

There's a new top fish of the Columbia River, and it doesn't mind the warm water

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There is a new king of the Columbia. Each spring, a chrome tide of fish native to the East Coast floods the Northwest's mightiest river by the millions. Shad, not salmon, are thriving in the warm, still water created by hydroelectric dams throughout the Columbia River Basin.

Some years, they make up more than 90% of fish migrating upstream. The 10-year average return of adult Chinook to the Columbia through 2023 was 690,906 fish. Shad?

It's the dammed and slowed waters of the basin, combined with climate warming, that make the conditions of the modern Columbia far more favorable for shad and other non-native species than for salmon and steelhead.

Summer temperatures in portions of the Columbia and Snake rivers are up 2.7 degrees Fahrenheit since 1960 because of the combined effects of climate change and dams, according to federal data. Temperatures are so high, sometimes exceeding 70 degrees, that they kill migrating salmon.

Meanwhile, warm-water fish—carp, bass, crappie and catfish—are doing great.

In a surprising discovery, scientists who looked into whether the shad boom itself was hurting native salmonids found no evidence to support the hypothesis.

"I would like to think we are not chumps here, but at some point you have to lead where the evidence takes you," said University of Washington salmon expert Tom Quinn, who with his co-authors published the findings in an April paper. "It seems a little, 'Huh, it just doesn't seem quite right,' and it is not inconceivable that we are wrong, but ... let's not just rush to judgment. The problem with evidence is it doesn't always lead where you want it to."

Scientists still have more questions than answers, Quinn stressed, about the ecological effects of this invasion, but one thing's for sure: Shad complicate things for dam operators.

Today, shad are so thick in the Columbia during their spring migration that the U.S. Army Corps of Engineers operates the dams in "shad mode," with an extra slug of water sent down the fish ladders to help the weak-swimming shad make it upstream. It's kind of like keeping a clog out of the plumbing.

"We have a huge biomass. If we didn't pass them, they would block the way for salmon, they couldn't get through," said Robert Wertheimer, fisheries field unit chief for the Corps of Engineers at Bonneville Lock and Dam. Dead shad also have to be scraped off equipment that keeps trash and other debris out of the dams' turbines.

Shad, native to the East Coast, are thriving in the modern, engineered Columbia River. Scientists say the dams and reservoirs have created near perfect conditions for shad, and they have a greater tolerance than native salmon for the [water temperatures](#) boosted by climate change and slack water.

Shad certainly make things more exciting—and difficult—for the fish counters stationed at windows into the fish ladders.

"It's a pain in the butt," said Daniel Keith Hess, a counter on the Oregon side of the Columbia. At every mainstem dam on both sides of the river, counters tabulate the migration of fish. The counts are important to set fishing seasons and monitor the state and health of fish in the river: Chinook, sockeye, coho, chum, pink, lamprey steelhead—and yes, even shad—are counted. Fish managers read the data posted online like box scores.

On a recent spring day, shad were rippling up the river at the rate of 8,000 an hour. With numbers like that, his only hope, Hess said, eyes still glued to the counting window, is to estimate in groups of 10. The shad also are easily shoved around by the current, so they course back

and forth in front of the windows, making an accurate count even harder.

Some days there are so many shad it can be hard to see the Chinook in beast mode, muscling up the ladder, slab-sided and hulking compared to all that shad glitter. "They will completely cover the window," Hess said, and it wasn't even an especially shady day.

Invaders

Shad have a storied history. Gen. George Washington kept his starving troops going at Valley Forge with smoked shad from the Delaware River, John McPhee recounts in his book of shad history and lore, "The Founding Fish." Shad were first brought out and planted in the Sacramento River in 1871 by Seth Green, the father of fish culture in North America.

This all started with a plan to provide cheap food to the hordes of settlers heading west, and at times even involved hauling shad in milk cans in a train's "aquarium car" in 1873—foiled when it wrecked in Nebraska, William Dill and Almo Cordone recount in their history of non-native fish in California. Undaunted, pioneer fish culturist Livingston Stone tried again with a shipment of 35,000 shad from the Hudson River, planted later that year in the Sacramento, followed by plantings by federal and state fish commissions through 1881. Eventually, more than half a million shad fry were stocked.

They thrived and soon traveled north, colonizing the Columbia, where they were also planted, beginning in 1885, according to the state Department of Fish and Wildlife.

By now, shad are everywhere. They are periodically caught in Grays Harbor and the Chehalis River, and this year, WDFW received lots of

reports of anglers catching shad in the Cedar River near Renton. Shad have also been caught in the lower Sammamish River near Kenmore, and by WDFW crews netting Lake Washington to suppress other non-native fish, such as pike and walleye. WDFW has taken more than 1,500 shad out of Lake Washington so far this year.

It's rare to hear the department egg on the public to catch and kill as much of anything as possible, but that's the deal with shad. While not categorized as an aquatic invasive species, WDFW urges anglers to mop up all the shad they can in the Lake Washington watershed.

Shad have long been present in the Columbia, but it was the drowning of Celilo Falls—once the world's signature salmon fishery—with the construction of The Dalles Dam in 1957 that really put out the welcome mat for shad. Flooding the falls obliterated the last natural barrier to a shad invasion of the entire Columbia Basin, according to a 2021 report by the Independent Scientific Advisory Board of the Northwest Power and Conservation Council. Population growth is estimated at about 5% per year, the ISAB found, and there is no indication so far we've reached peak shad.

Shad are sea-run fish like salmon, but some will actually spawn again and again. A big fat female can reach 2 feet in length and carry a whopping 600,000 eggs. They love to spawn in the Columbia's reservoirs and unlike salmon, don't need gravel to make a nest. And really, they are doing what animals do best: homing in on places optimal for survival. For shad, that's a reservoir.

The dams that slow and moderate the river's flow, with their ladders to carry shad from one big ponded reservoir to the next, are near-ideal conditions for shad passage, spawning and rearing.

"The chain of hydropower dams and reservoirs is largely responsible for

the abundance of shad, an unexpected result of the development," the ISAB found.

The future is theirs. Shad can tolerate a wide range of temperature—their native waters stretch from Newfoundland to Florida—so the steadily warming Columbia, which today does not meet Clean Water Act temperature standards in the summer months, is no problem for them.

"Warming conditions in ocean, estuary, and river habitats predicted by climate change models for the Pacific Coast will probably favor shad because of their tolerances for warmer water than salmonids," the ISAB found. "As warming continues, so too will shad's upward trend likely continue."

It's an upside-down world from salmon and steelhead that crave flow, and are repelled by warm water, holding off in their migration and even dying if temperatures climb. A record run of sockeye headed up the Columbia to their home waters in Canada is imperiled by hot water this summer. This is the third time in nine years sockeye have been foiled by hot water: More than a quarter million sockeye were killed in the Columbia in 2015. Shad did just fine that year, though, and even went on to notch some of their biggest years ever, including 2019 with 7.4 million adult shad counted.

"Those warm waters, they don't appear to have caused any problem for shad at all, and may have stimulated some additional production," said Stuart Ellis, harvest management biologist for the Columbia River Inter-tribal Fish Commission, which represents the four treaty tribes with rights to fish the Columbia. And it's salmon they want to catch—not shad, said Randy Settler, 69, a Yakama tribal elder who said he has to clean shad out of his nets when he uses mesh sized for sockeye.

He'll eat a shad, but there's no market for them, so they are a nuisance as much as anything to Native people, Settler said.

"You got to get them out of the nets, that takes time, and you can catch up to a couple thousand pounds a day. That takes space if you are going to do something with them," Settler said. "Most of the shad are thrown right back into the Columbia River and they are dead. There isn't a market for them. ... We are primarily a salmon fishery."

More than just a gate-crasher?

The effect of shad on native fish in the river is poorly understood, the ISAB found. Do they provide a distraction for predators that would otherwise eat salmon—or increase predators because of the biomass buffet they offer? Do they affect salmon and steelhead adversely through competition, predation or other interactions? Risks to salmon and steelhead remain uncertain but are potentially important, the board found.

"We started out thinking, 'Well duh, of course there are going to be obvious effects,'" said Quinn, the UW scientist. "But the more we dug, it was not so clear, not so obvious. We were not out to sell shad as okay; that was not our shtick. I am as into salmon as the next guy, but there wasn't anything here like a smoking gun."

Others see a problem.

Ecotrust, based in Portland, has sounded an alarm about shad, out of concern they could be competing with native juvenile salmon for food, crowding fish ladders—and tribal fishermen's nets. The nonprofit is providing a forum for brainstorming solutions, including developing commercial markets for shad.

Steve Parker, a member of the Washington Fish and Wildlife Commission, sees a situation that could potentially be a problem for salmon recovery, but also a possible opportunity if a market for shad could be developed.

"I characterize it as a problem just waiting to be solved, and to me the solutions are pretty obvious, and could be beneficial," Parker said. But so far, putting together the elements of a commercial-level fishery and market for shad has been difficult.

What to do?

This is hard to figure, given that back East shad are prized in fisheries, by tribes and commercial and sport fishers—and even depleted in their home waters. The roe of adults migrating upriver to spawn is a springtime delicacy, often paired with the tender crosiers of fiddlehead ferns.

But out here, there's no real appetite for the fish. With more than 600 bones each, despite their name, *Alosa sapidissima*, meaning "very delicious," neither shad nor their roe have ever really caught on. Native fishers typically disdain shad. But sport fishing—that's another story. One person's trash truly is another's treasure.

On a recent afternoon, more than 60 anglers were lined up shoulder-to-shoulder along the shore of the Columbia, at the base of the Bonneville Dam, trying their luck for shad. While some were catching them just for crab bait, others were looking forward to cooking them in soup, putting the [fish](#) in spring rolls, or making them into meatballs. Cooked long enough, especially in a pressure cooker, the bones just melt into mush, was the word amid the combat fishers.

Nicknamed silver bullets by anglers for their lively quicksilver ways,

shad are a favorite catch especially for kids and first-timers. Anglers of all ages were pulling shad after shad from the river and hoisting them up the banks to waiting cars for the ride home with shad by the trash-bagful.

Shad offer one of the few fisheries without limits, other than hours in the day. Some anglers arrived at daybreak, and were planning to come back the next morning. They came from Canada, Seattle and all over the region. The rocks were covered with scales, the air whipping with fishing lines. A sturgeon cruised the water's edge, hunting shad scraps.

For anglers, these days seemingly always fishing amid a climate of scarcity, the sheer all-you-can-eat—or at least catch—abundance of shad, was part of the fun.

"There's no limit," said Paul Ouch, of Maple Valley. "That's what I love."

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