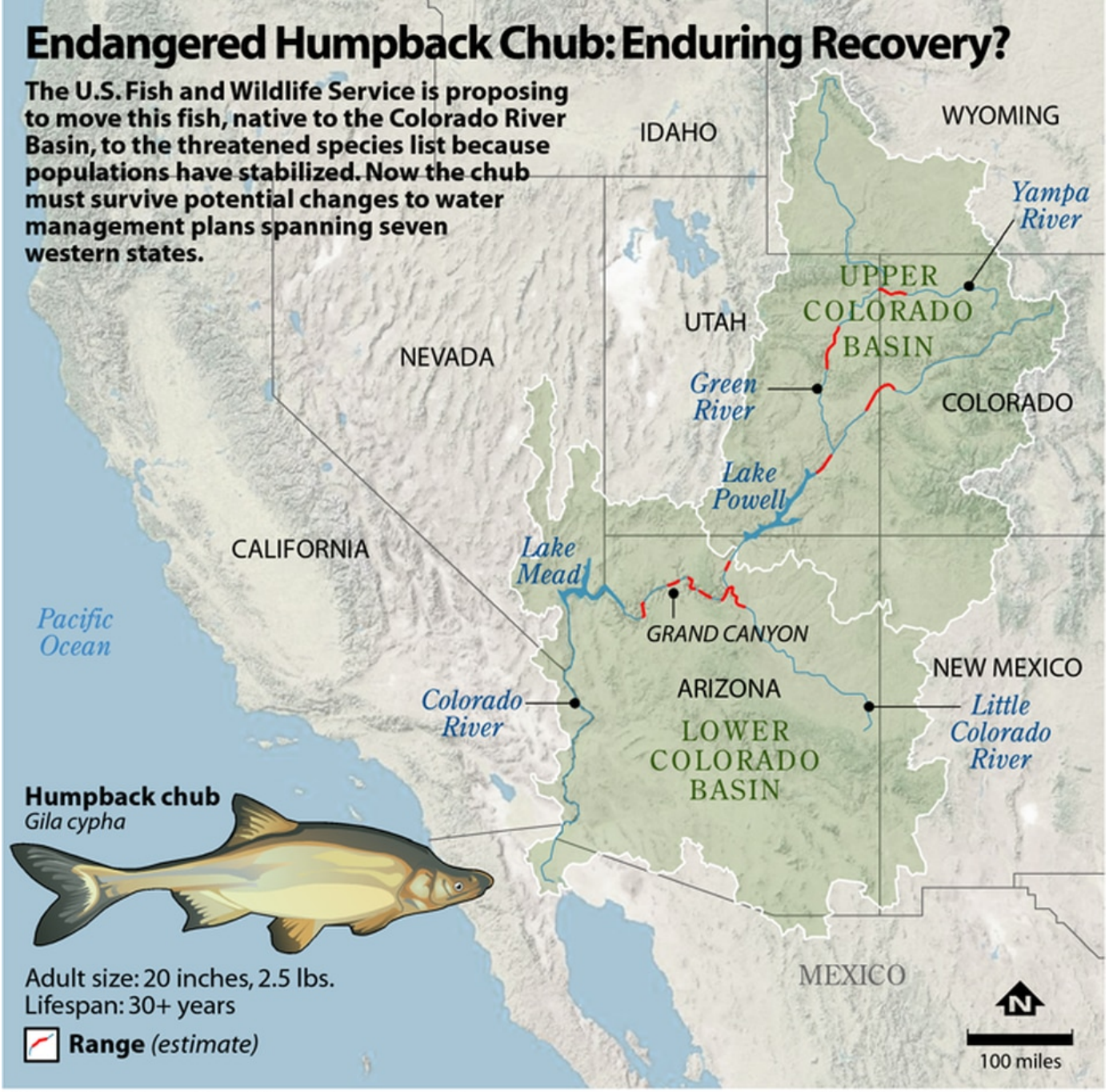
The exclusion, which amounts to environmental racism, means tens of thousands of Indigenous people have not been able to access their water and tap into the associated economic opportunities, such as selling their water rights and using the water for energy projects, he said. Instead, other stakeholders are using tribal water without paying for it.

Another reason the tribes should be part of the decision-making, he said, is because of their experience — thousands of years of dealing with water scarcity in the region — and their cultural views about the environment belong in any critical conversations about the Colorado. Otherwise the future looks "pretty catastrophic to us," Vigil told High Country News this spring.

"When we start talking about climate change," he said, "absolutely pushing to make sure that we're thinking about a mindset of how we fit into nature, rather than nature fitting into us."

Humpback chub informs decisions



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The humpback chub helps illustrate Vigil's point that water is living, that the river basin is more than a plumbing system.

Preserving the chub's DNA — and data about what's enabled the fish to survive 3 million to 5 million years of life in the basin — did not become a priority until the 1992 Grand Canyon Protection Act. Experimental releases at Glen

Canyon Dam, studies about predation, water chemistry, temperature changes and insects have helped revive populations, and now the U.S. Fish and Wildlife Service is proposing to downlist the humpback chub from endangered to threatened status.

The U.S. Geological Survey's Grand Canyon Research and Monitoring Center, directed by Scott VanderKooi, has led efforts to monitor environmental balance while dam operations continue to generate energy and regulate reservoir levels.

When the pandemic prompted the closure of the river to boating this spring, several scientific trips had to be scrapped or postponed, he explained. They included cultural resource monitoring, the juvenile humpback chub "abductions" and an important three-year test of ways to boost insect life along the river.

"For short-term changes, we're missing some data," VanderKooi said. "But for looking at these longer-term trends, we're confident that we'll have enough information to determine whether or not the experiment was successful and whether we were able to instigate those changes in the aquatic ecosystem that we believe will occur by altering these flows."

(Judy Fahys | InsideClimate News) The U.S. Geological Survey's Grand Canyon Research and Monitoring Center runs three scientific trips each year to keep track of humpback chub and other fish species. Here, Clay Nelson is using a floodlight to find stunned fish and retrieve them at a sampling site on the main Colorado downstream from the Little Colorado River. Scientific findings are being used to help guide Colorado River operations.

John Fleck described a long history of ignoring science in managing basin water in the recent book, "Science Be Dammed: How Ignoring Inconvenient Science Drained the Colorado River," co-written with Eric Kuhn.

"We're in the midst of this huge experiment that's really open-ended in terms of how we manage this river going forward, and we need all of this science to inform it," he said. "You can't just... say, 'Well, we're going to ignore that

piece,' because you're going to have these unintended consequences."

Fleck said the people deciding the basin's fate need information about the trade-offs. And data from Grand Canyon research will help them understand not only how to preserve a "sacred space" in American culture but also how to continue relying on a resource essential to the West.

It's hard to imagine that those funny-faced fish have much to teach us. But, in a sense, they already have. Those "alien abductions" of humpback chub deep in the redrock canyon have generated scientific understanding that we've used to slow the species' slide toward extinction.

The chub's story shows how probing natural systems on a small scale can lead to workable solutions. Now the question is whether that lesson will be scaled up and how well the next Colorado River management plan takes climate into account. In the end, research can only bring focus to the Colorado's real-world questions.

Data alone won't decide the river's future. Only people can do that.

Editor's note • *The Salt Lake Tribune is a content-sharing partner with InsideClimate News, a Pulitzer Prize-winning nonprofit, nonpartisan news organization that provides*

essential reporting and analysis on climate, energy and the environment. This story is part of a project covering the Colorado River Basin and water in the West. It was produced by InsideClimate News in collaboration with public radio station KUNC.

(Judy Fahys | InsideClimate News) Colorado River stakeholders have been experimenting with releases from Glen Canyon Dam to, among other things, improve the beaches that Grand Canyon river runners use for camping. Here at Olo Camp, sand beaches are monitored with the help of citizen scientists, with the broader aim of managing Colorado River water to the benefit of the environment, recreational users and water users.