Bethel Test Fishery Overview

Presentation to the Kuskokwim Working Group, July 20, 2011

Introduction

The Bethel test fishery provides an inseason catch per unit effort (CPUE) index comparable to historic test-fish CPUE indices that fishery managers use to address inseason salmon run timing and relative abundance. The current year test-fish CPUE index can be compared to prior year indices and, along with associated subsistence reports and weir, sonar, and aerial survey data, can be used to assess salmon run strength. Keep in mind however the comparison of test-fish CPUE data between years should be approached cautiously due to an array of factors affecting salmon catchability at the test-fish site. Such factors include, but are not limited to, water level and clarity, height of the flooding tides, weather conditions, river channel morphology and hydrology, fish size relative to gillnet mesh size, net saturation effects, and test-fish crew technique.

The location of the Bethel test fishery within the Kuskokwim River drainage is important to salmon managers in providing some of the first information on the development of salmon runs in a given year. Historically managers relied on test fisheries, commercial catch statistics, and informal reports from subsistence and sport fishermen to gauge inseason salmon run abundance. In 1987, the directed Chinook salmon commercial fishery was discontinued in the Kuskokwim River due to conservation concerns. In the absence of a June fishery, early inseason salmon run information is limited primarily to test-fish data and subsistence harvest reports.

Project Background

From 1966 through 1983, ADF&G conducted a set gillnet test fishery below Tuntutuliak near an abandoned fish camp called Kwegooyuk. At that site, the river ranged from approximately 3 to 4 miles in width and had two major channels; one channel along the east shore and one along the west shore. The river channels were separated by soft sandy shoals that were mostly flooded at high tide. It was also difficult to predict which side, east shore or west shore, would be the "main" river channel in a given year and it appears that it may have fluctuated several times during the history of that project. In that expansive body of water, the Kwegooyuk test fishery gillnets, 27 fathoms in length, were set from the east shore just upstream of the lower boundary of District W-1 and fished 24 hours a day.

The goals of the Kwegooyuk test fishery were to describe run timing and provide an index of abundance for Chinook, sockeye, and chum salmon, similar to the present day Bethel test fishery. Managers believed that run timing was adequately described by the Kwegooyuk test fishery, but the project did not provide a satisfactory index of run abundance. This problem was attributed to fluctuations in the migratory route of salmon between the east and west river channels as influenced inseason by changes in weather patterns and tidal stages, and between

seasons by alterations in river channel morphology. The Kwegooyuk test fishery was also shown to be a poor predictor of Chinook and chum salmon catches in the District 1commercial fishery. Due to the remoteness of the test-fish site, daily catches of fish were not able to be sold or distributed to the public for subsistence uses. This made discarding of the daily catches difficult or impossible, resulting in unavoidable waste that was not acceptable to ADF&G, local residents, and the industry.

In an effort to provide a more reliable index of relative abundance and run strength, and to provide a better avenue for the sale of test-fish catches, a drift gillnet test fishery program near Bethel was evaluated in July of 1983. This program ran at the same time with the Kwegooyuk test fishery. The focus was on the use of drift gillnets in a narrower river channel of the mainstem Kuskokwim River near Bethel. The objectives of the 1983 drift gillnet test fishery were to assess the feasibility of collecting run timing and abundance information for coho salmon. The new site was in the mainstem Kuskokwim River about 3 miles upstream from Bethel, just above the boundary line separating subdistricts 1-A and 1-B. The river was approximately ½ mile wide at the new location and had a single major channel that allowed drift gillnets to collect CPUE information at selected stations across the entire channel width. At that time four small channels circumvented the site (Steamboat, Straight, Church, and Napaskiak sloughs), but their influence on the test fishery was assumed minimal. The new test-fish location was also conveniently located in close proximity to local fish processors for the timely distribution and sale of daily catches. Conclusions from the 1983 program evaluation were that the drift gillnet test fishery at Bethel was viable and offered a more reliable means of monitoring salmon run timing and abundance than the Kwegooyuk test fishery. The Kwegooyuk set gillnet program was then discontinued after 1983 and replaced with a multiple-mesh drift gillnet project referred to as the Bethel test fishery.

Operating at a point upriver of most commercial and subsistence harvest means that instead of indexing total run abundance, the Bethel test fishery provides an index of relative abundance for salmon at a point midway in the commercial fishing district. This distinction is important because downriver commercial and subsistence harvests are not accounted for in the Bethel test fishery index. Moreover, the exploitation rate of the commercial fishery is likely inconsistent because of changes in gear efficiency, changes in regulations designed to alter harvest efficiency, variability in fishing patterns (such as length of openings and frequency of openings), changes in water level, variability in the timing of openings with salmon entry patterns into the river, the occurrence of fishermen strikes, etc. Any of these variables confound the comparison of current year data with historic test-fish data. Inconsistencies in exploitation rates of the commercial fishery, the effect of subsistence closures, or management actions influence the ability of the Bethel test-fish project to accurately and consistently estimate total run abundance and salmon escapement. Instead, it is more appropriate to use the Bethel test-fish data as an index of relative salmon abundance at Bethel. Taken within the context of these limitations, the Bethel test fishery provides timely and useful insights beneficial to salmon management in the Kuskokwim area.

Project Objectives

The two primary objectives for the Bethel test fishery salmon run monitoring project include:

1. Determine a daily mean index expressed as catch per unit effort or CPUE and a cumulative daily mean CPUE index for Chinook, sockeye, chum and coho salmon at the Bethel test-fish site from June 1 through August 24.

2. Estimate relative run abundance and timing of Chinook, sockeye, chum and coho salmon at the Bethel test-fish site by comparison of historical test-fish information.

Methods

The methods and location currently used to achieve the objectives of this project are similar to those used since 1984. Following each high tide, a series of gillnet drifts are conducted by the test-fish crew in the Kuskokwim River approximately 3 miles upstream of Bethel, just below where Straight Slough diverges from the main river channel. A 3-person crew performs the drifts. The crew utilized a 20 ft skiff and two 50 fathom drift gillnets of different mesh sizes. Each series of drifts begins approximately 1 hour after the published high slack tide for Bethel to ensure all drifts are conducted in water flowing downstream. If the weather conditions and high tide magnitude caused a delay in the ebbing of the tide, the time that the drifts begin is delayed. Each drift is conducted at one of 3 stations across the width of the main channel. For each high tide drift series, one of 6 unique permutations from a repeating fishing schedule is used to determine which mesh size will be fished at each station. This means that no station is fished with the same mesh size twice during a single high tide. However, this design dictates that one station is fished twice each high tide; first with the 8-inch gear and then with the 5 3/8-inch gear. The 2 remaining stations are fished only once; one station with the 8-inch gear and the other station with the 5 3/8-inch gear. The station fished and the station missed by a given mesh size varies with the random fishing schedule. The duration of each drift is approximately 20 minutes and the mean fishing time is calculated as half the time it takes to deploy and retrieve the gillnet, plus the time the gillnet is fully deployed. The river distance traversed by each drift varies depending on water and channel conditions, but the distance is generally less than 2 mile.

Beginning June 1 and continuing through July 10, 2 different mesh sizes are used; the first 2 drifts of each tide are conducted with the 8-inch mesh gillnet, and the second 2 drifts are performed with the 5 3/8-inch mesh gillnet. Different mesh sizes are used because the larger mesh catches larger Chinook salmon, whereas the smaller mesh is more effective on smaller Chinook and other salmon species. Beginning July 11 the use of the 8-inch mesh gear is discontinued for the remainder of the season because, typically, by mid July the Chinook salmon migration in the lower Kuskokwim River is essentially over.

The catch for each drift is tallied by species and by drift station. At the end of each series of drifts, the catch is either donated to charities or individuals desiring the fish for subsistence purposes. The data are entered into a Microsoft Excel™ computer program for analysis and recorded in the office log.

Test Fishing Index

The actual salmon catch for each drift is converted to catch per unit effort (CPUE) to enhance the comparability of catch results. This is done by converting the difference in net length and mean fishing time of each drift to the number of fish caught by 100 fathoms of net fished for 60 minutes. This standard net length and fishing time is a technique used in many gillnet test fisheries conducted by ADF&G throughout the state.

For each high tide, the drift CPUEs are averaged over all stations to calculate a mean tidal CPUE index for each species. For Chinook salmon the mean is calculated using the drift CPUEs from both 8-inch and 5 3/8-inch mesh nets with each drift and mesh size weighted equally. In contrast, only catches in the 5 3/8-inch mesh nets are used to calculate mean tidal CPUEs for sockeye, chum and coho salmon.

The mean tidal CPUEs are summed by species throughout the season to generate a cumulative CPUE index for the season and it is this data that is presented to the Working Group in the visual graph form to illustrate the comparison of current run information with known historical run results.

Conclusion

Kuskokwim River subsistence and commercial fishery salmon managers have found the Bethel test fishery project to be successful at indexing the relative abundance and migratory timing of salmon runs. Fishery managers require timely inseason assessment of salmon run abundance. Due to the great river distances between areas of harvest and escapement project locations throughout the drainage, escapement projects provide limited usefulness early in the salmon runs. As the runs progress, a relationship can be seen between inseason index information and escapement project information.

In order for the Bethel test fishery to be successful in achieving its objectives, project methods and procedures must be performed consistency between tides throughout the season and that consistency must be maintained between years. Again, it is not possible to account for the array of factors that affect salmon catchability during the season so it is best to compare the current year's data with the more recent historical years' data to reduce the influence of slower changing factors.

As one of the salmon stock assessment programs, the Bethel test fishery has evolved into the primary inseason salmon management tool. Consistency in methods, completeness of a historical database, frequency of operation, and timeliness of results contribute to the success of this program. The test fishery by itself is an imperfect tool. It requires a measure of

subjectivity by experienced staff to interpret the information effectively. When used in conjunction with other inseason assessment tools, the test fishery can provide managers with insight into salmon run abundance and migratory timing to provide for sustained yield fishery management on the Kuskokwim River.

Bethel Test Fishery Drift Stations 1, 2 and 3.