

# To Save the Wild Salmon Runs

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In 1805, when Lewis and Clark explored the Pacific Northwest, Clark said the Columbia and Snake Rivers had "incredible" numbers of salmon that swam stacked in layers to depths of 20 feet.

That was when people lived light and traceless with their environment and rivers were clean, wild and free flowing. Today,



Columbia River salmon levels are less than 3% the level that Lewis and Clark found.

The Columbia and Snake Rivers have 200 dams that kill up to 80-95 percent of young salmon migrating to the ocean each year, according to Save Our Wild Salmon, a coalition of environmental groups and commercial and sport fishing associations.

When the entire West Coast is considered, one hundred of the approximately former 400 salmon runs are already extinct and another 200 at considered at risk, according to the U.S. National Park Service.

To understand the many ways dams and other forms of human interference lead to the deaths of salmon, it is important to understand their life cycle.

In their feeding grounds in the North Atlantic Ocean, salmon eat a lot and store up fat. When it is about time for the females to lay their eggs, the male and female salmon leave the ocean

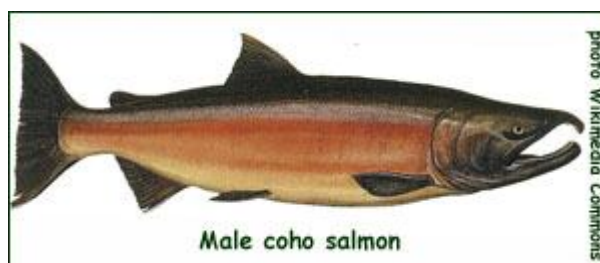


and swim against the current to the place where they were born.

Scientists believe this homing instinct, their ability to find the stream of their birth, comes from their acute sense of smell.

As they enter fresh water on this journey, they stop eating and live off the fat they stored in the ocean. If anything delays them, they could burn up all their energy and not be able to make the long trip.

During this journey, their color and shape changes. Their teeth grow long and they develop hooked jaws, which are more pronounced in the males. Some species get humps on their backs.



Many of them will be caught and eaten by otters, bears, raccoons or eagles, or by the worst predator of all -- humans -- on their trip upstream.

During their journey, a dam, or sometimes a series of dams, will often block their access to their spawning grounds, as well as threaten their chances of survival by changing the characteristics of the river.

Some dams have fish ladders, which look like watery stair steps, that help the salmon pass by the dam. But the salmon may use up their stored energy trying to make their way past dam after dam.



Ice Harbor Dam on the Snake River in Burbank, Wash.

Moreover, the majority of the hydroelectric dams lack adequate fish passage, according to the National Oceanic and Atmospheric Association (NOAA). The structures are costly to employ -- about \$75 million.

If every dam had a fishway, there would still be problems. For once the salmon make it to the other side of the dam, the water is more like a slow moving lake rather than a rushing river. But salmon depend on flowing water to provide oxygen and to bring food by them. Also, when the water is still, they grow confused and don't know where to go. They become vulnerable to their predators, which means many do not survive the reservoirs.

Those salmon that do make it back to the place of their birth are often fungus ridden and banged up, with scars on their bodies. Nonetheless, they are ready to begin the spawning process. The female salmon vigorously swishes her tail to dig a series of nests, called redds, in an area that is shallow, cool and clear with fast-flowing water rich in oxygen. Males fight among



Photo Wikimedia Commons

Salmon eggs

themselves to get close to the female. When the female chooses a male, they bump and nudge each other in an underwater dance.

The female lays between 2,500 to 6,000 pink pea-sized eggs and the male, hovering close by, fertilizes them with a milky fluid called milt. Without this fluid, the eggs would never develop.

Using kicking motions of the tail, the female covers the eggs with between six inches and two feet of gravel, which lets water pass through, but keeps a strong current from washing them away; keeps trout, birds and raccoons from eating them; and keeps the searing sunlight from baking them.

But if there are dams on the waterway, they will trap gravel, keeping it from flowing downstream.

Also, sediment from logging roads or from forests where all the trees have been cut can wash into the redds and cover the eggs, choking off the oxygen and suffocating the eggs.

Both the male and female salmon die within a few days after spawning. Their decomposing bodies provide a rich supply of nutrients for fish and animals, such as bears, eagles, wolves and ravens. Salmon carcasses get



Just hatched salmon alevins with yolk sacs.

spread throughout the forest, fertilizing the trees and other vegetation with nitrogen. Studies show that trees in the forest grow larger when the salmon are more abundant.

When the young salmon hatch in the spring, they have huge eyes and a pouch full of nutrient-rich egg yolk that they live off of while hidden in the gravel. They are called alevin.

In about two weeks, when their yolks have been absorbed, they squirm free from the gravel and go to live in wetlands where they feed on insects and escape from predators. They are then called fry. The insects the fry feed on can be killed if there are pesticides in the water from farm runoff.

If there are trees on the banks of the stream, insects in the trees fall into the water, which means the fry have more abundant food. Also, when there are trees on the banks, leaves fall into the water feeding insects the fry eat.

Trees on the banks of streams also help keep the water cool, as well as clean since pollutants stick to fallen leaves and needles as water is making its way to the stream.

Logs that fall in the water often provide fry with safe, still places to hide.

Also significant, if trees are in the flood plain, trees, tree roots, fallen needles and leaves and humus will slow down the flow of water entering the stream. Whereas if the trees in the floodplain have been cut by loggers or cut by developers who build houses and businesses, rain will in many cases rush into the stream and wash away the gravel and salmon eggs.

### **Other Ways Humans Hurt Salmon**

Dams are not the only form of human interference leading to a demise in wild salmon runs. Another problem is pollution of the water from homes and businesses that enters streams from pipes, as well as pesticide and fertilizer runoff from farms. Salmon need clean water to survive.

Salmon are also in decline from over fishing and climate change.

### **The Trip to the Ocean**

Some species of salmon begin their migration to the ocean as soon as they emerge from the gravel, while others linger in the stream from four to 18 months. They are called smolt when they begin the journey.

The silvery-colored young smolt, swimming with the current, faces slow moving water when they encounter the reservoir of a dam. Without the fast moving river current to sweep them along, they can get lost and confused. It may take three months to get to the ocean instead of two weeks, which means they don't undergo the biological changes that would enable them to move from fresh water to salt water.



Also, the water in the reservoir may be too warm. Salmon are cold water fish and need temperatures at 68 degrees or they can become diseased. If the temperature of the water gets above 77 degrees, they die.

Also, the warm water of the dam-created reservoirs provides good habitat for fish that prey on salmon smolts. As with adult salmon, many of the smolts never make it past the reservoirs of the dam.

There is also the likelihood that the smolts will plunge down 14 feet or so over the top of the dam and be killed or get killed in the blades of turbines that turn when water flows over them in order to create electricity.

Screens can be used to keep young salmon away from the turbines, but there is still the problem of how they are to get around the dam.

To comply with the Endangered Species Act, a few dams have expensive programs vacuum up many of the young salmon and put them on a barge or truck and transport them around the dam. But this leaves salmon disoriented and exhausted. Moreover, "They haven't been returning at high enough rates to maintain or rebuild their populations," said Michael Garrity with American Rivers. "It doesn't work well."

If the salmon do make it past a dam, there may be other dams they have to pass through on their way to the ocean. In the Columbia River system, salmon typically have to pass through eight dams.

To compensate for the great losses of fish caused by dams, in keeping with the Endangered Species Act, there are fish hatcheries that raise about 75 percent of the fish in the Columbia River. But this program has also failed in its mission since the fish are genetically impoverished and lack the hardiness and survival instincts of wild salmon.<sup>1</sup>

### **Reduced Stream Flow**

Another problem with dams is that they often significantly decrease the water level of stream flows, destroying fish habitat, according to the National

Oceanic Atmospheric Association. In contrast, when there is enough water in a stream, the salmon can move quickly and avoid predators. Scientists have shown a link between the amount of water in a stream and the survival of young salmon.

Stream flows are also often depleted by cities sucking out large volumes of water to provide for the ten- or twenty-minute-long showers of people and by large- scale farms sucking out irrigation water.

A senior ecologist with King County in Seattle, Washington, Bob Fuerstenberg, said the public utility where he lives held a campaign to educate the public about conserving water. As part of the campaign, they passed out low flow shower heads that put out one and six-tenths gallons of water per minute as opposed to three. "Well over half the population took them up on it and water consumption dropped almost immediately by about 30 percent," he said.

Next, the public utility undertook a campaign to use low flush toilets. "You could actually see water consumption drop," said Fuerstenberg.

In addition to these water-saving schemes, he and his wife also capture water from their roof in rain barrels to water their plants.

"On this conservation plan, my wife and I used 3,000 gallons less water than the year before," he said.

## Removing Dams

But so far, about 465 dams have been removed from U.S. waterways and approximately 100 more are scheduled to be removed, according to American Rivers. It is not a lot considering that the USA has 75,000 dams higher than six feet high and at least tens of thousands of smaller dams, according to the U.S. Army Corp of Engineers.

We will be letting future generations down if we fail to use the Endangered Species Act to save salmon from extinction.

### End Note:

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<sup>1</sup> Stephen J. O'Brien et al., "The Cheetah in Genetic Peril," *Scientific American*, May 1986; Will A. Nehlgen et al., "Pacific Salmon at the Crossroads: Stocks at Risk from California, Oregon, Idaho and Washington," *Fisheries*, March/April 1991; William K. Stevens, "Hatchery and Wild Fish: Clash of Cultures," *New York Times*, July 23, 1991.