

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES

1986
YUKON AREA
SALMON REPORT

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BACKGROUND

Area Boundaries and Legal Gear

The Yukon area includes all waters of the Yukon River drainage in Alaska and coastal waters from Canal Point light near Cape Stephens to the Naskonat Peninsula. For management purposes, the area is divided into six districts and 10 subdistricts (Figure 1). Commercial and subsistence fishing occurs along the 1,200 mile length of the Yukon River (in Alaska) and in the lower 220 miles of the Tanana River. The Lower Yukon area (Districts 1, 2 and 3) includes the coastal waters of the area and that portion of the drainage from the mouth to Old Paradise Village (river mile 301). The Upper Yukon area (Districts 4, 5 and 6) is that portion of the drainage upstream of Old Paradise Village to the U.S./Canada border including the Tanana River drainage.

Legal commercial fishing gear consists of set and drift gill nets in the lower Yukon area and fishwheels and set gill nets in the upper Yukon area. Open skiffs powered by outboard motors are used to operate the fishing gear and to deliver the fish to tenders or shore based buying stations. Subsistence gear commonly used to capture salmon include gill nets, and fishwheels.

Management Considerations

The overall objective of the Department's research and management programs is to manage the various salmon runs for optimum sustained yield.

Subsistence has been designated by the Legislature (State Law 151) as the highest priority among beneficial uses of fish and game resources. Except in areas where intensive commercial fisheries occur, the subsistence fishery is subject to few restrictions in order to give preference to subsistence users. The majority of Yukon River fishermen

usually take salmon for both commercial and subsistence purposes in major commercial fishing areas. Therefore, in order to enforce commercial fishing regulations, it is necessary to place some restrictions on the subsistence fishery. For example, during the commercial salmon fishing season in most areas, subsistence fishing is allowed only during the open commercial fishing periods. During the course of the year, however, substantially more subsistence fishing time is allowed than commercial fishing time.

Management is made difficult by the character of salmon runs, the nature of the various fisheries (for example, the rapid evolution of the lower Yukon set net fishery into a drift net fishery), and the river itself. Since most of the commercial fisheries have only developed or expanded in recent years, there is a lack of adequate escapement and return data on which to fully evaluate the effects of increased commercial harvests. The various fisheries, which are scattered over 1400 river miles, harvest mixed stocks usually several weeks and hundreds of miles from their spawning grounds. Because the Yukon River commercial fisheries harvest mixed stocks, some tributary populations may be under- or overharvested in relation to their actual abundance. For example, in a mixed-stock fishery, where it is impossible to manage each stock separately, some small spawning populations may be reduced to very low levels or even eliminated.

Research projects are underway and additional studies are planned, once additional funding becomes available, to obtain the biological information necessary for better management of the salmon runs. The current projects include: (1) chinook and fall chum salmon stock separation studies using scale pattern analysis techniques, (2) side-scanning sonar and tower counting to obtain accurate daily and seasonal escapements in important tributaries (Arvik, Andrefsky and Sheenjok Rivers), and (3) main river sonar feasibility study (near Pilot Station) to obtain estimates of total Yukon River salmon abundance.

Management of the Yukon River commercial salmon fishery must be conservative because of the difficulty in determining run size, harvesting of mixed stocks, increased effort and efficiency of the commercial fleet, allocation problems, and the need to provide for upriver escapements and subsistence requirements. Important management techniques include establishing guideline harvest ranges, gill net mesh-size restrictions, weekly fishing periods, and season closures. If it becomes apparent during the fishing season (based on analysis of commercial catch and test fishery data) that the run is substantially smaller or larger than needed for escapement and subsistence requirements, commercial fishing time is adjusted through the use of the emergency order or, less frequently, emergency regulation authority.

Status of Fishery, Stocks, and Management Strategies

All five species of Pacific salmon occur in the Yukon River, with chums being the most abundant, followed by chinooks, cohos, pinks, and sockeyes. Commercial salmon fishing (for chinooks) on the Yukon dates back to 1918, but the multi-species salmon fishery did not become fully developed until the mid-1970's. In the Alaskan portion of the Yukon River for the period 1981 - 1985, the average commercial salmon harvest was 1.3 million fish (Table 1) and the average subsistence harvest was 491,000 fish (Table 2).

Approximately 900 commercial fishermen (740 in the 3 lower districts) and 20 processors participate in the fishery. The ex-vessel value of the commercial salmon catch has averaged \$7.3 million for the period 1981 - 1985. Approximately 1,000 fishing families from 37 communities with a total population of nearly 9,000 people (not including the greater Fairbanks area) harvest salmon for subsistence utilization within the Yukon River drainage in Alaska.

Chinook Salmon

Chinook salmon spawning populations are widely distributed throughout the Alaskan and Canadian portions of the Yukon River drainage. Major spawning streams in Alaska include the Andreafsky, Arvik, Nulato, Salcha and Chena Rivers; in the Canadian portion of the drainage (Yukon Territory), important chinook salmon systems include the Big Salmon and Nisutlin Rivers. Chinook salmon escapement trends are shown in Table 3. In general index stream escapements from 1976 through 1981 were consistently above other years.

New information indicates that some chinook salmon stocks have undergone increased exploitation in recent years resulting in less than optimum escapements. This information, obtained from scale pattern analysis (1982 - 1985) and tagging studies (1982, 1983, 1985) indicated that during four out of the last five seasons chinook salmon exploitation rates ranged from 67% to 90% on upper river stocks and from 60% to 80% on middle river stocks. These high exploitation rates are the result of excessive chinook salmon harvests during recent years on runs of average magnitude. Unusually large returns during 1979 - 1981 set a trend for high harvest levels. Beginning in 1982 run strength dropped but harvests remained high.

Annual subsistence catch estimates of chinook salmon in Alaska during 1965 - 1985 ranged from 12,000 - 49,000 (25,841 average). During the 5-year period from 1981 - 1985 subsistence chinook catches increased (37,900 average) due to increased fishing effort and average to above average run size (Table 2). In the Yukon Territory (Canada), the 1981 - 1985 average subsistence catch was 7,200 chinook salmon.

During the period 1960 - 1971, the commercial catch of chinook salmon in Alaska ranged from 79,100 to 129,700 and averaged 104,800. Yukon chinook salmon runs generally declined in magnitude during the early to

mid-1970's, and average commercial harvests dropped to 83,600 during the period 1972 - 1976. The mid 1970's decline of Yukon River chinook salmon is partially attributed to greater interception rates by the Japanese high seas mothership fishery that prevailed before treaty renegotiations in 1978 and 1985.

Timing of chinook salmon runs is highly variable, in response to spring weather conditions. Opening of the commercial fishery in the lower river is likewise variable and usually occurs between 5 June and 15 June by emergency order. The season is opened only after it has been determined (by monitoring of test fishing and subsistence catches) that a sustained migration of fish is occurring and that the early portion of the run has passed through the lower river. This strategy has allowed for increased escapement through the commercial fishery of the early portion of the chinook salmon run. This practice was established: 1) to increase escapements to upper river areas which have experienced recent shortages, and 2) has provided for subsistence use, which is intense during the early portion of the run along the entire course of the river. Additionally, a delayed lower river commercial opening allows an opportunity to assess run strength prior to intensive commercial fishing effort. In Districts 4,5, and 6 the commercial fishing season opens 15 June.

Commercial and subsistence fishing in Districts 1, 2, and 3 is regulated by emergency order authority to establish season openings, season closures, fishing periods, and mesh size restrictions. Prior to the 1986 season fishing periods were normally allowed for two-24-hour periods per week (District 1 - Monday and Thursday, District 2 - Wednesday and Sunday). During the 1986 season fishing periods were established to provide for 24-hour fishing periods with 72 hours between periods to allow for a segment of the run to pass through each district without being harvested.

Regulations adopted by the Board of Fisheries prior to the 1983 season allow an additional subsistence fishing period every other weekend in Districts 1 and 2 through 19 July. In Districts 4, 5, and 6 fishing occurs during two 48-hour periods per week. Duration and frequency of fishing periods may be altered by emergency order, depending on run strength as indicated by comparative commercial and test catches.

A guideline harvest range of 60,000 - 120,000 chinook salmon for Districts 1 and 2 combined has been established by the Board of Fisheries. The midpoint (90,000) of this guideline harvest range should be the expected catch if the run is of average magnitude. If an exceptionally large run occurs, then the upper end (120,000) of the guideline harvest range may be exceeded. Consequently, fishing time may be reduced in Districts 1 and 2 to more evenly distribute harvest throughout the run, even in years of large runs. Commercial chinook salmon harvests in Districts 3-6 are likewise regulated by guideline harvest ranges which allow an additional (combined) harvest of 7,350 - 9,150 chinooks.

Summer Chums

Summer chums are the more abundant of the two chum salmon runs that occur in the Yukon River. Summer chums can be distinguished from fall chums by the following characteristics: (1) earlier run timing (early June to mid-July in the lower river); (2) rapid maturation in fresh water; (3) smaller body size (6 - 7 lb); (4) greater population size, and (5) spawning occurs primarily in lower 600 miles of the drainage.

The Anvik River supports the largest spawning population; other important spawning areas include the Andraefsky, Nulato, Rodo, Salcha and Hogatza River drainages. Although runs fluctuate greatly in abundance from year to year, Yukon River summer chum salmon stocks, with possible exceptions, have not experienced declining escapements (Table 4). Documented harvests and escapements during recent years show minimum run sizes ranging from 1.2 to 5.6 million fish.

Regulations regarding harvest and sale of summer-run chum salmon were liberalized beginning with the 1967 season. By 1973 most gillnet mesh-size restrictions were lifted in order to afford fishermen an opportunity to use small-mesh gill nets, which select for the more abundant chum salmon. Prior to this time, commercialization of this species had been limited because of its importance to upriver subsistence fisheries. Presently, the summer chum salmon subsistence fishery takes 241,000 fish annually (1981 - 1985 average) (Table 2).

The summer chum commercial fishery has developed rapidly in recent years. From 1967 through 1983 harvests ranged from 10,900 to 1.2 million fish, with the average harvest from 1981 to 1985 being 845,300 fish (Table 1). A regulation was promulgated prior to the 1976 season which established a range of dates after which only gill nets of 6-inch or smaller mesh could be used. This regulation was deleted prior to the 1985 season to provide for special summer chum salmon directed periods prior to termination of the chinook salmon directed fishery.

Management of summer chums is complicated by the fact that both chinook and summer chum salmon exhibit similar run timing. Because of the overriding importance of chinook salmon, the harvest of chums in the lower river is greatly dependent on the regulations and management strategies employed toward the more intensively managed chinook salmon fishery. Even if an exceptionally large run of summer chums develops, the harvest of that species may be no more than average because of restrictions imposed on the fleet for the conservation of chinook salmon. In an attempt to increase exploitation of large summer chum salmon runs, special summer chum salmon directed periods restricted to 6 inch maximum mesh size were initiated in 1985 and were increased in 1986. Guideline harvest ranges are used to regulate the harvest of chinooks and fall chums but have not been established for summer chums.

The majority of summer chums harvested in the upper Yukon districts is taken in Subdistrict 4-A. A statewide abundance of ocean-caught salmon in recent years has adversely affected the marketability of upriver summer chum salmon because of their relatively poor flesh quality; however, large amounts of high quality roe continue to be produced in this area.

Fall Chums

Fall chums have the following differentiating characteristics from summer chum salmon: (1) later run timing (mid-July to early September in the lower river); (2) larger size (7 - 9 lb), robust body shape, and bright silvery appearance in the lower river; (3) smaller population size; and (4) spawning that occurs in the upper portions of the drainage in spring fed streams.

Major spawning areas are located in the Porcupine River drainage (Sheenjek River in Alaska and Fishing Branch River in Canada), Chandalar River in Alaska, Tanana River drainage in Alaska (Toklat River, Delta River, and main stem Tanana upstream of Fairbanks) and the upper Yukon River drainage in Canada (Kluane River and mainstem Yukon River). Spawning occurs during September through mid-November.

Tagging studies conducted in the 1970's indicated Porcupine River and upper Yukon River fall chums are distinguished from Tanana River fall chums by their earlier run timing and their orientation along the north bank of the Yukon River in the Ruby area (mile 530 - 700), as opposed to the south bank orientation of Tanana drainage fall chums.

There has been a serious decline in fall chum salmon escapements in recent years (especially 1982 - 1984) for most of the major spawning areas (Figure 2 and Table 5). Average escapements in the Sheenjek, Fishing Branch, Toklat, and Delta Rivers for the period 1982 - 1984 were 40%, 60%, 59% and 25%, respectively, below escapement objectives.

Escapements in 1982 to most streams were the lowest ever recorded. Escapement levels in 1983 and 1984 were similar to record low 1982 escapements. Escapement objectives have not been met on a consistent basis in recent years.

The total utilization (commercial and subsistence catch combined) of fall chums in Alaska during the period 1981 - 1985 has averaged 477,373, an increase of 20% compared to the previous 5-year average (1976 - 1980) of 398,844 (Tables 1 and 2). In the lower Yukon area the majority of the fall chums are utilized for commercial purposes while in the upper Yukon area an increased proportion of fall chums are taken for subsistence. In the Canadian portion of the drainage the combined commercial and subsistence harvest of fall chums averaged 27,679 fish during the period 1981 - 1985.

Fall chum salmon subsistence catches in Alaska have increased in recent years, particularly in District 5. The average subsistence catch in Alaska during the recent 5-year period (1981 - 1985) of 179,129 fall chum salmon (Table 2) is an increase of 37% from the previous 5 year average (1976 - 1980). Comparative commercial and subsistence fall chum salmon catches by district for the period 1977 - 1985 are presented in Table 7. In the Yukon Territory approximately 5,500 fall chums are taken annually for subsistence purposes (recent 5-year average) (Table 6).

Commercial fall chum catches have also increased recently. In Alaska the recent 5-year average (1981 - 1985) harvest is 298,244 fish compared to the previous 5-year average of 269,200, an increase of 11% (Table 1). In the Yukon Territory the commercial catch has also increased from 5,300 (1976 - 1980 average) to 22,200 (1981 - 1985 average) (Table 6).

In response to the poor run experienced in 1982, difficulties in assessing inseason run strength, and the increasing efficiency of the fleet, the Alaska Board of Fisheries adopted several important regulatory restrictions. These restrictions were required to help

prevent overharvesting of specific run segments and to distribute the harvest throughout the run. The following is a summary of changes implemented by the Board between 1983 and 1984.

1) Commercial Fishing Season. Provides for an approximate 7-10 day closure of the commercial fishing season for the lower Yukon area in late July during the early portion of the fall chum run.

2) Set-Net-Only Area. During the fall chum commercial fishing season in coastal areas of District 1, commercial fishermen are restricted to the operation of set gill nets in a special "Set-Net-Only" area.

3) Weekly Fishing Periods. Fishing periods were established by emergency order in the lower Yukon area. Fishing time was reduced to two-24-hour periods per week in District 3 and in the Set-Net-Only area of District 1. In other areas of District 1 and in District 2 fishing was allowed for two-12-hour periods per week.

4) Guideline Harvest Ranges. The Board of Fisheries directed the Department to target toward the lower end of the present guideline harvest ranges unless the run is of very large magnitude.

5) Subsistence Fishing. The aforementioned reduced commercial fishing periods affect the subsistence fishery since fishing time for both fisheries is coincidental. An additional fishing period (24 hours) each weekend for subsistence is allowed in District 1 (excluding the set net area) and in District 2 after the re-opening of the fishing season in late July.

Further regulatory restrictions were adopted by the Board in 1985 for the 1986 season to provide for greater escapements and to reducing the risk of overharvesting anticipated weaker returns. In anticipation of a poor return of fall chums, the following regulations and management strategies were put into effect for the 1986 season only.

Lower Yukon Area

1) Commercial Fishing Season. Closure of the commercial fishing season 15 July in Districts 1, 2, and 3 to protect the early portion of the fall chum salmon run. It was anticipated that assessment of the overall strength of the run would not be evident for 2 or 3 weeks after the closure. If indicated run strength was poor, the commercial fishery would remain closed. If the fall chum salmon run proved to be average or better in magnitude, the fishing season would re-open by emergency order after 5 August.

2) Fishing periods. If sufficient fall chum salmon run strength was indicated, the commercial fishery would re-open and fishing time would be restricted. Based on emergency order authority, 12-hour fishing periods would be allowed in the Set-Net-Only area. In the remainder of District 1 and District 2 either set or drift gill nets could be operated for 6-hour fishing periods during the commercial fishing season.

3) Guideline Harvest Range. The fall chum salmon fishery guideline harvest range was reduced to 0 - 110,000 fish for Districts 1, 2, and 3 combined. It was determined that the upper end of the guideline harvest range would not be exceeded even if the run was above average in run magnitude. In the event of a below average return, the midpoint of the guideline harvest range (55,000) would not be exceeded if a coho directed commercial fishery was opened after 15 August.

4) Subsistence Fishing. Reduced commercial fishing periods affect the subsistence fishery since fishing time for both fisheries is coincidental. If subsistence harvest were restricted, additional fishing periods for subsistence would be allowed in Districts 1 and 2 after reopening of the commercial fishing season by emergency order. During commercial fishery closures, subsistence fishing would be allowed 7 days a week by regulation.

Upper Yukon Area

- 1) Commercial Fishing Season. Closure of the commercial fishery by emergency order no later than 1 -10 August in Subdistricts 4-B and 4-C to afford protection for the early portion of the fall chum salmon run.
- 2) Fishing Periods. If sufficient fall chum salmon run strength was indicated by test fishing catch data, the season would re-open by emergency order. A maximum of 2 days per week fishing time would be allowed.
- 3) Guideline Harvest Ranges. The fishery guideline harvest range was reduced to 0 - 50,250 fall chum and coho salmon combined for Districts 4,5, and 6. The guideline harvest for each district would not be exceeded even if the run was above average in magnitude.
- 4) Subsistence Fishery. If the commercial fall chum salmon fishing season in any district or subdistrict extended beyond 1 week, special subsistence only fishing periods would be announced by emergency order to compensate for reduced fishing time.

Coho Salmon

Coho salmon enter the river during August and early September. Escapement information is very limited. Comparative escapement information for this species is available only from the Tanana River drainage, where escapements appear to have been relatively stable during the last 10 years (Table 8). The Delta Clearwater River near Delta Junction supports the largest known population within the Yukon drainage.

The commercial harvest of coho salmon in the lower Yukon area is dependent upon the timing and duration of the fall chum season. Coho

migration in the lower river peaks during mid- to late August. Cohos are taken incidentally to to the fall chum fishery in most districts, but in some years contribute substantially to the commercial and subsistence harvests, especially in the Tanana River. Commercial catches in the Yukon area during the period 1981 - 1985 have averaged approximately 42,800 cohos (Table 1). Approximately 32,000 cohos are also taken annually (recent 5-year average) for subsistence (Table 2).

1986 SEASON SUMMARY

Area Summary

In 1986, a total of 1,280,597 salmon was harvested commercially in the Yukon area (Table 9). The catch was composed of 99,970 chinook; 993,353 summer chum; 140,019 fall chum; and 47,255 coho salmon. The chinook salmon catch was approximately 40,000 below the previous 5-year average, the summer chum salmon catch was 148,000 above the 5-year average, and the fall chum catch was 158,000 below the 5-year average. The coho salmon harvest was the third largest on record. Included in the summer chum salmon harvest was a record 272,884 lbs of salmon roe sold by upper Yukon area fishermen. Not included in the summer chum salmon harvest is the number of males estimated to have been taken incidentally in the roe fishery (193,000).

Yukon River fishermen received an estimated \$6,248,744 for their catch, similar to the recent 5-year average. Eight buyer-processors operated in the lower Yukon area, and 9 buyer-processors operated in the upper Yukon area.

In 1986, lower Yukon fishermen received an average price of \$1.63 per lb for chinook, \$0.38 per lb for summer chum, \$0.49 per lb for fall chum, and \$0.71 per lb for coho salmon. Upper Yukon commercial fishermen received an estimated per-pound average price of \$0.89 for chinook, \$0.22 for summer chum, \$0.14 for fall chum, \$0.21 for coho, and \$2.08

for salmon roe.

Subsistence harvest survey information is still being compiled, but it is projected that the catch will approximate 40,000 chinook; 165,800 summer chum; 125,700 fall chum; and 13,200 coho salmon (Table 2). Preliminary findings indicate adequate subsistence fishing time was allowed for subsistence fishermen to meet their needs except within the Kantishna Drainage. It also appears subsistence fishing effort in the upper Yukon River area may have been slightly reduced from recent years, especially in District 5. This may have been partially as a result of the anticipated poor return of fall chum salmon.

Chinook Salmon

The timing of the chinook salmon migration in the lower Yukon area was relatively late as anticipated by the cold temperatures and late breakup of river ice. The mean April Nome air temperature was 12° F (5° F lower than normal). The lower river was generally free of ice by 1 June. The first chinook salmon was reported caught on 6 June at Alakanuk by a subsistence fisherman.

Significant test fishing and subsistence catches occurred 16 June and increased sharply in the south mouth prior to the opening of the chinook directed commercial fishery. The commercial fishery was opened by emergency order after subsistence and test fishing catches indicated that the early portion of the chinook salmon run had passed through the lower river. In accordance with the Yukon Area Salmon Management Plan the fishing season was opened on a staggered basis: 19 June in District 1, 22 June in District 2, and 26 June in District 3. These were the second latest opening dates in the history of the fishery.

A conservative management plan was required in consideration of an anticipated chinook salmon run of average magnitude. This pre-season projection was based on the assessment of 5-year-old returns from the

1980 parent year in 1985, and new information which indicated excessive exploitation rates had occurred in 4 out of the last 5 seasons. Initially chinook salmon directed fishing periods (unrestricted mesh size) of 24 hours duration were established in the lower river with 72 hours between periods to allow for a segment of the run to pass through each district without being fished (Table 10). The schedule was maintained through two fishing periods each in Districts 1 and 2. This was different than prior seasons (since 1977) when two periods were scheduled each week (District 1 - Mondays and Thursday, District 2 - Sundays and Wednesdays).

On 25 June it was estimated that by the end of the second District 2 chinook salmon directed period, the combined District 1 and 2 harvest would approach 65,000 to 75,000 chinook salmon while the middle portion of the run was yet in progress. The chinook salmon run at this time, based on test and commercial catch information, appeared to be of average or slightly better than average magnitude which indicated an appropriate chinook salmon harvest for Districts 1 and 2 would be between 90,000 and 110,000, slightly in excess of the midpoint of the guideline harvest range. This harvest goal was to include the incidental catch of chinook salmon during restricted mesh size openings. The incidental catch had averaged 19,700 during the previous 5 years.

Departure from the established fishing schedule was necessary following the second District 2 period to ensure adequate escapement from the middle portion of the run, and to further spread the harvest out over the entire run. Therefore, the third unrestricted mesh size chinook salmon directed fishing periods were delayed until 29 June and 1 July in Districts 1 and 2, respectively. At this time the traditional twice weekly schedule was initiated.

In summary, a total of 94,832 chinook salmon was taken in Districts 1 and 2 between 14 June and 15 July. During eight unrestricted mesh size periods (four each in Districts 1 and 2) between 19 June and 7 July,

79,525 chinook salmon were taken, and during restricted mesh size periods ($\leq 6"$ stretched mesh) 15,307 chinook salmon were taken of which 2,498 were taken after the chinook directed season. In District 3, which is managed under a 1,800 to 2,200 guideline harvest range, a total of 901 chinook salmon was taken during three unrestricted mesh size periods. The total lower Yukon area chinook salmon harvest was 95,733 fish, well below the 1981 - 1985 average of 132,732 fish.

The first reported chinook salmon taken in District 4 was on 8 June in Galena. Significant catches did not begin in this district until the end of June. Only 11 chinook salmon were harvested in Subdistrict 4-A with 491 chinook salmon taken in Districts 4-B and 4-C. A large proportion of the chinook salmon harvest in this district is thought to be retained for personal use, rather than sold in the commercial market.

Run strength in the lower portion of District 5, as indicated by subsistence and commercial catches, indicated a run (predominantly Yukon Territory stocks) of above average magnitude. Run timing appeared to be normal and the first deliveries were made during the 48-hour period ending on 29 June. The season in Subdistricts 5-A, 5-B, and 5-C was closed by emergency order on 12 July with a harvest of 2,370 fish. In Subdistrict 5-D, 364 chinook salmon were taken and the season was closed by emergency order on 19 July. Even though catch rates indicated a stronger-than-average run, emergency closures were imposed when catches were at or near the lower end of the guideline harvest ranges in order to improve upriver escapements.

A reported total of 950 chinook salmon was harvested commercially from District 6 (Tanana River). The commercial season was closed on 17 July with the harvest estimated at 750 chinook salmon. The commercial season was re-opened 25 July to 13 August in response to above average summer chum salmon run strength. A total of 74 chinook salmon was taken during these twice weekly 48 hour periods. Late-arriving fish tickets from the 15 June to 17 July season accounted for the difference in estimated and

final catch estimates. Although escapements were judged to be above average prior to closure of the commercial season, the season was closed to maintain the harvest within the guideline range and to prevent a defacto reallocation of chinook salmon from the lower Yukon area to the upper Yukon area districts.

In the Alaskan portion of the drainage aerial surveys of the index streams documented above average escapements. In the Arvik River 1,118 chinook salmon in the McDonald Creek to Yellow River index area were observed [300 - 500 escapement objective (Esc. Obj.)]. In the East Fork of the Andreafsky River 1,954 chinook salmon were observed (1,100 - 1,600 Esc. Obj.), and in the West Fork 3,158 chinook salmon were observed (700 - 1,000 Esc. Obj.). The following additional Alaska chinook salmon escapements were also documented: Nulato River 2,947 (1,000 Esc. Obj.), Gisasa River 1,346 (650 Esc. Obj.), Chena River 2,030 (1,000 - 1,700 Esc. Obj.), and Salcha River 3,400 (1,500 - 3,500 Esc. Obj.).

In the Yukon Territory, escapements in the major index areas were below average. Escapements were similar to 1982, but below the very large escapements of 1980 and 1981. Chinook salmon escapements in 1986 for the major index areas were as follows: Big Salmon River (745), Nisutlin River drainage (716), and Whitehorse Dam Fishway (541).

Comparative chinook salmon escapement estimates are presented in Table 3.

Summer Chum Salmon

The summer chum salmon migration exhibited average run timing. The first lower river test net catches were on 7 June, and catches increased rapidly indicating an exceptionally strong summer chum salmon run. The summer chum salmon migration developed rapidly in comparison to the chinook salmon migration.

The commercial fishing season opened with special chum salmon directed fishing periods with restricted mesh size ($\leq 6''$ mesh size) due to the large abundance of summer chum salmon prior to significant development of the chinook salmon run (Table 10). A total of 352,772 summer chum salmon was harvested before the end of the chinook salmon directed fishing season. This harvest occurred during three restricted mesh size fishing periods in District 1 (14 June to 2 July) of 12-hour duration each and four restricted mesh size fishing periods in District 2 (15 June to 4 July) of 6 or 12-hour duration. During the eight unrestricted mesh size periods directed for chinook salmon in Districts 1 and 2 of 24-hour duration each, a total of 231,372 summer chum salmon was harvested. Following the chinook salmon directed season there were three restricted mesh size periods of 24-hour duration in District 1 (7 July - 15 July), and two restricted mesh size periods of 24-hour duration in District 2 (9 July - 14 July) for an additional summer chum salmon harvest of 85,410 fish. In District 3 a total of 442 summer chum salmon was commercially harvested during three 24-hour unrestricted mesh size fishing periods. The total lower Yukon Area summer chum salmon commercial harvest was 669,996 fish, slightly in excess of the 1981 - 1985 average harvest of 606,276 fish.

Special chum salmon directed fishing periods were introduced in 1985 when a single 6-hour period was allowed in District 2. The increased number of special chum salmon directed fishing periods in 1986 was in response to the late run timing of chinook salmon in comparison to the summer chum salmon migration and the exceptional strength of the summer chum salmon run. These special periods will not occur as frequently during years of average summer chum salmon run strength.

Problems were encountered by processors due to increased availability of summer chum in District 1. It was estimated that about 12,000 - 15,000 summer chum were wasted due to lack of processing capacity (not included in harvest figures). Additionally, lower river fishermen voiced their

concern and displeasure regarding the harvest of chum salmon prior to achieving the chinook salmon harvest guideline.

As in the past several years, only a very limited market existed in District 4 for summer run chum salmon. As a result, roe was again the primary fishery product from this area. A total of 269,738 lb of unprocessed roe was delivered during the summer season, approximately 88% of which originated in Subdistrict 4-A. A total of 300 chum (in the round) was sold. Catches peaked during the period of 29 June to 1 July, during which time approximately 52,139 lb of roe were sold. Roe deliveries this year exceeded the previous record (247,738 lb in 1985) by nearly 10% and was 26% above the 1981 - 1985 average. A total of 75 fishermen made deliveries during the course of the summer season, which approximates the 1981 - 1985 average of 77. The District 4 roe harvest resulted from an estimated harvest of 461,000 summer chum salmon (males and females). This estimate is based on a 1:1.4 male to female sex ratio as documented by the Department operated fishwheel located near Kaltag from 1983 to 1985. Males taken during this fishery are assumed to be documented in subsistence harvest totals. Although established regulations require utilization of carcasses, and many are utilized to meet subsistence requirements, significant waste was documented during the 1986 season.

Summer chum are sold in District 5 only incidentally to the chinook salmon fishery. A total of 690 chum were sold commercially during the 1986 season.

A commercial harvest of 50,483 summer chum and 2,146 lb of roe was made in District 6 in 1986. The first deliveries were made 7 - 9 July. By 15 July it was evident that a run of exceptional strength was in progress. Due to achievement of the chinook salmon harvest guideline, the season was closed 17 July. After chinook salmon abundance declined the season was reopened 25 July and closed 13 August. Approximately 88% of the summer chum salmon harvest was taken during the second season.

Poor market conditions and resulting low prices, however, are thought to have limited catches, particularly in Subdistrict 6-C. The 1986 harvest was approximately 21% above the 1981 - 1985 average of 41,388 fish.

Summer chum salmon escapements were generally very good in the lower Yukon drainage. In the Anvik River a total of 1,189,602 fish, the second highest escapement recorded, was enumerated by sonar. This escapement was more than double the escapement objective of 487,000 fish. In the Andreafsky River system, escapement fell within the established objectives. In the West Fork of the Andreafsky River 99,931 summer chum salmon (62,000 - 116,000 Esc. Obj.) were observed by aerial survey. In the East Fork of the Andreafsky River 83,931 summer chum salmon (76,000 - 109,000 Esc. Obj.) were observed. Escapement to the East Fork was additionally estimated by tower counting to total 167,614 summer chum salmon for the entire season.

In the upper Yukon area escapement objectives were achieved in the Nulato River as 64,265 summer chum were observed (37,000 to 53,000 escapement objective) as well as the Salcha River where 8,028 chum were observed (3,500 E.O.). Inclement weather conditions precluded a survey of the Hogatza River.

Comparative summer chum salmon escapement information is presented in Table 4.

Fall Chum and Coho Salmon

In the lower Yukon area the percentage of fall chum salmon in the test net catches increased steadily after 13 July, and by 18 July essentially all were fall chum salmon. The fishing season was closed effective 15 July in Districts 1-3 to afford protection for the early fall chum salmon run and to provide the Department the opportunity to determine if run strength was great enough to provide for a commercial harvest.

By 21 July it was apparent that the fall chum salmon run was early and that the early portion of the run was unexpectedly strong. As indicated by test net catches and main river sonar counts, relatively large numbers of fish entered the river 18 - 20 July and 24 - 26 July. By 25 July it was judged run strength was sufficient to allow a limited commercial harvest. A flexible guideline harvest range of 0 - 110,000 fall chum salmon was in effect for Districts 1, 2 and 3 combined.

The commercial fishing season was re-opened effective 4 August in District 1, 6 August in District 2, and 10 August in District 3 (Table 11). Fishing periods were established by emergency order on a period-by-period basis to provide management flexibility in adjusting harvest to run strength. After the re-opening of the fishing season both test fishing and main river sonar data indicated average to above average run strength. A total of 6 fishing periods each was allowed in Districts 1 and 2, and 5 fishing periods were established in District 3. Fishing periods were of 6 to 12-hour duration (except in the Set-Net-Only area of District 1 which had twice the amount of fishing time).

Department test net catches indicated a marked increase in coho salmon on 11 August after which significant numbers of coho salmon were taken. The proportion of coho to fall chum salmon increased with each period. By the last period on 24 August coho salmon accounted for approximately 50% of the commercial catch. A total of 113,452 fall chum salmon and 46,814 coho salmon were harvested. The fall chum salmon catch was 48% below the 1981 - 1985 average and the coho salmon catch was 25% above the 1981 - 1985 average.

Prior to the arrival of fall chum salmon into Subdistricts 4-B and 4-C the commercial fishery was closed to afford protection for the early portion of the fall chum run while providing an opportunity to determine if run strength was sufficient to provide for a commercial harvest. By

10 August catch rates at the north bank test fishwheel located 14 miles above Ruby verified lower river estimates of average or above average run strength and the commercial season was re-opened on 13 August. Poor market conditions limited fishing effort and catches, however, a few catcher-sellers operated. The season closed 5 September with a fall chum salmon harvest of 2,045 fish. No coho salmon landings were reported.

District 5 closed following the summer season on 19 July and re-opened 19 August after a portion of the fall chum salmon run had passed through the district, and fall chum salmon were well distributed throughout the district. Three 24-hour periods and a single 36-hour period took place prior to the 31 August season closure. A total of 22,448 fall chum salmon was harvested which included the sale of 395 lbs of roe. No coho salmon landings were reported.

Inseason fall chum salmon run strength into the Tanana River drainage (District 6) is initially identified by a test fishwheel located approximately 20 miles upstream of Ruby on the south bank of the Yukon River. Test fishwheel catches indicated the District 6 fall chum salmon run would be as strong as the mainstem Yukon River run. Based on Ruby test fishwheel catches and reports of several Tanana River subsistence fishermen, a 12-hour commercial fishing period was established by emergency order on 12 September. A total of 1,892 fall chum salmon and 441 coho salmon were harvested. This poor catch was the first indication of a poor fall chum salmon return to the Tanana River. The subsistence harvest was closely monitored over the next several days and catches continued to be poor, confirming that the Tanana River fall chum salmon run was weak. No further commercial fishing was allowed in the Tanana River. Due to the apparent poor run and the need to improve escapements to Kantishna River tributaries, which had poor escapements from 1982 to 1984, the Kantishna River was closed to subsistence fishing on 19 September. This closure affected four fishing families that live within the Kantishna drainage.

Based on inseason indicators (test fishing, main river sonar and commercial catch rates excluding District 6), the fall chum salmon run was judged to be early and of greater magnitude than anticipated, similar in strength to the runs of 1983 and 1985. Fishery management strategies in Districts 1-5 were based on apparent run strength within guidelines established by Board of Fisheries directive. Post-season catch and escapement information conflicts with the in-season evaluation of run strength and indicates that the 1986 return was more similar in abundance to years of poor returns (1982 and 1984) (Table 5). Escapements to the Delta, Toklat, Sheenjek, and Fishing Branch Rivers combined were 21% below the combined escapement objective for these systems. On an individual basis the Sheenjek was 9% above the escapement objective while the Delta, Toklat and Fishing Branch River escapements were 46%, 43%, and 37% below objectives, respectively. Commercial fishery timing affects escapement distribution as Tanana River fall chum salmon can be distinguished from Porcupine River and upper Yukon River fall chum salmon by their later run timing as indicated by tagging studies conducted in the late 1970's. The delayed season opening in 1986 resulted in achievement of the escapement objective for a single Porcupine River stock with Tanana River fall chum salmon stock escapements well below objectives.

The larger than expected return of fall chum salmon may be partially explained by unusually large contribution of 5-year-old fall chum salmon (preliminary estimate being 3% of total run), as well as conservation measures taken in mixed stock fisheries. Although the run was assessed in-season to be greater than escapement information later indicated, conservation measures established by the Board of Fisheries for the 1986 season, resulted in significantly better escapements than had occurred from 1982 - 1984. These regulations were only valid for the 1986 season. The established regulations provided for conservative management of the Yukon River fall chum salmon commercial fishery. It is anticipated 1987 and 1988 returns of fall chum salmon will be weak.

The Board of Fisheries needs to take action to address this issue to provide for adequate escapements in 1987 and 1988. The Department has provided a proposal similar to the 1986 regulations for Board of Fisheries action.

Limited coho salmon escapement information is obtained annually. During 1986 aerial surveys of five spawning index areas were conducted, two of which were flown under poor survey conditions. Escapements were above average in upper Tanana River tributaries while limited survey results suggest lower Tanana River tributaries were near average (Table 8).

OUTLOOK FOR 1987

Chinook Salmon

In most years, the dominant age class returning is 6 year-old-fish; however, 5- and 7-year-old fish also contribute to the run. The 1981 brood year return (6-year-olds in 1987) was judged above average in abundance as indicated by comparative catch and escapement data. The return of 5-year-olds (1982 brood year) is expected to be below average, based on below average run strength in 1982. Seven-year-olds are not expected to contribute significantly to the run in 1986, based on the below average return of 6-year-olds in 1986. In summary, based on evaluation of brood year run size data and assuming normal survival, it is expected that the 1987 Yukon River chinook salmon run will be above average in magnitude being supported primarily by 6-year-old fish. The expected commercial harvest in Alaska is expected to total 96,000 - 127,000 fish.

Summer Chum Salmon

Normally, Yukon River summer chum salmon runs are predominately composed of 4-year-old fish, although in some years 5-year-old fish are present in large numbers. The return of 4-year-olds in 1987 will be dependent

on the strength of the 1983 brood year and the survival of the resulting offspring. Based on the available catch and escapement data, the magnitude of the 1983 summer chum salmon run was judged below average to average in abundance. The return of 4-year-olds in 1987 is expected to be of similar magnitude. The return of 5-year-olds is expected to be average based on the average return of 4-year-olds in 1986. In summary, based on evaluation of brood year run size data and assuming normal survival, the magnitude of the Yukon River summer chum salmon run in 1987 is expected to be average. The commercial harvest is expected to total 600,000 - 900,000 fish.

Fall Chum Salmon

Similar to the summer run, the majority of the fall chum salmon return each year is 4-year-old fish. The magnitude of the 1983 escapement, which were near the lowest ever recorded in some streams, was judged to be poor. The return of 4-year-olds in 1987 is expected to be below average as a result. The return of 5-year-olds (1982 brood year) may not significantly contribute to the run based on the apparent below average return of 4-year-olds in 1986, and the very poor escapements in 1982. Although escapements in 1983 were slightly better than those of 1982, run strength in 1987 may not be as strong as in 1986 since contribution of 5-year-old fish in 1987 will probably be quite low. In summary, based on evaluation of brood year escapements and assuming average survival, a poor return is expected in 1987. If the actual return is weak, commercial catches will be restricted and some commercial fisheries may not be opened at all in order to achieve escapement objectives.

Coho Salmon

Four-year-old fish (1983 brood year) are the dominant age class. Adequate escapement information for coho salmon is lacking, but escapement surveys in the Tanana River system indicated average run

strength in 1983. The harvest in 1987 is expected to total 40,000 - 70,000 fish, depending on the amount of fishing effort directed on the fall chum run and duration of the fishing season.

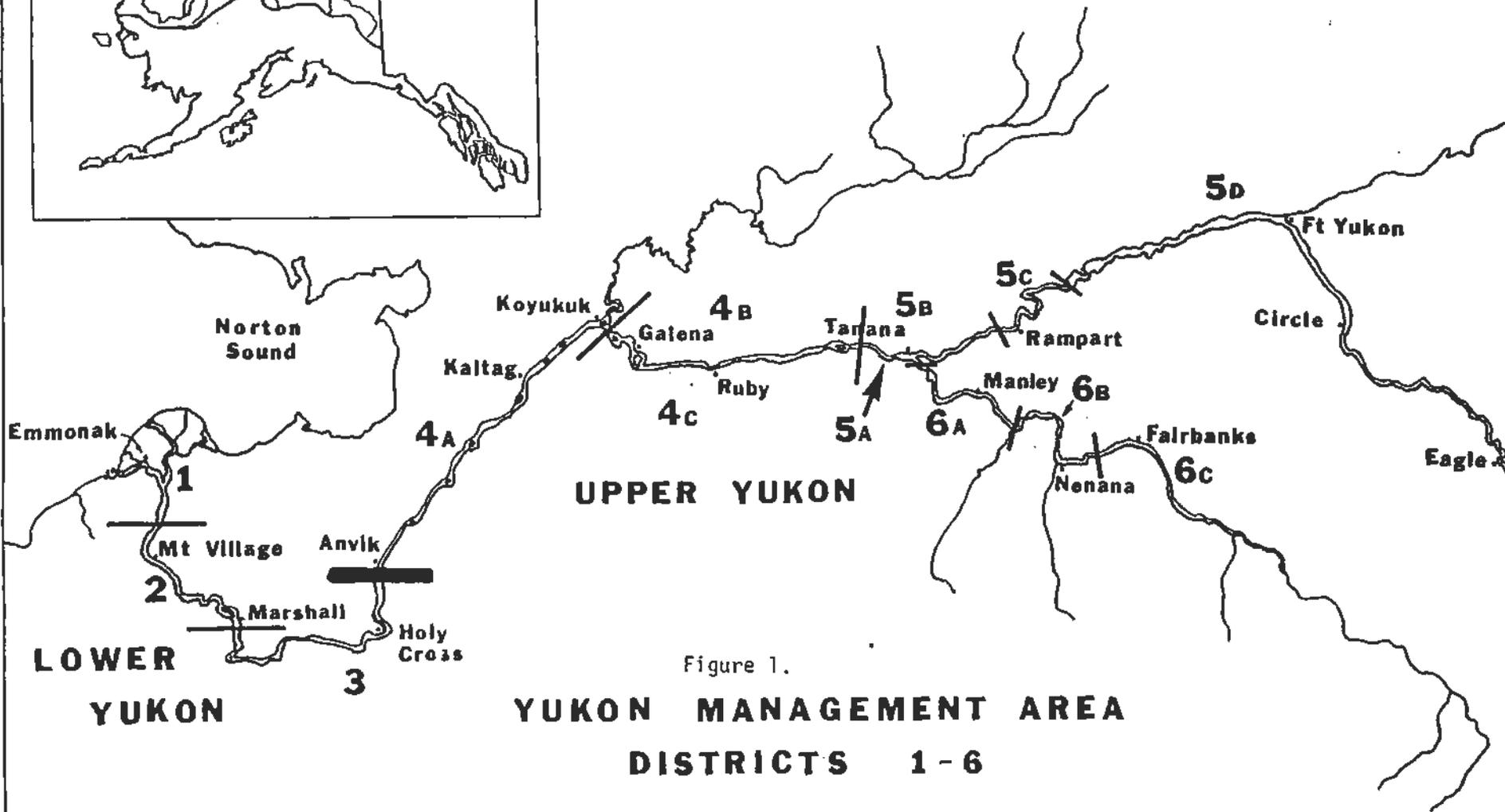
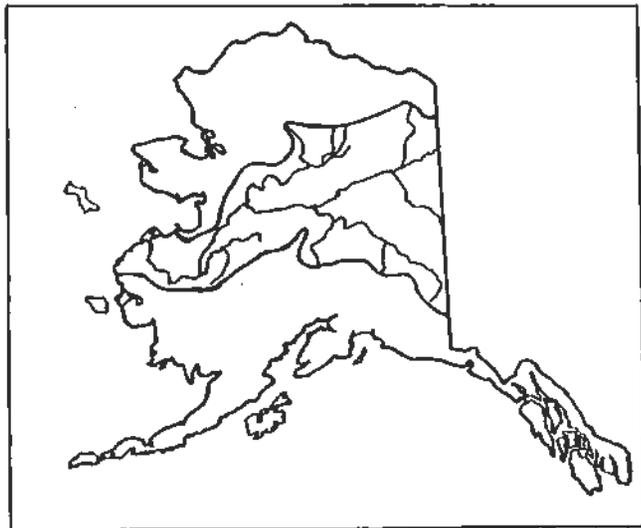


Figure 1.
YUKON MANAGEMENT AREA
DISTRICTS 1 - 6

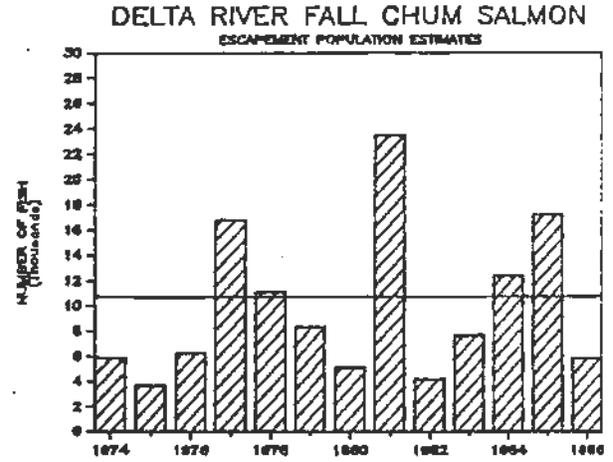
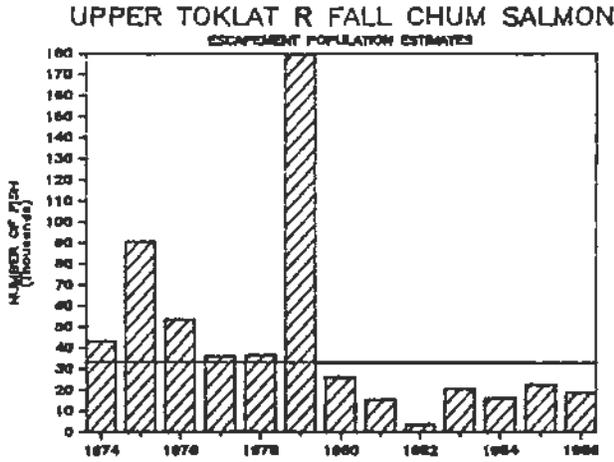
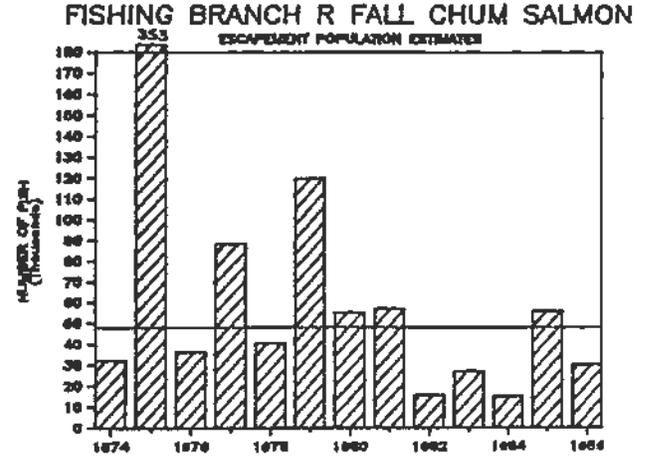
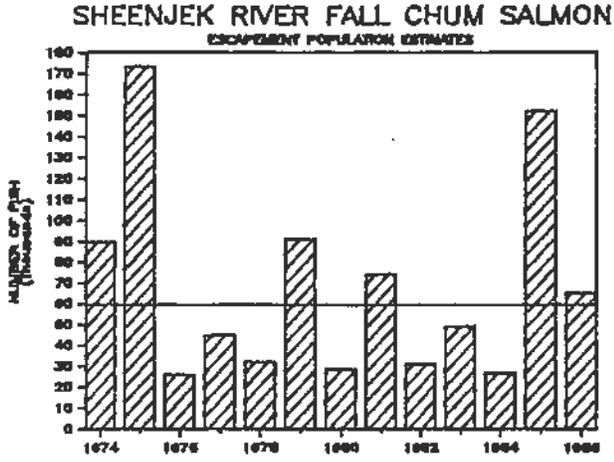


Figure 2. Fall chum salmon expanded escapement population estimates for four selected Yukon River spawning areas, 1974-1986.

Table 1. Commercial salmon catches, Yukon area, 1961 - 1986. a/

Year	Chinook	Summer Chum b/	Fall Chum b/	Total Chum b/	Coho b/	Total b/
1961	119,664	-	42,461	42,461	2,855	164,980
1962	94,734	-	53,116	53,116	22,926	170,776
1963	117,048	-	-	-	5,572	122,620
1964	93,587	-	8,347	8,347	2,446	104,380
1965	118,098	-	23,317	23,317	350	141,765
1966	93,315	-	71,045	71,045	19,254	183,614
1967	129,656	10,935	38,274	49,209	11,047	189,912
1968	106,526	14,470	52,925	67,395	13,303	187,224
1969	91,027	61,966	131,310	193,276	15,093	299,396
1970	79,145	137,006	209,595	346,601	13,188	438,934
1971	110,507	100,090	189,594	289,684	12,203	412,394
1972	92,840	135,668	152,176	287,844	22,233	402,917
1973	75,353	285,509	232,090	517,599	36,641	629,593
1974	98,089	589,892	289,776	879,688	16,777	994,554
1975	63,838	710,295	275,009	985,304	2,546	1,051,688
1976	87,776	600,894	156,390	757,284	5,184	850,244
1977	96,757	534,875	257,986	792,861	38,863	928,481
1978	99,168	1,077,987	247,011	1,324,998	26,152	1,450,318
1979	127,673	819,533	378,412	1,197,945	17,165	1,342,783
1980	153,985	1,067,715	298,450	1,366,165	8,745	1,528,895
1981	158,018	1,196,006	477,736	1,673,742	23,680	1,855,440
1982	123,644	614,222	224,992	839,214	37,176	1,000,034
1983	147,910	894,878	307,662	1,202,540	13,320	1,363,770
1984	119,904	755,821	210,560	966,381	81,940	1,168,225
1985	146,188	765,622	270,269	1,035,891	57,672	1,239,751
1986	99,970	993,353	140,019	1,133,372	47,255	1,280,597
5 yr average (1981-1985)	139,133	845,310	298,244	1,143,554	42,757	1,325,444

a/ Does not include Canadian catches.

b/ Includes "equivalent numbers" of salmon converted from roe sales. The number of males taken incidentally to the roe fishery are not included as part of the commercial harvest.

Table 2. Subsistence salmon catches, Yukon area, 1961 - 1986.

Year	Chinook	Summer a/ Chum	Fall b/ Chum	Total Chum	Coho	Total
1961	21,488	305,317	101,772	407,089	-	428,577
1962	11,110	261,856	87,285	349,141	-	360,251
1963	24,862	297,094	99,031	396,125	-	420,987
1964	16,231	361,080	120,360	481,440	-	497,671
1965	16,608	336,848	112,283	449,131	-	465,739
1966	11,572	154,508	51,503	206,011	-	217,583
1967	16,448	206,233	68,744	274,977	-	291,425
1968	12,106	133,880	44,627	178,507	-	190,613
1969	14,000	156,191	52,063	208,254	-	222,254
1970	13,874	166,504	55,501	222,005	-	235,879
1971	25,684	171,487	57,162	228,649	-	254,333
1972	20,258	108,006	36,002	144,008	-	164,266
1973	24,317	161,012	53,670	214,682	-	238,999
1974	19,964	227,811	93,776	321,587	-	341,551
1975	13,045	211,888	86,591	298,479	-	311,524
1976	17,806	186,872	72,327	259,199	-	277,005
1977	17,581	159,502	82,771	242,273	16,333	276,187
1978	30,297	197,137	94,867	292,004	7,787	330,088
1979	31,005	196,187	233,347	429,534	9,794	470,333
1980	42,724	272,398	172,657	445,055	20,158	507,937
1981	29,690	208,284	188,525	396,809	21,228	447,727
1982	28,158	260,969	132,897	393,866	35,894	457,918
1983	49,478	240,386	192,930	433,316	23,895	506,689
1984	42,428	230,747	174,823	405,570	49,020	497,018
1985	39,771	264,828	206,472	471,300	32,264	543,335
1986 d/	40,000	165,800	125,700	291,500	19,800	351,300
5 yr average (1981-1985)	37,905	241,043	179,129	420,172	32,460	490,537

a/ Includes small numbers of pinks.

b/ Includes small numbers of cohos prior to 1977.

c/ Prior to 1977 only king and "small salmon" were recorded during subsistence fishery surveys. Number of summer and fall chums are estimated for 1961-1976.

d/ Preliminary estimate

Table 3. Chinook salmon escapement counts for selected spawning areas in the Yukon River drainage, 1959-1986. a/

Year	Spawning Area									
	Andreafsky		Arvik		Nulato	Chena River	Salcha	Big Salmon b/	Nisutlin River c/	Whitehorse Fishway
	E. Fork	W. Fork	Aerial	Tower						
1959	-	-	-	-	-	-	-	-	-	1,054
1960	1,020	1,220	1,950	-	756	132 d/	1,660	-	-	660
1961	1,003	-	1,226	-	543 d/	-	2,878	-	-	1,068
1962	675 d/	762 d/	-	-	-	-	937	-	-	1,500
1963	-	-	-	-	-	137 d/	-	-	-	484
1964	867	705	-	-	-	-	450	-	-	587
1965	-	355 d/	650 d/	-	-	-	408	-	-	903
1966	361	303	638	-	-	-	800	-	-	563
1967	-	276	336 d/	-	-	-	-	-	-	533
1968	380	383	310 d/	-	-	-	739	827 d/	407	414
1969	231 d/	274 d/	296 d/	-	-	-	461 d/	286 d/	105 d/	334
1970	665	574 d/	368	-	-	-	1,882	670	615	625
1971	1,904	1,682	-	-	-	193 d/e/	158 d/	200 d/	650	856
1972	798	582 d/	-	1,198	-	138 d/e/	1,193	560	237	391
1973	825	788	-	613	-	21 d/	391	75 d/	36 d/	224
1974	-	285	-	471 d/	78 d/	1,035 e/	1,857	70 d/	150 d/	273
1975	993	301	-	730	204	316 e/	1,055	153 d/	239	313
1976	818	643	-	1,154	648	531	1,641	86 d/	102	121
1977	2,008	1,499	-	1,371	487 d/	563	1,202	316 d/	77 d/	277
1978	2,487	1,062	-	1,324	920	1,726	3,499	524	375	725
1979	1,180	1,134	-	1,484	1,507	1,159 d/	4,789	632	713	1,184
1980	958 d/	1,500	1,330	-	1,323 d/	2,541	6,757	1,568	975	1,383
1981	2,146 d/	231 d/	807 d/	-	791 d/	600 d/	1,237 d/	2,411	1,626	1,539
1982	1,274	851 d/	-	-	-	2,073	2,534	757	578	473
1983	-	-	653 d/	-	1,006	2,553	1,961	540	701	905
1984	1,573 d/	1,993	641 d/	-	-	501	1,031	1,044	832	1,042
1985	1,617	2,248	1,051	-	2,780	2,553	2,035	801	409	536
1986	1,954	3,158	1,118	-	2,974	2,031 d/	3,368	745	459 d/	541

a/ Data obtained by aerial survey unless otherwise noted. Only peak counts are listed.

b/ Big Salmon Lake - Souch Cr.

c/ Sidney Cr. - 100 Mile Cr.

d/ Incomplete survey and/or poor survey timing or conditions resulted in minimal or inaccurate count.

e/ Boat survey.

Table 4. Summer chum salmon escapement counts for selected spawning areas in the Yukon River drainage 1973-1985. a/

Year	Andreafsky			Anvik				
	E. Fork		W. Fork	Tower and		Nulato	Hogatza	Salcha
	Aerial	Sonar	Aerial	Sonar				
1973	10,149 b/	-	51,835	86,665 b/	-	-	-	-
1974	3,215 b/	-	33,578	201,277	-	51,160	-	3,510
1975	223,485	-	235,954	845,485	-	138,495	22,355	7,573
1976	105,347	-	118,420	406,166	-	40,001 b/	20,744	6,474
1977	112,722	-	63,120	262,854	-	69,660	10,734	677 b/
1978	127,050	-	57,321	251,339	-	54,480	5,102	5,405
1979	66,471	-	43,391	-	280,537	37,104	14,221	3,060
1980	36,823 b/	-	115,457	-	492,676	14,946 b/	19,786	4,140
1981	81,555	147,312	-	-	1,479,582	14,348 b/	-	8,500
1982	7,501 b/	181,352	7,267 b/	-	444,581	-	4,984 b/	3,756
1983	-	110,608	-	-	362,912	21,012 b/	28,141	716 b/
1984	95,200 b/	70,125	238,565	-	891,028	-	-	9,810
1985	66,146	-	52,750	-	1,080,243	29,838	22,566	3,178
1986	83,931	167,614	99,373	-	1,189,602	64,265	-	8,028

a/ Data obtained by aerial survey unless otherwise noted. Only peak counts are listed.

b/ Incomplete survey and/or poor survey timing or conditions resulted in minimal or inaccurate count.

Table 5. Yukon River fall chum salmon expanded escapement population estimates for four selected spawning areas, 1974-1986.

Year	Escapement Population Estimates				Proportion of Total				
	Delta a	U Toklat b	Sheenjek c	Fish Br d	Total	Delta	U Toklat	Sheenjek	Fish Br
1974	5,915	43,484	89,966	32,525 w	171,890	0.03	0.25	0.52	0.19
1975	3,734 p	90,984	173,371	353,282 w	621,371	0.01	0.15	0.28	0.57
1976	6,312 p	53,882	26,354	36,584	123,132	0.05	0.44	0.21	0.30
1977	16,876 p	36,462	45,544	88,400	187,282	0.09	0.19	0.24	0.47
1978	11,136	37,057	32,449	40,800	121,442	0.09	0.31	0.27	0.34
1979	8,355	179,627	91,372	119,898	399,252	0.02	0.45	0.23	0.30
1980	5,137	26,373	28,933	55,268	115,711	0.04	0.23	0.25	0.48
1981	23,508	15,775	74,560	57,386 e	171,229	0.14	0.09	0.44	0.34
1982	4,235	3,601	31,421 a	15,901	55,158	0.08	0.07	0.57	0.29
1983	7,705	20,807	49,392 a	27,200	105,104	0.07	0.20	0.47	0.26
1984	12,411	16,511	27,130 a	15,150	71,202	0.17	0.23	0.38	0.21
1985	17,276 p	22,805	152,768 a	56,100 w	248,949	0.07	0.09	0.61	0.23
1986 f	5,873	18,903	65,380 a	30,385 w	120,541	0.05	0.16	0.54	0.25
1974-86 AVERAGE	9,883	43,559	68,357	71,452	193,251	0.07	0.22	0.39	0.32
ESCAPEMENT OBJECTIVE g	10,800	33,000	60,000	47,900	151,700				

a Total escapement estimates made from migratory time density curve (Barton 1986) unless otherwise indicated; (p) population estimate from replicate foot surveys and stream life data.

b Total escapement estimates using Delta River migratory time density curve and percentage of live salmon present by survey date in the upper Toklat River area.

c Total escapement estimates using sonar to aerial survey expansion factor of 2.221 unless otherwise indicated; (s) sonar estimate.

d Total escapement estimates using weir to aerial survey expansion factor of 2.72 unless otherwise indicated; (w) weir estimate.

e Initial aerial survey count was doubled before applying the weir/aerial expansion factor of 2.72 since only half of the spawning area was surveyed.

f All 1986 data are preliminary.

g Escapement objectives were calculated by first averaging the population estimates for all four areas combined for the years 1974-1986, excluding the years 1975, 1979, 1982, and 1984. The resulting total escapement population objective of 151,698 fall chum salmon was then allocated to the four contributing spawning areas based on their average share of escapement for these same years.

Table 6. Canadian catch of Yukon River chum salmon (including Porcupine River), 1960-1986. a/

Year	Non Commercial				Total
	Commercial	Domestic	Indian Food Fish	Combined	
1960	5,493		10,115	10,115	15,608
1961	3,276		5,800	5,800	9,076
1962	936		8,500	8,500	9,436
1963	2,196		25,500	25,500	27,696
1964	1,929		10,258	10,258	12,187
1965	2,071		9,718	9,718	11,789
1966	3,157		10,035	10,035	13,192
1967	3,343		13,618	13,618	16,961
1968	453		11,180	11,180	11,633
1969	2,279		5,497	5,497	7,776
1970	2,479		1,232	1,232	3,711
1971	1,761		15,150	15,150	16,911
1972	2,532		5,000	5,000	7,532
1973	2,806		7,329	7,329	10,135
1974	2,544	466	8,636	9,102	11,646
1975	2,500	4,600	13,500	18,100	20,600
1976	1,000	1,000	3,200	4,200	5,200
1977	3,990	1,499	6,990	8,489	12,479
1978	3,356	728	5,482	6,210	9,566
1979	9,084	2,000	11,000	13,000	22,084
1980	9,000	4,000	9,218	13,218	22,218
1981	15,260	1,611	5,410	7,021	22,281
1982	11,312	683	4,096	4,779	16,091
1983	25,990	300	3,200	3,500	29,490
1984	22,932	535	5,800	6,335	29,267
1985	35,746	279	5,240	5,519	41,265
1986 b/	11,464	300	4,200	4,500	15,964
Average					
1961-65	2,082	--	11,955	11,955	14,037
1966-70	2,342	--	8,312	8,312	10,655
1971-75	2,429	2,533	9,923	10,936	13,365
1976-80	5,286	1,845	7,178	9,023	14,309
1981-85	22,248	682	4,749	5,431	27,679

a Catch in numbers of fish.

b Preliminary.

Table 7. Subsistence and commercial fall chin salmon catches by district, Yukon Area, 1977-1985.

District 1	1977	1978	1979	1980	1981	1982	1983	1984	1985
Subsistence	5,085	390	15,788	7,433	15,540	10,016	8,238	8,885	13,275
Commercial	131,758	127,947	109,406	106,829	167,834	97,484	124,371	78,751	129,948
Subtotal	136,843	128,337	125,194	114,262	183,374	107,500	132,609	87,636	143,223
District 2									
Subsistence	5,989	1,297	14,662	12,435	11,770	9,511	10,341	11,394	11,544
Commercial	51,994	51,646	94,042	83,881	154,883	96,981	85,645	70,803	40,490
Subtotal	57,983	52,943	108,704	96,316	166,653	106,092	95,986	82,197	52,034
District 3									
Subsistence	461	266	2,443	2,320	2,893	1,659	2,863	2,233	2,290
Commercial	15,851	11,527	25,955	13,519	19,043	5,815	10,018	6,429	5,164
Subtotal	16,312	11,793	28,398	15,839	21,936	7,474	12,881	8,662	7,454
Lower Yukon Total									
Subsistence	11,535	1,953	32,893	22,188	30,203	21,186	21,442	22,512	27,109
Commercial	199,603	191,120	229,403	204,229	341,760	199,880	220,034	155,983	175,602
Total	211,138	193,073	262,296	226,417	371,963	221,066	241,476	178,495	202,711
District 4									
Subsistence a/ Commercial c/	8,457 13,980	10,652 12,709	37,896 52,098	23,675 32,325	20,123 13,393	20,319 4,061	34,209 6,445	31,152 9,840	25,275 26,977
Subtotal	22,437	23,361	89,994	56,000	33,516	24,380	40,654	40,992	52,252
District 5									
Subsistence b/ Commercial c/	32,175 25,730	51,705 26,236	110,792 55,556	76,466 42,376	111,567 93,575	71,828 13,635	105,105 43,993	98,433 24,117	117,125 25,338
Subtotal	57,905	77,941	166,348	118,842	205,142	85,463	149,098	122,550	142,463
District 6									
Subsistence Commercial c/	30,604 18,673	30,557 16,946	51,766 41,355	50,328 19,520	26,632 29,008	19,564 7,416	32,174 37,190	22,726 20,620	36,963 42,352
Subtotal	49,277	47,503	93,121	69,848	55,640	26,980	69,364	43,346	79,315
Upper Yukon Total									
Subsistence	71,236	92,914	200,454	150,469	158,322	111,711	171,488	152,311	179,363
Commercial	58,383	55,891	149,009	94,221	135,976	25,112	87,628	54,577	94,667
Total	129,619	148,805	349,463	244,690	294,298	136,823	259,116	206,888	274,030
Area Total									
Subsistence	82,771	94,867	233,347	172,657	188,525	132,897	192,930	174,823	206,472
Commercial	257,986	247,011	378,412	298,450	477,736	224,992	307,662	210,560	270,269
Total	340,757	341,878	611,759	471,107	666,261	357,889	500,592	385,383	476,741

- a/ Includes Innoko and Koyukuk River drainages.
- b/ Includes Chandalar River drainages.
- c/ Includes "equivalent numbers" of salmon converted from roe sales.

Table 8. Comparative Yukon River drainage coho salmon aerial escapement estimates, 1972-1986 a/

Year	Drainage							
	Nenana River					Delta Clearwater River d/e/	Clearwater Lake and Outlet	Richardson Clearwater River
	Lost Slough	Clear Creek	Wood Creek b/	17 Mile Slough	Subtotal			
1972	-	-	-	-	-	632	417	454 g/
1973	-	-	-	-	-	3,322	551 d/	375 d/
1974	1,388	-	-	27	1,415	3,954	560	652 d/
1975	943	-	-	956	1,899	5,100	1,575 d/e/	4 g/
1976	118	13	-	281	412	1,920	1,500 d/e/	80 g/
1977	524	-	310 c/	1,167	2,001	4,793	730 d/e/	327
1978	350	-	300 c/	466	816	4,798	570 d/e/	-
1979	227	-	-	1,987	2,214	8,970	1,015 d/e/	372
1980	499	-	1,603 c/	592	1,091	3,946	1,545 d/e/	611
1981	274	-	849 h/	1,005	2,128	8,563 f/	459 g/	550
1982	-	-	1,436 h/	-	1,436	8,365 f/	-	-
1983	766	-	1,044 h/	103	1,913	8,019 f/	253	88
1984	2,677	2,600 b/e/	8,805 h/	-	14,082	11,061	1,368	428
1985	1,584	-	3,775 h/	2,081	7,440	5,358	750	-
1986	794	-	-	218 g/	1,012	10,857	3,577	146 g/

a/ Peak estimates presented only. Survey rating is fair-good unless indicated otherwise.

b/ Surveyed by F. R. E. D.

c/ Foot survey.

d/ Surveyed by Sport Fish.

e/ Boat survey.

f/ Population estimate.

g/ Poor survey.

h/ Weir count.

Table 9. Yukon area commercial salmon catch and effort data, 1986.

District/ Subdistrict	Number of Fishermen	Chinook	Summer Chum			Fall Chum			Coho	Total		
			Chum	Roe (lbs) a/b/	Equlv. Chum	Chum	Roe (lbs) a/c/	Equlv. Chum		Salmon	Roe (lbs)	Equlv. Salmon
1	444	53,035	381,127	0	381,127	59,352	0	59,352	24,824	518,296	0	518,338
2	259	41,849	288,427	0	288,427	51,307	0	51,307	21,197	402,780	0	402,780
3	18	901	442	0	442	2,793	0	2,793	793	4,929	0	4,929
Total Lower Yukon	672	95,785	669,996	0	669,996	113,452	0	113,452	46,814	925,995	0	926,047
District 4												
4-A	60	11	0	237,049	237,049	0	0	0	0	11	237,049	237,060
4-B	15	100	241	29,169	29,410	2,045	0	2,045	0	2,386	29,169	31,555
4-C	7	391	59	3,520	3,579	0	0	0	0	450	3,520	3,970
Sub total District 4	75	502	300	269,738 *	270,038	2,045	0	2,045	0	2,847	269,738 *	272,585
District 5												
5-A	1	0	0	0	0	1,332	0	1,332	0	1,332	0	1,332
5-B	13	1,494	682	0	682	11,907	395	12,302	0	14,083	395	14,478
5-C	13	875	8	0	8	7,471	0	7,471	0	8,354	0	8,354
5-D	3	364	0	0	0	1,343	0	1,343	0	1,707	0	1,707
Sub total District 5	30	2,733	690	0	690	22,053	395	22,448	0	25,476	395	25,871
District 6												
6-A	4	0	4,697	0	4,697	176	0	176	30	4,903	0	4,903
6-B	14	597	31,472	1,711	33,183	1,345	0	1,345	370	33,784	1,711	35,495
6-C	9	353	14,314	435	14,749	371	182	553	41	15,079	617	15,696
Sub total District 6	27	950	50,483	2,146	52,629	1,892	182	2,074	441	53,766	2,328	56,094
Total Upper Yukon	132	4,185	51,473	271,884 d/	323,357	25,990	577	26,567	441	82,089	272,461	354,550
Grand Total	804	99,970	721,469	271,884 d/	993,353	139,442	577	140,019	47,255	1,008,084	272,461 *	1,280,597

a/ Roe data in pounds of unprocessed product.

b/ May include small amount of chinook salmon roe.

c/ May include small amount of coho salmon roe.

d/ 271,844 lbs roe equates to 271,844 females (1 lb roe/female). Including males it is estimated that 465,000 summer chum salmon were harvested during the roe directed commercial fishery.

* Record catch

Table 10. Chinook and summer chum salmon commercial catch and effort by district, Lower Yukon area, 1986.

DISTRICT 1								
Period Dates	Mesh Size	Hours Fished	No. of Fishermen	Chinook	Ave. Wt.	Chum	Ave. Wt.	
1	6/14-6/14	Restricted	12	300	2,663	17.2	65,974	7.1
2	6/19-6/20	Unrestricted	24	406	21,731	21.0	29,025	7.1
3	6/23-6/24	Unrestricted	24	394	10,248	21.0	57,309	6.9
4	6/25-6/26	Restricted	12	308	4,091	17.1	74,494	6.9
5	6/29-6/30	Unrestricted	24	376	5,558	21.0	23,145	6.8
6	7/02-7/02	Restricted	12	276	1,608	17.4	53,707	6.8
7	7/03-7/04	Unrestricted	24	363	5,385	21.9	22,552	6.7
8	7/07-7/08	Restricted	24	271	606	18.0	18,060	6.6
9	7/10-7/11	Restricted	24	273	784	18.8	17,005	6.4
10	7/14-7/15	Restricted	24	257	319	18.0	19,856	6.9
Subtotal			204	441	52,993	20.4	381,127	6.9
DISTRICT 2								
Period Dates	Mesh Size	Hours Fished	No. of Fishermen	Chinook	Ave. Wt.	Chum	Ave. Wt.	
1	6/15-6/15	Restricted	12	195	798	16.8	26,915	7.1
2	6/21-6/21	Restricted	6	213	1,762	14.3	73,196	7.0
3	6/22-6/23	Unrestricted	24	224	14,505	20.8	32,894	7.1
4	6/24-6/24	Restricted	6	144	1,063	14.9	28,894	7.1
5	6/26-6/27	Unrestricted	24	226	12,248	21.0	34,309	7.0
6	7/01-7/02	Unrestricted	24	210	7,417	20.3	16,005	6.9
7	7/03-7/04	Restricted	12	172	824	15.3	29,592	6.8
8	7/06-7/07	Unrestricted	24	188	2,433	20.4	16,133	6.7
9	7/09-7/10	Restricted	24	147	455	17.6	13,718	6.6
10	7/13-7/14	Restricted	24	147	334	17.6	16,771	6.8
Subtotal			180	239	41,839	20.1	288,427	7.0
DISTRICT 3								
Period Dates	Mesh Size	Hours Fished	No. of Fishermen	Chinook	Ave. Wt.	Chum	Ave. Wt.	
1	6/26-6/27	Unrestricted	24	5	301	20.0	119	7.0
2	7/01-7/02	Unrestricted	24	3	401	20.0	169	7.1
3	7/06-7/07	Unrestricted	24	4	199	22.4	154	6.3
Subtotal			72	7	901	20.5	442	6.8
LOWER YUKON								
Total			456	672	95,733	20.2	669,996	6.9

Table 11. Fall chum and coho salmon commercial catch and effort by district, Lower Yukon area, 1986 ^{1/}

DISTRICT 1								
Period	Date	Hours Fished ^{2/}	No. of Fishermen	Chum	Av. Wt.	Coho	Av. Wt.	% Coho
11	8/04-05	12/6	194	11,395	7.37	501	6.41	4.2
12	8/07-08	12/6	185	7,489	7.32	679	6.20	8.3
13	8/12	12/6	197	10,480	7.36	3,812	6.27	26.7
14	8/14-15	24/12	218	16,272	7.24	6,224	6.20	27.7
15	8/18-19	12/6	169	5,809	7.23	3,852	6.45	39.9
16	8/21-22	24/12	198	7,907	7.16	9,756	6.43	55.2
Subtotal	8/04-22	96/48	282	59,352	7.29	24,824	6.34	29.5
DISTRICT 2								
Period	Date	Hours Fished	No. of Fishermen	Chum	Av. Wt.	Coho	Av. Wt.	% Coho
11	8/06	6	170	11,624	7.27	666	6.07	5.4
12	8/10	6	146	9,705	7.30	1,092	6.13	10.1
13	8/13	6	153	5,549	7.18	1,483	6.32	21.1
14	8/17	12	201	12,530	7.06	6,519	6.13	34.2
15	8/20	6	150	4,658	7.20	3,151	6.25	40.4
16	8/24	12	188	7,241	6.81	8,286	6.62	53.4
Subtotal	8/06-24	48	231	51,307	7.14	21,197	6.35	29.2
Districts 1 and 2	9/04-24			110,659	7.22	46,021	6.35	29.4
DISTRICT 3								
Period	Date	Hours Fished	No. of Fishermen	Chum	Av. Wt.	Coho	Av. Wt.	% Coho
04	8/10	6	6	381	7.60	9	6.44	2.3
05	8/13	6	7	354	7.10	47	5.79	11.7
06	8/17	12	9	1,095	7.32	116	6.09	9.7
07	8/20	6	6	369	8.50	140	5.74	27.5
08	8/24	12	11	594	7.14	481	6.66	44.7
Subtotal	8/10-24	48	14	2,793	7.46	793	6.13	22.1
Districts 1, 2, and 3	8/4-24		510	113,452	7.23	46,814	6.34	29.2

^{1/} Restricted mesh size (<6")

^{2/} Set net only area/gillnet area