

Why some fish are 'junk' and others are protected. Study points to bias against native species

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Andrew Rypel grew up fishing on Wisconsin's pristine lakes and rivers. With just a worm on his hook, he caught suckers, gar, sunfish and other native fish he never saw in his game fishing magazines.

From a young age, Rypel loved all the fish species and it surprised him that others paid little attention to the [native fish](#) in his area. He noticed there were stricter fishing restrictions on game fish, like walleye and trout, than the [native species](#). With no bag limits on many of his favorite native species, people could harvest as many as they pleased.

"I learned that there were all these different types of species," Rypel said. "Most of the fishing community focused on these select game fish species."

Anglers even told young Rypel to throw the less desirable native fish up on the bank after they were caught, as they were supposedly a "problem for the ecosystem" and took resources away from highly valued game species.

Rypel always found this perspective backward. Native fish are essential for healthy aquatic environments. And in the midst of the world's climate crisis, protecting these native species is more critical than ever.

Now working as an associate professor at the University of California, Davis, Rypel continues to notice inequities in [fisheries management](#). This year, he decided to do something about it.

"I finally got to a point in my career where I felt like I could write and lead a perspective piece highlighting the problems with the way that we manage freshwater fisheries," Rypel said.

The eventual study co-authored by Rypel and a number of colleagues discovered something that he'd known since his youth: Most fishing regulations are biased against native fishes. Written when attitudes toward native fish were grounded in elements of racism and even sexism, these archaic regulations continue to shape fisheries management today—often to the detriment of native fishes.

By publishing the study in July in *Fisheries Magazine*, a journal of the American Fisheries Society, Rypel hoped to "put some thoughts out there" about how to create a more sustainable future for fisheries management. Rypel said this study is an example of how a "limited perspective" can inhibit the proper management of a resource, such as native fish.

"Many of these fisheries have been valued by other groups of fishers over time and those voices just haven't been listened to," Rypel said.

Studies such as this also highlight the damaging environmental consequences of native species loss—a burgeoning threat as climate change causes more species to go extinct and ecosystems become less habitable for fragile species.

"These aren't just nasty fish mucking around in these streams that shouldn't be cared about," said co-author Parsa Saffarinia, a postdoctoral scholar at UC Davis. "There can be extreme consequences when a large proportion of them are removed."

Even California, a state that is championed for its [conservation efforts](#), struggles with outdated fishing regulations and negative attitudes toward its native species.

Delta smelt, a native California fish species found in the Sacramento-San Joaquin Delta, remains at the heart of the state's water debate. The species has been widely derided, including by Donald Trump and Ted Cruz, as a "useless minnow" since its protected status is used to deprive farmers of water.

On the Klamath, the pejorative "sucker-loving Indians" is sometimes used by agriculture supporters to describe the tribes fighting to keep water in Upper Klamath Lake to protect native fish that are important to

their heritage.

Up until a few years ago, "squawfish" was what just about every angler called the now-named Sacramento pikeminnow, a type of native fish so loathed by anglers, they hold derbies for them.

The issue of protecting native fish is pervasive throughout the country. In the Midwest and South, wildlife managers struggle to control populations of invasive Asian carp after their introduction over 100 years ago. With such a large population in Kentucky, commercial fishermen removed over 7.6 million pounds of carp in the state in 2020.

In Montana, populations of nonnative trout have been increasing since they were brought to Flathead Lake in 1905. Now, 143,000 lake trout must be removed from the lake every year to ease the population explosion. Zebra mussels, native to Europe and Asia, have infested 33 lakes and rivers in Texas. These nonnative, invasive fish and mollusks overcrowd habitats and take resources away from vulnerable native species.

In California, the California Department of Fish and Wildlife is working to restore native habitat, with the overarching goal to sustain the state's native fish diversity, said Claire Ingel, the statewide coordinator for the native fishes conservation program for CDFW.

"The goals are to restore habitat for native fish to such an extent that populations can withstand fluctuations in climate," Ingel said.

California was one of the first states to protect native species by law. The California Endangered Species Act was enacted in 1970, which was three years before the federal Endangered Species Act, Ingel said.

"As Californians, we've decided that they have value because we've

enacted legislation to protect them," Ingel said.

Much more than just 'trash fish'

To better understand discrepancies in fisheries management, Rypel and his fellow researchers compared policies and bag limits of native fish with those of the largemouth bass, a highly valued sport fish found across the country that is nonnative on the West Coast.

After conducting the nationwide survey of fishing regulations, the researchers found that fishing regulations for native species were less restrictive than of the bass in all states, meaning people could fish for as many individuals as they wanted. Beyond that, nearly every state across the country has policies encouraging the overfishing of native species, they found.

In many states, including California, largemouth bass bag limits are five fish per day, according to the study.

But, the regulations for native fish are less restrictive. Forty-three states, including California, have unlimited bag limits for at least one native species, the study found. In the remaining states, bag limits are between 15 and 50 fish a day.

Many of these inequalities are the result of discrepancies in fishes' economic values.

"We identified that many of the species are undervalued or at least haven't been valued in the ways that maybe they should be," said co-author Nann Fangue, a UC Davis professor. "If they're not an economically valuable species perhaps they haven't been given their fair share of attention and of course, conservation."

CDFW has reason to impose stricter fishing regulations on game fish species, such as largemouth bass. The department used to be supported almost entirely by fishing licenses.

Anglers pay high prices to catch the prized fish species, so the state wants to maintain healthy population levels of these game species, said co-author in the study Peter Moyle, a distinguished professor emeritus at UC Davis.

As a result, CDFW used to focus their management efforts on a very small number of fish, often to the detriment of native fishes, Moyle said. But now, more funding comes from other sources and CDFW focuses its efforts on conserving many native species.

However, still today, nonnative game species have significance to many people after being a part of the landscape for so long, especially anglers, Ingel said.

"Nonnative fish are economically and culturally important in California, and provide important opportunities for people to connect with outdoor spaces and cultural practices and connect to each other," Ingel said.

To many fisheries researchers, these discrepancies in fishing preference and economic value make no sense, until they look back to the origins of fisheries management.

"How did we get to this point ... to where some native species are treated as if they have low to no value and there's no limits on their harvest?" said co-author Solomon David, an assistant professor at Nicholls State University in Louisiana.

The answer lies in the nation's racist, sexist and colonialist history. Like most scientific fields, fisheries management was originally dominated by

European male voices.

When colonists first arrived in North America, they viewed native fish with tougher skin (such as gar) as "less desirable" than game fish like salmon or trout, which are easier to filet, David said. In turn, these white colonialists wrote biased regulations that continue to impact fisheries management.

Even today, the field has not improved much in recruiting people of diverse backgrounds, according to Moyle, who's been studying fish conservation for over 50 years. He said fisheries management and research is still predominated by white male voices, often leaving women and people of color left out of conversations.

The study explains how native fish are historically referred to as "rough" or "trash" fish—terms originating from commercial riverboat fishing in the mid-late 1800's. Without dams to regulate the water levels, boats were often too heavy to move through shallow rivers.

By "rough-dressing" (removing organs but not fileting) the less desirable fish, these boats could lessen their loads. If needed, the rough-dressed fish were the first ones thrown off the boat, "like how you might throw away the fruit that's more rotten," David said.

Today, biologists use the term "rough fish" to describe the unproven idea that native fish impede on game fish species—an attitude leading to mass killings of a number of native species.

"Over time, that term seeped into the angling culture," Rypel said. "Folks started to just refer to species that were less desirable as 'rough fish' and it kind of stuck."

In reality, these fish are highly valued, just not by the European

colonizers who originally wrote fishing regulations.

Many native fishes, such as suckers and gar, have been used by Indigenous people for hundreds of years, David said. Native Americans used all parts of the fish—gar scales were carved into arrowheads, hides were used as plow covers and meat was eaten.

Larry Nesper, a professor of anthropology at the University of Wisconsin, Madison, was included as a co-author in the study to address the value Native Americans have for native fish species and the historically racist attitudes toward them.

With a differing perspective on animal use than that of the European colonists, Native Americans eat animals in a respectful way that uses all parts of the body and calls attention to the fact that these animals have given up their lives.

"It's a different conception of our relationship to what we call the natural world," Nesper said.

Rypel hopes to see Indigenous perspectives integrated into fisheries regulations, to combat these racist origins and promote sustainable uses of fish and reduce waste, or "killing things to kill things," even if some species are seen as less desirable and charismatic.

Fish species can be valued more broadly than just their economic worth. They are also culturally valuable and beneficial to native ecosystems, said co-author Katherine O'Reilly, a Ph.D. candidate at the University of Notre Dame.

Changing regulations of these species will in turn benefit native ecosystems. Pollution, habitat loss and climate change threaten freshwater ecosystems—especially for native fish. Eighty-three percent

of native California fish species are declining, according to Rypel.

While salmon's high value is shown through its strict bag limits in California, they are not exempt from the threats of climate change. In the Sacramento River, "nearly all" of an endangered salmon species could soon die as a result of rising water temperatures.

Essential to freshwater ecosystems in California, native fishes help with nutrient cycling and provide food chain support for other native species. Like a jigsaw puzzle, every species plays a critical role in the ecosystem and if one contributor goes extinct, the whole system could collapse, O'Reilly said.

Without native fish, communities could see more serious impacts of climate change, which is why researchers like O'Reilly want to communicate to the public the importance of conserving these native species.

"Even though these species may not seem to have value to humans, they play a really critical role in their respective ecosystems," O'Reilly said.

Yet, conservation and policy about California's rivers and lakes remain complicated. Changing the species compositions of lakes and rivers is not as easy as it may seem.

California's bodies of water are inundated with 50 species of nonnative fish, with some tracing their origins in the state as far back to the 1800s. And as a result, the state's ecosystems and habitats have long strayed from the native landscape, and shifts in species abundance could stress out the changed environment.

"They're fish we're not going to get rid of," Moyle said. "They're here and they tend to be especially well adapted for the altered habitats."

In the Sacramento-San Joaquin Delta, of the nearly 46 [fish species](#) spotted over the years, 27 are not native to the estuary. In 2016, scientists worried that a bill seeking to reduce the number of striped bass, an East Coast species introduced to California in 1879, would stress the already changed estuary.

Scientists were skeptical that removing these nonnative game fish would have the intended benefit: to relieve stress from the declining Chinook, steelhead, Delta smelt and other native fish populations eaten by striped bass. Instead, they said singling out a species well-established in the ecosystem could cause more harm than good.

"Species like the striped bass, whatever harm they did as a predator, they did it a long time ago and now they're part of the Bay Delta ecosystem," Moyle said.

To combat these issues, Moyle said fisheries researchers can manage rivers and lakes in ways that favor the native species and minimize problems with nonnative fishes, a challenging feat to achieve. And at times, he said selective removal programs of nonnative species are necessary.

Because of the high volume of nonnative species in California, CDFW focuses their restoration and conservation efforts on environments that can effectively sustain native fish populations, to ensure a good chance for success, Ingel said.

"We live in a landscape that contains nonnative fish and we need to work in that landscape," Ingel said.

A more inclusive future for native fish?

Ever since Moyle came to UC Davis in 1972, he's seen the fisheries

world change dramatically. Poisoning operations of native fish are rarely done any longer, but in reality, fisheries management has a long way to go.

"You still have a lot of fish out there that are neither endangered nor are they game fish, and they're largely ignored by managers," Moyle said.

The study calls for a paradigm shift in fisheries management and conservation. The researchers offer suggestions for changing the narrative of native fish to shape a future that is more sustainable for fish and inclusive of diverse groups of people.

"We really want this to spark discussions more broadly and hopefully that will start to bring in voices that haven't been represented in these discussions about how we manage our resources," O'Reilly said.

The many recommendations include: integrating Indigenous perspectives, lowering bag limits for native species, enhancing science education and supporting the science of native fishes. But, perhaps the most important suggestion is to stop saying "rough fish" and instead call these species "native fish."

"We want to drop the term 'rough fish' because we do believe it's a pejorative and that it automatically assigns a lesser value to this organism," David said.

CDFW has not used the term "rough fish" in their management for many years. In addition to shifting away from negative terminology and classifications of native fish, CDFW has altered its management practices to fit a more inclusive narrative for native fish.

"Within our department, we have changed practices to adjust our management approaches to better reflect the native fish that exists on the

landscape," Ingel said.

Despite what some conservative media outlets (such as the Federalist) have reported about the study, using the term "rough fish" is not white supremacy. The biased regulations are not the fault of the white men today or even in the past, as there used to be a slimmer understanding of the importance of native species, Rypel said.

"You have to acknowledge where the field came from in order to figure out where we need to go to get better," Rypel said.

This study broadly acknowledges the importance of acknowledging and accepting inherent bias in research, according to Fangué, the UC Davis professor. Researchers must consider whether their approaches to research are representative of all concerned stakeholders.

To illustrate the benefits of including multiple perspectives in research, Rypel invited an array of scholars to be involved in the study, of different backgrounds and career stages.

"This wasn't just like a curmudgeonly old professor [that] had an ax to grind," Rypel said about himself. "This was something that cut across generations of fish scientists that had thought seriously about these issues."

Beyond fisheries management, negative biases toward native species and inequities in conservation apply to many species. Since publishing this study, scientists from other disciplines have told Rypel these issues exist in their subjects.

"In some ways, the message in the 'rough fish' paper is general in that this is probably a paradigm, or a way of thinking, that has been pervasive across conservation," Rypel said.

Conservation efforts have historically focused on charismatic megafauna—species such as tigers, elephants and pandas that have symbolic value and widespread popular appeal. Rypel said this study raises awareness about conservation for species just as crucial to the environment and ecosystems as classically charismatic animals.

"You've got all these native species, but only a few of them are ones that we actually concentrate on and have the majority of management and conservation dollars," David said.

David hopes the study has an impact on fisheries science as a profession, as the study calls into question cultural biases and the lack of diversity in science.

Just like how native fish conservation is slowly improving, so is representation in fisheries science, but women and people of color still remain underrepresented in the field. It's still a "systematic problem" in the world of research, well beyond just fisheries science, David said.

In time, the researchers will see whether their study impacts the fishing community. Young anglers may experience a fishing world different from what was there for Rypel. With much-needed shifts in attitudes toward native [fish](#) and resource management, Rypel said [fishing regulations](#) will likely continue for the better.

"It's going to be much more holistic in terms of trying to protect ecological function," Rypel said, "rather than a select group of [species](#) that were favored by European settlers in North America."

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