A single generation in the wild increases fitness for descendants of hatchery Chinook salmon (*Oncorhynchus tshawytscha*)

Kathleen G. O’Malley1, David I. Dayan1, Nicholas M. Sard2, Marc A. Johnson3, Cristín K. Fitzpatrick1, Ryan Couture4

1State Fisheries Genomics Lab, Coastal Oregon Marine Experiment Station, Department of Fisheries, Wildlife, and Conservation Sciences, Hatfield Marine Science Center, Oregon State University, Newport, OR, USA

2Department of Biological Sciences, State University of New York-Oswego, Oswego, NY, USA

3Native Fish Conservation and Recovery, Oregon Department of Fish and Wildlife, Salem, OR, USA

4Oregon Department of Fish and Wildlife, Corvallis, Oregon, USA

Reintroduction is an important tool for salmon recovery. These programs often use hatchery salmon from a nearby source to re-establish populations in vacant, historically occupied habitat. However, this approach is challenged by the relatively low reproductive success that hatchery-origin (HOR) salmon experience when they spawn in the wild, relative to their natural-origin (NOR) counterparts. In this study, we used genetic parentage analysis to compare the reproductive success of three groups of Chinook salmon (*Oncorhynchus tshawytscha*) reintroduced above the Cougar Dam on the South Fork McKenzie River, Oregon: HOR salmon from an integrated stock; their first generation of wild-born offspring (hereafter F1s); and NOR salmon that were born elsewhere. We found that F1s produced nearly as many adult offspring as NOR salmon, and 1.7-fold more adult offspring than their hatchery parents. This result suggests that, for the South Fork McKenzie reintroduction program, a single generation in the wild increases fitness for the descendants of hatchery salmon. However, even with elevated fitness, successful reintroduction remains demographically constrained by extrinsic factors.