

**Title:**

A Comparison of Life-History Traits in First-Generation Hatchery and Wild origin Upper Yakima River Spring Chinook Salmon

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**Abstract:**

We compared upper Yakima River hatchery and wild origin spring chinook salmon across the life history traits and quantitative traits to estimate whether these locally adapted traits are diverging after one generation of hatchery influence. Sex ratios of adult wild and hatchery origin fish did not significantly differ. The majority of both hatchery and wild origin fish returned at age 4 (mean=82%) with age 5 fish making up 0 to 24% of returns. Age 3 (jacks) ranged from 1 to 50% of total annual returns. The proportion of hatchery and wild origin jacks and adults (ages 4 and 5 combined) did differ, but showed no consistent trend. Mean hatchery body lengths were shorter than wild (age 3: 2.7 cm; age 4: 1.7 cm; age 5: 2.7 cm), as were body weights (age 3: 0.3 kg; age 4: 0.3 kg; age 5: 0.8 kg) representing a divergence in body size of between 0.5 and 1.0 SD. Changes in trait distributions of this magnitude will likely result in some reduction in population productivity and individual fitness. Median passage timing of adult hatchery returns at Roza Adult Monitoring Facility (RAMF) was 2.0 days later on average than wild fish. Jack median passage was 19-20 days later than adults, with no consistent difference between hatchery and wild returns. There was little to no correlation between collection date at RAMF and date of broodstock spawning 1 to 5 months later. Median spawn timing of hatchery fish was significantly earlier than wild fish by 6.5 days. Median carcass recovery dates of naturally spawning hatchery and wild fish did not differ.

