

## ABSTRACT

Two-sample mark-recapture experiments were conducted from early June to late August during 2002-2006 to estimate inriver abundance of Chinook salmon *Oncorhynchus tshawytscha* in the middle and upper Kuskokwim River and associated tributaries using radiotelemetry techniques. For each year, an attempt was made to distribute radio tags such that the radio-tagged fish would be representative of the entire run with respect to temporal abundance, size, sex, and stock composition. Fish were sampled using drift gillnets and fish wheels at various locations above and below Kalskag. Chinook salmon that were captured and radio-tagged constituted the marking event and fish counted at four weirs on tributaries of the Kuskokwim River constituted the second recapture event. Radio-tagged Chinook salmon that migrated past the weirs and were recorded by stationary tracking stations constituted the recaptured portion. Between 97% and 99% of radio-tagged fish were detected by a combination of two aerial surveys and 11 to 17 stationary tracking stations. For 2002-2005, Aniak River bound Chinook salmon were censored from the final estimate due to strong evidence of bank orientation at the marking sites despite moving the capture locations farther downstream from the mouth of the Aniak River. In addition, there were no independent data to evaluate differential probability of capture during the marking event. In 2006, a weir was placed on a tributary of the Aniak River, which allowed for the estimation of a marked:unmarked ratio of Aniak River Chinook salmon. As a result of this second event sampling effort, Aniak River bound Chinook salmon were included in the final estimate for 2006. For the first 3 years of this study an inriver estimate for the Holitna River drainage was calculated using the number of Holitna River bound Chinook salmon that were added to those tagged on this drainage by an independent effort. For 2005 and 2006, an estimate was calculated for Holitna River bound Chinook salmon using only those fish tagged on the mainstem Kuskokwim River. The estimate of abundance for Chinook salmon  $\geq 450$  mm MEF for the Kuskokwim River upstream of the Aniak River has ranged from 100,733 (SE=24,267) in 2002 to 165,538 (SE=22,660) for 2006. The abundance estimate for 2006 that includes the Aniak River is 233,133 (SE=28,450). The inriver abundance estimate for the Holitna River drainage has ranged from 42,013 (SE=4,981) in 2003 to 89,577 (SE=13,790) for 2006. The majority of radio-tagged Chinook salmon entered the Holitna and Aniak rivers. In general, radio-tagged fish that migrated farther upriver to spawn were captured at the tagging site earlier than those bound for nearby systems.

Key words: Kuskokwim River, Aniak River, abundance estimate, Chinook salmon, *Oncorhynchus tshawytscha*, Holitna River, mark-recapture, radio tag, radiotelemetry, tracking stations, aerial survey

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