

A-Y-K REGION

YUKON STATE/FED REPORT #6

YUKON RIVER ANADROMOUS FISH INVESTIGATIONS
1972 FIELD SEASON

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September 1973

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ABSTRACT

A salmon counting tower site was successfully operated on the Anvik River during 1972. An estimated 50 percent of the escapement (108,342 chum and 1,104 king salmon) migrated past the tower during July 5-31. Exploratory surveys conducted on the Salcha River during July-August identified major king salmon spawning areas and located a suitable salmon counting tower site.

The summer chum, fall chum, king salmon and coho runs were sampled at various locations for age and sex structure. The summer chum salmon sample was comprised of age 3₁ (4.6%), 4₁ (46.0%), 5₁ (49.0%) and 6₁ (0.4%) fish with a 1.1:1 sex ratio in favor of males. The fall chum salmon sample consisted of age 3₁ (12.2%), 4₁ (64.8%), 5₁ (23.0) fish with a 1.2:1 ratio in favor of females. Ages of the king salmon sample consisted of 4₂ (2.9%), 5₂ (16.2%), 6₂ (75.0%) and 7₂ (6.2%) fish with a 1.4:1 sex ratio in favor of females. The coho sample was made up of 4₃ (97.0%) and 5₄ (3.0%) fish with a 2.4:1 ratio in favor of males.

Subsistence catches of salmon were below the previous 11 year total average. Aerial surveys were conducted on selected streams of the Yukon River system.

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INTRODUCTION

The Yukon River (Figures 1-4) receives large runs of king and chum salmon which are utilized for both commercial and subsistence purposes. Although the exact sizes of these salmon runs have not been determined, it is believed the Yukon River is the greatest single king and chum salmon producing system in Alaska.

Management of this valuable natural resource is based upon effective regulation of the fishery to allow for optimum escapement and harvest of the remaining run. To achieve effective management, accurate assessments of the total sizes of the salmon runs or indices of escapement and abundance need to be known.

Since 1961 population studies have been conducted in the Yukon River to determine the number of adult king and chum salmon which form the annual spawning escapement; however, little success has been achieved towards this goal utilizing tag-recovery methods. New enumerating procedures with emphasis directed toward monitoring escapement quality and magnitude were needed.

Daily indices of salmon abundance in the vicinity of the river mouth and prior to their arrival at the major fishing grounds can be determined by test fishing methods enabling a more flexible day-to-day management. Indices of escapements can be derived in selected spawning systems by systematic visual sample counts of migrating salmon which have passed through the fishery. Ensuing run sizes will in turn be appraised from parental run data. These advance estimates, even though tentative because of many variables, will enable more effective management through sound regulations.

During 1972 studies were conducted to develop estimates or indices of the magnitude of king and summer chum salmon escapements in the Anvik (Figure 5) and Salcha Rivers (Figure 3) systems. Additional investigations were designed to provide information regarding age and sex composition of the

Yukon River salmon runs.

This Annual Technical Report documents the various Yukon River anadromous fish projects conducted during the 1972 field season and is subject to revision before formal publication of any segment.

FIGURE 1. Yukon River map.

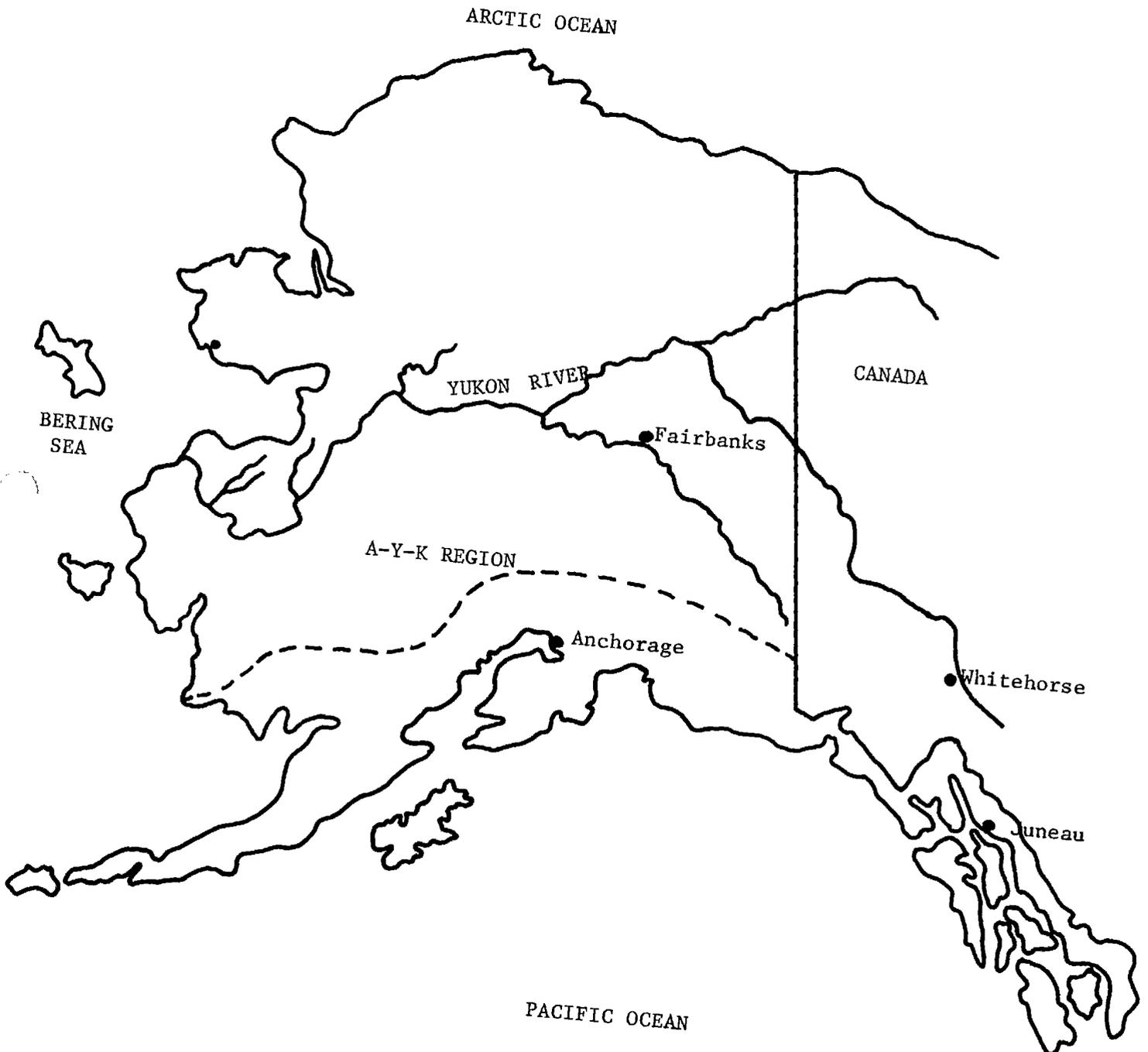


FIGURE 3. Mid-Yukon River map.

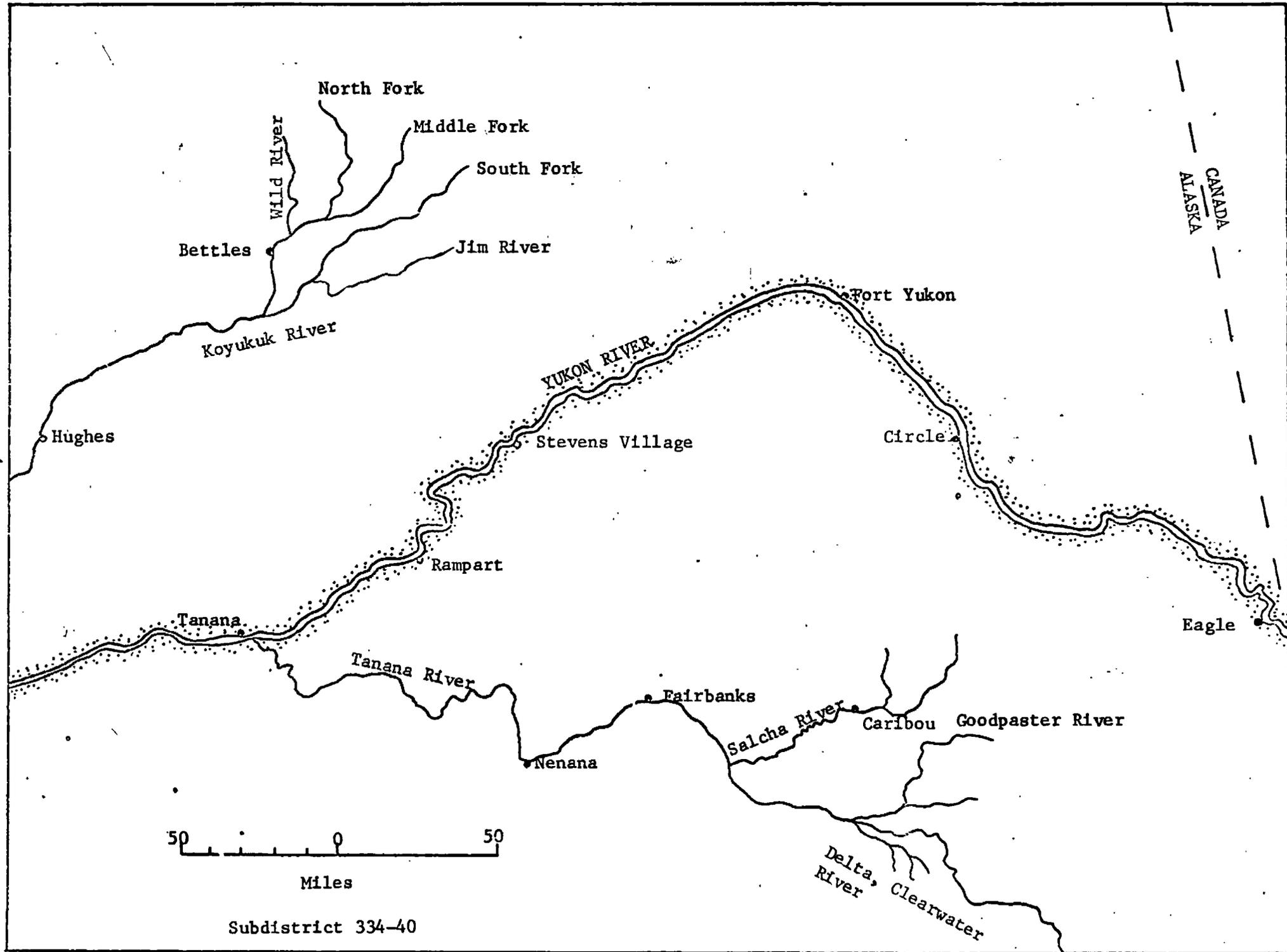
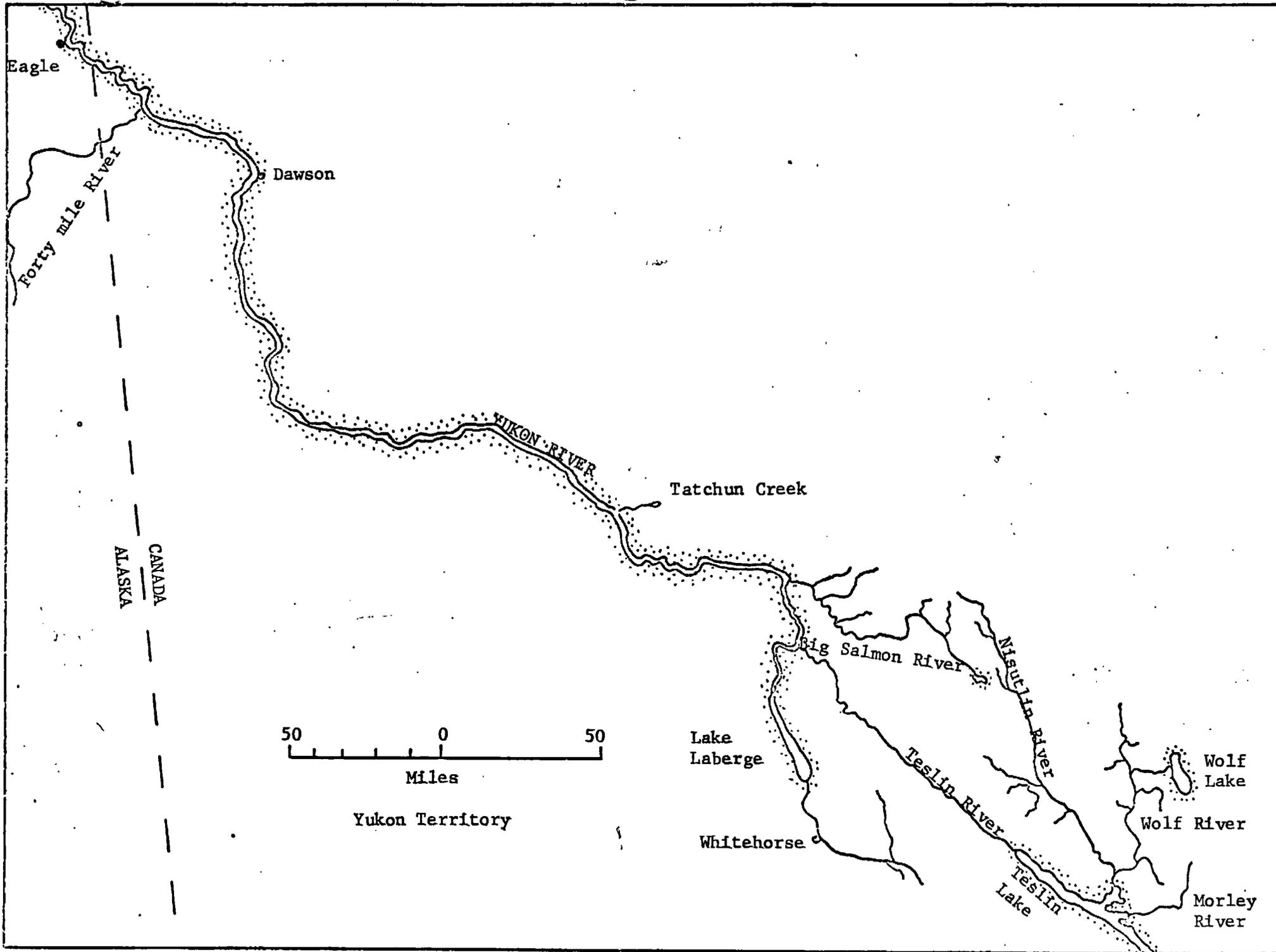


FIGURE 4. Upper Yukon River map.



METHODS AND MATERIALS

Escapement enumeration

ANVIK RIVER: A counting tower (Figure 6) was constructed on the Anvik River approximately 5 1/2 river miles above the mouth of the Yellow River by a three-man crew to enumerate migrating king and summer chum salmon within the system. A spruce log tower, nearly 30 feet high, was erected on the east bank. A second counting structure, built in 1971, was located directly opposite the tower on the west side of the river. This structure consisted of a log platform suspended between two live trees at a height of 36 feet above the ground on a 10 foot high cutbank.

A power line incorporating four 300 watt incandescent light bulbs housed in 18-inch diameter reflectors was strung across the river to provide illumination during darkness. A 1250 watt generator provided electric current for the lights.

The average water depth at the counting tower site was 3 feet with a width of approximately 125 feet; however, 25 feet of the width was too shallow to allow fish passage under low water conditions.

A 20-foot weir consisting of metal frame and pipe was erected in front of the tower on an experimental basis to evaluate the feasibility of a weir at this location. Further construction of the weir was abandoned due to excessive water velocity and depth during high water periods.

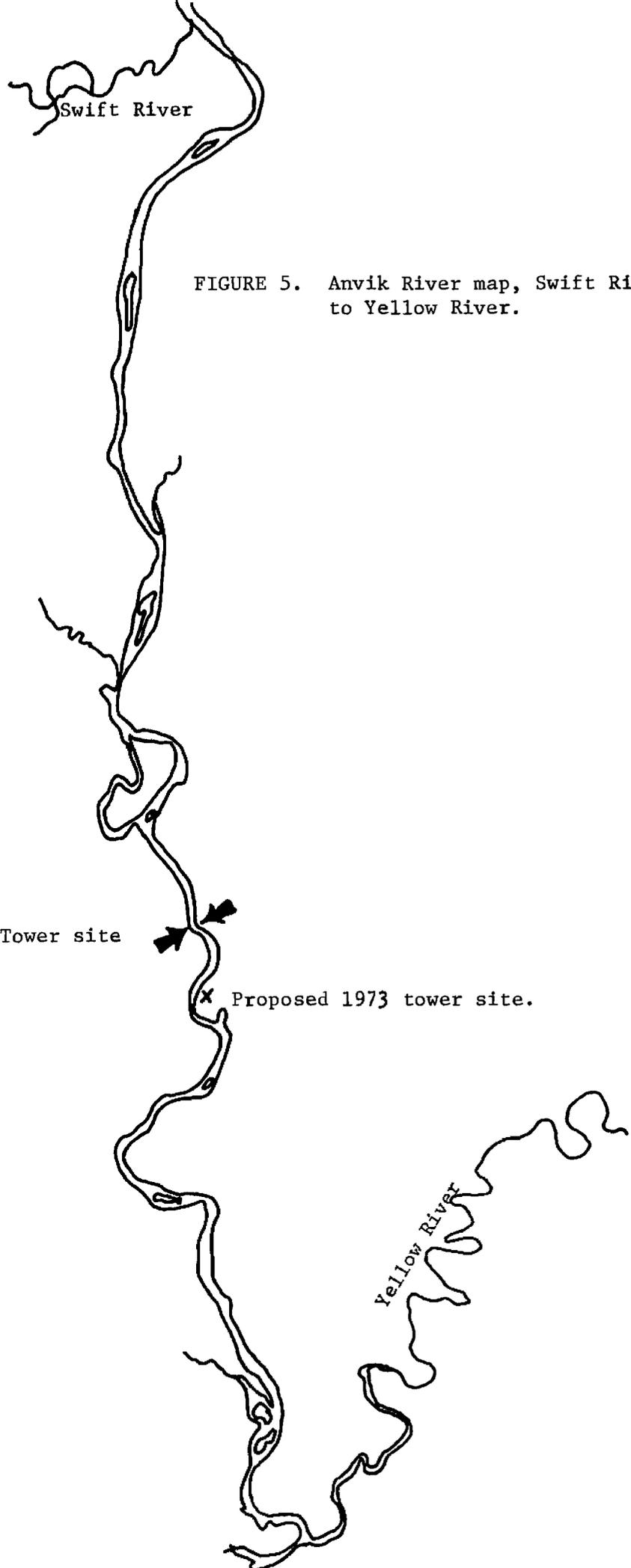


FIGURE 5. Anvik River map, Swift River to Yellow River.

Tower site

X Proposed 1973 tower site.

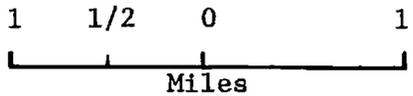




Figure 6. Salmon counting towers, Anvik River, 1972.



A four-man crew began 16 hour counting operations on July 5 and terminated activities on July 31. Each crew member was scheduled to enumerate migrating salmon for two 4-hour periods daily; counts were made from 1000 until 0200 hours the following day. Counts were recorded for both hourly totals and the first 10 minutes of each hour. Salmon moving downstream past the tower were recorded, but were not subtracted from the upstream count.

Lack of adequate personnel prohibited complete 24-hour counts to be conducted. Occasional unfavorable weather and water conditions plus faulty generators further reduced daily enumeration periods. Missing counts were estimated by averaging the last complete hourly count with the next complete hourly count.

Carcass sampling and enumeration surveys were conducted between July 20 and August 5 by boat and included the area from the mouth of Otter Creek to the village of Anvik. Objectives were to obtain age and sex data of spawned out king and summer chum salmon plus survey salmon species composition, specifically to determine if a significant pink salmon population utilized the system for spawning. An aerial survey of the Anvik River was conducted during July 22 utilizing a float equipped Cessna 180 aircraft.

SALCHA RIVER: An extensive exploratory survey was conducted on the Salcha River by a two-man crew in a riverboat from July 12 to August 18 to determine the abundance and distribution of king and summer chum salmon plus select and identify potential counting tower and weir sites. The area surveyed extended from the river mouth to the South Fork, a distance of 68 river miles. The shallow nature of the river necessitated the use of a flat bottom 24-foot riverboat powered by two 40 horsepower outboard motors equipped with jet units (Figure 7). All observations of salmon were recorded with spawning areas located and marked on maps. A number of king salmon redds were identified

Figure 7. Riverboat survey crew, Salcha River, 1972.



to specific locations by landmarks for possible future incubation studies. A six-foot wooden step ladder was fastened inside the boat and used as a tower to aid in observing salmon.

Throughout the study period, all available salmon carcasses were sampled for age and sex data. All sampled carcasses were immediately disposed of into the brush on either side of the river to eliminate data duplication on subsequent sampling surveys. Juvenile salmon were captured with dip nets for species identification.

An aerial survey of the Salcha was conducted during August 13 utilizing a Cessna 206 aircraft.

WHITEHORSE DAM: As part of a cooperative data exchange program Canadian Department of Fisheries personnel enumerated and sampled king salmon passing through the Whitehorse Dam fishway from August 4-29. Approximately 16 percent of the escapement was sampled for age and sex information and then released unharmed. A dip net was used to capture salmon out of the fishway. An aerial survey of the major king salmon spawning systems was conducted in the Yukon Territory on August 19.

Age and sex composition

Age and sex information was recorded for salmon sampled at various project locations. Fish were sexed internally by examination of the gonads. Sex determination of live fish released unharmed was made on the basis of external morphology including snout, vent, body symmetry and occasional appearance of milt or eggs.

Scale samples from all salmon were removed from the area of the first or second scale row above the lateral line on a diagonal down from the insertion of the dorsal fin to the origin of the anal fin. Scales were placed on gum

cards and plastic impressions made in the laboratory. Scales were later interpreted for age using the Gilbert-Rich age designation.

For purposes of this report, a 4₂ salmon returning to spawn in 1972 would be the progeny of the 1968 run that migrated from freshwater to the ocean in the spring of 1970.

It has been impossible to determine whether a few king salmon scale samples (usually less than 10 percent) have one or two freshwater annuli. This cannot be resolved until adequate samples of smolt are obtained for age and size analysis. Fish with questionable two freshwater annuli were, therefore, arbitrarily assigned one freshwater annulus.

Test fishing

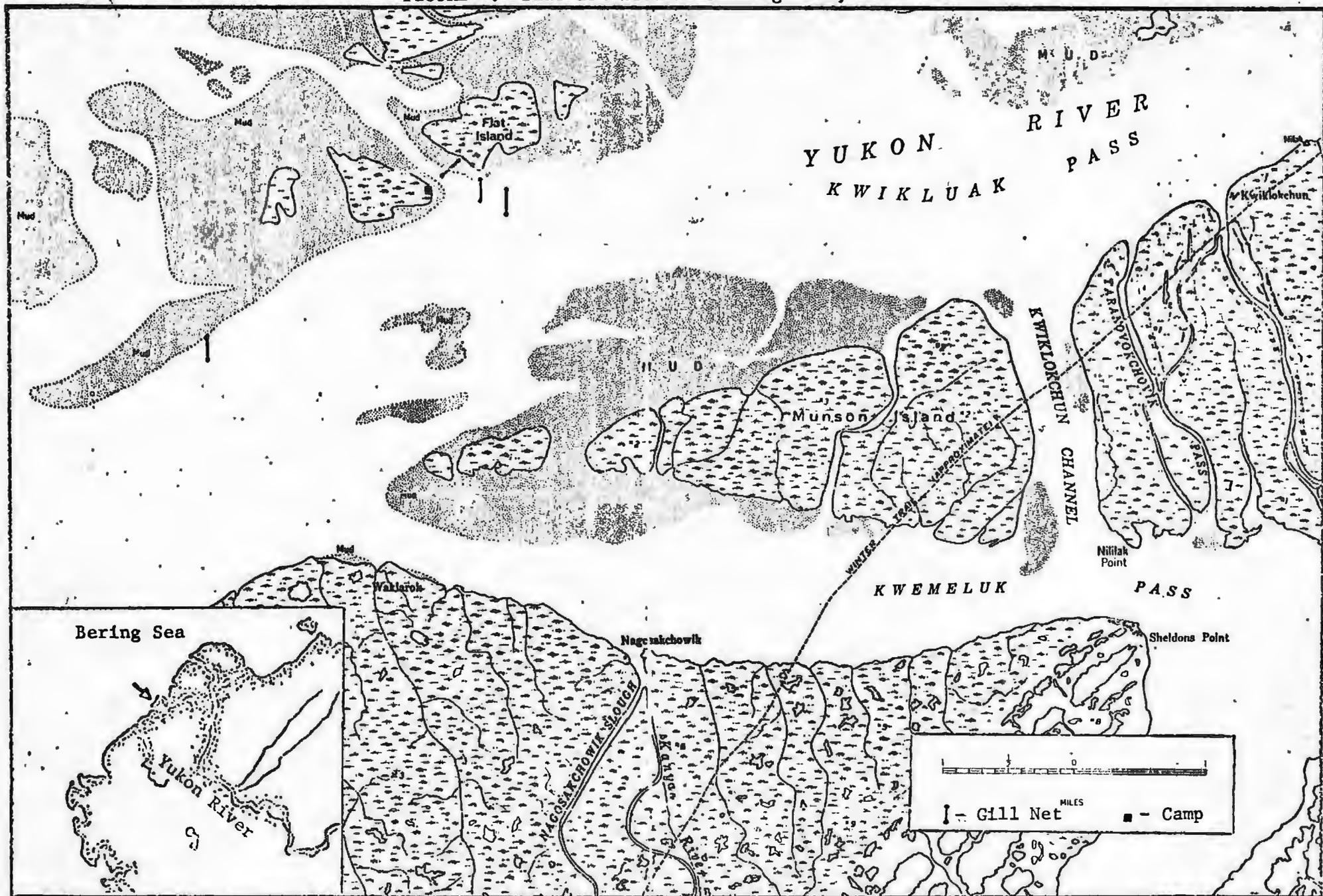
Set gill nets of 5 1/2 and 8 1/2 inch stretched mesh nylon webbing with standard floats and weighted with a lead line were used to capture salmon at the Flat Island test fishing site in the mouth of the Yukon River (Figure 8). Each net was approximately 25 fathoms long by 3 1/2 fathoms deep. Nets were fished in areas of little current with one end usually attached to the shore and the other end anchored offshore in deeper water.

Test fishing at the Flat Island site was conducted by a three-man crew from June 11 to July 14 to determine abundance and run timing of king and chum salmon. All fish were sampled for age and sex structure.

Subsistence catch tabulation

Much of the subsistence fishing information was obtained from personal interviews of fishermen and direct counts of salmon. Some catches were obtained by return of special catch forms or questionnaires distributed to fishermen prior to the fishing season. Two-man crews traveling by boat surveyed the majority of the Yukon River subsistence fishery. Biologists

FIGURE 8. Flat Island test fishing area, Yukon River.



traveling in a single engine aircraft surveyed the remaining subsistence fishery. The Whitehorse office of the Canadian Department of Fisheries supplied catch information for the Canadian portion of the Yukon drainage.

RESULTS

Escapement enumeration

ANVIK RIVER: Over a period of 290 hours during July 5-31, a total of 65,202 summer chum salmon and 527 king salmon was enumerated past the tower (Appendix Tables 1 and 2). Based on this data the expanded total escapements above the tower were calculated at 108,342 chums and 1,104 kings. These figures include estimates of 358 out of a total of 648 hours which were not counted during the 27-day period. Estimates made from 10-minute counts were within 0.9 percent of the actual value for chum salmon and 5.9 percent for king salmon. A summary of tower counts is presented in Table 1.

The main summer chum salmon migration peak past the tower occurred on July 12 while the king salmon migration peaked on July 16 and 26 (Figure 9). The daily chum run was heaviest from 2100 to 0100 hours with the majority of fish migrating upstream from 2100 to 2300 hours. The king migration was greatest from 1300 to 1800 hours with the peak occurring between 1600 to 1700 hours (Figure 10).

During August 4-5, a salmon carcass survey was conducted by boat from the tower site to the village of Anvik. A total of 1 pink, 44,585 summer chum and 46 king salmon carcasses was enumerated. Approximately 200 live chums and 46 live kings were accounted for during the survey. Observations indicated king salmon were still actively spawning. Survey data are summarized in Table 2.

An aerial survey of the Anvik River conducted on July 22 accounted for 211,633 summer chum and 418 king salmon from the headwaters to the village of Anvik (Table 3). A total of 74,118 chums and 346 kings was enumerated in that portion of the river above the counting tower. The cumulative expanded tower count through that date was 105,454 summer chums and 665 kings with

Figure 9. Daily summer chum and king salmon migration (expanded), Anvik River tower, 1972.

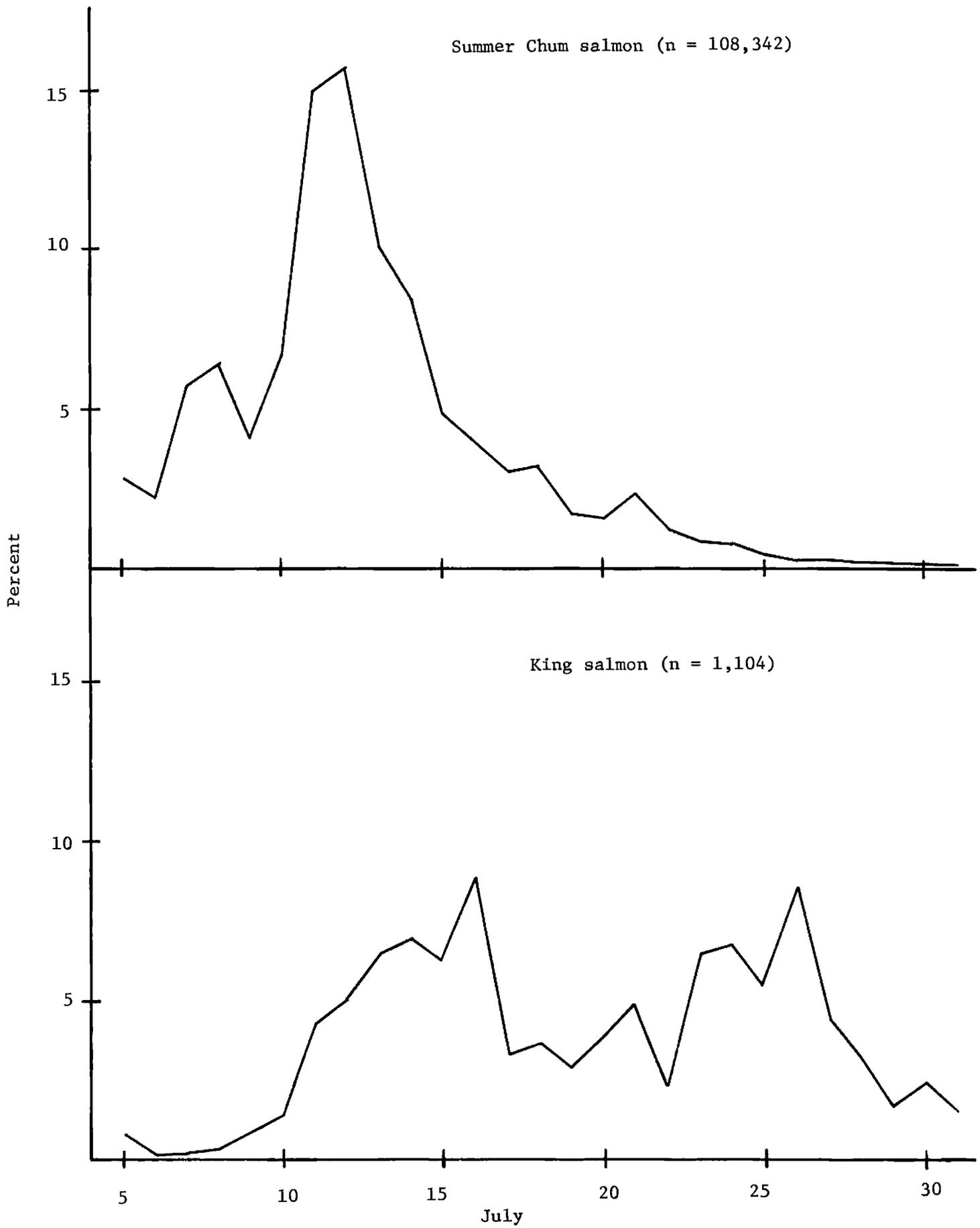


Figure 10. Hourly summer chum and king salmon migration (expanded), Anvik River tower, 1972

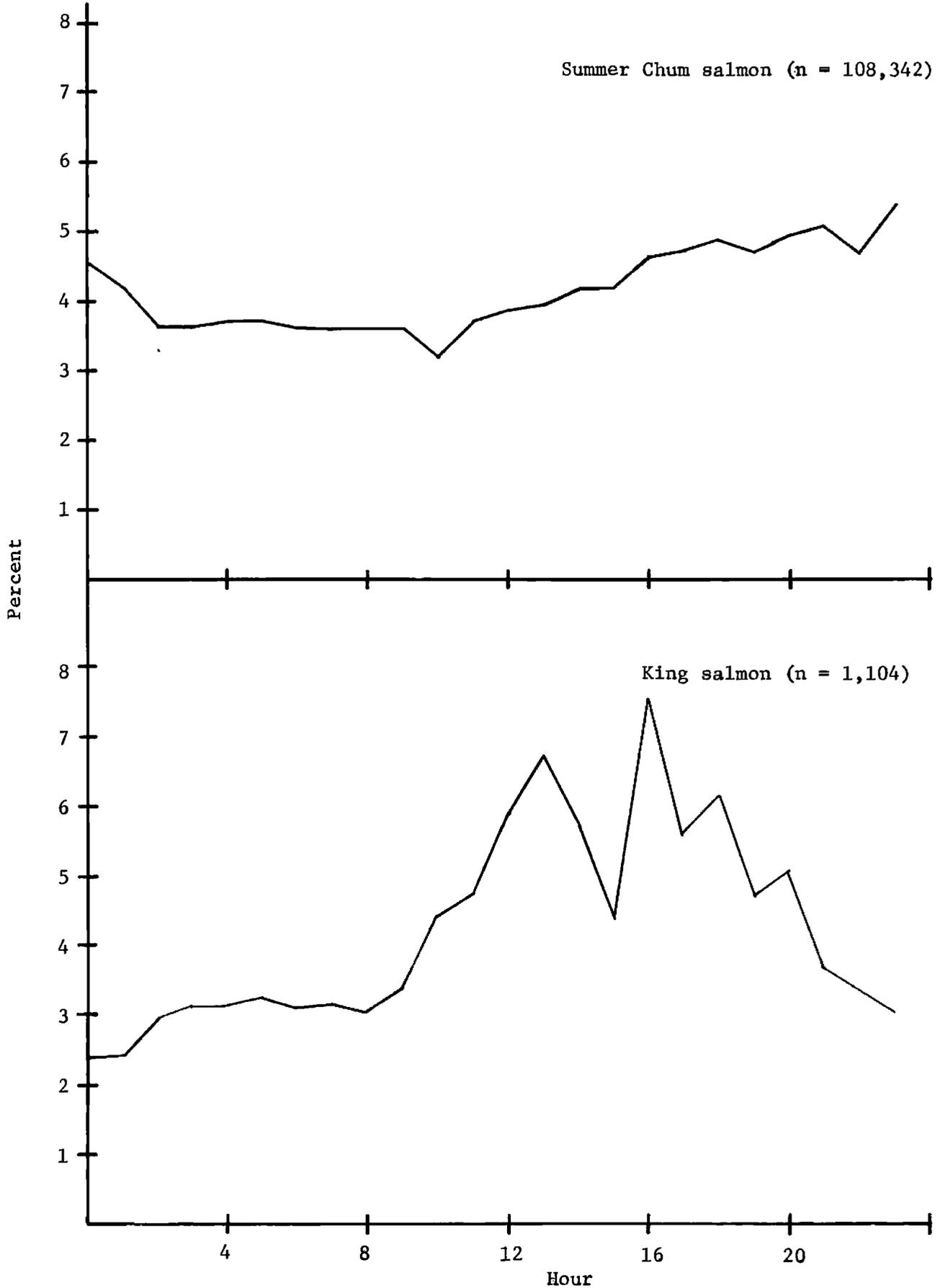


Table 1. Summer chum and king salmon enumeration summary, Anvik River tower, 1972.

| Date | Hours counted | Summer Chums | | | | Kings | | | |
|------------------------------------------------------|---------------|---------------------|-----------------------|------------------|-----------------------|-----------------|-----------------------|------------------|-----------------------|
| | | 10 minute total | Hourly total (actual) | Daily (expanded) | Cumulative (expanded) | 10 minute total | Hourly total (actual) | Daily (expanded) | Cumulative (expanded) |
| 7/ 5 | 2 | - | 310 | 3,104 | 3,104 | - | - | - | - |
| 6 | 16 | 264 | 1,559 | 2,351 | 5,455 | 1 | 9 | 9 | 9 |
| 7 | 17 | 761 | 4,861 | 6,070 | 11,525 | 1 | 1 | 1 | 10 |
| 8 | 15 | 893 | 5,036 | 6,938 | 18,463 | 0 | 2 | 2 | 12 |
| 9 | 15 | 474 | 2,655 | 4,335 | 22,798 | 1 | 3 | 3 | 15 |
| 10 | 8 | 733 | 3,777 | 7,145 | 29,943 | 3 | 7 | 15 | 30 |
| 11 | 16 | 1,943 | 11,685 | 15,893 | 45,836 | 1 | 29 | 45 | 75 |
| 12 | 15 | 1,769 | 11,036 | 16,899 | 62,735 | 10 | 46 | 55 | 130 |
| 13 | 16 | 1,109 | 7,355 | 10,875 | 73,610 | 8 | 53 | 69 | 199 |
| 14 | 16 | 978 | 5,983 | 9,119 | 82,729 | 11 | 71 | 75 | 274 |
| 15 | 15 | 580 | 3,468 | 5,199 | 87,928 | 12 | 52 | 67 | 341 |
| 16 | 6 | 163 | 1,110 | 4,274 | 92,202 | 4 | 24 | 97 | 438 |
| 17 | 16 | 402 | 2,163 | 3,273 | 95,475 | 1 | 21 | 35 | 473 |
| 18 | 9 | 197 | 1,237 | 3,348 | 98,823 | 1 | 11 | 40 | 513 |
| 19 | 4 | 40 | 252 | 1,725 | 100,548 | 0 | 5 | 32 | 545 |
| 20 | 6 | 90 | 467 | 1,659 | 102,207 | 3 | 14 | 42 | 587 |
| 21 | 12 | 150 | 1,009 | 2,002 | 104,209 | 13 | 36 | 54 | 641 |
| 22 | 9 | 64 | 335 | 1,245 | 105,454 | 6 | 14 | 24 | 665 |
| 23 | 6 | 28 | 173 | 725 | 106,179 | 4 | 20 | 70 | 735 |
| 24 | 8 | 50 | 260 | 778 | 106,957 | 4 | 19 | 73 | 808 |
| 25 | 7 | 24 | 124 | 404 | 107,361 | 1 | 7 | 59 | 867 |
| 26 | 2 | 7 | 29 | 249 | 107,610 | 0 | 8 | 94 | 961 |
| 27 | 5 | 7 | 69 | 278 | 107,888 | 0 | 11 | 49 | 1,010 |
| 28 | 16 | 28 | 96 | 170 | 108,058 | 3 | 22 | 34 | 1,044 |
| 29 | 15 | 4 | 64 | 102 | 108,160 | 3 | 17 | 18 | 1,062 |
| 30 | 13 | 6 | 38 | 104 | 108,264 | 1 | 15 | 25 | 1,087 |
| 31 | 5 | 6 | 31 | 31 | 108,342 | 1 | 10 | 17 | 1,104 |
| TOTAL | 290 | 10,770 | 65,202 | 108,342 | | 93 | 527 | 1,104 | |
| (10 minute counts x6) | | 64,620 (10,770 x 6) | | | | 558 (93 x 6) | | | |
| % difference (10 minute counts versus actual counts) | | 0.9 | | | | 5.9 | | | |

Table 2. Salmon carcass survey summary, Anvik River, 1972.

| Date | Survey method | Rating | Area surveyed | Summer Chums | | Kings | | Pinks | |
|-------|---------------|--------|---------------------------|--------------|-----------|-------|-----------|-------|-----------|
| | | | | Live | Carcasses | Live | Carcasses | Live | Carcasses |
| 8/4 | Boat | Good | Tower--Yellow River | 100 | 6,463 | 40 | 28 | - | - |
| | | | Yellow River-Beaver Creek | 50 | 14,324 | 2 | 10 | - | - |
| 8/5 | Boat | Good | Beaver Creek-Goblet Creek | 50 | 23,398 | 2 | 8 | - | - |
| | | | Goblet Creek-Anvik | - | 400 | - | - | - | 1 |
| TOTAL | | | | 200 | 44,585 | 44 | 46 | - | 1 |

the aerial survey accounting for approximately 70 percent of the chum and 52 percent of the king salmon escapement past the tower. An estimate of total escapement based on the aerial survey below the tower and tower counts would be 245,857 chums and 1,176 kings.

A proposed tower/weir site was selected for future use three-quarters of a mile downstream from the present site (Figure 5).

SALCHA RIVER: Exploratory surveys conducted during July and August located a suitable salmon counting tower and identified major king salmon spawning areas in the Salcha River (Appendix Figure 1).

The first adult king salmon was observed on July 21. High water conditions prevented earlier observations. Numerous king fry were located throughout the length of the system up to No Grub Creek. Fry were concentrated along the river bank, especially in cutback areas, near feeder streams and in slack water eddies. Two northern pike (Esox Lucius Linnaeus) approximately 150 mm in length were observed in the main river near Ninetyeight Creek. Limited numbers of adult summer chum salmon were available for observations during the study period.

Three king salmon redds were located, marked and their position mapped for possible future incubation studies. As a rule kings were observed spawning at the heads of riffles in water 2-4 feet deep.

All available king salmon carcasses were sampled on a daily basis with a total of 293 enumerated at various locations in the river. The major concentration of live fish, redds and resulting carcasses occurred in the area between the mouth of Redmond Creek and Ninetyeight Creek (Table 3). Collected data indicates females encounter a greater mortality than males at an earlier period in time (Table 4).

An aerial survey of the Salcha River conducted on August 3 accounted for 1,193 king salmon from the river mouth to the mouth of the North Fork (Tables 3 and 5).

WHITEHORSE DAM: At the Whitehorse Dam fishway a total of 403 king salmon was enumerated through the fishway from August 4 to 29 (Appendix Table 4). This was one of the lowest escapements passing over the dam since 1968 and

Table 3. King salmon abundance and distribution, Salcha River, 1972.

| Area ^{1/} | Aerial survey 8/3) | | Carcass Survey (8/4-18) | | | | | | Redds | |
|--------------------|-----------------------|-------|-------------------------|------|---------|-------|----------|-------|--------|-------|
| | Number | % | Males | | Females | | Combined | | Number | % |
| | | | Number | % | Number | % | Number | % | | |
| 100 | 241 | 20.2 | 49 | 48.5 | 52 | 51.5 | 101 | 34.5 | 7 | 16.3 |
| 200 | 333 | 27.9 | 72 | 47.7 | 79 | 52.3 | 151 | 51.5 | 12 | 27.9 |
| 300 | 60 | 5.0 | 5 | 19.2 | 21 | 80.8 | 26 | 8.9 | 7 | 16.3 |
| 400 | 485 | 40.7 | 5 | 35.7 | 9 | 64.3 | 14 | 4.8 | 11 | 25.6 |
| 500 | 74 | 6.2 | - | - | 1 | 100.0 | 1 | 0.3 | 6 | 13.9 |
| TOTAL | 1,193 | 100.0 | 131 | 44.7 | 162 | 55.3 | 293 | 100.0 | 43 | 100.0 |

- ^{1/} 100 - River mouth to mouth of Redmond Creek
 200 - Mouth of Redmond Creek to mouth of Ninety-eight Creek.
 300 - Mouth of Ninety-eight Creek to mouth of Flat Creek.
 400 - Mouth of Flat Creek to mouth of Butte Creek.
 500 - Mouth of Butte Creek to mouth of North Fork.

Table 4. Daily king salmon mortality based on carcass observations, Salcha River, 1972.

| Date | <u>Males</u> | | <u>Females</u> | | <u>Combined</u> | |
|-------|--------------|------|----------------|------|-----------------|-------|
| | Number | % | Number | % | Number | % |
| 8/ 4 | 4 | 1.4 | 7 | 2.4 | 11 | 3.8 |
| 5 | 2 | 0.7 | 15 | 5.1 | 17 | 5.8 |
| 6 | 7 | 2.4 | 15 | 5.1 | 22 | 7.5 |
| 7 | 6 | 2.0 | 10 | 3.4 | 16 | 5.4 |
| 9 | 4 | 1.4 | 8 | 2.7 | 12 | 4.1 |
| 10 | 8 | 2.7 | 16 | 5.5 | 24 | 8.2 |
| 11 | 19 | 6.5 | 25 | 8.5 | 44 | 15.0 |
| 12 | 21 | 7.1 | 9 | 3.1 | 30 | 10.2 |
| 13 | 12 | 4.1 | 21 | 7.2 | 33 | 11.3 |
| 14 | 16 | 5.5 | 15 | 5.1 | 31 | 10.6 |
| 16 | 21 | 7.2 | 14 | 4.8 | 35 | 12.0 |
| 17 | 5 | 1.7 | 2 | 0.7 | 7 | 2.4 |
| 18 | 6 | 2.0 | 5 | 1.7 | 11 | 3.7 |
| TOTAL | 131 | 44.7 | 162 | 55.3 | 293 | 100.0 |

Table 5. Aerial survey escapement counts, Yukon River system, 1972.

| Stream (Drainage) | Date | Survey Rating | Kings | Cohos | Chums |
|-------------------------------|---------|---------------|-------|-------|---------|
| Andreafsky River | | | | | |
| West Fork | 7/26 | Poor | 582 | | 25,573 |
| East Fork | 7/22 | Fair | 798 | | 41,460 |
| Total | | | 1,380 | | 67,033 |
| Anvik River | 7/22 | Fair | 418 | | 211,633 |
| Chatanika River ^{1/} | 8/10-20 | | 13 | | |
| Chena River | 8/5-25 | Fair | 138 | | 670 |
| Toklat River | 11/28 | Poor | | | 1,000 |
| Glacier Creek | 11/28 | Poor | | | 150 |
| Goodpaster River | 8/8 | Poor | 21 | | |
| Salcha River | 8/3 | Good | 1,193 | | |
| Salcha River | 8/8 | Poor | 81 | | 947 |
| Tanana River | 10/31 | Fair | | | 19,657 |
| Delta River | 10/31 | Good | | | 3,650 |
| Richardson Clearwater Creek | 10/31 | Poor | | 349 | |
| Clearwater Lake and Stream | 10/31 | Poor | | 417 | |
| Delta Clearwater Creek | 10/31 | Poor | | 434 | |
| Tatchun Creek ^{2/} | 8/25 | Excellent | 80 | | |
| Big Salmon River | 8/19 | Poor | 507 | | |
| Nisutlin River | 8/19 | Fair | 317 | | |

^{1/} Surveyed by boat.

^{2/} Surveyed by foot.

1969 (Appendix Table 3). Peak counts of king salmon through the facility were made during the period August 13-17.

AERIAL SURVEYS: Approximately 35 hours were spent conducting aerial surveys of selected salmon spawning streams in the Yukon River drainage during 1972. Results are summarized in Table 5. Index stream comparative estimates for the years 1959 to 1972 are presented in Appendix Table 3.

Age and sex composition

SUMMER CHUM SALMON: A total of 2,604 summer chum salmon was sampled for age and sex information throughout the run at various locations. For the entire sample 3₁, 4₁, 5₁ and 6₁ age groups were represented with age 5₁ (49.0%) fish most abundant for both sexes. The sex ratio was 1.1:1 in favor of females. Data are presented in Appendix Table 5.

FALL CHUM SALMON: A total of 583 fall chum salmon was sampled for age and sex information throughout the run (July 20-August 16) at Emmonak and Alakanuk. For the entire sample 3₁, 4₁ and 5₁ age groups were represented with age 4₁ (61.3%) fish most abundant for both sexes. The sex ratio was 1.2:1 in favor of females. Data are presented in Appendix Table 6.

KING SALMON: A total of 1,665 king salmon was sampled in the Yukon River system for age and sex information. Females were dominate in the 6₂ age group (47.6%) with an overall sex ratio of 1.4:1 in favor of females. Data are presented in Appendix Table 7.

COHO SALMON: A total of 71 coho salmon was sampled at Emmonak for age and sex information from August 5-16. For the entire sample 4₃ and 5₄ age

groups were represented with 4₃ (97.0%) fish most abundant for both sexes. The sex ratio was 1:2.5 in favor of males. Data are presented in Appendix Table 8.

Test fishing

Chum and king salmon test fishing catches made at Flat Island are summarized in Appendix Table 9. The first recorded fish were captured June 11. Notable peaks of abundance occurred on June 23 and 28 for chum salmon and on June 19 and July 5 for king salmon. Tidal influence affects salmon entry into the river. Substantial numbers of the king salmon run entered the river through the middle mouth where there is no test fishing site.

Subsistence catch tabulation

A minimum of 19,541 king and 140,102 salmon of other species, mostly chums, was taken in the Yukon River system subsistence fishery during 1971. The

previous 11-year average of king and chum salmon subsistence catches was 20,284 and 314,542 fish respectively. The recorded subsistence catches represent minimum figures as salmon consumed prior to the surveys and catches made after the completion of surveys are not always recorded. Subsistence harvest data for the years 1961 to 1972 are presented in Appendix Table 8.

DISCUSSION

Enumeration of migrating salmon in the Anvik River is feasible. Weather and related river conditions, plus a suitable tower site, appear to be the only limiting factors. The tower site must be located above the mouth of the Yellow River since the Anvik is relatively clear above its confluence with the Yellow River. Below the Yellow River, which has a brownish stain, the Anvik is relatively opaque and it is difficult to observe salmon.

Data from aerial surveys and 1972 tower counts indicate at least 50 percent of the salmon run spawned above the 1972 tower site. Verification of this data through annual monitoring would lend itself to establishment of an index site capable of providing valuable escapement data required for run management on a maximum sustained yield basis.

Recommendations are to enumerate salmon for complete 24-hour periods throughout the entire migration to gain meaningful information on run timing and magnitude. Ten-minute counts should also be conducted for evaluation as an index counting period to possibly eliminate the need for complete hourly counts. The tower site should be moved to the location selected 3/4 mile below the present site. A partial weir should be added on the west side of the river to channel fish past the counting tower and remove the necessity of a second tower allowing for a reduced manpower force.

Salcha River studies were a beginning in gathering basic research data on king salmon within the system. Analysis of the limited data available would be premature at this time. Efforts should be expanded towards establishing a counting tower for annual enumeration of the escapement. Spawning areas should be located annually and identified as to index areas for comparative studies of escapement monitoring by boat or aerial survey methods. Attempts should also be made to obtain smolt information in regards to abundance, outmigration timing and age structure.

The trans Alaska hot oil pipeline will cross the Salcha River, making research efforts there especially timely because of the possible effects from siltation or oil spills. Approximately 12 percent of the king salmon population spawn below the pipeline crossing and 30 percent spawn below McCoy and Redmond Creek which are crossed by the pipeline upstream from their confluence with the Salcha River.

The annual decline in subsistence fishing effort is attributed to increased welfare payments and more employment opportunities throughout the Yukon area. Snow vehicles are steadily replacing sled dogs and this is speeding up the decline of the subsistence fishery as most of the chum catches are used for dog food. However, based on progressing trends, an increased commercial harvest in the lower river is offsetting the decline in the upriver subsistence catch.

Commercial harvest data indicated the largest portion of the king salmon run entered the Yukon River through the middle mouth (Regnart, et al 1972). This migration route may also vary from year to year and distribute itself in all three mouths of the river. The Flat Island test fishing site is located in the south mouth and is not effectively sampling the entire salmon run. An additional test fishing site should be established in the middle mouth.

In general entry of the 1972 salmon runs into the Yukon River system was at least 5-7 days later than usual. This probably was influenced by below-average water temperature in the Bering Sea and a late breakup (June 3) of Yukon River ice.

During 1973 studies will be directed toward monitoring salmon escapement, age and sex structure, and magnitude in the Anvik and Salcha Rivers. Counting tower and other monitoring methods will be evaluated.

SUMMARY

Escapement enumeration

1. During July 5-31 a total of 65,202 summer chum salmon and 527 king salmon was enumerated past the Anvik River tower. Expanded totals were calculated at 108,342 chums and 1,104 kings.
2. Estimates made from 10 minute counts at the Anvik River tower were within 0.9 percent of the actual value for chum salmon and 5.9 percent for king salmon.
3. Salmon migration past the Anvik River tower was heaviest during the hours of 1300-0100.
4. An aerial survey of the Anvik River accounted for approximately 70 percent of the chum and 52 percent of the king salmon escapement past the tower.
5. Exploratory surveys of the Salcha River located the major king salmon spawning areas and a suitable counting tower site.
6. An aerial survey of the Salcha River, conducted on August 3, accounted for 1,193 king salmon.
7. A total of 403 king salmon was enumerated through the Whitehorse Dam fishway from August 4-29 with 63 fish sampled for age and sex structure.
8. Selected streams of the Yukon River system were surveyed to obtain information relating to escapement magnitudes.

Age and sex composition

1. The sampled summer chum salmon run was composed of 3₁, 4₁, 5₁ and 6₁ age groups with age 5₁ fish representing 49 percent of the entire sample.
2. The sampled fall chum salmon run was comprised of 3₁, 4₁ and 5₁ age groups with age 4₁ fish representing 61 percent of the sample.
3. Age and sex data from various locations indicated the king salmon run had a 1.4:1 sex ratio in favor of females with 6₂ fish comprising 75 percent of the sample.
4. The sampled coho salmon run indicated that 4₃ and 5₄ age groups were present with 4₃ fish comprising 97 percent of the run.

Test fishing

1. The first recorded chum and king salmon were captured June 11 at Flat Island. The king run peaked from 6/21-28 and summer chum from 6/22-24.
2. Salmon run timing and abundance was monitored at various locations on the Yukon River.

Subsistence catch tabulation

1. A minimum of 19,541 king salmon and 140,102 salmon of other species was taken in the Yukon River subsistence fishery.
2. Subsistence catches are decreasing as a result of a decline in effort.

ACKNOWLEDGEMENT

This project was financed in part with Anadromous Fish Act (P.L. 89-304) funds through the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, United States Department of Commerce. The Canadian Department of Fisheries kindly allowed for our participation in stream surveys in the Yukon Territory and data exchange.

LITERATURE CITED

Regnart, R., C. Yanagawa and M. Geiger. 1972. Arctic-Yukon-Kuskokwim Region annual management report. Alaska Department of Fish and Game. (In press).

Appendix Table 7. Summer chum salmon hourly enumeration log, Anvik River tower, 1972.^{1/}

| Hour/ Date | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Expanded | | Actual | | | |
|---------------|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|--------|--------|-------|------|
| | Total | % | Total | % | Total | % | Total | % | Total | % | Total | % | Total | % | Total | % | Total | % | Total | % | Total | % | Total | % | Total | % | Total | % | | |
| 7/ 5 | (127) ^{2/} | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | (127) | 155 | 155 | 3,104 | 2.9 | 310 | .48 | | |
| 6 | (99) | (99) | (99) | (99) | (99) | (99) | (99) | (99) | 43 | 36 | 40 | 55 | 45 | 71 | 80 | 79 | 122 | 88 | 117 | 89 | 96 | 177 | 178 | 243 | 2,351 | 2.2 | 1,559 | 2.39 | | |
| 7 | 200 | 153 | (120) | (120) | (120) | 86 | 202 | (179) | (179) | (179) | 156 | 218 | 313 | 318 | 308 | 244 | 332 | 306 | 355 | 423 | 424 | 455 | 368 | (312) | 6,070 | 5.6 | 4,861 | 7.46 | | |
| 8 | 255 | 245 | (235) | (235) | 225 | 268 | (211) | (211) | (211) | (211) | 153 | 327 | 362 | 288 | 361 | 375 | 326 | 419 | 362 | 372 | 353 | 345 | (294) | (294) | 6,938 | 6.4 | 5,036 | 7.72 | | |
| 9 | (294) | (294) | 242 | (173) | (173) | (173) | 148 | 196 | 244 | 222 | (201) | (201) | 179 | 146 | 113 | 245 | 194 | 192 | (147) | (147) | (147) | 102 | 72 | 66 | 4,335 | 4.0 | 2,655 | 4.07 | | |
| 10 | (100) | (100) | (100) | (100) | (100) | (100) | (100) | 133 | 177 | (321) | (321) | (321) | (321) | (321) | (321) | (321) | (321) | 464 | 443 | 596 | 585 | 633 | 746 | 7,145 | 7,145 | 6.6 | 3,777 | 5.79 | | |
| 11 | 647 | 659 | (526) | (526) | (526) | (526) | (526) | (526) | (526) | (526) | 393 | 448 | 500 | 550 | 552 | 595 | 759 | 709 | 839 | 756 | 849 | 1000 | 1170 | 1259 | 15,893 | 14.7 | 11,685 | 17.92 | | |
| 12 | 954 | 631 | (635) | (635) | (635) | (635) | (635) | (635) | (635) | (635) | 639 | 810 | 789 | 675 | 805 | 690 | 711 | 660 | 803 | 623 | (783) | 942 | 467 | 837 | 16,899 | 15.6 | 11,036 | 16.93 | | |
| 13 | 622 | 644 | (440) | (440) | (440) | (440) | (440) | (440) | (440) | (440) | 236 | 258 | 290 | 336 | 432 | 454 | 456 | 597 | 510 | 539 | 481 | 348 | 528 | 624 | 10,875 | 10.0 | 7,355 | 11.28 | | |
| 14 | 529 | 567 | (392) | (392) | (392) | (392) | (392) | (392) | (392) | (392) | 217 | 243 | 201 | 213 | 378 | 388 | 416 | 374 | 463 | 449 | 379 | 391 | 368 | 407 | 9,119 | 8.4 | 5,983 | 9.18 | | |
| 15 | 234 | 210 | (177) | (177) | (177) | (177) | (177) | (177) | (177) | (177) | 143 | 189 | 188 | 225 | 209 | 217 | 282 | 356 | (315) | 273 | 250 | 283 | 223 | 186 | 5,199 | 4.8 | 3,468 | 5.32 | | |
| 16 | 134 | 139 | (174) | (174) | (174) | (174) | (174) | (174) | (174) | (174) | 174 | 174 | (174) | (174) | (174) | 209 | 263 | (200) | (200) | (200) | 137 | (183) | (183) | 228 | (142) | (142) | 4,274 | 3.9 | 1,110 | 1.70 |
| 17 | (142) | (142) | 56 | 139 | 183 | 189 | 144 | 92 | 123 | 109 | 114 | (140) | (140) | 166 | 153 | 183 | (149) | (149) | 114 | 132 | (124) | (124) | 116 | 150 | 3,273 | 3.0 | 2,163 | 3.32 | | |
| 18 | (160) | (160) | (160) | (160) | 169 | 185 | 109 | 108 | 126 | (145) | (145) | (145) | (145) | (145) | (145) | (145) | (145) | (145) | 163 | 166 | 106 | 105 | (83) | (83) | 3,348 | 3.1 | 1,237 | 1.90 | | |
| 19 | (83) | (83) | (83) | (83) | (83) | (83) | (83) | (83) | (83) | (83) | (83) | (83) | 61 | 62 | (68) | (68) | (68) | (68) | 73 | 56 | (55) | (55) | (55) | (55) | 1,725 | 1.6 | 252 | 0.39 | | |
| 20 | (55) | (55) | (55) | (55) | (55) | (55) | (55) | (55) | (55) | (55) | 54 | (76) | (76) | (76) | 98 | (91) | 83 | (68) | 53 | 79 | 100 | (85) | (85) | (85) | 1,659 | 1.5 | 467 | 0.72 | | |
| 21 | (85) | (85) | (85) | (85) | (85) | (85) | (85) | (85) | (85) | 70 | 80 | 80 | 60 | 96 | 80 | 57 | 104 | 121 | 71 | 97 | 93 | (76) | (76) | (76) | 2,002 | 1.8 | 1,039 | 1.55 | | |
| 22 | (76) | (76) | (76) | (76) | (76) | (76) | (76) | (76) | (76) | (76) | 58 | 41 | 52 | 34 | 14 | 25 | 54 | 48 | 29 | (26) | (26) | (26) | (26) | (26) | 1,245 | 1.1 | 355 | 0.54 | | |
| 23 | (26) | (26) | (26) | (26) | (26) | (26) | (26) | (26) | (26) | (26) | (26) | (26) | 22 | 19 | 18 | 45 | 31 | 38 | (38) | (38) | (38) | (38) | (38) | (38) | 725 | .7 | 173 | 0.27 | | |
| 24 | (38) | (38) | (38) | (38) | (38) | (38) | (38) | (38) | (38) | (38) | (38) | 39 | 49 | 29 | 31 | 40 | 23 | 24 | 25 | (20) | (20) | (20) | (20) | (20) | 778 | .7 | 260 | 0.40 | | |
| 25 | (20) | (20) | (20) | (20) | (20) | (20) | (20) | (20) | (20) | (20) | 14 | 18 | 22 | 24 | 18 | 19 | 9 | (10) | (10) | (10) | (10) | (10) | (10) | (10) | 404 | .4 | 124 | 0.19 | | |
| 26 | (10) | (10) | (10) | (10) | (10) | (10) | (10) | (10) | (10) | (10) | (10) | (10) | 11 | 12 | 17 | (10) | (10) | (10) | (10) | (10) | (10) | (10) | (10) | (10) | 249 | .2 | 29 | 0.04 | | |
| 27 | (10) | (10) | (10) | (10) | (10) | (10) | (10) | (10) | (10) | (10) | (10) | 4 | (13) | (13) | (13) | (13) | (13) | 22 | 13 | 17 | 17 | (11) | (11) | (11) | 278 | .3 | 69 | 0.11 | | |
| 28 | (11) | (11) | (11) | (11) | (11) | 5 | 8 | 4 | 0 | 16 | 10 | 5 | 3 | 10 | 6 | 4 | 3 | 4 | 10 | 5 | 3 | (4) | (4) | (4) | 170 | .2 | 96 | 0.15 | | |
| 29 | (4) | (4) | (4) | (4) | (4) | (4) | (4) | (4) | 5 | 3 | 5 | 5 | 6 | 3 | 1 | 4 | 4 | 10 | 2 | 3 | 4 | 2 | 7 | (6) | 102 | .1 | 64 | 0.10 | | |
| 30 | (6) | (6) | (6) | (6) | (6) | (6) | (6) | (6) | (6) | (6) | 5 | 2 | 7 | 10 | 7 | 2 | 1 | 0 | 3 | 0 | 1 | 0 | (3) | (3) | 104 | .1 | 38 | 0.06 | | |
| 31 | (3) | (3) | (3) | (3) | (3) | (3) | (3) | (3) | (3) | (3) | (3) | 7 | 12 | 2 | 4 | 4 | 2 | (2) | (2) | (2) | (2) | (2) | (2) | (2) | 78 | .1 | 31 | 0.05 | | |
| TOTAL | 4924 | 4597 | 3910 | 3948 | 3967 | 3998 | 3905 | 3880 | 3951 | 3950 | 3467 | 4033 | 4154 | 4176 | 4659 | 4632 | 4963 | 5066 | 5249 | 5090 | 5279 | 5550 | 5144 | 5850 | 108,342 | 100.0 | 65,202 | 100.00 | | |
| <u>2</u> | 4.5 | 4.2 | 3.6 | 3.6 | 3.7 | 3.7 | 3.6 | 3.6 | 3.6 | 3.2 | 3.2 | 3.7 | 3.8 | 3.9 | 4.3 | 4.3 | 4.6 | 4.7 | 4.8 | 4.7 | 4.9 | 5.1 | 4.7 | 5.4 | | | | | | |

^{1/} Figures in parenthesis indicated estimates of missing counts made by averaging the last complete hourly count with the next complete hourly count.

^{2/} Estimated from 10 minute counts.

Appendix Table 2. King salmon hourly enumeration log, Anvik River tower, 1972.^{1/}

| Hour/ Date | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Expanded | | Actual | | |
|---------------|-------|-----|-------|-----|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|-------|--------|------|-----|
| | Total | % | Total | % | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7/ 6 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | 2 | - | - | - | 1 | 5 | - | - | - | - | 9 | .8 | 9 | 1.7 | |
| 7 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 1 | .1 | 1 | .2 | |
| 8 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | - | - | 2 | .2 | 2 | .4 | |
| 9 | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - | 1 | - | - | - | - | - | - | - | 3 | .3 | 3 | .6 | |
| 10 | - | - | - | - | - | - | - | - | - | - | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 3 | 2 | - | - | 1 | 1 | 15 | 1.4 | 7 | 1.3 |
| 11 | - | - | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | 4 | 1 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 1 | 3 | 4 | - | 1 | 45 | 4.1 | 29 | 5.5 | |
| 12 | - | - | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 2 | 3 | 7 | 1 | 4 | 5 | 5 | 3 | 7 | 2 | (1) | 3 | 2 | 2 | 55 | 5.0 | 46 | 8.7 | |
| 13 | 1 | 1 | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | 3 | - | 4 | 2 | 9 | 4 | 6 | 5 | 6 | 5 | 3 | 1 | 3 | - | 69 | 6.3 | 53 | 10.1 | |
| 14 | 1 | - | - | (1) | 2/ (1) | (1) | - | (1) | - | (1) | 1 | 3 | 3 | 8 | 7 | 3 | 15 | 5 | 9 | 1 | 12 | 1 | - | 2 | 75 | 6.8 | 71 | 13.5 | |
| 15 | - | - | (1) | (2) | (1) | (2) | (1) | (2) | (1) | (2) | 3 | 4 | 5 | 7 | 1 | 4 | 5 | 4 | (3) | 3 | 8 | 3 | 4 | 1 | 67 | 6.1 | 52 | 9.9 | |
| 16 | - | - | (4) | (4) | (4) | (4) | (4) | (4) | (4) | (4) | (4) | (4) | (4) | 9 | 6 | (5) | (5) | (5) | 4 | (4) | (4) | 5 | (3) | (3) | 97 | 8.8 | 24 | 4.6 | |
| 17 | (3) | (3) | - | - | 2 | 1 | 2 | 2 | - | 1 | 4 | (2) | (2) | 2 | 1 | 3 | (1) | (1) | - | 3 | (1) | (1) | - | - | 35 | 3.2 | 21 | 4.0 | |
| 18 | - | - | - | - | - | 1 | - | - | 1 | (3) | (3) | (3) | (3) | (3) | (3) | (3) | (3) | (3) | 5 | 1 | 2 | 1 | (1) | (1) | 40 | 3.6 | 11 | 2.1 | |
| 19 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 1 | (2) | (2) | (2) | (2) | (2) | (2) | 3 | 1 | (1) | (1) | (1) | (1) | 32 | 2.9 | 5 | 0.9 | |
| 20 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 2 | (3) | (3) | (3) | 4 | (2) | 1 | (1) | 2 | 3 | 2 | (2) | (2) | (2) | 42 | 3.8 | 14 | 2.7 | |
| 21 | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | 3 | 1 | 6 | 2 | 4 | 2 | 3 | 8 | 3 | 3 | 1 | - | - | - | - | 54 | 4.9 | 36 | 6.8 | |
| 22 | - | - | - | - | - | - | - | - | - | - | 1 | 2 | 2 | 2 | - | - | 4 | 2 | 1 | (2) | (2) | (2) | (2) | (2) | 24 | 2.2 | 14 | 2.7 | |
| 23 | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | 4 | 2 | 2 | 5 | - | 7 | (4) | (4) | (4) | (4) | (4) | (4) | (4) | 70 | 6.3 | 20 | 3.8 | |
| 24 | (4) | (4) | (4) | (4) | (4) | (4) | (4) | (4) | (4) | (4) | (4) | 1 | - | 2 | 2 | 2 | 5 | 3 | 4 | (2) | (2) | (2) | (2) | (2) | 73 | 6.6 | 19 | 3.6 | |
| 25 | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | 1 | 1 | 1 | - | - | 1 | 3 | (5) | (5) | (5) | (5) | (5) | (5) | (5) | 59 | 5.3 | 7 | 1.3 | |
| 26 | (5) | (5) | (5) | (5) | (5) | (5) | (5) | (5) | (5) | (5) | (5) | (5) | (5) | (5) | 7 | 1 | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | 94 | 8.5 | 8 | 1.5 | |
| 27 | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | 2 | (2) | (2) | (2) | (2) | 3 | 2 | 2 | 2 | (2) | (2) | (2) | 49 | 4.4 | 11 | 2.1 | |
| 28 | (2) | (2) | (2) | (2) | (2) | (2) | 2 | 1 | 1 | 2 | 1 | 2 | 4 | 5 | - | - | 1 | 3 | - | - | - | - | - | - | 34 | 3.1 | 22 | 4.2 | |
| 29 | - | - | - | - | - | - | - | - | 1 | 1 | - | - | 4 | - | 1 | 1 | 3 | 4 | - | 1 | - | - | 1 | (1) | 18 | 1.6 | 17 | 3.2 | |
| 30 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 1 | 1 | 3 | 8 | 1 | - | - | 1 | - | - | - | - | - | - | 25 | 2.3 | 15 | 2.8 | |
| 31 | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 1 | 6 | 1 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 17 | 1.5 | 10 | 1.9 | |
| TOTAL | 27 | 26 | 32 | 34 | 34 | 36 | 34 | 35 | 33 | 40 | 47 | 52 | 64 | 74 | 63 | 48 | 82 | 61 | 67 | 51 | | 40 | 36 | 33 | 1,104 | 100.0 | 527 | | |
| \bar{x} | 2.4 | 2.4 | 2.9 | 3.1 | 3.1 | 3.3 | 3.1 | 3.2 | 3.0 | 3.6 | 4.3 | 4.7 | 5.8 | 6.7 | 5.7 | 4.3 | 7.4 | 5.5 | 6.1 | 4.6 | 5.0 | 3.6 | 3.3 | 3.0 | | | | | |

^{1/} Figures in parenthesis indicate estimates of missing counts made by averaging the last complete hourly count with the next complete hourly count.

^{2/} Counts each hour alternated between 1 and 2, to get a total for estimated hourly counts.

Appendix Table 3. Summary of Yukon River system king salmon escapement estimates in index areas, 1959-1972.^{1/}

| Year | Andreafsky R. | | Anvik R. | Salcha R. | Big Salmon R. ^{2/} | Nisutlin R. ^{3/} | Whitehorse Dam fishway |
|------|-------------------|-------------------|-------------------|-------------------|-----------------------------|---------------------------|------------------------|
| | West fork | East fork | | | | | |
| 1959 | - | - | - | - | - | - | 1,054 |
| 1960 | 1,220 | 1,020 | 1,950 | 1,660 | - | - | 660 |
| 1961 | - | 1,003 | 1,226 | 2,878 | - | - | 1,068 |
| 1962 | 762 ^{4/} | 675 ^{4/} | - | 937 | - | - | 1,500 |
| 1963 | - | - | - | - | - | - | 484 |
| 1964 | 705 | 867 | - | 450 | - | - | 587 |
| 1965 | 355 ^{4/} | - | 650 ^{4/} | 408 | - | - | 903 |
| 1966 | 303 | 361 | 638 | 800 | - | - | 563 |
| 1967 | 276 ^{4/} | - | 336 ^{4/} | - | - | - | 533 |
| 1968 | 383 | 380 | 297 ^{4/} | 735 | 300-400 | 407 | 407 |
| 1969 | 274 ^{4/} | 231 ^{4/} | 296 ^{4/} | 461 ^{4/} | 286 | 105 | 334 |
| 1970 | 574 ^{4/} | 665 | 368 ^{4/} | 1,882 | 670 | 615 | 625 ^{6/} |
| 1971 | 1,284 | 1,904 | - | 158 ^{4/} | 200 ^{5/} | 640 ^{5/} | 856 |
| 1972 | 582 | 798 | 418 | 1,193 | 507 | 317 | 403 |

^{1/} With exception of Whitehorse fishway counts, data obtained from aerial surveys.

^{2/} Quiet Lake to Scurvy Creek.

^{3/} Sidney Creek to Hundred Mile Creek.

^{4/} Incomplete survey or poor survey conditions resulting in a very minimal estimate.

^{5/} Canadian Department of Fisheries survey.

^{6/} Counts prior to 1970 conducted by local sportsman group on a volunteer basis. Late counts made by Fisheries personnel.

Appendix Table 4. Daily king salmon escapement counts, Whitehorse Dam fishway, Yukon River, 1972.

| Date | Daily Count | Cumulative Total |
|------|-------------|------------------|
| 8/ 4 | 1 | 1 |
| 5 | 2 | 3 |
| 6 | 6 | 9 |
| 7 | 11 | 20 |
| 8 | 4 | 24 |
| 9 | 7 | 31 |
| 10 | 10 | 41 |
| 11 | 14 | 55 |
| 12 | 14 | 69 |
| 13 | 44 | 113 |
| 14 | 34 | 147 |
| 15 | 45 | 192 |
| 16 | 49 | 241 |
| 17 | 37 | 278 |
| 18 | 24 | 302 |
| 19 | 7 | 309 |
| 20 | 18 | 327 |
| 21 | 31 | 358 |
| 22 | 7 | 365 |
| 23 | 14 | 379 |
| 24 | 13 | 392 |
| 25 | 4 | 396 |
| 26 | 0 | 396 |
| 27 | 2 | 398 |
| 28 | 5 | 403 |
| 29 | Gate opened | 403 |

Appendix Table 5. Age and sex composition of summer chum salmon samples, Yukon River, 1972.

| Location | Gear | Age Group | | | | Total |
|------------------------|--------------|-----------------------|----------------|----------------|----------------|---------------|
| | | 3 ₁ | 4 ₁ | 5 ₁ | 6 ₁ | |
| <u>Males</u> | | | | | | |
| Flat Island | G.N.--5 1/2" | 5 (1.1) ^{1/} | 86 (18.9) | 93 (20.4) | -- | 184 (40.4) |
| | G.N.--8 1/2" | 6 (1.1) | 102 (18.3) | 163 (29.3) | 1 (0.2) | 271 (48.7) |
| Emmonak-Alakanuk | G.N.--5 1/2" | 4 (7.0) | 23 (40.4) | 2 (3.5) | -- | 29 (50.9) |
| | G.N.--8 1/2" | 46 (3.8) | 295 (24.3) | 263 (21.6) | -- | 604 (49.7) |
| Anvik River | Carcasses | -- | 25 (7.8) | 138 (43.1) | 4 (1.3) | 167 (52.2) |
| TOTAL | | 61 (2.3) | 531 (20.39) | 659 (25.3) | 5 (.20) | 1,255 (48.2) |
| Percent total--males | | (4.9) | (42.3) | (52.5) | (0.4) | (100.0) |
| <u>Females</u> | | | | | | |
| Flat Island | G.N.--5 1/2" | 6 (1.3) | 124 (27.2) | 141 (30.9) | 1 (0.2) | 272 (59.6) |
| | G.N.--8 1/2" | 2 (0.4) | 137 (24.6) | 143 (25.7) | 2 (0.4) | 285 (51.3) |
| Emmonak-Alakanuk | G.N.--5 1/2" | 4 (7.0) | 20 (35.1) | 4 (7.0) | -- | 28 (49.1) |
| | G.N.--8 1/2" | 46 (3.8) | 348 (28.6) | 215 (17.7) | 2 (0.2) | 611 (50.3) |
| Anvik River | Carcasses | -- | 37 (11.6) | 115 (35.9) | 1 (0.3) | 153 (47.8) |
| TOTAL | | 58 (2.2) | 666 (25.6) | 618 (23.7) | 6 (0.2) | 1,349 (51.8) |
| Percent total--females | | (4.3) | (49.4) | (45.8) | (0.4) | (100.0) |
| <u>Combined Sexes</u> | | | | | | |
| Flat Island | G.N.--5 1/2" | 11 (2.4) | 210 (46.1) | 234 (51.3) | 1 (0.2) | 456 (100.0) |
| | G.N.--8 1/2" | 8 (1.4) | 239 (43.0) | 306 (55.0) | 3 (0.5) | 556 (100.0) |
| Emmonak-Alakanuk | G.N.--5 1/2" | 8 (14.0) | 43 (75.4) | 6 (10.5) | -- | 57 (100.0) |
| | G.N.--8 1/2" | 92 (7.6) | 643 (52.9) | 478 (39.3) | 2 (0.2) | 1,215 (100.0) |
| Anvik River | Carcasses | -- | 62 (19.4) | 253 (79.1) | 5 (1.6) | 320 (100.0) |
| TOTAL | | 119 (4.6) | 1,197 (46.0) | 1,277 (49.0) | 11 (0.4) | 2,604 (100.0) |

^{1/} Percent

Appendix Table 6. Age and sex composition of fall chum salmon, Yukon River, 1972

| Location | Gear | Age Group | | | | Total |
|-----------------------|--------------|-------------------------|----------------|----------------|----------------|-------------|
| | | 3 ₁ | 4 ₁ | 5 ₁ | 6 ₁ | |
| <u>Males</u> | | | | | | |
| Emmonak - Alakanuk | G.N.--5 1/2" | 33 (12.4) ^{1/} | 174 (65.1) | 60 (22.5) | - | 267 (45.8) |
| <u>Females</u> | | | | | | |
| Emmonak - Alakanuk | G.N.--5 1/2" | 38 (12.0) ^{1/} | 204 (65.6) | 74 (23.4) | - | 316 (54.2) |
| <u>Combined Sexes</u> | | | | | | |
| Emmonak - Alakanuk | G.N.--5 1/2" | 71 (12.2) | 378 (64.8) | 134 (23.0) | - | 583 (100.0) |

^{1/} %

Appendix Table 7. Age and sex composition of king salmon samples, Yukon River, 1972.

| Location | Gear | Age Group | | | | Total |
|------------------------|--------------|-----------------------|----------------|----------------|----------------|---------------|
| | | 4 ₂ | 5 ₂ | 6 ₂ | 7 ₂ | |
| <u>Males</u> | | | | | | |
| Flat Island | G.N.--5 1/2" | 1 (5.6) ^{1/} | 4 (22.2) | 5 (27.8) | 1 (5.6) | 11 (61.1) |
| | G.N.--8 1/2" | 2 (0.4) | 61 (11.5) | 162 (30.5) | 9 (1.7) | 234 (44.0) |
| Emmonak-Alakanuk | G.N.--8 1/2" | 7 (1.0) | 73 (10.0) | 181 (25.0) | 16 (2.2) | 277 (38.3) |
| Salcha River | Carcasses | 22 (7.5) | 16 (5.5) | 89 (30.4) | 4 (1.4) | 131 (44.7) |
| Tanana | Fishwheel | 7 (33.3) | 8 (38.1) | - - | - - | 15 (71.4) |
| Whitehorse | Fishway | - - | 8 (12.7) | 17 (27.0) | 2 (3.2) | 27 (42.9) |
| Anvik River | Carcasses | - - | 8 (53.3) | 2 (13.3) | - - | 10 (66.7) |
| TOTAL | | 39 (2.3) | 178 (10.7) | 456 (27.4) | 32 (1.9) | 705 (42.3) |
| Percent total--males | | (5.5) | (25.3) | (63.7) | (5.5) | (100.0) |
| <u>Females</u> | | | | | | |
| Flat Island | G.N.--5 1/2" | - - | 4 (22.2) | 3 (16.7) | - - | 7 (38.9) |
| | G.N.--8 1/2" | 4 (0.8) | 52 (9.8) | 214 (40.2) | 28 (5.3) | 298 (56.0) |
| Emmonak-Alakanuk | G.N.--8 1/2" | - - | 21 (2.9) | 393 (54.4) | 32 (4.4) | 446 (61.7) |
| Salcha River | Carcasses | - - | 6 (2.1) | 150 (51.2) | 6 (2.1) | 162 (55.3) |
| Tanana | Fishwheel | - - | 1 (4.8) | 5 (23.8) | - - | 6 (28.6) |
| Whitehorse | Fishway | - - | 8 (12.7) | 23 (36.5) | 5 (7.9) | 36 (57.1) |
| Anvik River | Carcasses | - - | - - | 5 (33.3) | - - | 5 (33.3) |
| TOTAL | | 4 (0.2) | 92 (5.5) | 793 (47.6) | 71 (4.3) | 960 (57.7) |
| Percent total--females | | (0.4) | (9.6) | (82.6) | (7.4) | (100.0) |
| <u>Combined sexes</u> | | | | | | |
| Flat Island | G.N.--5 1/2" | 1 (5.6) | 8 (44.4) | 8 (44.4) | 1 (5.6) | 18 (100.0) |
| | G.N.--8 1/2" | 6 (1.1) | 113 (21.2) | 376 (70.7) | 37 (7.0) | 532 (100.0) |
| Emmonak-Alakanuk | G.N.--8 1/2" | 7 (1.0) | 94 (13.0) | 574 (79.4) | 48 (6.6) | 723 (100.0) |
| Salcha River | Carcasses | 22 (7.5) | 22 (7.5) | 239 (81.6) | 10 (3.4) | 293 (100.0) |
| Tanana | Fishwheel | 7 (33.3) | 9 (42.9) | 5 (23.8) | - - | 21 (100.0) |
| Whitehorse | Fishway | - - | 16 (25.4) | 40 (63.5) | 7 (11.1) | 63 (100.0) |
| Anvik River | Carcasses | - - | 8 (53.3) | 7 (46.7) | - - | 15 (100.0) |
| TOTAL | | 43 (2.9) | 270 (16.2) | 1,249 (75.0) | 103 (6.2) | 1,665 (100.0) |

^{1/} (%)

Appendix Table 8. Age and sex composition of coho salmon samples, Yukon River, 1972.

| Location | Gear | Age Group | | Totals |
|----------------|--------------|-------------------------|----------------|-------------------------|
| | | 4 ₃ | 5 ₄ | |
| <u>Males</u> | | | | |
| Flat Island | G.N.--5 1/2" | 49 (98.0) ^{1/} | 1 (2.0) | 50 (70.0) ^{1/} |
| <u>Females</u> | | | | |
| Flat Island | | 20 (95.0) | 1 (5.0) | 21 (30.0) |
| Combined Sexes | | 69 (97.0) | 2 (3.0) | 71 (100.0) |
| <u>1/ %</u> | | | | |

Appendix Table 9. King and summer chum salmon test fishing catches, Flat Island, Yukon River, 1972.

| Date | Gill net--8 1/2" <u>1</u> / | | Gill net--5 1/2" <u>2</u> / | | Total | | |
|--------|-----------------------------|------|-----------------------------|------|-------|------|-------|
| | Effort (hours) | King | Chum | King | Chum | King | Chum |
| 6/11 | 27 | 7 | 2 | - | - | 7 | 2 |
| 12 | 31 | 5 | 3 | - | - | 5 | 3 |
| 13 | 36 | 2 | 2 | - | - | 2 | 2 |
| 14 | 46 | 23 | 6 | 1 | 1 | 24 | 7 |
| 15 | 48 | 30 | 14 | - | 3 | 30 | 17 |
| 16 | 48 | 12 | 3 | - | 1 | 12 | 4 |
| 17 | 48 | 11 | 10 | - | 4 | 11 | 14 |
| 18 | 48 | 64 | 29 | - | - | 64 | 29 |
| 19 | 48 | 82 | 36 | - | - | 82 | 36 |
| 20 | 48 | 28 | 20 | - | 2 | 28 | 22 |
| 21 | 48 | 15 | 19 | - | 5 | 15 | 24 |
| 22 | 48 | 4 | 2 | - | - | 4 | 2 |
| 23 | 48 | 8 | 66 | 3 | 47 | 11 | 113 |
| 24 | 48 | 1 | 18 | - | 57 | 1 | 75 |
| 25 | 48 | 8 | 8 | - | 13 | 8 | 21 |
| 26 | 48 | 18 | 8 | - | 36 | 18 | 44 |
| 27 | 47 | 4 | 4 | 1 | 28 | 5 | 32 |
| 28 | 40 | 25 | 67 | 8 | 95 | 33 | 162 |
| 29 | 48 | 28 | 38 | - | 54 | 28 | 92 |
| 30 | 35 | 1 | 1 | - | 7 | 1 | 8 |
| 7/ 1 | 46 | 4 | 7 | - | 1 | 4 | 8 |
| 2 | 48 | 25 | 38 | 2 | 15 | 27 | 53 |
| 3 | 48 | 5 | 3 | - | - | 5 | 3 |
| 4 | 48 | 11 | 10 | - | - | 11 | 10 |
| 5 | 48 | 60 | 31 | 2 | 24 | 62 | 55 |
| 6 | 48 | 24 | 38 | - | 28 | 24 | 66 |
| 7 | 48 | 18 | 19 | 1 | 17 | 19 | 36 |
| 8 | 48 | 27 | 31 | - | 14 | 27 | 45 |
| 9 | 48 | 8 | 16 | - | 2 | 8 | 18 |
| 10 | 48 | 36 | 45 | 2 | 47 | 38 | 92 |
| 11 | 48 | 8 | 11 | - | 28 | 8 | 39 |
| 12 | 48 | 14 | 10 | 1 | 33 | 15 | 43 |
| 13 | 42 | 7 | 10 | 1 | 35 | 8 | 45 |
| 14 | 24 | - | 4 | - | - | - | 4 |
| Totals | 1,526 | 623 | 629 | 22 | 597 | 645 | 1,226 |

1/ Two 25 fathom set gill nets, sites No. 1 and No. 2.

2/ One 25 fathom set gill net, site No. 3.

Appendix Table 10. Summary of subsistence harvest data,
Yukon River, 1961-1972.^{1/}

| Year | <u>Total Catch</u> | |
|------|--------------------|----------------------------|
| | King Salmon | Other Salmon ^{2/} |
| 1961 | 31,864 | 412,889 |
| 1962 | 21,610 | 357,641 |
| 1963 | 32,970 | 421,575 |
| 1964 | 16,171 | 481,449 |
| 1965 | 19,608 | 458,661 |
| 1966 | 14,272 | 221,786 |
| 1967 | 19,448 | 288,577 |
| 1968 | 15,006 | 192,124 |
| 1969 | 15,000 | 216,272 |
| 1970 | 16,410 | 226,723 |
| 1971 | 25,251 | 216,033 |
| 1972 | 19,541 | 140,102 |

^{1/} Does not include catches from the village of Stebbins, a coastal village located northeast of the Yukon River mouth.

^{2/} Mostly chum salmon, but includes small numbers of pink and coho salmon.

Appendix Figure 1. King salmon redd locations, Salcha River, 1972.

