

Riverine survival

Problem Statement

Fifty to ninety percent of Snake River yearling and subyearling chinook salmon die at dams and reservoirs as they migrate downstream to the ocean. Even when juvenile salmon are barged around hydro-power dams, adult return rates are less than the rates of return before dam construction.

Critical factors

- Fish mortality at dams and reservoirs impacts rebuilding of sustainable salmon populations throughout the Columbia River Basin.
- Currently, many juvenile salmon are barged or trucked around the dams.
- Transporting fish around dams seems to increase juvenile rates of survival but adult rates of return remain lower than expected.
- The relationship between downstream survival rates and adult returns is unclear.

Status of research

The Northwest Fisheries Science Center (NWFSC) conducts research to determine accurate juvenile survival rates for Columbia Basin salmon populations and collects the data needed to compare the survival of transported and non-transported fish when river flows and spill volumes increase.

NWFSC research indicates that juvenile survival through the Snake River dams and reservoirs is substantially higher than it was during the 1970s when the lower Snake River dam system was completed. Researchers have collected juvenile salmon during their downstream migration, implanted transmitter tags (PIT-tags) in them, released them, and detected them at downstream dams.



Loading juvenile salmon at Lower Granite Dam

NWFSC scientists have evaluated the transportation of juvenile salmon around dams on the Columbia and Snake rivers for more than two decades, and have found that transported fish survive their downstream journey at much higher rates than non-transported fish. NWFSC scientists are currently evaluating survival differences between transported and non-transported fish when river flows and spill volumes increase. They collect migrating juveniles at Lower Granite Dam on the Snake River and mark them with PIT-tags. Some of these juveniles are simply re-released at the collection site, while others are barged past Bonneville Dam and released there. The rates at which adult salmon from these two groups return to Lower Granite Dam are used to evaluate the benefits of transportation. Data indicate that this benefit appears to vary within the migration season.

Future considerations

Fisheries managers need updated survival estimates for juvenile fish in order to make rational recommendations for managing hydropower system flow, spill, turbine operations, and juvenile fish transportation. Additional research is also required to discover why fish with equally-high juvenile survival rates have substantially different rates of adult return.

The Center will expand its juvenile survival studies to the entire Columbia River hydropower system and compare survival rates of transported and non-transported fish under a variety of environmental conditions.

Key Players

Fish Ecology (FE) Division, NWFSC
Columbia Basin Fish & Wildlife Authority
Columbia River Inter-Tribal Fish Commission
Washington Department of Fish & Wildlife
Oregon Department of Fish & Wildlife
Idaho Department of Fish & Game

National Biological Service, U.S. Geological Survey
Northwest Power Planning Council
Pacific Fishery Management Council
U.S. Army Corps of Engineers
U.S. Fish & Wildlife Service

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