

# Can Beavers Clean Our Water and Restore Wild Salmon Populations?

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✓ Fact Checked

## STORY AT-A-GLANCE

- › Beavers are “ecosystem engineers” with an “ability to manipulate and change their environment” that’s second only to humans; their creation of dams and ponds benefits many other animal, bird and insect species
- › The density and survival of juvenile steelhead increased following the installation of simulated beaver dams
- › Young salmon spend the early seasons of their life in the quiet depths of beaver ponds before migrating toward the ocean; as such, beaver provide help in maintaining the proper complexity of habitat that young salmon need to thrive
- › One of the beavers’ greatest gifts to the environment is slowing down water flows and impounding water, which results in water storage, allowing water to infiltrate the ground and restore aquifers
- › Beaver ponds improve water quality by acting as sinks for nitrogen in the water and result in a process called denitrification, during which nitrogen compounds are turned back into nitrogen gas, which is then released from the water

Beavers are intriguing animals found throughout North America. The largest living rodents in the region, beavers were hunted for their pelts to near extinction in the 1800s, but have made a comeback and are now relatively common along rivers, streams, lakes and marshes.

Beavers have an ingenious ability to change the landscape to suit their needs, building dams in order to create deep, calm water, or ponds, in which to build their

homes, known as lodges.

It's their natural inclination to build dams that has led to conflicts with humans, as the dams can cause flooding or block irrigation, not to mention that sometimes the trees beavers chew down may be ornamental or fruit-bearing instead of a type not missed by landowners.

As a result, many have long labeled beavers as little more than pests. In the 1970s, states including Washington, California and Oregon had laws in place that required beaver dams to be removed from streams to allow fish to pass through and, in 2009, the Atlantic Salmon Conservation Foundation funded a proposal to eradicate beavers from 10 rivers systems on Prince Edward Island.<sup>1</sup>

Even as recently as 2016, Wildlife Services, a part of the U.S. Department of Agriculture, killed more than 400 of the animals in Oregon in order to "allow people and wildlife to coexist," prompting the Center for Biological Diversity and Northwest Environmental Advocates to threaten legal action against the agency to stop the killings.<sup>2</sup>

The threat of litigation led Wildlife Services to agree to stop killing beavers (along with river otter, muskrat and mink) in Oregon in January 2018 as well as analyze their wildlife-killing program's effects on endangered fish, including salmon and steelhead.<sup>3</sup>

The fact is, killing beavers and removing their dams remains hotly debated and highly controversial, as research continues to show that these creatures, far from being pests, are actually an integral and beneficial part of the environment.

## **Beavers May Benefit Endangered Salmon Species**

Beavers are known as "ecosystem engineers" with an "ability to manipulate and change their environment" that's second only to humans.<sup>4</sup> Their creation of dams and ponds benefits many other animal, bird and insect species. According to the Washington Department of Fish & Wildlife:<sup>5</sup>

*"Beavers dams create habitat for many other animals and plants of*

*Washington. In winter, deer and elk frequent beaver ponds to forage on shrubby plants that grow where beavers cut down trees for food or use to make their dams and lodges.*

*Weasels, raccoons and herons hunt frogs and other prey along the marshy edges of beaver ponds. Migratory waterbirds use beaver ponds as nesting areas and resting stops during migration.*

*Ducks and geese often nest on top of beaver lodges since they offer warmth and protection, especially when lodges are formed in the middle of a pond. The trees that die as a result of rising water levels attract insects, which in turn feed woodpeckers, whose holes later provide homes for other wildlife."*

Ironically, while it was long believed that beaver dams would provide an obstacle for salmon and steelhead, posing a threat to the fish, it's now been shown that they may, in fact, do the opposite.

One study revealed that the density and survival of juvenile steelhead increased following the installation of simulated beaver dams, with researchers concluding, "Beaver mediated restoration may be a viable and efficient strategy to recover ecosystem function of previously incised streams and to increase the production of imperiled fish populations."<sup>6</sup>

It shouldn't come as a surprise, considering that in the early 1800s, when Lewis and Clark explored the Pacific Northwest, both salmon and beavers not only existed but coexisted in very high numbers.<sup>7</sup>

Young salmon, it turns out, spend the early seasons of their life in the quiet depths of beaver ponds before migrating toward the ocean. As such, beaver provide help in maintaining the proper complexity of habitat that young salmon need to thrive.

In their recovery plan for Oregon Coast Coho salmon, the National Marine Fisheries Service even named beaver dams and man-made beaver dam analogues among their strategies for improving habitat.<sup>8</sup>

Meanwhile, research by Michael Pollock, of the National Oceanic and Atmospheric

Administration (NOAA), revealed that decreasing beaver populations were responsible for declines of up to 86 percent of juvenile coho salmon production potential in the Stillaguamish River basin in Washington.<sup>9</sup>

Speaking to The Atlantic, Pollock explained, "Beavers create complex habitat and enhance local biological diversity in a way that's really unique ... They do a much better job of managing these systems than we do."<sup>10</sup>

## **Beavers Slow Down Water Flow — An Understated Benefit to the Environment**

Ben Goldfarb, an environmental journalist who has written extensively about beavers, describes beavers as a keystone species because their dams and resulting beaver ponds support so many other organisms. In an interview with Water Deeply, Goldfarb explained that one of the beavers' greatest gifts to the environment is slowing down water flows and impounding water.<sup>11</sup>

The latter results in water storage, allowing water to infiltrate the ground and restore aquifers. Further, for young salmon, beaver ponds provide much-needed protection that larger waterways can't provide. He explained:<sup>12</sup>

*"Think about what it's like to be a baby salmon — you're this tiny little creature that gets eaten by bigger fish and birds and all kinds of things, and you're looking for a nice, slow bit of slack water in which you can take refuge.*

*You don't want to be in the main channel because then you just get blown downstream. For a juvenile salmon or trout, you can't really conceive of better habitat than a beaver pond or wetland."*

The Tulalip Beaver Project, which relocates "nuisance" beavers from urban and suburban areas to the upper Snohomish Watershed in Washington, has had great success in creating wetlands that support fish spawning habitat and water storage. Since its start in 2014, the project has moved 122 beavers to 20 locations, building more than 12 acres of wetlands in the process.<sup>13,14</sup>

There's still a long way to go to restore beaver habitats and related benefits, however. According to the Center for Biological Diversity, beaver populations remain at only 3 to 10 percent of their historical levels.<sup>15</sup> A study by researchers with Utah State University similarly found that beavers occupied just 8 to 17 percent of available stream habitat.<sup>16</sup>

Goldfarb acknowledged the challenges of humans coexisting with beavers, but believes there's much room for improvement:<sup>17</sup>

*"The problem is that good beaver habitat is the same as good human habitat. We both like low-gradient, fertile river valleys. That's where we've build our towns and our farms and our infrastructure.*

*Today, we're occupying a lot of the habitat that beavers would like to use. It's not possible to get back to the place that we once were with beavers in every stream and pond and wetland. But, certainly, I think that we're at a tiny fraction of where we could be."*

## **Beavers Change Water Chemistry, May Offset Some Effects of Industrial Agriculture Pollution**

Runoff from synthetic **chemical fertilizers** as well as the excessive amounts of manure from **concentrated animal feeding operations** (CAFOs) that's often sprayed onto farm fields are highly problematic for water.

When provided with an excess of nutrients, such as occurs when fertilizer runoff from farms contaminates **waterways**, algae can quickly grow out of control, depleting oxygen from the water, blocking light to organisms lower in the water column and clogging fish gills.<sup>18</sup>

Massive manure and **fertilizer pollution** churned out by CAFOs has been blamed for causing the largest dead zone on record in the Gulf of Mexico.<sup>19</sup> Fertilizer runoff has also been blamed for **toxic algae** taking over Florida coastlines. It's so prolific in some areas that blue-green algae can now be seen from space.<sup>20</sup>

Solving the problem will take sweeping changes to industrial agriculture, transitioning to a regenerative agricultural system instead, but there's also potential for beavers to help.

When University of Rhode Island researchers were looking into the nitrogen content of streams, they noticed that nitrogen levels were lower in water collected downstream of beaver ponds — an effect that's believed to be related to the slowing down of the water and its mixing with organic matter.<sup>21</sup>

When researchers looked into the matter, they found beaver ponds acts as sinks for nitrogen in the water and result in a process called denitrification, during which nitrogen compounds are turned back into nitrogen gas, which is then released from the water. They estimated that in rural watersheds of southern New England with high nitrogen loading, denitrification from beaver ponds could remove from 5 to 45 percent of nitrates from the water.<sup>22</sup>

## **Following Nature's Cues May Help Solve Man-Made Problems**

Separate research by scientists at the University of Exeter in England has followed a family of captive beavers living in an outdoor fenced-in enclosure, which are part of Devon Wildlife Trust's enclosed beaver trial. From 2011 to 2018, the family of beavers built 13 dams, creating deep ponds in an area that was formerly a small stream.<sup>23</sup>

The actions trapped significant amounts of sediment (made up of mostly soil eroded from an industrial agriculture site upstream), nitrogen and phosphorus, which would otherwise have passed through to a local river system.

The results suggest that beaver ponds may help mitigate the soil erosion and pollution from industrial agriculture. Lead study author Richard Brazier, a hydrologist and professor of earth surface processes, said in a news release:<sup>24</sup>

*"It is of serious concern that we observe such high rates of soil loss from agricultural land, which are well in excess of soil formation rates. However, we are heartened to discover that beaver dams can go a long way to*

*mitigate this soil loss and also trap pollutants which lead to the degradation of our water bodies.*

*Were beaver dams to be commonplace in the landscape we would no doubt see these effects delivering multiple benefits across whole ecosystems, as they do elsewhere around the world."*

It seems that, when humans are willing to listen, nature has many lessons to teach, and the more we strive to live in concert with nature, as opposed to against it, the better off we'll be.

Similar to the way **oysters** have been found to process nitrogen compounds into harmless nitrogen gas, or **worms** naturally excrete beneficial microbes into the soil, drastically improving its composition, by allowing beavers to do what they naturally do in the environment, the **ecosystem** as a whole may glean a great benefit.