RELEASE STRATEGIES TO IMPROVE POST-RELEASE PERFORMANCE OF HATCHERY STEELHEAD IN NORTHEAST OREGON

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SUMMARY

This presentation covered recently published information from three journal articles. Most of the slides were from two studies with Wallowa and Imnaha stock steelhead; one that compared the post-release performance of smolts that were either released following an acclimated period or direct-released, and a second study in which smolts were released volitionally following an acclimation period or forced-released from acclimation ponds. The third study was with spring Chinook salmon smolts that were acclimated for either two months or four months before being force released.

In the acclimation versus direct-release study, from years 1987 through 1996 we released 14 paired groups of yearling steelhead smolts into the Grande Ronde River that were either acclimated (AC) for 16 to 57 d in ponds supplied with ambient stream water or trucked from a groundwater-supplied hatchery and directly-released (DR). Upon release we monitored outmigration travel times and survival to Lower Granite Dam (LGD) on the Snake River using freeze brand marks or implanted Passive Integrated Transponder (PIT) tags in a sample of each release group. Across all release groups, travel time was significantly slower for AC groups (34.7 d) than for those that were DR (31.8 d); however, there was no significant difference in outmigration survival probabilities to LGD between AC and DR groups. We used recoveries of coded-wire tags (CWT) to estimate smolt-to-adult survival (SAS) and a stray rate index. Across all release groups, SAS was 33% higher, and straying was 42% lower for AC steelhead.

In the forced versus volitional release study, conducted over 4 release years, we compared the performance of hatchery steelhead groups that were force-released (FR) from acclimation ponds to those provided a 2-week volitional release (VR). Upon fish release into streams, we monitored smolt outmigration travel times and survival to Lower Granite Dam (LGD) on the Snake River using Passive Integrated Transponder (PIT) tags in a sub-sample of each release group. To better understand the outmigration characteristics of volitionally departing fish, we also captured and PIT-tagged fish as they exited ponds in the first and last 24 h of VR. Across all release groups, travel time was 3% faster for fish that were forced from acclimation ponds than for VR groups; however, average survival of VR groups (65.0%) was significantly higher than FR groups (58.6%). On average, fish that departed acclimation ponds in the first 24 h of VR took 6 d longer to reach LGD and had lower survival (50.3%) than those departing in the last 24 h (56.9%), though these differences were not statistically significant. We estimated smolt-to-adult survival (SAS) and a stray rate index (SRI) for FR and VR groups based on recoveries of coded-wire tagged adults. Across all releases, SAS was not significantly different (FR = 0.63%, VR = 0.59%), nor was the SRI (FR = 10.9%, VR = 10.6%). Our finding that VR provided no post-release survival benefit is consistent with other published studies, but this is the first study to quantify stray rate in relation to VR.

In the study in which hatchery spring Chinook salmon were acclimated either two or four months before release, in release years 2000 through 2005 fish were transferred from a groundwater-supplied hatchery to acclimation ponds supplied with stream water either in November (November transfer; NT) or January (JT) for rearing at ambient water temperatures prior to release into the Umatilla River in early March. After stream release, PIT tag data indicated that median travel time to John Day Dam on the Columbia River was slower for NT groups (51 d) than for JT groups (46

d), with significant differences in five of six release years. Average outmigration survival probabilities were 15% higher for NT groups, though this difference was not significant. Based on CWT recoveries we found that NT groups had a significantly higher SAS than JT groups, with an average difference of 27%. However, little or no straying occurred for both strategies.

Complete information and analysis are in the following papers:

Clarke, L. R., M. W. Flesher, T. A. Whitesel, G. R. Vonderohe, and R. W. Carmichael. 2010. Post-release performance of acclimated and direct-released hatchery summer steelhead into Oregon tributaries of the Snake River. North American Journal of Fisheries Management 30:1098-1109.

Clarke, L. R., M. W. Flesher, S. M. Warren, and R. W. Carmichael. 2011. Survival and straying of hatchery steelhead following forced or volitional release. North American Journal of Fisheries Management 31:116-123.

Clarke, L. R., W. A. Cameron, and R. W. Carmichael. 2012. Performance of spring Chinook salmon reared in acclimation ponds for two and four months before release. North American Journal of Aquaculture 74:65-72.