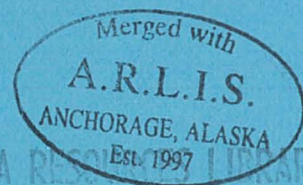




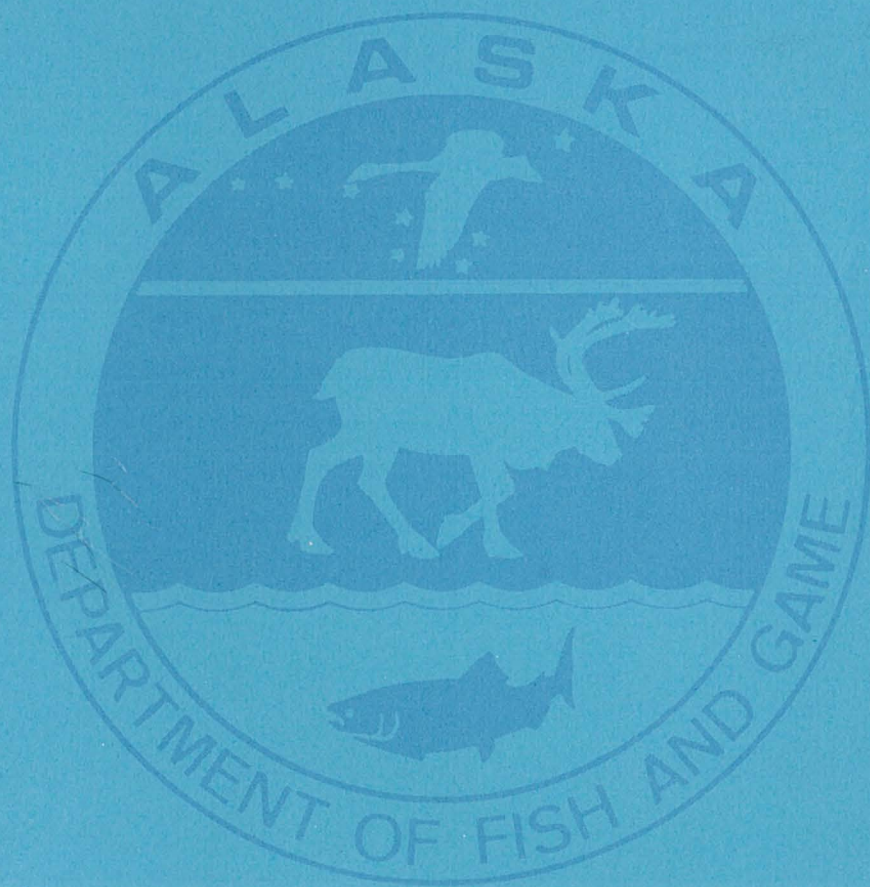
VOLUME 22  
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FEDERAL AID IN FISH RESTORATION  
AND  
ANADROMOUS FISH STUDIES



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# INVENTORY AND CATALOGING

G-I-E Louis A. Gwartney, Richard B. Russell  
G-I-F Fred T. Williams, Wilson D. Potterville  
G-I-H Stanley W. Kubik



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STATE OF ALASKA

*Jay S. Hammond, Governor*

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Annual Performance Report for

INVENTORY AND CATALOGING OF SPORT FISH  
AND SPORT FISH WATERS OF THE BRISTOL BAY AREA

by

*Louis A. Gwartney  
and  
Richard B. Russell*

ALASKA DEPARTMENT OF FISH AND GAME  
*Ronald O. Skoog, Commissioner*

SPORT FISH DIVISION  
*Rupert E. Andrews, Director*

## RESEARCH PROJECT SEGMENT

State: ALASKA NAME: Sport Fish Investigations  
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Study No: G-I Study Title: INVENTORY AND CATALOGING

Job No.: G-I-E Job Title: Inventory and Cataloging  
of Sport Fish and Sport  
Fish Waters of the Bristol  
Bay Area

Cooperators: Louis A. Gwartney and Richard B. Russell

Period Covered: July 1, 1980 to June 30, 1981

## ABSTRACT

The Bristol Bay area includes all waters flowing into Bristol Bay from Cape Newenham to Port Heiden. Research activities in the area are designed to monitor traditional fisheries and to expand studies into areas with developing sport fisheries.

The 1980 Naknek River sport harvest of chinook salmon, Oncorhynchus tshawytscha (Walbaum), was estimated to be 2,500 fish. No escapement counts were made due to high, muddy waters.

Rainbow trout, Salmo gairdneri Richardson, spawning surveys were made at Lower Talarik Creek and Brooks River. Both streams had average runs. A creel census was conducted on the upper Naknek River between January 5 and April 9, 1980. During the period, 830 anglers retained 913 rainbow trout. Catch by month is presented for this winter fishery.

A 2-day survey of Arctic grayling, Thymallus arcticus (Pallas), at lower Ugashik Lake resulted in a population curve similar to all previous years' data. Basic catalog and inventory surveys were completed on five systems throughout the area. Stream or lake characteristics are discussed along with sizes and/or ages of fishes present.

## BACKGROUND

The Bristol Bay area includes all waters flowing into Bristol Bay from Cape Newenham to Port Heiden. The area shown in Figure 1 reflects the area of study within the total Bristol Bay area. The area contains some of the



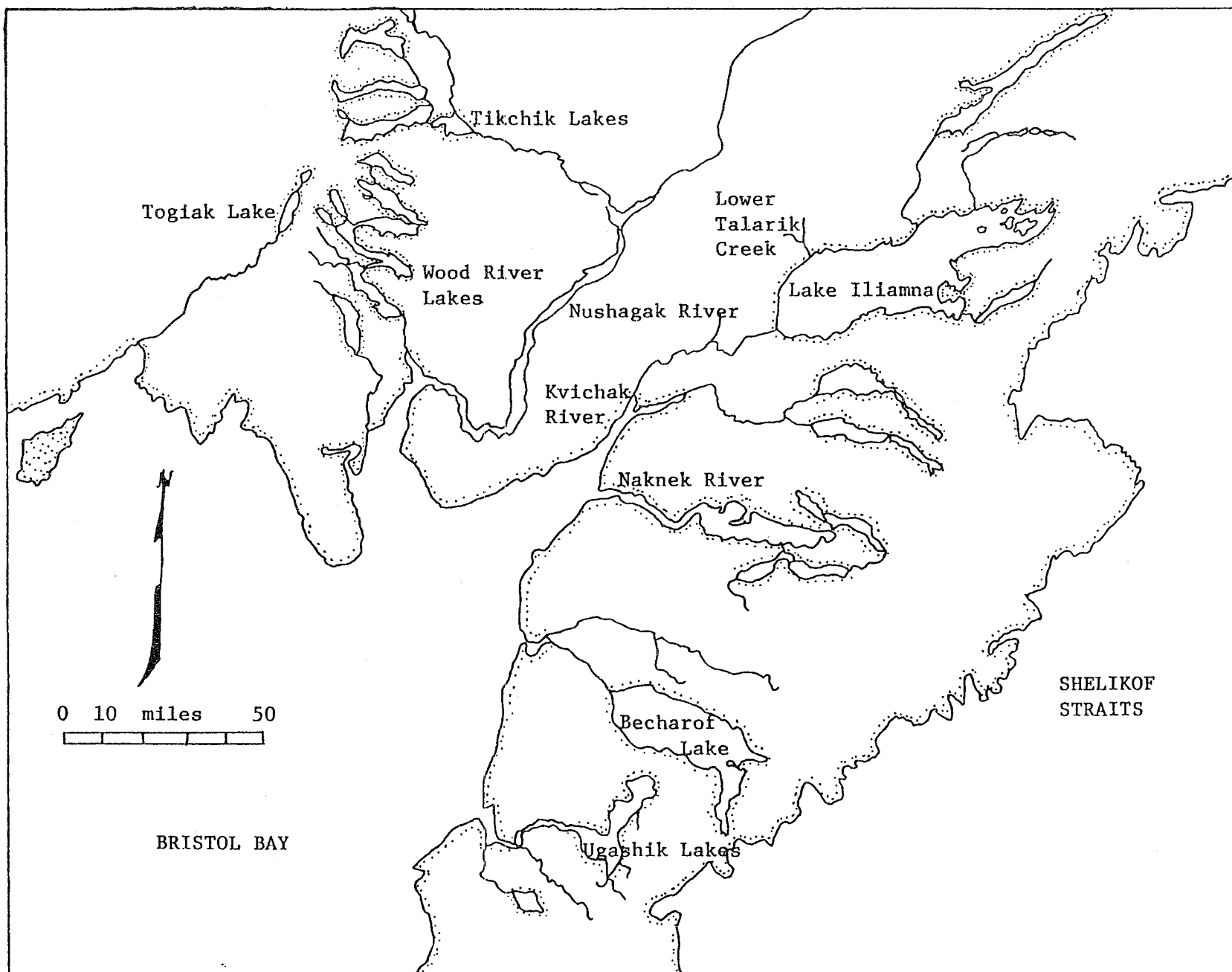


Figure 1 Bristol Bay Study Area.

best recreational fishing waters in the State. While the Kvichak and Naknek drainages have been sport fished for many years, there is still the opportunity for expansion of the recreational fishery into other Bristol Bay waters less well known to the general public. Many professional fishing guides and anglers with airplanes are currently fishing these areas.

Rainbow trout, abundant throughout the area, require a large amount of staff time for monitoring, particularly in the Naknek and Kvichak drainages. A comprehensive, 5-year study of rainbow trout in Lake Iliamna was completed in 1976 (Russell, 1977). Since this study was completed spawning surveys and creel censuses have been continued on select streams to determine the minimum number of large rainbow trout available for harvest by the angling public.

In the early 1970s, the Sport Fish staff collected biological data and made population estimates of Arctic grayling at lower Ugashik Lake outlet. In 1980 this work was repeated for comparisons and for information upon which to base regulatory recommendations.

Another major sport fishery in the area occurs in June and July on the Naknek River for chinook salmon. Sport, subsistence and commercial catches have been estimated annually.

With the establishment of the Lake Clark National Monument, a basic 2-year inventory study was initiated in 1978. This project was jointly funded by the State of Alaska and the National Park Service. Results were published as a completion report in 1980 (Russell, 1980). Inventory studies continued through 1980 with surveys made in the Nushagak, Tikchik, Wood River, Kvichak and Becharof drainages. Table 1 presents common and scientific names of species mentioned in the following report.

#### RECOMMENDATIONS

1. The Naknek River chinook salmon creel census should be repeated in 1981.
2. The enumeration of chinook salmon and rainbow trout in selected streams in the Naknek and Kvichak drainages should continue in order to establish a minimum spawning escapement.
3. Population estimates of Arctic grayling at Lower Ugashik Lake outlet and Ugashik Narrows should be continued.
4. The survey of selected streams within the Bristol Bay area to determine the existence of, or the potential for, a recreational fishery should be continued and information collected about the sport fishes present.

Table 1. List of Common and Scientific Names.

Common Name	Scientific Name and Author
Chinook salmon	<u>Oncorhynchus tshawytscha</u> (Walbaum)
Chum salmon	<u>Oncorhynchus keta</u> (Walbaum)
Coho salmon	<u>Oncorhynchus kisutch</u> (Walbaum)
Sockeye salmon	<u>Oncorhynchus nerka</u> (Walbaum)
Rainbow trout	<u>Salmo gairdneri</u> Richardson
Lake trout	<u>Salvelinus namaycush</u> (Walbaum)
Arctic char	<u>Salvelinus alpinus</u> (Linnaeus)
Dolly Varden	<u>Salvelinus malma</u> (Walbaum)
Arctic grayling	<u>Thymallus arcticus</u> (Pallas)
Northern pike	<u>Essox lucius</u> Linnaeus
Burbot	<u>Lota lota</u> (Linnaeus)
Arctic lamprey	<u>Lampetra jamonica</u> (Martens)
Longnose sucker	<u>Catostomus catostomus</u> Forster
Round whitefish	<u>Prosopium cylindracium</u> (Pallas)
Alaska blackfish	<u>Dallia pectoralis</u> Bean
Ninespine stickleback	<u>Pungitius pungitius</u> (Linnaeus)
Threespine stickleback	<u>Gasterosteus aculeatus</u> Linnaeus
Sculpin	<u>Cottus</u> sp.

## OBJECTIVES

1. To determine the distribution and utilization of sport fish species within the waters of the job area, with emphasis on the Tikchik and Upper Nushagak systems.
2. To determine the magnitude of rainbow trout spawning stocks in Lower Talarik Creek, Dream Creek, Copper River, Naknek River, Brooks River and other streams as time permits.
3. To determine the magnitude of chinook salmon spawning stocks utilizing the Naknek drainage.
4. To determine sport harvest of chinook salmon in the Naknek River.
5. To estimate the population of Arctic grayling at Lower Ugashik Lake Outlet and Ugashik Lake Narrows.
6. To provide recommendations and identify future research needs relative to the management of the area sport fish resources.

## TECHNIQUES USED

Anglers were interviewed to determine creel and effort information. Those not interviewed were enumerated to provide estimates of total effort. The interview data were expanded to include all anglers enumerated by a ratio proportion formula, thus yielding estimates of total angler effort and total rainbow trout harvest.

### Expansions

Angler Effort	$\frac{\text{No. of anglers interviewed}}{\text{No. of anglers hrs. fished}}$	=	$\frac{\text{Total No. anglers observed}}{X}$
In Angler Hours			

Rainbow Trout	$\frac{\text{No. of anglers interviewed}}{\text{No. of rainbow trout kept}}$	=	$\frac{\text{Total No. anglers observed}}{X}$
Harvested			

The number of spawning salmon and trout was determined by aerial surveys or by walking along stream banks. In areas of large concentrations, fish were estimated in tens or hundreds.

Arctic grayling at Lower Ugashik Lake Outlet were caught with rod and reel, and measurements made with a standard measuring board.

For Catalog and Inventory studies, fish were captured using gill nets, dip nets, hook and line, minnow traps, and backpack electroshocker. Gill nets were of three types:

1. 125 foot long, variable mesh monofilament diving nets, 6 feet deep, comprised of five 25-foot panels bearing mesh sizes 1/2", 3/4" 1", 1-1/2" and 2" respectively (mesh size = square measure).
2. 125 foot long, variable mesh nylon floating net, 6 feet deep, comprised of five panels bearing mesh sizes as above;
3. 75 foot long, monofilament floating net, 10 feet deep, 4-inch mesh.

The electroshocker used for fish collection was a Smith-Root, Type V, 12v, backpack electrofisher. All fish captured were measured to the nearest millimeter (both standard fork length and total length), and examined internally to determine sex and stage of maturity. Scales and otoliths were removed, depending on the species sampled, to be used in age analysis.

## FINDINGS

### Results

#### Naknek River Chinook Salmon:

The 1980 Naknek River chinook salmon sport harvest appears to be similar to estimates made in 1978 and 1979. No formal creel census was conducted, but the average 1978 and 1979 harvest estimates of 2,500 chinook salmon appear to be similar to the 1980 harvest.

Chinook salmon escapements counts for the Naknek system were not accomplished in 1980 due to unseasonably high and muddy waters. Based on the success of the anglers, I would estimate that escapements are adequate and similar to that of 1979.

#### Rainbow Trout Surveys:

Rainbow trout spawning surveys were again conducted in April and May of 1980 in selected index streams in the Naknek and Kvichak drainages. These surveys, continuous since 1972 (Table 2), provide an annual comparison of the numbers of large spawning rainbow trout. Since these large rainbow trout spend most of the summer associated with the lake environment, these spring surveys are made at the only time visual observation of their numbers is possible.

A creel census was conducted on the upper Naknek River between January 5 and April 9, 1980. During this period, 56 days were spent observing and interviewing anglers after they completed each day's fishing. From January 5 to March 2, anglers concentrated their efforts in the upper Naknek (Figure 2) and after March 2, started fishing just above Rapids Camp.

Eight hundred and thirty anglers fished an estimated 2,706 angler hours and caught an estimated 1,494 rainbow trout, 126 Arctic grayling, 34 char, 8 northern pike, 4 lake trout, 1 burbot and 1 round whitefish for a total

Table 2. A Summary of Rainbow Trout Spawning Surveys Made on Streams in the Naknek and Kvichak Drainages, 1973-1980.

Stream	Number of Rainbow Trout Spawners							
	1973	1974	1975	1976	1977	1978	1979	1980
Copper River	102	91	85	*	400-500	250-350	200-250**	***
Brooks River	150	169	88	100	125-175	125-150	250-300	200
Lower Talarik Creek	1,000	1,100	1,100	1,000	800	1,100-1,200**	1,900-2,100**	1,250-1,300**
Dream Creek	218	43	46	200-250	138	175-225	*	***

\* No count possible due to turbid waters.

\*\* Aerial survey.

\*\*\* No peak count made.



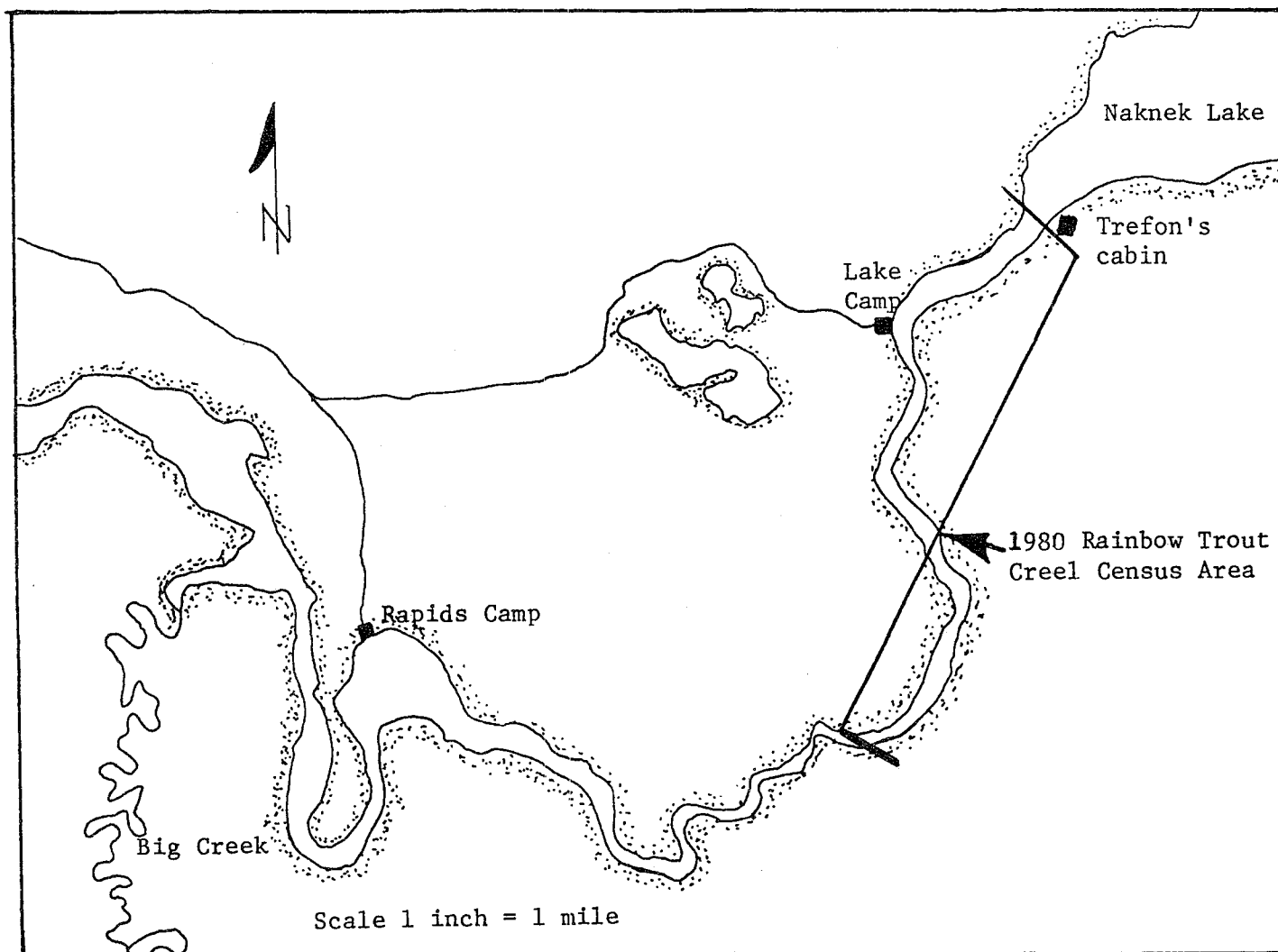


Figure 2. Upper Naknek River Showing Rainbow Trout Creel Census Area, 1980

catch per angler hour of 0.62 fish. Rainbow trout catch per angler hour was 0.55. Anglers retained an estimated 913 rainbow trout, 145 of which were sexually mature prespawners. Table 3 presents these data by month.

Most of the anglers were either local residents or resident military personnel. Of these anglers interviewed, 80% were from the local King Salmon-Naknek area. Only 4% were professionally guided.

#### Lower Ugashik Lake Outlet Arctic Grayling Survey:

Due to the extremely large numbers of sockeye salmon in the Ugashik system, no attempt was made to estimate Arctic grayling populations at either the outlet or narrows (Figure 3). A 2-day sample on August 12 and 13, 1980, was made at the outlet resulting in a population distribution similar to 1978 and 1979 (Figure 4). In fact, the mean size was identical to the 1978 sample.

#### Cataloging and Inventory Surveys:

The field investigations proposed for 1980 included a series of surveys of waters in the upper Nushagak River drainage. Several of the Tikchik Lakes, Tikchik River, Nuyakuk River, and major upriver Nushagak tributaries were scheduled for surveys. However, the field survey program was greatly altered due to a late breakup in the Tikchik Lakes area, as well as a summer of very inclement flying weather, large escapement of sockeye salmon into the Tikchik Lakes, and personnel changes in the area staff. Float surveys of King Salmon River and Tikchik River were accomplished.

#### King Salmon River:

A float survey was conducted from June 16-25 originating in a small pot hole lake approximately 10 miles east of Upnuk Lake and terminating at the mainstem Nushagak River, roughly 60 miles downstream (Figure 5).

The river drops 560 feet in elevation over its 60 mile course. The drop is gradual and there are no rapids. The upper 14-15 miles of river flows through rolling tundra. It is small at this point (25-50 ft. wide) mostly shallow, and is bordered by willows. Just prior to its passage through the Shotgun Hills at Mile 15, it increases in both volume and velocity. At about Mile 22, the first spruce forest is encountered. From there downstream the riverbanks are forested and it flows through lowland tundra with lots of meander, back sloughs, side channels and deep holes (especially on bends). Log debris piles and sweepers are common. The river is approximately 175 feet wide at its confluence with the Nushagak.

Ten species of fish were captured in the river during the survey. These included Arctic grayling, Arctic lamprey, burbot, chinook salmon, coho salmon, Dolly Varden, longnose sucker, rainbow trout, round whitefish and sculpins. Hook and line sampling yielded 149 grayling, 32 rainbow trout, and 21 Dolly Varden in 61 hours of angling. Electrofishing at three locations (560 seconds total) yielded catches of juvenile chinook and coho salmon. No adult salmon were observed or captured during the survey.

Table 3. Upper Naknek River Rainbow Trout Creel Census Between January 5 and April 9, 1980.

	<u>Anglers Observed</u>	<u>Anglers Checked</u>	<u>Hours Fished</u>	<u>Rainbow Caught</u>	<u>Rainbow Kept</u>	<u>Rainbow Spawners Kept</u>
January	6	6	14	4	4	4
February	153	153	421	203	129	31
March	416	391	1164	793	508	61
April	186	151	689	248	125	27
	<u>761</u>	<u>701</u>	<u>2288</u>	<u>1248</u>	<u>766</u>	<u>123</u>

Above expanded to the total of 61 open-water days

Season						
Totals	830	-	2706	1494	913	145

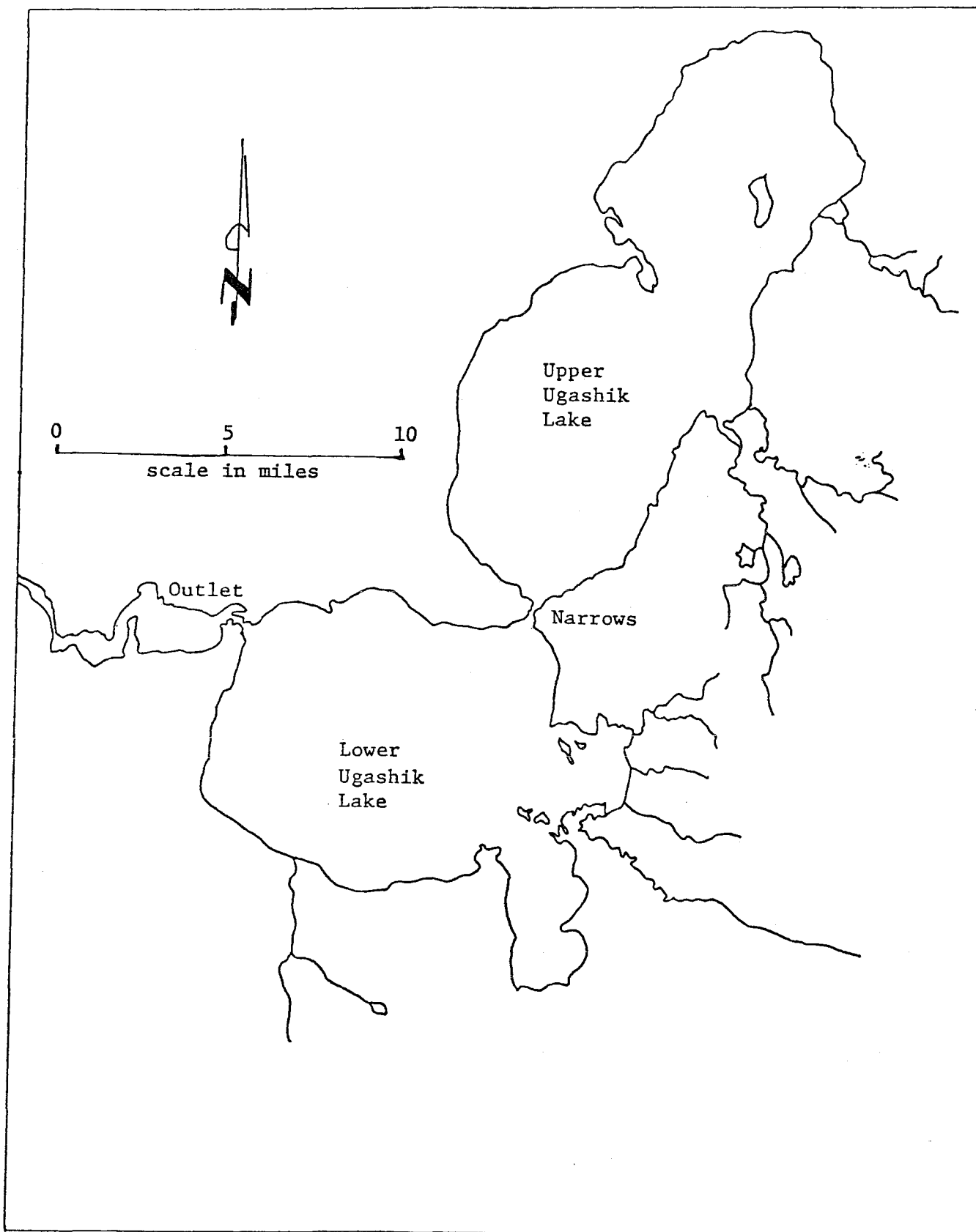


Figure 3. Upper and Lower Ugashik Lakes

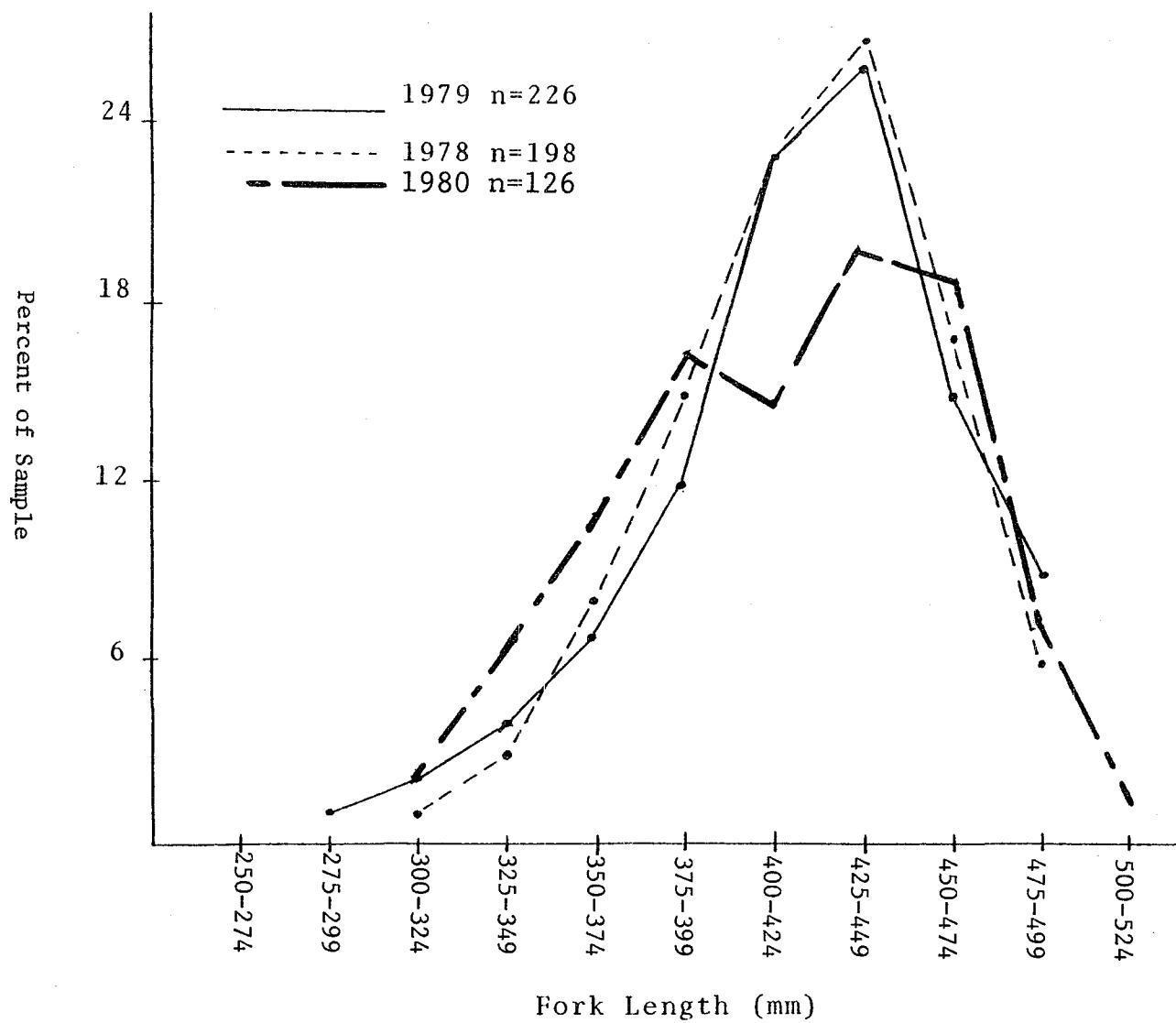


Figure 4. Length frequencies of Arctic Grayling from Lower Ugashik Outlet comparing samples taken in 1978, 1979, and 1980.

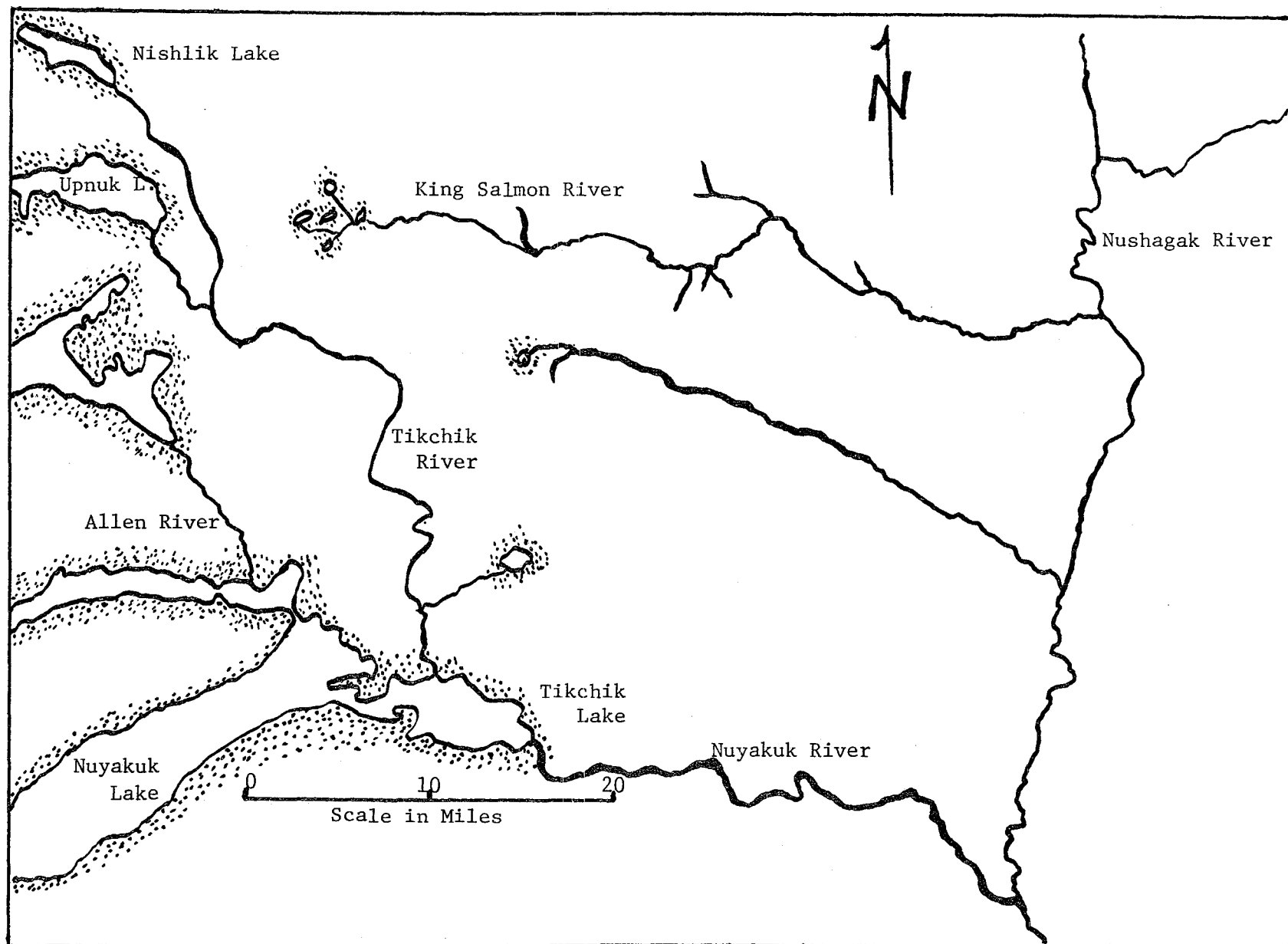


Figure 5. Upper Nushagak River Drainage



Grayling were numerous throughout the river and had apparently finished spawning prior to the survey. Table 4 presents a length frequency of sport fishes captured on hook and line in King Salmon River. Table 5 presents age-length data specifically for Arctic grayling.

Rainbow trout were either absent or very scarce in the upper 25 miles of the river and were not abundant until the lower 15-20 miles. Some were still engaged in spawning activity in this lower river area. No small juveniles were observed or caught during the trip. Table 6 presents a length distribution of those rainbow trout sampled. The largest of these was approximately 650 mm in length. Length/age distribution of those fish sampled is presented in Table 5.

Dolly Varden were caught throughout the river but were more abundant in its lower reaches. They appeared to be schooled, as several were often caught in succession. The length distribution of those caught appears in Table 4. No otoliths were collected. Almost all were uniformly skinny. One juvenile was captured while electroshocking.

The chinook and coho salmon juveniles were found in side channels downriver hiding in roots and log debris and under overhanging banks. One large school of adult round whitefish was observed in a side slough at about Mile 13 and one round whitefish fry was captured nearby.

The river characteristics are conducive to wilderness float trips and fishing. However, caution should be exercised by floaters, especially after reaching the spruce forest area, as sweepers are common and there are places where the river runs through the open forest with no defined channel. Side channels are numerous and log debris in the river could provide problems for float trips.

#### Tikchik River:

This river was float-surveyed July 11-17 from Upnuk Lake to Tikchik Lake (Figure 5), a distance of approximately 48 river miles. The river is floatable from Nishlik Lake as well as from Upnuk Lake. The latter was chosen as a starting point because it was clear, while the Nishlik fork had a substantial amount of silt.

Tikchik River drops 481 feet over its course from Upnuk Lake to Tikchik Lake. There are no rapids of consequence, although two short areas of Class II white water were encountered at Miles 18 and 20 below Upnuk Lake. At normal summer water levels, these would be hardly noticeable.

The river flows through rolling tundra from Upnuk Lake southeasterly to the forks. At its origin, it is approximately 80-90 feet wide with a velocity of 3 to 4 miles per hour. Shortly downstream, it widens and shallows and many small islands are present in midstream. There is very little cover for fishes in the Upnuk Lake fork of the river.

At the forks, the river channel nearly doubles in size and willow cover becomes more abundant. However, at the time of this survey, the trans-

Table 4. Length Frequencies of Fishes Caught on Hook and Line from King Salmon River Between June 16 and June 24, 1980.

<u>Fork Length (mm)</u>	<u>Arctic Grayling</u>	<u>Rainbow Trout</u>	<u>Dolly Varden</u>
200-224	...	...	...
225-249	1	...	...
250-274	...	...	...
275-299	3	...	...
300-324	4	...	...
325-349	23	3	...
350-374	56	1	...
375-399	39	5	4
400-424	22	3	5
425-449	1	9	7
450-474	...	5	2
475-499	...	3	3
500-524	...	...	...
525-549	...	2	...
550-574	...	1	...
Totals	149	32	21

Table 5. Average Fork Lengths by Age Group of Arctic Grayling from the King Salmon and Tikchik Rivers.

<u>Age Group</u>	<u>King Salmon River</u>		<u>Tikchik River</u>	
	<u>Sample Size</u>	<u>Mean Fork Length (mm)</u>	<u>Sample Size</u>	<u>Mean Fork Length (mm)</u>
0	...	...	1	21
1	...	...	...	...
2	...	...	...	...
3	...	...	5	273
4	2	309	20	304
5	10	335	44	357
6	23	346	42	384
7	27	371	18	404
8	38	383	20	430
9	17	391	11	450
10	2	404	2	469
Totals	119		163	

Table 6. Average Fork Lengths by Age Groups of Rainbow Trout from the King Salmon River.

	<u>Sample Size</u>	<u>Age Group (Years)</u>	<u>Mean Fork Length (mm)</u>
	4	4	370
	6	5	402
	9	6	438
	9	7	448
	2	8	504
	1	9	537
Total	31		

parency of the Nishlik fork was only 2 feet and the waters downstream were much more turbid than the Upnuk fork had been.

The river below the forks was quite braided for about 6 miles until it entered a small canyon, through which it descends for the next 16 miles. River terraces extended 75 to 150 feet above the level throughout the canyon. About 8 miles down the canyon the walls diverge, and the river resumes its braided character and continues all the way downstream to the mouth. Spruce, cottonwood and birch forests border this entire lower 27 miles of river. Large, deep holes are found on bends and at channel confluences. Back sloughs and log debris piles are numerous. The river averages 150-200 feet in width through much of its lower reaches.

Nine species of fish were found in the river during the survey. These included: Arctic grayling, burbot, chinook salmon, coho salmon, Dolly Varden, northern pike, round whitefish, sockeye salmon and sculpins. Hook and line sampling yielded: 166 Arctic grayling, 5 Dolly Varden, and 3 northern pike in 52 total hours of fishing. Electrofishing at two locations (393 seconds) yielded catches of juvenile chinook, coho, and sockeye salmon as well as sculpins, burbot and Dolly Varden fry. One grayling fry was caught by hand near the forks. Round whitefish were observed in a slow flowing side slough, but were not captured. An estimated 85,000 to 100,000 adult sockeye salmon were observed migrating upstream in the lower 20 miles of river between July 15 and 17. A large school of sockeye salmon was also present at the river mouth, and several other schools were observed in the general vicinity of the mouth on July 17. A few adult chinook salmon were also observed in the lower 20 miles of river. No rainbow trout or lake trout were caught or observed during the survey.

Grayling were caught in the lower mile of the Upnuk fork and from there they were found all the way downstream to Tikchik Lake. The length frequency of those captured is presented in Table 7. The length-age distribution of these fish compared to the King Salmon grayling appears in Table 5. Dolly Varden were caught infrequently on hook and line in the lower 30 miles of river. Table 7 presents their length distribution. Juveniles were captured with electrofishing gear at the forks and again downstream about 18 miles above the river outlet. Others were observed occasionally in side channels and back waters.

Northern Pike were all caught in back waters within the lower 15 miles of the river. Several juveniles were seen but not captured.

Chinook, sockeye and coho salmon fry were frequently observed in side channels and back waters. Chinook and sockeye salmon fry were noticeably abundant.

The river is easily floatable and it would be suitable as a first wilderness float trip for a raft or kayak enthusiast.

Peck's Creek:

Table 7. Length Frequencies of Fishes Caught on Hook and Line from  
Tikchik River Between July 11 and July 17, 1980

<u>Fork Length (mm)</u>	<u>Arctic Grayling</u>	<u>Dolly Varden</u>	<u>Northern Pike</u>
150-174	...	...	...
175-199	1	...	...
200-224	...	...	...
225-249	...	...	...
250-274	2	...	...
275-299	12	...	...
300-324	14	...	...
325-349	14	...	...
350-374	32	...	...
375-399	36	1	...
400-424	24	...	...
450-474	11	...	...
475-499	1	1	1
500-524	...	...	...
525-549	...	1	...
550-574	...	2	...
575-599	...	...	...
600-624	...	...	...
625-649	...	...	...
650-674	...	...	...
675-699	...	...	1
Totals	147	5	2



A 23-mile float survey was conducted between July 30 and August 4 on Peck's Creek (Figure 6). The starting point was a small lake adjacent to the stream approximately 23 miles upstream of the Kvichak River. A short portage of approximately 150 yards was necessary to reach the creek.

The creek is 15 to 30 feet wide throughout its length. It meanders through low, rolling tundra and has a thin corridor of spruce, birch and willows bordering it throughout its length. Velocity rarely exceeds 2 f.p.s. There are no rapids. Sweepers and shallows are the only obstacles to float navigation.

Eight species of fish were found in the creek. These included: Arctic grayling, Alaska blackfish, chinook salmon, chum salmon, ninespine stickleback, rainbow trout, sculpins and threespine stickleback. Hook and line sampling yielded: 22 rainbow trout, 4 chinook salmon and three Arctic grayling in 13 angler hours. Electrofishing (349 seconds) yielded two chinook salmon fry, one juvenile blackfish and several sticklebacks and sculpins.

All the rainbow trout, grayling, and chinook salmon caught on hook and line were taken in the upper 6 miles of the float in an area utilized by spawning chinook and chum salmon. Only one rainbow trout was seen downstream. Table 8 presents length frequencies of rainbow trout and Arctic grayling caught in Peck's Creek. A total of 89 chinook salmon spawners and 167 chum salmon spawners were seen during the float. Due to poor viewing conditions, however, this was a minimal count. All were spawning in the upper stream area.

The stream, in its upper reaches, offers recreational angling potential for rearing rainbow trout and spawning chinook salmon. It is not a highly recommended float stream due to its small size, sluggish flow and the abundance of sweepers.

#### Ruth Lake:

Ruth Lake is a tributary to the Island Arm of Becharof Lake (Figure 7). It was surveyed on June 4 and 5, 1980. Geographical characteristics, as well as basic species composition and length distribution data were objectives of the survey.

The lake is 3.75 miles long and varies in width with a maximum of 0.75 miles. Surface elevation is approximately 25 feet above sea level. It drains via Ruth River into Becharof Lake. The lake basin is bordered on the east, south and west by steep walled mountains. Run-off from these and two small inlet creeks are the water source. Bank cover around the lake is primarily alder with some willow along inlet creeks.

Seven species of fish were captured from the lake. These were: Arctic char, Dolly Varden, humpback whitefish, ninespine stickleback, round white fish, sockeye salmon and threespine stickleback. Gill-netting yielded 13 Arctic char, 19 Dolly Varden, 3 humpback whitefish, 4 round whitefish and 8 sockeye salmon smolts. The two species of sticklebacks were found in the

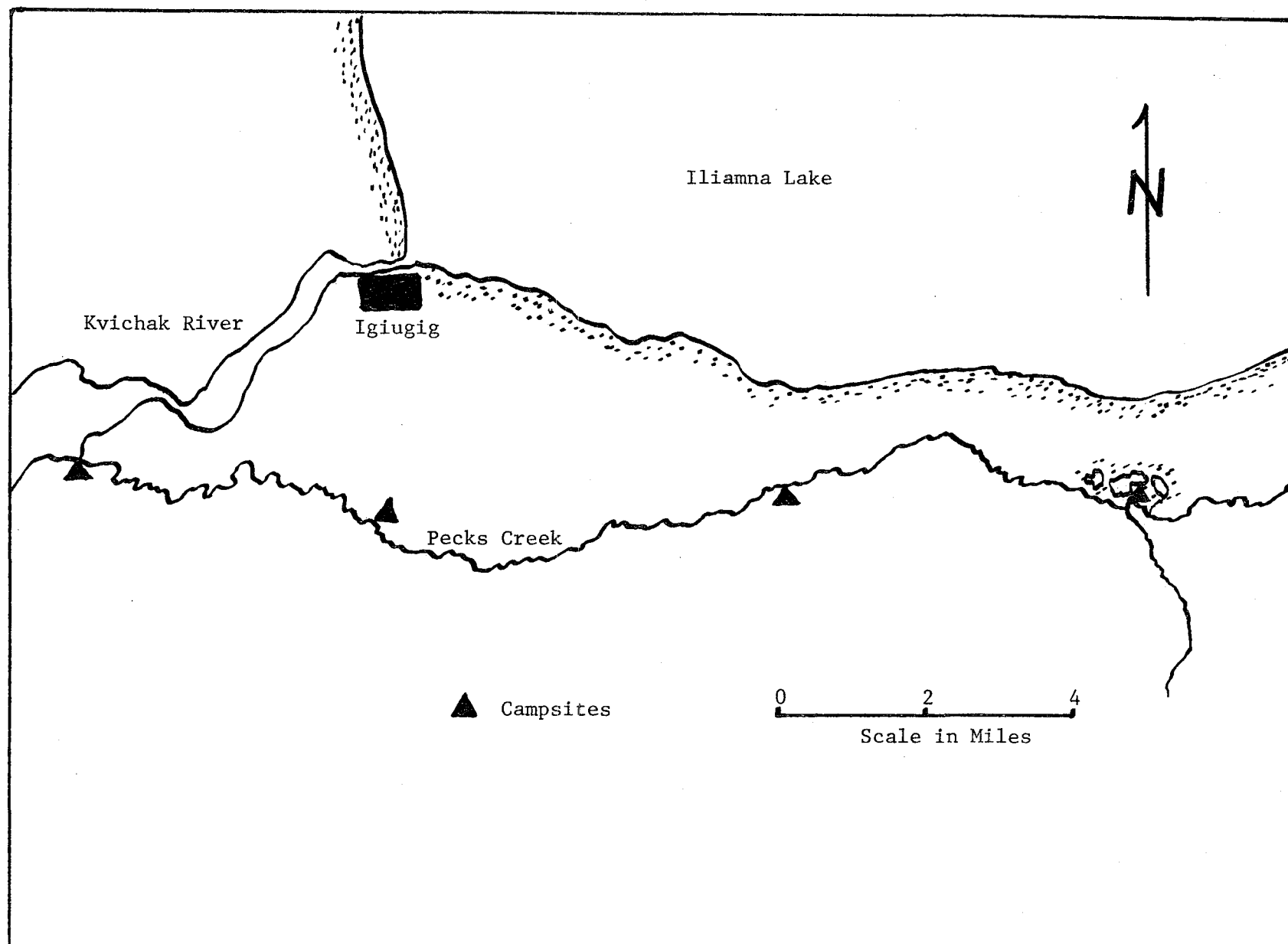


Figure 6. Pecks Creek

Table 8. Length Frequencies of Rainbow Trout and Arctic Grayling Caught on Hook and Line from Pecks Creek Between July 30 and August 4, 1980.

<u>Fork Length (mm)</u>	<u>Rainbow Trout</u>	<u>Arctic Grayling</u>
175-199	3	...
200-224	3	...
225-249	3	...
250-274	6	2
275-299	4	1
300-324	3	...
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Totals	22	3

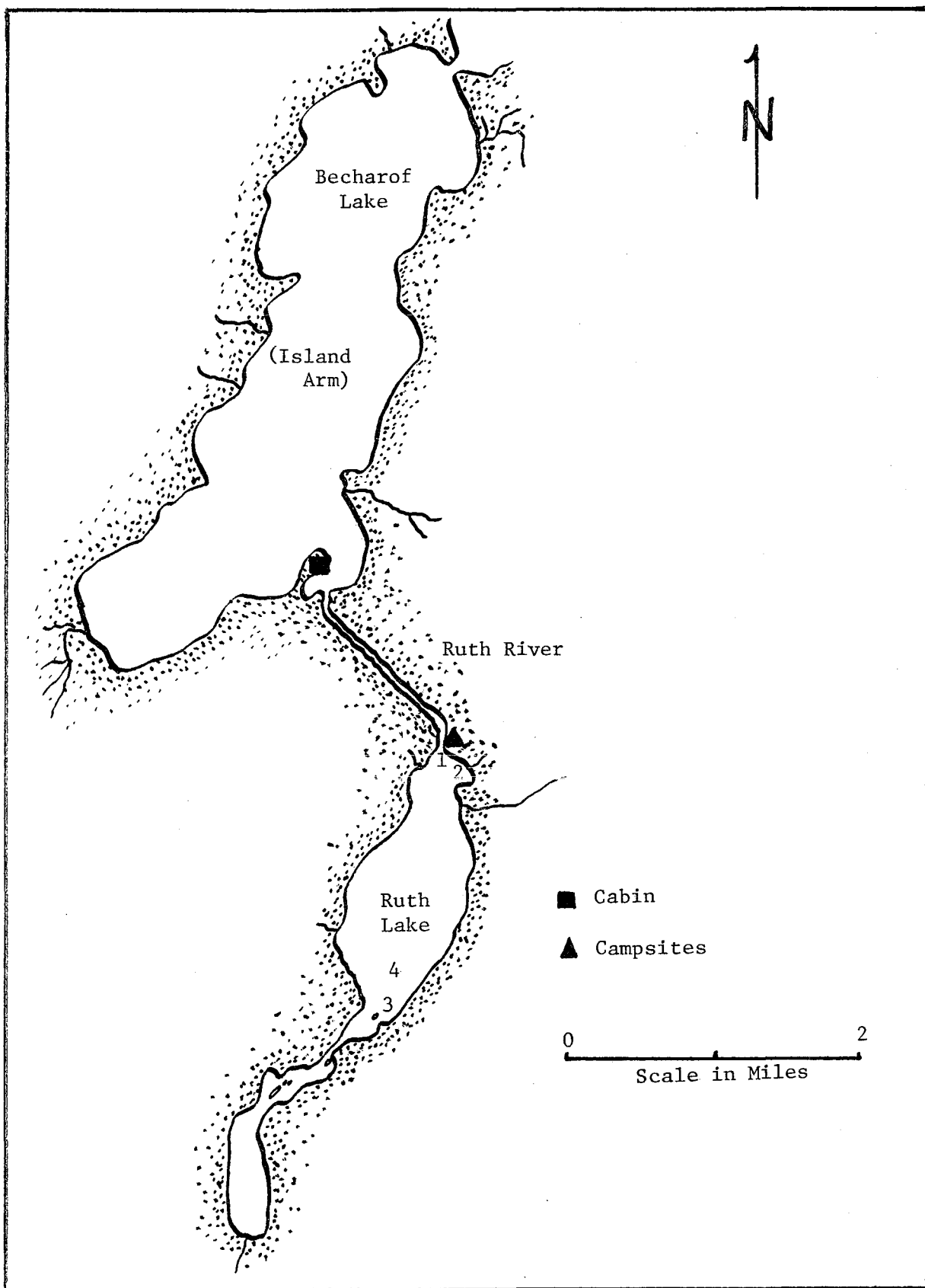


Figure 7. Ruth Lake, Showing Sample Stations, 1980.

stomachs of Arctic char and humpback whitefish. Sockeye salmon fry were observed along shore and removed from the stomachs of several char. The length distribution of the gill net samples appears in Table 9.

#### Ruth River:

June 6 was spent sampling Ruth River with hook and line. In 7 hours, a catch of four Arctic grayling and several Arctic char or Dolly Varden was achieved (Table 10). Nearly all these fish were caught in the lower one-quarter mile of river. The river level was low and bank cover was scarce, and the fish were in the runs and deeper waters of the lower river.

#### Lynx Lake and Lynx Creek:

A 4-day survey was conducted on this system between June 30 and July 3 (Figure 8). The objective was to determine species and size distribution of fishes present.

Two days were spent surveying Lynx Lake. Variable mesh monofilament gill nets were set to capture resident fishes present. Cumulatively, in 32 hours of gill net fishing, 46 Arctic char, 40 rainbow trout, 2 Arctic grayling, 2 sockeye salmon smolt and 1 northern pike were caught. Additionally, three sticklebacks, sockeye salmon fry and sculpins were observed in the lake.

The Arctic char captured ranged in fork length from 116 to 464 mm with a mean length of 299 mm (Table 11). The rainbow trout ranged in length from 122 to 371 mm with a mean of 225 mm.

Stomach contents from each of the char and rainbow trout captured were examined. The results of these examinations are presented in Table 12. Gastropods, sockeye salmon fry, Trichoptera larvae and threespine stickleback were the four food items found most commonly in char stomachs. Caddis larvae, coleopterans, caddis adults and mosquitoes were the four items found most commonly in rainbow trout stomachs.

One day was spent sampling Lynx Creek with hook and line. In 13 angler hours, approximately 1 mile of stream was sampled and a catch of 62 rainbow trout, 44 Arctic grayling and 2 Arctic char was achieved. The average catch was 8.3 fish/hour. Length distribution of the catch is presented in Table 13.

The stream appears to provide important rearing and feeding areas for both rainbow trout and Arctic grayling. It is probably also used by both for spawning. Two recently spawned-out rainbow trout were captured in the creek. Evidence (foot prints and lost fishing tackle) indicates it also is utilized by recreational anglers.

#### Discussion

The entire 1980 spring and summer field season was plagued with bad weather resulting in high, muddy waters and marginal flying conditions. Many

Table 9. Length Frequencies of Gill Net Catch Fish from Ruth Lake on June 5, 1980.

<u>Fork Length (mm)</u>	<u>Char</u>	<u>Humpback Whitefish</u>	<u>Round Whitefish</u>	<u>Sockeye Smolt</u>
100-124	...	...	...	5
125-149	3	...	...	1
150-174	1	...	...	...
175-199	1	...	...	...
200-224	7	...	...	...
225-249	4	...	1	...
250-274	3	...	...	...
275-299	2	...	...	...
300-324	1	...	1	...
325-349	1	...	1	...
350-374	2	...	...	...
375-399	2	...	...	...
400-424	1	...	1	...
425-449	1	1	...	...
450-474	2	1	...	...
475-499	...	1	...	...
500-524	...	...	...	...
525-549	...	...	...	...
550-574	...	...	...	...
575-599	...	...	...	...
600-624	...	...	...	...
625-649	1	...	...	...
Totals	32	3	4	6

Table 10. Length Frequencies of Char and Arctic Grayling Caught on Hook and Line from Ruth River on June 6, 1980.

<u>Fork Length (mm)</u>	<u>Char</u>	<u>Arctic Grayling</u>
350-374	...	...
375-399	2	2
400-424	1	...
425-449	1	1
450-474	2	1
475-499	...	...
500-524	...	...
525-549	1	...
	—	—
Totals	7	4

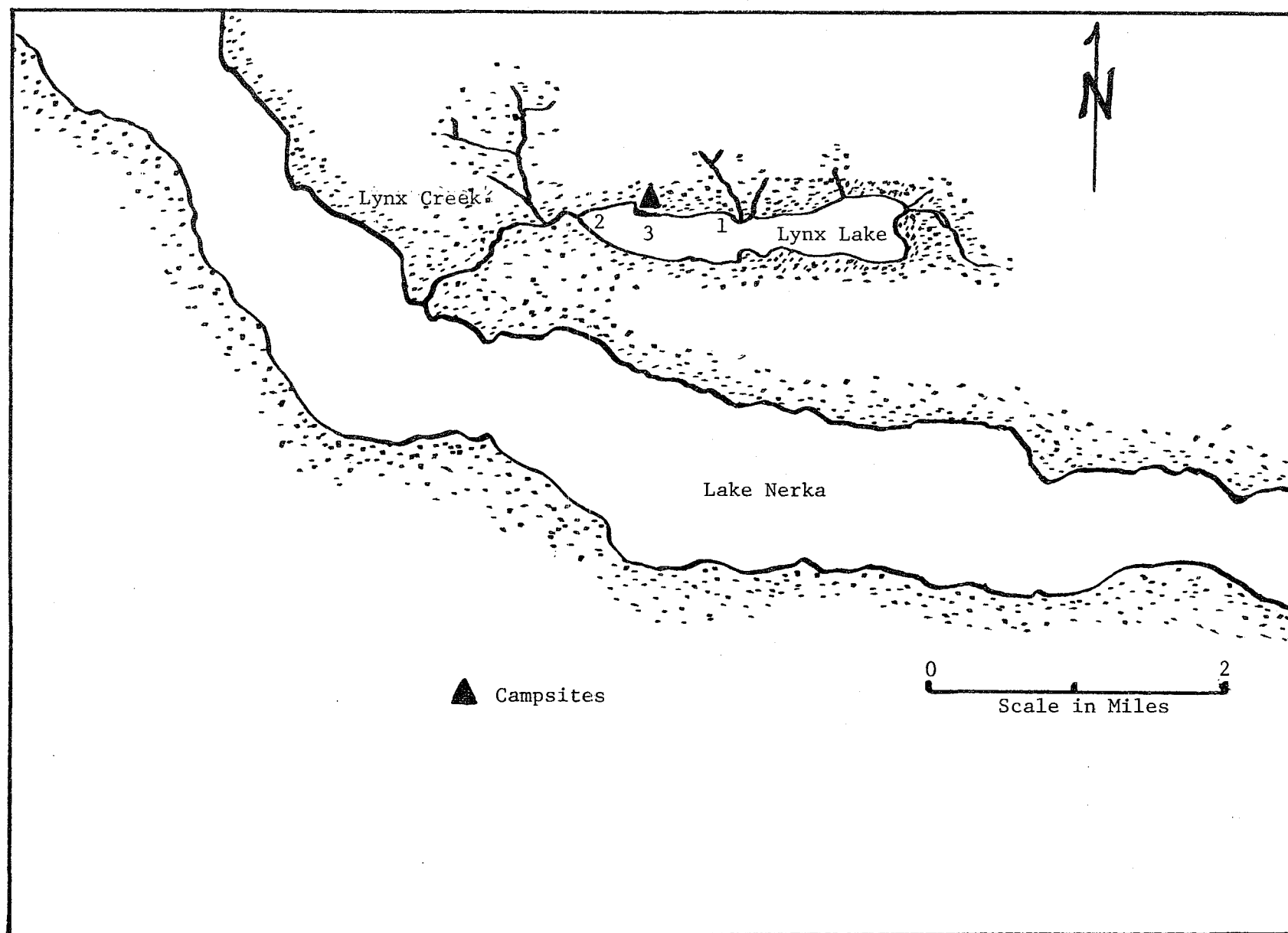


Figure 8. Lynx Lake, Showing Sample Stations, 1980.



Table 11. Length Frequencies of Gill Net Caught Arctic Char and Rainbow Trout from Lynx Lake on July 1, 1980.

<u>Fork Length (mm)</u>	<u>Arctic Char</u>	<u>Rainbow Trout</u>
100-124	5	1
125-149	2	...
150-174	...	6
175-199	1	13
200-224	3	3
225-249	2	5
250-274	3	2
275-299	2	4
300-324	4	1
325-349	6	1
350-374	8	3
375-399	5	...
400-424	3	...
425-449	1	...
450-474	1	...
Totals	46	39

Table 12. Stomach Contents of Gill Net Caught Fish, Lynx Lake July 1, 1980.

<u>Food Item</u>	<u>Arctic Char</u>		<u>Rainbow Trout</u>	
	<u>Number of Stomachs</u>	<u>% of Occurrence</u>	<u>Number of Stomachs</u>	<u>% of Occurrence</u>
Gastropods	11	24	3	8
Sockeye fry*	11	24	1	3
Threespine stickleback	5	11		
Caddis larvae	8	17	20	51
Caddis adults	2	4	7	18
Mosquito adults	...	...	5	13
Coleoptera	...	...	11	28
Hymenoptera	...	...	1	3
Terrestrial insects	...	...	3	8
Leeches	1	2	1	3
Empty	7	15	3	8
Unidentified fish	3	6	...	...
Pelecypods	2	4	1	3

\* 11 char had sockeye fry in their stomachs. The number ingested were 13, 3, 4, 2, 3, 3, 3, 2, 34, 7, and 1.

One rainbow trout had ingested 6 sockeye fry.

Table 13. Length Frequencies of Fishes Caught on Hook and Line from Lynx Creek on July 2, 1980.

<u>Fork Length (mm)</u>	<u>Rainbow Trout</u>	<u>Arctic Grayling</u>	<u>Arctic Char</u>
100-124	...	...	...
125-149	2	...	...
150-174	10	1	...
175-199	7	8	1
200-224	9	3	...
225-249	11	9	...
250-274	9	10	...
275-299	7	5	1
300-324	3	2	...
325-349	1	2	...
350-374	1	2	...
375-399	1	1	...
400-424	...	1	...
425-449	...	...	...
450-474	1	...	...
475-499	...	...	...
Totals	62	44	2

activities planned were either delayed or cancelled. In addition, a decision was made to transfer one position to Soldotna, Alaska, leaving only one person in the King Salmon Management Area after September 1, 1980.

No creel census for sport-caught chinook salmon in the Naknek River was conducted in 1980 due to funding constraints. The chinook run, although weak at first, increased in early July and lasted into early August. No estimates of spawning chinook salmon were made due to the poor water conditions.

Similarly, the only counts of peak spawning rainbow trout counts were made in Brooks River in the Naknek system and Lower Talarik Creek in the Kvichak drainage. Both counts were near the average when compared to the previous 7 years' data.

The relatively mild winter afforded a good opportunity to census the Upper Naknek River rainbow trout fishery particularly on large prespawning adults. Anglers followed the traditional pattern of releasing large numbers of fish. Overall, just over one rainbow trout per angler was taken for the 61 days of fishing and only 145 rainbow trout spawners were retained.

The 2-day census of Arctic grayling at Lower Ugashik Outlet produced a population structure almost identical to previous years. The mean size was identical to 1978, and within 5 mm of 1979 year's. Several grayling over 500 mm in fork length were captured this year.

Basic surveys on five systems in the area continued to expand our knowledge of existing and potential sport fishing waters and give basis for better decisions relating to Bristol Bay.

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Annual Performance Report for

INVENTORY AND CATALOGING OF SPORT FISH AND  
SPORT FISH WATERS OF THE COPPER RIVER,  
PRINCE WILLIAM SOUND, AND UPPER SUSITNA RIVER DRAINAGES

by

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ALASKA DEPARTMENT OF FISH AND GAME  
*Ronald O. Skoog, Commissioner*

SPORT FISH DIVISION  
*Rupert E. Andrews, Director*

## RESEARCH PROJECT SEGMENT

State: ALASKA Name: Sport Fish Investigations  
of Alaska

Project No.: F-9-13

Study No.: G-I Study Title: INVENTORY AND CATALOGING

Job No.: G-I-F Job Title: Inventory and Cataloging of  
Sport Fish and Sport Fish  
Waters of the Copper River,  
Prince William Sound, and  
the Upper Susitna River  
Drainages.

Cooperators: Fred T. Williams and Wilson D. Potterville

Period Covered: July 1, 1980 to June 30, 1981.

## ABSTRACT

Test netting in nine managed lakes was conducted. The results from Tolsona Lake showed a serious decline in the grayling population. The net frequency of 0.52 Arctic grayling, Thymallus arcticus (Pallas) was the second lowest since test netting was begun in 1963.

Population estimates were made on Swanson River rainbow trout, Salmo gairdneri Richardson, which were stocked in Tex Smith and Crater Lakes in 1979. The survival was determined to be 40 percent (N = 1,881) and 41 percent (N = 1,651), respectively.

A creel census on the Gulkana River was conducted for the sixth consecutive year. In 1980 a total of 7,797 anglers caught 1,320 chinook salmon, Onocorhynchus tshawytscha (Walbaum), 676 sockeye salmon, Oncorhynchus nerka (Walbaum), 753 rainbow trout and 5,719 grayling. Angler participation was almost exactly the same as in 1979, while the catch of chinook salmon dropped 33 percent. The reduced catch was due to poor fishing conditions in the middle and lower river sections.

Measurements from 137 sport-caught grayling from the Gulkana River compared favorably with data collected in 1968, 1978 and 1979. The average length of grayling measured in 1980 was only 5 millimeters less than those measured in 1979 and 22 millimeters less than those measured in 1968.

Stream surveys in the Valdez area revealed a better than average escapement for an even year, which are historically lower than odd years. Totals of 1,668 pink salmon, Oncorhynchus gorbuscha (Walbaum), 2,521 chum salmon, Oncorhynchus keta (Walbaum), 6,801 coho salmon, Oncorhynchus kisutch (Walbaum), and 1,000 sockeye salmon were counted.

Length data from sport-caught round whitefish, Prosopium cylindraceum (Pallas) and broad whitefish, Coregonus nasus (Pallas), from the Slana River showed insignificant change when compared to data collected during 9 previous years.

Thirty-six hundred Age 0+ coho salmon trapped in Corbin Creek (tributary to Robe Lake) in May and July were fin-clipped. Later trapping in Robe Lake and Robe River took none of these marked fish until December which indicates the young coho spent considerable rearing time in the parent stream rather than in the lake.

#### BACKGROUND

The Copper River Basin, Upper Susitna River drainage and northeast Prince William Sound areas are typical of many within the state, in that recreational angling opportunity is provided by a number of anadromous species and also by both indigenous and stocked lake and stream dwelling fishes.

The stream dwelling species most often taken by sport anglers are Arctic grayling, Dolly Varden, chinook and sockeye salmon.

The majority of angling pressure is on waters adjacent to the highway system. This area, including the Copper Basin, Cordova and Valdez, has over 650 miles of the Alaska Highway System. A map of the study area is presented in Figure 1.

The principal lake dwelling species caught by recreational anglers in the Glennallen area are the indigenous species, burbot, lake trout and Arctic grayling; and the introduced species, coho salmon and rainbow trout.

The Cordova (Prince William Sound) area is primarily commercial fishing oriented. Access to this area is only by boat or aircraft. Sport fishing effort in salt water is light and primarily for coho salmon, chinook salmon and halibut. Fresh water angling is directed toward coho salmon, cutthroat trout, sockeye salmon, Dolly Varden and stocked grayling. A significant increase in sport fishing effort is not anticipated until access to and within the area improves.

The limited Cordova area road system (approximately 60 miles) affords access to several lakes and streams with Arctic grayling, cutthroat trout and coho salmon populations.

Most of the recreational angling opportunities in the Valdez area are provided by saltwater fisheries directed toward anadromous species, including pink salmon, chum salmon, coho salmon, and bottom fish. All



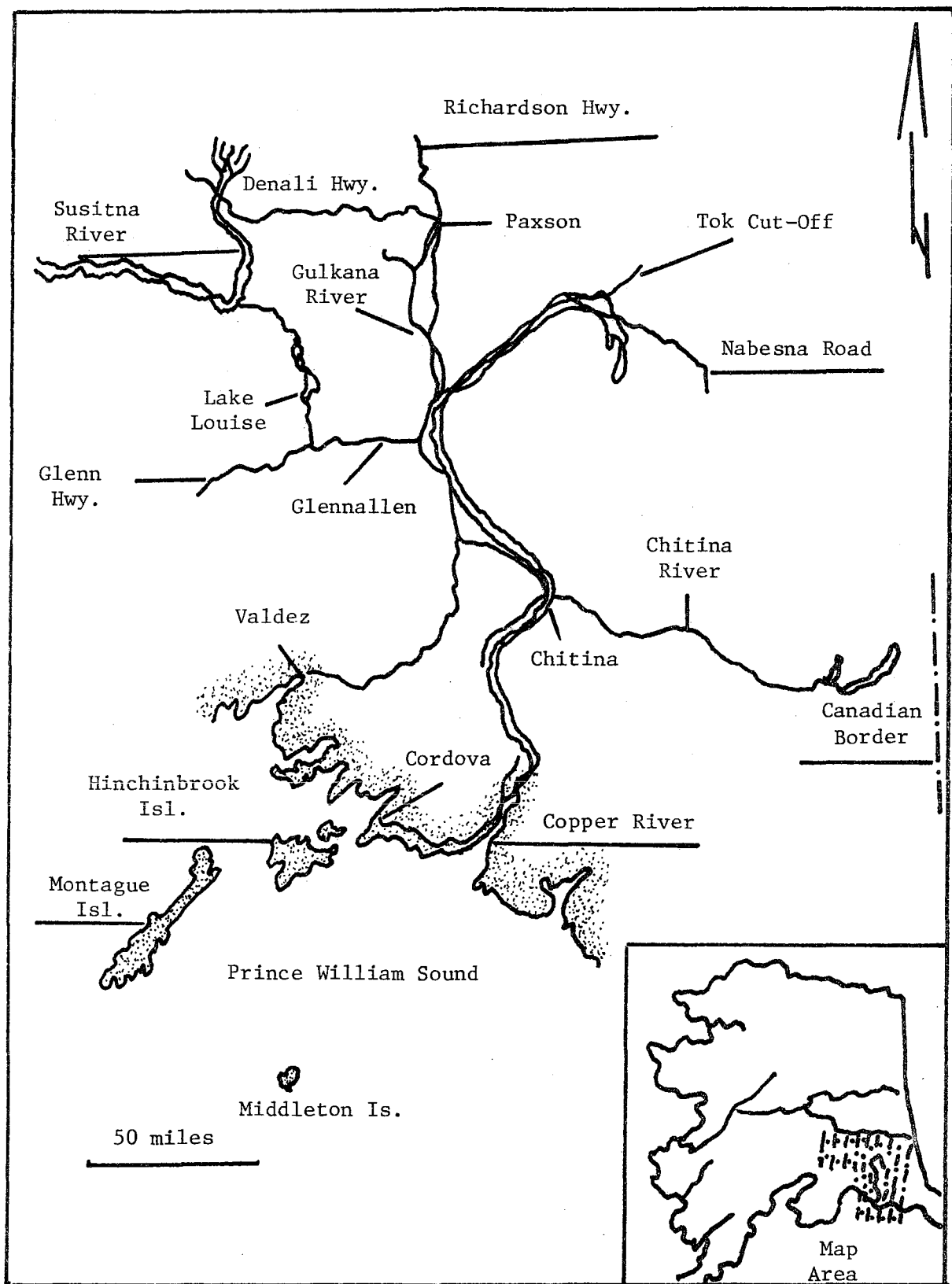


Figure 1. Map of the Study Area.

freshwater drainages into Valdez Arm are closed to salmon fishing, but Dolly Varden are taken in fair numbers.

The present population of Valdez is estimated to be 4,500. If construction of the Alpetco plant at Valdez begins in 1981, there will be an estimated 2,800 people employed. This large work force, plus their dependents, will be reflected in an increase in fishing effort.

It is expected that Valdez will continue to grow and become more industrialized in the future. This trend in growth may have a detrimental effect on the fisheries. Suitable land for homes and businesses is limited in the Valdez area and already there are trailer courts and housing projects adjacent to or bisected by salmon spawning streams. Spawning and rearing areas for fish may be reduced, polluted and, possibly, ground water supplies will be affected. Presently the fish stocks are generally in good condition, and there appears to be no need for more restrictive angling regulations at this time. However, with an increase in the human population, increased harassment of spawning salmon can be expected, and increased monitoring of the fisheries and the environment will be necessary to protect the resource.

Activities reported in the following text are directed toward the research and subsequent management needs of these species and toward the attainment of desirable levels of angler utilization. The species of fish discussed in this report are listed in Table 1.

#### RECOMMENDATIONS

1. The study of anadromous fish stocks in the Upper Copper River drainage and Prince William Sound should be continued to determine timing and magnitude of runs.
2. Monitoring of seismic activities, road and bridge construction, pipeline maintenance, and other land uses should be continued to afford maximum protection to the fishery resource and habitat.
3. Continued evaluation should be made of experimental fish stocking to determine the species and strains of fish best suited for individual lakes. This can be done by comparing the survival and growth of various strains of rainbow trout and coho salmon.
4. Cataloging and inventory surveys should be continued on a limited basis as required to increase our knowledge of the fisheries resources in the area and provide more fishing opportunities for the angler.
5. Investigations of grayling in the Gulkana River should be continued to determine age-length composition of sport-caught fish and any deterioration of the fishery.

Table 1. List of Common Names, Scientific Names and Abbreviations.

Common Name	Scientific Name and Author	Abbreviation
Pink salmon	<u>Onchorhynchus gorbuscha</u> (Walbaum)	PS
Chinook salmon	<u>Oncorhynchus tshawytscha</u> (Walbaum)	KS
Chum salmon	<u>Oncorhynchus keta</u> (Walbaum)	CS
Coho salmon	<u>Oncorhynchus kisutch</u> (Walbaum)	SS
Sockeye salmon	<u>Oncorhynchus nerka</u> (Walbaum)	RS
Dolly Varden	<u>Salvelinus malma</u> (Walbaum)	DV
Lake trout	<u>Salvelinus namaycush</u> (Walbaum)	LT
Rainbow trout	<u>Salmo gairdneri</u> Richardson	RT
Threespine stickleback	<u>Gasterosteus aculeatus</u> Linnaeus	TST
Burbot	<u>Lota lota</u> (Linnaeus)	BB
Sucker	<u>Catostomus catostomus</u> (Forster)	S
Arctic grayling	<u>Thymallus arcticus</u> (Pallas)	GR
Round whitefish	<u>Prosopium cylindraceum</u> (Pallas)	WF
Broad whitefish	<u>Coregonus nasus</u> (Pallas)	WF

6. Investigations of waters in the Valdez area should continue as required to determine the feasibility of proposed rehabilitation and/or enhancement programs of salmon stocks. Cooperative work with the Valdez Fisheries Development Association should be continued.
7. The creel census program on the Gulkana River should be discontinued at this time. This creel census has been conducted annually since 1975 and the effort and harvest is very close to the data received from the Statewide Harvest Surveys.
8. A creel census program should be initiated for the Valdez area when funds are available. Preferably the census should be conducted during an odd year since the pink and chum runs are much higher in those years. The last two creel census programs were conducted during even (low run) years.
9. The degree of monitoring of the whitefish fishery in the Slana River should be increased. Private landowners who control access to the fishery have expressed concern about over-exploitation of the resources.

#### OBJECTIVES

1. To determine the magnitude of various fish stocks and develop plans for their enhancement.
2. To determine stocking measures, formulate recommendations for the management of area waters and direct the course of future studies.
3. To determine the environmental characteristics of the existing and potential recreational fishing waters of the job area and, where practical, obtain estimates of the sport fish harvest and angler participation rates.
4. To determine the effects of proposed construction programs on fisheries and fisheries environment, and assist in determining the current status of public access and access needs to the recreational fishing waters.

#### TECHNIQUES USED

Standard techniques described by Williams (1971) were used in lake and stream surveys and for collection of fish samples. Each test netting was conducted for a minimum of 16 hours, including an overnight period. Salmon enumerations were made from aircraft and on foot. All measurements of fish length were from snout to fork of tail. Fyke nets were also used for fish collection.

The Gulkana River was divided into three sections for purposes of creel census, based on accessibility. These sections were (1) lower, from the mouth upstream for a distance of 2 miles; (2) middle, in the vicinity of Richardson Highway bridge; and (3) upper, from the mouth of Sourdough Creek upstream to the West Fork of the Gulkana River. The middle section was subdivided into the Bridge and Glenn Rich Pit Sections.

During the creel census on the Gulkana River, the fishing day was determined to be between the hours of 8:00 a.m. and midnight, and was further divided into four separate 4-hour periods. Weekends and holidays were each censused during two randomly chosen 4-hour periods. Two randomly chosen weekdays per week were each censused during one randomly selected 4-hour period. This creel census schedule was applied to all three sections.

During Robe Lake investigations, minnow traps were used to collect juvenile salmon. Dissolved oxygen concentrations were determined using a Hach Kit with powder pillows.

Baited minnow traps were used to capture juvenile rainbow trout from Tex Smith and Crater Lakes. The Schnabel method was used for population estimates.

## FINDINGS

### Population Sampling, Managed Lakes

Hunter Lake, near Mile 122, Glenn Highway, and Jack Lake, Mile 28 Nabesna, were test netted in 1980 to determine their potential as egg take sites (Table 2). In Hunter Lake test nets were fished a total of 169 net hours and only 76 grayling were captured for a net frequency of 0.45 fish per hour. The test netting was done once in July and twice during August. It appears the grayling population may be no better than in Tolsona Lake and the potential as an egg take site is poor. In addition, access would be by ATV equipment, which always presents potential problems.

Eighty-eight test hours on Jack Lake captured 40 grayling for a net frequency of 0.45 fish per hour. Sampling at Jack Lake was not as complete as desired, so it will be checked again in the spring of 1981.

### Tolsona Lake Grayling

Tolsona Lake has a surface area of 320 acres and a maximum depth of 13 feet. This eutrophic lake is fed by three small streams. Two of the inlets are intermittent and the major one, Bessie Creek, generally runs all summer. This stream freezes solid in late winter.

Bessie Creek, tributary to Tolsona Lake, has been used as a source of grayling eggs since 1965. Until 1979 the average take of eggs has been 1,000,000, which satisfied the hatchery requirements. This required stripping approximately 200-250 females depending on size and fecundity.

Table 2. Gill Net Summary, Previously Surveyed Lakes, 1980.

Name	Location	Number of fish	Species	Length Range (mm)	Mean Length (mm)	Frequency**	Percent Composition
Arizona	T8N R7W S11	25	GR	114-356	284	1.04	100
Bell	T8N R7W S22	23	LT	425-645	538	.48	21
		4	GR	190-195	193	.08	4
		60	WF	180-470	234	1.25	56
		20	SK	100-465	372	.42	19
Caribou	T5N R7W S16	34	GR	216-324	259	.71	100
Elbow	T5N R7W S22	80	GR	102-343	181	1.67	100
Hunter	T20N R12E S1	76	GR	130-410	282	.45	100
Jack	T9N R11E S36	40	GR	180-390	235	.45	49.5
		36	WF	240-470	392	.41	44.5
		3	LT	455-615	557	.03	4
		2	BB	370-545	458	.02	2
Snowshoe	T3N R8W S16	20	GR	145-325	260	.26	18
		74	WF	205-380	263	.95	65
		1	BB	300	300	.01	1
		18	SK	125-460	339	.23	16
Tolsona	T8N R7W S11	23	GR	170-380	242	.52	31
		51	SK	160-410	266	1.16	68
		1	BB	130	130	.02	1

Table 2. (Cont.) Gill Net Summary, Previously Surveyed Lakes, 1980.

Name	Location	Number of Fish	Species	Length Range (mm)	Mean Length (mm)	Frequency**	Percent Composition
Tom's	T6N R6W S17	2	BB	210-430	320	.04	03
		13	GR	115-215	151	.29	16
		28	WF	150-405	310	.62	35
		36	SK	95-535	3.4	.80	46

\* Species

GR - Grayling  
WF - Whitefish  
LT - Lake trout  
BB - Burbot  
SK - Sucker

\*\* Frequency is number of fish per net hour.

In the past it has been necessary to trap and retain only a portion of the spawning run to satisfy egg requirements (Table 3). In 1979 the entire run was trapped and only 220 fish were captured. In 1980 the entire run was also trapped and only 26 grayling were taken.

Test netting has been conducted at Tolsona Lake since 1963 (Table 3). The net frequencies are shown in Table 3 and show considerable variation from year to year; however, during the years 1970 through 1978 the catch rate was considered acceptable. In 1979 and 1980 trapping and test netting showed a definite decline in grayling numbers.

In 1979, 206 adult grayling trapped at Bessie Creek were marked by removal of the adipose fin. Approximately two months later the lake was test netted. Seventeen of the 40 grayling taken were marked fish (42%). During trapping operations in Bessie Creek in 1980, 17 of the 26 adults were marked fish. In 1980 the lake was again test netted and four of the 23 grayling captured were marked fish (17%). Based on the recovery of marked fish and the number of fish trapped, it is apparent that the grayling population is very low.

Dissolved oxygen determinations (D.O.) have been conducted at Tolsona since 1963 (Table 3). Historically Tolsona Lake has been noted for low winter D.O.'s. These values show considerable variance from year to year. In 1971, dissolved oxygen determinations taken in March showed a low of 0.5 ppm at a depth of 5 feet. That winter there was a partial winter kill on grayling, suckers and burbot. No egg take was made that spring. Since 1971 winter dissolved oxygen has been within the survival limit for grayling and no other winter kills have been noted.

From 1968 to 1978 at least 75,000 grayling have been stocked annually in Tolsona Lake. The last time it was stocked was in 1979 with approximately 35,000 which appeared to be in very poor condition. Survival of this plant was probably very poor.

In 1975 the test net frequency for suckers in Tolsona Lake was 11.1 fish per net hour. This was a tremendous increase from the 17-year average of 1.88 fish per net hour. It is interesting to note that the 17-year average test net frequency for grayling is 1.89 fish per net hour.

Following the population boom of suckers, a sucker removal program was started in 1976, which consisted of trapping adults as they entered Bessie Creek. By 1980 the net frequency for suckers was down to 1.16 fish per net hour. However, in 1980 the net frequency for grayling was also down to 0.52 per net hour.

There are no apparent reasons for the disastrous decline of grayling in 1979. All of the obvious factors appear to be normal and similar to past data.



Table 3. Dissolved Oxygen Concentrations and Grayling Population  
Data for Tolsona Lake, 1963-1980.

Year	Lowest* D.O.'s PPM	Grayling Stocked	Grayling Trapped** At Bessie Cr.	Net Freq.*** for Grayling
1963	6.5			0.56
1964	3.5			
1965	4.0		2000+	2.3
1966	3.5		925	4.27
1967	4.0		671	0.14
1968	1.5	100,000	204	0.50
1969	1.0	175,000	Creek dry	1.05
1970	2.5	100,000	480	2.18
1971	0.5		Didn't trap	1.66
1972	3.0	180,000	416	2.10
1973	1.5	75,000	700	2.74
1974	1.0		500	2.25
1975	7.0	80,000	1000+	2.25
1976	1.0	280,000	750	2.48
1977	1.0	80,000	774	4.0
1978	2.0	80,000	636	2.47
1979	5.0	35,000	220	0.74
1980	5.0		26	0.52

\* Dissolved oxygen determinations were taken at a depth of 5 feet during the month of March.

\*\* The number of fish trapped does not necessarily mean that is the total run, since in some years only enough fish for egg requirements were trapped.

\*\*\* Net frequency is the number of grayling taken per net hour. Test netting is usually done in June and July.

### Swanson River Rainbow Population Estimates

Two area lakes with similar limnological characteristics were chosen for survival population estimates of planted Swanson River rainbow trout. Both lakes were planted in October of 1979 with rainbow trout at 671/lb. Tex Smith Lake with 17 surface acres received 4,697 rainbow trout for a total of 293 fish per surface acre. Crater Lake with 16 surface acres received 4,026 for a total of 252 fish per surface acre. Both lakes originally had outlets; however, an outlet control structure was erected in Tex Smith in 1975 (Williams 1976) and the Crater Lake outlet was modified with a French drain in 1979.

Prior to stocking Swanson River rainbow trout, Tex Smith and Crater Lakes were test netted. In Tex Smith Lake, 134 test net hours caught only 10 coho salmon for a frequency of .07 fish per net hour. These coho salmon were the result of a 1975 stocking. In addition, two fyke nets were fished for 96 hours and failed to catch any fish. Crater Lake was test netted a total of 133 hours and 91 coho salmon were caught for a frequency of .68 fish per net hour. One rainbow trout was also captured.

Baited double entrance minnow traps were used for 522 hours and 384 hours for capture and recapture in Crater and Tex Smith Lakes, respectively. Captured fish were marked by an adipose fin clip, then released. The Schnabel method of estimating populations was used and population estimations are shown in Table 4. Although Crater Lake had a much higher population of coho salmon than Tex Smith Lake, the percent survival of the rainbow trout was almost the same at 41% and 40%, respectively.

Growth rates differed in the two lakes. In Tex Smith Lake, which had a slightly lower survival of rainbow trout and a smaller population of residual coho salmon, the fingerling rainbow trout ranged from 80 to 155 mm fork length and averaged 114 mm. Crater Lake had a slightly higher survival competing with a much higher remanent population of coho salmon. Fingerling rainbow trout trapped during this study ranged from 60 to 115 mm fork length and averaged 95 mm.

### Gulkana River Creel Census

Table 5 shows the results of the 1980 creel census on the Gulkana River compared to 1978 and 1979 data. There was no significant increase overall in angler-days of effort from 1979 to 1980, however, there was a 38% decrease in the middle section, a 17% increase in the lower section and a 38% increase in the upper section (Figure 2).

Although the effort was higher in 1980 in the lower river section, the hours fished per angler decreased to 1.35 hours from 5.02 hours in 1979 and the catch per angler dropped from 0.276 to 0.049. These decreases were a result of high and muddy water which made fishing extremely difficult in the fly-fishing-only section.

Table 4. Swanson Rainbow Trout Population Estimates in Selected Study Lakes in the Copper River Basin, 1980.

	Date Stocked	# Stocked	Population Estimate	Survival	95% Confidence Level	
					Estimate	Survival
Tex Smith	10/10/79	4,697	1,881	40%	1,395-2,528	30% - 54%
Crater	10/10/79	4,026	1,651	41%	1,324-2,058	30% - 51%

Table 5. Gulkana River Sport Harvest and Effort Estimates, 1978-1980.

	Lower Section			Middle Section			Upper Section			All Sections		
	1978	1979	1980	1978	1979	1980	1978	1979	1980	1978	1979	1980
No. of anglers	942	1,182	1,384	1,613	4,232	2,625	2,510	2,364	3,784	5,965	7,778	7,797
No. of hours	5,326	5,937	1,864	5,362	17,920	1,949	16,718			27,406		
Hours per angler	5.65	5.02	1.35	3.32	4.23	4.55	6.66			5.41		
Catch												
Chinook	112	256	60	64	1,292	490	253	412	770	429	1,960	1,320
Sockeye	132	70	8	26	36	20	243	32	648	401	138	676
Rainbow trout	15	0	0	38	40	27	228	100	728	281	140	753
Grayling	57	52	0	101	204	9	2,058	1,888	5,710	2,216	2,074	5,719
Catch per angler												
Chinook	0.119	0.217	0.043	0.040	0.305	0.187	0.101	0.174	0.203	0.085	0.252	0.169
Sockeye	0.140	0.059	0.006	0.016	0.009	0.008	0.097	0.014	0.171	0.079	0.018	0.087
Total salmon	0.259	0.276	0.049	0.056	0.314	0.195	0.198	0.188	0.374	0.164	0.270	0.256
Catch per angler hour												
Chinook	0.021	0.043	0.032	0.012	0.072	0.041	0.015			0.016		
Sockeye	0.025	0.012	0.004	0.005	0.002	0.002	0.015			0.015		
Total salmon	0.046	0.055	0.036	0.017	0.074	0.043	0.030			0.031		

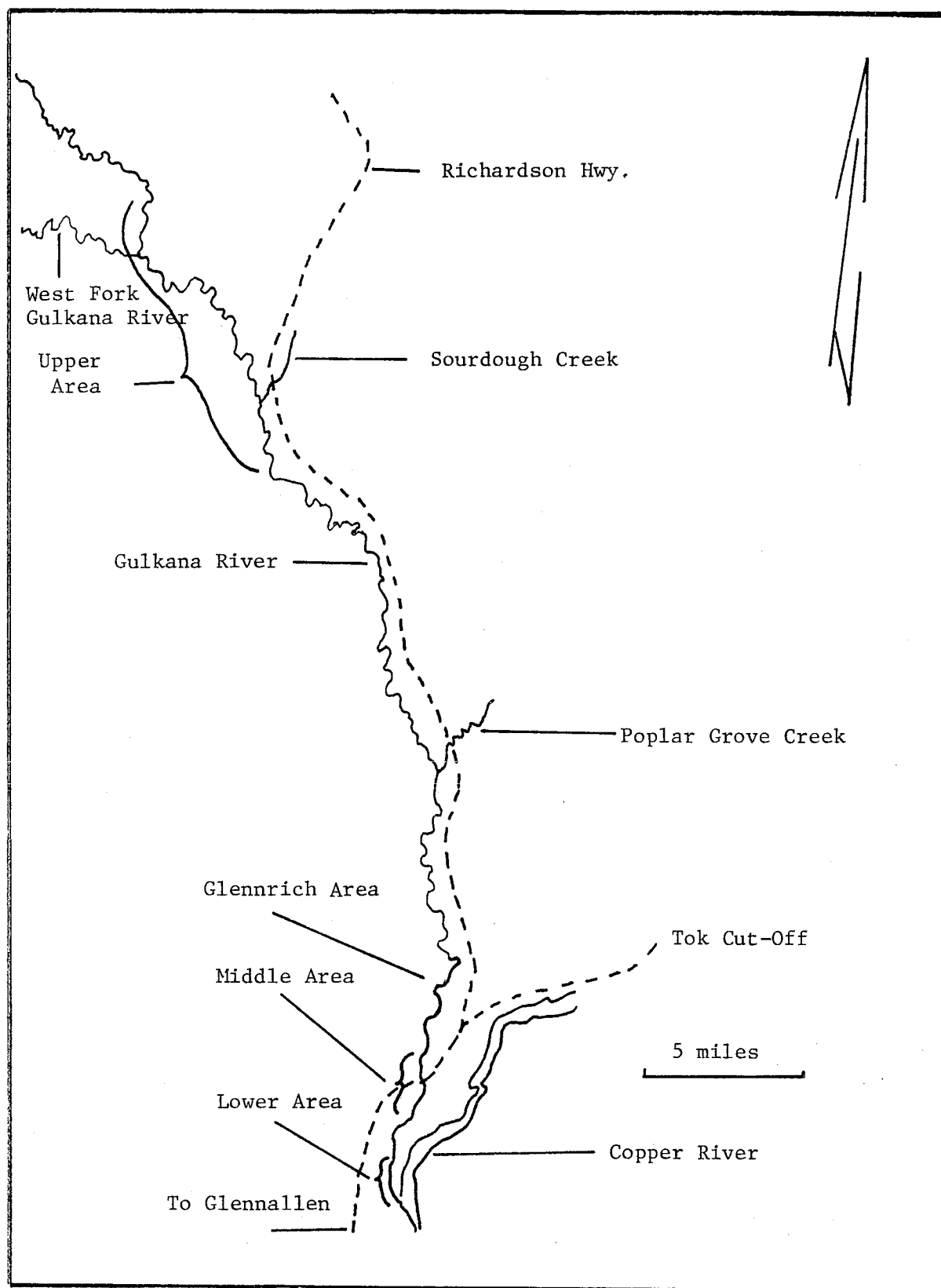


Figure 2. Gulkana River Creel Census Areas.

The large decrease in anglers, effort and harvest in the middle section was also due to poor fishing conditions even though conventional fishing methods (not limited to flies) are allowed there.

In the upper section there was an 87% increase in the catch of chinook salmon and a 19.25% increase in the catch of sockeye salmon over 1979. This was because of more angler effort and a much better run of salmon.

In the upper area the power boat anglers took the majority of salmon (Table 6). These anglers put their boats in the water at Sourdough and travel upstream to the confluence of the West Fork and the main stem of the Gulkana River. During rainy weather almost all of the muddy water comes from the West Fork and fishing is generally good in the main Gulkana River above the confluence because it is clear.

There was an 82% increase in floater days and a 198% increase in their catch of grayling. Floaters generally keep relatively few of the grayling caught. This was true again this year when they kept only 922 (19%) of an estimated 4,828 caught. Float fishermen traditionally are more interested in grayling but in 1980 they took a record 200 chinook salmon.

The residency of anglers who fished the Gulkana River from 1976 through 1980 is shown in Table 7. The only major change was the higher percent of anglers who were from the Fairbanks area. Anchorage anglers more often fish the lower and middle sections, while the Fairbanks fishermen favor the upper section. The lower and middle sections are at least 30 miles closer to Anchorage than the upper section.

Table 8 shows lengths of sport-caught chinook salmon from the Gulkana River 1972-1980. There appears to be a slight decrease in the average fish size since 1977; however, this is not considered to be significant.

Angling effort in the Gulkana River has increased annually since the creel census was started in 1975 (Table 9). The catch of chinook and sockeye salmon has fluctuated considerably during the same period. This is due to (1) water conditions; (2) subsistence and commercial catch; and (3) changes in commercial fish regulations from time to time.

#### Chinook Salmon Escapement

Escapement data from chinook salmon from index streams in the upper Copper River drainage is presented in Table 10. These aerial counts were made by personnel of the Commercial Fish and Sport Fish Divisions.

These are actual counts and not estimates. Counting conditions in 1980 were fair to poor because of rain, overcast and muddy water.

The Gulkana River is the most important chinook salmon stream in the Copper River drainage. In 1980 only that portion of the system above the confluence of the West Fork was countable. Based on the limited count, it is

Table 6. 1979 and 1980 Gulkana River Harvest and Effort Estimates for the Upper River Section by Shore, Float, and Power Boat Anglers.

	<u>1979</u>	<u>1980</u>
<u>Float Anglers</u>		
Angler Days	768	1,396
Chinook salmon	8	200
Sockeye salmon	0	70
Grayling	1,618 caught, 340 kept	4,828 caught, 922 kept
Rainbow trout	70 caught, 12 kept	628 caught, 356 kept
<u>Power Boat Anglers</u>		
Angler Days	1,184	2,222
Chinook salmon	382	568
Sockeye salmon	32	578
Grayling	200	862 caught, 328 kept
Rainbow trout	30	98 caught, 60 kept
<u>Bank Anglers</u>		
Angler Days	412	166
Chinook salmon	12	2
Sockeye salmon	0	0
Grayling	70	20
Rainbow trout	2	0

Table 7. Residency of Anglers Fishing the Gulkana River in 1976-1980.

	1976	1977	1978	1979	1980
No. of Alaska Communities Represented	15	17	24	21	16
No. of Other States Represented	20	28	27	29	25
No. of Other Countries Represented	2	5	3	6	3
Percent of Anglers from Alaska	91	87	89	88	90
Percent of Anglers from Anchorage	37	33	24	24	24
Percent of Anglers from Fairbanks	32	20	30	36	54



Table 8. Lengths of Gulkana River Chinook Salmon, 1972-1980.

Year	Number of Fish	Length Range (mm)	Average Length (mm)
1972	33	770-1,160	1,026
1973	38	665-1,210	1,025
1974	37	650-1,222	1,089
1975	93	724-1,219	1,001
1976	50	673-1,240	1,027
1977	40	667-1,200	988
1978	54	610-1,255	1,006
1979	154	673-1,275	988
1980	92	670-1,195	997

Table 9. Gulkana River Estimated Sport Harvest and Effort, 1975-1980.

	1975	1976	1977	1978	1979	1980
Angler days	2,734	2,721	3,906	5,065	7,778	7,797
Hours	13,171	12,344	17,735	27,406		
Angler Catch						
Chinook salmon	697	296	332	429	1,960	1,320
Sockeye salmon	47	707	998	401	138	676
Total salmon	744	1,003	1,330	830	2,098	1,996
Grayling			2,970	2,216	2,074	5,719
Rainbow trout		70	104	281	140	443
Catch Per Angler						
Chinook salmon	0.255	0.109	0.085	0.085	0.252	0.170
Sockeye salmon	0.017	0.260	0.256	0.079	0.018	0.087
Total salmon	0.272	0.369	0.341	0.164	0.270	0.260

Table 10. Chinook Salmon Aerial Surveys, Upper Copper River Tributaries, 1975-1980.\*

Stream	1975**	1976	1977	1978	1979	1980**
Gulkana River	740	994	924	1,136	1,052	696
East Fork Chistochina River	71	289	132	137	765	575
Mendeltna Creek	NC	35	73	52	5	3
Kaina Creek	NC	37	91	125	279	247
Grayling Creek	NC	17	NC	92	153	66
Little Tonsina	161	98	35	285	285	70

\* The figures are actual counts and not estimates. These data are considered as minimum escapement figures.

\*\* Counting conditions in 1975 and 1980 were generally poor due to high, muddy water during most of the season. Only approximately one half of the Gulkana River was counted in 1980.

NC No counts made.

estimated that there were over 1,000 spawning chinook salmon in the Gulkana River after the sport fish harvest.

#### Gulkana River Grayling

A comparison of length of sport-caught grayling taken from the Gulkana River in 1968, 1978 and 1980 is shown in Table 11. The average size is 22 mm less than in 1968 and only slightly less than in 1979. These fish were caught by ADF&G personnel and all fish were measured regardless of size. These fish were taken during a float trip between Paxson Lake and Sourdough. This portion of the river is the most heavily used by grayling anglers. Although there was a slight decrease in the size of grayling in 1980 over previous years, it is not considered significant.

Figure 3 shows the percentage of fish caught in the various age/size groups for 1978, 1979 and 1980. As can be seen, Age III and IV grayling make up the majority of the catch with Age III dominating.

#### Slana River Whitefish Fishery

The Slana River sport fishery on round whitefish, in Table 12, and broad whitefish occurs in October after the glacial-fed stream clears up. The fishery takes place at night with lanterns used for illumination and the fish are harvested by the use of spears.

This fishery has been lightly monitored since 1964. There have been recent public concerns that the fishery was being depleted because of excessive effort and harvest.

In October 1980, measurements were taken of sport-caught whitefish and compared to past data (Table 12). While some of the past sample sizes are too small to be significant, it is apparent that there has been little change in the length range and average size of fish harvested. There has been little change in the composition and population of this whitefish fishery.

Recently, the only access to that portion of the Slana River where the fishing occurs passed into private ownership. In 1980 the number of participants was notably less than in past years because of the change from public to private ownership.

#### Robe Lake Investigations

Investigations of the limiting factors of salmon production and the feasibility of an enhancement program in the Robe Lake system were initiated in 1972. During 1980, through a grant funded by the Coastal Energy Impact Program, the Valdez Fishery Development Association assisted in this study. Data collected in this joint effort added to, and supported the considerable physical and biological information previously collected and reported. Dissolved oxygen concentrations taken at previously selected sites (Figure 4) concur with findings reported by Williams (1980).

Table 11. Length Data from Gulkana River Arctic Grayling, 1968, 1978, 1979 and 1980.

Year	Number of Fish	Length Range (mm)	Average Length (mm)
1968	100	177-425	290
1978	190	177-425	294
1979	146	86-420	273
1980	137	95-400	268

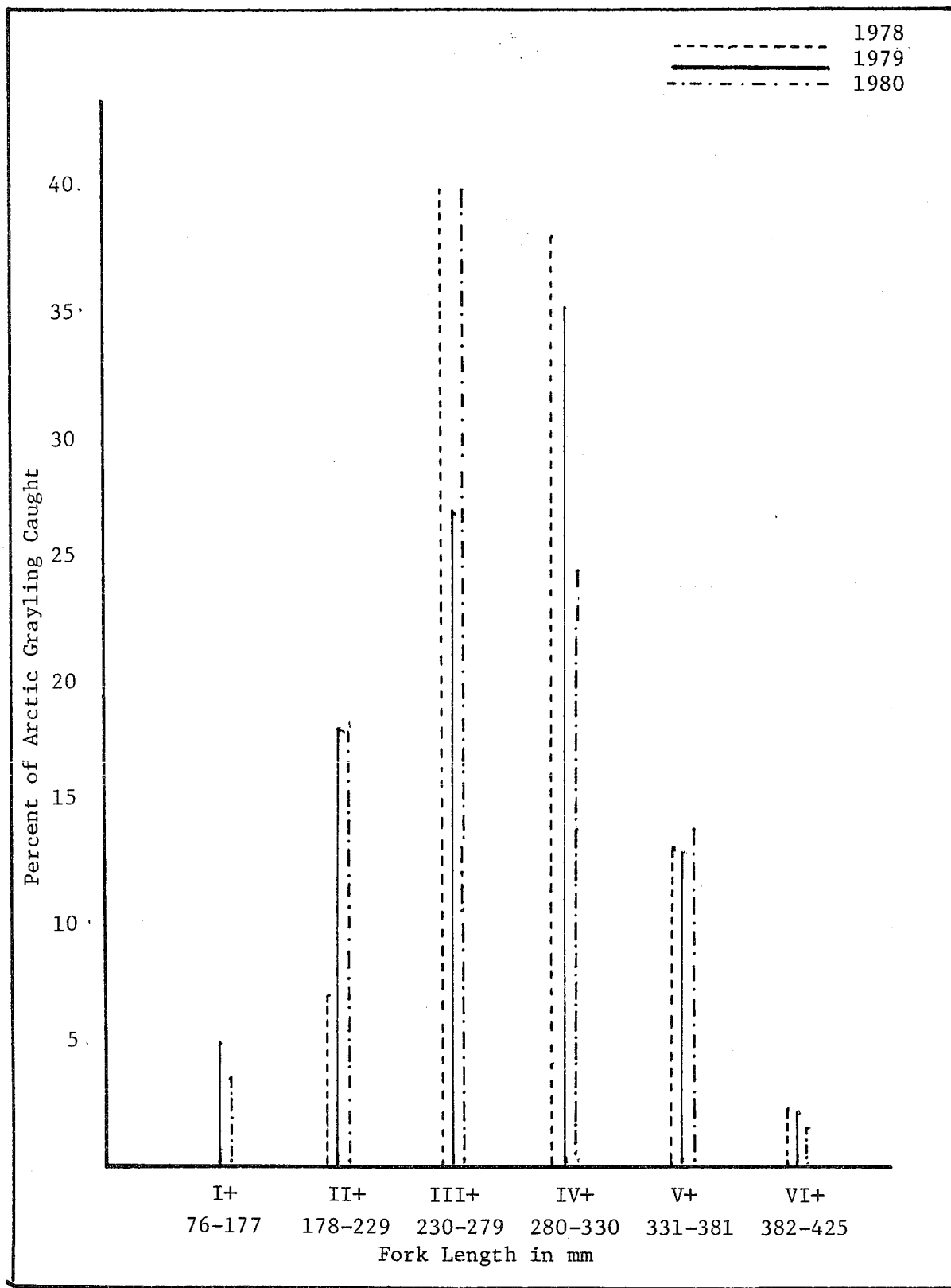


Figure 3. Age and Length Frequency of Gulkana River Grayling, 1978, 1979, 1980.

Table 12. Length Data of Slana River Whitefish.\*

<u>Data</u>	<u>No.</u>	<u>Fork Length Length Range</u>	<u>Average</u>
10/22/64	28	292 - 348 mm 11.5" - 13.7"	320 mm 12.6"
10/19/69	55	235 - 446 mm 9.25" - 17.5"	353 mm 14"
10/17/72	50	320 - 430 mm 12.5" - 17"	368 mm 14.5"
10/16/74	16	242 - 413 mm 9.5" - 16.3"	349 mm 13.5"
10/21/75	101	283 - 423 mm 11" - 16.5"	346 mm 13.5"
10/13/76	102	250 - 430 mm 10" - 17"	347 mm 13.5"
10/14/77	25	330 - 470 mm 13" - 18.5"	370 mm 14.5"
10/10/78	13	311 - 381 mm 12" - 15"	359 mm 14"
10/19/79	41	270 - 395 mm 10.5" - 15.5"	349 mm 13.8"
10/13/80 - 10/25/80	144	280 - 490 mm 11" - 19"	368 mm 14.5"

\* These measurements were taken from fish harvested by sport fishermen using spears. The dates listed are not necessarily those when the fish were most abundant.

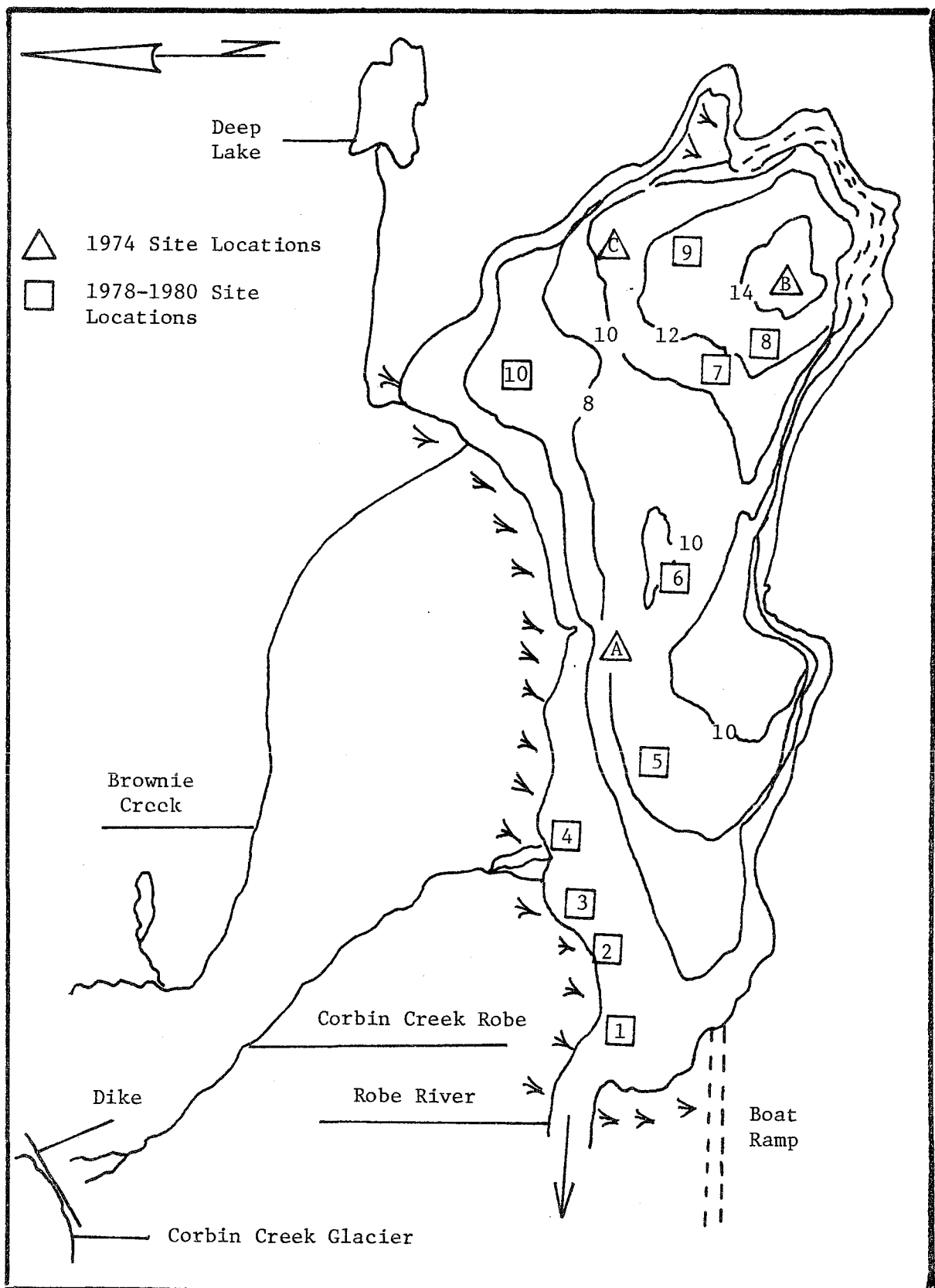


Figure 4. Locations of Study Sites, Robe Lake System.



In 1980 a beach seine and baited minnow traps with double entrances were used to capture young-of-the-year and Age I+ coho salmon. The results of this trapping provided length and growth data which was essentially the same as previously reported. During the trapping program it was found that when the traps were fished for 20 or more hours at depths having D.O. concentrations of 2 ppm or less, all of the coho salmon were dead. It is surmised that the salmon descend from areas of the lake having acceptable D.O. levels to these lower levels for feeding purposes. The length of time these fish can survive in these oxygen depleted zones is not known but presumably it is rather short.

In 1980 Corbin Creek was again sampled for juvenile coho salmon. Valdez Fisheries Development Association received approval from Alaska Department of Fish and Game, F.R.E.D. Division, for a left ventral fin clip of Corbin Creek coho juveniles. In May and July 3,600 Age 0+ coho were clipped for a migration study. Recapture of these coho showed minimal lineal movement in Corbin Creek. Gill-netting, beach-seining and fish-trapping of Robe Lake, Robe River, Brownie and Deep Creeks from June through October did not recover any clipped Age 0+ salmon. The number of unmarked juvenile coho salmon taken in December indicate that these young fish drop out of Corbin Creek in November and December.

The first marked coho salmon were trapped from Robe Lake in December 1980 when three were taken. Three more were trapped in January 1981.

#### Port Valdez Stream Surveys

Foot surveys were again conducted on salmon spawning streams in Port Valdez. Table 13 is a list of the enumeration areas and Figure 5 shows their locations. Results of these surveys are shown in Table 14. Normally odd numbered years have poor returns of pink salmon. This was true again in 1980 but the number of adult salmon counts was 288% higher than in any even year since 1974.

The count of coho salmon, 6,801, was the highest on record. The largest number were counted in the Robe Lake system which includes the Robe River, Robe Lake, Brownie and Corbin Creeks. The numbers presented in Table 14 are actual counts and not estimates and are considered minimum figures.

#### Habitat Protection Investigations

In 1980 over 20 construction oriented projects were reviewed and monitored to ensure adequate protection for the environment and fishery resources. In addition, many placer mining applications and water rights requests were reviewed.

The extension of the airport at Valdez presented considerable siltation problems to anadromous streams No. 141 and 142 which are important pink salmon streams. Construction of settling basins and filter plugs finally eliminated the problem.

Table 13. Valdez Area Salmon Enumeration Areas.

Anadromous Stream Number	Name	Count Areas
221-60-137	Robe Lake/River System	Robe River Robe Lake Corbin Creek Brownie Creek Deep Creek
221-60-137	Lowe River System	4.5 Mile Pit 6.5 Mile Seep 8.5 Mile 12 Mile 17 Mile
221-60-139	Sewage Lagoon	Entire drainage
221-60-141	Loop Road 1	Entire drainage
221-60-142	Loop Road 2	Entire drainage
221-60-143	Siwash Creek	Entire drainage
221-60-144	Ess Creek	Lower 1/2 of drainage
221-60-145	City Limits (Crooked Creek)	Waterfalls downstream through Slough area
221-60-147	Mineral Creek	Brush (Horsetail) Creek

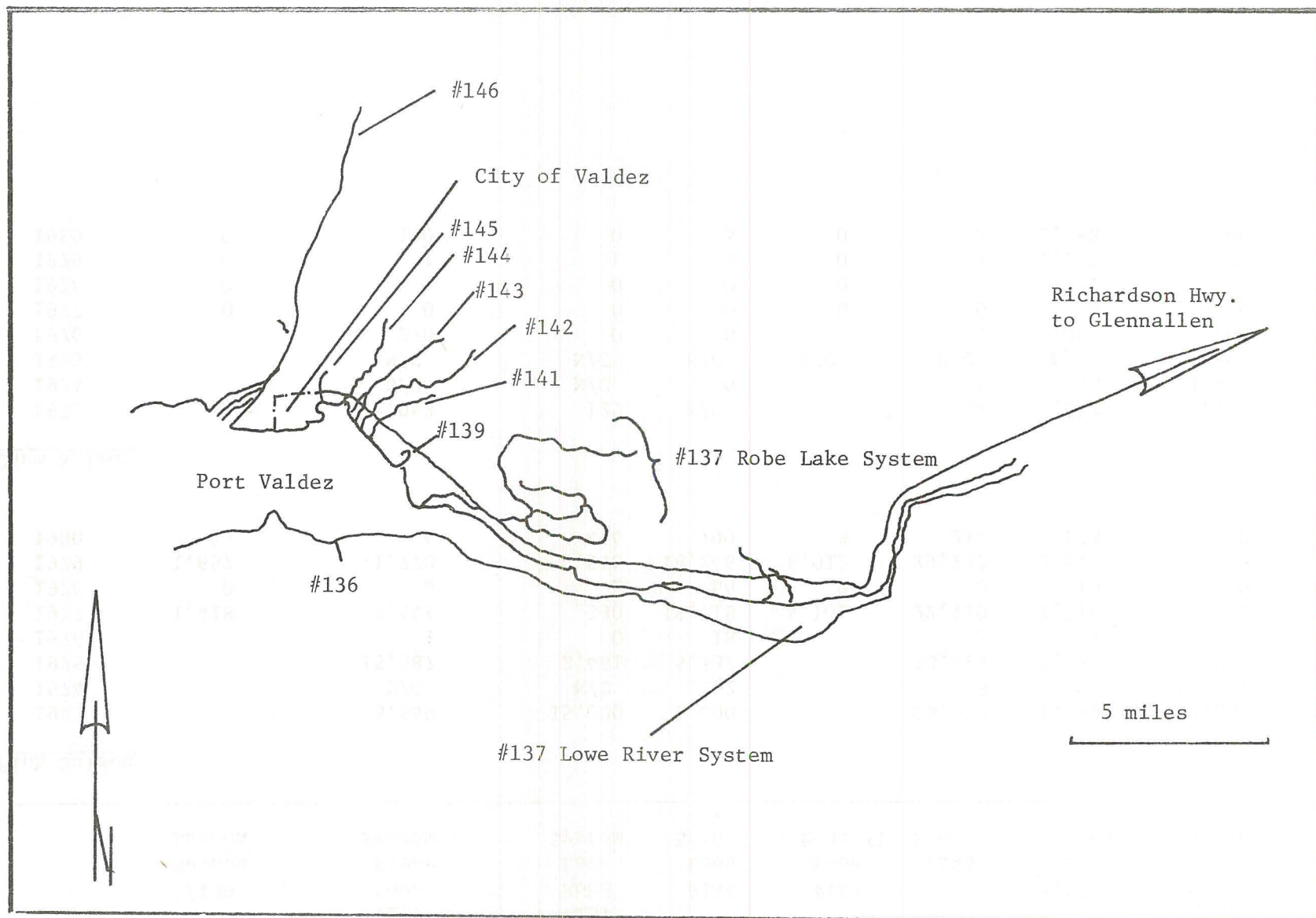


Figure 5. Salmon Spawning Streams in Upper Valdez Bay.

Table 14. Port of Valdez Salmon Counts, 1973-1980.

	#139 Sewage Lagoon	#137 Lowe River System	#137 Robe Lake System	#141 Loop Road I	#142 Loop Road II	#143 Siwash	#145 City Limits	#147 Mineral Creek System
<u>Pink Salmon</u>								
1973		6,549	15,000	7,000		26,770	1,700	2,235
1974		N/C	N/C	252		8	98	217
1975		15,387	2,461	5,537		33,113	1,262	947
1976		1	0	18		5	5	8
1977	1,418	1,441	330	18,718	4,101	22,120	2,714	179
1978	0	0	2	56	0	0	10	0
1979	1,657	1,770	1,546	16,246	6,012	29,232	5,512	53
1980	43	4	454	790	3	214	178	0
<u>Chum Salmon</u>								
1973		1,063	125	N/C		232	1,812	7,111
1974		N/C	N/C	0		16	483	1,454
1975		N/C	N/C	N/C	N/C	N/C	N/C	N/C
1976		270	0	6		2	1,080	564
1977	0	0	0	0	0	0	0	0
1978	0	1	0	0	0	0	111	68
1979	0	1	11	0	0	2	1,277	126
1980	0	190	0	5	0	0	2,186	140

Table 14 (Cont.). Port of Valdez Salmon Counts, 1973-1980.

	#139 Sewage Lagoon	#137 Lowe River System	#137 Robe Lake System	#141 Loop Road I	#142 Loop Road II	#143 Siwash	#145 City Limits	#147 Mineral Creek System
<u>Coho Salmon</u>								
1973		N/C	4,000	N/R		6	N/R	20
1974		N/C	1,662	N/R		0	N/R	0
1975		1,506	1,533	N/R		0	N/R	16
1976	0	1,310	1,049	0		0	2	66
1977	0	1,363	1,522	N/R	0	N/R	N/R	1
1978	0	1,643	5,091	0	0	0	0	0
1979	0	1,536	3,470	0	0	0	0	31
1980	0	1,329	5,467	1	0	0	2	2
<u>Red Salmon</u>								
1973			1,300					
1974			3,000					
1975		2	10					
1976	0	1					1	2
1977	0		9,188					
1978	0	29	972	0	0	0	0	4
1979	0	16	2,216	0	0	0	0	4
1980	0	0	993	0	0	0	0	7

N/C = No count taken

N/R = No run

Construction of the hydroelectric complex at Solomon Gulch near Valdez was monitored. The plant will not be completed until fall of 1981 and the operation will be monitored to determine the effects of the 9 cfs minimum flow requirement for the lower section of Solomon Gulch Creek.

Very little work was done on the construction of the Alpetco Plant in Valdez in 1980. It is expected that there will be more activity in 1981 and increased surveillance will be required.

A minor oil spill occurred on the Chistochina dike during the winter. The frozen ground prevented the oil from penetrating the soil and the spill was burned off.

Several state land selections, reclassifications and proposed sales were reviewed and appropriate comments to protect fisheries values were presented.

## DISCUSSION

Survival studies on Swanson River rainbow trout were conducted in Tex Smith and Crater Lakes. Although Crater Lake had a much higher residual population of coho salmon than Tex Smith Lake, the percent survival was almost the same at 41% and 40%, respectively. The ability of the Swanson River rainbow trout to avoid capture by other fish species is apparently excellent and they appear to be well suited for this area. In the future other suitable lakes will be stocked with these rainbow trout and further survival and growth studies will be conducted.

The Slana River whitefish fishery is unique in this area. The fishery occurs in October when the glacier-fed river clears up. Fish are taken at night with spears using lanterns for illumination. Recently there has been some public concern that this fishery is being overharvested.

Limited length data gathered since 1964 show no significant change in the length, range and average length of fish taken. The access road to the fishing area has recently been transferred to private holdings. This significantly reduced the effort in 1980 and this will probably continue in the future.

Robe Lake studies were continued in 1980 in conjunction with the Valdez Fisheries Development Association. Thirty-six hundred Age 0+ coho salmon were captured in the primary spawning stream, Corbin Creek, and fin-clipped. In later trapping operations in Robe Lake and Robe River, none of the marked fish were recovered until December, giving evidence that the majority of the coho salmon hatched in Corbin Creek also rear there in their first year. During winter coho salmon trapping operations at Robe Lake, fish caught at depths having dissolved oxygen concentrations of 2 ppm or less were all dead after 20 hours. Apparently the coho fry and fingerlings descend periodically to these areas for feeding purposes and then return to levels of the lake having more hospitable D.O. concentrations.

The length of time the fish can remain in areas of low D.O.'s is not known but presumably it is short.

Tolsona Lake has been used as a grayling egg-take site since 1965. The average number of eggs taken annually was approximately 900,000 to 1,000,000. Prior to 1979 it had not been necessary to utilize the entire spawning run into Bessie Creek in order to satisfy egg requirements. However, in 1979 only 220 grayling entered the creek to spawn. After the egg-take, 206 of these grayling were fin-clipped. Two months later the lake was test-netted. During trapping operations at Bessie Creek in 1980 only 26 adult fish entered the stream. Seventeen of these had been marked in 1979. During test-netting later, four of the 23 grayling caught were marked.

All of this data points to a rapid declining grayling population. The reasons for this are not readily apparent. While Tolsona Lake is well known for low winter dissolved oxygen concentrations, the levels during the winters of 1978, 1979 and 1980 were well within the non-lethal range for grayling. In 1975 there was a dramatic increase in the sucker population. The test net frequency for suckers was 11.1 fish per net hour as related to a 17-year average of 1.88.

As a matter of interest, the 17-year average test net frequency for grayling is 1.89 fish per net hour. It was felt the large biomass of suckers could have some effect on the grayling population. In 1976 a program of sucker control was started. This was carried out by trapping and seining in Bessie Creek where they spawn. By 1980 the test net frequency was down to 1.16 fish per hour. However, the net frequency for grayling in 1980 was 0.52 fish per hour which was the third lowest in 17 years of records.

The lake has been stocked with at least 75,000 grayling fry annually since 1968 and this appeared to be adequate until the unexplained decline in 1979. The last time it was stocked was in 1979 when approximately 35,000 fry in very poor condition were planted. A very low survival was expected. There is no obvious reason(s) for the rapid decline of grayling in Tolsona Lake. This same thing occurred with grayling in a lake in Arizona which was used as an egg-take site (William Gaylor, personal communication). The reason(s) for the decline in the Arizona lake was not determined.

It is tentatively planned to secure grayling from another approved site and introduce them into Tolsona Lake in an effort to reestablish the population.

A creel census of sport fishermen has been conducted on the Gulkana River since 1975. During that time there has been an annual increase in angler days of use except in 1980 when the effort was almost identical to 1979. The harvest of chinook salmon has fluctuated somewhat and hit a high of 1,960 fish in 1979. This was because the commercial fishery on chinook and sockeye salmon on the Copper River run was closed that year. In 1980 a commercial quota of 15,000 chinook salmon was established. As a result the 1980 Gulkana River sport fish catch was the second highest recorded. In



the upper section of the Gulkana River there are three distinct types of anglers: float fishermen, power boat fishermen, and bank fishermen. The float fishermen traditionally catch the majority of the grayling. In 1980 they reported catching 4,828 grayling and releasing all but 922. On an average 3-4 day float trip it is not practical to try and preserve grayling for future consumption.

The lower section always receives the lightest fishing effort since it is a fly-fishing-only area. Success in this area is therefore dependent on water conditions. In 1980 the river was high and muddy during most of the season and the catch rate in the lower section dropped from 0.217 chinook salmon per angler in 1979 to 0.040 per angler in 1980. The poor fishing conditions also caused a decrease in effort, harvest and catch rate in the middle section.

The Gulkana River chinook salmon fishery is basically managed on escapement rather than on the sport fish catch. The sport fish catch since 1975 has varied from 296 to 1,960 annually. Also the commercial and subsistence catch varies from year to year. As a rule of thumb, the fishing is usually poor in the middle and lower section when the river is high and muddy. It is also impossible to make aerial salmon surveys under those conditions. When survey conditions are good, several flights are made throughout the summer. The desired minimum escapement is 1,000 actual counted chinook salmon, and if surveys indicate an escapement below this figure the fishery can be closed.

The catch of grayling increased to 5,719 in 1980 which is an increase of 93% over the highest previous year of record (1977). This is probably the result of an 82% increase in floater angler days. In 1980 almost 100% of the grayling caught came from that section of the river from Paxson Lake downstream to Sourdough.

The Gulkana River from Paxson Lake to Sourdough has been created a Wild and Scenic River by Congress. This action will not doubt result in Federal regulations which will have impact on the use of the river and this will affect the harvest.

Lengths of grayling from this section of the river have been collected 4 different years from 1968 to 1980. The data show only a slight decrease (22 mm) in the average size of grayling caught. The fish were sport-caught by Fish and Game personnel and all fish regardless of size were measured.



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Annual Performance Report for

INVENTORY AND CATALOGING OF SPORT FISH AND  
SPORT FISH WATERS OF THE LOWER SUSITNA RIVER  
AND CENTRAL COOK INLET DRAINAGES

by

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*Ronald O. Skoog, Commissioner*

SPORT FISH DIVISION

*Rupert E. Andrews, Director*

RESEARCH PROJECT SEGMENT

State: ALASKA Name: Sport Fish Investigations  
of Alaska

Project No.: F-9-13

Study No.: G-I Study Title: INVENTORY AND CATALOGING

Job No.: G-I-H Job Title: Inventory and Cataloging  
of Sport Fish and Sport Fish  
Waters of the Lower Susitna  
River and Central Cook Inlet  
Drainages

Cooperator: Stanley W. Kubik

Period Covered: July 1, 1980 to June 30, 1981

ABSTRACT

Creel census data obtained from three west side Susitna River streams disclosed that anglers fished an estimated 15,045 man-days to harvest 7,348 chinook salmon, Oncorhynchus tshawytscha (Walbaum).

Although total escapement counts are not available for 1980, indications are that the chinook salmon escapement in west side Susitna streams was equal to the high escapements recorded during the 1976-1979 period.

A creel census conducted at Whittier in Prince William Sound indicated that 1,575 angler-days (6,966 angler-hours) were expended to harvest 1,791 coho salmon, Oncorhynchus kisutch (Walbaum).

Rainbow trout, Salmo gairdneri (Richardson), were experimentally stocked in seven Anchorage area lakes and coho salmon planted in 12 lakes.

BACKGROUND

Whittier, located on Passage Canal in Western Prince William Sound, was the site of a creel census program in 1979 and 1980 to assess the success of Fisheries Rehabilitation, Enhancement and Development Division (F.R.E.D.) coho salmon smolt releases and establish sport fish effort and harvest levels. The creation of a coho salmon sport fishery is part of an overall program to enhance sport salmon fishing in the Whittier area. In theory, when these salmon return from their seaward migrations they will gather at

the release site and mill around for some time making them available to the sport angler.

For the second consecutive year, three streams on the west side of the Susitna River were open during the special chinook salmon season. The quota set for the three streams was 11,000 chinook salmon 508 millimeters and over in length. Other pertinent historical data are presented in Reports of Progress by Kubik (1976-1979) and stock status of Upper Cook Inlet Chinook Salmon (Sport Fish Division, Alaska Department of Fish and Game).

The program of restocking Anchorage area lakes was continued in 1980. In recent years, stocking programs in this area have relied heavily on plants of catchable size rainbow trout.

The study area is shown in Figure 1, and a list of common and scientific names of all species mentioned in this report is presented in Table 1.

#### RECOMMENDATIONS

1. Creel censuses should be continued on the Deshka River and Alexander and Lake Creeks to monitor angling effort and obtain estimates of the total chinook harvest.
2. Chinook salmon escapement counts should be continued on west side Upper Cook Inlet streams.
3. Coho salmon sport fish effort and harvest data should continue to be collected in selected west side Cook Inlet drainages.
4. Coho salmon sport fish effort and harvest data should continue to be collected at Whittier.
5. Experimental stocking evaluations on Anchorage area lakes should be continued.

#### OBJECTIVES

1. To determine the environmental characteristics of the existing and potential recreational fishing waters of the job area and, where practical, obtain estimates of the sport fish harvest and angler participation rates.
2. To evaluate the impact of water use and urban development projects on fisheries, aquatic life and water quality of lakes and streams in the area.
3. To determine stocking measures, formulate management practices and direct the course of future studies on area waters.

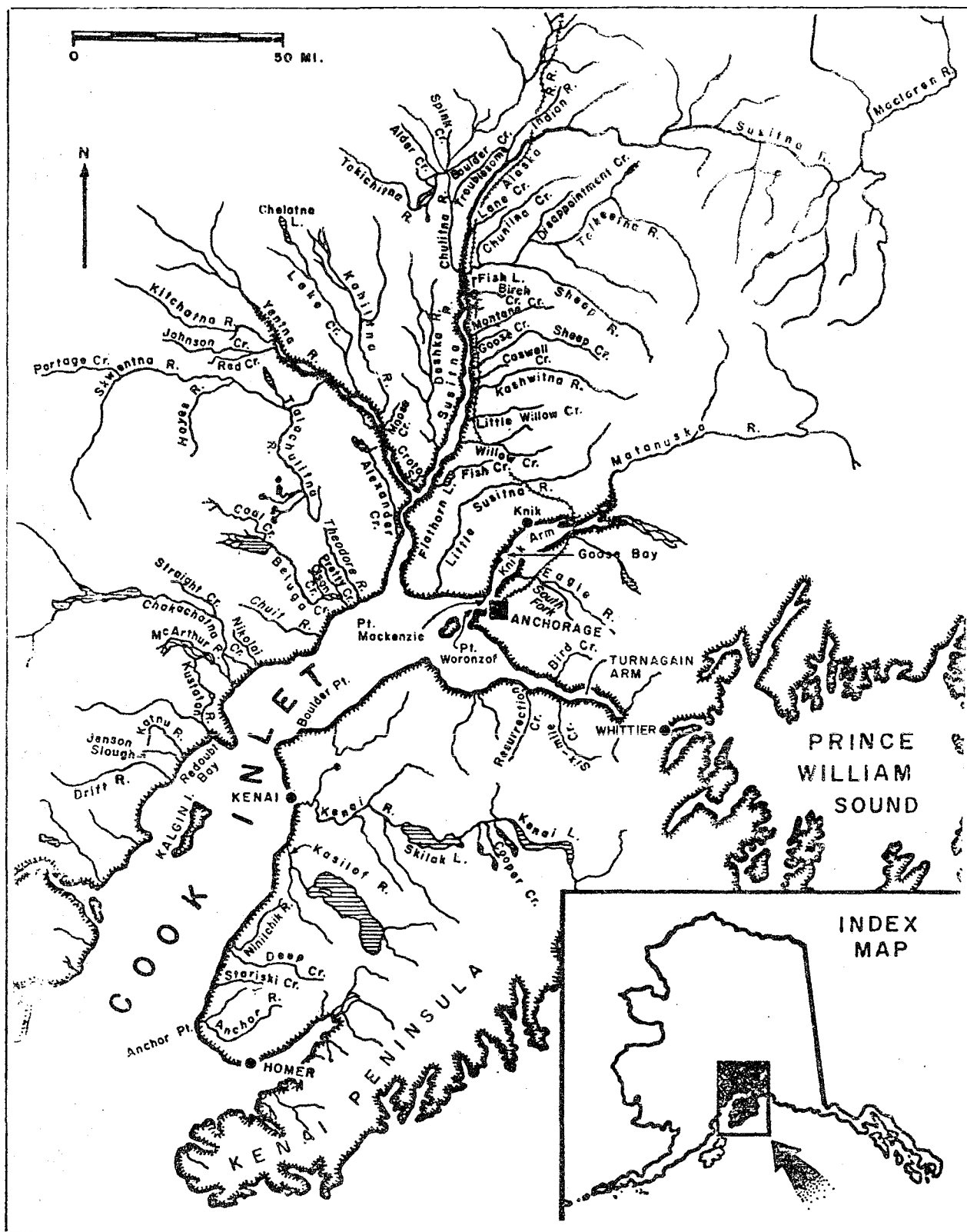


Figure 1. Cook Inlet, Alaska, showing salmon streams where major king salmon runs occur.

Table 1. List of Common Names, Scientific Names and Abbreviations.

Common Name	Scientific Names & Author	Abbreviation
Coho salmon	<u>Oncorhynchus</u> <u>kisutch</u> (Walbaum)	SS
Chinook salmon	<u>Oncorhynchus</u> <u>tshawytscha</u> (Walbaum)	KS
Rainbow trout	<u>Salmo</u> <u>gairdnari</u> Richardson	RT
Threespine stickleback	<u>Gasterosteus</u> <u>aculeatus</u> (Linnaeus)	TST

4. To investigate, evaluate and develop plans for the enhancement of salmon stocks.

#### TECHNIQUES USED

The Whittier coho salmon creel census was designed to obtain effort and harvest data and evaluate the success of the 1979 F.R.E.D. coho salmon smolt release. The period from August 1 through September 30 was stratified by weekday and weekend/holiday. The schedule called for interviewing anglers during a randomly chosen 8-hour period on all weekends, holidays and three randomly chosen weekdays each week. Interviews of all anglers who had completed the day's fishing were attempted. The statistical design is similar to that used in the 1978-79 Deshka River coho salmon creel census. In addition to recording hours fished and the catch, length and weight data along with scale samples were collected. The fish were each checked for the adipose clip and the heads were retained from a number of clipped fish for examination purposes.

During the 1980 chinook salmon fishery, effort and harvest were evaluated by a creel census. The period of May 24 through July 6 was stratified by week, weekday and weekend/holiday. Interviews of anglers who had finished fishing were conducted through the period from 4:00 am to 10:00 pm on weekends and holidays. All 5 days of the week were sampled. The weekday schedule was divided into six 3-hour interview periods. Two 3-hour periods were randomly chosen for sampling each day. Interview procedures consisted of contacting anglers having completed their fishing, recording the number of hours fished and chinook salmon kept for each angler. Total length (tip of snout to tip of tail), and scale samples were obtained from departing anglers' catches whenever possible.

Fish population sampling on four Fort Richardson Military Reservation lakes was accomplished with 125-ft variable mesh gill nets. Measurements on fish collected included total lengths to the nearest millimeter (mm) and weight to the nearest gram (g). Two nets were fished for a period of 24 hours in each lake.

#### FINDINGS

##### Whittier Coho Salmon Creel Census

A creel census program to evaluate total coho salmon harvest and effort levels was conducted in Whittier. Data indicate that 1,575 angler-days (6,966 angler-hours) were expended to harvest 1,791 coho salmon between August 14, when the first coho salmon was taken, and September 24, when the census was terminated.

Sixty percent of the coho salmon taken were harvested by boat anglers in contrast to 1979 when 95% were harvested by shore anglers.

Approximately 85% of the total coho catch in 1980 was taken in the vicinity of Cove Creek Lagoon (Figure 2). Ten percent of the harvest came from the Divide Creek area and the remaining 5% scattered throughout Passage Canal. The 1979 catch was almost entirely taken by anglers fishing in the Whittier boat harbor.

Of the 708 creel checked coho salmon, 81 (11.4%) were adipose clipped. Male coho salmon with an adipose clip averaged 698 mm in length at an average weight of 9.1 lbs, while the unclipped males averaged 681 mm at a weight of 8.5 lbs. Female coho salmon with an adipose clip averaged 698 mm at a weight of 9.1 lbs, while unclipped females averaged 673 mm and a weight of 9.4 lbs (Table 2).

In 1980, the catch estimate combined with personal observations by ADF&G personnel produced a total run size estimate of approximately 4,000 coho salmon, or a return rate of 5% from the original release of 81,241 smolts.

#### West Side Susitna River Chinook Salmon Fishery

In 1979 eight streams in Upper Cook Inlet were opened to the taking of chinook salmon 508 mm and over in length. Three streams on the west side of the Susitna River and five streams on the east side were open during the special chinook salmon season.

A seasonal quota of 11,000 chinook salmon over 508 mm in length was established for the three west side streams. This quota was allocated by stream as follows: Deshka River 7,000; Alexander Creek 2,000; and Lake Creek 2,000. The daily bag and possession limit was one chinook salmon 508 mm and over in length with a yearly bag limit of five over 508 mm.

In 1980 the open stream and season catch quotas were the same as 1979. Additional areas on the Deshka River, Alexander and Lake Creeks were opened in 1980. In 1980 the daily bag and possession limit was two chinook salmon over 508 mm in length, one of which could exceed 711 mm. All streams were opened to fishing from May 24 through July 6 inclusive; in 1980 these fisheries remained open throughout the scheduled season. A summary of 1979-80 catches and angling effort is shown in Table 3.

As in 1979, the fishery was monitored closely on a day-to-day basis for both enforcement purposes and to collect biological data such as angler participation, harvest and age class breakdown of the harvest. A punch card was required for the taking of chinook salmon.

Table 4 shows the percentage of different size groups of chinook salmon harvested in 1979 and 1980 from west side Susitna River streams. The 508 to 711 mm chinook salmon harvested in 1980 are 4-year-old fish which returned from the 1976 brood year and were virtually all males. It should be noted in Table 4 that in 1979 only 14.9% of the harvest was comprised of 508 to 711 mm chinook salmon, while in 1980, 45.8% was in this size group. The first of the large escapements occurred in 1976 and the strong showing of Age IV chinook salmon in the 1980 fishery indicates that the survival of



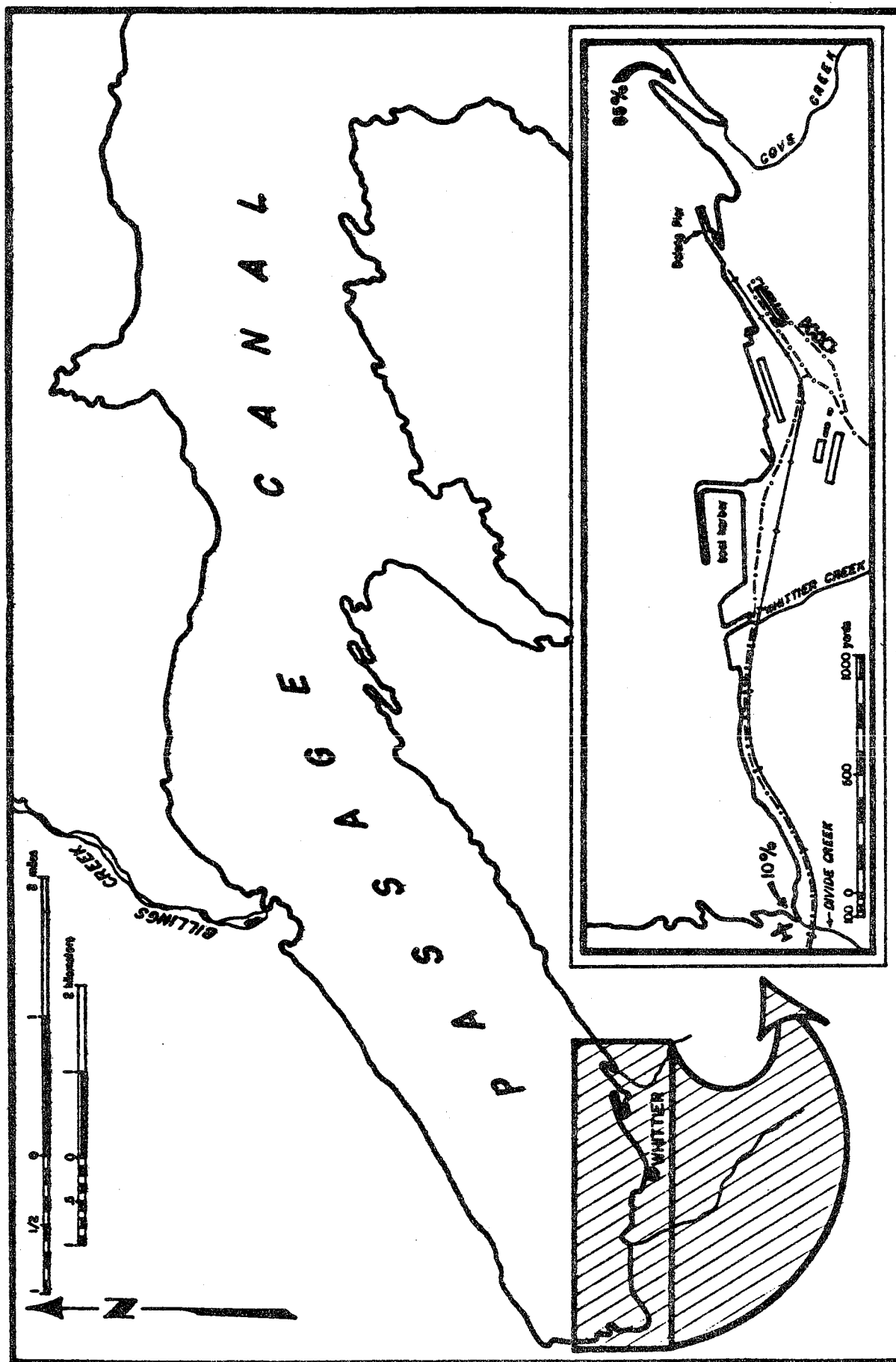


Figure 2. Passage Canal, Whittier area.

Table 2. Whittier Coho Salmon Creel Census Summary, 1979-1980.

	Boat Anglers		Shore Anglers		Total	
	1979	1980	1979	1980	1979	1980
Angler-hours	1,732	4,713	2,796	2,253	4,528	6,966
Angler-days	197	917	986	658	1,183	1,575
Coho harvest	41	1,075	772	716	813	1,791
Coho per Angler-day	0.21	1.17	0.78	1.09	0.69	1.14
Coho per Angler-hour	0.02	0.23	0.28	0.32	0.18	0.26
Mean Coho Weights in Pounds						
	Adipose Clipped		Unclipped		Total	
	1979	1980	1979	1980	1979	1980
Males	6.7	9.1	8.2	8.5	7.8	8.6
Females	8.4	9.1	8.3	9.4	8.3	9.3
Total	7.6	9.1	8.3	9.0	8.1*	9.0*
Mean Coho Lengths in Millimeters						
	Adipose Clipped		Unclipped		Total	
	1979	1980	1979	1980	1979	1980
Males	558	698	597	681	587	686
Females	617	698	610	673	612	678
Total	589	698	604	676	602**	681**

\* Average Weight

\*\* Average Length

Table 3. Effort and Harvest Data of the Chinook Salmon Sport Fishery  
on West Side Susitna River Tributaries, 1979-1980.

	Quota	Harvest		Angler-Days		Harvest Per Angler-Day	
		1979	1980	1979	1980	1979	1980
Alexander Creek	2,000	1,277	2,281	2,778	4,411	0.46	0.52
Deshka River	7,000	2,954	4,023	6,451	8,397	0.46	0.48
Lake Creek	<u>2,000</u>	<u>2,045</u>	<u>1,044</u>	<u>3,954</u>	<u>2,237</u>	<u>0.52</u>	<u>0.47</u>
Total	11,000	6,276	7,348	13,183	15,045	0.48	0.49

Table 4. Percentage of Size Group of Chinook Salmon Harvested in West Side Streams 1979-1980.

	1979 Harvest		1980 Harvest	
	20-28 in.	28 in. & over	20-28 in.	28 in. & over
	Percentage			
Caswell Creek	12.4	87.6	39.5	60.5
Alexander Creek	29.8	70.2	54.6	45.4
Lake Creek	<u>13.5</u>	<u>86.5</u>	<u>51.1</u>	<u>48.9</u>
	14.9	85.1	45.8	54.2

offspring from the 1976 escapement was extremely good. In 1981, chinook salmon from the 1976 brood year will be returning as 5-year-olds. If returns of this age group are as strong as this year's Age IV chinook salmon, then west side streams should experience an excellent run of chinook salmon over 711 mm in 1981. In addition to the potentially strong return of 5-year-old chinook salmon, it is expected there will again be a strong showing of Age IV fish returning from the 1977 brood year originally of 101,592, which was the highest recorded in recent times.

Since 1973, when reliable comparisons could be made in the spawning populations, total stock estimates have ranged from 6,100 to 101,592 chinook salmon (Table 5).

Repeated efforts to determine 1980 chinook salmon escapements in Upper Cook Inlet streams met with dismal results. Streams remained at extremely high levels throughout the spawning period as they did during the fishery. The final result was that no escapement estimates were obtained in 1980. The persistent rainfalls resulted in the second wettest summer since recordings were initiated in 1916; more than 8.06 inches of rain fell during the three summer months.

Although escapement counts are not available, it is felt that the 1980 Upper Cook Inlet chinook salmon escapement was equal to the high escapements recorded during the 1976-1979 period. This assumption is primarily based on personal observations by Department personnel monitoring the fishery and on the sport fish harvest in 1980, which were similar to 1979 harvest levels. The harvest increased from 6,276 in 1979 to 7,348 in 1980, while the effort remained nearly the same (Table 3), indicating the 1980 run strength was similar to 1979 levels. This harvest level would not have occurred if the run had been substantially below 1976-79 levels.

#### Deshka River:

The Deshka River has historically been the most important producer of chinook salmon in Upper Cook Inlet. During the 1980 season, 55% (4,023) of the total harvest was from the Deshka River. Chinook salmon were taken the first day of the season, May 24, and the catch rate gradually increased until the fourth week when the peak catches were recorded, thereafter catches gradually declined. Harvest and effort estimates for 1980 by weekly sampling periods from May 24 through July 6 are presented in Table 6. The 1980 catch of 4,023 chinook salmon was considerably higher than the 2,954 caught in 1979.

A sample of 555 sport caught chinook salmon 508 mm and over were measured for size and sex composition. The salmon ranged in length from 539 mm to 1397 mm with an average of 806 mm. Males average 744 mm and females 914 mm. Sex ratio of males to females in the sport fishery was 1.9:1. The 1980 catch was composed predominately of 4-year-old fish (1.2) ranging in length from 539 mm to 711 mm.

Table 7. Lake Creek Chinook Salmon Sport Catch and Effort by Week, 1980.

Week	Angler-Days	508-711 mm	Greater than 711 mm	Total	% of <u>1</u> / Total	Cum. % of <u>2</u> / Total
5/24-5/30	4	0	0	0	0	(0)
5/31-6/6	161	0	0	0	0	(0)
6/7-6/13	215	3	3	6	0.6	(0.6)
6/14-6/20	784	241	179	420	40.2	(40.8)
6/21-6/27	559	195	169	364	34.9	(75.7)
6/28-7/3	342	61	82	143	13.7	(89.4)
7/4-7/6	172	34	77	111	10.6	(100.0)
Total	2,237	534	510	1,044		
Percent		51%	49%			

1/ Expanded estimate

2/ Cumulative total

A total of 347 chinook salmon carcasses from the Deshka River were also examined for size and sex composition. The sampled fish ranged in length from 465 mm to 1218 mm, with a mean of 926 mm. Males averaged 917 mm and females 943 mm. Five-year-old fish were the predominant age group of the carcass population. Sex ratio of male to females was 1.7:1.

#### Lake Creek:

The first recorded chinook salmon was caught June 7. However, it was not until the fourth week of the season that the catch rates increased enough to indicate Lake Creek was experiencing a strong run (Table 7). Unfortunately, high water conditions persisted through most of the season, and the 1980 harvest of 1,044 was down considerably from the 1979 level of 2,045 (Table 3). The catch rate dropped from 0.52 in 1979 to 0.47 in 1980.

Two hundred sixty five sport caught chinook salmon sampled on Lake Creek varied in size from 520 mm to 1346 mm. Males averaged 763 mm and females 963 mm. Approximately 51% of the sport catch were 4-year-old fish. The male to female sex ratio was 2.8:1.

#### Alexander Creek:

The first recorded chinook salmon was caught May 24, after which the catch rate gradually increased through the third and fourth week of the season (Table 8). The largest number of fish, 760, were recorded taken during the third week, June 7-13. Almost 60% of the chinook salmon taken during this period were comprised of 508 to 711 mm, Age IV fish. Alexander Creek topped all other Upper Cook Inlet streams with 54.6% of the total harvest falling in the 508 to 711 mm range. The 1980 harvest of 2,281 chinook salmon was nearly double that of 1979; the catch rate increased from 0.46 in 1979 to 0.52 in 1980.

Four hundred and forty four chinook salmon sampled from the Alexander Creek recreational fishery measured from 514 mm to 1232 mm in length with a mean of 750 mm. The strongest age group represented in the sport catch was 4-year-old fish. Males averaged 707 mm and females 886 mm. Sex ratio of males to females was 3.5:1.

In general chinook salmon stocks appear to be in a healthy state. While stock levels appear to be currently stable, it should be recognized the balance of the cycle has not yet been completed. The showing of 4-year-old fish in 1980 from the 1976 brood year is only the first successful adult return from the peak years 1976-80. Not until 1982 when adult returns from the high escapement years are evaluated can a trend be established that might indicate Upper Cook Inlet chinook salmon stocks have recovered to their historic levels.

#### Experimental Lake Stocking

Nineteen lakes in the Anchorage management area were experimentally stocked with game fish in 1980. The location of each lake, species and number of fish released is shown in Table 9.

Table 5. Upper Cook Inlet-West Side Chinook Salmon Escapement Counts and Population Estimates, 1973-1980.

Year	Observed Counts*	Estimated Counts
1980	**	**
1979	42,216	54,719
1978	47,875	65,811
1977	77,303	101,592
1976	39,435	51,300
1975	7,962	10,000
1974	9,208	11,700
1973	5,454	6,100

\* Includes Anchorage area streams.

\*\* No count available.



Table 6. Deshka River Chinook Salmon Sport Catch and Effort by Week, 1980.

Week	Angler-Days	508-711 mm	Greater than 711 mm	Total	% of <u>1</u> / Total	Cum % of <u>2</u> / Total
5/24-5/30	1,325	188	339	527	13.1	(13.1)
5/31-6/6	1,905	225	463	688	17.1	(30.2)
6/7-6/13	1,214	285	320	605	15.0	(45.2)
6/14-6/20	2,033	442	835	1,277	31.7	(76.9)
6/21-6/27	1,042	246	257	503	12.5	(89.4)
6/28-7/3	626	144	167	311	7.8	(97.2)
7/4-7/6	252	58	54	112	2.8	(100.0)
Total	8,397	1,588	2,435	4,023		
Percent		39%	61%			

1/ Expanded estimate

2/ Cumulative total

Table 8. Alexander Creek Chinook Salmon Sport Catch and Effort by Week, 1980.

Week	Angler-Days	508-711 mm	Greater than 711 mm	Total	% of 1/ Total	Cum. % of 2/ Total
5/24-5/30	471	185	168	353	15.5	(15.5)
5/31-6/6	920	201	132	333	14.6	(30.1)
6/7-6/13	1,239	455	305	760	33.3	(63.4)
6/14-6/20	904	166	203	369	16.2	(79.6)
6/21-6/27	473	156	137	293	12.8	(92.4)
6/28-7/3	302	49	67	116	5.1	(97.5)
7/4-7/6	102	33	24	57	2.5	(100.0)
Total	4,411	1,245	1,036	2,281		
Percent		55%	45%			

1/ Expanded estimate

2/ Cumulative total

Table 9. Fish Stocked in Anchorage Area Lakes, 1980.

Lake	Location	Species Stocked	No. Stocked
Sand	Anchorage	RT catchables	5,011
Campbell Point	Anchorage	" "	4,987
Jewel	Anchorage	" "	5,681
Lower Fire	Eagle River	" "	5,011
Mirror	Peters Creek	SS catchables	5,897
DeLong	Anchorage	" "	5,000
C Street	Anchorage	" "	5,014
Cheny	Anchorage	" "	5,014
Beach	Birchwood	" "	4,921
Otter	Ft. Richardson	RT catchables	10,931
Clunie	" "	" "	10,275
Gwen	" "	SS catchables	7,943
Thompson	" "	" "	2,537
Derby Pond	" "	" "	1,018
Hillberg	Elmendorf	" "	7,973
Triangle	Elmendorf	" "	2,348
Six Mile	Elmendorf	" "	5,747
Fish	Elmendorf	" "	2,980
Green	Elmendorf	RT catchables	5,013

Total Stocked:

RT - 46,909

SS - 56,392

RT = Rainbow trout

SS = Coho salmon

### Test Netting

From October 6 through October 10, Thompson, Gwen, Otter and Clunie Lakes were test-netted by Fort Richardson Wildlife personnel to evaluate fish growth since stocking, fall feeding habits, effects of parasites, and to develop sound recommendations for stocking in the spring of 1981.

Lengths and weights of fish populations from the four lakes sampled are summarized in Table 10.

Sampling of the fish population revealed that:

1. Food items have not changed significantly over the years. The primary food of rainbow trout in Otter and Clunie Lakes was Gasterosteus aculeatus (threespine stickleback). Trout in Otter Lake also consumed Physa gyrina Sax., (a snail). Coho salmon at Gwen Lake fed on Gammarus limneaus Smith (an amphipod) and at Thompson Lake, Ishnura (damselfly) nymphs were heavily used by the cohos.
2. The rainbow trout at Otter Lake contained a moderate infestation of a broad (8-10 mm) tapeworm (Cestoid), 40-60 mm long. The rainbows at Clunie Lake were heavily infested with a different Cestoid, 1-2 mm broad and 20-80 mm long. Personal communication with the Alaska Department of Fish and Game (ADF&G) fish pathologist revealed that these Cestoids will stunt fish growth. Also there is no effective method of controlling these pathogens.
3. There was a high overwinter survival rate (1979) of rainbow trout at Otter Lake as evidenced by the larger fish captured in the test nets. These older fish were stocked in 1979.
4. The coho salmon at Gwen Lake were significantly smaller than rainbow trout stocked in previous years. Rainbow trout sampled during October, 1979 average 373 mm as compared to 268 mm for the coho salmon in 1980. Wildlife personnel theorized that the smaller growth rate for the coho salmon may be attributed to a depletion of the freshwater shrimp which seemed to be the predominant food organism of the coho salmon. Rainbow trout, however, in the past supplemented their diet by feeding on surface insects.

### DISCUSSION

The chinook salmon sport fishery was considered a success despite the high stream conditions which persisted throughout the season. Total estimated harvest for the three west side streams was 7,348 chinook salmon in 1980, as compared to 6,276 harvested during 1979.

The F.R.E.D. Division of ADF&G released 50,057 coho salmon smolts in Cove Creek Lagoon on June 30, 1980, to produce an adult return in 1981. Thirty percent of the smolts released were marked with coded wire tags and adipose

Table 10. Test Netting Results, Fort Richardson Lakes, 1980.

Lake	Species	Sample Size	Length (mm)		Weight (grams)	
			Range	Mean	Range	Mean
Otter	Rainbow trout	15	241-508	425	168.2-1886.0	1190.5
Clunie	Rainbow trout	17	211-318	265	92.4-333.3	205.4
Gwen	Coho salmon	54	206-318	268	105.9-352.4	208.4
Thompson	Coho salmon	17	155-259	231	48.5-168.9	129.1

fin clips. Plans call for maintenance of this sport fishery through continued planting of coho salmon smolts. Encouraged by the Department of Fish and Game coho salmon stocking program in the area, Whittier city officials and representatives of the Department have met to discuss the practicablity of starting a fishing derby similar to the one held each year in Seward.

As in previous years, the program for restocking Anchorage area lakes continued. A total of 19 lakes received 56,392 coho salmon and 46,909 rainbow trout in 1980. During 1981, 18 lakes in the local area are scheduled to receive 32,500 coho salmon and 72,500 catchable rainbow trout.

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