Combining PIT Tags with Scale Reading to Better Understand the Life History of Snake River Fall Chinook Salmon

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From 1998 through 2004, the U. S. Fish and Wildlife Service used the adult trap and separation-by-code system at Lower Granite Dam (LGR) to collect scales from returning fall Chinook salmon adults that had been PIT-tagged as part of their research efforts. In 2005, NOAA Fisheries joined with the USFWS effort, adding all transport study fish to the pool of targeted adults. From each scale sample, Washington Department of Fish and Wildlife's (WDFW) staff assigned age-at-ocean-entry (subyearling or yearling), which we then compared to that adult's juvenile PIT-tag detection history.

From 1998 through 2008, a total of 1,712 scale samples were taken from PIT-tagged adults and jacks at Lower Granite Dam, with most (1,435) being collected in 2007 and 2008. Staff from the WDFW scale lab were able to assign age-at-ocean-entry to 1,543 scale samples. As an indicator of their accuracy, all fish detected migrating as yearlings were correctly assigned a yearling age-at-ocean-entry. Juvenile detection histories for all fish sampled were compiled from observation data stored in the PTAGIS database managed by the PIT Tag Operations Center at the Pacific States Marine Fisheries Commission.

Comparing the juvenile detection history with the scale readings from each returning adult has shown these ocean-type salmonids, previously thought to migrate to the ocean as subyearlings, display a variety of life history strategies, taking from one month to over a year to reach the ocean. We found some fish over-wintered within the hydropower system before entering the ocean, with some fish transported to below the last hydropower dam also over-wintered before entering the ocean. All juvenile detection histories had at least one yearling ocean entrant. The percentage of returning adults that showed a yearling age-at-ocean-entry ranged from 3.9 and 6.5% for fish transported or last detected during the summer of the year they were released, respectively, to 100% for fish last detected after transport ended in late fall and before it began again in early spring of the following year. Finally, age-at-ocean-entry affected the number of years spent in the ocean and size at return. We found that subyearling ocean entrants were less likely than yearling ocean entrants to return after spending 1 year or less at sea (subyearlings produced fewer jacks and no mini-jacks). When aging adults based on time spent in the ocean, full-term adults that had been yearling ocean entrants were usually larger than full-term adults that entered the ocean as subyearlings. However, when aging adults based on brood year, adults that had been yearling ocean entrants were smaller than those that entered the ocean as subyearlings.