

## Evidence of Residual Effects From the Capture and Handling of Yukon River Fall Chum Salmon in 2002

In 2002, the U. S. Fish and Wildlife Service continued a study, initiated in 2001, of the effects of capturing Yukon River fall chum salmon (*Oncorhynchus keta*) in fish wheels, marking them with spaghetti tags, and releasing them to continue their migration. Two fish wheels were used to capture 5,518 fall chum salmon in the Yukon River mainstem approximately 50 km upriver of the Tanana River confluence. Fish were captured, tagged, and either released immediately (47.3%) or held in a live-box for as long as 9.6 h before being released. Fish were recaptured in fish wheels at five upriver sites near Rampart, Stevens Village, Beaver, and Circle, Alaska and in the mainstem near the international border in Canada. Mark rates of 3.0%, 4.6%, 3.0%, 1.6%, and 1.4% were observed at the five upriver locations, respectively. The mark rates observed at Stevens Village and Beaver are the first, from adequately sized samples, to be greater than or equal to that observed at the Rampart recapture site. However, the Beaver fish wheel caught few fish until it was moved late in the season, so the data may not be descriptive of the entire migration. Mark rates at the Circle and Canadian sites were substantially less than at the Rampart site, with the relative magnitude of the reduction similar to that observed in prior years. The reduced mark rates at upriver locations are a concern because they may reflect a violation of mark-recapture model assumptions or the impaired ability of captured fish to complete their migration. Possible causes of the differences in mark rates were investigated by modeling travel time and the probability of recapture as a function of measures of the conditions under which fish were captured and held. The length of time that fish were held in a live-box was positively associated with an increased probability of recapture at both the marking and Rampart recapture sites. In addition, a measure of crowding in a live-box was inversely related to the migration rate between the marking and Rampart recapture sites. These results are similar to those obtained in 2001. However, contrary to findings in 2001, the probability of recapture at the recapture sites upriver from Rampart was not significantly related to the conditions under which fish were held. Although holding fall chum salmon in a live-box appears to negatively affect their ability to migrate for at least some portion of time, measures of the conditions under which fish are held do not fully explain the reduced mark rates observed at the more distant upriver locations, and we recommend continued efforts to investigate potential causes.

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