

Title: A Synthesis of Findings from an Integrated Hatchery Program after Three Generations of Spawning in the Natural Environment

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Abstract: The Cle Elum Supplementation and Research Facility in the Yakima River Basin, Washington is an integrated spring Chinook Salmon *Oncorhynchus tshawytscha* hatchery program designed to test whether artificial propagation can increase natural production and harvest opportunities while keeping ecological and genetic impacts within acceptable limits. Only natural-origin (naturally spawned) fish are used for hatchery broodstock. Spawning, incubation, and early rearing occurs at a central facility; pre-smolts are transferred for final rearing, acclimation, and volitional release at sites adjacent to natural spawning areas where returning adults can spawn with natural-origin fish. The first wild broodstock were collected in 1997 and age-4 adults have returned to the Yakima River since 2001. An unsupplemented population in the adjacent Naches watershed provides a reference for evaluating environmental influences. The program has been comprehensively monitored from inception. A synthesis of findings, many already published, includes: supplementation increased harvest, redd counts, and spatial distribution of spawners; natural-origin returns were maintained; straying to non-target systems was negligible; natural-origin females had slightly higher breeding success (production of surviving fry) in an artificial spawning channel, while behavior and breeding success of natural- and hatchery-origin males were similar; hatchery-origin fish showed differences in morphometric and life history traits; high rates of hatchery age-2 (mini-jack) production were reported but observed proportions of outmigrating juvenile and adult (ages 4 and 5) returning males were comparable for hatchery- and natural-origin fish; hatchery