Assessing methods to estimate inseason salmon abundance in the lower Copper River

Abstract: The U.S. Fish and Wildlife Service (USFWS), through the Office of Subsistence Management, funded the Native Village of Eyak (NVE) to undertake a three-year study and work with the Alaska Department of Fish and Game (ADF&G) to assess and develop methods of monitoring salmon escapement in the lower Copper River near Cordova, Alaska. This project was designed to use fixed-aspect riverine acoustics and drift gillnetting techniques to monitor and study the behavior and distribution of salmon in the highly braided Copper River delta. The ultimate goal of this project is to develop an annual monitoring program that can provide fishery managers with more timely estimates of salmon escapement than those currently available from a sonar site (Miles Lake) 52 km upstream of the ocean commercial fishing boundary. A multifaceted research design was developed in an attempt to significantly shorten the development time of a lower river test fishery by studying fish migratory behavior and by testing and comparing the utility of using acoustics and gillnets/driftnets as test fishing tools.

Fieldwork was conducted from 5 May until 7 June 2001 in the vicinity of the Mile-27 and Mile-37 Bridges on the Copper Valley Highway. Bathymetric maps were prepared for sections of river channels downstream of both these bridges using a digital echo sounder and a differential GPS system. Bathymetric maps were used in-season to aid in the selection of test fishing sites.

Drift gillnetting was conducted at the Mile-27 Channel for a total of 21 days from 13 May to 7 June. A total of 602 sockeye salmon and 18 chinook salmon were captured during 889 minutes of driftnet fishing. Daily test fishing indices for sockeye salmon peaked on 25 May at 1,176 fish per hundred fathom hours and the season cumulative index was 8,483. We compared the daily test indices to the upstream Miles Lake sonar counts lagged by one day to examine changes in catchability of the gillnet test fishery over time. These data suggest that there was a shift in the gillnet catchability between 26 and 28 May where the gillnet test fishery became less effective (a 50% reduction in catchability). This decline in catchability was coincident with rising river levels.

Acoustic sampling of the river and upstream migrating fish was conducted using both multibeam and single transducer acoustic systems. A multibeam sonar system was deployed to sample areas and conditions that are typically difficult to sample with single transducer systems. Conditions in the lower Copper River were more favorable for using single transducer systems than we originally envisioned, and therefore we discontinued use of the multibeam system. Splitbeam sonar systems were deployed at nine locations near Mile 27 and Mile 37 of the Copper River Highway. Transducers were either stationary (on river banks) or mobile (on a boat). We collected acoustic fish-count data from a site at Mile 27 (within the gillnet test fishing reach) from 13-27 May 2001. Fish counts were low (mean of 19/day) from 13-22 May, but increased more than 100-fold to a mean of 2104/day from 23-27 May. A peak daily count of 2,790 fish occurred on 26 May and 10,706 fish were counted during the entire 15-day period.

Results from 2001 indicated that it was easier to capture and count salmon in and near the Mile-27 Channel than originally believed. Test fishing indices from both the drift gillnet and acoustic gear indicate that sockeye salmon took one day to travel from the Mile-27 Channel to the Miles Lake sonar site in late May 2001. Travel time for the same section of river during early June may have been two days, but the data are less conclusive than they are for late May. Both acoustic and drift gillnet gear were capable of detecting the presence of fish in the Mile-27 Channel and the daily indices were correlated with subsequent upstream estimates from the Miles Lake sonar site.

Plans for the 2002 fieldwork include deployment of both acoustic and driftnet test fishing in the Mile-27 Channel from early May until early June. This will allow us to begin to characterize the among-year variability in catchability coefficients of the two gear types and in the time for sockeye salmon to travel from Mile 27 to the Miles Lake sonar site. In addition, fish passage should be regularly monitored near the Mile-37 Bridge in 2002 in order to minimize any confounding of data interpretation that could be caused by significant shifts in the distribution of fish between the two primary channels (Mile-27 and Mile-37) within and among seasons.

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