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AYK REGION
STOCK STATUS

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STATUS OF SALMON STOCKS, FISHERIES
AND MANAGEMENT PROGRAMS IN
THE YUKON RIVER

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Arctic-Yukon-Kuskokwim Region
Anchorage, Alaska

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DESCRIPTION OF AREA

The Yukon River is the largest river in Alaska, draining approximately 35 percent of the state (Figure 1). The river originates in British Columbia, Canada within 30 miles of the Gulf of Alaska and flows over 2,300 miles through Yukon Territory and Alaska to its mouth on the Bering Sea draining an area of approximately 330,000 square miles. More than half (1,224 river miles) of the main stem Yukon River flows through Alaska (Table 1). Figures 2 through 4 show location of major spawning streams throughout the drainage.

STATUS OF FISHERIES

Table 2 presents annual commercial and subsistence catches in Alaska and Yukon Territory for the 1903-1980 period.

Subsistence Fishery

The subsistence salmon fishery in the Alaskan drainage is one of the largest of its kind in the state. There are approximately 10,000-15,000 Eskimo and Indian people in the area, the majority of whom reside in more than 45 small villages scattered along the coast and major river systems. Nearly all of these native people are dependent to varying degrees on the fishery resources for their livelihood. Subsistence has been designated by the Alaska State Legislature (State Law 151) as the highest priority among beneficial users of the fish and game resources.

A comprehensive household survey is made annually to document subsistence catches in Alaska. This survey is facilitated by the use of catch calendars that are mailed to all fishermen prior to the season on which daily catches are entered.

King and chum salmon are the the most important species taken for subsistence purposes. Only small numbers of pink and coho salmon are taken. King salmon are utilized almost exclusively for human consumption while chum salmon are also fed to sled dogs. Salmon are mostly taken by gillnets and fishwheels.

Table 3 presents comparative subsistence salmon catch and effort data for villages surveyed each year in Alaska. Subsistence catches of king salmon in Alaska have remained relatively stable during 1961-79, generally averaging 15-20,000 per year. Yukon Territory subsistence king catches average 3-5,000 fish annually.

Subsistence catches of summer and fall chum in Alaska and Yukon Territory are shown in Table 4. Subsistence catches of summer chums in Alaska have declined since the early 1960's (312,439, 5 year average 1961-65). Presently the summer chum subsistence fishery takes about 200,000 annually (194,217, 5 year average 1975-79).

Fall chum salmon subsistence catches in Alaska have remained relatively stable. The 1961-65 fall chum harvest in Alaska averaged 104,146 while the recent 5 year (1975-79) average is 108,824. In the Yukon Territory subsistence fall chum catches (taken mostly at Old Crow) average approx-

imately 10,000 fish annually. Year to year fluctuations in the catch usually are attributed to variable run magnitudes.

Comparative subsistence fishing effort data for Alaska is shown in Table 3. Fishing effort, in terms of fishing families, has generally averaged 600-700 families for the period 1961-79. The increases in the amount of fishing gear (gillnets and fishwheels) during 1975-79 reflects the development of the upper Yukon area commercial fishery. Fishing effort data for the Yukon Territory subsistence fishery is unavailable.

The economic value of the subsistence catch to Alaskan fishermen is difficult to quantify. However, assuming that the value of subsistence caught fish is at least equal in value to the price paid to commercial fishermen for his catch, then some approximate values can be calculated. It is therefore estimated that the Alaska subsistence king salmon catch is valued at \$500,000 annually (1975-79 average catch of 21,915 x 23.0 lbs x \$1.00/lb. = \$504,045). The value of the Alaska subsistence summer chum catch is estimated at \$540,000 annually (1975-79 average catch of 194,217 x 7.0 lbs. x \$0.40/lb. = \$543,808). The value of the Alaska fall chum salmon subsistence catch is estimated at \$350,000 annually (1975-79 average catch of 108,824 x 8.0 lbs. x \$0.40/lb. = \$348,246). Overall, the approximate total value of the Yukon River subsistence salmon harvest to Alaska fishermen is estimated at 1.39 million dollars annually.

Commercial Fishery

The commercial salmon fishery in Alaska dates back to 1918, although

major commercial utilization of all species has only existed since 1961 (Table 2). The first recorded commercial salmon harvest in the drainage dates back to 1903 in Yukon Territory. Chum and king salmon are the primary species harvested. The relatively recent development and expansion of the commercial salmon fisheries in Alaska has enabled many area residents to obtain a cash income when other employment is often sporadic or nonexistent. Nearly all of the area's commercial fishermen are resident Eskimos and Indians as are the majority of processing plant workers.

The major commercial fisheries are found in the lower 150 miles, although commercial fishing is also widely dispersed over 1200 river miles in the main stem upper Yukon and lower Tanana Rivers. In the lower river, set and drift gillnet gear are operated, while in the upper Yukon area fishwheels and set gillnets are used to take salmon. Most fishermen operate small (16-20 ft.) outboard-powered skiffs and do not use net rollers or powered reels of any type.

During the early years (prior to 1960) only king salmon were harvested commercially on a sustained basis in Alaska. From 1918 through 1960 king salmon catches averaged approximately 30,000 fish annually (Table 2). Under Department of Fish and Game management beginning in 1961, the annual king salmon harvest during 1961-70 averaged 104,371 fish. For the 1971-80 period king catches averaged 100,497 fish annually and have ranged from 63,740 (1975) to 152,870 (1980) fish, reflecting year to year variable run strength. In the Yukon Territory commercial king salmon catches have averaged approximately 3,000 fish annually ((1961-80 average of 3,079), although catches have increased sharply in 1979

(6,175) and 1980 (6,454). Table 5 presents comparative catch, effort and abundance indices for king salmon.

The chum salmon commercial fishery has only recently developed as a result of the decline in the subsistence fishery for summer chums, establishment of new markets (especially in Japan) and expansion of the upper Yukon area fishery. Presently the bulk of the commercial chum catch in Alaska is composed of summer chums. Table 6 presents comparative catch, effort and abundance indices for chum salmon.

Commercial utilization of summer chums began in 1967 as regulations were liberalized. Only 11,179 summer chums were taken commercially in 1967 but the catches increased rapidly in ensuing years. A record 1,062,496 summer chums was taken in 1980. The recent 5 year average (1974-79) is 744,800 fish. Harvest of summer chums in Yukon Territory is negligible.

The commercial fishery for fall chum salmon in Alaska began in the early 1960's. Commercial catches have ranged from 8,347 in 1964 to 362,480 in 1979. The recent 5 year average (1975-79) harvest in Alaska is 256,700 fish. In the Yukon Territory, the commercial harvest of fall chums average 2-3,000 fish annually (1961-79).

Coho salmon are of minor importance in both the subsistence and commercial fisheries in Alaska. The commercial harvest of cohos is dependent upon fishing effort exerted on the more numerous fall chums. Commercial coho catches in Alaska since 1961 have ranged from 350 to 38,021 and the recent 5 year average (1975-79) is 17,700. Future expansion of the coho salmon in Alaska fishery appears unlikely. Coho salmon catch data from

the Yukon Territory is unavailable but is apparently negligible.

Commercial fishing effort in Alaska has increased sharply since 1961 as the amount of set gillnet gear doubled while drift gillnet gear tripled in the lower Yukon area. Also the number of fishing vessels has doubled since 1961 (Table 5). With the development of the upper Yukon commercial fishery, the amount of fishwheel gear increased. In 1976 the Commercial Fisheries Entry Program was implemented to stabilize the amount of fishing gear. Presently about 700 gillnet (drift and set combined) permits are issued yearly for the lower Yukon area. In the upper Yukon area about 75 gill net (set gill nets only) and 170 fishwheel permits are issued each year. Commercial fishing effort for the Yukon Territory is unavailable.

The economic value of the commercial catch to fishermen in Alaska is estimated at 4.1 million dollars annually (1975-80 average) and the annual wholesale value is approximately 10.3 million dollars. The average value of the catch to the fishermen by species is 2.5 million dollars - kings, 1.6 million dollars - chums (1.1 million dollars - summer chums, 0.5 million dollars fall chums) and 0.04 million dollars cohos.

STATUS OF STOCKS

All five species of Pacific salmon are indigenous to the Yukon River drainage with chum salmon being the most abundant. It is estimated that king salmon, pink salmon, coho salmon and sockeye salmon follow in order of abundance.

The Yukon River drainage is too extensive for complete escapement coverage during any given year. Escapement estimates are made of representative or "index" streams to determine annual trends. Primarily aerial surveys are conducted to obtain escapement information but also limited ground and boat surveys, counting towers, sonar and weirs have been utilized in some streams.

Population estimates presented in this report are based on tag recovery studies and documented harvests plus observed escapements. The accuracy of tag recovery estimates is questionable due to the following possible biases that can't be quantified: tag loss, post tagging mortality, unreported tag loss, and fishing gear selectivity for tag types and fish age, sex and size. Estimates of run magnitudes based on documented catches and escapements are minimal since many spawning streams cannot be surveyed each year.

King Salmon

The majority of king salmon enter the river soon after ice breakup during June and early July. Based on limited tag recovery data, there is some evidence that Yukon Territory and possibly other upstream stocks are more abundant during the early portion of the run, while downstream stocks are more abundant during the late portion of the run.

Adult king salmon range in age from 3 (1 freshwater annulus, 1 ocean annulus) to 7 years (1 freshwater annulus, 5 ocean annuli). Delayed maturity and associated increased marine mortality of females results in the runs usually being composed of a majority of males. The majority of

females mature at 6-7 years, few are present in the 4 and 5 year age classes and none in the 3 year age class. Fishwheels and small mesh gillnets are selective to the younger age classes (ages 3-5) which are mostly males. Large mesh (8-8-1/2 inches stretched mesh) gillnets are selective to the older age groups (ages 5-7) which contain a higher percentage of females. Since the greatest harvests are made by the large mesh gillnets, a further sex ratio imbalance in favor of males on the spawning grounds usually occurs.

Spawning occurs throughout the drainage both in Alaska and Yukon Territory. Spawning has been documented in 55 streams in Alaska and 49 streams in Yukon Territory (Tables 7-8). Figure 5 compares the relative abundance of king salmon spawners in Alaska and Yukon Territory based on comparable escapement counts of important index streams. Spawning occurs during mid July to late August.

King salmon escapements in recent years (1977-80) have been above average, especially in 1978-80 when record escapement levels were documented in important index streams (Table 9). The recent increase in escapements reverses a decline which occurred during 1972-76. Improved escapements in recent years is attributed primarily to strong runs and restrictions placed on the Alaskan commercial fishery. Also reduced high seas interceptions by the Japanese mothership fishery may have had beneficial effects.

All population estimates are based on tag recovery studies (Appendix 1). Estimates by ADFG of annual run magnitudes ranged between 161,000-600,000 fish during 1966-1970 (Table 10). The U.S. Fish and Wildlife Service estimated the size of the run upstream from Rampart to be 17,000

and 22,400 during 1961 and 1962, respectively. Canadian estimates of run magnitudes upstream of Dawson were 29,000 in 1974 and 11,100-36,700 in 1974.

Summer Chum Salmon

Summer and fall chum salmon represent two major stocks in the Yukon River. Summer chums can be differentiated from fall chums by the following characteristics: 1) earlier run timing (early June - mid July in the lower river); 2) rapid maturation in freshwater; 3) smaller body size (6-8 lbs.); 4) greater population size; and 5) nearly all spawning takes place in Alaska. Run timing for summer chums and kings is coincidental.

Age composition ranges from 3-6 year olds with the 4 year age class usually dominant. Generally equal numbers of males and females are found in commercial and subsistence catches and in the spawning escapements.

Spawning has been documented in 75 Alaskan and only two Yukon Territory streams (Tables 7-8). Since 1961 in excess of 18,000 summer chums have been tagged in the lower river and out of 1676 recoveries only one was made in Yukon Territory (Appendix 2). Spawning is usually completed by early August.

Summer chum salmon escapements have generally been good in recent years. Escapements were especially strong in 1975 when approximately 1.3 million summer chums were documented in just two tributary streams, the Anvik and Andreafsky Rivers (Table 11). Estimates of total run size using tag recovery data were 3.6 and 1.6 million fish for 1970 and 1971,

respectively. Documented harvests and escapements in several major spawning streams have yielded minimum population estimates ranging from 1.3-2.6 million fish during recent years (Table 10).

Fall Chum Salmon

Fall chums have the following differentiating characteristics: 1) later run timing (mid July-early Sept in the lower river); 2) larger size (7-9 lbs.) and robust body shape and bright silvery appearance in the lower river; 3) smaller population size, and 4) spawning occurs in the upper portions of the drainage in streams that are spring fed, usually remaining ice free during the winter.

Age and sex composition is similar to that for summer chums.

Spawning has been documented in 32 Alaskan and 6 Yukon Territory streams (Tables 7-8). Major spawning areas are located in the Porcupine River drainage (Sheenjek River in Alaska and Fishing Branch River in Yukon Territory) and the Tanana River drainage (Toklat River, Delta River and mainstem Tanana upstream of Fairbanks). Spawning occurs during September through November.

Figure 6 shows the relative abundance of fall chum spawners in Alaska and Yukon Territory based on comparable escapement counts of important index streams.

Tagging studies have identified differences in temporal and spatial distribution for two major stocks. Porcupine River stocks (Yukon Territory and Alaska) occur earlier and in the mid-Yukon (Mile 500-600), where

tagging occurred, these fish migrate near the north bank of the river. Tanana River stocks (Alaska) in this area migrate near the south bank later in the run. Annual fall chum salmon escapements have fluctuated sharply depending on run strength. The magnitude of the 1971-75-79 cycle year run has been very strong. The Tanana River drainage escapements in general appear more stable and experience less fluctuation than the Porcupine River system (Table 12). For example, recent escapements in the Fishing Branch River have ranged from 353,000 (1975) to 13,000 (1976) and averaged 92,000.

Tag recovery data for fall chums is summarized in Appendix 3. Use of tag and recovery data resulted in population estimates of 460,000 and 513,000 fish during 1977 and 1978 respectively. Minimum annual population estimates based on documented harvests and escapements range from 349,000 to 922,000 since 1974 (Table 10).

Pink Salmon

This species spawns entirely within Alaska. Pink salmon enter the river during late June and July. Major spawning concentrations occur in the Andreafsky River.

Coho Salmon

Coho salmon enter the river during August and early September. Escapement information is very limited and spawning has been documented in 25 Alaskan and only 1 Yukon Territory streams (Tables 7-8). Coho salmon comparative escapement information is available only from the Tanana

River drainage in Alaska (Table 13). In general escapements appear to have been stable. Escapements in 1979 were the highest recorded for some streams.

Sockeye Salmon

Based on sporadic, small catches, the abundance of this species is very low. Spawning areas have not been documented to date.

MANAGEMENT AND RESEARCH

Management Problems and Strategies

Management is made difficult by the character of the salmon runs, fisheries and the river itself. Since most of the commercial fisheries and fishery programs have only developed or expanded in recent years, the existing data base is inadequate for precise fishery management.

The various fisheries scattered over 1,400 river miles harvest mixed stocks usually several weeks and hundreds of miles from their spawning grounds. Because the Yukon River commercial fishery is essentially a "cape fishery" (fishing on mixed stocks), some tributary populations may be under or overharvested in relation to their actual abundance.

Due to the turbid water conditions of the main river and some spawning tributaries, the vast size of the drainage (one-third of which is in Canada) and the large number of spawning streams, accurate inseason assessment of the salmon escapement immediately past the intensive downriver fishery is very difficult with the present available technology

and funding. Total escapement is unknown and most escapement data are obtained several days or weeks after the peak in the commercial fishery.

In-season management is essentially limited to analysis of comparative catch data assuming that catches reflect on the abundance of the run.

The catch data itself is difficult to compare since the fisheries have undergone changes in recent years (mesh size restrictions, reduced fishing time, delayed openings of the seasons, increased fishing efficiency, etc.). Management is also hampered by the variable run timing and pattern of entry into the lower fishery.

The overall objective of the Yukon area research and management programs is to manage the various salmon runs for optimum sustained yield. The commercial fishery is regulated on the assumption that a harvestable salmon surplus, after providing for spawning and subsistence utilization requirements is available.

As a result of the difficulty in obtaining the necessary biological information, the mixed stock situation, increased effort and efficiency of the commercial fishery, and because of the need to provide for subsistence which has been designated the highest priority by the Legislature, the management of the Yukon River salmon runs must take a conservative approach. Regulation of both the commercial and subsistence fisheries has become more restrictive in recent years as fishing effort and efficiency has increased. Fishing time has been sharply reduced in most of the fisheries. Other restrictions imposed in recent years include conservative guideline harvest levels or quotas, delayed season openings, gill net

mesh size limitations, and in-season fishing time reductions and season closures. Table 14 lists major regulation changes affecting the king and chum salmon fisheries in Alaska since 1961.

Personnel

The Alaska Department of Fish and Game presently assigns six permanent staff biologists to management and research activities in the Yukon River salmon fisheries. During the summer and fall of 1980, twenty-four seasonal employees were assigned to various fisheries projects throughout the drainage.

Funding Levels

Funding support for fisheries programs in the Yukon River in Fiscal year 1981 total \$550,000 (\$200,000 permanent salaries and \$350,000 operational funds). In addition, the Department has been awarded a special appropriation of 1.2 million dollars in FY81 to conduct special projects and to purchase capital equipment items needed for additional management and research projects.

Slightly less than half of the continuing operational funds are utilized for activities in the upper Yukon area (upstream of Anvik) and in the Tanana River. Fisheries research accounts for approximately 40% of the operational expenditures while management activities account for about 60%.

Specific Management and Research Programs

The two major sources of information used to assess run magnitude and timing are derived from in-season commercial catch and effort documentation and test fishing projects. Commercial catches and effort are monitored by crews stationed at key locations in the lower and upper Yukon areas. The crews are responsible for tabulating fishery data from fish tickets, resulting in summaries by fishing period and statistical area. These data are compared to all prior fishing years to determine run status in relation to these years. Catch monitoring crews are stationed at Emmonak in the lower Yukon, and at Anvik, Galena, Tanana, Manley and Nenana in the upper Yukon. More monitoring effort is needed in the upper Yukon area because of the extensive geographic area in which the salmon fishery occurs. In addition to fishery information, the monitors sample commercial catches for age, sex, and size data.

Test fishing is utilized by the Department in order to have a daily, standardized data base on salmon abundance and timing. The commercial fishery is normally closed for several days during the week, (the exact amount of closure time varies from year to year and has increased markedly over the past ten years) and changes in gear efficiency and effort distribution create the need for some kind of standardized catch statistics for comparison with commercial catch statistics.

In the lower Yukon area gillnet test fishing is conducted in the south mouth and the middle mouth. Set gillnets are fished for 24

hours per day, seven days per week from late May through August. Both large mesh nets (8-1/2" stretch measure) and small mesh nets (5-1/2 & 6") stretch measure) are utilized until after July 15, when only the small mesh nets are fished.

Escapement enumeration in tributary streams forms another important data source useful in both management and research. Escapements can be used to evaluate the effect of management actions taken during the season, and when compared to prior years data, trends can be detected which indicate the need for changes in management strategy. Spawning escapements also indicate potential brood year production for future returns.

More than thirty index salmon streams are surveyed annually in Alaska and Yukon Territory by ADFG biologists. A single engine fixed wing aircraft is generally used to fly an entire stream during peak spawning periods. Some of the larger tributaries are divided into smaller sections to facilitate yearly escapement comparisons.

Side scan sonar salmon counters are presently in use in a single Yukon tributary, the Anvik River, to enumerate summer chum salmon in that system. The Anvik River was chosen for sonar counters because it is the largest producer of summer chum salmon in the Yukon River drainage. A crew of 2 or 3 persons is required to install and operate sonar counters on each bank. The sonar devices are particularly useful in streams where poor water visibility

prevents visual counting with towers or from airplanes.

Currently the Department plans to operate side scanning sonars in two additional important king and summer chum spawning streams beginning in 1981. They are the Andraefsky River near St. Marys and the Melozitna River near Ruby.

A new type of sonar counter for use in large, turbid rivers has been tested by the Department in the lower Kuskokwim River near Bethel. The counter, called the "fan scan sonar" has the potential to enumerate salmon in the turbid mainstem of the Yukon River. The transducers are placed on the river bottom and transmit sound beams upwards toward the surface in a 180 degree arc. The unit works most effeciently in water depths of 30-50 feet. In future years it may replace test fishing as an abundance indicator in some situations.

A single counting tower project is currently used in the Yukon River drainage. It is located on the lower Sheenjek River, tributary of the Porcupine River, and is designed to enumerate fall chum salmon.

In addition to those projects that have direct management application, some special projects are designed to contribute information on salmon stocks or their biology which may have future application in altering the present management approach in Yukon River fisheries. Two programs being pursued at the present time are fall chum salmon stock separation by using tag and recovery methods, and king salmon stock separation using scale analysis.

The fall chum tagging and recovery project has been located in the lower Tanana River for the past two fall seasons to attempt to distinguish major spawning stocks by timing or river bank orientation.

King salmon stock separation, using scale pattern analysis was initiated during the 1980 season. Scales were collected from several of the more important king salmon producing tributaries in Alaska and Yukon Territory. Approximately 2000 scales were collected from the streams in this manner. These scales will be used to determine whether consistent differences may be present in the scales and if so, to establish known standards for those streams. Scales of unknown origin, taken in the commercial fisheries will be compared to the known to determine whether they can be classified to stream of origin. If feasible, it may be possible in future years to conduct the king salmon fishery more on the basis of specific stock management than at the present time. At the present time the identity of king salmon stocks in the fisheries at any given time is very poorly known.

SPECIAL ISSUES

High Seas Interception of Yukon River Salmon stocks

Incidental catches of western Alaska king salmon by the Japanese mother-ship gillnet salmon fishery and by the foreign groundfish trawling fleet in the Bering Sea include substantial numbers of Yukon River stocks. In 1979 the foreign offshore catch of king salmon in the Bering Sea and

northern Gulf of Alaska was in excess of 500,000 fish (Table 15). It is estimated that this catch includes a minimum of 179,355 king salmon of western Alaska origin (Bristol Bay, Kuskokwim and Yukon areas).

Since 1977, the high seas mothership fishery of Japan has been severely restricted by the renegotiation of the International North Pacific Fisheries Convention between Japan, Canada and the United States. It has been estimated that the resulting annual savings of Western Alaska king salmon will exceed 50% of the numbers intercepted prior to the renegotiation. Interceptions of Western Alaska king salmon by this fishery have exceeded 400,000 in some years. The average king salmon interception rate during the eleven years, 1969-1979, is estimated at 160,400 from data provided by the National Marine Fisheries Service. The estimated interception in 1979 was 65,000 king salmon.

Incidental king salmon catches by foreign trawl fleets have been documented for only the last two years primarily from records maintained by the U.S. on-board observers. The vast majority of king salmon are taken by Japanese and Russian fleets operating during the winter.

It is not possible at the present time to determine with precision the proportion of Yukon king salmon in the Western Alaska interceptions. Assuming somewhat similar distributional patterns of all Western Alaska stocks in the Bering Sea and North Pacific Ocean, one can roughly apportion the interceptions using relative inshore harvest of major king salmon fisheries in western Alaska. The Yukon River harvest of king salmon averages about 30% of the total Western Alaska king salmon catch. If 30% of the estimated 179,355 western Alaska interceptions in 1979 were

of Yukon River origin, approximately 54,000 were taken in offshore fisheries. A fact of disturbing importance at present is that the estimated interceptions by the Bering Sea trawl groundfishery are greater than anticipated, and in 1979 they surpassed the high seas mothership gillnet fishery in western Alaska king salmon interceptions.

Offshore interceptions have reduced inshore returns to the Yukon fisheries severely in many years and substantially in most. A period of declining escapements and catches in the mid 1970's can be partly attributed to this factor. During those years (1972-1976) severe restrictions were imposed on Alaska fishermen for the conservation of stocks in the Yukon River drainage.

High seas tagging research conducted over the past 20 years has not indicated substantial interception of western Alaska chum salmon in the Bering Sea or North Pacific Ocean. The majority of immature chum salmon apparently are distributed in the Gulf of Alaska east of the mothership and Landbased gillnet area. Chum salmon are not frequently encountered in trawl catches.

Other Estimates of Salmon Abundance in Yukon Territory

Other estimates of Yukon Territory salmon abundance are summarized in Appendix 4. It is our opinion that these estimates are not supported by the existing data base.

Industrial Development

Existing and planned hydroelectric projects to support the mining

industry in Yukon Territory represent threats to king salmon spawning stocks. Two existing dams, one on the Lower Mayo River and the other on the north fork of the Klondike River, prohibit access to upstream spawning areas. However, the Klondike Dam may have been recently modified in recent years to allow fish passage. A dam constructed on the main river at Whitehorse in 1957 contains a fishway, but problems in passing adult king salmon have occurred at this site during some years. Studies by Canadian Fisheries personnel show that substantial numbers of salmon fry and smolt are killed in the turbines at the Whitehorse Dam. Studies are currently underway to determine the feasibility of constructing a large hydroelectric project on the main river at Five Finger Rapids near Carmacks which, if constructed, will pose an added threat to the salmon resource.

The proposed Five Finger Rapids Dam will probably obstruct river travel between Yukon Territory and Alaska. Although commercial river transportation is currently quite minimal, recreational use of the river in this area has expanded greatly. The obstruction of river travel poses legal questions. For example, Article XXVI of the Treaty of Washington (1871) states in part that, "The navigation of the Rivers Yukon, Porcupine and Stikine, ascending and descending from, to and into the sea, shall forever remain free and open for the purposes of commerce to the subjects of Her Britannic Majesty and to the citizens of the United States, subject to any laws and regulations of either country within its own territory, not inconsistent, with such privilege of free navigation".

There are no existing or planned dams in the Yukon River drainage within Alaska except a flood control dam on the Chena River near Fairbanks

which will not affect passage of salmon. The once proposed hydroelectric site at Rampart is now included in a new wildlife refuge which precludes future construction.

Construction of the Trans-Alaska Oil Pipeline has had minimal and no lasting effect on salmon stocks. The route of this pipeline generally avoided important Yukon River spawning areas.

With the exception of mining activities in some areas of the Alaska and Yukon Territory and the aforementioned dams in Yukon Territory, most spawning and rearing habitats in the drainage have been preserved in their original condition.

Fisheries Enhancement and Rehabilitation

State sponsored salmon aquaculture in the Alaska portion of the drainage has only recently been initiated on a feasibility scale. A small research hatchery at Clear, Alaska in the Tanana River drainage, has operated for one year to determine the potential for supplemental production of fall chum and coho salmon in interior Alaska. A research effort is underway to examine hatchery potential in the lower Yukon River.

There are limitations to successful salmon enhancement especially in the upper portions of the drainage which may retard the development of production scale facilities. First, most salmon stocks are in reasonably good condition and their reproductive potential remains intact throughout

the entire drainage with very few exceptions. No major stock has been seriously overfished and with the exception of some streams in Yukon Territory, industrial developments have not impaired spawning habitats. The absence of documented stock decline due to any of the above factors removes much of the impetus for aquaculture development to enhance the salmon resource.

Second, Yukon River salmon fisheries, represent a classical mixed stock fishery which extends for over a thousand river miles in Alaska and Canada. Salmon traveling to upriver spawning tributaries or hatcheries must pass through this fisheries "gantlet" to reach their natal areas. Unilateral stock enhancement in upriver areas would therefore contribute salmon for harvest in all the downriver fisheries since there would be little chance that the enhanced stock could be harvested discretely until it actually reached the hatchery. The management system presently in place, and the extended nature of the fishery make it extremely likely that a large surplus of salmon would accumulate at the hatchery proper, since separate harvest of the hatchery returns would probably not be possible in the downstream common fishery. This should not preclude rehabilitation efforts to replace lost production as a result of industrial developments.

The best means of insuring the present well-being of the Yukon salmon resource include: 1) maintenance of spawning and rearing habits in their present condition; 2) minimize salmon interceptions in high seas fisheries and 3) conduct programs that improve the biological base on which to base sound fishery management decisions.



YUKON RIVER BASIN
(330,000 square miles)

FIGURE 1

FIGURE 2. Lower Yukon Field map.

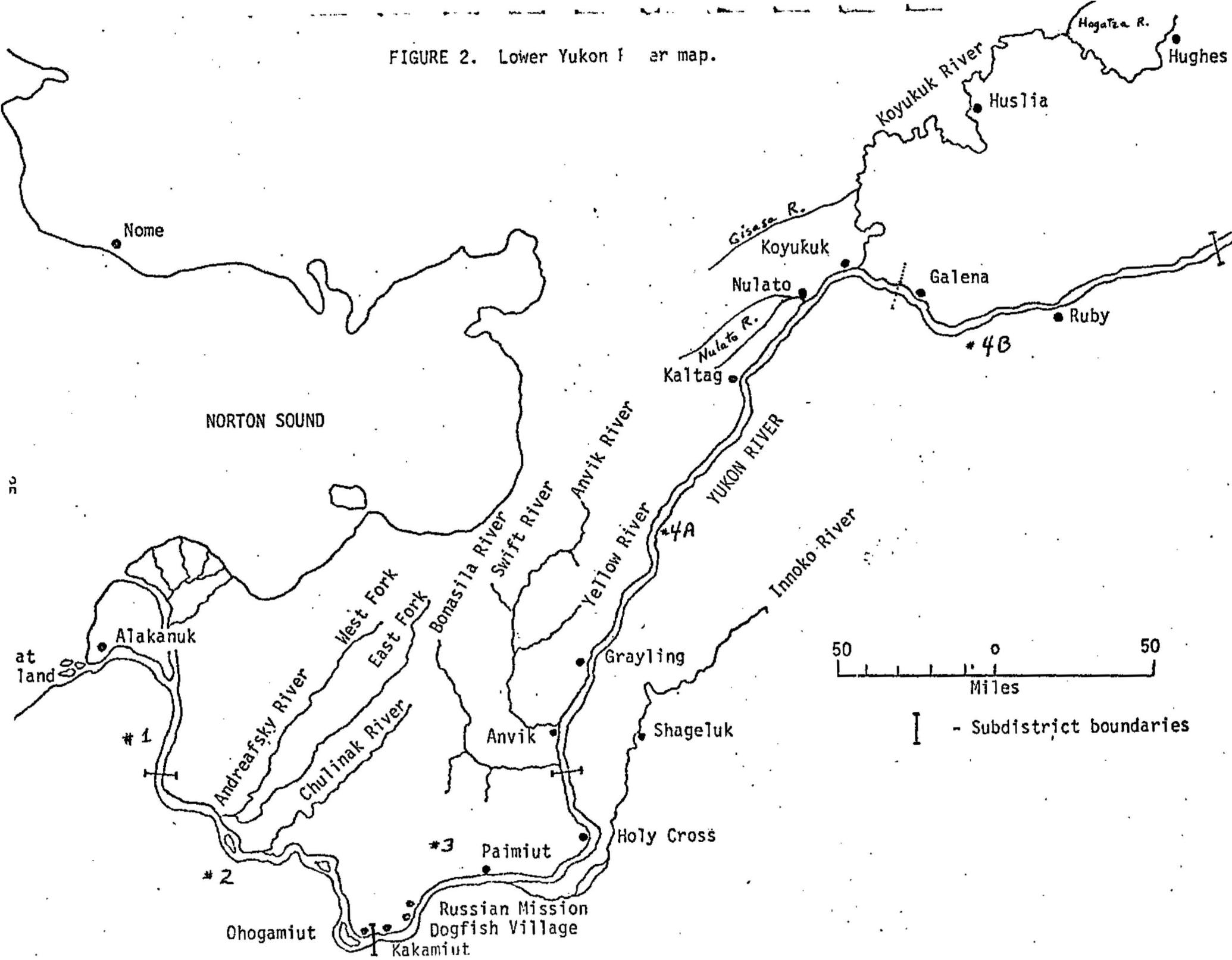


FIGURE 3. Mid-Yukon River map

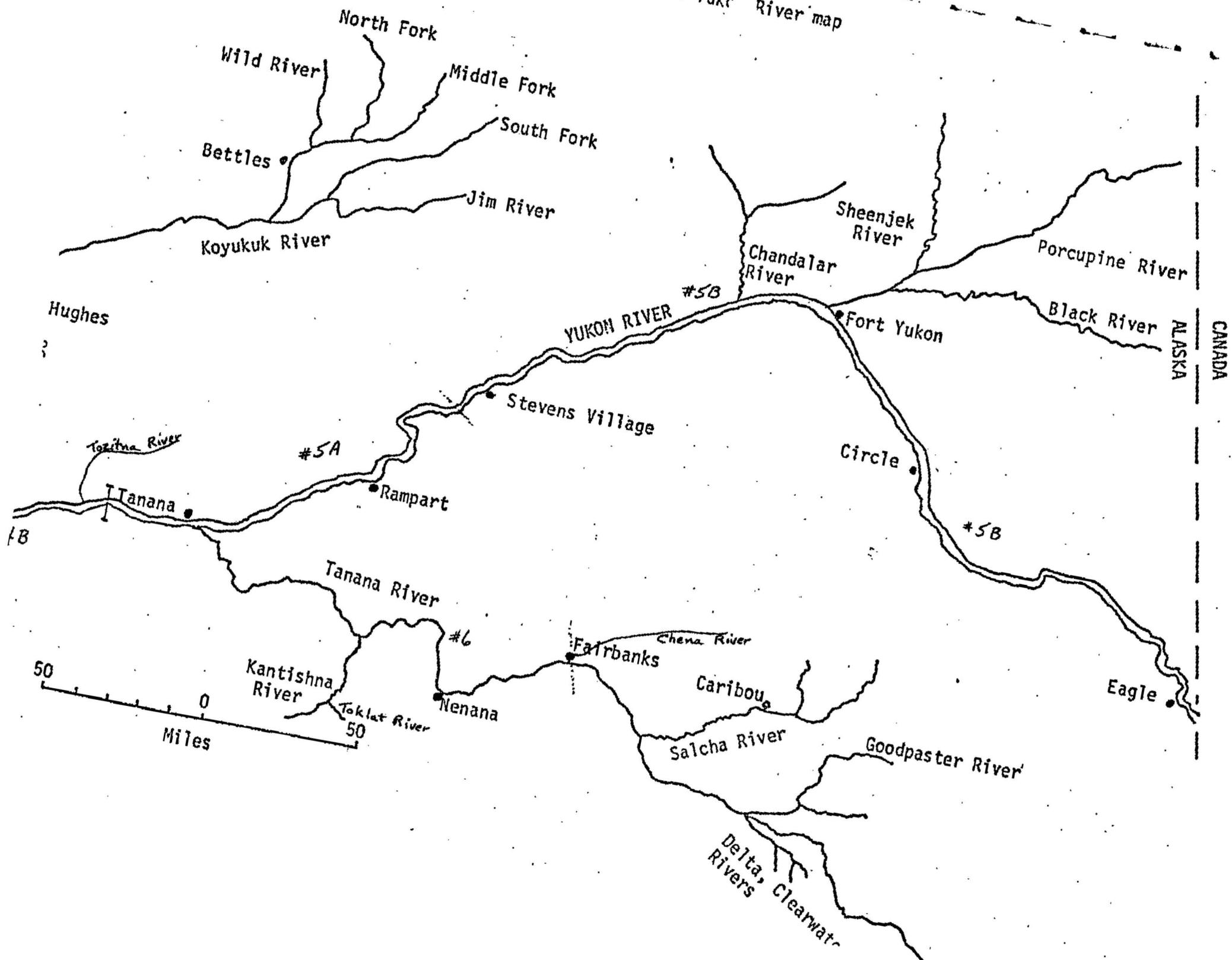


FIGURE 4. Upper Yukon River map.

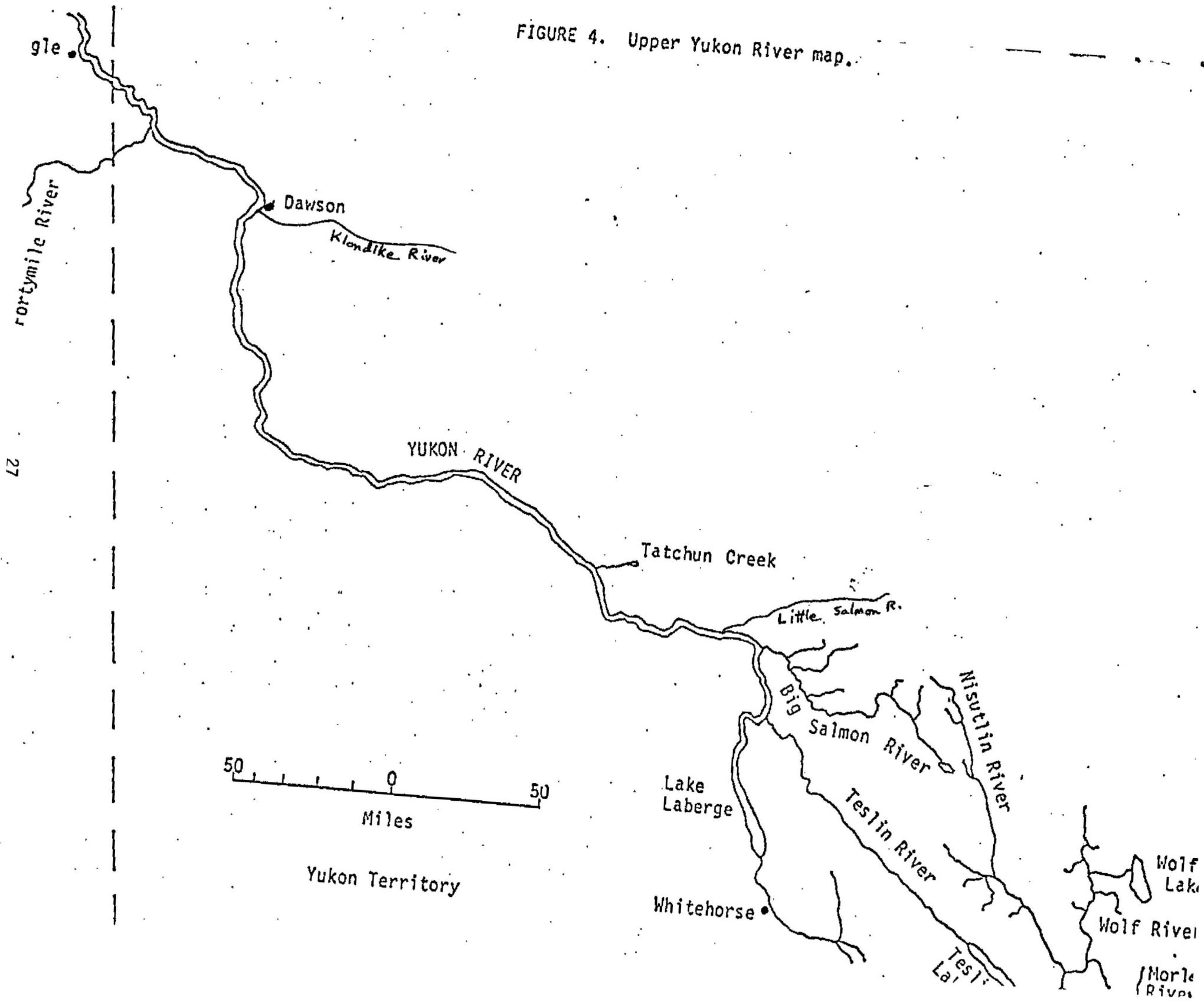


FIGURE 5. COMPARISON OF YUKON RIVER DRAINAGE KING-SALMON AERIAL SURVEY ESTIMATES FOR SPAWNING STREAMS IN ALASKA AND THE YUKON TERRITORY, 1975-1980.

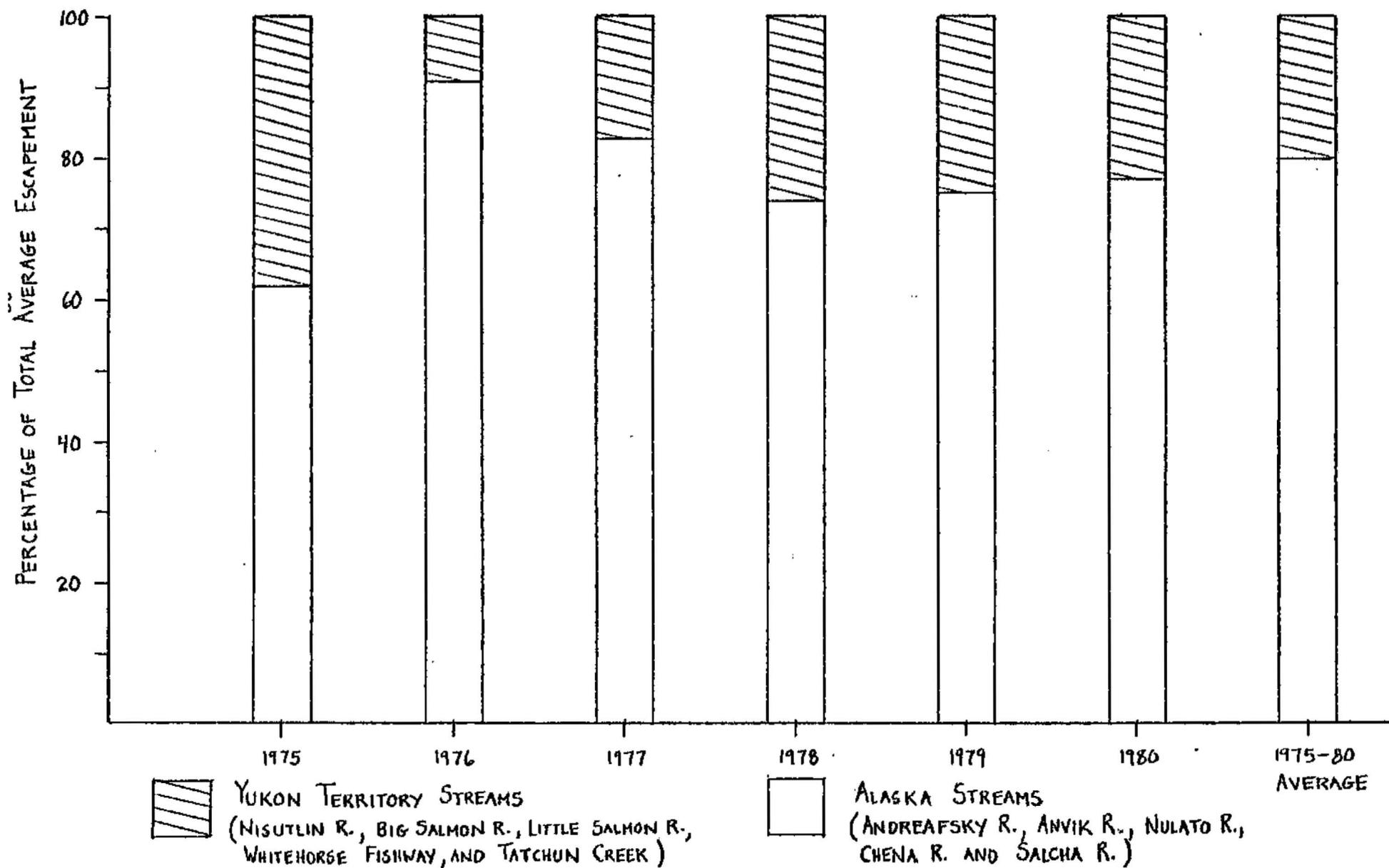


FIGURE 6. COMPARISON OF YUKON RIVER DRAINAGE, FALL CHUM SALMON AERIAL SURVEY ESCAPEMENT ESTIMATES FOR SPAWNING STREAMS IN ALASKA AND THE YUKON TERRITORY, 1974-1979.

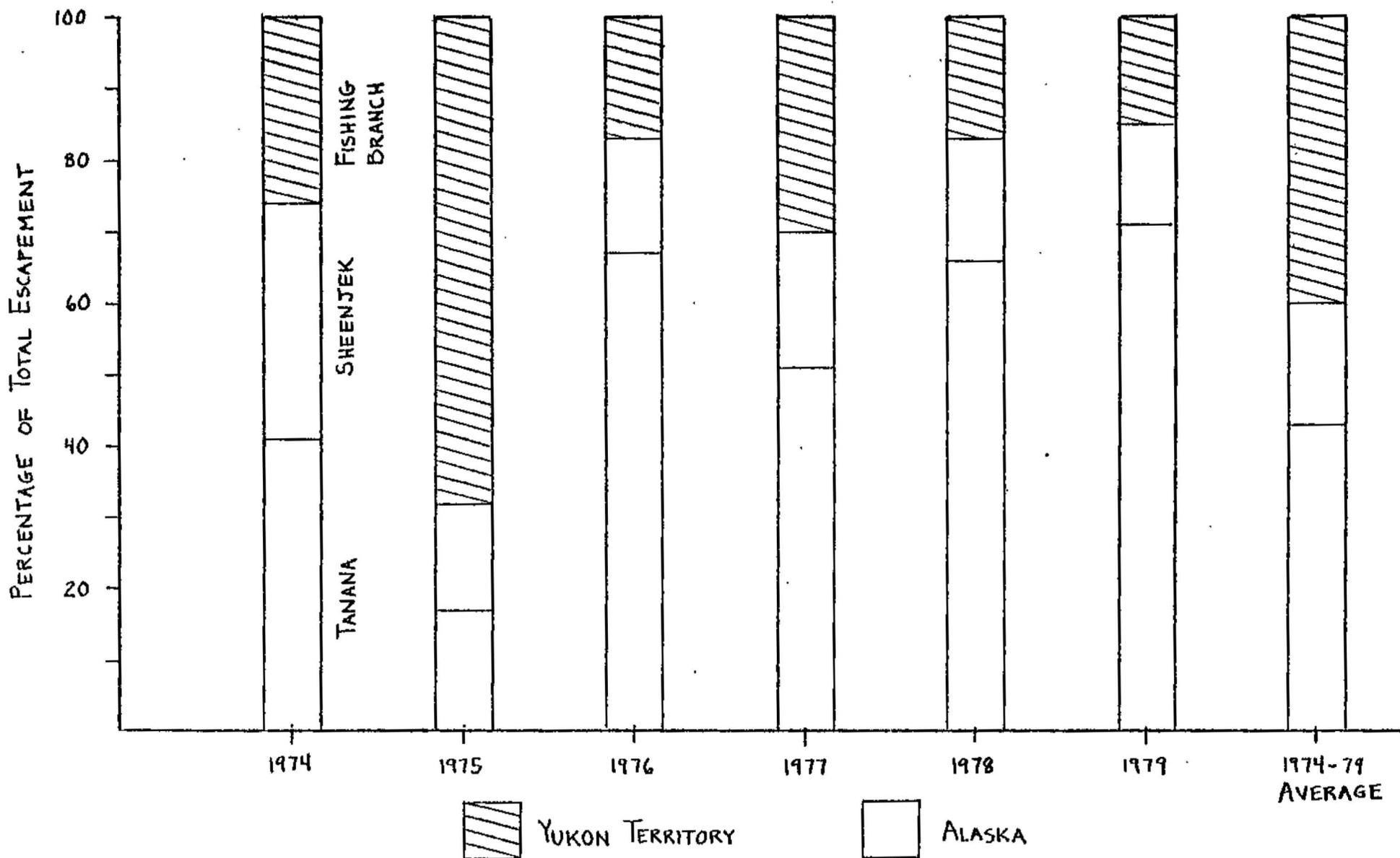


Table Tj. Yukon River Drainage Mileages

<u>Location</u>	<u>Mileages from Mouth</u>
<u>North Mouth (Apoon Pass)</u>	
Kotlik	6
Hamilton	26
<u>Middle Mouth (Kwipak, Kawanak Pass)</u>	
Choolunawick	16
Akers Camp	26
New Hamilton	34
<u>South Mouth (Kwikluak Pass)</u>	
Mouth, Black River	-18
Flat Island	0
Sheldons Point	5
Tin Can Point	8
Alakanuk	17
Emmonak-Kwiguk (Kwiguk Pass)	24
Sunshine Bay	24
Aproka Pass (upstream mouth)	35
Kwipak Pass (upstream mouth)	44
Head of Passes	48
Fish Village	52
Mouth Anuk River (Subdistrict 1/2 Boundary)	63
<hr/>	
Patsys Cabin	71
Mountain Village	87
Old Andraefsky	97
Pitkas Point	103
Mouth, Andraefsky River	104
St. Marys	107
Pilot Station	122
Mouth, Atchuelinguk (Chulinak) River	126
Pilot Village	138
Marshall (Fortuna Ledge)	161
Upstream Mouth Owl Slough (Subdistrict 2/3 Boundary)	163
<hr/>	
Ingrihak	170
Ohogamut	185
Kakamut	193
Russian Mission	213
Dogfish village	227
Paimuit	251
Mouth, Innoko River (South Slough)	274

Shageluk	328
Hoikachuk	383
Holy Cross	279
Mouth, Koserefski River	286
Mouth, Bonasila River (Subdistrict 3/4 Boundary)	306

Anvik	317
Mouth, Anvik River	318
Grayling	336
Mouth, Thompson Creek	349
Blackburn	370
Eagle Slide	402
Mouth, Rodo River	447
Kaltag	450
Mouth, Nulato River	483
Nulato	484
Koyukuk	502
Mouth, Koyukuk River	508
Mouth, Gisasa River	564
Huslia	711
Mouth, Dakli River	755
Mouth, Hogatza River	780
Hughes	881
Mouth, Kanuti River	935
Alatna (Mouth, Alatna River)	956
Allakaket	956
Mouth, South Fork	986
Mouth, John River	1,117
Bettles	1,121
Middle Fork	1,141
Cold Foot	1,174
Wiseman	1,186

Bishop Rock	514
Prospect Point	519
Galena	530
Whiskey Creek	555
Mouth, Yuki River	562
Ruby	581
Mouth, Melozitna River	583
Horner Hot Springs	605
Kokrines	608
Mouth, Nowitna River	612
Birches	647
Kallands - Mouth of Illinois Creek (Subdistrict 4/5 Boundary)	664
Mouth, Tozitna River	681
Tanana Village	695
Mouth, Tanana River (Subdistrict 5/6 Boundary)	695
Manley Hot Springs	765
Mouth, Kantishna River	793
Mouth, Toklat River	838
Mouth, Sushana River	850
Mouth, Bearpaw River	887
Outlet, Lake Minchumina	959

Minto	835
Nenana	860
Mouth, Nenana River	860
Mouth, Wood River	894
Rosie Creek Bluffs	912
Mouth, Chena River (Fairbanks)	920
Mouth, Salcha River	965
Benchmark #735 Slough	991
Mouth, Little Delta River	1,000
Mouth, Delta Creek	1,014
Mouth, Clear Creek (Richardson-Clearwater)	1,015
Mouth, Shaw Creek	1,021
Mouth, Delta River (Big Delta)	1,031
Delta Junction	1,041
Mouth, Goodpaster River	1,049
Bluff Cabin Slough	1,050
Outlet, Clearwater Lake	1,052
Mouth, Clearwater Creek, (Delta Clearwater)	1,053
Mouth, Gerstle River	1,059
Outlet, Healy Lake	1,071
Outlet, Lake George	1,086
Tanacross	1,128
Outlet, Tetlin Lake	1,188
Mouth, Nabesna River	1,210
Northway Junction	1,214
Mouth, Chisana River	1,215
Mouth, Sheep Creek	1,297
Rampart Rapids	731
Rampart	763
Mouth, Hess Creek	789
Mouth, Ray River	817
Highway Bridge - Pipeline Crossing	820
Mouth, Dall River	841
Stevens Village	847
Mouth, Hodzana River	897
Beaver	932
Mouth, Hadweenzic River	952
Mouth, Chandalar River (Venetie Landing)	982
Venetie	1,025
Fort Yukon	1,002
Mouth, Porcupine River	1,002
Mouth, Black River	1,026
Chalkyitsik	1,084
Mouth, Salmon River	1,142
Mouth, Salmon Trout River	1,193
Mouth, Sheenjek River	1,054
Mouth, Coleen River	1,157
U.S.-Canadian Border	1,219
Old Crow	1,259
Fishing Branch River spawning area	1,600
Circle	1,061
Woodchopper	1,110
Mouth, Charley River	1,124

Mouth, Kandik River	1,135
Mouth, Nation River	1,166
Mouth, Tatonduk River	1,186
Mouth, Seventymile River	1,194
Eagle	1,213
U.S.-Canadian Border	1,224

Mouth, Fortymile River	1,269
Dawson	1,319
Mouth, Klondike River	1,320
Mouth, Sixty Mile River	1,369
Mouth, Stewart River	1,375
McQuesten	1,455
Stewart Crossing	1,491
Mayo	1,520
Mouth, Hess River	1,594
Mouth, White River	1,386
Mouth, Donjek River	1,455
Mouth Kluane River	1,541
Outlet Kluane Lake	1,587
Burwash Landing	1,595
Kluane	1,625

Fort Selkirk	1,477
Mouth, Pelly River	1,478
Pelly Crossing	1,410
Mouth, MacMillan River	1,442
Ross River	1,602
Minto	1,499
Mouth, Tatchun Creek	1,530
Carmacks	1,547
Mouth, Little Salmon River	1,583
Mouth, Big Salmon River	1,621
Mouth, North Big Salmon River	1,641
Mouth, South Big Salmon River	1,657
Outlet, Big Salmon Lake	1,714
Mouth, Teslin River	1,654
Roaring Bull Rapids	1,707
Johnson's Crossing (Outlet, Teslin Lake)	1,756
Teslin	1,780
Mouth Nisutlin River	1,788
Mouth, Sidney Creek	1,637
Mouth, Hundred Mile Creek	1,851
Mouth, McNeil River	1,887
Outlet, Nisutlin Lake	1,892
Outlet, Lake Laberge	1,679
Inlet, Lake Laberge	1,712
Mouth, Takhini River	1,718
Whitehorse	1,745
Mouth, M'Clintock River	1,769
Outlet, Marsh Lake	1,764
Outlet, Little Atlin Lake	1,788
Outlet, Atlin Lake	1,812
Atlin	1,844
Tagish	1,786
Outlet, Tagish Lake	1,788
Carcross (Outlet Lake Bennett)	1,810
Bennett	1,835

Table 3. Yukon River comparative subsistence catch and effort data, 1961-1979 (numbers per fishing family are in parenthesis).

Year	Total Catch		Equivalent Catch ^{1/}		Mean Equivalent Catch per Family ^{1/}	
	King Salmon	Other Salmon ^{2/}	King Salmon	Other Salmon ^{2/}	King Salmon	Other Salmon ^{2/}
1961	31,864	405,632	20,117	403,765	32	647
1962	21,610	356,754	10,217	325,244	18	577
1963	32,790	408,381	23,919	376,440	40	625
1964	22,877	485,630	14,847	458,609	25	762
1965	19,723	458,379	16,499	430,949	30	788
1966	14,272	214,236	11,507	204,913	23	416
1967	19,661	288,595	16,306	256,956	35	546
1968	15,006	189,607	11,883	170,552	25	358
1969	15,000	213,725	13,916	195,476	30	426
1970	15,794	223,237	13,474	199,163	34	498
1971	27,953	228,849	24,058	191,011	48	383
1972	21,868	151,008	19,314	129,343	46	311
1973	26,459	219,275	23,530	198,054	44	374
1974	23,137	323,834	19,014	284,977	38	580
1975	15,466	300,379	12,600	262,741	21	448
1976	19,329	262,624	16,196	235,056	25	358
1977	20,388	267,127	15,740	235,401	27	408
1978	30,297	299,791	25,496	255,447	36	360
1979	35,205	452,328	26,616	315,661	33	387

Year	Fishing Families surveyed	People in fishing families ^{1/}	Snowmachines ^{1/}	Sled dogs ^{1/}	Gear operated ^{1/}	
					6111 nets	Fishwheels
1961	624	3,626 (5.8)		4,806 (7.7)	577	169
1962	564	3,279 (5.8)		3,848 (6.8)	613	138
1963	602	4,154 (6.9)		4,214 (7.0)	716	156
1964	602	3,612 (6.0)		4,003 (6.6)	840	155
1965	547	3,993 (7.3)		3,993 (7.3)	645	127
1966	492	3,149 (6.4)		3,112 (6.3)	582	116
1967	471	2,779 (5.9)	192 (0.4)	2,752 (5.8)	530	86
1968	476	3,094 (6.5)	262 (0.6)	2,719 (5.7)	565	71
1969	459	2,984 (6.5)	349 (0.8)	2,448 (5.3)	930	63
1970	400	2,680 (6.7)	346 (0.9)	2,214 (5.5)	647	55
1971	499	3,244 (6.5)	460 (0.9)	2,226 (4.5)	795	63
1972	416	2,621 (6.3)	438 (1.0)	1,589 (3.8)	755	59
1973	530	3,339 (6.3)	571 (1.1)	2,375 (4.5)	991	83
1974	491	3,093 (6.3)	534 (1.1)	2,105 (4.3)	668	90
1975	587	3,698 (6.3)	762 (1.3)	2,585 (4.4)	1,119	126
1976	657	4,139 (6.3)	882 (1.3)	3,401 (5.2)	1,071	154
1977	577	3,635 (7.3)	785 (1.4)	3,413 (5.9)	755	164
1978	711	3,929 (5.5)	843 (1.2)	3,722 (5.2)	943	178
1979	815	4,386 (5.3)	914 (1.1)	4,623 (5.7)	1,324	179

^{1/} Data from villages surveyed each year since 1961: Mouth to Fort Yukon and Tanana River (does not include Fairbanks or Shageluk).

^{2/} Mostly chum salmon, some pinks and cohos.

Table 5. Yukon River Comparative King Salmon Data.

Year	Total Catch ^{1/}	Subsistence Catch ^{1/}	Commercial Catch ^{1/}	Numbers of Commercial Fishing Vessels ^{2/}		Hours open to Commercial Fishing ^{3/}	Test Fishing Catch/Hour ^{4/}	Escapement Index ^{5/}
				Licensed Fishing Vessels	Actual Fishing Vessels			
1961	155,570	31,364	123,706	322	-6/	852	6/	1,650
1962	120,381	21,610	98,771	447	-6/	818	6/	1,218
1963	152,247	32,970	119,277	385	-6/	774	6/	404
1964	119,672	22,877	96,795	415	-6/	606	6/	652
1965	140,006	19,723	120,363	433	-6/	720	6/	655
1966	109,529	14,272	95,257	478	-6/	552	6/	507
1967	151,554	19,661	131,893	507	-6/	744	.37	533
1968	123,744	15,006	108,732	464	-6/	746	.65	476
1969	106,863	15,000	91,863	454	-6/	660	.70	334
1970	98,854	15,974	82,880	492	-6/	636	.67	1,057
1971	142,169	20,044	113,685	561	559	528	.86	1,348
1972	116,524	21,868	94,609	579	579	552	.41	794
1973	103,657	26,433	77,224	625	605	540	.49	523
1974	123,476	23,343	100,133	619	550	576	.26	805
1975	82,785	15,645	66,740	708	590	420	.20	696
1976	116,477	19,329	92,171	716	642	372	.48	783
1977	121,422	20,388	101,034	598	580	386	.19 ^{6/}	1,247
1978	130,874	30,297	100,577	6/	633	336	.36	1,943
1979	170,436	35,205	135,231	6/	635	312	6/	2,063
1980 ^{7/}	188,400	30,000	158,400	6/	636	246	6/	2,651

1/ Catches from entire Yukon River drainage including Canada.

2/ Numbers of commercial fishing vessels in lower 150 miles of river (subdistricts 1 and 2). "Actual numbers of fishing vessels" represents those vessels delivering at least once during the king salmon season.

3/ "King salmon season" (June-early July) in lower 150 miles of river (subdistricts 1 and 2).

4/ Located in south mouth; 25 fathom 8 1/2 inch set gill nets.

5/ Average numbers of fish counted in four Index areas: West Fork, Andreafsky River; East Fork, Andreafsky River; Salcha River; Whitehorse fishway, does not include counts made during "poor" aerial survey conditions.

6/ Information not available.

7/ Preliminary data.

Table 6. YUKON RIVER COMPARATIVE CHUM SALMON DATA

Year	Total Catch ^{1/}	Subsistence Catch ^{2/}	Commercial Catch ^{2/}	Numbers of Commercial Fishing Vessels ^{3/}		Hours Open To Commercial Fishing ^{4/}		Test Fishing Catch/Hours ^{7/} Summer Chums	Escapement Index		
				Licensed Fishing Vessels	Actual Numbers of Fishing Vessels ^{4/} King Salmon Season ^{5/}	Fall Season ^{6/}	King Salmon Season ^{5/}		Fall Season ^{6/}	Summer Chums ^{8/}	Fall Chums ^{9/}
1961	461,599	412,009	45,856	322	10/	10/	10/	384	10/	4,631	10/
1962	435,463	358,441	54,096	447	10/	10/	10/	504	10/	14,833	10/
1963	429,309	421,625	2,192	385	10/	10/	10/	432	10/	10/	10/
1964	498,343	485,621	10,276	415	10/	10/	10/	408	10/	12,810	10/
1965	404,669	458,931	25,308	433	10/	10/	10/	10/	10/	51,188	10/
1966	308,067	214,611	74,202	478	10/	10/	10/	672	10/	20,866	10/
1967	352,420	288,577	52,796	507	10/	10/	264	504	1.30	116,000	10/
1968	270,740	189,607	67,830	464	10/	10/	588	528	0.30	31,997	10/
1969	422,874	213,754	194,139	454	10/	10/	492	600	4.18	139,250	10/
1970	534,653	223,205	349,203	492	10/	10/	468	984	2.92	108,258	10/
1971	646,297	220,749	291,445	561	559	352	456	768	1.85	84,920	275,000
1972	464,617	151,000	299,376	579	579	428	504	1,428	0.83	104,297	11,684
1973	778,524	221,620	520,263	625	605	628	696	1,620	2.82	46,263	6,954
1974	1,228,716	330,223	882,253	619	550	443	768	876	4.14	83,371	15,306
1975	1,306,284	311,979	987,359	708	590	613	612	912	4.21	328,124	102,864
1976	1,030,330	262,624	762,509	716	642	616	372	756	3.02	116,841	9,785
1977	1,106,519	267,127	881,687	598	500	509	386	780	1.41	109,818	13,664
1978	1,591,976	299,791	1,292,185	10/	633	633	336	936	2.81	110,278	10,985
1979	1,627,392	452,328	1,175,064	10/	635	678	312	768	10/	98,364	29,400
1980 ^{11/}	1,700,000	350,000	1,350,000	10/	636	627	246	672	10/	200,360	10/

1/ Catches from entire Yukon River drainage including Canada. (Mostly chum salmon, but includes small numbers of pink and coho salmon).

2/ Catches from entire Yukon River drainage including Canada. Catches 1961-1972 were primarily fall chums. After 1972, catch comprised of mostly summer chums.

3/ Numbers of commercial fishing vessels in lower 150 miles of river (subdistricts 1 and 2).

4/ "Actual numbers of fishing vessels" represents those vessels delivering at least once.

5/ "King salmon season" (June-early July) in lower 150 miles of river (subdistricts 1 and 2).

6/ "Fall season" (mid July-August) in lower 150 miles of river subdistricts 1 and 2).

7/ Located in south mouth; 25 fathom 5-1/2 inch set gill net operated early June-mid July).

8/ Average numbers of fish counted in four index areas: West Fork, Andreafsky River; East Fork, Andreafsky River; Anyik River, Salcha River. Does not include counts made during "poor" aerial survey conditions.

9/ Average numbers of fish counted in eight index areas: Toklat River, Delta River, Tanana River, Benchmark #735 slough, Bluff Cabin slough, Delta Clearwater slough, Sheenjek River and Fishing Branch River.

10/ Information not available.

11/ Preliminary data.

Table 7 . Yukon River Drainage Salmon Spawning Streams in Alaska.

Spawning Stream	Greatest No. of Salmon Counted ^{1/} in any one year (1959-1980)			
	King	Summer Chum	Fall Chum	Coho
Alatna R.	4	975	-	-
Andreafsky R., East	2,487	119,000	-	-
Andreafsky R., West	1,500	235,954	-	-
Anvik R.	1,950	752,825	-	-
Archuelinguk R.	86	2,855	-	1 ^{2/83/}
Baker Creek	-	42	-	-
Banner Creek	-	-	4 ^{3/}	-
Batza Creek	-	372	-	-
Bear Creek	8	4,267	-	-
Bear Paw Creek	96	-	1,657	-
Beaver Creek (Anvik R.) drainage	10	25,700	-	257
Beaver Creek (mouth)	-	-	110 ^{4/}	-
Bench Mark #735 Slough	-	-	4,071	-
Big Salt R.	-	196	-	-
Big Tanana Slough	-	-	-	87
Birch Creek (Kantishna R.) drainage	-	-	1	-
Black R.	-	-	15	-
Blackburn Creek	-	4,267	-	-
Blacksand Creek	2	75	-	-
Blue Creek	-	-	15	64
Bluff Cabin Slough	-	-	10,312	-
Bonanza Creek	-	11	-	-
Bonasila R.	300	10,000	-	-
Box Creek	-	100	-	-
Caribou Creek	2	9,089	-	-
Chandalar R.	100	-	17,455	-
Charley R.	-	4	-	-
Chatanika R.	65	648	-	-
Chena R.	2,541	4,350	-	2
Chulinak R.	394	33,616	-	-
Clear Creek, Hogatza	-	12,375	-	-
Clear Creek, Nenana	56	7,610	-	13
Clearwater Lk & outlet	-	-	400	1,500
Dakli R.	4	10,503	-	-
Delta R.	-	-	17,925	37
Delta-Clearwater R.	-	-	164	8,970
Dishna R.	7	2,886	-	-
Fish Creek, Koyukuk	-	1,000	-	-
Fish Hole Creek, Kevinjek	-	-	200	-
Five-Mile Clearwater	-	-	-	3
Flat Creek	-	160 ^{3/}	-	-
Fox Creek	-	41	-	-
Gisasa R.	951	56,904	-	-
Glacier Creek, Kantishna	12	-	-	-
Glacier Creek, Nenana	-	-	150	-
Goodpaster R.	402	113	-	-
Grayling Creek	-	392	-	-
Hawk R.	1	600	-	-
Henshaw Creek	99	1,053	-	-
Hodzana R. (mouth)	-	-	9 ^{4/}	-
Hogatza R.	-	19,786	-	-
Illinois Creek	2	-	-	-
Indian R.	38	4,420	-	-
Jim R.	53	7,000	-	-
Kako Creek	-	4,500	-	-
Kala Creek	7	3	-	-
Kaltag River	13	19,000	-	-
Kanutl R.	-	25	-	-
Kateel R. North	30	4,176	-	-
Kevinjek Creek	-	-	1,625 ^{3/}	-
Kokrines Stream	-	22	-	-
Koyukuk R.	12	420	-	-
Koyukuk R., Middle Fork	37	350	-	-
Koyukuk R., North Fork	7	-	-	-
Koyukuk R., South Fork	179	14,626	-	-
Little Salcha R.	-	47	-	-
Lockwood Creek	-	634	-	-

Table 7. Yukon River Drainage Salmon Spawning Streams in Alaska (continued).

Spawning Stream	Greatest No. of Salmon Counted ^{1/} in any one year (1959-1980)			
	King	Summer Chum	Fall Chum	Coho
Lost Slough	-	-	-	116
Malamute Fork, Koyukuk	17	780	-	-
McDonald Creek	-	4,465	-	-
McKinley Creek	-	-	405	-
Melozitna Hot Springs Cr.	9	1,945	-	-
Melozitna R.	136	8,743	-	-
Minook Creek	-	25 ^{3/}	-	-
Moose Creek	-	-	2,996	-
Morelock Creek	-	35	-	-
Nelson-Clearwater Cr.	1 ^{4/}	-	-	-
Nenana Slough	1	-	115	831
Nenana Clearwater Sl.	-	-	-	900
Nenana R.	-	-	23	827
Ninety-Eight Creek	-	2 ^{3/}	-	-
Nulato R., North	1,093	87,280	-	-
Nulato R., South	422	51,215	-	-
One Mile Slough	-	-	3,850	-
Otter Creek	5	47,645	-	2
Panguingue Creek	-	-	-	2
Piledriver Slough	2	1	-	-
Porcupine R.	-	-	92 ^{4/}	2 ^{2/}
Richardson-Clearwater R.	-	-	327	349
Rodo R.	57	25,335	-	-
Salcha R.	6,756	7,879	-	-
Salmon Fork, Black	-	-	1,510	-
Salmon-Trout R.	-	-	350	-
Seventeen Mile Slough	-	-	1,565	1,987
Sheenjok R.	-	-	78,060	14
Sheep Creek	-	-	29	-
Simon Creek	-	4,272	-	-
Sinyalak Creek	-	710	-	-
Slate Creek	13 ^{3/}	-	-	-
Spruce Creek	10 ^{3/}	46 ^{3/}	-	-
Stink Creek	-	1,736	-	-
Stuyahok R.	-	6,040	-	-
Swift R.	3	21,545	-	197
Tanana R.	1	-	29,820	22
Tatalina R.	-	-	3 ^{4/}	-
Thompson Cr.	3	17,190	-	-
Tolovana R.	6 ^{4/}	19 ^{4/}	-	-
Toklat R.	-	-	177,199	-
Tolstoi Creek	-	491	-	-
Tozitna R.	257	3,512	-	-
Unnamed Slough, Nenana	-	-	-	6
Unnamed Trib., Nenana	-	-	-	111 ^{8/}
U.S.F.W.S. #4 (below Dogfish) Village	1	40	-	-
Volkmeir R., Mouth	-	-	87	-
Wheeler Creek	5	8,675	-	-
Wilson Creek	-	558 ^{3/}	-	-
Wood Creek	-	-	-	310 ^{3/}
Y16-1, Melozitna (unnamed)	-	140	-	-
Y16-2, Melozitna (unnamed)	6	130	-	-
Yellow R.	139	38,630	-	-

1/ All aerial survey counts unless indicated otherwise 2/ Boat survey 3/ Ground survey
 4/ Test netting with gill nets 5/ Tower count 6/ EC-FS estimate 7/ Weir
 8/ Minnow trap

Total No. of Spawning Streams	55	75	32	25
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Table 8 . Yukon River Drainage Salmon Spawning Streams in Canada (Yukon Territory)

Spawning Stream	Greatest No. of Salmon Counted ^{1/} in any one year (1959-1980)			
	King	Summer Chum	Fall Chum	Coho
Bear Feed Creek	1 ^{3/}	-	-	-
Big Kalzas R.	23	-	-	-
Big Salmon R.	1,568	-	-	-
Blind Creek	11 ^{3/}	-	-	-
Earn R.	90	-	-	-
Fishing Branch R.	2	-	353,282 ^{5/}	8
Gladys R.	50	-	-	-
Gienlyon Creek	1	-	-	-
Hayes R.	150 ^{6/}	-	-	-
Hoolie R.	24	-	-	-
Husky Dog Creek	7	-	-	-
Jennings R.	150 ^{6/}	-	-	-
Kalzas R.	23	-	-	-
Klondike R.	100 ^{1/ & 3/}	50 ^{1/ & 3/}	-	-
Kluane R.	-	-	4,820	-
Lewis Lake Outlet	20	-	-	-
Little Kalzas R.	13	-	-	-
Little Salmon R.	489	-	21 ^{3/}	-
MacMillan R. South	22	-	-	-
Mayo R.	20	-	-	-
McNeil R. and Lakes	7	-	-	-
McQuesten R.	40 ^{3/}	-	-	-
Michie Creek	20	-	-	-
Miner R.	89	-	-	-
Mitchie Cr.	39	-	-	-
Moose R.	25	-	-	-
Morley Creek	350	-	-	-
Nisutlin R.	1,849	-	-	-
Nisutlin Lake & Outlet	122	-	-	-
Nordenskiold R.	17	-	-	-
Northern Lake & Outlet	49	-	-	-
Ollie Lake & Outlet	84	-	-	-
Pelly Lake & Outlet	77	-	-	-
Pleasant Creek	58	-	-	-
Prevost R.	1 ^{3/}	-	-	-
Red R.	10	-	-	-
Riddell R.	5	-	-	-
Rose R.	104	-	-	-
Russet Creek	2	-	-	-
Scurvy Cr.	3	-	-	-
Sheldon Lake	2	-	-	-
Sidney Creek	2	-	-	-
Swift R.	250	-	-	-
Tahkini R.	165	-	-	-
Tatchun Creek	175	-	-	-
Tay R.	1	-	-	-
Teslin R.	3,500 ^{6/}	-	-	-
Tincup Creek	50 ^{6/}	-	-	-
Wolf R.	750 ^{6/}	28	-	-
Yukon R., Main Stem	30	-	1,000	-

^{1/} All aerial surveys unless indicated otherwise ^{2/} Boat survey ^{3/} Ground survey
^{4/} Test gillnet ^{5/} Weir ^{6/} EC-FC estimate

Total No. of spawning streams	49	2	6	1
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Table 10. Summary of Yukon River Salmon Population Estimates Cited in Literature.

Portion of Run	Year	Location of Tagging Site	Method ^{1/}	King Salmon	Summer Chum Salmon	Fall Chum Salmon	Source	
<u>Entire Run</u>	1966	River Mile 0	1	310,000-342,000			Alaska Dept of Fish and Game 1966 Annual Mgmt. Report, Arctic-Yukon-Kuskokwim area.	
	1967	River Mile 0	1	397,000-600,000			ADFG 1967 Arctic-Yukon-Kuskokwim Area Anadromous Fish Investigations: 82 pp.	
	1968	River Mile 185	1	190,000			ADFG 1968 Arctic-Yukon-Kuskokwim Area Anadromous Fish Investigations: 113 pp.	
	1969	River Mile 185	1	161,000			ADFG 1969 Arctic-Yukon-Kuskokwim Area Anadromous Fish Investigations: 77 pp.	
	1970	River Mile 185	1	227,000	3,630,000		ADFG 1970 Yukon River Anadromous Fish Investigations: 45 pp.	
	1971	River Mile 185	3		1,560,000		ADFG 1971 Yukon River Anadromous Fish Investigations: 45 pp.	
	1974		2			514,000 ^{2/}	ADFG 1974 Annual Mgmt. Report, Arctic-Yukon-Kuskokwim Region: 165 pp.	
	1975		2		2,574,000 ^{2/}	891,000 ^{2/}	ADFG 1975 Annual Mgmt. Report, Yukon Area: 65 pp.	
	1976		2		1,650,000 ^{2/}	349,000 ^{2/}	ADFG 1976 Annual Mgmt. Report, Yukon Area: 97 pp.	
	1977		2		1,255,000 ^{2/}		ADFG 1977 Annual Mgmt. Report, Yukon Area: 92 pp.	
			River Mile 540-601	1			513,000	ADFG 1980. Yukon River Salmon Studies, Technical Report: 78 pp.
	1978			2		1,792,000 ^{2/}		ADFG 1978 Annual Mgmt. Report, Yukon Area: 96 pp.
			River Mile 601-725	1			460,000	ADFG 1980 Yukon River Salmon Studies, Technical Report: 78 pp.
1979			2		1,460,000 ^{2/}	922,388 ^{2/}	ADFG 1979 Annual Mgmt. Report, Yukon Area: 88 pp.	
<u>Run upstream of Rampart</u>	1961	River Mile 763	3	17,000		131,000	U.S. Fish & Wildlife Service 1964 Rampart Canyon Dam & Reservoir Project, Yukon River: 122 pp.	
	1962	River Mile 763	3	22,400		114,000	Same as above	
<u>Run into Yukon Territory excluding Porcupine River</u>	1973	River Mile 1289	1	29,000		40,000	Sweitzer, O. 1974 Distribution and Abundance of chinook (<i>Oncorhynchus tshawytscha</i>) and chum (<i>O. keta</i>) salmon in the upper Yukon River system in 1973, as determined by a tagging program. Environment Canada, Fisheries & Marine Service: 24 pp.	
	1974	River Mile 1289	1	11,100- 36,700		9,000-31,400	Brook, D.N. 1976 Distribution and Abundance of chinook (<i>Oncorhynchus tshawytscha</i>) and chum (<i>O. keta</i>) salmon in the upper Yukon River system in 1974 as determined by a tagging program. Environment Canada, Fisheries & Marine Service: 56 pp.	

^{1/} Method: 1 - Tag-recovery and commercial - subsistence harvests; 2 - Commercial-subsistence harvests and observed spawning escapements
3 - Tag recovery with only recoveries at agency fishing sites.

^{2/} Minimum estimates due to incomplete documentation of spawning escapements.

ner chum salmon escapement estimates 1958-1980

1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
25,619		17,600 ^{4/}	119,000	84,090	98,095	41,460	10,149 ^{2/}	3,215 ^{2/}	223,485	105,347	112,722	127,050	66,471	36,223 ^{2/}
18,145	14,495 ^{3/}	74,600 ^{2/}	159,500	91,710 ^{2/}	71,745	25,573	51,835	33,258	235,954	118,420	63,120	57,321	43,391	114,759
43,764		92,200	278,500	175,000	169,840	67,033			459,439	223,767	175,842	184,371	109,862	151,532
						100,342	71,475	201,277	601,080	237,051	162,514	166,102	37,467	-
						137,515	15,190		211,130	168,315	100,240	85,237	200,537 ^{5/}	482,181 ^{5/}
						74,118	10,966		634,355	243,695	-	-	84,620	
37,500	116,000	51,500 ^{2/}		232,700		208,763	26,156		845,485	412,010	100,240	85,237	-	-
37,500	116,000	51,580 ^{2/}		232,700		245,857	86,665		845,485	406,156	262,754	251,339	200,537 ^{5/}	482,181 ^{5/}
								16,137	25,335	38,250	16,118	17,845	-	-
								22,144	87,200	39,690	50,275	41,659	35,598	11,244
								29,016	51,215	9,230	11,385	12,821	1,506	3,702
								51,160	138,495	48,920	69,660	54,400	37,104	141,946
								22,022	56,904	21,342	2,204	9,280	10,962	10,388
									7,610	9,356	6,437	2,716	5,132	12,375
									14,745	10,188	4,297	2,306	9,009	7,441
									22,355	19,544	10,734	5,162	14,221	19,786
								1,823	3,512	725 ^{2/}	761	2,262	-	570
						670	79	4,350 ^{3/}	2,702 ^{3/}	685	610	1,609	1,025	338 ^{3/}
2,200		3,790	425 ^{2/}	7,879	306 ^{2/}	947 ^{2/}	290	8,040 ^{5/}	7,573	6,474	677	5,405	3,060	4,140

Table 12. Comparative Yukon River drainage fall chum salmon aerial survey escapement estimates, 1971-1979 1/

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
<u>TANANA RIVER DRAINAGE</u>									
Bear Paw River	-	-	1,530	2,996	1,657	-	-	-	-
Toklat River drainage									
Upper Toklat River 3/	-	1,000 2/	6,957	34,310	42,418	35,224	25,000	35,000	107,593 8/
Lower Toklat River	-	-	-	-	35,867	2,000 2/	-	-	64,540
Subtotal Toklat R. drainage			6,957	34,310	78,285	37,224	25,000	35,000	172,133
<u>UPPER TANANA RIVER DRAINAGE</u>									
Benchmark #735 Slough	-	5,255	127 2/	1,450	-	336	1,270	1,705	2,714
Delta River	-	3,650	7,971	4,010	3,946 2/	5,526	17,925	10,051	8,125
Upper Tanana River 4/	-	8,350	5,635	4,567	-	4,979	3,725	5,700	20,820
Bluff Cabin Slough	-	6,040	3,450	4,840	5,000 2/	3,197	6,491	5,340	6,875
Delta Clearwater Slough (1 Mile Slough)	-	-	1,720	1,235	745 2/	1,552	1,900	475	3,850
Subtotal Upper Tanana R. drainage		23,295	18,903	16,102	9,691	15,590	31,311	23,271	42,384
<u>CHANDALAR RIVER</u>	-	-	-	17,455	6,345 2/	58 2/	4,183	-	-
<u>PORCUPINE RIVER DRAINAGE</u>									
Sheenjek River	-	-	1,175	40,507	78,060	12,023	20,506	14,610	41,140
Fishing Branch River (Yukon Terr)	250,300,000	35,125 5/	15,987 6/	32,525 6/	353,282 6/	13,450	32,500	15,000	44,080
Subtotal Porcupine R. drainage	250-300,000	35,125	17,162	73,032	431,342	25,473	53,006	29,610	85,220
TOTAL	250-300,000	59,420	44,552	143,895	527,320	78,345	113,500	87,881	299,737

- 1/ All surveys rated fair-good unless rated otherwise. Only peak estimates listed.
 2/ Poor or incomplete survey; very minimal and/or rough estimate.
 3/ Includes following areas: Toklat River in vicinity of roadhouse, Shushana River and Geiger Creek.
 4/ Richardson Highway Bridge to Blue Creek.
 5/ Combined tagging population estimate and weir count.
 6/ Weir count.
 7/ Foot survey.
 8/ Combined aerial and ground survey estimates.

Table 13 . Comparative Yukon River drainage coho salmon aerial survey escapement estimates, 1971-1979 ^{1/}

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
<u>Nenana River drainage</u>									
<u>Lost Slough</u>									
East Bank 1 mile below Anderson	-	-	-	900	116	118	524	350	227
East Bank 3 miles below Anderson	-	-	-	488	827	-	-	-	-
<u>Wood Creek</u>	-	-	-	-	-	-	310	-	-
<u>Clear Creek</u>	-	-	-	-	-	13	-	-	-
<u>Seventeen Mile Slough</u>	-	-	-	<u>27</u>	<u>956</u>	<u>229</u>	<u>1,167</u>	<u>466</u>	<u>1,987</u>
Subtotal Nenana R. drainage	-	-	-	1,415	1,899	360	2,001	816	2,214
<u>Delta Clearwater River</u>	3,000	632 ^{3/}	1,982	3,950	5,100 ^{3/}	1,920	4,793 ^{3/}	4,798 ^{3/}	8,970 ^{3/}
<u>Clearwater Lake and Outlet</u>	-	417	249 ^{2/}	560	1,530	460 ^{3/}	730 ^{3/}	570 ^{3/}	1,015 ^{3/}
<u>Richardson Clearwater River</u>	-	527 ^{2/}	175	235	4 ^{2/}	80 ^{2/}	327	-	372

- ^{1/} Peak estimates presented only
^{2/} Poor or incomplete survey
^{3/} Boat survey by Sport Fish Division

Table 14. Summary of Important Regulation Changes Affecting Commercial and Subsistence Salmon Fisheries in the Yukon Area, 1961-80.

<u>Year</u>	<u>Action Taken</u>	<u>Explanation</u>
1961	King Salmon quota of 60,000 fish in lower river (below Owl Slough) eliminated and fishing time reduced from 5 1/2 to 4 days per week. In remainder of area 5,000 king salmon quota remained in effect and fishing allowed 7 days per week instead of 5 1/2 days per week.	To manage king salmon fishery on a more flexible basis.
1961	Silver salmon quota of 5,000 fish allowed upstream of Owl Slough. Only king salmon could be harvested before August 1 in the district.	To allow harvest of fall chum and coho salmon and to prohibit commercial fishing for summer chums.
1962	Four subdistricts created. Specific quotas of 3,000 king and 3,000 silver salmon established for subdistrict 3 (Owl Slough to Koyukuk River) and 2,000 king and 2,000 silver salmon for subdistrict 4 (Koyukuk River to Canadian Border).	To provide for reallocation of catches.
1963	Established two 2 day periods per week in subdistricts 1 and 2 instead of single 4 day weekly period.	To provide better balanced king salmon harvests and escapements.
1964	Established a 4 day week fishing period in subdistrict 3 instead of previous 7 day a week fishing schedule.	To allow for better balanced harvests and escapements.
1965	Substituted "chum and coho salmon combined" instead of "silver salmon" for the 2,000 and 3,000 quotas in subdistricts 3 and 4, respectively.	To clarify regulations. "Silver" salmon is used by local fishermen to refer to either fall chum or coho salmon.
1967	Established a minimum gill net mesh size of not less than 8 inch prior to July 15 in subdistricts 1 and 2.	To minimize incidental harvest of summer chums.
1967	Allowed the taking of all salmon species before August 1 in subdistricts 1 and 2. Previously only king salmon could be taken commercially before August 1.	To provide for commercial utilization of summer chums.
1968	Establish a 3-1/2 day a week fishing schedule in subdistricts 1 and 2.	To provide for adequate king salmon escapements in response to increased fishing effort.

1970	Establish a 4 day a week fishing schedule during a second season following closure of the king salmon season in districts 1 and 2.	To provide for a 4 day a week fishing schedule for fall chum salmon.
970	Allowed fishermen to substitute up to 50 fathoms of gill net of any mesh size during the "king salmon season" in subdistricts 1 and 2.	To allow an increased harvest of summer chum salmon.
1971	Allowed fishermen to substitute up to 50 fathoms of gill net of any mesh size during June 1 through July 10.	To allow an increased harvest of summer chum salmon.
1973	Allowed any size mesh gill net to be fished in subdistricts 1 and 2 except that only gill nets of 6 inch or smaller may be used after June 24 in subdistrict 1 and after July 27 in sub-district 2.	To provide for increased harvest of summer chums in subdistricts 1 and 2 during late June-early July and to minimize the incidental catch of king salmon.
1974	Established a 3 day a week fishing schedule in subdistricts 1 and 2.	To provide for adequate escapements of king and fall chum salmon in response to increased fishing effort.
1974	Reduced size of subdistrict 4 and establish two new sub-districts (5 and 6).	To provide for development of upper Yukon area Commercial fishery.
1974	Reduced fishing time in upper Yukon area (subdistrict 4,5, 6) from 7 to 5 days a week.	To provide for adequate escapements in response to development of upper Yukon commercial fishery.
1974	Established separate salmon quotas in subdistricts 4,5,and 6 totaling 5,000 king and after August 15 50,000 chum and coho salmon combined.	To provide for development of upper Yukon area commercial fishery.
1974	Prohibited use of drift gill nets in subdistricts 4,5,and6.	To prevent entry of a type of gear not currently used. Sufficient set gill net and fishwheel gear available to harvest resource.
1974	Specified that salmon may be taken with gill nets of only 6 inch or smaller mesh size after July 3 in subdistricts 1 and 2.	To provide for increased harvests of summer chums and minimize the incidental catch of king salmon.
1974	Established a 200,000 chum salmon quota after July 15 for subdistricts 1,2, and 3.	To provide for a lower Yukon area fall chum salmon fishery.
1975	Established two sections within subdistricts 4 and 5.	To provide better reporting of catches within each subdistrict.
1975	Established an August 31 season closing date in the lower Yukon area and a June 15 season opening	To lessen overharvest of early or late run segments and minimize subsistence fishing restrictions

1976	Establish three sections within subdistrict 6.	To provide better breakdown of catches within the subdistrict.
1976	Allowed 7 day a week fishing schedule in section 5-B of subdistrict 5.	To allow more fishing time because of very few number of commercial fishermen in section 5-B.
1976	Prohibited use of fishwheels in lower Yukon area.	To minimize potential gear conflicts. Fishwheels were not being fished. Available gill net gear sufficient to harvest resource.
1976	Specified range of dates (June 27-July 5 in subdistricts 1 and 2; July 5-July 15 in subdistrict 3) when salmon may be taken commercially by gill nets of 6 inch or smaller mesh size.	To allow a more optimum harvest of summer chums and minimize the incidental catch of king salmon.
1976	Established specific dates (after July 15 in subdistrict 1, after July 18 in subdistrict 2, and after July 21 in subdistrict 3) when 200,000 chum salmon quota becomes effective.	To allow better separation of summer and fall chum salmon catch in mid July.
1976	Adopted regulations to limit the areas where subsistence salmon roe sales are allowed.	To regulate the sale of subsistence caught salmon roe which was legalized by Alaska State Legislature.
1977	Established a June 10 season opening date in subdistricts 1, 2, and 3.	To prevent overharvest of early run segment of king salmon.
1977	Adopted additional regulations to restrict subsistence salmon roe sales.	To regulate the sale of subsistence caught salmon roe which was legalized by the Alaska State Legislature.
1977	Establish 2-1/2 day a week fishing schedule during June 10-July 10 in subdistricts 1 and 2.	To provide for adequate king salmon escapements in response to increase fishing effort and efficiency.
1977	Establish a split fishing period of two-2 day periods a week instead of a single 4 day period in subdistrict 3.	To provide for better balanced harvests and escapements.
1978	Repealed regulations governing the sale of subsistence salmon roe.	To prohibit sale of subsistence salmon roe which was resulting in wastage and increased catches beyond that required for subsistence needs. Board of Fisheries recommended to State Legislature the repeal of Law allowing such sales.

1978	Changed the subdistricts 2/3 boundary line from Owl Slough to Toklik.	To reallocate the king salmon harvest within subdistrict 3.
1978	Closed section 4-A of sub-district 4 on August 1 to commercial salmon fishing.	To reallocate the fall chum salmon quota within subdistrict 4.
1978	Decreased the commercial king salmon catch quota from 3,000 to 2,000 fish in subdistrict 3.	To maintain king salmon harvest at present levels in accordance with boundary change between subdistricts 2 and 3.
1978	Allocated the 10,000 combined chum and coho salmon quota in subdistrict 4 to section 4-B only.	To reallocate the fall chum salmon quota within subdistrict 4.
1979	Reduced fishing time from 5 to 4 days a week and established split fishing periods in section 4-A of subdistrict 4.	To provide for adequate escapements and more balanced harvests of summer chum salmon in response to increased fishing effort and efficiency.
1979	Specified range of dates (July 10-July 31) in subdistrict 4 when salmon may be taken commercially by gillnets of 6 inch or smaller mesh size.	To allow a more optimum harvest of summer chums and minimize the incidental catch of king salmon.
1979	Reduced fishing time by one day per week in all subdistricts during the fall chum fishing seasons.	To provide for adequate escapements and more balanced escapements in response to increased fishing effort and efficiency.
1979	Established flexible guideline harvest levels of king, fall chum, and coho salmon to replace quota structure in all subdistricts.	To provide for more flexible management in the harvest of salmon in accordance with variable run magnitudes.
1980	Reduced weekly fishing periods from 4 to 3 days a week during June 10 through July 25 in subdistrict 3.	To provide for better balanced harvests and escapements of king salmon.
1980	Reduced weekly fishing periods from 5 to 4 days a week from June 15 through August 15 in section 4-B of subdistrict 4, section 5-A of subdistrict 5 and in subdistrict 6.	To provide for better balanced harvests and adequate escapements of king and summer chum salmon in response to increased fishing effort and efficiency.

Table 15. 1979 Foreign Offshore King Salmon catches and estimated western Alaska Interception.

<u>Fishery</u>	<u>Approximate Total Catch (1979)</u>	<u>Est. W. Alaska Interceptions (1979)</u>
Bering Sea Foreign Trawl	100,129	93,120 ^{1/}
Japanese mothership gillnet	126,000	65,000 ^{2/}
- dropouts 33% of catch	41,580 ^{3/}	21,235 ^{3/}
Japanese landbased gillnet	162,000	unknown-may
-dropouts 33% of catch	53,460	be substantial
Gulf of Alaska trawl	20,000	unknown-may be substantial
Totals	503,169	179,355

^{1/} from R. Major's 7/21/80 letter to B. Larkins (NMFS files). Percentage of W. Alaska chinook in foreign trawl catch estimated at 93%.

^{2/} Dahlberg, M.L. 1980. Report of U.S. observations of the Japanese mothership salmon fishery during 1980. (Document submitted to annual meeting of the International North Pacific Fisheries Commission, Anchorage, Alaska, October 1980. 12 pp. Northwest and Alaska Fisheries Center, Natl. Mar. Fish. Serv., Natl. Oceanic Atmos. Admin., Auke Bay Laboratory, P.O. Box 155, Auke Bay, Ak. 99821.)

^{3/} approximate values based on INPFC research.

Appendix 1. Summary of Yukon River King Salmon Tag and Recovery Data.

Year	Tagging Location ^{1/} (River mile 1224:US/ Canada border)	Agency ^{2/}	Capture Gear ^{3/}	Tag Type ^{4/}	Tagging Dates	Number Tagged	Number of Recoveries (%) ^{5/}			Comments
							Alaska	Yukon Terr.	Total	
1961	River Mile 730	2	1,3	1	6/27-9/12	165	62(38)	9(5)	71(43)	Does not include 5 rec. by USFWS fishing gear
1962	River Mile 730	2	1,3	1	?	?			?	
1963	River Mile 122	1	1	2	6/18-7/15	142	70(49)	0	70(49)	
1963	River Mile 0 (S. Mouth)	1	2	2	6/8-6/26	462	137(30)	2(-)	139(30)	Includes 8 rec. from unknown areas
1964	River Mile 0 (S. Mouth)	1	2	2	6/18-7/12	175	58(33)	0	58(33)	Includes 2 rec. from unknown areas
1965	River Mile 0 (S. Mouth)	1	1,2	2	6/7-7/4	819	318(39)	0	318(39)	Includes 9 rec. from unknown areas
1966	River Mile 0 (S. Mouth)	1	2	2	6/11-7/8	573	169(29)	3(-)	172(29)	Includes 5 rec. from unknown areas
1967	River Mile 0 (S.&M. Mouths)	1	2	2	6/3-7/9	724	241(33)	0	241(33)	
1968	River Mile 185-251	1	2	2	6/27-7/16	376	88(23)	10(3)	98(26)	
1969	River Mile 185	1	1,2	2,3	6/1-7/11	293	72(24)	5(2)	77(26)	
1970	River Mile 185	1	1,2	2,3	6/14-7/10	340	43(13)	6(2)	49(15)	
1973	River Mile 1,289	3	1	1	7/13-9/2	452		94(21)	94(21)	Includes only rec. above Dawson (Mile 1319), also includes rec. in agency fishing gear.
1974	River Mile 1,289	3	1	1,2	7/7-9/18	727	2(-)	230(32)	232(32)	

^{1/} River mile 0-163:Districts 1&2; River mile 163-306: District 3; River Mile 306-664: District 4; River Mile 664-1224: District 5.

^{2/} 1- Alaska Department of Fish and Game 2- U.S. Fish and Wildlife Service 3- Environment Canada Fisheries & Marine Service.

^{3/} 1- Fishwheel 2- Gillnet 3- Fyke trap

^{4/} 1- Peterson disc 2- Spaghetti tag (vinyl tubing) 3- Floy anchor tag (vinyl tubing)

^{5/} Recoveries from commercial and subsistence fisheries; spawning ground recoveries and recaptures in agency fishing gear excluded unless noted otherwise.

Appendix 2. Summary of Yukon River Summer Chum Salmon Tag and Recovery Data.

Year	Tagging Location ^{1/} (River mile 1224:US/ Canada border)	Capture Gear ^{2/}		Tag Type ^{4/}	Tagging Dates	Number Tagged	Number of Recoveries (%) ^{5/}			Comments
							Alaska	Yukon Terr.	Total	
1961	River Mile 87	1	1	1	6/22-7/21	1009	322(32)	0	322(32)	
1962	River Mile 87	1	1	1,2	6/14-7/28	3796	597(16)	0	597(16)	Does not include 10 spawning ground rec. in Alaska
1963	River Mile 122	1	1	2	6/18-7/18	861	245(28)	0	245(28)	
1965	River Mile 0	1	1,2	2	6/6-7/4	1065	64(6)	0	64(6)	Includes 4 rec. from unknown areas
1966	River Mile 0	1	2	2	6/15-7/10	299	12(4)	0	12(4)	
1967	River Mile 0	1	2	2	6/5-7/9	527	26(5)	1(-)	27(5)	Y.T. rec. at Old Crow(Porcupine R.)
1968	River Mile 185-251	1	2	2	6/14-7/16	591	45(8)	0	45(8)	
1969	River Mile 185	1	1,2	2,3	6/15-7/12	1508	104(7)	0	104(7)	
1970	River Mile 185	1	1,2	2,3	6/16-7/15	3049	129(4)	0	129(4)	
1971	River Mile 185	1	1	2,3	6/22-7/23	6153	131(2)	0	131(2)	

^{1/} River mile 0-163: Districts 1&2; River mile 163-306: District 3; River Mile 306-664: District 4; River Mile 664-1224: District 5.

^{2/} 1- Alaska Department of Fish and Game 2- U.S. Fish and Wildlife Service 3- Environment Canada Fisheries & Marine Service.

^{3/} 1- Fishwheel 2- Gillnet 3- Fyke trap

^{4/} 1- Peterson disc 2- Spaghetti tag (vinyl tubing) 3- Floy anchor tag (vinyl tubing)

^{5/} Recoveries from commercial and subsistence fisheries; spawning ground recoveries and recaptures in agency fishing gear excluded unless noted otherwise.

Appendix 3. Summary of Yukon River Fall Chum Salmon Tag and Recovery Data.

Year	Tagging Location ^{1/} (River mile 1224:US/ Canada border)	Agency ^{2/}	Capture Gear ^{3/}	Tag Type ^{4/}	Tagging Dates	Number Tagged	Number of Recoveries (%) ^{5/}			Comments
							Alaska	Yukon Terr.	Total	
1961	River Mile 87	1	1	1	7/30-8/18	88	21(24)	1(1)	22(25)	
1961	River mile 730	2	1,3	1	6/30-10/8	9768	2695(28)	156(1)	2851(29)	Probably includes small number of summer chums.
1962	River mile 87	1	1	2	7/27-8/21	171	40(23)	1(1)	41(24)	
1962	River Mile 730	2	1,3	1	?	?			?	
1963	River Mile 122	1	1	2	7/19-8/10	199	42(21)	0	42(21)	
1971	River Mile 185	1	1	2,3	7/27-8/13	485	17(35)	0	17(35)	
1972	River Mile 763	3	1	1	8/26-9/26	811	55(7)	5(1)	60(8)	Does not include 1 spawning ground rec. in Fishing Br. R.
1973	River Mile 763	3	1	1	8/25-9/25	777	113(15)	18(2)	131(17)	Does not include 3 spawning ground rec. in Fishing Br. R.
1973	River Mile 1289	3	1	1	8/23-9/28	1067	?	?	166	Includes only rec. above Dawson (Mile 1319) also includes rec. in agency fishing gear.
1974	River Mile 1289	3	1	1,2	8/13-10/2	1276	1(-)	287(22)	288(22)	
1976	River Mile 540-555	1	1	1	8/12-9/17	1217				
1977	River Mile 540-601	1	1	1	8/5-10/3	5358				
1978	River Mile 601-725	1	1	1	8/1-9/22	9668				

^{1/} River mile 0-163: Districts 1&2; River mile 163-306: District 3; River Mile 306-664: District 4; River Mile 664-1224: District 5.

^{2/} 1- Alaska Department of Fish and Game 2- U.S. Fish and Wildlife Service 3- Environment Canada Fisheries & Marine Service.

^{3/} 1- Fishwheel 2- Gillnet 3- Fyke trap

^{4/} 1- Peterson disc 2- Spaghetti tag (vinyl tubing) 3- Floy anchor tag (vinyl tubing)

^{5/} Recoveries from commercial and subsistence fisheries; spawning ground recoveries and recaptures in agency fishing gear excluded unless noted otherwise.

Appendix 4. Other estimates of Yukon Territory Salmon abundance from Canadian authorities. 1/

<u>Year</u>	<u>Estimate</u>		<u>Reference</u>
	<u>Kings</u>	<u>Fall chums</u>	
1961	41,300 esc.		1/8/63 letter from W.R. Hourston to Harry Rietz.(USFWS-BCF).
1962	39,000 esc.		Same as above.
1973	50,000-100,000 esc. goal	200,000-500,000 esc.goal	10/1/73 letter from K.V. Aro to Kenneth A. Henry (NMFS)
1975	60,000 pop est. (50,000 esc.) (10,000 catch)	90,000 pop.est. (75,000 esc.) (15,000 catch)	4/2/75 letter from W.R. Hourston to James Brooks (ADF&G)

1/ Methodology not explained.