Summary of Findings:

Productivity and Life History Diversity of Chinook in the Middle Green River

DRAFT for discussion at the February 11 WRIA 9 Watershed Ecosystem Forum meeting

February 5, 2016

Overview

With funding from WRIA 9, Joe Anderson of Washington Department of Fish and Wildlife analyzed Chinook spawning data, juvenile Chinook outmigrant data and flow data over the last 15 years to determine how different river flows and adult returns affect the productivity of Chinook salmon in the Green River above River Mile 34. At a minimum, the results indicate a need to increase the amount of rearing habitat in the middle and upper reaches of the Green River. The ITC recommends revising policies, programs and projects to promote increasing Middle Green rearing habitat in the updated WRIA 9 Salmon Habitat Plan, as outlined below.

Summary of Findings

- There are two dominant life history types of outmigrating juvenile Chinook: fry, which typically migrate downstream in March, and are small (less than 45mm/1.7 inches); and parr, which migrate downstream between May and July, and are larger (between 45mm and 80mm/1.7-3 inches). Parr are expected to have greater long-term survival than fry, though this has not been demonstrated empirically in the Green River.
- In the Middle Green River above the smolt trap, rearing habitat is the primary limiting factor for fry and parr. There are not enough off-channel or side channel areas accessible to fry, so fry must leave to find a place to rear, and this limits the number of parr that are produced in the middle Green River. In addition, high flows appear to force fry to move downstream because they cannot find off-channel refuge from the high velocity river.
- Very high peak flows while eggs are incubating in the gravel (October through January) scour redds, and there are fewer juvenile outmigrants.
- High peak flows during the fry rearing period (January through March) result in fewer parr.
- There is some evidence that in years with long duration flows above 1200 cfs in the spring (April – June), more parr are produced. This may be due to increased availability of rearing habitat in side channels that are disconnected at lower flows.

Policy Implications

- Rearing habitat in the Middle Green is limited; more off-channel wetlands and side channels are needed so more fry can stay longer, grow larger, and outmigrate as parr.
- The large number of fry leaving the Middle Green points to the importance of additional rearing habitat along the Lower Green and Duwamish, which are even more degraded than the Middle Green.
- Because of the predominance of agricultural lands in the Middle Green, it will likely be necessary to engage directly with the agricultural community and local jurisdictions to identify ways to achieve mutual benefits.
- The ITC will review policy MS-1, and may recommend changes because spawning and rearing habitats are not ecologically isolated, and projects often influence both.
- This study did not evaluate the quality of spawning habitat in the Middle Green. The Howard Hanson Dam continues to block sediment from migrating down the river, and a greater emphasis on rearing habitat does not mean there is a need to discontinue gravel supplementation and other projects to improve or maintain spawning habitat.

Future Technical Work

- The ITC and Salmon Recovery Team will revise the project prioritization criteria and update the project list with a greater emphasis on Middle Green rearing habitat.
- Sustained high flows during incubation (October-January) have a negative impact on Chinook productivity, yet extreme high flows are important for long-term habitat quality. The ITC recommends that the WRIA discuss potential changes to flood flow management with the U.S. Army Corps of Engineers.
- More research is needed to determine the relative survival to adulthood of fry and parr, where in the watershed juvenile salmonids are rearing, and where they are becoming contaminated.
- The smolt trap provides basic data that is crucial to understanding the effects of actions on Chinook productivity, and the ITC recommends that WRIA 9 continue to support its operation.