

*Surface Passage Systems
and Removable Spillway Weirs
Lower Columbia and Snake River Dams*

Surface Passage systems

Most Columbia River Basin juvenile anadromous salmon and steelhead tend to stay in the upper 10 to 20 feet of the water column as they migrate downstream to the ocean. Juvenile fish passage routes at the Corps' lower Columbia and Snake river dams, because of the dams' configurations, cause the juvenile fish to dive to depths of 50 to 60 feet to find the passage routes. Engineers and biologists for the past several years have been pursuing new technologies that would provide more surface-oriented, less stressful, passage routes for juvenile fish. Two of these are the removable spillway weir and the Bonneville Dam Second Powerhouse Corner Collector.

Removable Spillway Weir (RSW)

A prototype removable spillway weir, or RSW, was installed at Lower Granite Dam on the lower Snake River in 2001. The RSW allows juvenile salmon and steelhead to pass the dam near the water surface under lower velocities and lower pressures, providing a more efficient and less stressful dam passage route.

The design of the RSW is different from existing spillways whose gates open 50 feet below the water surface at the face of the dam and pass juvenile fish under high pressure and high velocities. The RSW passes juvenile salmon and steelhead over a raised spillway crest, similar to a waterslide. Juvenile fish are safely passed over the weir more efficiently than with conventional spill while reducing migration delays at the dam.

The RSW structure also is designed to be "removable" by controlled descent to the bottom of the dam forebay. This capability permits returning the spillway to original flow capacity during major flood events.

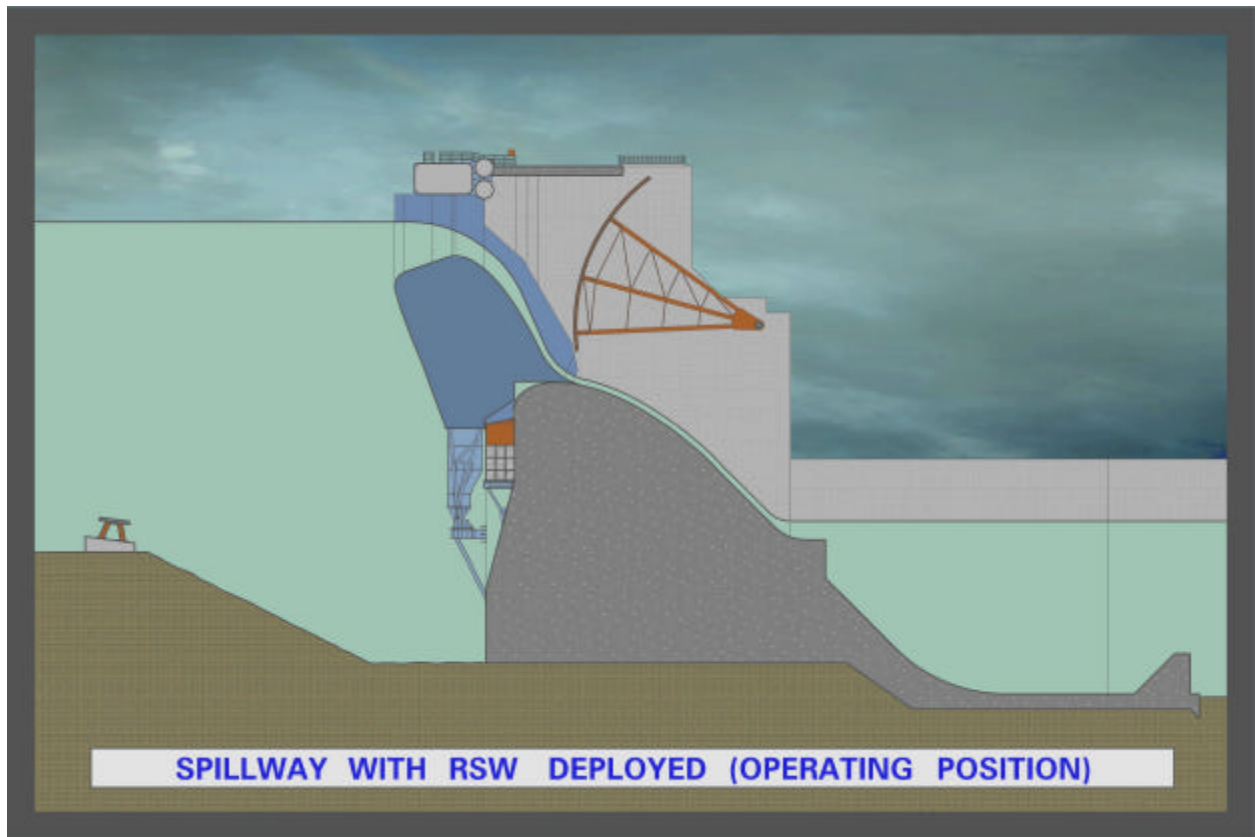
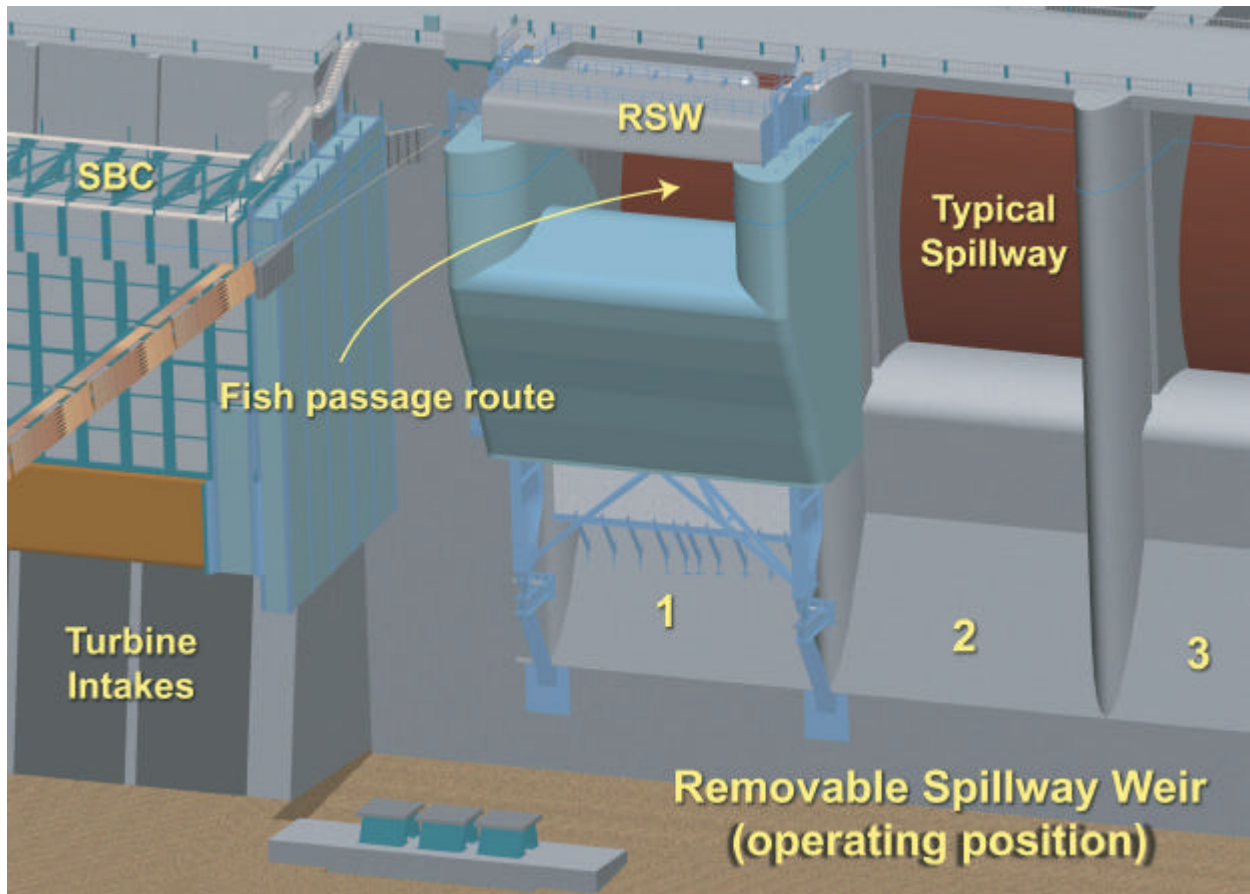
Another RSW is slated for completion in 2005 at Ice Harbor Dam. Additional RSWs are being considered for Little Goose, Lower Monumental, McNary and possibly John Day dams.

The RSW has the potential to provide not only fish benefits but also power savings to the region, since the amount of water used to pass similar numbers of fish is less. Initial biological tests indicate that fish pass over the RSW much more efficiently than under conventional spillway gates. Preliminary tests show that the RSW is 4 or 5 times more effective in fish passage per unit of flow than existing gates. Given the high effectiveness, less spill may be required which reduces total dissolved gas in the river, improving water quality.

Bonneville Dam Corner Collector

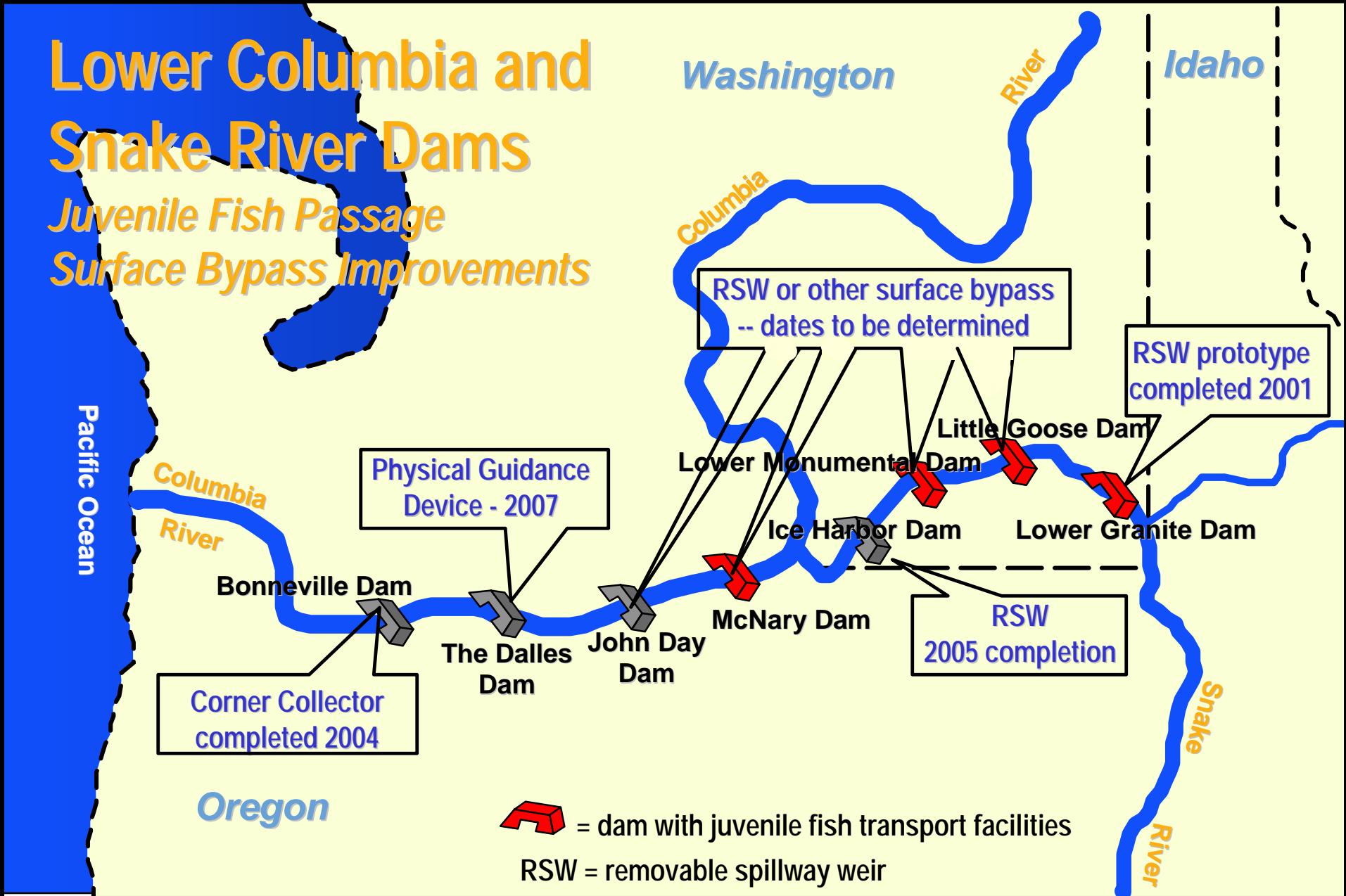
Construction was completed on the Bonneville Dam Second Powerhouse Corner Collector early this year (2004). The corner collector facility includes a 2,800-foot long transportation channel, a 500-foot long outfall channel, a plunge pool, and modification of the ice and trash chute to ensure safe passage. The bypass flume begins at the southeastern corner of the powerhouse, where a gate can be removed to allow approximately 5,000 cubic feet per second of water to spill into the chute carrying fish downstream. The fish will re-enter the river just beyond the westernmost tip of Cascades Island, over one-half mile downstream in faster moving water away from predators. A plunge pool excavated into the river bottom will permit fish to re-enter the river and avoid injuries that might occur at lower river levels.

Field testing in 1998 revealed that about 40 percent of juvenile fish in the forebay (area directly upstream) of the Bonneville Dam Second Powerhouse were passing the dam through the existing ice and trash chute (a chute used to clear floating debris from the reservoir behind the dam) when that facility was operated. By modifying the ice and trash chute into a surface flow bypass system at that location, the Corps estimates the number of juveniles guided into the corner collector will be increased to 50 to 60 percent, passed without injury and returned safely to the river. The corner collector will work in conjunction with the existing Second Powerhouse screened juvenile bypass system, which had survival improvements completed in 1999. Together, these non-turbine routes are estimated to pass about 90 percent of all juvenile fish at the Second Powerhouse with an estimated survival rate of greater than 95 percent. Two studies to gauge success of the facility were carried out this year, and results will be available this fall.



Lower Columbia and Snake River Dams

Juvenile Fish Passage Surface Bypass Improvements



NOTE: Other than projects with completion dates shown, actual construction and schedules for these features will depend on results of on-going research, regional collaboration and prioritization, and funding.