

LOWER YUKON RIVER
SALMON TEST FISHING STUDIES, 1986

by

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INTRODUCTION

The Yukon River supports significant commercial and subsistence salmon fisheries extending from its mouth on the Bering Sea to the Yukon Territory, Canada. The Alaskan Yukon River management area is divided into six regulatory districts (Figure 1). The lower three districts of the river, constituting approximately the first 300 miles, are collectively referred to as the Lower Yukon area. Set and drift gill nets are the legal gear for commercial salmon fishing. The Lower Yukon area accounts for approximately 75% of the limited entry salmon permits issued in the Yukon management area and is correspondingly the focus of the most intensive effort and harvests. Approximately 97% of the catch and effort for the Lower Yukon area fishery has occurred in Districts 1 and 2.

Although all five species of Pacific salmon (Oncorhynchus spp.) occur in the Yukon River, only chinook or king (O. tshawytscha), chum (O. keta), and coho salmon (O. kisutch) are significant to the commercial fishery. The chum salmon run is divided into distinct early (summer chum) and late (fall chum) sub-populations. Recently the abundance of pink salmon (O. gorbuscha) has increased during even numbered years. There has been no commercial market for pink salmon to date.

Management of Yukon River salmon stocks is complicated by the difficulty in assessing relative run strength and timing within the season. The vast size of the drainage (330,000 square miles) and turbid water conditions make it presently impossible to assess escapements past the lower Yukon River fishery in a timely manner. Escapement of summer chum salmon in the Anvik and Andreafsky Rivers (Buklis 1986) and fall chum salmon in the Sheenjok River (Barton 1986) are obtained by sonar or tower enumeration. Yukon sonar, a research project directed toward the development of sonar enumeration of adult salmon in the main stem of the Yukon River has been operated in District 2 near Pilot Station. This project provided in-season abundance estimates of chinook, summer chum, fall chum and coho salmon in 1986 (Mesiar and Thompson - in press). Other escapement estimates based on aerial surveys of index tributaries (ADF&G 1986) are not conducted for weeks and in some cases months after key management decisions have been made in the lower river fishery. As a result, management decisions are currently based on commercial catch and test fishing data collected during the season in the lower river.

Comparative commercial catch and catch per fisherman hour (CPUE) data have traditionally been used to indicate relative abundance of salmon stocks. A microcomputer-based system has been developed to improve the accuracy and speed with which basic catch and effort statistics can be generated from fish tickets collected during the fishing season (Brannian and Brady 1985). However, due to the increase in the efficiency of the commercial fishing fleet in recent years and the corresponding decrease in fishing time, commercial CPUE is probably of limited usefulness as a comparative statistic (Geiger and Andersen 1982). As a result it has become increasingly necessary to place greater reliance on relative abundance information gathered from test fishing for in-season management.

Test fishing in the lower Yukon River was initiated in 1963 at Flat Island. Set nets were fished 7 days per week, 24 hours per day through the chinook and summer chum salmon runs (late May to mid-July). In 1977, test fishing was expanded to include the fall chum and coho salmon runs (mid-July to the first of September) in the Big Eddy area near Emmonak. Test fishing at Flat Island was discontinued in 1979 and test fishing in the south mouth (Kwikluak Pass) was conducted throughout the season in the Big Eddy area. Test fishing was initiated in the Middle Mouth area (Kawanak Pass) in 1979. During 1980 and 1981 the Middle Mouth project was extended in duration to cover the fall chum and coho salmon season, and geographically to cover the north mouth (Apoon Pass) of the delta (Brady 1983a).

With the expanded coverage, data collected from test fishing have increased in reliability and importance for evaluating relative abundance and run timing in order to implement management decisions. A time density approach has been applied to obtain a mean date of migration as a descriptive statistic for comparative run timing (Mundy 1979 and 1981). Correlations have been identified and described between the test net data and commercial catch data by statistical area (Brady 1983a). An attempt has been made to evaluate the use of set net test fishing data as an index of total abundance (Brady 1984). In 1982 and 1983 an effort was made to determine the feasibility of utilizing drift gill nets for test fishing (Brady 1983b). The results obtained from lower Yukon River test fishing with set gill nets in 1986 are presented in this report.

METHODS

Test Net Operation

Test fishing in 1986 was conducted from Emmonak and the Middle Mouth camp located in District 1 (Figure 2). Two technicians based in Emmonak fished set gill nets to monitor salmon passage through the Big Eddy area of the south mouth (Kwikluak Pass) of the delta. The Middle Mouth camp was located on Chinikluk Slough. Two technicians fished set gill nets to monitor salmon passage through the Middle Mouth (Kawanak Pass) and north mouth (Apoon Pass) of the delta.

Test fishing begins as soon after ice breakup as possible, usually late May or early June. Productive set net sites, leased from local commercial fishermen, were fished 24 hours per day, seven days per week throughout the duration of the projects. The contracted commercial fishermen typically operated the test nets during commercial fishing periods and either sold or retained the fish for their own use. During the remaining time, Department personnel fished the nets. Commercial fishermen insure that the Department crew fish the nets in the most efficient manner for their particular sites. Gill nets were picked at least twice each day (just before noon and midnight). When large catches occurred some nets were picked more often. Fish found in the test nets alive and in good condition were counted and released by the technicians. Dead fish were given away to subsistence users, except those taken near the time of a commercial fishing opening which were sold to salmon buyers. Daily test net catch and effort data were reported daily to the Fish and Game office in Emmonak.

Prior to 16 July, four set gill net sites were fished at Big Eddy (Figure 3); two 8.5 inch (22 cm) mesh nets (stretch measure) targeted on chinook salmon and two 5.5 inch (14 cm) mesh nets targeted on summer chum salmon. After 15 July, two to three sites were operated, all 6 in (15 cm) mesh nets targeted on typically larger fall chum and coho salmon (Figure 4). The Middle Mouth camp operated two 8.5 in mesh nets and two 5.5 in mesh nets during the chinook salmon season. After 15 July, three 6 in mesh nets were fished. Specific net site locations at Middle Mouth are illustrated in Figures 5 and 6. All nets were 25 fathoms in length. The 8.5 in, 5.5 in and 6 in mesh gill nets were 28, 45 and 35 meshes deep, respectively.

Typically catch data for missed fishing time was linearly interpolated from preceding and following data by fishing site. Site 4 at Big Eddy had very large summer chum catches, therefore, occasionally this site was only fished for six hours during a day. Catch data was expanded by a factor of four to estimate daily catch when fishing time was reduced to six hours. The riverbank caved in at site 1 at Big Eddy on 19 June and this location was not fishable the rest of the year. A new site was established on 3 July. Site 1 catch data was interpolated for the period 20 June to 2 July by the relationship between site 1 and 2 catches prior to 20 June. Catches for site 1 during this time were estimated to be 50% and 16% of chinook and summer chum catches at site 2, respectively.

All chum salmon caught after 15 July were considered fall chum salmon, while all chums caught prior to 16 July were called summer chum salmon. These dates have been used to separate the two runs of chum salmon because of the difficulty in classifying harvested fish based on morphological characteristics. It is assumed that the number of fall chum salmon taken prior to 16 July and the number of summer chum taken after 15 July is similar in magnitude for a given year.

An attempt is made each year to maintain standardized set net site locations while maximizing the coverage of the passes and the productivity of each net. This becomes a difficult task when water levels, eddies and sand bar locations change between and within seasons. In order to quantify some of these factors a bottom profile was made at each net site with a fathometer.

Throughout the season, daily catches of freshwater fishes and salmon species not taken commercially were tallied at both projects. Climatological observations including cloud cover, precipitation, wind, and air and water temperatures were collected on a daily basis.

Catch and Effort Data Analysis

Combined daily catch is often used as a basic statistic in the analysis of test fishing data. The combined daily catch is the sum of the catch for one species from all nets in one day. Because the total number of sites fished may vary from year to year, combined daily catch data is not always directly comparable between years. Brady (1983a and 1984) attempted to account for these variations in data collection by calculating the combined daily CPUE. Combined daily CPUE was defined as

the combined daily catch divided by the total 25 fathom set net hours fished that day, or catch per 25 fathom set net hour. However, combined daily chinook and summer chum salmon CPUE calculated without regard to number of nets fished by mesh size does not adequately standardize test fishing data within or between years.

In order to improve comparability a standardized approach to calculating chinook and summer chum salmon CPUE was developed by Bergstrom (1986). Since chinook salmon captured in 5.5 in mesh nets may provide relevant information in regard to small younger aged fish in the population, chinook salmon catches in those nets were incorporated into the combined daily CPUE along with all 8.5 in mesh nets as in the past. Beginning in 1984 there have been two 5.5 in mesh nets fished at each project in contrast to one at each project historically. Therefore, chinook salmon catch and effort data collected from Big Eddy 5.5 in mesh nets were averaged and then combined with data collected from 8.5 in mesh nets to calculate daily CPUE. Chinook salmon catch and effort data collected from the 5.5 in mesh net at site 3 at Middle Mouth was combined with the 8.5 in mesh nets while site 4 data was excluded. Site 3 has been located in the same place since the Middle Mouth project was initiated, thus this method should ensure that the results are comparable between years as much as possible.

Analysis of summer chum salmon CPUE was restricted to catch and effort data collected from 5.5 in mesh nets. To have included large mesh size gill net data would have artificially lowered daily and cumulative CPUE. Utilizing only data from 5.5 in mesh nets enhances comparability of summer chum salmon CPUE data between years, because the number of large mesh nets fished will not have any effect on CPUE.

Fall chum and coho salmon daily set net CPUE data were calculated as in previous reports. Catch and effort data were combined from all 6 in mesh set gill nets, except for site 3 at Big Eddy, which was fished only four days. There were some concerns with catch data collected during the fall season. First, site 3 at Middle Mouth has been set at a very productive location only since 1985, however, this site was even more efficient in catching fall chums this year. There was concern that CPUE calculated for this site might not be comparable to other years. Second, it appeared to test-fish crews that coho salmon were smaller sized than in 1984 and 1985, therefore, coho catches in 6 inch mesh gill nets might not reflect relative abundance. Coho salmon length data (mid-orbit to fork of tail) from 1984-1986 were compared to identify if there was a statistical difference in size between years.

Migratory Timing

The time density statistics, mean date of migration and variance for each species were calculated from daily set net test fishing CPUE, as described in previous reports (Mundy 1979, Brady 1983a). The mean date is an estimate of the central point of the migration and can be used to compare run timing from year to year. The variance helps describe the behavior of the run. Large variances indicate a run spread over a relatively long period of time, while a small variance indicates a compact run that develops and subsides quickly (Mundy 1982). The results obtained by analysis of each project individually were used to identify differences in run timing between the major passes of the delta. Time density statistics calculated from Big Eddy and Middle Mouth combined CPUE by species were utilized to identify the overall run timing through the delta. Fall chum CPUE at site 3 in Middle Mouth was used in this analysis since concerns about comparing relative abundance between years were not believed to impact relative timing.

Since run timing is important to management of salmon stocks throughout the Yukon River Management area, relative run timing between selected projects operated by ADF&G and Canada's Department of Fisheries and Oceans (DFO) in the Yukon River drainage was examined. Mean date of migration and variance were calculated from daily escapement estimates of chinook, summer chum, fall chum and coho salmon obtained from the Yukon sonar project (Mesiar and Thompson - in prep), summer chum from Andrafsky River tower and Anvik River sonar (Buklis 1986) and fall chum from Sheenjok River sonar (Barton 1986). Test fishing CPUE data from Big Eddy and Middle Mouth were combined to obtain lower Yukon test fishing migratory timing data. Fall chum and coho salmon daily test fishing catch data were obtained from north and south bank Ruby fishwheels, respectively, located near the village of Ruby (Fred Andersen, Alaska Department of Fish and Game, Fairbanks, personal communication). Chinook and fall chum salmon daily catch data were obtained from a DFO mark and recapture program located near the US-Canada border (US/Canada Treaty Joint Technical Committee, Personal Communication). Mean migration date and variance were calculated for fall chum at the Ruby test fishing project and chinook and fall chum salmon at the Canadian tagging project.

Timing differences for the various species were examined through differences in mean date of migration; and graphically using cumulative proportion data from catch, CPUE or enumeration counts depending on the project. All projects were assumed to be indicators of relative abundance although indices were of different units of measure and scale.

Species Composition

Percent composition of fall chum salmon in commercial catches and in combined Big Eddy and Middle Mouth test net catches of fall chum and coho salmon were compared to determine if test fishing data were a good indicator of commercial catch species composition. District 1 commercial catches were compared directly to the test net data. A two day lag time was used to compare District 2 commercial catches to a four day moving average of test net catches. The two day lag time was estimated by using an average migration rate of 30 miles per day and estimating that fish passing the test fishery two days prior to a commercial fishing period would not be vulnerable to harvest in the lower end of District 2. The four day moving average was designed to account for approximately four days of fish passage being available to harvest within District 2 during a commercial fishing period.

Cumulative CPUE as an Index of Relative Abundance

Due to the broad coverage of the test nets since 1979, test fishing data provide a good basis for comparing relative salmon run timing and abundance between years. Big Eddy and Middle Mouth combined cumulative CPUE curves were monitored during the season and compared to historical performance curves by species. Due to concerns with site 3 at Middle Mouth being disproportionately efficient in catching fall chum salmon, combined fall chum CPUE from all sites and all sites excluding site 3 were compared to historical data. Cumulative CPUE was defined as the cumulative sum over m days of the combined Big Eddy and Middle Mouth daily CPUE.

RESULTS AND DISCUSSION

Test Net Catches and Daily CPUE

The Yukon River delta was ice free 1 June. The mean April air temperature in Nome was 12°F. Water levels were quite low in early June compared to most years, and fishing conditions were good. Some set nets were relocated due to changes in hydrology of established test fishing sites. The objective was to maintain comparability of the catch as an index of abundance. Daily test net catches and number of hours fished

by site are presented in Appendix Tables 1-4. For comparative purposes, the 1986 commercial salmon catches for Districts 1 and 2 are presented in Tables 1 and 2, respectively. Daily effort and catch of pink and sockeye salmon (*O. nerka*), and freshwater fishes are presented by location in Appendix Tables 5-8.

Bar graphs illustrating the combined daily CPUE by species for the Big Eddy and Middle Mouth projects are presented in Figures 7-10. In most cases there is a definite drop in test fishing CPUE after commercial fishing periods in District 1 (refer to Tables 1 and 2 for commercial fishing dates).

Test fishing daily CPUE indicated similar entry pattern of chinook salmon in the south mouth (Big Eddy) and the middle mouth of the Yukon River (Figure 7). Summer chum salmon were much more abundant in the Big Eddy (south mouth area) (Figure 8). Both summer chum and chinook salmon daily CPUE declined after 30 June. Middle Mouth project test net catches at sites 1 and 4 located at Apoon Pass (north mouth) indicated lower abundance of chinook and summer chum salmon than for south and middle mouths. These same trends were evident in District 1 commercial catch data by statistical area (ADF&G 1986). There were very few summer chum salmon present in test net catches after 18 July.

Fall chum salmon were first identified in test net catches on 11 July. Daily fall chum salmon CPUE data exhibited the typical pulse type entry pattern as seen in prior years (Figure 9). In general, the entry pattern of fall chum salmon at Big Eddy and Middle Mouth was similar with peaks in daily CPUE occurring at approximately the same time at both projects. Both test fishing projects indicated a substantial early run component from 18 to 21 July. Site 3 at Middle Mouth proved to be a very productive location for fall chum salmon. Coho salmon daily CPUE data suggested a larger passage rate through the Middle Mouth than South Mouth (Figure 10). Overall, commercial fall chum and coho salmon catches were larger in Middle Mouth than in South Mouth (ADF&G 1986).

Since test fishing crews noted that coho salmon appeared to be of smaller size than in 1984 and 1985, age, sex and size sampling data from 1984 to 1986 were examined to see if this actually was true. Age 2.1 (European notation) was the dominant age class each year: 74%, 76% and 89% for 1984, 1985 and 1986, respectively (Buklis and Wilcock 1985 and 1986, and Buklis 1987). The mean lengths of females and males were very similar each year for age 2.1 coho salmon (within 1 to 3 mm). The mean length of females sampled in commercial catches were 582 mm (SD = 1.8), 585 mm (SD = 2.3), and 551 (SD = 1.9) in 1984, 1985 and 1986 respectively. The mean lengths were found to be statistically different ($p = .001$). Coho salmon were significantly smaller sized in 1986 compared to 1984 and 1985.

Species Composition

The contribution of fall chum salmon to combined fall chum and coho salmon test fishing catches at Big Eddy and Middle Mouth was typically greater than the percentage of fall chum salmon in Districts 1 and 2 commercial catches (Figure 11). This probably occurred because of the large catches of fall chum salmon at Middle Mouth site 3 and because of lower catchability for coho salmon due to their smaller average size in 1986. Commercial fishermen were restricted to gill nets of 6 inch or smaller mesh size during the fall season, therefore, they were more likely to catch smaller sized coho salmon than the test nets which were exclusively 6 in mesh.

Test nets at Big Eddy sites 2, 3 and 4 (chinook season) were set near sand bars. The average water depth at the inshore end of these nets was 17 ft (5.2 m) and gradually the depth increased to an average of 27 ft (8.2 m) at the offshore end. The water depth at sites 2 and 4 was approximately 8 ft (2.4 m) deeper than in 1985. Site 1 (chinook season) at Big Eddy was located near a cut bank and the water depth ranged from 4 (1.3) to 70 ft (21.3 m) at the inshore and offshore end, respectively. After the bank caved in on this site, site 1 was moved to near the entrance of Kwiguk Pass. Water depth at the new location ranged from 4 ft (1.2 m) to 19 ft (5.8 m). Water depth at Big Eddy site 2 during the fall chum and coho salmon season averaged 23 ft (7.0 m) and 20 ft (6.1 m) at the inshore and offshore end, respectively. Test nets at Middle Mouth sites 2 and 3 were set from the bank. The water depth at the inshore end averaged 5 ft (1.5 m) and increased gradually to an average of 25.5 ft (7.8 m) offshore. Sites 1 and 4 located in north mouth were relatively more shallow averaging 4 ft (1.2 m) at the inshore end and 16 ft (4.9 m) at the offshore end.

Climatological observations at Big Eddy and Middle Mouth are presented in Appendix Tables 9 and 10, respectively. Overall, 1986 was fairly cool with a lot of precipitation.

Migratory Timing

Time density tables illustrating the relative timing of the salmon runs based on test net CPUE at Big Eddy and Middle Mouth are presented in Tables 3-10. Migratory timing of the chinook salmon run in 1986 was average with mean dates of 22 June for both Big Eddy and Middle Mouth, (Tables 3 and 4). The chinook salmon run was fairly compressed with relatively low passage rates documented after 30 June. The mean dates of the summer chum salmon run were 19 and 25 June for Big Eddy and Middle Mouth, respectively (Tables 5 and 6).

Historical chinook and summer chum salmon mean dates and variances are presented in Table 11. The similarity in run timing of these two species is apparent most years with 1981 being the outlier. The summer chum salmon run was earlier than the chinook salmon run in 1986. The variance for a late-run year has been smaller than those for early-run years.

The mean dates of migration for fall chum salmon in 1986 were 30 July and 3 August for Big Eddy and Middle Mouth, respectively (Tables 7 and 8). The large total CPUE for site 3 at Middle Mouth is noteworthy. Mean date of migration for coho salmon was 19 August for both Big Eddy and Middle Mouth (Tables 9 and 10). Historical fall chum and coho salmon mean dates and variances are presented in Table 12. In most years the mean date of the fall chum salmon run at Middle Mouth has been later than that for Big Eddy. When comparing mean dates between years it should be noted that the Big Eddy project was started later in 1977 (21 July) than in other years, consequently the mean date is not directly comparable. Coho salmon run timing has been similar for both projects over the past six years. The later run timing exhibited by coho salmon compared to fall chum salmon is readily apparent. Run timing of these two species may be later than the data suggests, since an unknown portion of fall chum and coho salmon passage occurs after test fishing is discontinued in late August.

Mean date of migration for salmon passage in 1986 at selected projects located in the Yukon River drainage (Table 13) were used to estimate the rate of migration between various points in the drainage. The mean date for the chinook salmon run was 22 June for both the lower Yukon test fishery and Yukon sonar, although the latter project is 100 miles farther upriver. Differences in mean dates calculated for these two projects were greatly influenced by the intensive commercial fishery located between them. The Yukon sonar project showed a lower abundance of chinook salmon passage after 23 June compared to lower river test fishing CPUE data (Figure 12). Subjectively matching the first peak of test fishing CPUE at Big Eddy and Middle Mouth with the first peak in Yukon sonar counts indicates about a two to three day lag time between the two projects. The mean migration date of chinook salmon at the Canadian tagging project was approximately 1 month later than that calculated at the Yukon sonar project. The point at which 50% of the chinook salmon run had passed Yukon sonar and the Canadian tagging project differed by 32 days (Table 13). The estimated average migration rate was 34.7 miles per day between Yukon sonar and the U.S.-Canada border. Cumulative proportion data showing relative timing are presented in Figure 13.

The mean date of the summer chum salmon migration was 20 June, 24 June, 4 July and 3 July for the lower Yukon test fishery, Yukon sonar, Andrafsky Tower and Anvik sonar, respectively (Table 13). Migration timing between the lower Yukon test fishery and Yukon sonar was approximately four days. Unfortunately, the Anvik sonar and Andrafsky Tower projects were terminated prior to the end of the summer chum run due to budget reductions. Figure 14 shows cumulative proportion data which describes relative timing as indexed at the selected projects. Migration timing between the Yukon sonar project and Anvik River sonar was approximately 10 days as indicated by their respective mean dates. A travel time of 10 days seems likely as shown in Figure 15 where Anvik sonar counts were lagged 10 days compared to the Yukon sonar counts.

Mean dates were 1 and 6 August for fall chum salmon migratory timing through the lower Yukon test fishery and Yukon sonar, respectively (Table 13). However, a subjective comparison of peaks in daily test fishing combined Big Eddy and Middle Mouth CPUE and Yukon sonar counts in-season indicated about 3 days travel time between these two projects.

The mean dates of migration of fall chum salmon was 18 August, 3 September and 10 September at the north bank Ruby test fish wheel, Sheenjek sonar and Canadian tagging fish wheel projects, respectively. Figure 16 shows cumulative proportion data for all of the selected fall chum salmon assessment projects. It appears that there was approximately 12 days travel time from Yukon sonar to the north bank Ruby test fish wheel site. This information could prove helpful in determining run timing and estimated abundance of fall chum salmon in the District 4 fishery.

Coho salmon migratory timing information is less reliable than for other salmon since all projects terminated prior to the end of the migration. Mean dates of the coho migration were 19 August, 22 August and 12 September at the lower Yukon test fishery, Yukon sonar, and south bank Ruby test fish wheel, respectively (Table 13). Cumulative proportion data is presented in Figure 17.

Cumulative CPUE as an Index of Relative Abundance

Cumulative daily CPUE curves from combined Big Eddy and Middle Mouth data for chinook, summer chum, fall chum and coho salmon are presented in Figures 18-21, respectively. Based on the season cumulative CPUE generated in this fashion, 1981 stands out as a strong year for chinook and summer chum salmon runs, while in 1982 there was a relatively weak chinook salmon run.

The 1986 returns of chinook and summer chum salmon appeared to be average and above average in size relative to 1981-1985, respectively. The fall chum salmon run in 1986 was above average as indicated by test fishing data when data from site 3 at Middle Mouth were included. The fall chum salmon return in 1986 was about average in relative magnitude when site 3 data at Middle Mouth were not included. During prior years, significant numbers of fall chum salmon were harvested during the first three weeks of the return downstream of the test net sites. During 1986, the commercial fall chum fishery did not begin until 4 August. It should be noted that the large catches of fall chum salmon at site 3 at Middle Mouth probably inflated the index for the 1985 return relative to other years when this site was not operated. From subsistence and commercial catches, and escapement data for 1981-1986 (ADF&G 1986) the relative abundance of the 1986 fall chum salmon return was judged to be average at best. Certainly it was lower in magnitude than returns in 1981 and 1985. Therefore, not including test fishing data from site 3 at Middle Mouth provides a better comparison for relative abundance.

The coho salmon cumulative CPUE obtained in 1986 was lower than that of any other year during 1981-1986. This is believed to be primarily a factor of lower catchability of the 6 in mesh gill nets due to smaller sized coho salmon in the 1986 return, and not because of lower relative abundance.

CONCLUSIONS AND RECOMMENDATIONS

The lower Yukon River test fishing project continues to play an essential role in the daily management of the lower Yukon River salmon fishery. The data base from Big Eddy and Middle Mouth provides an index of salmon abundance by species. Management implications are significant. By monitoring the test fishery through the course of the season, the manager has a quantitative tool to assist in his assessment of total run strength. Trends in abundance as indicated by cumulative CPUE curves are generally established by mid-season, allowing for appropriate management regulations on the latter portion of the runs.

The failure of cumulative commercial CPUE to accurately reflect relative run size can be attributed in part to the rapid increase in efficiency of the commercial fishing fleet in recent years. This trend is likely to continue, making it unlikely that comparative commercial CPUE can be used to any large extent in the future (Brady 1983c). Daily test net CPUE efficiency, by contrast, is relatively more consistent from year to year. Further study of the relationship between test fishing CPUE and total abundance of the various salmon runs into the Yukon River is warranted.

Utilizing set gill nets for test fishing has some disadvantages. In years when large amounts of debris are present, such as 1982, the effort (number of hours fished) can not be accurately determined. It is not known how long debris has been in a net affecting its efficiency. CPUE calculations are also affected when set nets become saturated with salmon during periods of high passage rates. Another problem affecting CPUE is varying fish size and catchability between years. This problem was identified with coho salmon in 1986. Although experimental test fishing with drift gill nets for summer chum salmon proved inconclusive (Brady 1983b), this method of test fishing should not be dismissed. Test fishing with drift gill nets normally provides more accurate determinations of CPUE. Saturation of drift nets can usually be controlled and the amount of fishing time (effort) can be measured with more certainty, than with set nets.

If a drift net test fishery is initiated, then, to ensure comparisons between years, it would be worthwhile to operate both set nets (at the present sites) and drift nets for several years to establish a relationship between the two methods.

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Table 1. Commercial salmon catch and effort data by fishing period, set and drift gill nets combined, District 1, Yukon area, 1986. a

Period No.	Period Dates	Hours Fished	No. of Fishermen	Period Catch and Catch Per Unit Effort						Cumulative Catch and Catch Per Unit Effort					
				Chinook	CPUE	Coho	CPUE	Chum	CPUE	Chinook	CPUE	Coho	CPUE	Chum	CPUE
2	6/19-6/20	24	406	21,731	2.23	0	0.00	29,025	2.98	21,731	2.23	0	0.00	29,025	2.98
3	6/23-6/24	24	394	10,248	1.08	0	0.00	57,309	6.06	31,979	1.67	0	0.00	86,334	4.50
5	6/29-6/30	24	376	5,558	0.62	0	0.00	23,145	2.56	37,537	1.33	0	0.00	109,479	3.88
7	7/03-7/04	24	363	5,385	0.62	0	0.00	22,552	2.59	42,922	1.16	0	0.00	132,031	3.57
Subtotal b		96	431	42,922	1.16	0	0.00	132,031	3.57						
1	6/14	12	300	2,663	0.74	0	0.00	65,974	18.33	2,663	0.74	0	0.00	198,005	4.88
4	6/25-6/26	12	308	4,091	1.11	0	0.00	74,494	20.16	6,754	0.93	0	0.00	272,499	6.16
6	7/02	12	276	1,608	0.49	0	0.00	53,707	16.22	8,362	0.79	0	0.00	326,206	6.86
8	7/07-7/08	24	271	606	0.09	0	0.00	18,060	2.78	8,968	0.52	0	0.00	344,266	6.37
9	7/10-7/11	24	273	784	0.12	0	0.00	17,005	2.60	9,752	0.41	0	0.00	361,271	5.96
10	7/14-7/15	24	257	319	0.05	0	0.00	19,856	3.22	10,071	0.34	0	0.00	381,127	5.71
Subtotal c		204	441	10,071	0.34	0	0.00	381,127	5.71						
11	8/04-8/05	12/6	194	8	0.00	501	0.30	11,395	6.88	10,079	0.32	501	0.30	11,395	6.88
12	8/07-8/08	12/6	185	6	0.00	679	0.40	7,489	4.43	10,085	0.30	1,180	0.35	18,884	5.64
13	8/12	12/6	197	2	0.00	3,812	2.37	10,480	6.52	10,087	0.29	4,992	1.01	29,364	5.92
14	8/14-8/15	24/12	218	16	0.00	6,224	1.65	16,272	4.32	10,103	0.26	11,216	1.29	45,636	5.23
15	8/18-8/19	12/6	169	1	0.00	3,852	2.54	5,809	3.83	10,104	0.25	15,068	1.47	51,445	5.02
16	8/21-8/22	24/12	198	9	0.00	9,756	2.85	7,907	2.31	10,113	0.23	24,824	1.82	59,352	4.34
Subtotal d		96/48	282	10,113	0.23	24,824	1.82	59,352	4.34						
Season Total		300/252	444	53,035		24,824		440,479							

a Catches reported in numbers of fish sold in the round.

b Chinook salmon season, no mesh size restrictions.

c Summer chum salmon season (6/14 to 7/15). Six inch maximum mesh size restriction in effect during periods 1, 4, 6 and 8-10. Chinook salmon subtotal represents catch during restricted mesh size fishing periods.

d Fall chum salmon season (8/04 to 8/22). After 7/15 the district was divided into a Set Net Only (12 or 24 hour) area and a Gill Net (6 or 12 hour) area.

Table 2. Commercial salmon catch and effort data by fishing period, set and drift gill nets combined, District 2, Yukon area, 1986. a

Period No.	Period Dates	Hours Fished	No. of Fishermen	Period Catch and Catch Per Unit Effort						Cumulative Catch and Catch Per Unit Effort					
				Chinook	CPUE	Coho	CPUE	Chum	CPUE	Chinook	CPUE	Coho	CPUE	Chum	CPUE
3	6/22-6/23	24	224	14,505	2.70	0	0.00	32,894	6.12	14,505	2.70	0	0.00	32,894	6.12
5	6/26-6/27	24	226	12,248	2.26	0	0.00	34,309	6.33	26,753	2.48	0	0.00	67,203	6.22
6	7/01-7/02	24	210	7,417	1.47	0	0.00	16,005	3.18	34,170	2.16	0	0.00	83,208	5.25
8	7/06-7/07	24	188	2,433	0.54	0	0.00	16,133	3.58	36,603	1.80	0	0.00	99,341	4.88
Subtotal b		96	235	36,603	1.80	0	0.00	99,341	4.88						
1	6/15	12	195	798	0.34	0	0.00	26,915	11.50	798	0.34	0	0.00	126,256	5.56
2	6/21	6	213	1,762	1.38	0	0.00	73,196	57.27	2,560	0.71	0	0.00	199,452	8.32
4	6/24	6	144	1,063	1.23	0	0.00	28,894	33.44	3,623	0.81	0	0.00	228,346	9.19
7	7/03-7/04	12	172	824	0.40	0	0.00	29,592	14.34	4,447	0.68	0	0.00	257,938	9.59
9	7/09-7/10	24	147	455	0.13	0	0.00	13,718	3.89	4,902	0.49	0	0.00	271,656	8.93
10	7/13-7/14	24	147	334	0.09	0	0.00	16,771	4.75	5,236	0.38	0	0.00	288,427	8.49
Subtotal c		180	239	5,236	0.38	0	0.00	288,427	8.49						
11	8/06	6	170	4	0.00	666	0.65	11,624	11.40	5,240	0.36	666	0.65	11,624	11.40
12	8/10	6	146	1	0.00	1,092	1.25	9,705	11.08	5,241	0.34	1,758	0.93	21,329	11.25
13	8/13	6	153	3	0.00	1,483	1.62	5,549	6.04	5,244	0.32	3,241	1.15	26,878	9.55
14	8/17	12	201	1	0.00	6,519	2.70	12,530	5.19	5,245	0.28	9,760	1.87	39,408	7.54
15	8/20	6	150	1	0.00	3,151	3.50	4,658	5.18	5,246	0.27	12,911	2.11	44,066	7.19
16	8/24	12	188	0	0.00	8,286	3.67	7,241	3.21	5,246	0.24	21,197	2.53	51,307	6.12
Subtotal d		48	231	5,246	0.24	21,197	2.53	51,307	6.12						
Season Total		228	259	41,849		21,197		339,734							

a Catches reported in numbers of fish sold in the round.

b Chinook salmon season, no mesh size restrictions.

c Summer chum salmon season (6/15 to 7/14). Six inch maximum mesh size restriction in effect during periods 1, 2, 4, 7 and 9-10. Chinook salmon subtotal represents catch during restricted mesh size fishing periods.

d Fall chum salmon season (8/06 to 8/24).

Table 3. Big Eddy test fishing daily and cumulative chinook salmon CPUE and proportion, 1986.

Day No.	Date	Site 1 CPUE	Site 2 CPUE	Site 3 and 4 Average CPUE	Total CPUE	Cum. CPUE	Daily Prop.	Cum. Prop.
1	05-Jun	0.00	0.00	0.00	0.00	0.00	0.000	0.000
2	06-Jun	0.04	0.04	0.00	0.03	0.03	0.002	0.002
3	07-Jun	0.04	0.00	0.00	0.01	0.05	0.001	0.003
4	08-Jun	0.04	0.08	0.04	0.06	0.10	0.003	0.006
5	09-Jun	0.25	0.21	0.02	0.16	0.26	0.009	0.014
6	10-Jun	0.21	0.08	0.04	0.11	0.37	0.006	0.020
7	11-Jun	0.08	0.04	0.08	0.07	0.44	0.004	0.024
8	12-Jun	0.38	0.50	0.08	0.32	0.76	0.017	0.041
9	13-Jun	0.63	0.29	0.08	0.33	1.10	0.018	0.059
10	14-Jun	0.33	0.33	0.54	0.40	1.50	0.022	0.081
11	15-Jun	0.67	1.79	0.31	0.92	2.42	0.050	0.131
12	16-Jun	0.42	1.29	0.21	0.64	3.06	0.035	0.166
13	17-Jun	0.92	2.92	0.21	1.35	4.41	0.073	0.239
14	18-Jun	2.38	4.29	0.52	2.40	6.80	0.130	0.369
15	19-Jun	1.00	2.38	0.10	1.16	7.96	0.063	0.432
16	20-Jun	0.17	0.29	0.08	0.18	8.14	0.010	0.442
17	21-Jun	1.38	2.75	0.50	1.54	9.69	0.084	0.525
18	22-Jun	0.75	1.54	0.31	0.87	10.55	0.047	0.572
19	23-Jun	0.83	1.67	0.38	0.96	11.51	0.052	0.624
20	24-Jun	0.38	0.75	0.15	0.42	11.94	0.023	0.647
21	25-Jun	1.08	2.21	0.33	1.21	13.14	0.066	0.713
22	26-Jun	1.17	2.33	0.31	1.27	14.42	0.069	0.782
23	27-Jun	0.58	1.17	0.13	0.63	15.04	0.034	0.815
24	28-Jun	0.25	0.54	0.06	0.28	15.33	0.015	0.831
25	29-Jun	0.29	0.58	0.00	0.29	15.62	0.016	0.847
26	30-Jun	0.04	0.08	0.06	0.06	15.68	0.003	0.850
27	01-Jul	0.54	1.08	0.02	0.55	16.23	0.030	0.880
28	02-Jul	0.50	1.04	0.15	0.56	16.79	0.030	0.910
29	03-Jul	0.17	0.88	0.13	0.39	17.18	0.021	0.931
30	04-Jul	0.08	0.17	0.00	0.08	17.26	0.005	0.936
31	05-Jul	0.00	0.13	0.13	0.08	17.35	0.005	0.941
32	06-Jul	0.17	0.46	0.02	0.22	17.56	0.012	0.952
33	07-Jul	0.08	0.04	0.02	0.05	17.61	0.003	0.955
34	08-Jul	0.04	0.13	0.02	0.06	17.67	0.003	0.958
35	09-Jul	0.58	0.38	0.17	0.38	18.05	0.020	0.979
36	10-Jul	0.04	0.13	0.06	0.08	18.12	0.004	0.983
37	11-Jul	0.04	0.04	0.02	0.03	18.16	0.002	0.985
38	12-Jul	0.04	0.29	0.08	0.14	18.30	0.008	0.992
39	13-Jul	0.17	0.04	0.06	0.09	18.39	0.005	0.997
40	14-Jul	0.13	0.04	0.00	0.06	18.44	0.003	1.000
41	15-Jul	0.00	0.00	0.00	0.00	18.44	0.000	1.000
Total		16.88	33.00	5.44	18.44			

Mean Day No. = 18.37

Variance = 48.69

Table 4. Middle Mouth test fishing daily and cumulative chinook salmon CPUE and proportion, 1986.

Day No.	Date	Site 1 CPUE	Site 2 CPUE	Site 3 CPUE	Total Daily CPUE	Cum. CPUE	Daily Prop.	Cum. Prop.
1	08-Jun	0.00	0.04	0.00	0.03	0.03	0.001	0.001
2	09-Jun	0.00	0.04	0.00	0.02	0.05	0.001	0.002
3	10-Jun	0.00	0.00	0.13	0.04	0.09	0.002	0.004
4	11-Jun	0.00	0.33	0.42	0.25	0.34	0.012	0.016
5	12-Jun	0.04	0.58	0.63	0.42	0.76	0.020	0.036
6	13-Jun	0.00	0.29	0.54	0.28	1.03	0.013	0.050
7	14-Jun	0.04	0.63	0.54	0.40	1.44	0.019	0.069
8	15-Jun	0.04	1.67	1.13	0.94	2.38	0.045	0.115
9	16-Jun	0.00	0.92	1.00	0.64	3.02	0.031	0.145
10	17-Jun	0.00	0.63	0.58	0.40	3.42	0.019	0.165
11	18-Jun	0.04	3.46	1.96	1.82	5.24	0.088	0.252
12	19-Jun	0.21	5.96	2.63	2.93	8.17	0.141	0.394
13	20-Jun	0.21	0.83	0.67	0.57	8.74	0.027	0.421
14	21-Jun	0.50	2.08	1.75	1.44	10.19	0.070	0.490
15	22-Jun	0.13	1.13	0.75	0.67	10.85	0.032	0.523
16	23-Jun	0.29	0.54	0.42	0.42	11.27	0.020	0.543
17	24-Jun	0.13	0.42	0.17	0.24	11.51	0.011	0.554
18	25-Jun	0.46	4.88	1.96	2.43	13.94	0.117	0.671
19	26-Jun	0.46	5.42	3.38	3.08	17.02	0.148	0.819
20	27-Jun	0.13	2.21	1.54	1.29	18.31	0.062	0.882
21	28-Jun	0.33	0.58	0.46	0.46	18.77	0.022	0.904
22	29-Jun	0.33	0.21	0.29	0.28	19.05	0.013	0.917
23	30-Jun	0.17	0.08	0.04	0.10	19.15	0.005	0.922
24	01-Jul	0.25	0.38	0.00	0.21	19.35	0.010	0.932
25	02-Jul	0.29	0.67	0.04	0.33	19.69	0.016	0.948
26	03-Jul	0.25	0.25	0.04	0.18	19.87	0.009	0.957
27	04-Jul	0.17	0.13	0.04	0.11	19.98	0.005	0.962
28	05-Jul	0.17	0.08	0.00	0.08	20.06	0.004	0.966
29	06-Jul	0.08	0.08	0.00	0.06	20.12	0.003	0.969
30	07-Jul	0.17	0.29	0.04	0.17	20.28	0.008	0.977
31	08-Jul	0.13	0.13	0.00	0.08	20.37	0.004	0.981
32	09-Jul	0.08	0.04	0.00	0.04	20.41	0.002	0.983
33	10-Jul	0.08	0.04	0.04	0.06	20.47	0.003	0.985
34	11-Jul	0.00	0.04	0.00	0.01	20.48	0.001	0.986
35	12-Jul	0.00	0.13	0.00	0.04	20.52	0.002	0.988
36	13-Jul	0.04	0.21	0.08	0.11	20.63	0.005	0.993
37	14-Jul	0.00	0.29	0.00	0.10	20.73	0.005	0.998
38	15-Jul	0.04	0.08	0.00	0.04	20.77	0.002	1.000
Total		5.25	35.75	21.25	20.77			

Mean Day= 15.48 Variance= 36.19

Table 5. Big Eddy test fishing daily and cumulative summer chum salmon CPUE and proportion, 1986.

Day No.	Date	Site 3 CPUE	Site 4 CPUE	Total CPUE	Cum. CPUE	Daily Prop.	Cum. Prop.
1	05-Jun	0.00	0.00	0.00	0.00	0.000	0.000
2	06-Jun	0.00	0.00	0.00	0.00	0.000	0.000
3	07-Jun	0.50	0.13	0.15	0.15	0.001	0.001
4	08-Jun	0.17	0.67	0.42	0.57	0.002	0.003
5	09-Jun	0.79	9.58	5.19	5.76	0.030	0.034
6	10-Jun	1.08	12.29	6.69	12.45	0.039	0.073
7	11-Jun	0.67	7.67	4.17	16.61	0.024	0.097
8	12-Jun	2.42	13.75	8.08	24.70	0.047	0.145
9	13-Jun	3.13	20.38	11.75	36.45	0.069	0.213
10	14-Jun	3.25	13.25	8.25	44.70	0.048	0.262
11	15-Jun	3.79	20.71	12.25	56.95	0.072	0.334
12	16-Jun	3.71	16.71	10.21	67.15	0.060	0.393
13	17-Jun	2.00	26.29	14.15	81.30	0.083	0.476
14	18-Jun	4.04	30.54	17.29	98.59	0.101	0.577
15	19-Jun	3.67	9.58	6.63	105.22	0.039	0.616
16	20-Jun	2.08	3.08	2.58	107.80	0.015	0.631
17	21-Jun	1.17	9.21	5.19	112.99	0.030	0.662
18	22-Jun	2.13	13.75	7.94	120.92	0.046	0.708
19	23-Jun	1.63	19.17	10.40	131.32	0.061	0.769
20	24-Jun	1.58	5.88	3.73	135.05	0.022	0.791
21	25-Jun	1.13	15.29	8.21	143.26	0.048	0.839
22	26-Jun	1.25	10.38	5.81	149.07	0.034	0.873
23	27-Jun	1.63	5.46	3.54	152.61	0.021	0.894
24	28-Jun	1.21	2.79	2.00	154.61	0.012	0.906
25	29-Jun	1.29	3.58	2.44	157.05	0.014	0.920
26	30-Jun	0.54	1.13	0.83	157.88	0.005	0.925
27	01-Jul	0.63	1.21	0.92	158.80	0.005	0.930
28	02-Jul	0.88	1.75	1.31	160.11	0.008	0.938
29	03-Jul	0.92	2.04	1.48	161.59	0.009	0.946
30	04-Jul	0.75	0.54	0.65	162.24	0.004	0.950
31	05-Jul	0.13	0.71	0.42	162.65	0.002	0.953
32	06-Jul	0.46	1.71	1.08	163.74	0.006	0.959
33	07-Jul	0.21	1.08	0.65	164.38	0.004	0.963
34	08-Jul	0.13	0.88	0.50	164.88	0.003	0.966
35	09-Jul	0.54	1.58	1.06	165.95	0.006	0.972
36	10-Jul	0.25	1.54	0.90	166.84	0.005	0.977
37	11-Jul	0.04	0.42	0.23	167.07	0.001	0.979
38	12-Jul	0.21	1.25	0.73	167.80	0.004	0.983
39	13-Jul	0.54	1.92	1.23	169.03	0.007	0.990
40	14-Jul	0.46	2.17	1.31	170.34	0.008	0.998
41	15-Jul	0.13	0.67	0.40	170.74	0.002	1.000
Total		51.08	290.71	170.74			

Mean Day No. = 15.35

Variance = 53.56

Table 6. Middle Mouth test fishing daily and cumulative summer chum salmon CPUE and proportion, 1986.

Day No.	Date	Site 3 CPUE	Site 4 CPUE	Total Daily CPUE	Cum. CPUE	Daily Prop.	Cum. Prop.
1	08-Jun	0.00	0.00	0.00	0.00	0.000	0.000
2	09-Jun	0.00	0.00	0.00	0.00	0.000	0.000
3	10-Jun	0.00	0.00	0.00	0.00	0.000	0.000
4	11-Jun	0.29	0.00	0.15	0.15	0.006	0.006
5	12-Jun	0.58	0.00	0.29	0.44	0.012	0.018
6	13-Jun	0.21	0.00	0.10	0.54	0.004	0.023
7	14-Jun	0.38	0.00	0.19	0.73	0.008	0.031
8	15-Jun	1.63	0.00	0.81	1.54	0.034	0.065
9	16-Jun	0.75	0.00	0.38	1.92	0.016	0.080
10	17-Jun	0.17	0.00	0.08	2.00	0.003	0.084
11	18-Jun	4.29	0.00	2.15	4.15	0.090	0.174
12	19-Jun	5.17	0.04	2.60	6.75	0.109	0.283
13	20-Jun	1.17	0.00	0.58	7.33	0.024	0.308
14	21-Jun	3.21	0.04	1.63	8.96	0.068	0.376
15	22-Jun	0.83	0.04	0.44	9.40	0.018	0.395
16	23-Jun	0.13	0.00	0.06	9.46	0.003	0.397
17	24-Jun	0.58	0.08	0.33	9.79	0.014	0.411
18	25-Jun	6.21	0.13	3.17	12.96	0.133	0.544
19	26-Jun	8.13	0.08	4.10	17.06	0.172	0.717
20	27-Jun	4.92	0.46	2.69	19.75	0.113	0.829
21	28-Jun	1.38	0.21	0.79	20.54	0.033	0.863
22	29-Jun	0.75	0.08	0.42	20.96	0.017	0.880
23	30-Jun	0.33	0.04	0.19	21.15	0.008	0.888
24	01-Jul	0.54	0.04	0.29	21.44	0.012	0.900
25	02-Jul	0.67	0.04	0.35	21.79	0.015	0.915
26	03-Jul	0.25	0.08	0.17	21.96	0.007	0.922
27	04-Jul	0.04	0.08	0.06	22.02	0.003	0.925
28	05-Jul	0.13	0.00	0.06	22.08	0.003	0.927
29	06-Jul	0.00	0.04	0.02	22.10	0.001	0.928
30	07-Jul	0.17	0.13	0.15	22.25	0.006	0.934
31	08-Jul	0.04	0.04	0.04	22.29	0.002	0.936
32	09-Jul	0.21	0.00	0.10	22.40	0.004	0.941
33	10-Jul	0.08	0.17	0.13	22.52	0.005	0.946
34	11-Jul	0.04	0.00	0.02	22.54	0.001	0.947
35	12-Jul	0.13	0.04	0.08	22.63	0.003	0.950
36	13-Jul	0.83	0.00	0.42	23.04	0.017	0.968
37	14-Jul	1.13	0.00	0.56	23.60	0.024	0.991
38	15-Jul	0.38	0.04	0.21	23.81	0.009	1.000
Total		45.71	1.92	23.81			

Mean Day= 17.50

Variance= 45.50

Table 7. Big Eddy test fishing daily and cumulative fall chum salmon CPUE and proportion, 1986.

Day No.	Date	Site 1 CPUE	Site 2 CPUE	Total CPUE	Cum. CPUE	Daily Prop.	Cum. Prop.
1	16-Jul	0.33	0.08	0.21	0.21	0.005	0.005
2	17-Jul	2.67	0.04	1.35	1.56	0.030	0.034
3	18-Jul	8.71	1.04	4.88	6.44	0.107	0.141
4	19-Jul	2.50	2.75	2.63	9.06	0.057	0.198
5	20-Jul	1.50	5.63	3.56	12.63	0.078	0.276
6	21-Jul	1.04	2.13	1.58	14.21	0.035	0.311
7	22-Jul	0.21	1.63	0.92	15.13	0.020	0.331
8	23-Jul	1.96	0.63	1.29	16.42	0.028	0.359
9	24-Jul	2.04	4.71	3.38	19.79	0.074	0.433
10	25-Jul	0.13	3.79	1.96	21.75	0.043	0.475
11	26-Jul	0.13	0.63	0.38	22.13	0.008	0.484
12	27-Jul	0.58	0.17	0.38	22.50	0.008	0.492
13	28-Jul	0.13	1.00	0.56	23.06	0.012	0.504
14	29-Jul	0.08	0.33	0.21	23.27	0.005	0.509
15	30-Jul	0.46	2.75	1.60	24.88	0.035	0.544
16	31-Jul	0.42	2.46	1.44	26.31	0.031	0.575
17	01-Aug	0.83	3.67	2.25	28.56	0.049	0.624
18	02-Aug	0.46	1.79	1.13	29.69	0.025	0.649
19	03-Aug	0.29	2.42	1.35	31.04	0.030	0.679
20	04-Aug	0.38	1.46	0.92	31.96	0.020	0.699
21	05-Aug	0.42	2.71	1.56	33.52	0.034	0.733
22	06-Aug	1.42	2.08	1.75	35.27	0.038	0.771
23	07-Aug	0.83	1.29	1.06	36.33	0.023	0.794
24	08-Aug	0.08	1.21	0.65	36.98	0.014	0.808
25	09-Aug	0.04	1.04	0.54	37.52	0.012	0.820
26	10-Aug	0.04	0.08	0.06	37.58	0.001	0.821
27	11-Aug	0.29	1.38	0.83	38.42	0.018	0.840
28	12-Aug	0.83	1.42	1.13	39.54	0.025	0.864
29	13-Aug	0.38	0.33	0.35	39.90	0.008	0.872
30	14-Aug	0.71	0.17	0.44	40.33	0.010	0.882
31	15-Aug	0.42	0.13	0.27	40.60	0.006	0.888
32	16-Aug	0.17	0.04	0.10	40.71	0.002	0.890
33	17-Aug	0.00	0.04	0.02	40.73	0.000	0.890
34	18-Aug	0.50	0.25	0.38	41.10	0.008	0.898
35	19-Aug	0.17	0.17	0.17	41.27	0.004	0.902
36	20-Aug	0.17	0.29	0.23	41.50	0.005	0.907
37	21-Aug	0.71	1.00	0.85	42.35	0.019	0.926
38	22-Aug	0.75	0.67	0.71	43.06	0.015	0.941
39	23-Aug	0.38	0.29	0.33	43.40	0.007	0.949
40	24-Aug	0.83	1.75	1.29	44.69	0.028	0.977
41	25-Aug	0.38	0.96	0.67	45.35	0.015	0.991
42	26-Aug	0.00	0.33	0.17	45.52	0.004	0.995
43	27-Aug	0.08	0.29	0.19	45.71	0.004	0.999
44	28-Aug	0.00	0.08	0.04	45.75	0.001	1.000
Total		34.42	57.08	45.75			

Mean Day No. = 15.32

Variance = 128.77

Table 8. Middle Mouth test fishing daily and cumulative fall chum salmon CPUE and proportion, 1986.

Day No.	Date	Site 1 CPUE	Site 2 CPUE	Site 3 CPUE	Total CPUE	Cum. CPUE	Daily Prop.	Cum. Prop.
1	16-Jul	0.08	0.00	0.63	0.24	0.24	0.004	0.004
2	17-Jul	0.00	0.13	4.33	1.49	1.72	0.024	0.028
3	18-Jul	0.04	1.21	9.83	3.69	5.42	0.061	0.089
4	19-Jul	0.17	0.92	10.50	3.86	9.28	0.063	0.152
5	20-Jul	0.08	0.83	12.96	4.63	13.90	0.076	0.228
6	21-Jul	0.08	0.67	10.21	3.65	17.56	0.060	0.289
7	22-Jul	0.04	0.17	5.88	2.03	19.58	0.033	0.322
8	23-Jul	0.13	0.13	1.50	0.58	20.17	0.010	0.331
9	24-Jul	0.00	1.21	3.33	1.51	21.68	0.025	0.356
10	25-Jul	0.08	0.25	3.33	1.22	22.90	0.020	0.376
11	26-Jul	0.29	0.00	0.92	0.40	23.31	0.007	0.383
12	27-Jul	0.04	0.00	0.75	0.26	23.57	0.004	0.387
13	28-Jul	0.04	0.00	0.42	0.15	23.72	0.003	0.390
14	29-Jul	0.04	0.08	0.08	0.07	23.79	0.001	0.391
15	30-Jul	0.04	0.58	2.92	1.18	24.97	0.019	0.410
16	31-Jul	0.25	1.17	9.46	3.63	28.60	0.060	0.470
17	01-Aug	0.08	0.29	4.58	1.65	30.25	0.027	0.497
18	02-Aug	0.08	0.71	2.75	1.18	31.43	0.019	0.517
19	03-Aug	0.13	0.04	1.67	0.61	32.04	0.010	0.527
20	04-Aug	0.04	0.38	2.04	0.82	32.86	0.013	0.540
21	05-Aug	0.04	0.83	4.83	1.90	34.76	0.031	0.571
22	06-Aug	0.00	1.17	5.46	2.21	36.97	0.036	0.608
23	07-Aug	0.04	0.63	3.46	1.38	38.35	0.023	0.630
24	08-Aug	0.04	0.29	1.42	0.58	38.93	0.010	0.640
25	09-Aug	0.04	0.13	1.08	0.42	39.35	0.007	0.647
26	10-Aug	0.00	0.04	0.50	0.18	39.53	0.003	0.650
27	11-Aug	0.00	0.50	1.13	0.54	40.07	0.009	0.659
28	12-Aug	0.13	3.17	10.63	4.64	44.71	0.076	0.735
29	13-Aug	0.04	0.50	4.75	1.76	46.47	0.029	0.764
30	14-Aug	0.04	1.29	2.67	1.33	47.81	0.022	0.786
31	15-Aug	0.17	1.33	5.96	2.49	50.29	0.041	0.827
32	16-Aug	0.08	0.79	2.13	1.00	51.29	0.016	0.843
33	17-Aug	0.08	0.38	1.13	0.53	51.82	0.009	0.852
34	18-Aug	0.17	0.21	5.54	1.97	53.79	0.032	0.884
35	19-Aug	0.04	0.58	3.96	1.53	55.32	0.025	0.909
36	20-Aug	0.00	0.33	1.21	0.51	55.83	0.008	0.918
37	21-Aug	0.08	0.58	2.04	0.90	56.74	0.015	0.932
38	22-Aug	0.17	0.33	1.83	0.78	57.51	0.013	0.945
39	23-Aug	0.29	0.63	3.08	1.33	58.85	0.022	0.967
40	24-Aug	0.04	0.88	3.83	1.58	60.43	0.026	0.993
41	25-Aug	0.08	0.13	0.63	0.28	60.71	0.005	0.998
42	26-Aug	0.00	0.00	0.04	0.01	60.72	0.000	0.998
43	27-Aug	0.00	0.08	0.29	0.13	60.85	0.002	1.000
Total		3.33	23.54	155.67	60.85			

Mean Day No. = 18.56

Variance = 148.24

Table 9. Big Eddy test fishing daily and cumulative coho salmon CPUE and proportion, 1986.

Day No.	Date	Site 1 CPUE	Site 2 CPUE	Total CPUE	Cum. CPUE	Daily Prop.	Cum. Prop.
1	16-Jul	0.00	0.00	0.00	0.00	0.000	0.000
2	17-Jul	0.00	0.00	0.00	0.00	0.000	0.000
3	18-Jul	0.00	0.00	0.00	0.00	0.000	0.000
4	19-Jul	0.00	0.00	0.00	0.00	0.000	0.000
5	20-Jul	0.00	0.00	0.00	0.00	0.000	0.000
6	21-Jul	0.00	0.00	0.00	0.00	0.000	0.000
7	22-Jul	0.00	0.00	0.00	0.00	0.000	0.000
8	23-Jul	0.00	0.00	0.00	0.00	0.000	0.000
9	24-Jul	0.00	0.00	0.00	0.00	0.000	0.000
10	25-Jul	0.00	0.00	0.00	0.00	0.000	0.000
11	26-Jul	0.00	0.00	0.00	0.00	0.000	0.000
12	27-Jul	0.00	0.00	0.00	0.00	0.000	0.000
13	28-Jul	0.00	0.00	0.00	0.00	0.000	0.000
14	29-Jul	0.00	0.00	0.00	0.00	0.000	0.000
15	30-Jul	0.04	0.00	0.02	0.02	0.004	0.004
16	31-Jul	0.04	0.08	0.06	0.08	0.011	0.014
17	01-Aug	0.00	0.21	0.10	0.19	0.018	0.032
18	02-Aug	0.00	0.04	0.02	0.21	0.004	0.036
19	03-Aug	0.00	0.00	0.00	0.21	0.000	0.036
20	04-Aug	0.13	0.04	0.08	0.29	0.014	0.050
21	05-Aug	0.13	0.08	0.10	0.40	0.018	0.068
22	06-Aug	0.13	0.04	0.08	0.48	0.014	0.083
23	07-Aug	0.00	0.13	0.06	0.54	0.011	0.094
24	08-Aug	0.04	0.00	0.02	0.56	0.004	0.097
25	09-Aug	0.00	0.04	0.02	0.58	0.004	0.101
26	10-Aug	0.00	0.00	0.00	0.58	0.000	0.101
27	11-Aug	0.67	0.54	0.60	1.19	0.104	0.205
28	12-Aug	0.13	0.38	0.25	1.44	0.043	0.248
29	13-Aug	0.08	0.04	0.06	1.50	0.011	0.259
30	14-Aug	0.13	0.08	0.10	1.60	0.018	0.277
31	15-Aug	0.00	0.17	0.08	1.69	0.014	0.291
32	16-Aug	0.00	0.17	0.08	1.77	0.014	0.306
33	17-Aug	0.08	0.04	0.06	1.83	0.011	0.317
34	18-Aug	0.29	0.38	0.33	2.17	0.058	0.374
35	19-Aug	0.08	0.17	0.13	2.29	0.022	0.396
36	20-Aug	0.29	0.25	0.27	2.56	0.047	0.442
37	21-Aug	0.33	0.33	0.33	2.90	0.058	0.500
38	22-Aug	0.21	0.21	0.21	3.10	0.036	0.536
39	23-Aug	0.42	0.71	0.56	3.67	0.097	0.633
40	24-Aug	0.63	1.38	1.00	4.67	0.173	0.806
41	25-Aug	0.38	0.50	0.44	5.10	0.076	0.881
42	26-Aug	0.04	0.54	0.29	5.40	0.050	0.932
43	27-Aug	0.17	0.29	0.23	5.63	0.040	0.971
44	28-Aug	0.08	0.25	0.17	5.79	0.029	1.000
Total		4.50	7.08	5.79			
Mean Day No. =				34.91	Variance =		50.35

Table 10. Middle Mouth test fishing daily and cumulative coho salmon CPUE and proportion, 1986.

Day No.	Date	Site 1 CPUE	Site 2 CPUE	Site 3 CPUE	Total CPUE	Cum. CPUE	Daily Prop.	Cum. Prop.
1	16-Jul	0.00	0.00	0.00	0.00	0.00	0.000	0.000
2	17-Jul	0.00	0.00	0.00	0.00	0.00	0.000	0.000
3	18-Jul	0.00	0.00	0.00	0.00	0.00	0.000	0.000
4	19-Jul	0.00	0.00	0.00	0.00	0.00	0.000	0.000
5	20-Jul	0.00	0.00	0.04	0.01	0.01	0.002	0.002
6	21-Jul	0.00	0.00	0.00	0.00	0.01	0.000	0.002
7	22-Jul	0.00	0.00	0.00	0.00	0.01	0.000	0.002
8	23-Jul	0.00	0.00	0.00	0.00	0.01	0.000	0.002
9	24-Jul	0.00	0.00	0.00	0.00	0.01	0.000	0.002
10	25-Jul	0.00	0.00	0.00	0.00	0.01	0.000	0.002
11	26-Jul	0.00	0.00	0.00	0.00	0.01	0.000	0.002
12	27-Jul	0.00	0.00	0.00	0.00	0.01	0.000	0.002
13	28-Jul	0.00	0.00	0.00	0.00	0.01	0.000	0.002
14	29-Jul	0.00	0.00	0.00	0.00	0.01	0.000	0.002
15	30-Jul	0.00	0.04	0.00	0.01	0.03	0.002	0.004
16	31-Jul	0.00	0.04	0.00	0.01	0.04	0.002	0.006
17	01-Aug	0.00	0.00	0.08	0.03	0.07	0.004	0.010
18	02-Aug	0.00	0.04	0.00	0.01	0.08	0.002	0.012
19	03-Aug	0.04	0.00	0.00	0.01	0.10	0.002	0.014
20	04-Aug	0.00	0.04	0.04	0.03	0.13	0.004	0.019
21	05-Aug	0.00	0.00	0.25	0.08	0.21	0.012	0.031
22	06-Aug	0.00	0.04	0.42	0.15	0.36	0.023	0.054
23	07-Aug	0.08	0.00	0.08	0.06	0.42	0.008	0.062
24	08-Aug	0.00	0.00	0.00	0.00	0.42	0.000	0.062
25	09-Aug	0.04	0.00	0.04	0.03	0.44	0.004	0.066
26	10-Aug	0.00	0.00	0.21	0.07	0.51	0.010	0.076
27	11-Aug	0.00	0.25	0.25	0.17	0.68	0.025	0.101
28	12-Aug	0.25	0.38	1.21	0.61	1.29	0.091	0.192
29	13-Aug	0.00	0.08	0.29	0.13	1.42	0.019	0.210
30	14-Aug	0.13	0.00	0.08	0.07	1.49	0.010	0.221
31	15-Aug	0.42	0.13	0.50	0.35	1.83	0.052	0.272
32	16-Aug	0.04	0.08	0.13	0.08	1.92	0.012	0.285
33	17-Aug	0.08	0.04	0.08	0.07	1.99	0.010	0.295
34	18-Aug	0.00	0.08	0.88	0.32	2.31	0.047	0.342
35	19-Aug	0.13	0.67	0.67	0.49	2.79	0.072	0.414
36	20-Aug	0.08	0.21	0.08	0.13	2.92	0.019	0.433
37	21-Aug	0.08	0.25	0.42	0.25	3.17	0.037	0.470
38	22-Aug	0.58	0.38	0.54	0.50	3.67	0.074	0.544
39	23-Aug	0.38	0.17	1.04	0.53	4.19	0.078	0.623
40	24-Aug	0.63	0.42	3.92	1.65	5.85	0.245	0.868
41	25-Aug	0.38	0.50	0.71	0.53	6.38	0.078	0.946
42	26-Aug	0.08	0.04	0.33	0.15	6.53	0.023	0.969
43	27-Aug	0.17	0.13	0.33	0.21	6.74	0.031	1.000
Total		3.58	4.00	12.63	6.74			

Mean Day No. = 35.38

Variance = 37.48

Table 11. Chinook and summer chum salmon mean migration date and variance, lower Yukon River test gill net catches, 1963-1986.

Year	Flat Is./Big Eddy a		Middle Mouth		Combined		Run Timing b
	Mean Date	Variance	Mean Date	Variance	Mean Date	Variance	
Chinook Salmon							
1963	6/17	29.7					E
1964	6/25	27.4					L
1965	6/20	17.3					A
1966	6/25	16.5					L
1967	6/22	109.1					A
1968	6/18	51.6					E
1969	6/14	53.9					E
1970	6/21	52.2					A
1971	6/26	31.7					L
1972	6/24	60.1					L
1973	6/20	65.9					A
1974	6/13	55.8					E
1975	6/26	25.3					L
1976	6/29	13.5					L
1977	6/28	24.5					L
1978	6/13	90.7					E
1979	6/14	111.1					E
1980	6/15	62.1	6/19	81.6	6/18	77.0	E
1981	6/16	101.9	6/14	80.4	6/15	90.7	E
1982	6/22	98.4	6/24	55.2	6/22	85.1	A
1983	6/16	114.9	6/15	117.4	6/15	116.9	E
1984	6/25	50.8	6/22	39.7	6/23	46.6	A
1985	6/28	42.0	7/03	27.1	7/01	39.7	L
1986	6/22	48.7	6/22	36.2	6/22	42.5	A
Summer Chum Salmon							
1979	6/23	120.0					
1980	6/17	65.3	6/25	91.1	6/21	96.7	
1981	7/02	58.5	6/22	86.0	6/29	88.9	
1982	6/18	57.3	6/25	67.7	6/20	78.0	
1983	6/15	83.2	6/22	148.7	6/18	127.3	
1984	6/23	65.3	6/21	45.8	6/23	62.0	
1985	6/27	31.5	6/29	28.7	6/28	32.0	
1986	6/19	53.6	6/25	45.5	6/20	56.2	

a Flat Island operational 1963-1978, Big Eddy 1979-1986.

b Chinook salmon run timing:

E = early, mean date prior to 18 June

A = average, mean date 18 June to 23 June

L = late, mean date after 23 June

Table 12. Fall chum and coho salmon mean migration date and variance, lower Yukon River test gill net catches, 1977-1986.

Year	Big Eddy		Middle Mouth		Combined	
	Mean Date	Variance	Mean Date	Variance	Mean Date	Variance
Fall Chum Salmon						
1977	a 8/07	78.8				
1978	8/04	130.9				
1979	8/04	80.9				
1980	8/04	145.2	8/08	175.8	8/07	170.4
1981	8/04	95.6	8/01	109.9	8/02	107.5
1982	7/30	111.2	8/07	134.3	8/03	138.2
1983	7/29	133.5	8/08	74.8	8/05	110.5
1984	8/05	123.6	8/07	93.2	8/06	102.6
1985	8/06	128.1	8/09	116.9	8/08	121.6
1986	7/30	128.8	8/03	148.2	8/01	144.3
Coho Salmon						
1977	8/15	33.5				
1978	8/20	28.6				
1979	8/14	48.4				
1980	8/23	31.7	8/21	57.5	8/22	52.1
1981	8/18	39.7	8/20	27.4	8/19	33.4
1982	8/18	64.1	8/21	40.5	8/19	52.9
1983	8/19	37.0	8/19	34.0	8/19	34.8
1984	8/13	42.1	8/14	49.1	8/14	46.1
1985	8/14	59.6	8/17	39.7	8/15	55.3
1986	8/19	50.4	8/19	37.5	8/19	42.7

a Project started 21 July, five days later than other years.

Table 13. Mean migration date and variance for chinook, summer chum, fall chum and coho salmon at selected projects located in the Yukon River drainage, 1986.

Project	River Mile a	Chinook		Summer Chum		Fall Chum		Coho b	
		Mean Date	Variance	Mean Date	Variance	Mean Date	Variance	Mean Date	Variance
Lower Yukon Test Fishing	24	6/22	42.5	6/20	56.2	8/01	144.3	8/19	42.7
Yukon Sonar	123	6/22	21.1	6/24	42.1	8/06 c	22.3	8/22 c	54.7
Andreafsky Tower d	125			7/04	22.7				
Anvik Sonar d	365			7/03	25.5				
Ruby Test Fish Wheel N. Bank	602					8/18	94.2		
Ruby Test Fish Wheel S. Bank	617							9/12	55.6
Sheenjek Sonar	1,060					9/03	80.3		
Canada Tagging Fish Wheel	1,233	7/24	33.6			9/10	76.9		

a Number of miles from Flat Island in the south mouth of the Yukon River delta.

b All projects were terminated prior to the end of the coho salmon run.

c Calculated for time period of 19 July to 31 August.

d Andreafsky and Anvik River escapement enumeration projects were terminated early.

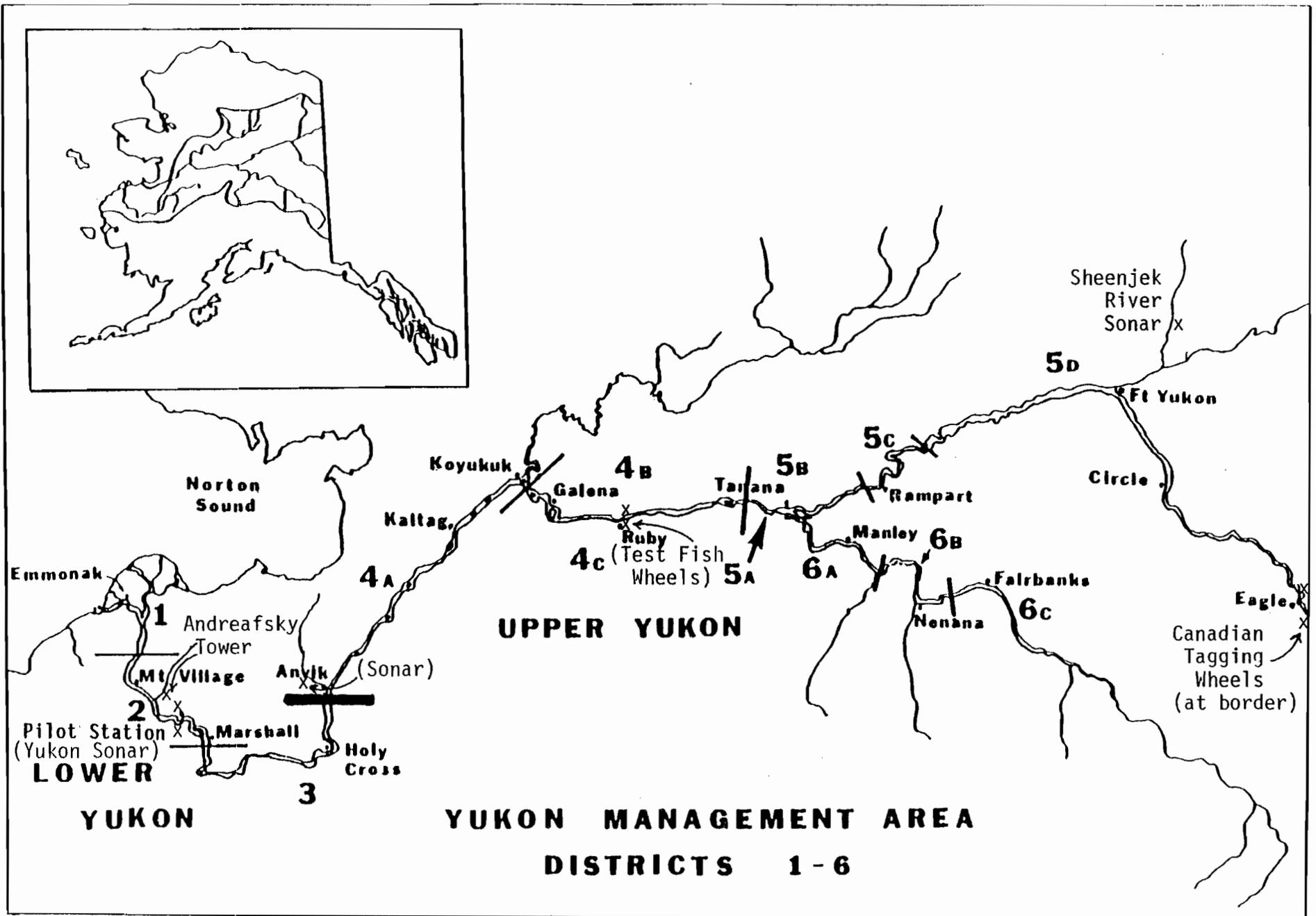


Figure 1. Yukon River management area, Districts 1 - 6, Alaska.

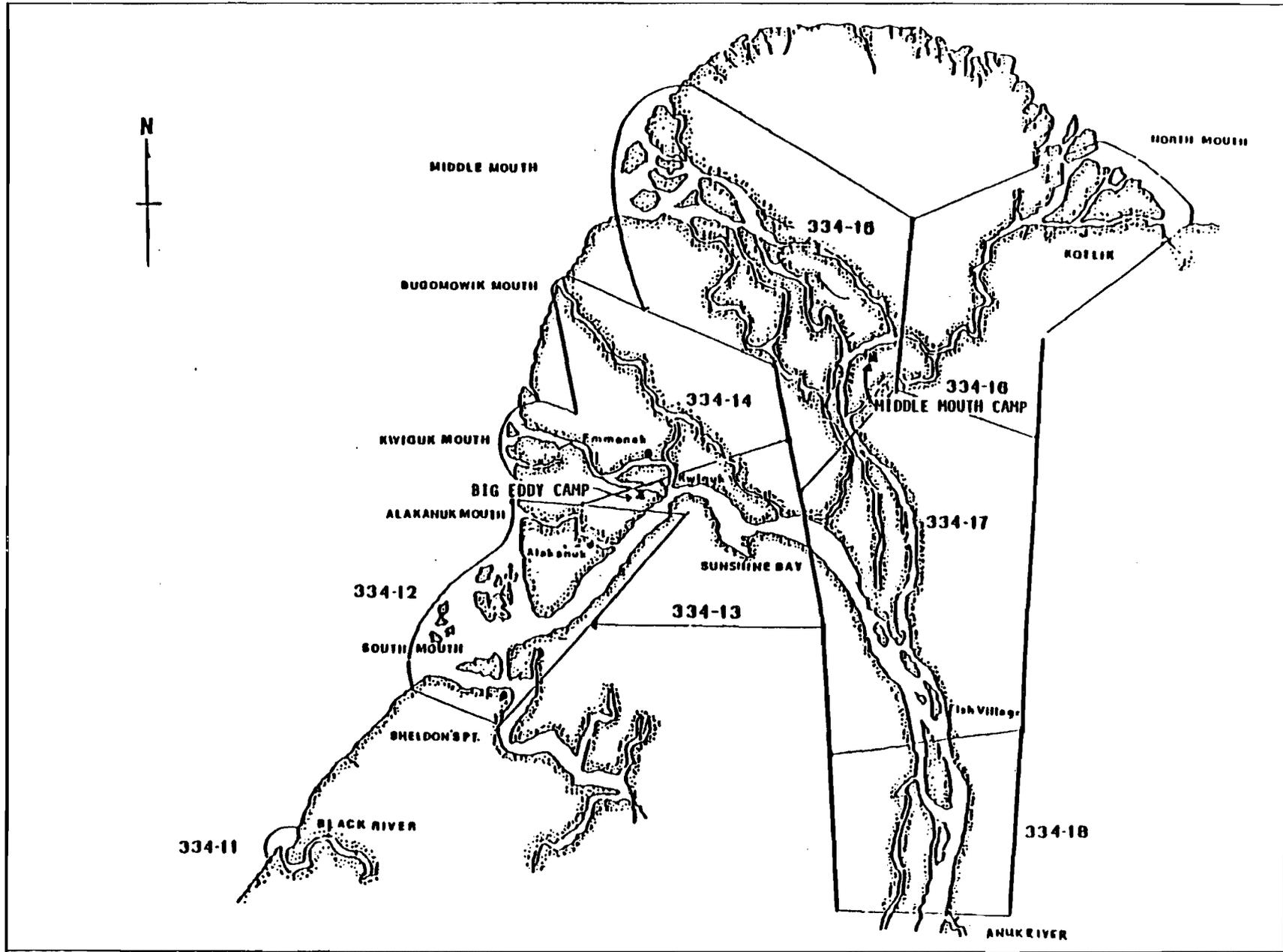


Figure 2. Map of District 1 showing location of Big Eddy and Middle Mouth test fishing camps, and commercial fisheries statistical areas, Yukon River Delta.

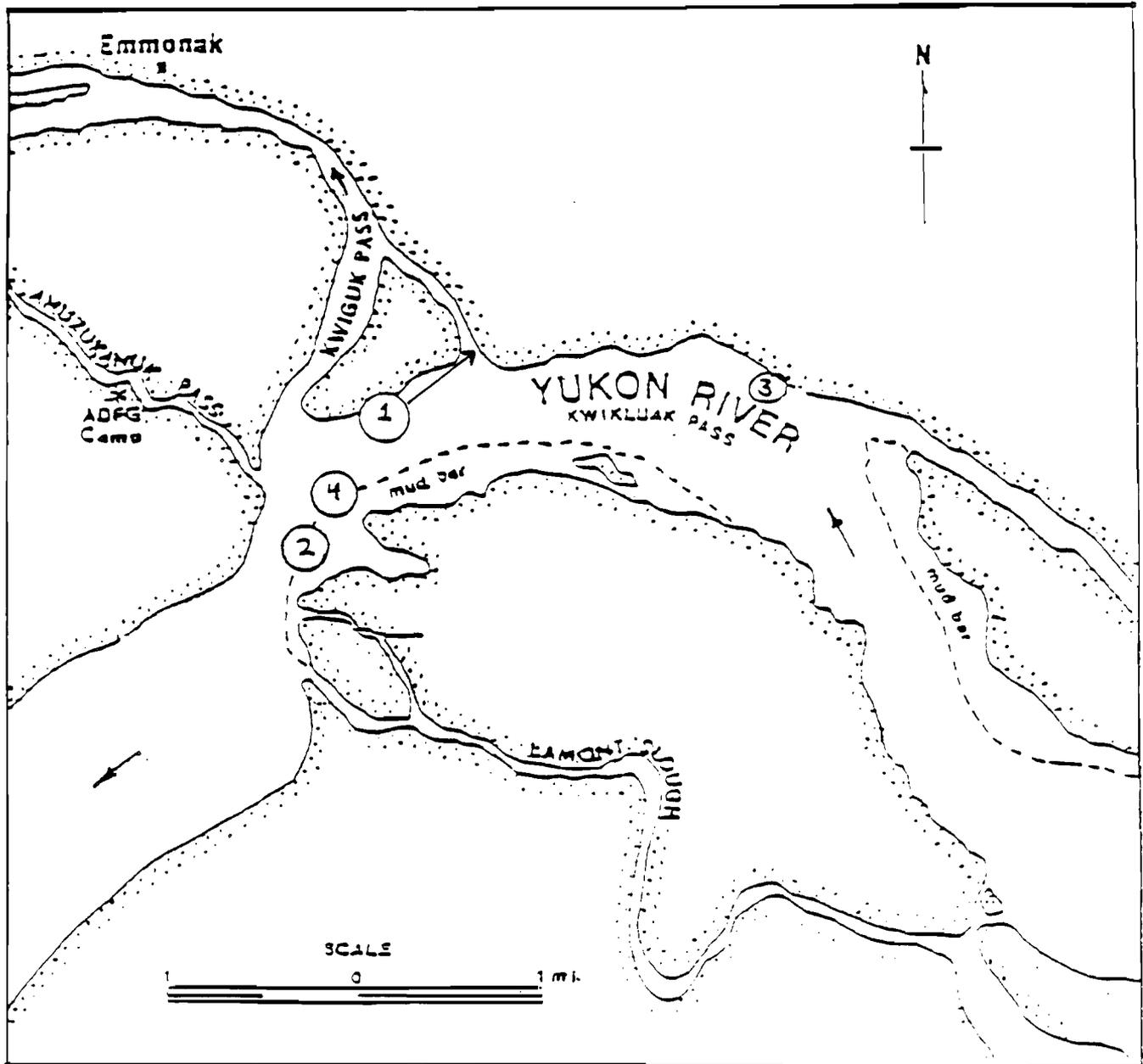


Figure 3. Map of Big Eddy area showing locations of test fishing sites from 5 June to 15 July, 1986. Sites 1 and 2 were fished with 8.5 inch mesh nets, and sites 3 and 4 were fished with 5.5 inch mesh nets. Site 1 was relocated 0.5 miles upstream on 3 July.

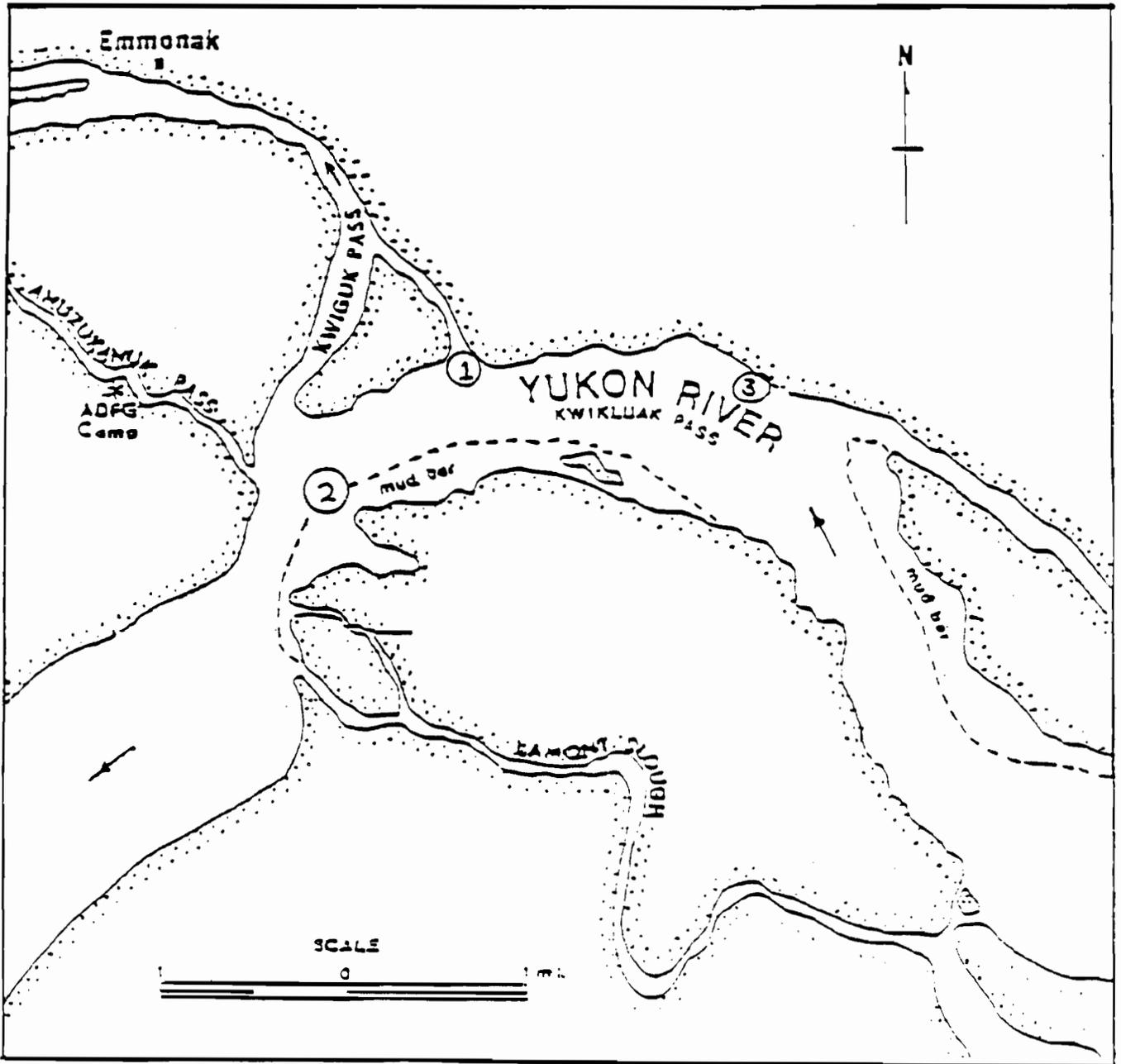


Figure 4. Map of Big Eddy area showing locations of test fishing sites fished with 6 inch mesh nets from 16 July to 28 August, 1986.

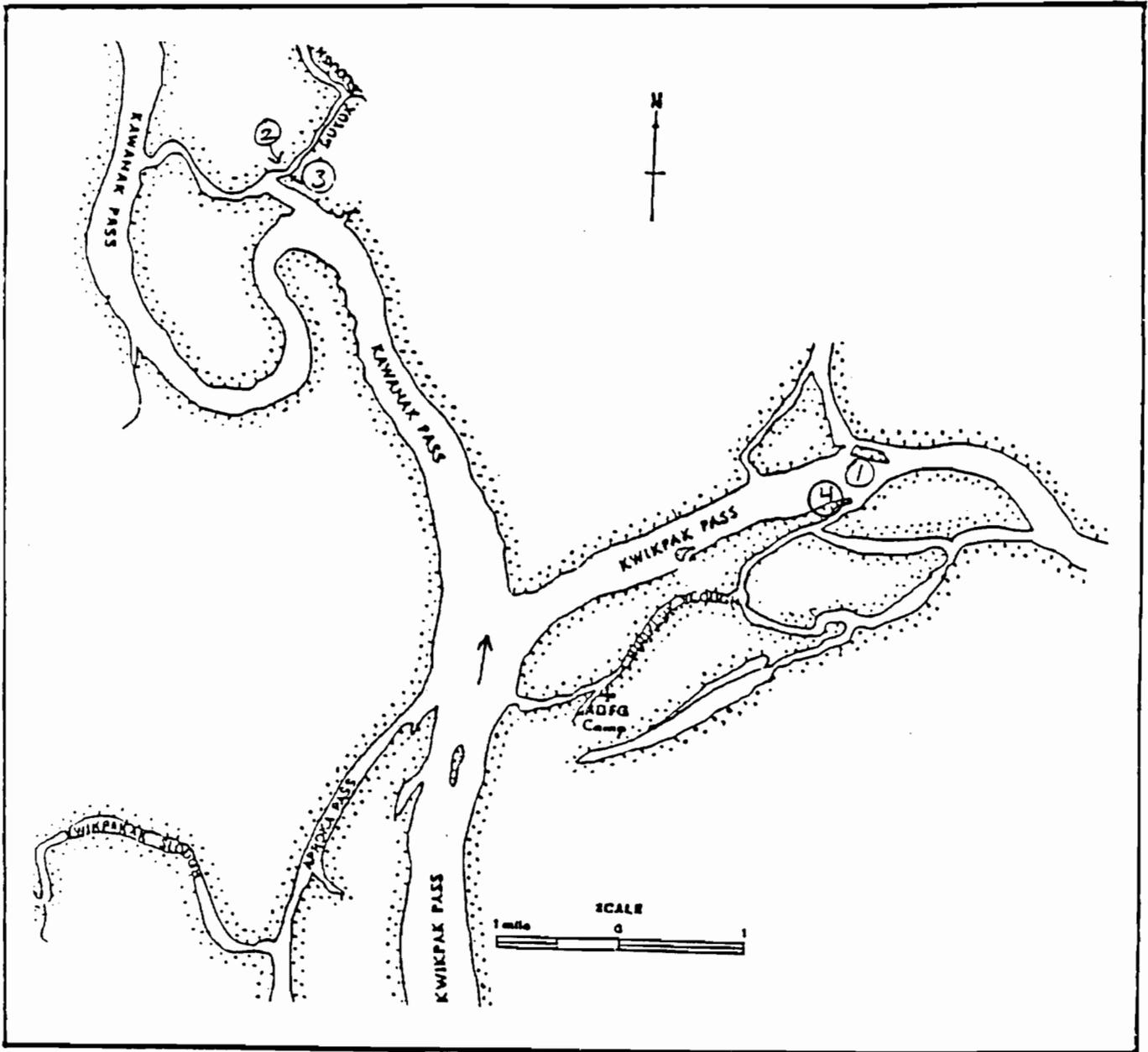
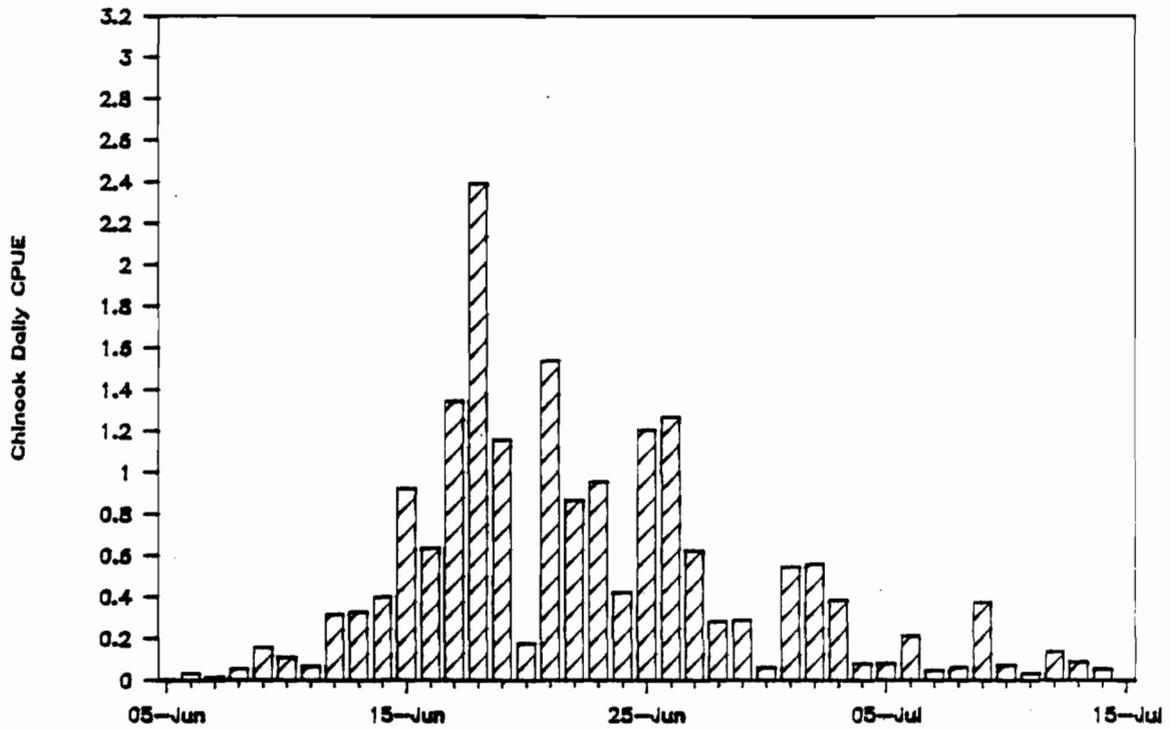


Figure 5. Map of Middle Mouth area showing locations of test fishing sites from 8 June to 15 July, 1986. Sites 1 and 2 were fished with 8.5 inch mesh nets, and sites 3 and 4 were fished with 5.5 inch mesh nets.

Big Eddy



Middle Mouth

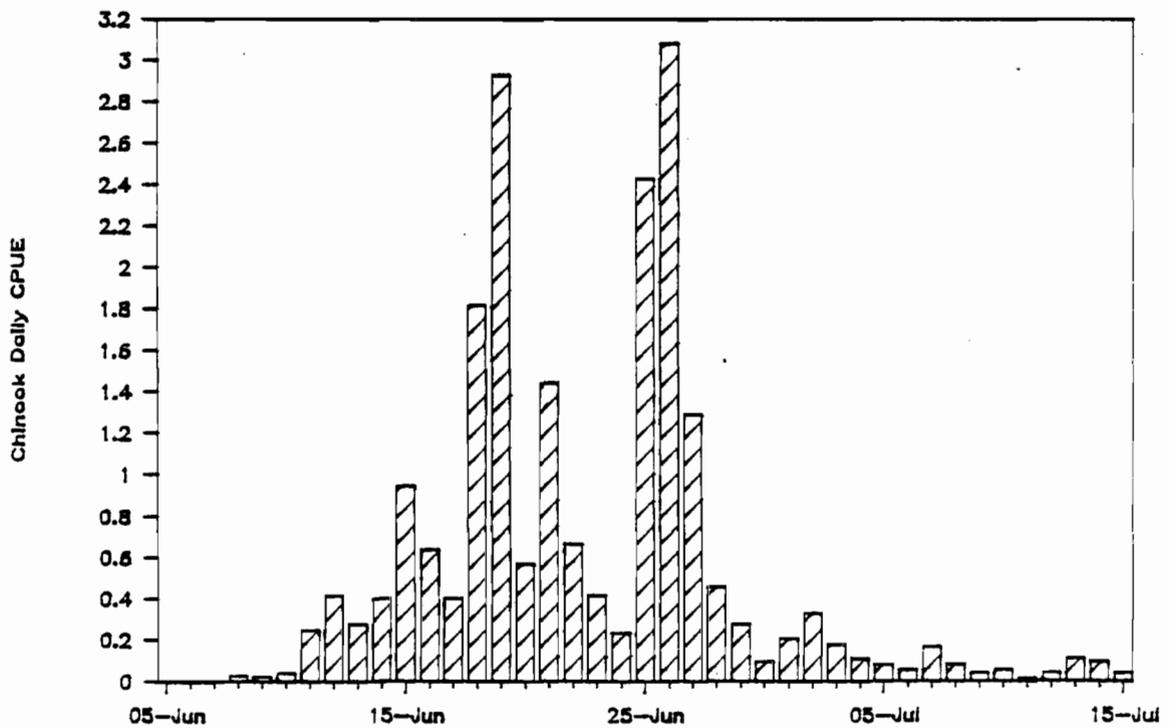
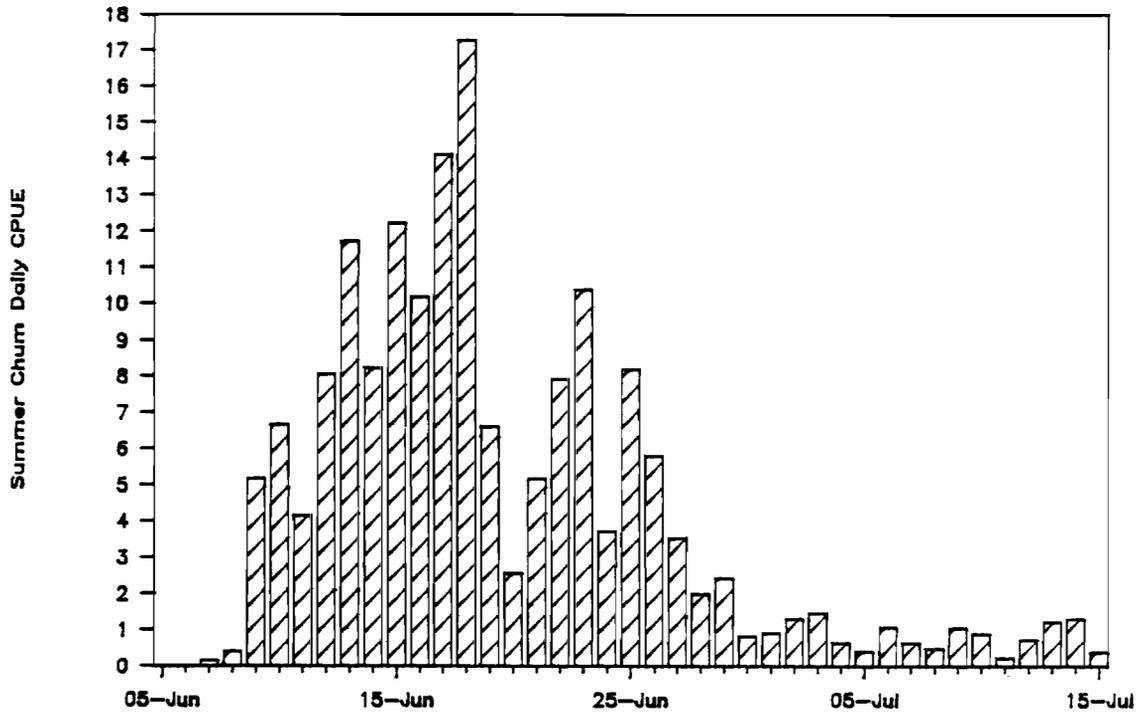


Figure 7. Daily chinook salmon test fishing CPUE at Big Eddy and Middle Mouth, 1986.

Big Eddy



Middle Mouth

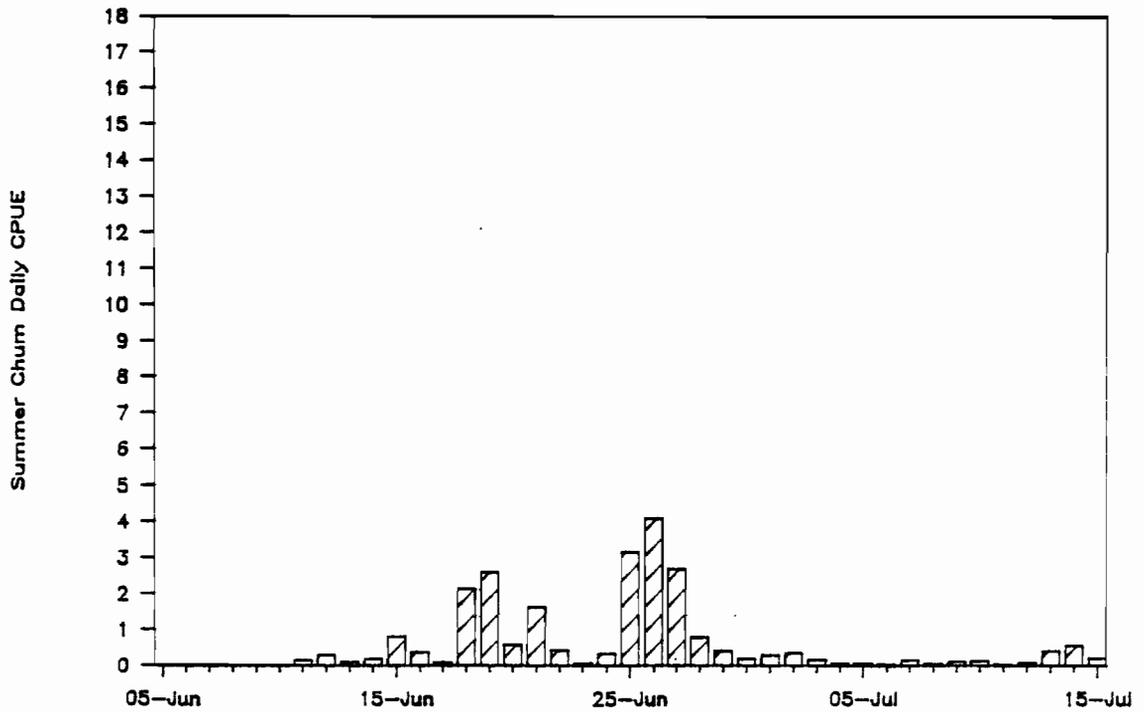
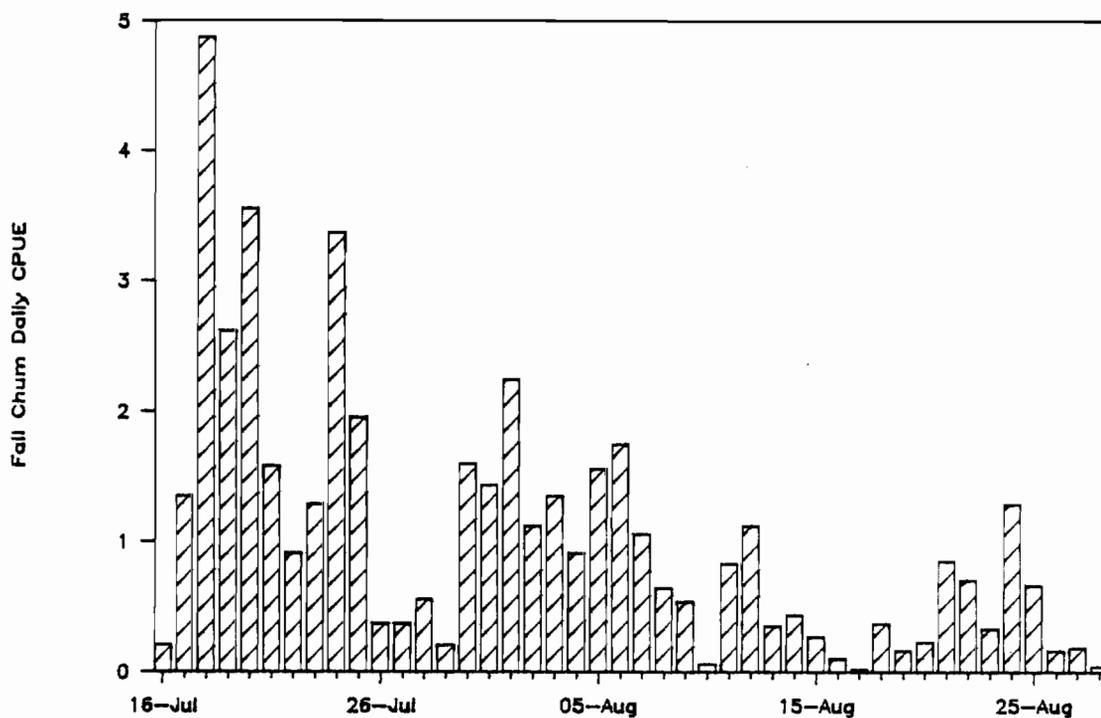


Figure 8. Daily summer chum salmon test fishing CPUE at Big Eddy and Middle Mouth, 1986.

Big Eddy



Middle Mouth

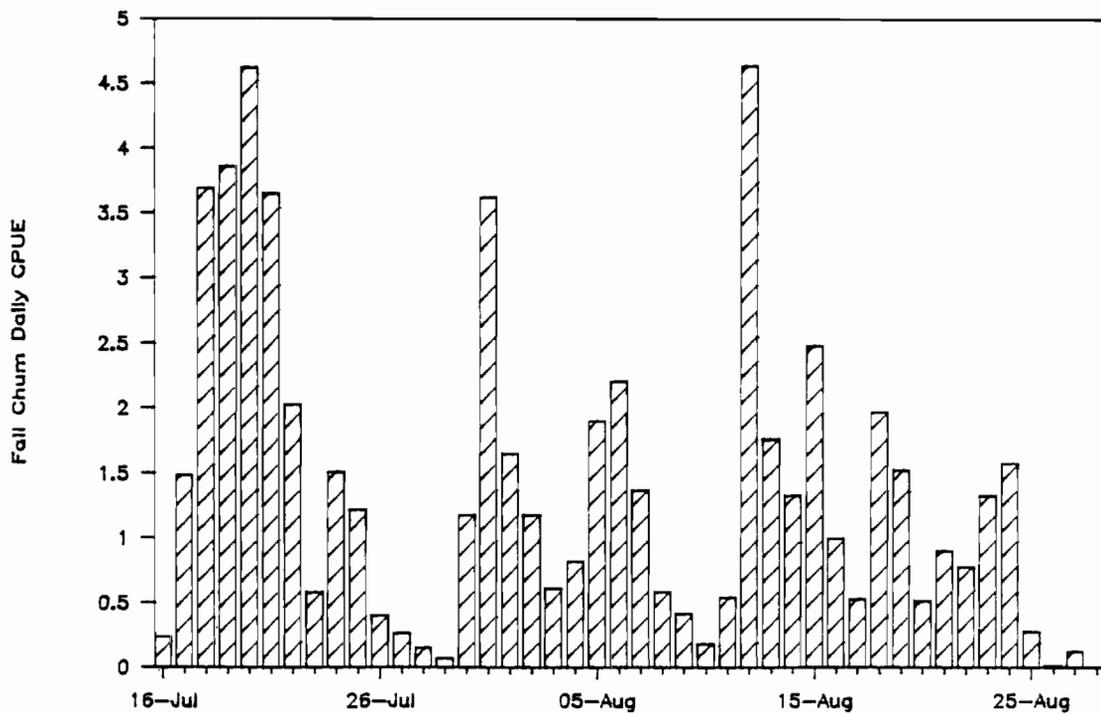
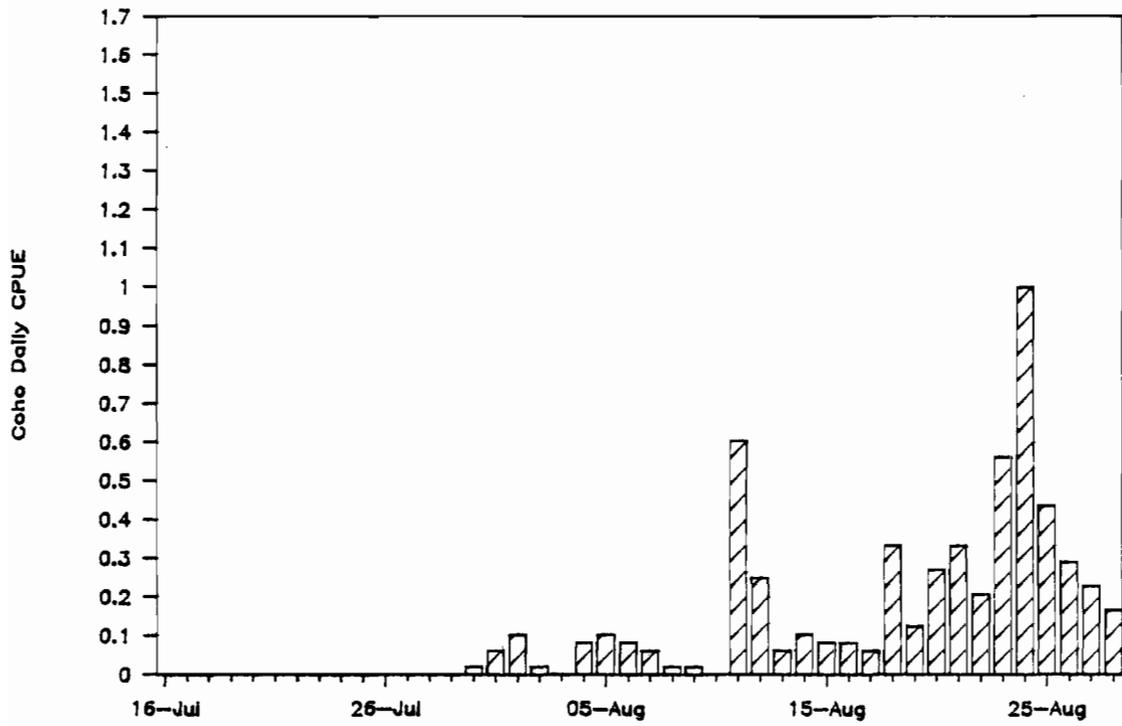


Figure 9. Daily fall chum salmon test fishing CPUE at Big Eddy and Middle Mouth, 1986.

Big Eddy



Middle Mouth

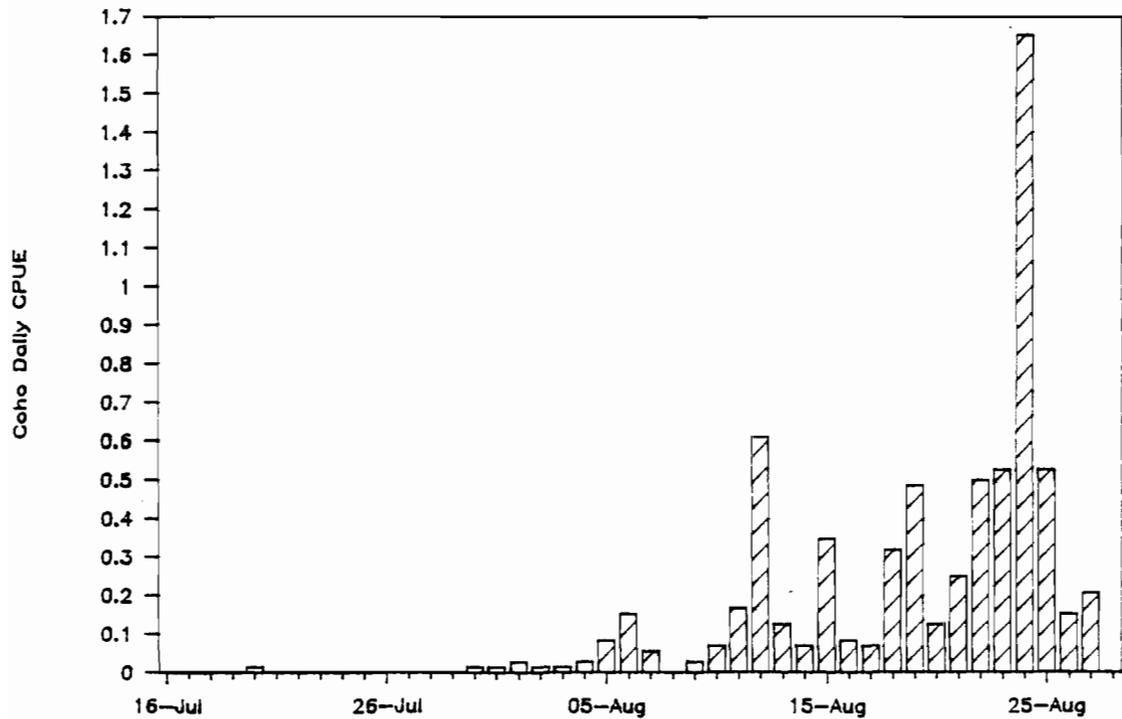
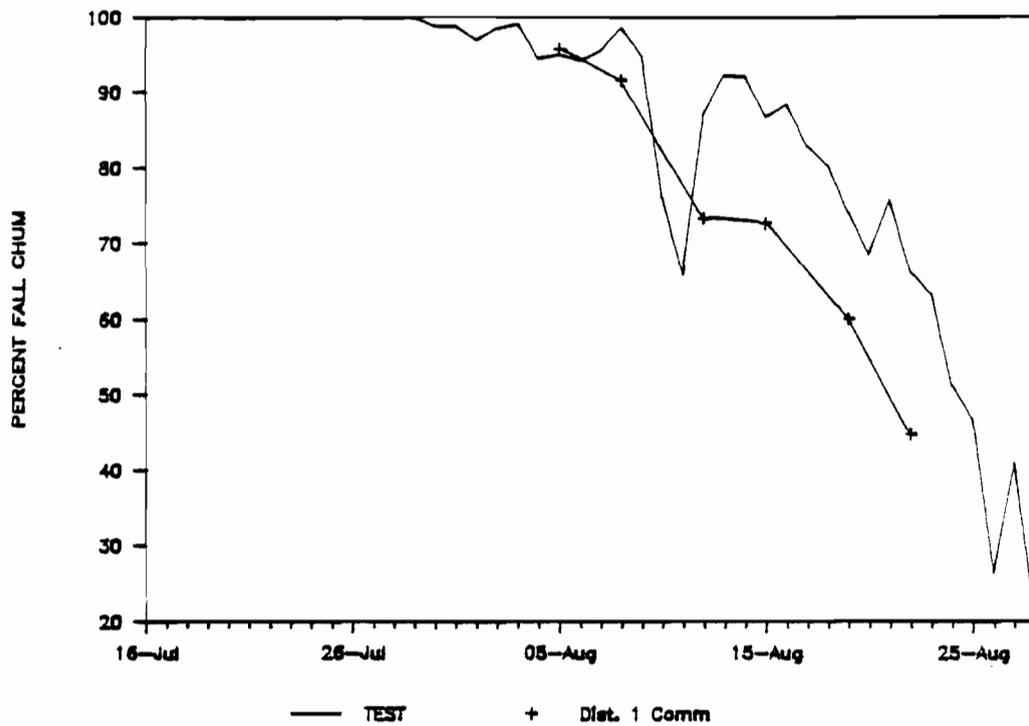


Figure 10. Daily coho salmon test fishing CPUE at Big Eddy and Middle Mouth, 1986.

Test Fish and District 1



Test Fish and District 2

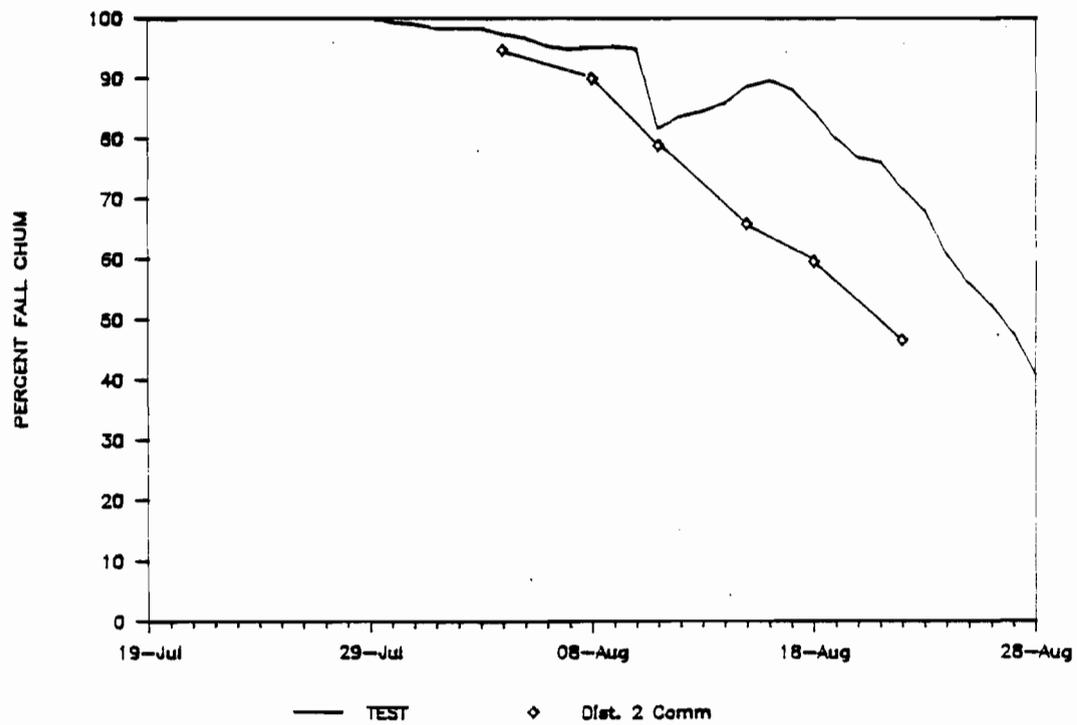


Figure 11. Percent composition of fall chum salmon in combined fall chum and coho salmon catches in District 1 and District 2 commercial fisheries and in the Big Eddy and Middle test fishery, 1986.

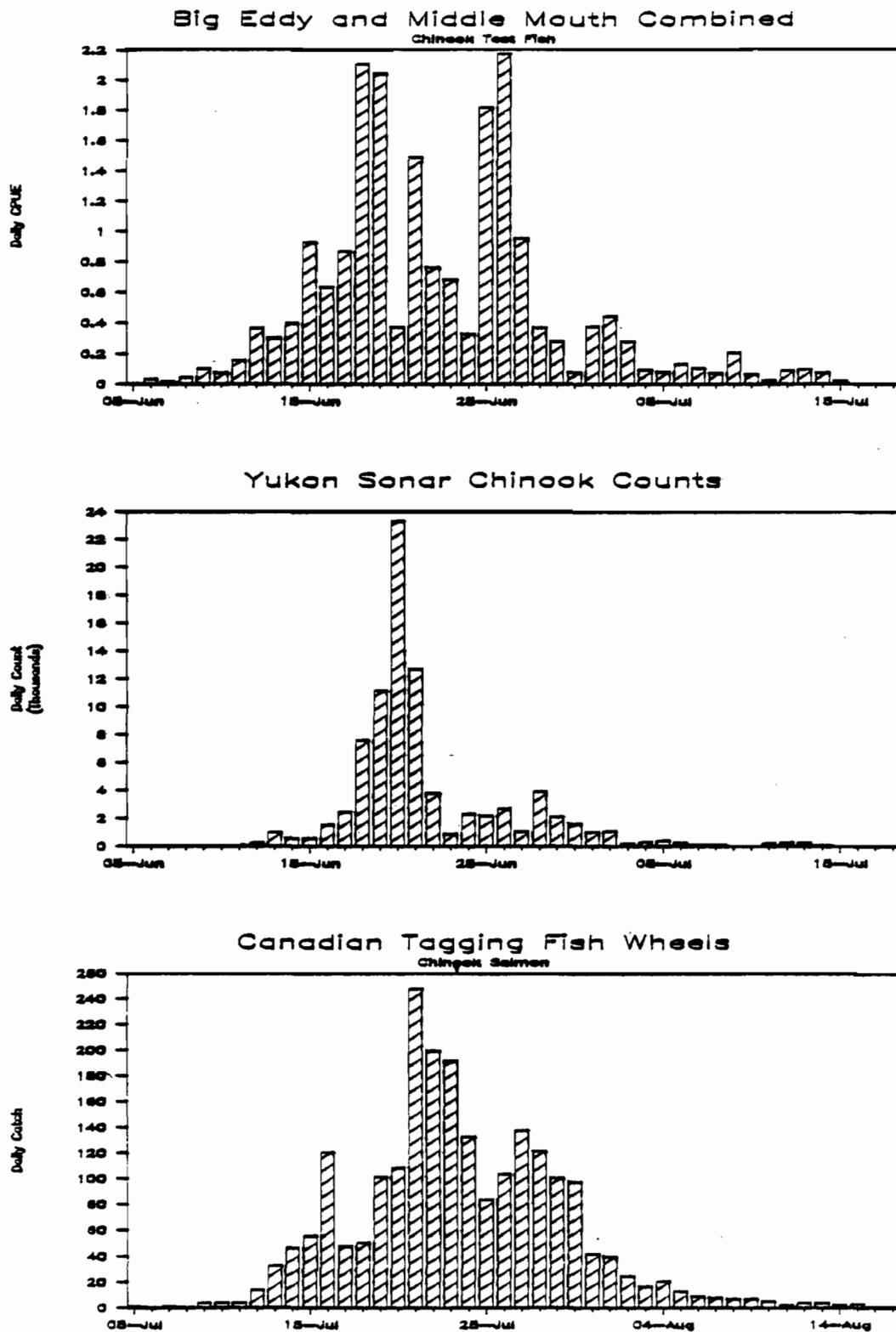


Figure 12. Chinook salmon combined lower Yukon test fishing daily CPUE, Yukon sonar daily counts, and Canadian tagging fishwheel daily catches, 1986.

Chinook Salmon Run Timing

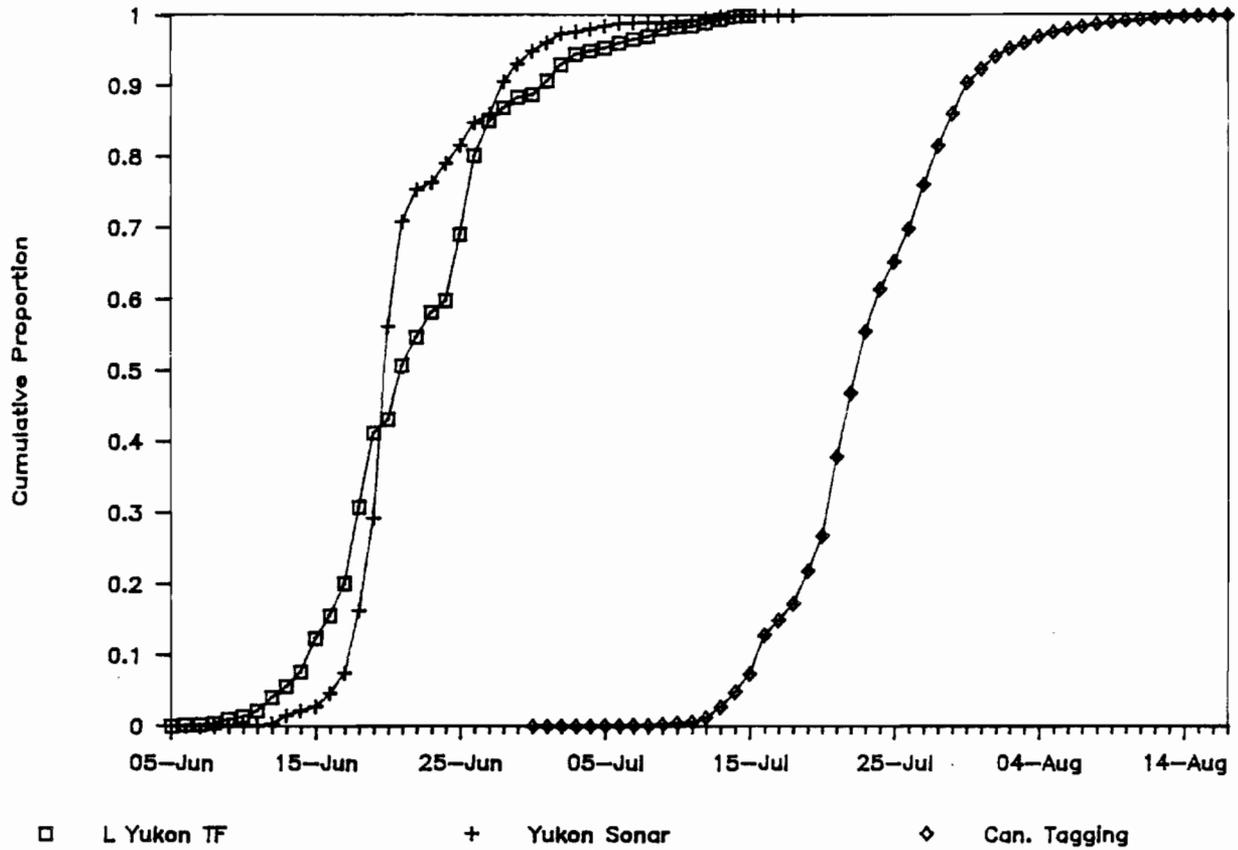


Figure 13. Cumulative proportion of chinook salmon from combined Big Eddy and Middle Mouth test fishing CPUE (lower Yukon test fish), Yukon sonar counts and Canadian tagging fish wheel catch, 1986.

Summer Chum Salmon Run Timing

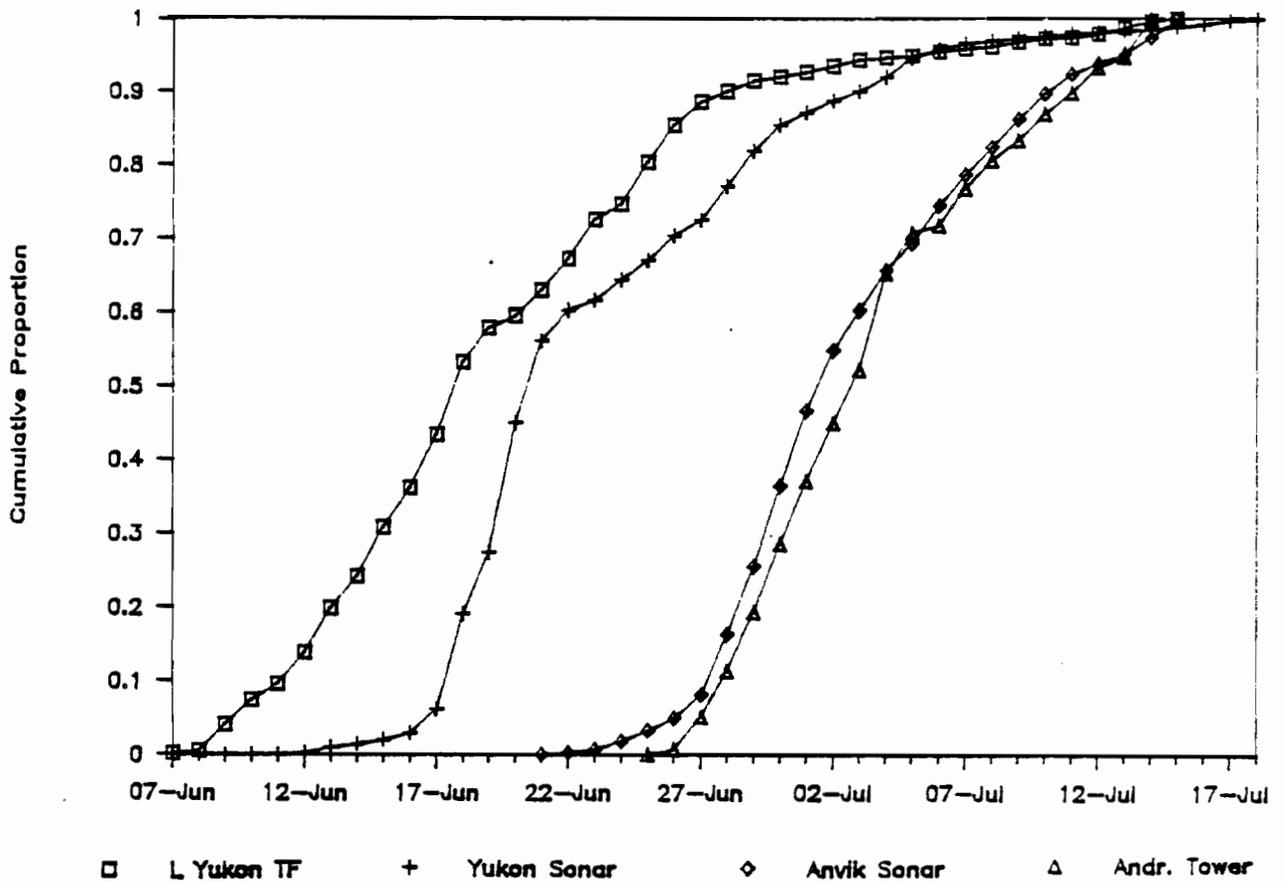


Figure 14. Cumulative proportion of summer chum salmon from combined Big Eddy and Middle Mouth test fishing CPUE (lower Yukon test fish), Yukon sonar counts, Anvik River sonar counts and Andreafsky Tower counts, 1986.

Summer Chum Sonar Counts

Anvik Sonar - 10 Day Lag

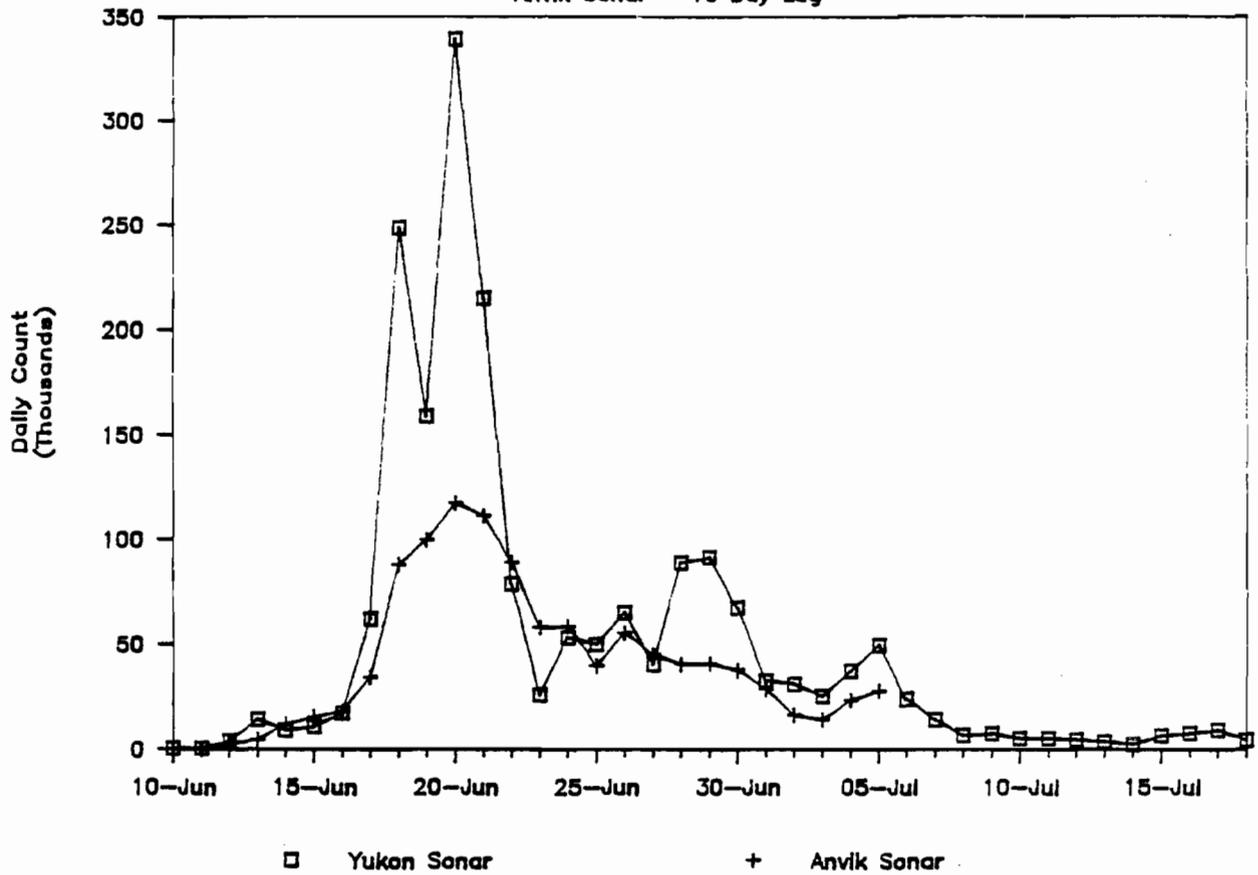


Figure 15. Comparison of daily summer chum salmon sonar counts at Yukon sonar and Anvik River sonar (lagged ten days), 1986.

Fall Chum Salmon Run Timing

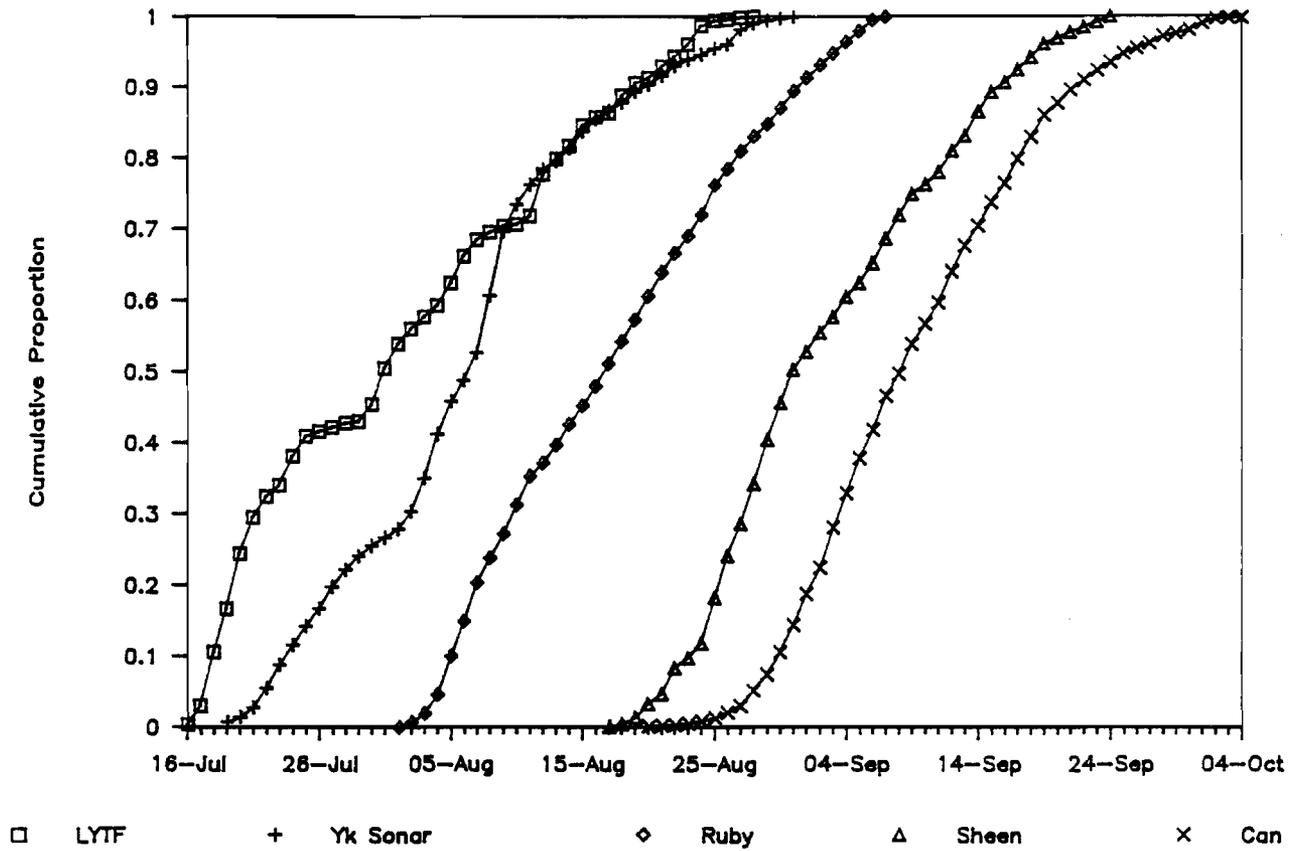


Figure 16. Cumulative proportion of fall chum salmon from combined Big Eddy and Middle Mouth test fishing CPUE (lower Yukon test fish), Yukon sonar counts, north bank Ruby test fishwheel catch, Sheenjok River sonar counts and Canadian tagging fishwheel catch, 1986.

Coho Salmon Run Timing

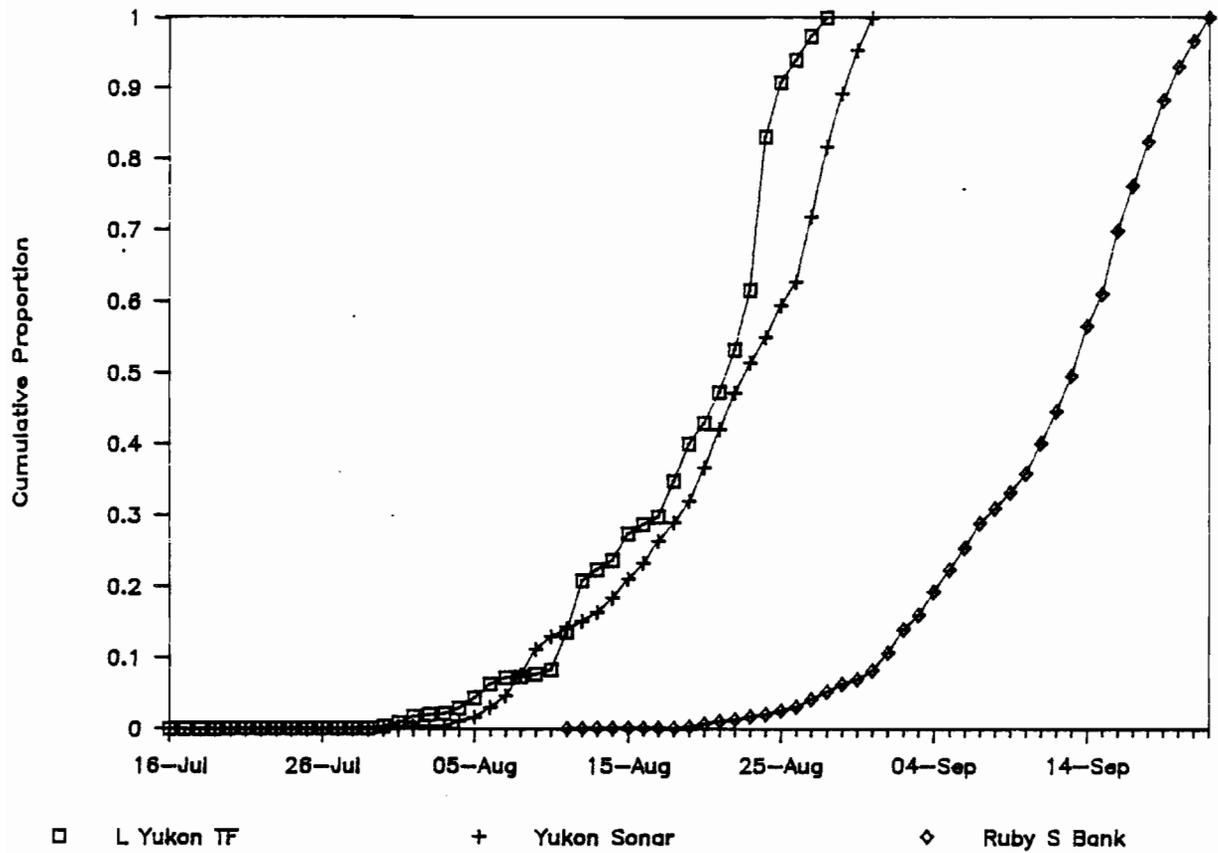


Figure 17. Cumulative proportion of coho salmon from combined Big Eddy and Middle Mouth test fishing CPUE (lower Yukon test fish), Yukon sonar and south bank Ruby test fishwheel catch, 1986.

BIG EDDY & MIDDLE MOUTH

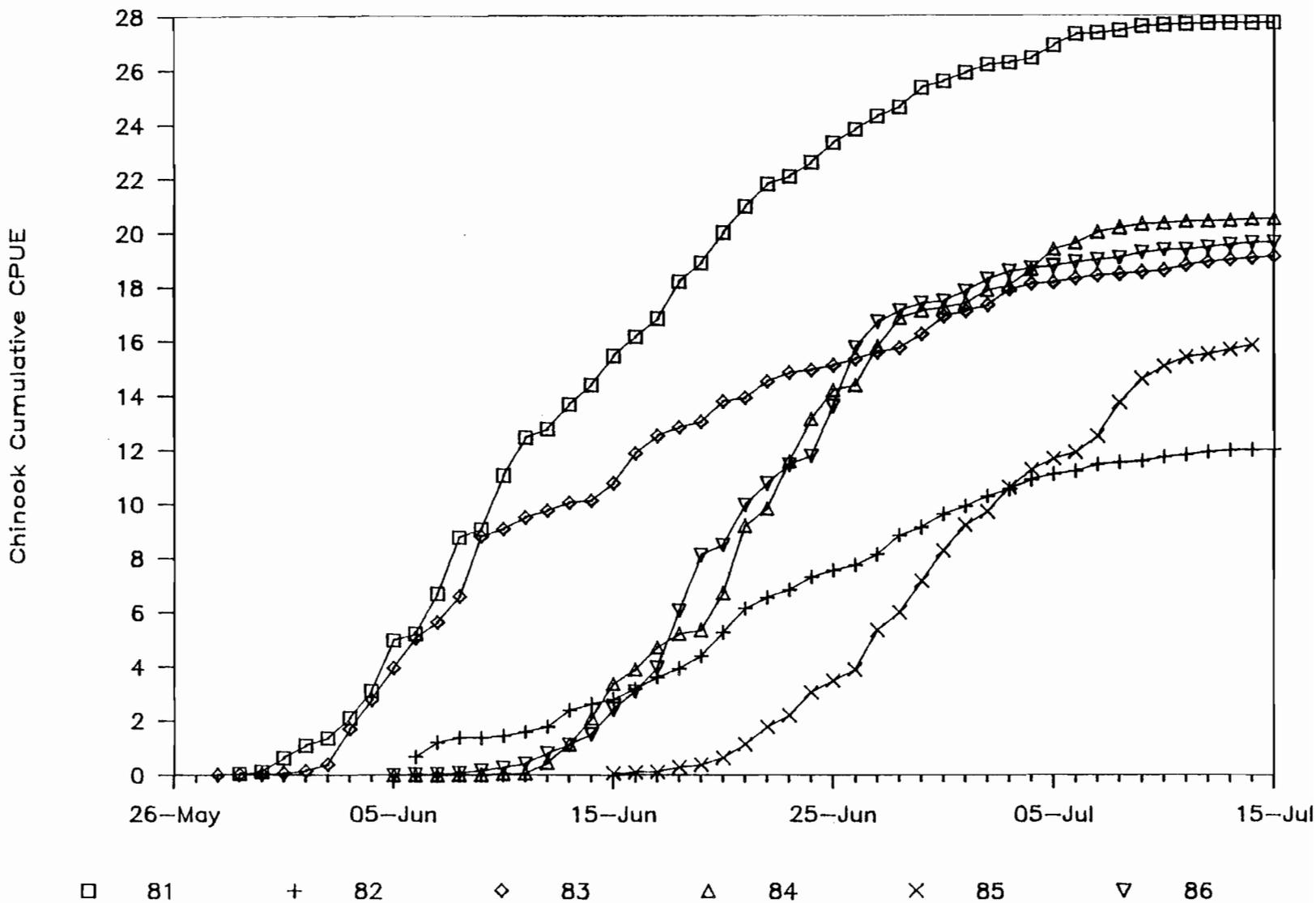


Figure 18. Chinook salmon cumulative daily CPUE, Big Eddy and Middle Mouth combined, 1981-1986.

BIG EDDY & MIDDLE MOUTH

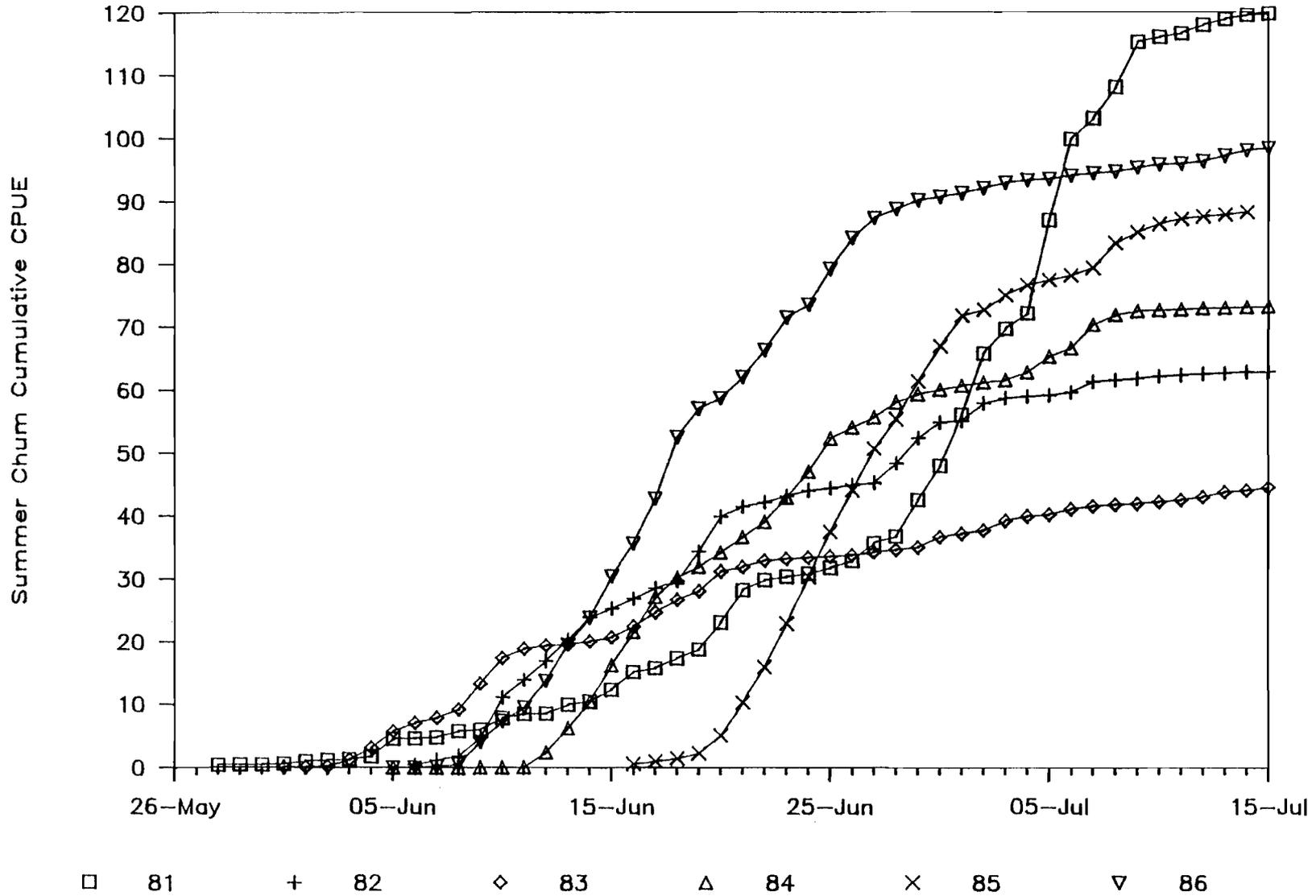


Figure 19. Summer chum salmon cumulative daily CPUE, Big Eddy and Middle Mouth combined, 1981-1986.

BIG EDDY & MIDDLE MOUTH

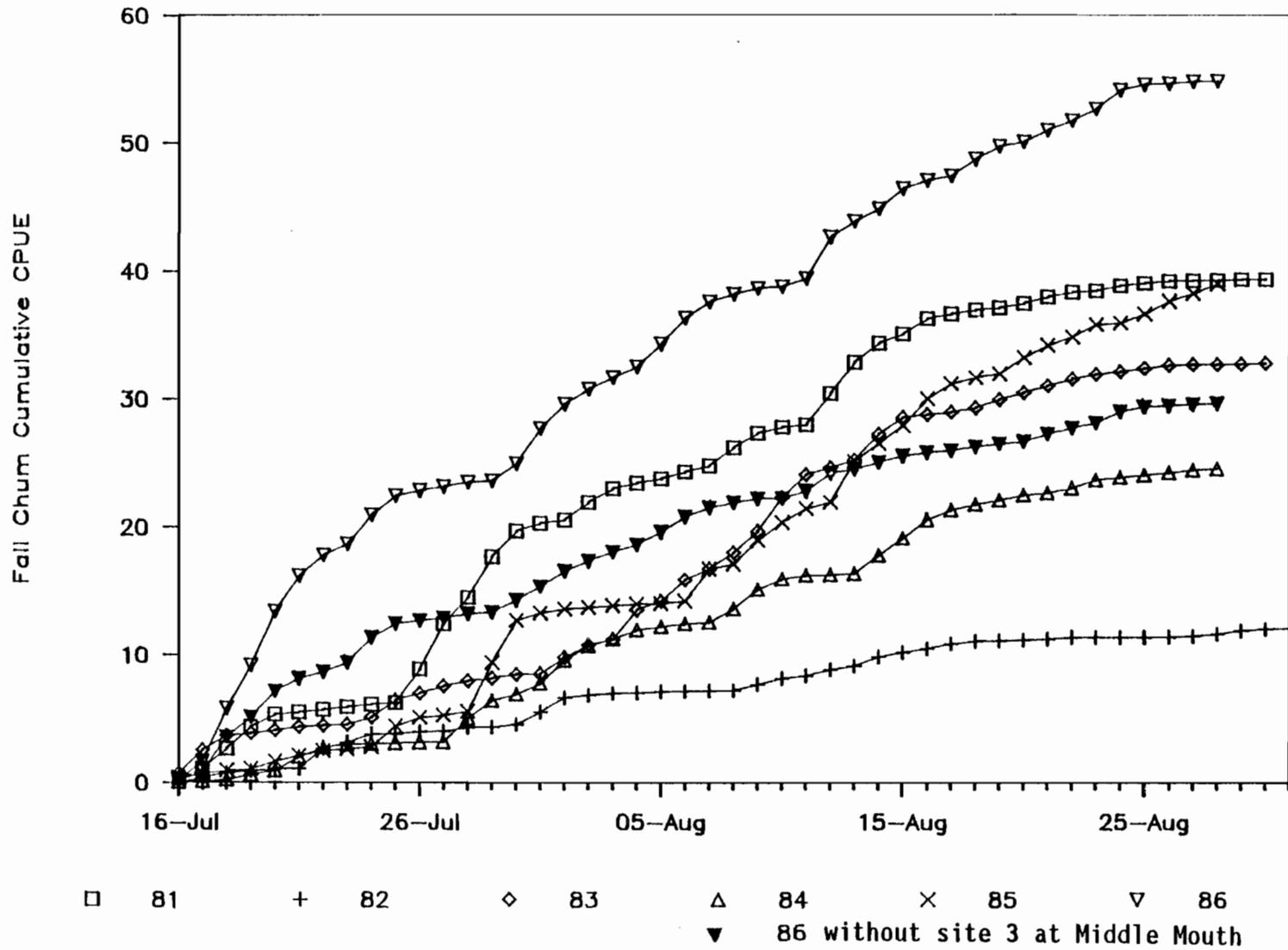


Figure 20. Fall chum salmon cumulative daily CPUE, Big Eddy and Middle combined, 1981-1986.

BIG EDDY & MIDDLE MOUTH

50

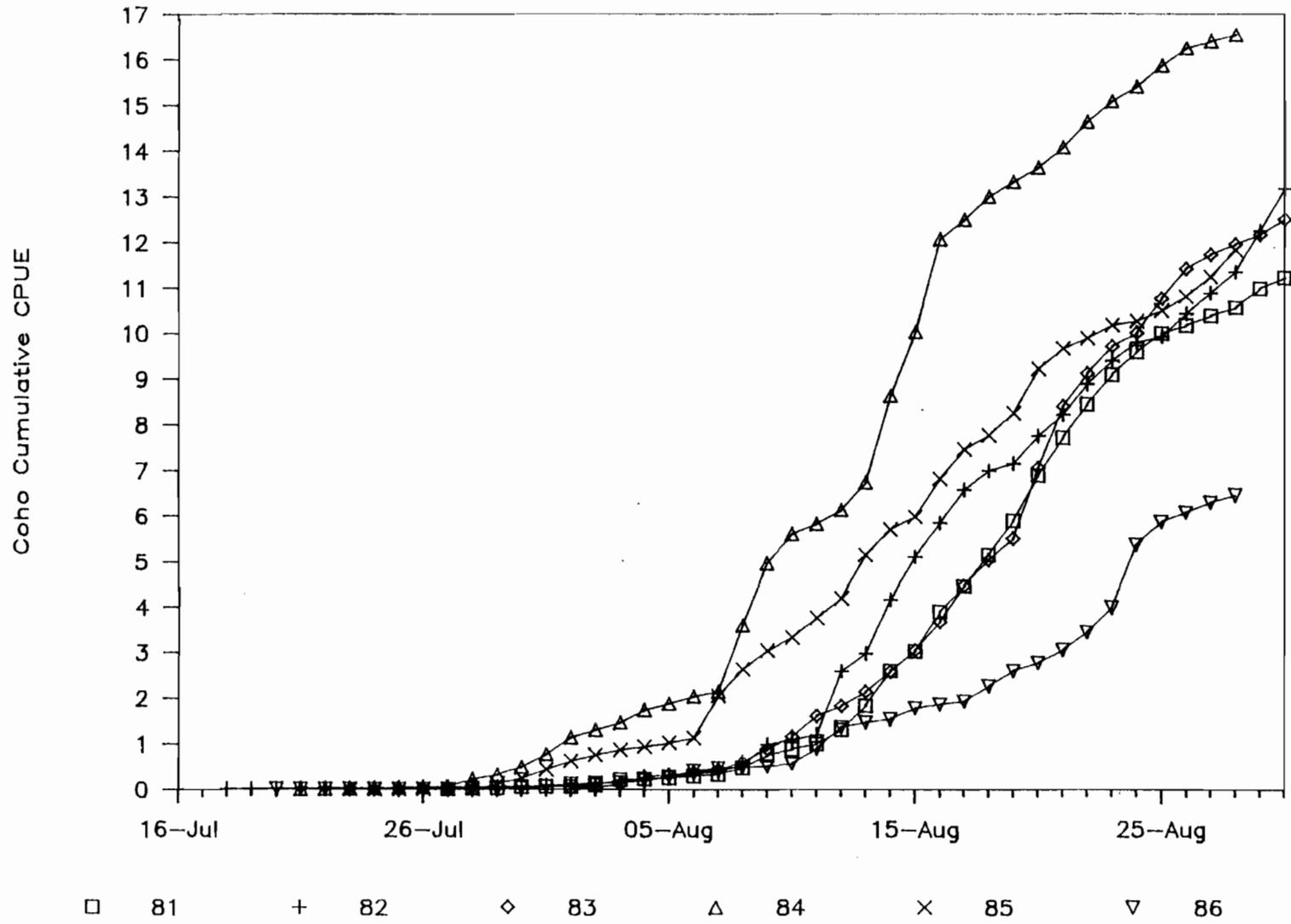


Figure 21. Coho salmon cumulative daily CPUE, Big Eddy and Middle Mouth combined, 1981-1986.

Appendix Table 1. Big Eddy daily test fishing catch of chinook and summer chum salmon, and hours fished by site, 5 June to 15 July, 1986.

Date	Site 1 a			Site 2			Site 3			Site 4		
	Hours Fished	Chinook Catch	Chum Catch	Hours Fished	Chinook Catch	Chum Catch	Hours Fished	Chinook Catch	Chum Catch	Hours Fished	Chinook Catch	Chum Catch
05-Jun	9	0	0	9	0	0						
06-Jun	24	1	0	24	1	0				12	0	0
07-Jun	24	1	0	24	0	0				24	0	3
08-Jun	24	1	0	24	2	0	24	1	4	24	1	16
09-Jun	24	6	1	24	5	1	24	0	19	24	1	230
10-Jun	24	5	1	24	2	1	24	0	26	24	2	295
11-Jun	24	2	1	24	1	1	24	0	16	24	4	184
12-Jun	24	9	2	24	12	0	24	0	58	24	4	330
13-Jun	24	15	6	24	7	7	24	0	75	24	4	489
14-Jun	24	8	2	24	8	5	24	1	78	24	25	318
15-Jun	24	16	5	24	43	35	24	4	91	24	11	497
16-Jun	24	10	4	24	31	22	24	1	89	24	9	401
17-Jun	24	22	0	24	70	42	24	1	48	24	9	631
18-Jun	24	57	6	24	103	60	24	1	97	24	24	733
19-Jun	24	24	0	24	57	22	24	1	88	24	4	230
20-Jun	24	4	0	24	7	0	24	0	50	24	4	74
21-Jun	24	33	1	24	66	9	24	0	28	24	24	221
22-Jun	24	18	3	24	37	19	24	1	51	24	14	330
23-Jun	24	20	2	24	40	15	24	0	39	24	18	460
24-Jun	24	9	0	24	18	1	24	0	38	24	7	141
25-Jun	24	26	2	24	53	11	24	1	27	24	15	367
26-Jun	24	28	0	24	56	3	24	1	30	24	14	249
27-Jun	24	14	1	24	28	4	24	0	39	24	6	131
28-Jun	24	6	0	24	13	1	24	0	29	24	3	67
29-Jun	24	7	0	24	14	2	24	0	31	24	0	86
30-Jun	24	1	0	24	2	0	24	1	13	24	2	27
01-Jul	24	13	0	24	26	2	24	1	15	24	0	29
02-Jul	24	12	0	24	25	1	24	6	21	24	1	42
03-Jul	24	4	0	24	21	3	24	3	22	24	3	49
04-Jul	24	2	0	24	4	1	24	0	18	24	0	13
05-Jul	24	0	0	24	3	0	24	0	3	24	6	17
06-Jul	24	4	0	24	11	0	24	0	11	24	1	41
07-Jul	24	2	0	24	1	1	24	0	5	24	1	26
08-Jul	24	1	0	24	3	0	24	0	3	24	1	21
09-Jul	24	14	3	24	9	1	24	0	13	24	8	38
10-Jul	24	1	0	24	3	0	24	0	6	24	3	37
11-Jul	24	1	0	24	1	0	24	0	1	24	1	10
12-Jul	24	1	0	24	7	0	24	0	5	24	4	30
13-Jul	24	4	8	24	1	0	24	0	13	24	3	46
14-Jul	24	3	2	24	1	0	24	0	11	24	0	52
15-Jul	24	0	0	24	0	0	24	0	3	24	0	16
Total	969	405	50	969	792	270	914	24	1,215	948	237	6,977

a Catches interpolated 20 June to 2 July by the relationship between site 1 and 2 catches prior to 20 June. Chinook and summer chum catches were estimated to be 50% and 16% of catches in site 2, respectively.

Appendix Table 2. Middle Mouth daily test fishing catch of chinook and summer chum salmon, and hours fished by site, 8 June to 15 July, 1986.

Date	Site 1			Site 2			Site 3			Site 4		
	Hours Fished	Chinook Catch	Chum Catch	Hours Fished	Chinook Catch	Chum Catch	Hours Fished	Chinook Catch	Chum Catch	Hours Fished	Chinook Catch	Chum Catch
08-Jun	12	0	0	24	1	0						
09-Jun	24	0	0	24	1	0				24	0	0
10-Jun	24	0	0	24	0	0	24	3	0	24	0	0
11-Jun	24	0	0	24	8	0	24	10	7	24	0	0
12-Jun	24	1	0	24	14	0	24	15	14	24	0	0
13-Jun	24	0	0	24	7	0	24	13	5	24	1	0
14-Jun	24	1	0	24	15	0	24	13	9	24	0	0
15-Jun	24	1	0	24	40	0	24	27	39	24	0	0
16-Jun	24	0	0	24	22	2	24	24	18	24	0	0
17-Jun	24	0	0	24	15	2	24	14	4	24	0	0
18-Jun	24	1	0	24	83	7	24	47	103	24	0	0
19-Jun	24	5	1	24	143	18	24	63	124	24	0	1
20-Jun	24	5	5	24	20	2	24	16	28	24	0	0
21-Jun	24	12	1	24	50	4	24	42	77	24	0	1
22-Jun	24	3	2	24	27	2	24	18	20	24	0	1
23-Jun	24	7	0	24	13	0	24	10	3	24	0	0
24-Jun	24	3	0	24	10	2	24	4	14	24	0	2
25-Jun	24	11	9	24	117	5	24	47	149	24	0	3
26-Jun	24	11	24	24	130	11	24	81	195	24	2	2
27-Jun	24	3	18	24	53	5	24	37	118	24	0	11
28-Jun	24	8	7	24	14	3	24	11	33	24	0	5
29-Jun	24	8	2	24	5	2	24	7	18	24	1	2
30-Jun	24	4	5	24	2	0	24	1	8	24	0	1
01-Jul	24	6	0	24	9	2	24	0	13	24	0	1
02-Jul	24	7	3	24	16	6	24	1	16	24	0	1
03-Jul	24	6	6	24	6	2	24	1	6	24	0	2
04-Jul	24	4	6	24	3	3	24	1	1	24	0	2
05-Jul	24	4	2	24	2	0	24	0	3	24	0	0
06-Jul	24	2	3	24	2	0	24	0	0	24	0	1
07-Jul	24	4	1	24	7	1	24	1	4	24	0	3
08-Jul	24	3	0	24	3	1	24	0	1	24	0	1
09-Jul	24	2	0	24	1	0	24	0	5	24	0	0
10-Jul	24	2	0	24	1	0	24	1	2	24	0	4
11-Jul	24	0	1	24	1	0	24	0	1	24	0	0
12-Jul	24	0	0	24	3	0	24	0	3	24	0	1
13-Jul	24	1	2	24	5	3	24	2	20	24	0	0
14-Jul	24	0	1	24	7	3	24	0	27	24	0	0
15-Jul	24	1	2	24	2	1	24	0	9	24	0	1
Total	900	126	101	912	858	87	864	510	1,097	888	4	46

Appendix Table 3. Big Eddy daily test fishing catch of chinook, coho and fall chum salmon, and hours fished by site, 16 July to 28 August, 1986.

Date	Site 1			Site 2			Site 3					
	Hours Fished	Chinook Catch	Coho Catch	Chum Catch	Hours Fished	Chinook Catch	Coho Catch	Chum Catch	Hours Fished	Chinook Catch	Coho Catch	Chum Catch
16-Jul	24	2	0	8	24	0	0	2				
17-Jul	24	0	0	64	24	0	0	1				
18-Jul	24	2	0	209	24	0	0	25	12	2	0	234
19-Jul	24	0	0	60	24	0	0	66	12	0	0	15
20-Jul	24	0	0	36	24	0	0	135				
21-Jul	24	0	0	25	24	1	0	51				
22-Jul	24	0	0	5	24	0	0	39	12	0	0	14
23-Jul	24	0	0	47	24	0	0	15	12	0	0	15
24-Jul	24	0	0	49	24	0	0	113				
25-Jul	24	0	0	3	24	0	0	91				
26-Jul	24	0	0	3	24	0	0	15				
27-Jul	24	0	0	14	24	0	0	4				
28-Jul	24	0	0	3	24	0	0	24				
29-Jul	24	0	0	2	24	0	0	8				
30-Jul	24	0	1	11	24	0	0	66				
31-Jul	24	0	1	10	24	0	2	59				
01-Aug	24	0	0	20	24	0	5	88				
02-Aug	24	0	0	11	24	0	1	43				
03-Aug	24	0	0	7	24	0	0	58				
04-Aug	24	0	3	9	24	0	1	35				
05-Aug	24	0	3	10	24	0	2	65				
06-Aug	24	0	3	34	24	0	1	50				
07-Aug	24	0	0	20	24	0	3	31				
08-Aug	24	0	1	2	24	0	0	29				
09-Aug	24	0	0	1	24	0	1	25				
10-Aug	24	0	0	1	24	0	0	2				
11-Aug	24	0	16	7	24	0	13	33				
12-Aug	24	0	3	20	24	0	9	34				
13-Aug	24	0	2	9	24	0	1	8				
14-Aug	24	0	3	17	24	0	2	4				
15-Aug	24	0	0	10	24	1	4	3				
16-Aug	24	0	0	4	24	0	4	1				
17-Aug	24	0	2	0	24	0	1	1				
18-Aug	24	0	7	12	24	0	9	6				
19-Aug	24	0	2	4	24	0	4	4				
20-Aug	24	0	7	4	24	0	6	7				
21-Aug	24	0	8	17	24	0	8	24				
22-Aug	24	0	5	18	24	0	5	16				
23-Aug	24	0	10	9	24	0	17	7				
24-Aug	24	0	15	20	24	0	33	42				
25-Aug	24	0	9	9	24	0	12	23				
26-Aug	24	0	1	0	24	1	13	8				
27-Aug	24	0	4	2	24	0	7	7				
28-Aug	12	0	1	0	12	0	3	1				
Total	1,044	4	107	826	1,044	3	167	1,369	48	2	0	278

Appendix Table 4. Middle Mouth daily test fishing catch of chinook, coho and fall chum salmon, and hours fished by site, 16 July to 27 August, 1986.

Date	Site 1			Site 2			Site 3					
	Hours Fished	Chinook Catch	Coho Catch	Chum Catch	Hours Fished	Chinook Catch	Coho Catch	Chum Catch	Hours Fished	Chinook Catch	Coho Catch	Chum Catch
16-Jul	24	0	0	2	24	0	0	0	24	0	0	15
17-Jul	24	1	0	0	24	0	0	3	24	1	0	104
18-Jul	24	0	0	1	24	1	0	29	24	0	0	236
19-Jul	24	0	0	4	24	0	0	22	24	1	0	252
20-Jul	24	0	0	2	24	0	0	20	24	0	1	311
21-Jul	24	0	0	2	24	0	0	16	24	0	0	245
22-Jul	24	0	0	1	24	0	0	4	24	0	0	141
23-Jul	24	0	0	3	24	0	0	3	24	0	0	36
24-Jul	24	0	0	0	24	0	0	29	24	0	0	80
25-Jul	24	0	0	2	24	1	0	6	24	0	0	80
26-Jul	24	0	0	7	24	0	0	0	24	0	0	22
27-Jul	24	0	0	1	24	0	0	0	24	0	0	18
28-Jul	24	0	0	1	24	0	0	0	24	0	0	10
29-Jul	24	0	0	1	24	0	0	2	24	0	0	2
30-Jul	24	0	0	1	24	0	1	14	24	0	0	70
31-Jul	24	0	0	6	24	0	1	28	24	0	0	227
01-Aug	24	0	0	2	24	0	0	7	24	0	2	110
02-Aug	24	0	0	2	24	0	1	17	24	0	0	66
03-Aug	24	0	1	3	24	0	0	1	24	0	0	40
04-Aug	24	0	0	1	24	0	1	9	24	0	1	49
05-Aug	24	0	0	1	24	0	0	20	24	0	6	116
06-Aug	24	0	0	0	24	0	1	28	24	0	10	131
07-Aug	24	0	2	1	24	0	0	15	24	0	2	83
08-Aug	24	0	0	1	24	0	0	7	24	0	0	34
09-Aug	24	0	1	1	24	0	0	3	24	0	1	26
10-Aug	24	0	0	0	24	0	0	1	24	0	5	12
11-Aug	24	0	0	0	24	0	6	12	24	0	6	27
12-Aug	24	0	6	3	24	0	9	76	24	0	29	255
13-Aug	24	0	0	1	24	0	2	12	24	0	7	114
14-Aug	24	0	3	1	24	0	0	31	24	0	2	64
15-Aug	24	0	10	4	24	0	3	32	24	0	12	143
16-Aug	24	0	1	2	24	0	2	19	24	0	3	51
17-Aug	24	0	2	2	24	0	1	9	24	0	2	27
18-Aug	24	0	0	4	24	0	2	5	24	0	21	133
19-Aug	24	0	3	1	24	0	16	14	24	0	16	95
20-Aug	24	0	2	0	24	0	5	8	24	0	2	29
21-Aug	24	0	2	2	24	0	6	14	24	0	10	49
22-Aug	24	0	14	4	24	0	9	8	24	0	13	44
23-Aug	24	0	9	7	24	0	4	15	24	0	25	74
24-Aug	24	0	15	1	24	0	10	21	24	0	94	92
25-Aug	24	0	9	2	24	0	12	3	24	0	17	15
26-Aug	24	0	2	0	24	0	1	0	24	0	8	1
27-Aug	24	0	4	0	24	0	3	2	24	0	8	7
Total	1,032	1	86	80	1,032	2	96	565	1,032	2	303	3,736

Appendix Table 5. Daily test fishing catch of miscellaneous freshwater fish and salmon not commercially taken, 5.5 inch mesh gill nets at Big Eddy, 1986.

Date	Hours Fished	Pink Salmon	Sockeye Salmon	Sheefish	Humpback Whitefish	Broad Whitefish	Rainbow Smelt	Burbot	Northern Char	Pike
05-Jun	0									
06-Jun	12									
07-Jun	26			1						
08-Jun	48					1				
09-Jun	48			2						
10-Jun	48			2						
11-Jun	48			1						
12-Jun	48									
13-Jun	48			2						
14-Jun	48			2						
15-Jun	48			1						
16-Jun	48									
17-Jun	48									
18-Jun	48									
19-Jun	48	2								
20-Jun	48			2				1		
21-Jun	48									
22-Jun	48	1		1						
23-Jun	48	1								
24-Jun	48									
25-Jun	48	2		2						
26-Jun	48	3								
27-Jun	48	2		1						
28-Jun	48	5								
29-Jun	48	4								
30-Jun	48	11		1						
01-Jul	48	18	1							
02-Jul	48	43	1	1						
03-Jul	48	35	1	1						
04-Jul	48	41		1						
05-Jul	48	35								
06-Jul	48	46	2	1						
07-Jul	48	49								
08-Jul	48	62		1						
09-Jul	48	31								
10-Jul	48	107								
11-Jul	48	135								
12-Jul	48	64								
13-Jul	48	44								
14-Jul	48	56								
15-Jul	48	58								
Total	1,862	855	5	23	0	1	0	1	0	0

a Two 8.5 inch mesh test gill nets captured a total of 12 pink salmon and 17 sheefish during the same time period.

Appendix Table 6. Daily test fishing catch of miscellaneous freshwater fish and salmon not commercially taken, 5.5 inch mesh gill nets at Middle Mouth, 1986. a

Date	Hours Fished	Pink Salmon	Sockeye Salmon	Sheefish	Humpback Whitefish	Broad Whitefish	Rainbow Smelt	Burbot	Char	Northern Pike
09-Jun	12									
10-Jun	24			10						
11-Jun	48			15						
12-Jun	48			6						1
13-Jun	48			7						
14-Jun	48			5						
15-Jun	48			1						
16-Jun	48			3						
17-Jun	48			2						
18-Jun	48									
19-Jun	48				1					
20-Jun	48									
21-Jun	48			4						
22-Jun	48	1		1						
23-Jun	48			1						
24-Jun	48			1						
25-Jun	48			1				1		
26-Jun	48			1						
27-Jun	48	1								
28-Jun	48	10		1		1				
29-Jun	48	22		2						
30-Jun	48	35		1				1		
01-Jul	48	50				2				
02-Jul	48	93								
03-Jul	48	131								
04-Jul	48	87		2						
05-Jul	48	85								
06-Jul	48	49				2				
07-Jul	48	71				1				
08-Jul	48	63								
09-Jul	48	33								
10-Jul	48	96							1	
11-Jul	48	53								
12-Jul	48	86	4							
13-Jul	48	32	1							
14-Jul	48	49								
15-Jul	48	58				1				
Total	1,716	1,105	5	64	1	7	0	2	1	1

a Two 8.5 inch mesh test gill nets captured a total of 176 pink salmon, 9 sheefish, 1 rainbow smelt, 1 humpback whitefish and 1 broad whitefish during the same time period.

Appendix Table 7. Daily test fishing catch of miscellaneous freshwater fish and salmon not commercially taken, 6 inch mesh gill nets at Big Eddy, 1986.

Date	Hours Fished	Pink Salmon	Sockeye Salmon	Sheefish	Humpback Whitefish	Broad Whitefish	Rainbow Smelt	Burbot	Char	Northern Pike
16-Jul	48	15								
17-Jul	48	5								
18-Jul	60	12								
19-Jul	60	16								
20-Jul	48	13								
21-Jul	60	15								
22-Jul	60	21								
23-Jul	48	12								
24-Jul	48	6								
25-Jul	48	3								
26-Jul	48	6								
27-Jul	48	5								
28-Jul	48	4								
29-Jul	48	6								
30-Jul	48	9								
31-Jul	48	6								
01-Aug	48	5								
02-Aug	48	4								
03-Aug	48	2								
04-Aug	48	7	1							
05-Aug	48	1								
06-Aug	48	1								
07-Aug	48									
08-Aug	48	1								
09-Aug	48									
10-Aug	48	1								
11-Aug	48	1								
12-Aug	48	2								
13-Aug	48	2								
14-Aug	48									
15-Aug	48									
16-Aug	48		1							
17-Aug	48									
18-Aug	48									
19-Aug	48									
20-Aug	48									
21-Aug	48									
22-Aug	48									
23-Aug	48									
24-Aug	48									
25-Aug	48									
26-Aug	48									
27-Aug	48									
28-Aug	24									
Total	2,136	181	2	0	0	0	0	0	0	0

Appendix Table 8. Daily test fishing catch of miscellaneous freshwater fish and salmon not commercially taken, 6 inch mesh gill nets at Middle Mouth, 1986.

Date	Hours Fished	Pink Salmon	Sockeye Salmon	Sheefish	Humpback Whitefish	Broad Whitefish	Rainbow Smelt	Burbot	Char	Northern Pike
16-Jul	72	36				1				
17-Jul	72	67								
18-Jul	72	42								
19-Jul	72	23								
20-Jul	72	12								
21-Jul	72	20								
22-Jul	72	23		1						
23-Jul	72	24								
24-Jul	72	19								
25-Jul	72	15	1	1						
26-Jul	72	30								
27-Jul	72	28								
28-Jul	72	36		1						
29-Jul	72	17								
30-Jul	72	11								
31-Jul	72	9								
01-Aug	72	5								
02-Aug	72	2								
03-Aug	72	2								
04-Aug	72	1								
05-Aug	72	3								
06-Aug	72	2								
07-Aug	72	1								
08-Aug	72	1		1				1		
09-Aug	72									
10-Aug	72	2	1							
11-Aug	72									
12-Aug	72									
13-Aug	72	1				1				
14-Aug	72									
15-Aug	72									
16-Aug	72									
17-Aug	72									
18-Aug	72									
19-Aug	72									
20-Aug	72									
21-Aug	72									
22-Aug	72			1						
23-Aug	72									
24-Aug	72									
25-Aug	72									
26-Aug	72					1				
27-Aug	72									
Total	3,096	432	2	5	0	3	0	1	0	0

Appendix Table 9. Cloud cover, precipitation, wind, and air and water temperatures at Big Eddy, 1986.

Date	Sky a		Precip. b	Wind (Dir. Mph)		Air Temp.(C)		Water Temp.(C)	
	AM	PM		AM	PM	AM	PM	AM	PM
04-Jun	0	3	A		SE 5		9		7.0
05-Jun	3	3	A	SW 2	NW 6	7	9	9.0	8.5
06-Jun	1	2	A	SW 3	N 5	10	9	9.0	9.0
07-Jun	3	3		NE 7	N 10	8	12	10.0	9.5
08-Jun	3	4	B	NW 2	CALM	7	8	9.5	9.5
09-Jun	4	3	A	SE 14	CALM	8	12	9.5	10.0
10-Jun	2	2	A	SW 7	NW 5	8	8	10.5	11.0
11-Jun	4	1		NE 2	N 5	8	12	11.0	11.0
12-Jun	3	3		SE 4	E 7	12	13	11.0	11.5
13-Jun	3	1		E 2	NE 10	13	22	11.0	13.0
14-Jun	1	1			NW 3		14		13.0
15-Jun	3	1		NW 4	W 5	18		13.0	
16-Jun	1	1		CALM	N 5	16	22	13.5	14.5
17-Jun	3	4	A	NW 4	W 10	14	9	14.5	14.0
18-Jun	4	4	A	SW 14	CALM	7	8	13.5	13.5
19-Jun	4	4		NW 2	N 5	7	8	13.5	13.5
20-Jun	4	4	A		NW 3-5		9		13.0
21-Jun	3	4	A	N 3	W 5	10	9	13.5	13.5
22-Jun	4	4	A	CALM	W 4	7	11	13.5	13.5
23-Jun	4	2	A	S 7	SE 5	9	8	12.0	13.0
24-Jun	4	4	A	SE 15	SE 15-20	8	7	13.5	12.0
25-Jun	4	4	A	SE 15	SE 10	7	7	13.5	12.0
26-Jun	4	4	A	SE 12	SE 5	7	8	11.0	11.5
27-Jun	3	4		SE 4	CALM	9	12	11.5	11.5
28-Jun	2	4		N 5	NE 5	9	9	11.5	11.5
29-Jun	1	3		CALM	NW 3-5	8	10	13.0	13.0
30-Jun	2	1		N 3	N 5-8	8	12	13.5	14.0
01-Jul	1	1		CALM	NW 5	11	9	15.0	14.5
02-Jul	1	1		NW 3	NW 5	14	14	17.0	18.0
03-Jul	1	1		CALM	NW 5-10	14	16	17.0	18.0
04-Jul	1	2		CALM	SW 10	16	17	18.0	18.0
05-Jul	1	1		E 0-5	E 5-10	16	18	18.0	19.0
06-Jul	1	3		N 0-5	E 5	15	16	18.0	18.5
07-Jul	4	4		SE 0-5	SE 5-10	10	16	18.0	18.5
08-Jul	0	2			S 5		14		18.5
09-Jul	1	3		SE 5	CALM	12	14	18.5	18.5
10-Jul	4	4		CALM	CALM	12	12	18.5	18.0
11-Jul	4	4		W 2	NW 5	12	14	18.0	18.0
12-Jul	4	2	A	SE 5-7	S 5	9	12	17.0	16.5
13-Jul	3	0		S 5-10		12		16.5	
14-Jul	1	0		E 3-5	SE 7-10	14	13	16.5	16.5
15-Jul	2	4		E 5	SE 7	12	12	16.5	16.5
16-Jul	4	4	B	S 5-7	S 5	11	12	16.5	16.5
17-Jul	4	4	B	S 5-10	NW 5-10	9	10	16.5	16.5
18-Jul	4	4	B	SE 15-20	S 15-20	10	12	16.5	16.0
19-Jul	4	4	A	S 10-15	S 20	10	10	15.5	15.5
20-Jul	4	4	A	SW 20	SW 10-12	9	9	15.5	15.0
21-Jul	4	1		E 5-7	E 5	12	14	15.0	15.0

-Continued-

Appendix Table 9. Cloud cover, precipitation, wind, and air and water temperatures at Big Eddy, 1986 (continued).

Date	Sky a		Precip. b	Wind (Dir. Mph)		Air Temp.(C)		Water Temp.(C)	
	AM	PM		AM	PM	AM	PM	AM	PM
22-Jul	2	4	B	NE 3	N 3	12	13	15.0	15.0
23-Jul	4	1	B	W 5-10	SW 10	9	15	15.0	15.0
24-Jul	0	0							
25-Jul	0	0							
26-Jul	0	0							
27-Jul	4	1		CALM		11		14.5	
28-Jul	1	1		CALM	SW 0-2	15	18	13.5	14.5
29-Jul	4	4	A	SW 10-15	SW 15	11	9	14.5	14.5
30-Jul	4	4	A	SW 10	E 5	9	10	14.5	
31-Jul	4	4	B	S 15	S 20-25	9	9	14.5	14.0
01-Aug	4	4	B	SE 10-15	E 25	10	11	14.0	14.0
02-Aug	4	4	B	E 18-20	E 15	11	13	14.5	14.5
03-Aug	4	4	A	E 20	E 20	11	12	14.0	14.0
04-Aug	3	4	A	SE 25	SE 25	9	9	12.0	12.0
05-Aug	4	4	A	SE 15-20	S 15-20	8	8	12.5	13.5
06-Aug	3	3	A	SE 8-10	SE 10	10	10	13.5	13.5
07-Aug	4	3	A	SE 10	S 10	8	11	13.5	13.5
08-Aug	3	3		SE 0-5	CALM	10	12	13.5	13.5
09-Aug	4	4	A	E 0-2	E 5	11	11	13.5	13.5
10-Aug	3	4	A	E 10-15	S 20-25	9	8	12.5	12.5
11-Aug	3	3	A	S 20-25	CALM	9	10	12.5	12.5
12-Aug	2	4	A	SW 8-10	S 15	8	9	12.5	12.5
13-Aug	4	3	A	S 22	S 10-12	9	8	12.5	12.5
14-Aug	3	3	A	W 10	W 5	8	7	12.5	12.5
15-Aug	3	4		S 7		7		12.0	12.0
16-Aug	4	4	A	SW 15	CALM	9	10	12.0	12.0
17-Aug	4	2	A	N 8	N 5-8	10	8	12.0	12.0
18-Aug	1	4		CALM	CALM	8	8	12.0	12.5
19-Aug	4	4	A	S 10	S 10-15	7	9	13.0	12.5
20-Aug	4	4	A	S 10-15	S 18-20	10	12	12.0	12.5
21-Aug	5	5	B	S 10-15	CALM	11	10	12.5	12.5
22-Aug	4	4	B	NE 15	NE 20	7	7	12.5	12.5
23-Aug	4	4	B	E 20	E 15	7	7	12.0	12.0
24-Aug	4	4	B	E 10-15	E 8	7	9	12.0	12.0
25-Aug	4	4	B	E 10	E 10	11	13	12.0	12.0
26-Aug	4	4	A	N 10-15	N 15	11	12	12.0	12.0
27-Aug	4	3	A	N 10	CALM	12	13	12.0	12.0
28-Aug	4	0	A	CALM		10		12.0	12.0

- a Sky Code: 0 - No observation
 1 - Clear sky, cloud covering 1/10 or less
 2 - Cloud covering not more than 1/2 of sky
 3 - Cloud covering more than 1/2 of sky
 4 - Completely overcast
 5 - Fog
- b Precipitation Code: A - Intermittent rain
 B - Continuous rain
 C - Snow
 D - Snow and rain mixed

Appendix Table 10. Cloud cover, precipitation, wind, and air and water temperatures at Middle Mouth, 1986.

Date	Sky a		Precip. b	Wind (Dir. Mph)		Air Temp.(C)		Water Temp.(C)	
	AM	PM		AM	PM	AM	PM	AM	PM
07-Jun	3	3		NE 15	N 20	10	9	7.0	8.0
08-Jun	3	3		N 15	NW 10	9	13	9.0	8.0
09-Jun	1	0		NE 5	CALM	10	13	10.0	10.5
10-Jun	1	2		CALM	NW 5-6	6	7	10.0	11.0
11-Jun	3	1		N 4-6	N 7-12	6	12	11.0	11.5
12-Jun	1	3		SW 5	SW 15	14	16	11.0	12.0
13-Jun	2	1		CALM	NE 20	14	12	12.0	12.0
14-Jun	1	1		N 5-15	NE 10-15	23	17	13.5	12.0
15-Jun	1	1		NW 2-5	CALM	17	7	12.0	12.0
16-Jun	1	1		N 2-4	N 2-5	18	8	13.5	13.5
17-Jun	2	3		N 2-4	SW 5-10	13	9	14.5	14.5
18-Jun	4	3	A	SW 10-15	S 3-5	7	7	12.0	12.0
19-Jun	3	4		CALM	N 7-10	7	7	13.5	12.0
20-Jun	0	3			N 7-10		10		13.5
21-Jun	2	5	A	SW 5-10	CALM	14	16	13.5	13.5
22-Jun	0	3	A		N 2-4		8		13.5
23-Jun	4	3	A	S 2-5	S 2-5	9	13	13.5	13.5
24-Jun	4	4	B	SE 15-20	S 8-10	10	7	13.5	13.5
25-Jun	4	4	A	S 8-10	S 8-12	7	7	13.5	12.0
26-Jun	4	4	A	S 4-6	CALM	7	6	13.5	10.0
27-Jun	3	3		SE 5-7	N 2-3	11	7	12.0	12.0
28-Jun	1	2		NE 7-10	N 5-7	11	11	12.0	12.0
29-Jun	1	2		CALM	N 5-8	16	13	12.0	13.5
30-Jun	1	1		N 10-15	CALM	17	12	13.5	14.5
01-Jul	1	1		CALM	N 10-15	12	12	15.0	15.0
02-Jul	1	1		N 5-10	NW 10	16	18	15.0	15.0
03-Jul	1	1		N 5-10	N 5-10	17	17	15.5	16.0
04-Jul	3	0		W 5-10	CALM	16	16	16.0	16.5
05-Jul	4	2		N 0-5	CALM	14	10	16.0	16.0
06-Jul	4	4	A	NW 0-5	NW 5-10	16	17	15.5	16.5
07-Jul	4	4	B	CALM	CALM	15	14	16.5	16.5
08-Jul	2	3	A	SE 5-10	CALM	15	9	16.5	16.5
09-Jul	1	4		CALM	N 5-10	12	12	15.5	15.0
10-Jul	4	0		N 5-10	NW 5-10	14	14	16.5	15.5
11-Jul	4	4		NW 5-10	W 5-10	11	13	15.5	15.5
12-Jul	4	3	A	SE 5-10	CALM	10	8	16.0	15.5
13-Jul	4	3	A	SE 10-15	CALM	11	6	15.5	15.5
14-Jul	2	3		NE 5-10	NE 0-5	12	14	15.5	15.5
15-Jul	3	4	A	N 0-5	SE 10-15	9	14	14.5	15.5
16-Jul	4	4	B	SE 5-10	SE 5	11	8	14.5	15.5
17-Jul	4	4	B	W 10-15	CALM	9	11	12.0	14.5
18-Jul	4	4	B	SW 10-15	SW 10-15	9	10	13.5	14.5
19-Jul	4	4	B	SW 30-40	SW 20-30	8	11	14.5	14.5
20-Jul	4	4	B	SW 25-30	SW 20-30	10	4	13.5	13.5
21-Jul	4	2	A	SW 0-5	W 0-5	8	13	13.5	14.5

-Continued-

Appendix Table 10. Cloud cover, precipitation, wind, and air and water temperatures at Middle Mouth, 1986 (continued).

Date	Sky a		Precip. b	Wind (Dir. Mph)		Air Temp.(C)		Water Temp.(C)	
	AM	PM		AM	PM	AM	PM	AM	PM
22-Jul	4	4	B	NW 5-10	NW 10-15	12	8	14.5	14.5
23-Jul	4	2	B	W 10-20	W 15-25	11	11	14.5	14.5
24-Jul	3	4	B	SW 5-10	SW 5-10	8	12	13.5	14.5
25-Jul	4	4	A	SW 5-10	W 5-10	8	8	13.5	12.0
26-Jul	4	4	A	W 5-10	W 0-5	7	11	12.0	12.0
27-Jul	4	2	A	CALM	CALM	10	11	13.5	12.0
28-Jul	1	1		CALM	CALM	13	18	12.0	12.0
29-Jul	4	4	A	SW 10-15	SW 5-10	10	10	12.0	13.5
30-Jul	4	4	B	SW 10-15	SW 15-20	7	10	12.0	13.5
31-Jul	4	4	B	SW 20-30	SW 25-30	9	8	12.0	13.5
01-Aug	4	4	B	SW 15-20	SE 10-15	7	9	12.0	13.5
02-Aug	4	4	B	SE 10-15	SE 10-15	10	12	12.0	13.5
03-Aug	4	4	A	SE 15-20	SE 10-15	11	9	12.0	13.5
04-Aug	2	3	A	NE 15-20	SE 25-30	9	9	11.0	11.5
05-Aug	0	4	A		SE 10-15		7		10.5
06-Aug	4	3	A	SE 5-10	SE 0-5	9	11	11.0	11.0
07-Aug	4	0	A	SE 10-15		8		11.0	
08-Aug	4	3	A	CALM	CALM	6	12	11.0	11.0
09-Aug	3	4	A	CALM	CALM	11	8	11.5	12.0
10-Aug	4	4	B	CALM	E 40-45	9	7	12.0	12.0
11-Aug	4	3	A	E 40-45	CALM	6	6	11.0	11.0
12-Aug	2	4	A	S 0-5	W 10-15	9		11.0	12.0
13-Aug	4	3	B	SW 15-20	CALM	6	4	10.0	11.0
14-Aug	3	3	A	NW 5-10	CALM	7	3	10.0	10.5
15-Aug	4	0		CALM		3		10.5	
16-Aug	4	4	B	E 10-15	N 0-5	7	7	10.0	10.0
17-Aug	4	3	A	NW 5-10	NW 5-10	9	7	10.0	10.0
18-Aug	1	3		CALM	W 5-10	10	12	11.0	11.0
19-Aug	4	4	A	SE 5-10	SE 5-10	10	12	11.0	11.0
20-Aug	4	4	B	SW 5-10	SE 10-20	9	10	11.0	11.0
21-Aug	4	4	B	SE 10-15	SE 10-15	6	12	11.0	11.0
22-Aug	4	4	B	NW 15	E 30-40	6	4	9.0	8.0
23-Aug	4	4	B	E 15-20	E 10-15	4	6	9.0	10.0
24-Aug	4	4	B	E 15-20	E 10-15	4	6	9.0	10.0
25-Aug	4	4	A	E 5-10	E 5-10	7	10	8.0	10.5
26-Aug	3	4	A	E 20-30	NE 20-25	10	10	10.0	10.5
27-Aug	4	4	A	N 10	N 5-10	9	8	10.0	11.0
28-Aug	3	0	A	CALM		10		10.5	

- a Sky Code: 0 - No observation
 1 - Clear sky, cloud covering 1/10 or less
 2 - Cloud covering not more than 1/2 of sky
 3 - Cloud covering more than 1/2 of sky
 4 - Completely overcast
 5 - Fog
- b Precipitation Code: A - Intermittent rain
 B - Continuous rain
 C - Snow
 D - Snow and rain mixed