Fact Sheet

June 2013

Columbia Basin salmon and steelhead: many routes to the ocean

Federal efforts to rebuild iconic salmon and steelhead runs in the Columbia River system are yielding higher survival rates. Learn how young fish travel past the dams on their journey to the ocean.

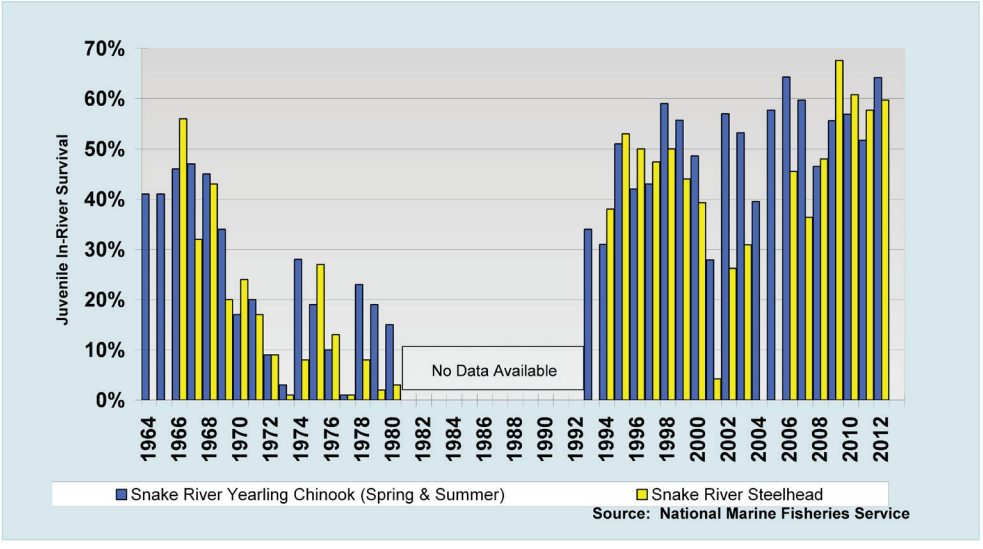
Young fish pass the eight federal dams on the lower Columbia and Snake rivers by many routes: swimming through juvenile bypass systems, spillways and turbines; or being collected and transported in barges or trucks. Adult fish migrate back upstream to their spawning grounds using fish ladders, also called fishways.

Today, major improvements have rendered these dams friendlier for juvenile and adult fish. Juvenile survival through all eight of the dams and reservoirs is higher now than when there were just four dams. Adult survival through the dams is similar to a natural river.

The U.S. Army Corps of Engineers has invested over $1.8 billion in fish passage improvements at the federal dams since 2001, resulting in significant survival improvements. Northwest electric ratepayers reimburse the U.S. Treasury for these investments at the dams.

The Corps and the Bureau of Reclamation own and operate the federal dams in the Columbia Basin. Together with the Bonneville Power Administration, which sells the electricity those dams produce, the three agencies are collectively known as the federal Action Agencies. To ensure their activities are consistent with the Endangered Species Act, the Action Agencies operate under a Biological Opinion, or BiOp. A BiOp outlines the

Snake River Chinook and Steelhead In-river Survival Estimates



The survival of young fish through the federal dams has been on an upward trend since the 1990s.

professional opinion of a regulatory agency — in this case, NOAA Fisheries — on whether another federal agency's actions will jeopardize a species listed as threatened or endangered under the Endangered Species Act.

The 2008 Biological Opinion includes dam survival performance standards (through all passage routes) of 96 percent for spring migrating fish and 93 percent for summer migrating fish. Juvenile dam survival estimates of 86 to 99 percent have been demonstrated at all Snake and Columbia River dams.

Surface passage structures such as spillway weirs and the Bonneville Dam corner collector provide more natural river conditions for fish passage. Increased availability of passage routes near the water's surface reduces juvenile fish passage delay, improves water quality, makes more efficient use of spill and improves juvenile fish survival.

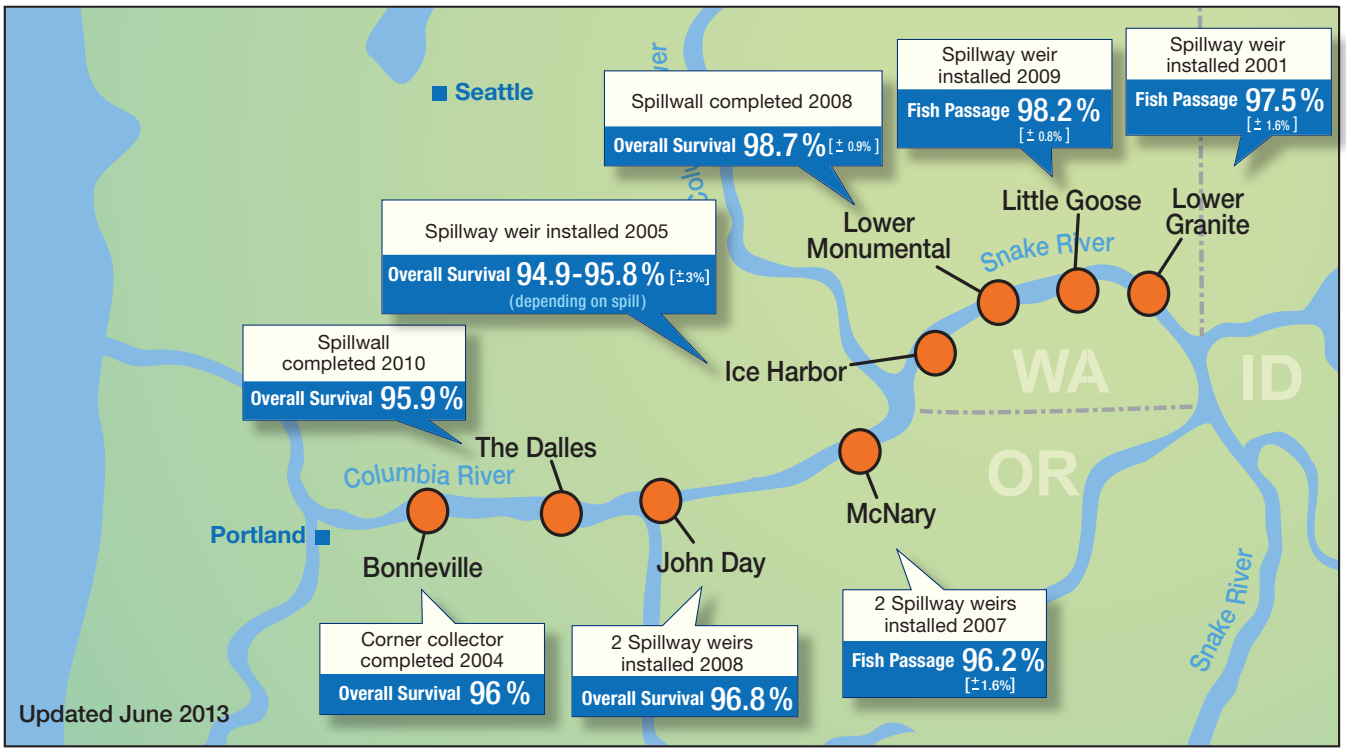
Screened bypass systems are in place for juvenile fish at seven of the eight lower Columbia and Snake River dams. These bypass systems guide fish away from turbines using submerged screens installed in the turbine intakes. As fish travel with the water flow into the turbine intakes, the screens guide them up through channels in the dam, routing them away from the turbines. The fish are then either passed back to the river below the dam (bypassed) or loaded into barges or trucks for transport downstream past the dams.

Through funding from BPA ratepayers, the Corps continues to make modifications to bypass systems to improve the survival of young fish.

Spill helps juvenile fish migrate safely past the dams

The Action Agencies, release (or spill) water over the federal dams in the spring and summer to help juvenile

Juvenile Fish Passage Improvements & Fish Passage at Lower Columbia and Snake River Dams



All eight federal dams on the lower Columbia and Snake rivers offer a surface passage route for migrating juvenile salmon and steelhead. [NOTE: Overall survival numbers are most recent data for yearling (spring) chinook.]

The smooth green flow of spill over a surface passage route provides a safer way for young fish to migrate downstream.

salmon and steelhead migrate safely to the ocean. With spill, fish go past the dams in water that flows through spillway openings, rather than traveling through turbines or bypass systems. The federal agencies have built such water releases into the 2008/2010 Biological Opinion, tailoring it based on continued research and consulting with the region to meet the established survival targets for migrating fish.

Spill past the dams has been used to promote the downstream passage and survival of young salmon and steelhead since 1981. The amount and timing of spill has been adjusted at each of the lower Snake and lower Columbia River dams over time in response to new information. The most recent BiOp, in 2008, specifies average spilling of 30 to 40 percent of flow, 24 hours a day, at all eight federal dams on the lower Snake and Columbia rivers from early April through the end of the fish migration in August.

While spill is effective, it is not a “silver bullet” by itself. The effectiveness of spill to increase fish survival is variable and depends on the configuration at each dam. Too much spill can be harmful to fish. Very high amounts of spill can hurt fish and other aquatic life by raising dissolved gas levels, causing a condition similar to the bends, which can affect divers who ascend too quickly. Spill can also interfere with the passage of adult fish at the dams.

Flows provide cooler, swifter water for young fish

Operators augment seasonal river flows with water released from storage dams upstream such as Libby, Hungry Horse, Albeni Falls, Grand Coulee and Dworshak dams. Known as flow augmentation, this operation is intended to help reduce migration time for young fish and aid adult fish spawning. These releases can also help cool water to temperatures that are safer for salmon.

Available storage at the upstream dams is limited, so each year the Action Agencies coordinate with Canada to store additional water in Canadian reservoirs during the winter. This water can then be used in the summer to improve flows.

The Bureau of Reclamation also provides 487,000 acre-feet of water from the upper Snake River above Brownlee Reservoir specifically to increase flows during the migration season. This operation is specified in NOAA Fisheries’ 2008 BiOp for the Upper Snake projects.

Water releases from Libby Dam in Montana help juvenile fish farther downstream in the river system as they move to the ocean, as well as cooling local water temperatures.

Fish transportation barges at Lower Granite Dam. (Photo: Tony Grover, NW Power and Conservation Council.)

Combining transport with spill and structural improvements to maximize survival

About a third of the juvenile chinook and steelhead that migrate through the lower Snake and Columbia rivers are transported downriver by barge. The Corps collects the fish at juvenile bypass facilities at Lower Granite, Little Goose, Lower Monumental and McNary dams and transports them to release sites below Bonneville Dam.

The survival rate for juvenile fish that are barged is close to 100 percent. In order to determine the best timing and conditions for transporting fish, the Corps conducts research that compares the adult returns to the spawning grounds of transported fish versus fish that migrated in-river. In general, fish survive better migrating in-river in early April, but they survive better when transported during lower-flow conditions in mid- to late May. Also, steelhead generally exhibit higher survival, compared to chinook salmon, when transported during the spring migration.

The percentage of fish that are transported has declined significantly in recent years. NOAA Fisheries estimates that approximately 35 percent of juvenile fish were barged in 2010, depending on the species.

Where to get information

For more information about efforts by Action Agencies to rebuild salmon and steelhead populations, visit www.salmonrecovery.gov. For inquiries about BPA's fish and wildlife programs, please visit *www.efw.bpa.gov/IntegratedFWP* or contact BPA by email efwweb@bpa.gov, or phone 503-230-5136, toll free at 800-282-3713.

The U.S. Army Corps of Engineers and Bureau of Reclamation own and operate the federal dams on the Columbia and Snake rivers, while BPA markets the electricity they generate and owns the transmission infrastructure needed to transport that energy to customer utilities.