

WILDLIFE MANAGEMENT

Engineering Against Endangerment

Bringing a species back from the brink

By Matt Alderton

STRETCHING 150 MILES FROM Portland to Eugene, Oregon's Willamette Valley is surrounded on three sides by verdant mountains, whose dense forests form a coniferous curtain around 5,300 square miles of prime real estate. Flush with fresh water, temperate weather and fecund soil, it's the kind of agricultural Eden to which settlers have always flocked for food, shelter and subsistence. And flock they did in the 19th century, converting vast swathes of raw wilderness into working farmland.

"The Willamette Valley was the original population center of the West," explained Chris Allen, a biologist in the U.S. Fish and Wildlife Service's (FWS) Oregon office. "When (Euro-American) settlers started to manipulate the valley in the mid-1800s, it became a breadbasket for the state and for the region."

For more than 150 years, that breadbasket has fed development across the valley and is now home to some 2.7 million people — approximately 70 percent of Oregon's population. For those people, settlement of the Willamette Valley was a gift. What has been an economic blessing, however, has also been an environmental curse.

The U.S. Army Corps of Engineers is partly at fault. In 1936, Congress authorized the agency to erect 13 dams and reservoirs on tributaries of the Willamette River. Built between 1941 and 1969, they were intended to provide critical flood control for the Willamette Valley's growing population. And they did — at a cost.

That flood control had the side effect of altering the area's delicate ecosystem. Global conservation organization The Nature Conservancy estimates that the Willamette Valley has lost two-thirds of its native habitat. As a result, FWS reports, there are now 12 native species of fish, wildlife and plants whose numbers in the valley are so low that they are listed as threatened or endangered under the federal Endangered



Adult chinook salmon

DIANA FREDLUND

In 2015, the U.S. Fish and Wildlife Service removed the Oregon chub from the Endangered Species list.

Species Act (ESA).

In recent years, those species have compelled the Corps to pivot. Based on 2008 recommendations by the National Marine Fisheries Service and FWS, USACE's mission in the Willamette Valley is no longer limited to building and managing dams; now, it includes mitigating its impact.

"We're operating dams for many societal benefits," said Greg Taylor, a fisheries biologist overseeing the Corps' Willamette Valley program. "The trick is: How do you keep the dams in place to do the things they've been designed to do, yet also address some of the issues that have impacted wildlife? We're doing that by making improvements in a whole bunch of different arenas."

SAVING SALMON

If the Pacific Northwest had an official mascot, it would be either chinook salmon or steelhead trout, both of which are listed as "threatened" in the Willamette Valley.

"These species are an iconic part of Oregon," noted Ian Chane, a program manager in the Corps' Portland District, who added that the fish are significant economically, culturally, recreationally and ecologically. "Every year, they return to the Willamette Valley from the Pacific Ocean. They come back. They spawn, and they die. This puts nutrients back into freshwater ecosystems that are naturally nutrient-deficient. Because a lot of other species are dependent on this, these fish are really important to maintain."

The numbers are grim: In 2004, the

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FISH SPECIES OF THE WILLAMETTE

The Corps works to restore marine life (fish not to scale)



CHINOOK SALMON

Average size: 10 to 15 lbs.
Population in 2004: **96,725**
Population in 2017: **36,628**



STEELHEAD TROUT

Average size: 8 to 11 lbs.
Population in 2004: **11,842**
Population in 2017: **822**



OREGON CHUB

Average size: 1 to 3 inches
Population in 1993: **Less than 1,000**
Population in 2015: **100,000+**

GETTY IMAGES; RICK SWART/ODFW

SOURCES: Washington Department of Fish & Wildlife; Oregon Department of Fish and Wildlife

Oregon Department of Fish and Wildlife counted 96,725 spring chinook and 11,842 winter steelhead; populations in 2017 were 36,628 and 822, respectively.

The Corps' dams have contributed to salmon and steelhead decline in several ways. For one, they've blocked passage for adult fish swimming upstream to their spawning habitat and for juvenile fish migrating downstream to the ocean. Also, they've altered water temperatures in ways that make rivers and streams inhospitable. Meanwhile, the aforementioned floodplain loss harms juvenile salmon whose rearing depends on off-channel habitat for food and protection.

Although progress is slow, the Corps is pursuing both short- and long-term remedies. In 2010, for instance, it unveiled a \$10.4 million fish collection facility at Cougar Dam on the South Fork McKenzie River.



JOHN DAY

Dam fish ladders are used to help facilitate the natural migration of marine life.

Fish whose upstream passage is blocked by the dam leap their way up a concrete fish ladder into a tank that's emptied into a truck, which then transports them to the top of the dam. A \$50.5 million temperature control tower installed in 2005 at the same dam allows operators to control the temperature of the released water by drawing it from the reservoir above at various depths; mixing warmer water from the top of the reservoir with colder water from the bottom creates the optimal temperature for fish downstream.

At Detroit Dam on the North Santiam River, a similar temperature control tower is scheduled for construction, with downstream fish passage possible by 2023. The floating screen will collect juvenile fish so they can be transported safely downstream instead of dying in the dam's turbines, as they often do now. In the meantime, dam operators are "spilling" warm

reservoir water over the dam in the summer, which moderates downstream temperatures while also granting passage to juvenile fish.

Although the Corps is optimistic, it's still too early to determine whether its plans will work.

"These are really big challenges," Chane said. "We can very easily calculate how water will behave (as a result of the changes we're making), but it's very hard to estimate how fish are going to behave."

SMALL FISH, BIG VICTORY

In size and significance, the Oregon chub pales in comparison to salmon and steelhead. Its good fortune, however, foretells what's possible when the Corps commits to species recovery.

Endemic to the Willamette Valley, Oregon chub are small minnows — at most 3 inches long — whose green and silver

coloring allows them to lurk inconspicuously in shallow side channels and backwater sloughs. Unfortunately, flood control across the valley has decimated chubs' natural habitat. When FWS listed them as endangered in 1993, there were fewer than 1,000 surviving chub across only eight known populations.

The Oregon Chub Working Group formed in 1991 to help protect the chub population. Consisting of FWS, the Corps and other state and local partners, it began a 23-year recovery effort that culminated in 2015 when FWS removed the Oregon chub from the Endangered Species List.

"Oregon chub was the first fish ever protected under the Endangered Species Act to be delisted due to recovery instead of extinction," reported Allen, who said there are now more than 100,000 chub across more than 100 known populations. "That's a really big deal to our agency and to everyone working on fish recovery under the Endangered Species Act."

Allen said chub owe their rejuvenation to two Corps contributions. The first was financial: The Corps provided funding for finding and monitoring chub populations, which helped the Oregon Chub Working Group understand the conditions needed for new populations to thrive. The second was operational: The Corps increased minimum flows from its dams, allowing more water to flow into the Willamette Valley, where extra floodplain moisture created new off-channel habitats to seed fresh chub populations.

"Those habitats had been drying up in the summer and late fall because of how the Corps was operating," Allen said. "Increasing the minimum flows created a trend back toward what the (Willamette River) used to look like before these dams were constructed, and that definitely has benefited the chub."

MORE THAN THE CHUB, IN FACT

"Oregon chub represents so much more than recovery of a single species," Allen continued. "We're talking about a native species that evolved alongside a lot of other native species. If the chub has reached a point of recovery, that represents a milestone in the recovery of the entire ecosystem."

And that bodes well for the entire Willamette Valley.

"The thing that we can all learn from the Oregon chub is that multiple entities can come together and work toward a common goal," Taylor said. "Salmon and steelhead are tougher — there are more people involved, and it's a lot more complex — but I'm hopeful that we can achieve the same level of collaboration and, over time, get those populations back on their feet."