

Title: Outmigration Survival of Supplemented and Wild Spring Chinook Smolts

Authors: David Fast^{1*}, Charles Strom¹, Mark Johnston¹, David Lind¹, Curt Knudsen², Doug Neeley³, Bill Bosch¹

^{1*}Yakama Nation, YKFP Nelson Springs Research Office, 771 Pence Road,

Yakima, WA, 98902, 509-945-1206, Fast@Yakama.com.

² Oncorh Consulting

³ IntSTATS Consulting

The Yakima/Klickitat Fisheries Program (YKFP) has designed a supplementation program to enhance the Spring Chinook salmon (*Oncorhynchus tshawytscha*) in the Yakima Basin. The purpose of the YKFP is to test the assumption that new artificial production can be used to increase harvest and natural production. The first step in the sequence of evaluating this hypothesis is to determine if we can increase the survival of juveniles reared in the hatchery environment over that of fish reared in the wild, and maintain that survival advantage through the smolt outmigration period?

This paper describes the experimental design for monitoring the survival of outmigrating smolts from the new Semi-Natural Treatment (SNT) rearing techniques against the Optimum Conventional Treatments (OCT) of existing successful hatcheries in the Pacific Northwest. We also compare the survival of the supplementation smolts with that of outmigrating wild smolts.

Survival is measured from release in the Yakima River to detection of PIT tags at McNary Dam on the Columbia River.

There were no significant differences in release-to-McNary survivals between the SNT and OCT fish in brood years 1997, 1998, and 2001 ($p=0.742$, 0.873 , and 0.729). For brood year 1999 the SNT survival index was significantly higher than that of OCT when adjusted for brood source ($P = 0.027$ based on a one-sided test). The release-to-McNary-Dam survival of brood-year 2000 (2002-outmigrant) smolts reared under the semi-natural treatment (SNT) was significantly less than that of smolts reared under the optimal conventional treatment (OCT) ($p=0.078$). There was a significantly higher pre-release mean BKD index associated with SNT compared to OCT for all three release sites ($p=0.0014$). A logistic analysis of covariation on survival was conducted with BKD index as the covariate; the result was that there was no significant difference between the SNT and OCT for BKD adjusted survival indices ($p=0.644$).

These results suggest that the Semi-Natural Treatment is not significantly higher than the Optimum Conventional Treatment in terms of its effect on the survival index to McNary.

In the comparison of wild and hatchery smolt outmigration survival the hatchery smolt survival was less than the late-run wild smolt survival in four of the five years. There was no significant difference between hatchery and wild smolt survival to McNary Dam in outmigration-year 2001.