

Spawner and Redd Characteristics of Hatchery and

Natural Origin

Upper Yakima River Spring Chinook

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Abstract

We monitored the characteristics of redds constructed by naturally spawning upper Yakima River hatchery and natural origin female spring Chinook salmon (*Oncorhynchus tshawytscha*) between 2002 and 2006. We compared the redds in terms of size, water depth, velocity, substrate and habitat characteristics, date of initial redd construction, and distance to the nearest surrounding redd. Redds were sampled by snorkeling during the spawning period between September and early October. During surveys female origin was identified by the presence (natural origin) or absence (hatchery origin) of an adipose fin. After females were no longer present, redd characteristics were measured (total sample size: hatchery n=152; natural n=201). After eliminating autocorrelated variables, a 2-way MANOVA testing for Origin (Hatchery and Natural) and Year main effects in the distribution of bowl depth, bowl velocity, percent sand within the bowl, and distance to the nearest redd demonstrated no significant Origin effect ($p>0.86$), despite the fact that hatchery female mean fork lengths (FL) were smaller by between

0.7 to 1.6 cm's. All distributions except bowl velocity showed significant Year effects ($p < 0.001$). Only bowl length showed a significant, weak negative correlation with FL, explaining just 5% of the total variation. Both hatchery and natural females preferred spawning habitat in the pool/riffle transition zone. Spawning density showed a weak negative correlation with apex height, distance to the nearest redd, and bowl length and explained between 6 and 9% of the total variation. Within years there were relatively small differences between hatchery and natural redds despite large interannual differences and no consistent trend in hatchery or natural origin means. However, our statistical tests did not have sufficient power to detect these relatively small differences due to low sample sizes.