

## Use of Parentage Analysis to Determine Reproductive Success of Hatchery-Origin Spring Chinook Salmon Outplanted into Shitike Creek, Oregon

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**Abstract.**—Removal of fish passage barriers provides Pacific salmon *Oncorhynchus* spp. and steelhead *O. mykiss* the opportunity to recolonize previously accessible habitat, though the time scale of natural recolonization may not be sufficient for management or conservation goals. One strategy for accelerating recolonization is to outplant hatchery-origin adults into newly restored habitats. In this paper, we describe how genetic parentage analysis was used to determine the reproductive success of adult stream-type spring Chinook salmon *O. tshawytscha* taken from two localized hatchery stocks and outplanted into a stream. We defined reproductive success as the production of migratory juveniles. In 2002 and 2003, 83 and 265 adult hatchery salmon, respectively, were outplanted into Shitike Creek, Oregon, a tributary to the Deschutes River. Using 11 microsatellite markers, 799 and 827 migratory juveniles from the two brood years were genotyped and matched back to potential outplanted parents using genetic parentage analyses. Successful spawning of outplant–outplant, outplant–wild, and wild–wild fish occurred in Shitike Creek in both years. Adults outplanted in 2002 showed far fewer matches (18%) to sampled juveniles than those from 2003 (88%). Additionally, only 1% of juveniles had both parents identified as outplants in 2002, compared with almost 61% in 2003. Differences in the number of females outplanted each year appeared to account for the differential productivity. The number of offspring attributed to an individual outplant was variable, ranging from 1 to more than 10. Multiple outplant × outplant matings were identified for each sex as males mated with up to seven females and females mated with up to four males. This study shows that, under the right conditions, outplanted adult hatchery fish taken from localized hatchery stocks can contribute to the overall juvenile production in a natural stream.