

Salmon and Hydropower: A Power System to Keep Salmon Safe

Northwest families and businesses have been making investments through their electric bills for decades to help fish and wildlife affected by the construction and operation of the large federal dams on the Columbia and Snake rivers. In the early 1990s, these efforts ramped up dramatically, when 13 species of salmon and steelhead were listed for protection under the Endangered Species Act (ESA).

Many factors contributed to the decline in native Northwest salmon and steelhead populations.

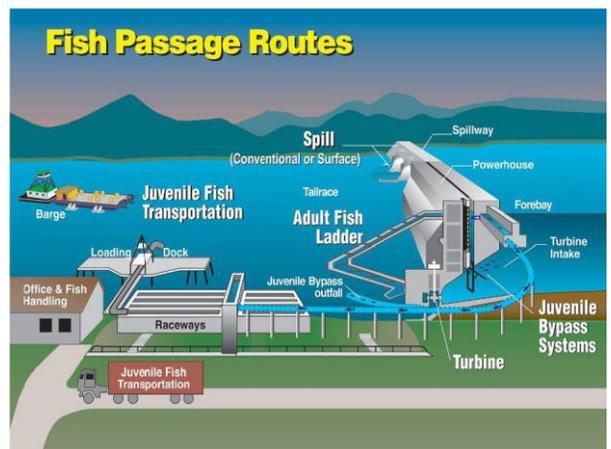
- Over-harvest to supply commercial canneries decimated runs in the early 1900s.
- Development of the federal dams, starting in 1938, put further pressure on the runs.
- Habitat destruction on tributaries and streams hastened the downturn.
- Hatchery fish, raised to mitigate for the development of the dams and provide for commercial, sport and tribal harvest, also continue to affect survival of wild stocks.

Federal agencies and utilities that own and operate dams have stepped up to find and carry out solutions for the listed stocks. More than \$14 billion has been invested in measures to protect fish since 1978. Between 10 and 20 percent of the typical electricity bill for a Northwest family or business goes to pay for fish and wildlife programs, depending on the electric service provider.

Major changes in three of the four “Hs” – **hydro**, **habitat**, and **hatcheries** -- are taking place, and **harvest** reform is starting to be taken seriously, as experiments on selective fishing techniques move forward in the region. Major actions are highlighted below.

Changes in the Hydropower System

- **Adult fish ladders** were installed by the 1990s at all federal dams on the Snake River below Hells Canyon and on the Columbia below Grand Coulee to help move returning adult fish upstream.
- **High efficiency turbine upgrades** result in survival rates of more than 95 percent for young fish moving downstream.
- **Mechanical bypass systems** installed in front of turbine intakes divert between 70 and 95 percent of juvenile fish into protected routes past a dam.
- **Fish Slides** or removable spillway weirs (RSWs) pass fish through and over the dams; fish survival is 97 percent on average. All eight of the federal mainstem dams have been outfitted with these slides or other structural changes to improve survival.
- **A spill wall** at The Dalles Dam makes for safer travels for young fish passing that project.
- **A corner collector** at Bonneville Dam, another type of surface bypass, achieves almost 100 percent survival for fish passing through that system.
- **Hydropower operations** are modified during the migration season and other times to ease fish past the dams. Operators increase and decrease flows, depending on what biologists call for, to aid passage and provide protection for spawning and rearing habitat.



- **Pushing large volumes of water through and over the dams “(known as spill)”** in the spring and summer is another tool to aid passage survival. In late summer, when water is scarce and few fish are in the river, spill provides few benefits and is extremely costly.
- **Transporting or barging** fish to below Bonneville Dam has been a part of protecting young salmon for years with survivals at 98 percent of fish barged.
- **Predator control** saves millions of migrating young fish each year. Programs remove salmon-eating predators, such as Northern pike minnow, Caspian terns, and sea lions.

Dam operators estimate they lose at least 1,000 average megawatts of energy annually to help speed young salmon through the hydro system downstream. The loss of this clean renewable power amounts to hundreds of millions of dollars in lost power revenues and less hydropower to back up intermittent wind resources.

Changes in Habitat

- **Tributary habitat improvement** planning in the Columbia and Snake River basin tributaries focus on restoring spawning and rearing grounds, opening tributary channels for fish to use, and providing more water in-stream.
- **The 2008 Columbia Basin Accords** with states and tribes added \$100 million each year to build on existing habitat work and make further improvements. The Accords also fund hatchery initiatives aimed at reducing impacts on native salmon and steelhead.
- **An Estuary Agreement** with the State of Washington in 2009 added \$45 million more to improve conditions in the Columbia River estuary.

Changes in Hatchery Practices

- **Hatchery practices are under review** across the region, and the new federal salmon plan or Biological Opinion requires the use of Hatchery Genetic Management Plans (HGMPs) to reduce negative impacts of hatchery salmon on wild salmon populations. More needs doing.

The Results: More Juveniles Reach the Ocean and More Adults Return to Spawn

- **Juvenile salmon survivals** at the eight large federal hydro projects on the Columbia and Snake rivers are high, averaging 97 percent collectively. Overall, juvenile survival past the dams is three times higher today than it was 30 years ago.
- **Total adult returns** at Bonneville Dam in 2013 reached nearly 1.8 million and 2014 returns reached over 2.5 million, setting a new modern-day record for total adult returns in one year. This is largely due to record fall chinook, sockeye and coho runs. In 2014, the adult coho returns reached levels 5-7 times greater than the 10 year average in the Snake and upper Columbia rivers.
- **Snake River sockeye**, on the brink of extinction in the 1990s, have been rebuilding. In 2014, over 2,700 successfully passed the eight mainstem dams on their journey to their spawning grounds. On the Columbia River in 2014, over 608,000 upper **Columbia River sockeye** passed Priest Rapids dam, a total 3.6 times higher than the 10 year average.

Uncertainty and annual variability are hallmarks of the adult salmon and steelhead returns to the Columbia River. While scientists agree that ocean conditions are the biggest factor in survival, salmon abundance in the ocean and positive adult returns in the upper tributaries indicate all the hard work is paying off.

Northwest RiverPartners is an alliance of farmers, utilities, ports and businesses that promote the economic and environmental benefits of the Columbia and Snake Rivers and salmon recovery policies based on sound science.