COOPERATIVE SALMON DRIFT GILLNET TEST FISHING IN THE LOWER YUKON RIVER, 2003

By

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and

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ABSTRACT

The Lower Yukon drift gillnet test fish program is designed to assess run timing and relative abundance of Chinook, chum, and coho salmon returning to the Yukon River. This project tests the feasibility of using drift gillnets to obtain pertinent information inseason that fisheries managers can use for assessing relative abundance and run timing of these salmon species. Testing the ability of the summer season Middle Mouth drift gillnet test fishery to correlate with trends in other Lower Yukon test fisheries or the Pilot Station sonar passage estimates was inconclusive. Drift fishing at incorrect times in relation to high tides may have caused the failure of Middle Mouth to correspond with other assessment projects in the Lower Yukon River during the summer season. Fall operations for drift gillnet test fishing in the Lower Yukon River were similar to trends observed in the sonar passage estimates obtained at Pilot Station. Age, sex and length measurements were taken; run timing recorded and catch per unit effort calculated for each species.

KEY WORDS: Yukon River, Chinook salmon, chum salmon, coho salmon, gillnet test fishery, run assessment, catch per unit effort.

INTRODUCTION

The Lower Yukon drift gillnet test fish program is designed to assess the run timing and relative abundance of Chinook salmon *Oncorhynchus tshawytscha*, chum salmon *O. keta,* and coho salmon *O. kisutch*. The goal of this project is to determine the feasibility of using drift gillnets to obtain pertinent information that fisheries managers can use inseason to assess relative abundance and run timing of salmon returning to the Yukon River drainage. These data may be used in conjunction with other information to help ensure that sufficient numbers of salmon pass the Lower Yukon to provide for escapement into Alaskan and Canadian tributaries, and to provide for subsistence uses.

Total number of Chinook and chum salmon returning to the Yukon River has been depressed in recent years. These low numbers prompted the Alaska Department of Fish and Game (ADF&G) to expand an existing drift gillnet test fishery located at Big Eddy to include drift locations at Middle Mouth with the assistance of the Emmonak Tribal Council. The new program includes two drift gillnet test fishing locations at the Middle Mouth of the Yukon River delta. With the addition of the Middle Mouth drift sites to the Big Eddy drift sites, assessment is possible for salmon transiting the North, Middle, and South Mouths of the Yukon River Delta downstream from major commercial and subsistence fisheries.

The information obtained by the Middle Mouth drift gillnet test fishery may supplement the existing summer season Chinook salmon set gillnet test fisheries in the Lower Yukon. Beginning in 2001, the summer and fall chum salmon set gillnets nets were replaced by drift gillnets. In recent years, managers were uncertain if the set gillnets were providing representative samples of the summer and fall chum salmon runs at the Middle Mouth and Big Eddy test fishing sites. Deviation of the drift gillnet data from the set gillnet data may be explained by changes in riverbanks, channels, and sand bar migrations.

OBJECTIVES

The objectives for the Lower Yukon drift gillnet test fisheries are to:

1.) Collect relative abundance and run timing information on Chinook, summer chum, fall chum, and coho salmon on a daily basis.
2.) Maintain an up-to-date log of catches and catch per unit effort (CPUE) index by species.
3.) Sample and record age, sex, and size data used in scale pattern analysis.

METHODS

Two locations were used in 2003 for the Lower Yukon drift gillnet test fish project. The first test fishing location, Big Eddy, was located in the main channel of the South Mouth of the Yukon River delta upstream and southeast from the village of Emmonak (Figure 1). One drift station was located on each side of the north and south shore. Station 1 at Big Eddy was located directly south of the confluence of the Kwiguk Mouth and South Mouth near the southern shore. On June 18, Station 1 was moved downstream approximately 1 mile (800 m), because CPUE was heavily skewed towards Station 2. Station 2 was located directly east of Station 1 on the opposite shore approximately 0.25 miles (200 m) downstream and southeast from the starting point of Station 1. The Big Eddy drift gillnet fishing locations were primarily chosen to assess salmon transiting via the South Mouth of the Yukon River delta. The locations were secondarily chosen because of their proximity to the village of Emmonak.

The second test fishing location, Middle Mouth, was located upstream and south from the confluence of the Kawanak and Kwikpak Passes to assess numbers of salmon entering the North and Middle Mouths of the Yukon River delta (Figure 1). Two drift gillnet stations were utilized in Kwikpak Pass near Hamilton Slough, one on either side of the outlet at approximately river mile 24 (39 km). Station 1 was located on the west side of the river and Station 2 was located on the opposite bank. The Station 1 drift gillnet starting point was at a place named "Hootch's Camp" approximately 3 miles from the Middle Mouth camp. Station 2 was located on the East bank approximately 0.25 to 0.50 miles (400-800 m) downstream and north from Hootch's Camp. During the summer season both Chinook and summer chum salmon CPUE was skewed heavily toward Station 1. On July 16, Station 2 was relocated upstream about .25 miles and closer to shore.

Different sized mesh gillnets were used in the summer and fall fishing seasons. In the summer season, two drift gillnets with different mesh sizes were used from 28 May to 15 July at Big Eddy and from 31 May to 15 July at Middle Mouth. A single mesh size drift gillnet was used in the fall season from 16 July to 28 August, when the test fisheries were terminated for the season. The three different types of gillnets were of similar construction, 50 fathoms (91.4 m) in length with a cork marking 25 fathoms (45.7 m). Summer season test fishing used gillnets designed to capture Chinook and summer chum salmon. Gillnets for Chinook salmon were constructed of 8.25-inch (21.0 cm) mesh web 35 meshes in depth. Summer chum salmon gillnets were constructed of 5.5-inch (14 cm) mesh web 45 meshes in depth. Gillnets used for catching fall chum and coho salmon were constructed with 6.0-inch (15.2 cm) mesh 45 meshes in depth.

All gillnets were fished by drifting from 22 foot (6.7 m) open aluminum skiffs with one end of the net attached to the skiff and the other attached to a buoy. In times of increased salmon abundance, inclement weather, or excess debris the amount of net fished was reduced to 25-fathoms to make the net more manageable. When 25 fathoms of gillnet was fished, the information was recorded and compensated for in the CPUE calculations. Drift gillnets were fished twice daily during both tidal surges at the Middle Mouth and Big Eddy locations. Depth profiles at each of the drift stations were made at various times during the season. To take depth profiles, technicians checked depths during the setting and the retrieval of the drift net.

Times used for determining tidal stage were based on the Nushagak tide table. For South Mouth (Kwikluak Pass) 2 hours and 30 minutes were added to the time of Nushagak high tide to estimate the time of correspond with the high tide at the moth. In south mouth 4 hours and 30 minutes are added for travel time for the mouth so, timing of the tidal surge at Big Eddy was determined to occur 7 hours after the published high tide.

In Middle Mouth (Kawanak Pass), 3 hours and 9 minutes are added to the Nushagak high tide to correspond with the high tide at the mouth. After extensive experimental drifts, the Middle Mouth travel time was determined to be 3 hours and 30 minutes after the adjusted high tide at the mouth, so drifting at Middle Mouth occurs 6 hours and 39 minutes after the posted high tide.

The deployment, fishing, and retrieval of the drift gillnets were recorded for each sampling event. CPUE was calculated using fish per 100 fathom-hours:

$$\text{CPUE} = [((100 \text{ fathom} * 60 \text{ minutes}) * (n))/(L*T)]$$

where:

n= number of fish caught,
L= length of net in fathoms
T= the time the net fished

The time the net fished was calculated using:

$$T = ([(\text{set time} + \text{retrieval time})/2] + \text{soak time})$$

(Molyneaux 1999). The amount of time the gillnet was soaked varied. An independent CPUE calculation was made for each drift fished. This value was summed with CPUE calculations from the same day and gear type and then averaged to obtain a CPUE for the day and gear type:

$$\text{Daily CPUE} = ((\sum \text{CPUE})/n)$$

where:

n=number of sets for the given day and gear type.

The fish captured were counted and released unharmed, unless injured by the netting activity. Fish injured by gillnets were distributed locally for subsistence purposes.

Retained salmon were sampled for age, sex and length (ASL) information. All salmon lengths were measured as mid-eye to fork-of-tail length and rounded off to the nearest five millimeters. Three scales were taken from each Chinook and coho salmon sampled. One scale was collected from each summer and fall chum salmon sampled. The sex of each salmon was verified by visual examination of the gonads through a small ventral incision.

Summer Season

Big Eddy and Middle Mouth locations were fished twice daily using drift gillnets equipped with 8.25 (Chinook) and 5.5 (chum) inch stretched mesh as previously described. Drift gillnet fishing at the Big Eddy location started 28 May and continued through 15 July. Middle Mouth drift gillnet fishing started 31 May and continued through 15 July. Both Big Eddy and Middle Mouth locations were fished using the same methods. Station 1 was fished first using the Chinook salmon gillnet followed by the summer chum salmon gillnet, and then Station 2 was drifted using the Chinook gillnet followed by the summer chum salmon gillnet. The objective was for the net to be retrieved after an estimated 30 fish had been captured, but before the net had been fished twenty minutes. The species, number caught, number retained, mesh size, station, and fishing times were recorded and injured fish were retained for local subsistence use and ASL collection.

Fall Season

From 16 July until the end of the Lower Yukon drift gillnet test fishery on 28 August, 6.0-inch mesh gillnets were utilized. Similar to the summer season, the objective was to retrieve the drift gillnets after 20 minutes of fishing and an estimated 30 fish had been caught. These nets were fished once per station twice daily at Big Eddy and Middle Mouth starting with Station 1, followed by Station 2. The species, number caught, number retained, mesh size, station, length of gillnet used, and fishing times were recorded and injured fish were retained for local subsistence use and ASL collection. During the fall season crew members installed lights on the skiffs for night fishing to illuminate the net and skiff deck. Strobe lights were attached to buoys and hand-held spotlights were also used to illuminate the nets during night fishing operations.

RESULTS

Summer Season

Chinook Salmon

In 2003 the Lower Yukon drift gillnet test fishing project completed its third year of operation in both Big Eddy and Middle Mouth. In 2003 an estimated 257,636 Chinook salmon were counted at Pilot Station, this count is much higher than 112,550 in 2002 and 87,496 in 2001. Examination of each of the last three years of drift gillnet data, showed a higher Chinook salmon CPUE in 2001, 620.81 compared to 319.13 in 2002 and 407.97 in 2003 (Table 12).

The mean drift time at the Big Eddy location was 17.4 minutes per drift and a total drift time of 69.2 minutes per day using 8.25-inch mesh (Appendix A1). A total of 307 Chinook salmon were captured by the 8.25-inch gillnet at Big Eddy with a corresponding cumulative CPUE of 499.19

(Table 1). Of the 203 Chinook salmon sampled for ASL data, approximately 48% were male. Age-1.4 Chinook salmon dominated the sample, comprising 62.1% of the total fish captured. Chinook salmon ages-1.3 and -1.5 in Big Eddy made up 30.5% and 6.9% of the sample respectively. Chinook salmon ages-1.2, -2.4, and -2.3 made up less than 1% of the total sample (Table 2). Mean length for male Chinook was 595.0 mm for age-1.2 (*n*=1), 755.0 mm for age-1.3 (*n*=53), 822.0 mm for age-1.4 (*n*=39), and 883.0 mm for age-1.5 (*n*=4). Female Chinook salmon had mean lengths of 791.0 mm for age-1.3 (*n*=9), 871.0 mm for age-1.4 (*n*=87), and 889.0 mm for age-1.5 (*n*=10) respectively (Table 2). The midpoint of the Chinook salmon run at Big Eddy occurred 17 June (Table 1).

The mean drift time at Middle Mouth was 17.0 minutes per drift and a total of 68.2 minutes per day using 8.25-inch mesh (Appendix A1). A total of 200 Chinook salmon were captured at the Middle Mouth location with a corresponding cumulative CPUE of 308.17 (Table 1). Of the 103 Chinook salmon sampled for ASL data, approximately 46% were male. Age-1.4 dominated the Chinook salmon sample making up 64.1% of the total, followed by age-1.3, which comprised 27.2% of the total. Chinook salmon aged -1.5 was a minor occurrence at 8.7%. Mean lengths for male Chinook were 772.0 mm for age-1.3 (*n*=19), 841.0 mm for age-1.4 (*n*=26), and 948.0 mm for age-1.5 (*n*=2) respectively. Female Chinook salmon mean lengths were 789.0 mm for age-1.3 (*n*=9), 865.0 mm for age-1.4 (*n*=40), and 874.0 mm for age-1.5 (*n*=7) respectively (Table 2). The midpoint of the Chinook salmon run at the Middle Mouth test fishery location was 17 June (Table 1).

A total of 507 Chinook salmon were caught at the Big Eddy and Middle Mouth drift gillnet test fishery locations, with a corresponding cumulative CPUE of 407.97. The combined midpoint of the Chinook salmon run at the Big Eddy and Middle Mouth locations occurred on 18 June (Table 1). In 2003, 47.1% of the total Chinook salmon sampled were males (Table 2).

ADF&G worked in cooperation with the U. S. Fish and Wildlife Service (USFWS) to distribute salmon retained by the drift gillnet test fisheries to the residents in the local communities of Emmonak, Alakanuk, and Kotlik for subsistence use. Of the 736 Chinook salmon captured in all mesh sizes combined, 319 were released unharmed, 405 were given away for subsistence uses or sold, and 12 Chinook salmon were discarded because of no recipients or poor fish condition (Appendix A.2). These numbers reflect Chinook salmon caught in both summer chum and Chinook salmon gillnet gear (all related mesh sizes), therefore the 736 Chinook salmon released, sold, discarded or given to residents is larger than the number of fish caught in the Chinook salmon drift gillnet test fisheries alone.

Summer Chum Salmon

The Pilot Station sonar estimates for summer chum salmon passage for 2003 was 1,235,367 and in 2002, was 1,158,475. The 2002 and 2003 summer chum passage estimates for Pilot Station sonar has increased from an estimate of 435,224 in 2001. The Lower Yukon summer chum drift gillnet test fishery also increased from a combined CPUE of 1,802.42 in 2001 to 2,489.55 in 2002 (Table 3), but then decreased in 2003 having a combined CPUE of 1677.63.

The mean drift time in the Big Eddy location was 17.2 minutes per drift and a total of 68.8 minutes per day using 5.5-inch mesh gillnets for summer chum salmon (Appendix A1). A total of 1,479 summer chum salmon were captured at Big Eddy with a corresponding cumulative CPUE of 2642.95 (Table 3). Females comprised 53.7% of the 566 summer chum salmon sampled for ASL data. Age-0.4 and -0.3 summer chum salmon predominated, making up 21.2% and 76.7% of the total sample, respectively. Summer chum salmon age-0.5 and -0.2 made up the remaining 1.9% and 0.2% of the sample. Mean lengths for male summer chum salmon captured at Big Eddy were 560.0 mm for age-0.2 (n=1), 569.0 mm for age-0.3 (*n*=204), 591.0 mm for age-0.4 (*n*=53), and 624.0 mm for age -0.5 (*n*=4) respectively. Mean lengths for female summer chum salmon were 559.0 mm for age-0.3 (*n*=230), 576.0 mm for age-0.4 (*n*=67), and 594.0 mm for age-0.5 (*n*=7) respectively (Table 4). The midpoint for the of summer chum salmon run at the Big Eddy drift location was 21 June (Table 3).

The mean drift time at Middle Mouth was 16.9 minutes per drift and a total of 68.3 minutes per day for summer chum salmon using 5.5-inch mesh gillnet (Appendix A1). There were 471 total summer chum captured with a corresponding cumulative CPUE of 709.38 (Table 3). Females comprised 55.9% of the 256 summer chum salmon sampled for ASL data. Age-0.4 summer chum salmon made up 13.3% of the total sample and age-0.3 made up 83.2% of the total. Age-0.5 and -0.2 summer chum salmon comprised 2.7% and 0.8% of the total sample, respectively. Mean lengths for male summer chum salmon were 573.0 mm for age-0.3 (*n*=94), 604.0 mm for age -0.4 (*n*=16), and 637.0 mm -0.5 (n=3) respectively. Female summer chum salmon had mean lengths of 553.0 mm for age-0.2 (n=2), 562.0 mm for age-0.3 (*n*=119), 581.0 mm for age-0.4 (*n*=18), and 583.0 for age-0.5 (*n*=4) (Table 4). The midpoint of the summer chum salmon run at the Middle Mouth location was 3 July (Table 3).

A combined total of 1950 summer chum salmon were caught at the Big Eddy and Middle Mouth locations with a corresponding cumulative CPUE of 1677.63 (Table 3), with a combined midpoint occurring on 24 June (Table 3). Approximately 225 summer chum salmon were released unharmed. Local residents utilized 1801 summer chum salmon and 18 were discarded (Appendix A.2). These numbers reflect summer chum salmon caught in both summer chum and Chinook salmon gillnet gear (all related mesh sizes), therefore the 2074 fish released, discarded or given to residents is larger than the number of fish caught in the summer chum salmon drift gillnet test fisheries alone. The percentage of released chum (summer and fall) and coho salmon is much lower than that of Chinook salmon (Appendix A.2) because chum (summer and fall) and coho salmon tend to run in larger pulses than Chinook salmon. During a large pulse, over 100 fish may be caught in a single drift. When these large pulses occur, the net is retrieved as quickly as possible to reduce harvest, and few fish end up being released.

Fall Season

Fall Chum Salmon

In 2003, both the Lower Yukon test fisheries and the Pilot Station sonar indicated that the fall chum salmon run was evenly distributed and fairly strong. Significant fall chum salmon catches

were seen in Middle Mouth, this didn't correlate with the summer chum salmon trend, which saw much lower drift net CPUE in Middle Mouth when compared to Big Eddy (Figure 12).

The mean drift time in the Big Eddy location was 17.9 minutes per set and a total of 71.7 minutes per day using 6.0-inch mesh gillnets (Appendix A1). The Big Eddy drift gillnet test fishery captured 734 fall chum salmon with a corresponding cumulative CPUE of 1,371.06 (Table 5). Females comprised 60.2% of the 294 fall chum salmon sampled for ASL data. Age-0.3 fall chum salmon made up 91.8% of the total sampled and age-0.4 made up 6.5%. Age –0.2 fall chum salmon comprised .7% total sampled, respectively. Mean lengths for male fall chum salmon were 598 mm for age-0.2 (*n*=2), 607 mm for age-0.3 (*n*=106), and 632.0 mm for age-0.4 (*n*=9). Female fall chum salmon had mean lengths of 555.0 mm for age-0.2 (*n*=1), 595.0 mm for age-0.3 (*n*=164), 615.0 mm for age-0.4 (*n*=10), and 630.0 mm for age-0.5 (*n*=2) (Table 6). The midpoint of the fall chum salmon run at the Big Eddy location was 5 August (Table 5).

Middle Mouth drift gillnet test fishing had a mean fishing time of 18.7 minutes per set and 75.0 minutes per day using 6.0-inch mesh gillnet (Appendix A1). There were 702 total fall chum captured with a corresponding cumulative CPUE of 1127.23 (Table 5). Females comprised 55.5% of the 391 fall chum salmon sampled for ASL data. Age-0.3 fall chum salmon made up 88.7% of the total sampled and age-0.4 made up 10.5%. Age-0.5 and -0.2 fall chum salmon each comprised .3%. Mean lengths for male fall chum salmon were 560.0 mm for age-0.2 (*n*=1), 609.0 mm for age-0.3 (*n*=155), 618.0 mm for age-0.4 (*n*=17), and 618 mm for age-0.5 (n=1). Female fall chum salmon had mean lengths of 565.0 mm for age-0.2 (*n*=1), 597.0 mm for age-0.3 (*n*=192), and 605.0 mm for age 0.4 (*n*=24) (Table 6). The midpoint of the fall chum salmon run at the Middle Mouth location was 4 August (Table 5).

A combined total of 1,436 fall chum salmon were captured at the Big Eddy and Middle Mouth drift gillnet test fishery locations with a corresponding cumulative CPUE of 1249.15 (Table 5). 189 fall chum salmon were released unharmed, none were discarded, and 1,247 were distributed to local residents (Appendix A.2).

Coho Salmon

The Lower Yukon coho drift gillnet test fishery over the last three years has tracked well with the Pilot Station passage estimates. In 2003 the Lower Yukon coho drift gillnet fishery had a CPUE of 702.00 and Pilot Station passage estimate of 276,961 fish. In 2002 there was a lower coho salmon drift gillnet CPUE of 382.16 (Table 7) and a lower passage estimate of 135,737 fish.

The mean drift time in the Big Eddy location was 17.9 minutes per set and a total of 71.7 minutes per day using 6.0-inch mesh gillnet (Appendix A1). There were 362 coho salmon captured with a corresponding cumulative CPUE of 684.07 (Table 7). Females comprised approximately 45.2% of the 217 coho salmon sampled for ASL data. Four age classes comprised the coho salmon ASL data with 74.2% of the sample being age-2.1, age-1.1 represented 22.1% followed by age-3.1 and age-2.2 with 2.8% and .9% respectively. Mean lengths for male coho salmon were 591.0 mm for age-1.1 (*n*=29), 588.0 mm for age-2.1 (*n*=86), 560.0 mm for age-2.2 (n=1), and 598.0 mm for age-3.1 (*n*=3). Female coho salmon had mean lengths of 594.0 mm for

age-1.1 (*n*=19), 590.0 mm for age-2.1 (*n*=75), 555 mm for age-2.2, and 598.0 mm for age-3.1 (*n*=3) (Table 8). The midpoint of the coho salmon run at the Big Eddy drift gillnet location was 15 August (Table 7).

Middle Mouth drift gillnet test fishing had a mean fishing time of 18.7 minutes per set and 75.0 minutes per day using 6.0-inch mesh gillnet (Appendix A1). There were 353 coho salmon captured with a corresponding cumulative CPUE of 738.97 (Table 7). Female coho salmon made up approximately 52.8% of the 214 coho salmon sampled for ASL data. Most coho salmon were age-2.1 (72.4%), followed by age-1.1 (24.3%), -3.1 (2.8%) and -2.2 (0.5%). Male coho salmon had mean length measurements of 584.0 mm for age-1.1 (*n*=20), 584.0 mm for age-2.1 (*n*=78), and 607.0 mm for age-3.1 (*n*=3). Female coho salmon had mean lengths of 589.0 mm for age-1.1 (*n*=32), 593.0 mm for age-2.1 (*n*=77), 600 mm for age-2.2 (n=1), and 588.0 mm for age-3.1 (*n*=3) (Table 8). The midpoint of the coho salmon run at the Middle Mouth drift gillnet location was 15 August (Table 7).

A combined total of 715 coho salmon were captured in the Big Eddy and Middle Mouth drift gillnet test fisheries, which resulted in a corresponding cumulative CPUE of 711.52 (Table 7). 80 coho salmon were released unharmed, 0 were discarded, and 635 were distributed to local residents (Appendix A.2).

DISCUSSION

Summer Season

In order to catch fish on each incoming high tide, the Middle Mouth drift gillnet test fishery started the season by fishing 1.5 hours prior to the drift gillnet test fishery conducted at Big Eddy, which was seven hours after the posted high tide at the Yukon River mouth as recorded in the Nushagak tide table. This correction was originally made late in the 2001 season, after lower catch rates were observed at Middle Mouth compared to Big Eddy early in the season. In 2003 as in 2001 the catch rates improved significantly during the fall season in Middle Mouth, so the correction was considered reliable. These improved catch rates indicate that salmon pulses enter south mouth, before middle and north mouth.

Chinook Salmon

The Middle Mouth Chinook salmon drift gillnet test fishery correlated with the Big Eddy Chinook salmon drift gillnet test fishery closer in 2003 than in 2001 or 2002 (Figures 2, 3 and 4). However, Chinook catch rates in the Middle Mouth Chinook salmon drift gillnet test fishery were still lower, when compared to the Big Eddy and Middle Mouth set gillnet catches and the Big Eddy drift catches in 2003. The Pilot Station sonar project reached the midpoint of the Chinook salmon run on 16 June (Table 9). The Chinook salmon run midpoint appeared to occur at the Big Eddy test fishery location on 17 June, this was the same Middle Mouth midpoint of 17

June (Table 1). The Lower Yukon drift project should reach the midpoint two to three days before the Pilot Station midpoint because of fish travel time between the test fish sites and Pilot Station. When the catch data from the Middle Mouth and Big Eddy drift gillnet test fishing locations were combined, the midpoint of Chinook salmon run in the Lower Yukon River was determined to be 17 June, one day after the Pilot Station sonar midpoint estimate (Tables 1 and 9). The combined set gillnet test fisheries in the Lower Yukon River reached its midpoint on 15 June for Chinook salmon (Table 10), one day before the Pilot Station midpoint. The Lower Yukon set gillnet project's daily catch rates generally followed trends in passage estimates recorded for Chinook salmon at Pilot Station (Figures 3, 4, and 5).

In 2003, the Lower Yukon drift gillnet test fishery did not appear to be a useful tool for assessing relative abundance of Chinook salmon because of difficulties in initial coordination between the correct high tide and drift times, and the lack of comparable historical data. Hopefully with increased experience, drift gillnet test fishing in Middle Mouth and Big Eddy will result in data that are indicative of the relative Chinook salmon abundance. Currently only three years of Lower Yukon Chinook drift data are comparable (Table 12 and Figure 6).

Chinook salmon males captured at Big Eddy by drift gillnets were larger than Chinook males captured by the Big Eddy set gillnets. The difference between male Chinook salmon caught at Big Eddy averaged 30 mm for fish age-1.2 (jacks). Chinook salmon males ages-1.3 were 19 mm smaller in Big Eddy drift nets than in Big Eddy set nets. Chinook salmon males age-1.4 caught in the Big Eddy drift gillnets were 33 mm smaller than those caught in the Big Eddy set gillnets. Age-1.5 Chinook salmon caught in the Big Eddy drift gillnets were the same size as those caught in the Big Eddy set gillnets. Female Chinook salmon caught in the Big Eddy set gillnets also had a larger average length than those caught in the Big Eddy drift gillnets. Chinook salmon females caught in set gillnets were 35 mm larger for age-1.3 fish, 8 mm larger for age-1.4 fish, and 45 mm larger for age-1.5 fish. Similar to the trend in Big Eddy, Chinook salmon caught in the Middle Mouth set gillnets were larger, on average than those caught in the Middle Mouth drift gillnets. Male Chinook salmon caught in the Middle Mouth set gillnets were; 5 mm larger for age-1.3 fish, 25 mm larger for age-1.4 fish, but 20 mm smaller for age-1.5 fish. Female Chinook salmon caught in the Middle Mouth set gillnets were 4 mm larger for age-1.3 fish, 13 mm larger for age-1.4 fish, and 45 mm larger for age-1.5 fish. These differences may be explained by the different mesh sizes used between the set and drift gillnet projects (8.5-inch compared to 8.25-inch), efficiency differences between the set and drift gillnets, the small sample size from the drift compared to the set gillnet fishery (306 from the drift compared to 1,400 from set gillnet catches), or sampling error (Table 2). More data will need to be collected and analyzed before a definitive trend may be described.

Summer Chum Salmon

From 2001-2003, no set gillnet test fishery targeted summer chum salmon at either the Big Eddy or the Middle Mouth sites, therefore the data collected from the summer chum salmon captured by the 5.5-inch drift gillnets in the Lower Yukon test fisheries can only be compared to the escapement estimate obtained from the Pilot Station sonar project and the 2001 and 2002 drift data (Table 13 and Figures 7-12). The midpoint of the summer chum run in the Middle Mouth drift gillnet test fishery lagged behind that of the Big Eddy location, occurring on 3 July

compared to 21 June (Table 3). The summer chum salmon midpoint occurred on 1 July at the Pilot Station sonar project (Table 9). The midpoint for Middle Mouth occurred 4 or 5 days later than would be anticipated from the Pilot Station estimates. The midpoint of the summer chum run at Big Eddy occurred six or seven days earlier than would be anticipated. When Middle Mouth and Big Eddy are combined, the midpoint of the summer chum salmon run occurred on 24 June (Table 3), which was seven days before the Pilot Station summer chum salmon midpoint. This deviation from the expected results is thought to be an artifact of sampling error caused by the higher catch rates in Big Eddy not representing the true timing of summer chum salmon entering the Yukon River. These higher catch rates could be caused by the mistiming of the tidal surge in the Middle Mouth area during the summer season.

Summer chum salmon captured in the Big Eddy 5.5-inch drift gillnet test fishery compared well in size to those captured in the Middle Mouth drift gillnet test fishery. Male summer chum salmon at the Big Eddy site were 4 mm smaller for age-0.3 fish, 13 mm larger for age-0.4 fish and 13 mm larger for age-0.5 fish. Female summer chum captured in Middle Mouth were 3 mm larger for age-0.3 fish, 5 mm smaller for age-0.4 fish, and 11 larger for age-0.5 fish (Table 4).

Fall Season

Fall Chum Salmon

Timing of fall chum salmon caught in the 2003 Lower Yukon drift gillnet test fishery was later than 2001, but earlier than 2002 (Table 14 and Figure 13). Pulses of fall chum salmon observed in the combined CPUE for Big Eddy and Middle Mouth were also observed in the Pilot Station sonar passage estimates (Figures 14, 15, and 16). The midpoint for the fall chum salmon run occurred on 4 August at the Middle Mouth drift gillnet test fishery and on 5 August at Big Eddy. The combined results from Middle Mouth and Big Eddy show that the midpoint of the fall chum salmon run occurred on 4 August (Table 5). The midpoint of the fall chum salmon run occurred on 8 August at the Pilot Station sonar site (Table 11). The Middle Mouth midpoint was one or two days earlier than expected, when compared to the Pilot Station midpoint. The Big Eddy midpoint occurred on the expected date, when compared to the Pilot Station midpoint.

Fall chum salmon captured in the Big Eddy 6.0-inch drift gillnet test fishery compared well in size to those captured in the Middle Mouth drift gillnet test fishery. Male fall chum salmon at the Big Eddy site were 14 mm larger for age -0.4 fish and 2 mm smaller for age -0.3 fish. Female fall chum salmon captured in Middle Mouth were 10 mm larger for age -0.2 fish and 2 mm smaller for age –0.3 fish (Table 6). The proportion of age –0.4 fall chum salmon decreased dramatically in 2003 to 8.8% from a ten year average of 31.3%, it is unknown at this time what has caused this decrease, collecting a larger number of fall chum samples in future may be necessary.

Relative abundance information cannot be calculated from the data collected for fall chum salmon at the Big Eddy and Middle Mouth drift gillnet test fishery locations. However, the correlation of the 2001-2003 CPUE data calculated for the Lower Yukon drift gillnet test

fisheries and sonar passage estimates at Pilot Station indicate a relationship may be used in the future (Figures 17, 18 and Table 14).

Coho Salmon

Timing of coho salmon caught in the 2003 Lower Yukon drift gillnet test fishery was later than 2001 and compared well to 2002 (Figure 19 and Table 15). The pulses of coho salmon caught in the Middle Mouth and Big Eddy drift gillnet test fisheries followed the trends observed in the Pilot Station sonar estimates (Figures 20, 21, and 22). The midpoint for the coho salmon run in the Middle Mouth and Big Eddy drift gillnet test fisheries occurred on 15 August. The combined results from both locations show that the midpoint of the coho salmon run occurred on 15 August (Table 7). The midpoint of the coho salmon run, as estimated by the Pilot Station sonar occurred on 19 August (Table 11). This is one day later than one would anticipate given transit time for salmon between the Lower Yukon test fisheries and the Pilot Station sonar. More data should be collected to verify if the difference in the coho salmon run midpoints at Middle Mouth and at Big Eddy were a trend or an anomaly.

Coho salmon captured in the Big Eddy 6.0-inch drift gillnet test fishery compared well in size to those captured in the Middle Mouth drift gillnet test fishery. Female coho salmon at the Big Eddy site were 3 mm smaller for age –2.1 fish and 10 mm larger for age –3.1 fish. Female coho salmon captured in Middle Mouth were 5 mm smaller for age –1.1 fish (Table 8).

RECOMMENDATIONS

The Lower Yukon drift gillnet project completed two years of full operation in 2003, with summer and fall drifts being performed in both Middle Mouth and Big Eddy. Inconsistencies seen when comparing the catches of the drift gillnet project to other run assessment projects are most likely caused by the short duration (3 years) of the project. No determination had been made yet of how much effect the tidal surge has on fish entering the river. We recommend that the tidal surge timing in the Big Eddy and Middle Mouth locations be verified at the beginning of the 2004 season using experimental drifts.

Funding available for this project was reduced after the 2003 season. As a result, it was necessary to reduce the scope of the project for 2004 by cutting either the Chinook salmon portion or the fall chum salmon portion of the project. The Chinook salmon portion of the project was cut because the long term set net test fishery project was still funded and could fill the gap left by the loss of the drift gillnet test fishery. During the fall chum salmon run there is no alternative test fishery at the river mouth to rely on. Even though funding is not currently available for the 2004 season and beyond, the Department believes the project is valuable and will be seeking funds to continue it into the future.

LITERATURE CITED

Molyneaux, D.B. 1999. Data summary for the Kuskokwim River salmon test fishery at Bethel, 1984-2000. Alaska Department of Fish and Game, Commercial Fisheries Division, Regional Information Report No. 3A99-33, Anchorage.