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STATE OF ALASKA

Jay S. Hammond, Governor

Annual Performance Report for

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

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RESEARCH PROJECT SEGMENT

State:	ALASKA	Name:	Sport Fish Investigations of Alaska
Project No.:	F-9-14		
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, 1981 to June 30, 1982

ABSTRACT

Population estimates of Swanson River rainbow trout, Salmo gairdneri Richardson, stocked in Tex Smith and Crater Lakes in 1979, were continued in 1981. Trapping of marked fish in Crater Lake in 1981 revealed the survival of Age I trout in 1980 (1979 stocking) was 28 percent and only 320 rainbow trout, or eight percent of the total stocking in 1979 survived to Age II. A French drain, installed in the outlet of Crater Lake to prevent the out-migration of these stocked rainbow trout, apparently failed as fish were found in a lake about 200 yards downstream.

A population estimate of rainbow trout in Tex Smith Lake was completed and survival of previously stocked fish was determined by age class. In 1981, the survival of Age I fish (stocked in 1979) was determined to be 84 percent. The survival of Age II rainbow trout stocked in 1979 indicated a survival of 67 percent. An outlet water control structure at Tex Smith Lake was successful in preventing out-migration of the stocked rainbow trout.

In 1981, 145 sport-caught arctic grayling, Thymallus arcticus (Pallas), from the Gulkana River, were measured and scale samples taken. The data were compared to information collected in 1968, 1978, 1979 and 1980, and revealed little change in the average fork length. The average fork length of 718 grayling measured during these 5 sampling years was 288 millimeters and the 1981 average was 287 millimeter. The 1977 year class grayling represented 18 percent of the catch in 1979 as Age II, 40 percent as Age III in 1980 and 61 percent as Age IV in 1981. The 1976 year class was much weaker.

In 1981, 24 managed lakes were test-netted to determine any change in the status of stocked and wild fish. Poor survival of stocked rainbow trout and coho salmon, Oncorhynchus kisutch (Walbaum), was noted in some lakes including four that had no outlets.

Five previously unsurveyed lakes were investigated in 1981 to determine physical and biological characteristics. All of these lakes are located in the Lake Louise area and accessible by trail. Little Lake Louise has a population of lake trout, Salvelinus namaycush (Walbaum), round whitefish, Prosopium cylindraceum (Pallas), longnose suckers, Catostomus catostomus (Forster), and burbot, Lota lota (Linnaeus). Two of the lakes contained whitefish and burbot. The remaining two were apparently barren of fish life. All four of these lakes have potential for the establishment of salmonid populations by stocking, following the installation of outlet control structures.

An experimental grayling egg take was conducted at Junction Lake on the Lake Louise Road. Three hundred sixteen adult grayling were trapped with fyke nets and 132 females artificially spawned to produce 660,190 eggs for an average of 5,000 eggs per female.

During stream surveys conducted at the eastern terminus of Valdez Bay, a total of 75,069 pink salmon, Oncorhynchus gorbuscha (Walbaum), 3,292 chum salmon, Oncorhynchus keta (Walbaum), and 7,725 coho salmon were counted. This is the highest number of these salmon we have recorded.

In 1981, measurements were made of 262 sport-caught round whitefish and broad whitefish, Coregonus nasus (Pallas), from the Slana River. The whitefish averaged 370 millimeters in fork length and ranged from 340 to 480 millimeters. The data showed no significant difference in size compared to 10 previous years of data.

KEY WORDS

Arctic grayling, coho salmon, pink salmon, chinook salmon, sockeye salmon, Gulkana River, Valdez Bay, Valdez Fisheries Development Association, Swanson River rainbow trout, whitefish, Copper River, Habitat, Schnabel Multiple Census Estimate of Population Size, escapement.

BACKGROUND

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

The majority of angling pressure is on waters adjacent to the highway system. This area, including the Copper River Basin, upper Susitna River Basin, Cordova, Eastern Prince William Sound and Valdez, has over 650 miles of the Alaska Highway System within its borders. A map of the study area is presented in Figure 1.

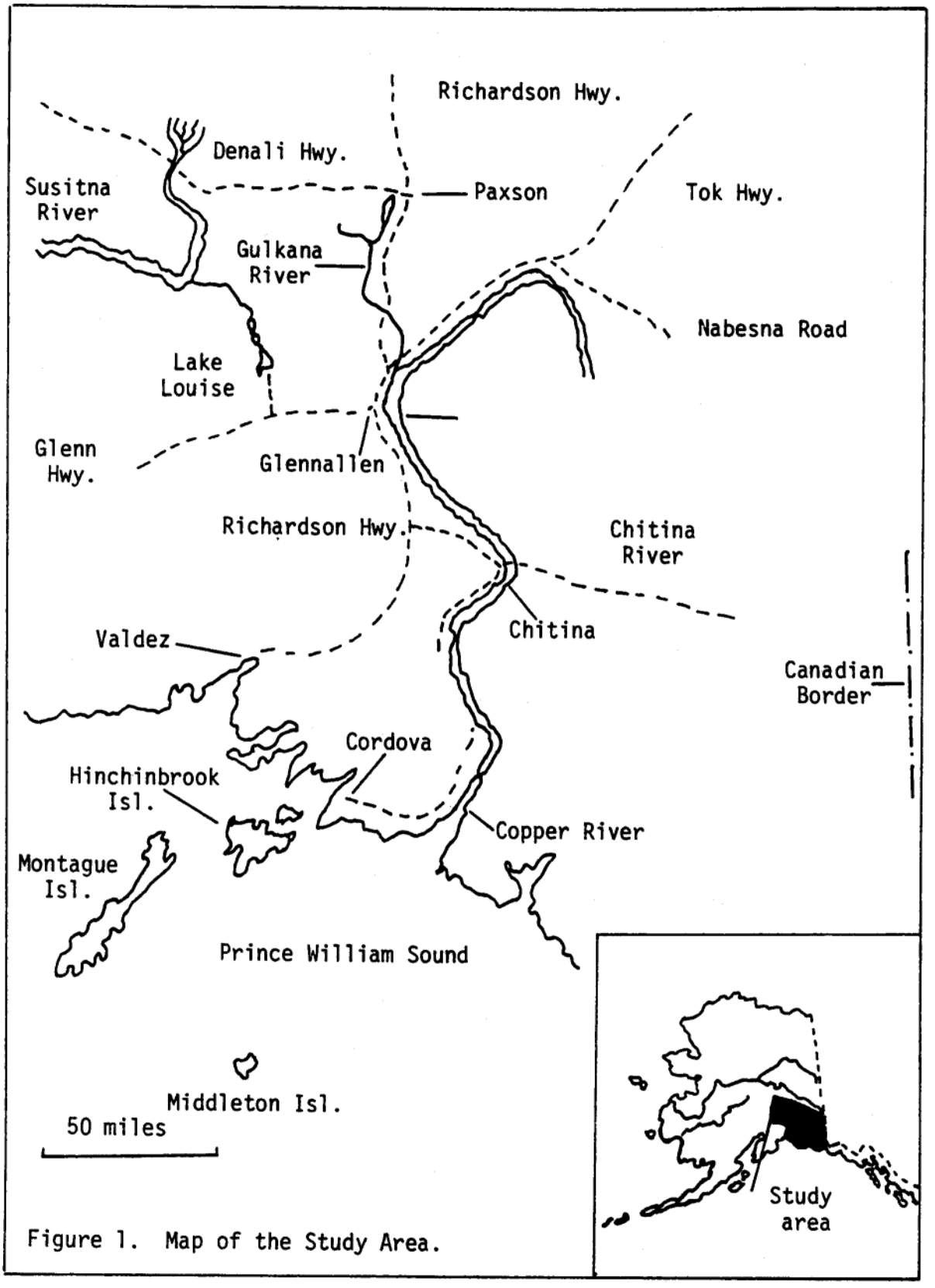


Figure 1. Map of the Study Area.

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 stream-dwelling species most often taken by sport anglers are grayling, Dolly Varden, Salvelinus malma (Walbaum), chinook and sockeye salmon.

Fishing within the Cordova (Prince William Sound) area is primarily commercially oriented. Access to this area is only by boat or aircraft. Sport fishing effort in saltwater is light and primarily for coho salmon, chinook salmon and halibut, Hippoglossus stenolepis Schmidt. Freshwater angling is directed toward coho salmon, cutthroat trout (Salmo clarki Richardson), 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, except for the Eyak River where the fishing effort for coho salmon increased 50% during the period 1979-1980. The limited Cordova area road system (approximately 60 miles in length) affords access to several lakes and streams with 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, chum and coho salmon, as well as bottom fish. All 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 people.

It is expected Valdez will continue to grow and become more industrialized in the future. The 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 in area, polluted and, possibly, the ground water supplies may be adversely affected. Increases in human population often result in additional harassment of spawning salmon, and increased monitoring of the fish stocks may be necessary. Presently the fish stocks are in good condition and there appears to be no need for more restrictive angling regulations at this time. Construction of a private nonprofit hatchery is expected to be completed and operational by fall of 1982 for the production of pink and chum salmon fry and coho salmon smolts.

Activities reported in the following text are directed to 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 run timing and magnitude.

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

Common Name	Scientific Name and Author	Abbreviation
Pink salmon	Oncorhynchus gorbuscha (Walbaum)	PS
Chinook salmon	Oncorhynchus tshawytscha (Walbaum)	KS
Chum salmon	Oncorhynchus keta (Walbaum)	CS
Coho Salmon	Oncorhynchus kisutch (Walbaum)	SS
Sockeye salmon	Oncorhynchus nerka (Walbaum)	RS
Lake trout	Salvelinus namaycush (Walbaum)	LT
Rainbow trout	Salmo gairdneri Richardson	RT
Burbot	Lota lota (Linnaeus)	BB
Sucker	Catostomus catostomus (Forster)	S
Arctic grayling	Thymallus arcticus (Pallas)	GR
Round whitefish	Prosopium cylindraceum (Pallas)	WF
Broad whitefish	Coregonus nasus (Pallas)	WF
Slimy sculpin	Cottus cognatus Richardson	Sc
Cutthroat trout	Salmo clarki Richardson	CT
Dolly Varden	Salvelinus malma (Walbaum)	DV
Pacific halibut	Hippoglossus stenolepis Schmidt	H

2. Monitoring of seismic activities, road and bridge construction, mining, pipeline maintenance and other land and water 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 suited for individual lakes. This can be done by comparing the survival and growth of various strains of rainbow trout, coho salmon and grayling.

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.

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. A creel census of coho salmon fishermen on Eyak River should be conducted. According to the Statewide Harvest Study, fishing effort increased 50% from 1979 to 1980. Escapement counts should be correlated with creel census data.

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 salmon runs are much larger in those years. The last two creel census programs were conducted during even (low run) years.

9. Monitoring of the whitefish fishery in the Slana River should be continued to determine size composition of the catch and any apparent changes in condition of the resource.

10. Limnological studies on selected lakes in the area should be continued to complement the studies of stocked fish survival and growth and to determine the potential for successful establishment of additional sport fisheries.

OBJECTIVES

1. To determine the magnitude of various fish stocks and develop plans for their enhancement.

2. To determine stocking measures and formulate recommendations for the management of area waters.

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 potential 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 collecting fish samples. Each test netting was conducted for a minimum of 16 hours and included 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 used for fish collection.

Conventional fishing gear and spears were used to collect grayling from the Gulkana River and whitefish from the Slana River for age and growth studies.

Swanson River rainbow trout populations in Crater and Tex Smith Lakes were determined by Chapman's Modification of the Schnabel Multiple Census Estimate of Population Size (Ricker, 1975). All fish were captured with fyke nets, enumerated, anesthetized with Ms 222, marked with a left ventral fin clip and released.

Limnological and chemical tests were conducted using a standard Hach field kit, Kemmerer-type, water bottles, Yellow Spring Instrument #57, a Heath kit thermo spotter model MI-104 and a 0.15 meter plankton net with a 130u mesh and detachable bucket.

Swanson River Rainbow Trout Population Estimates

Population estimates initiated in 1980 of Age 1+ rainbow trout in two area lakes were repeated in 1981. Both lakes were planted in October 1979 with rainbow trout at 671/lb. Tex Smith, 17 surface acres, received 4,697 rainbow trout for a total of 276 fish per surface acre. Crater Lake, 16 surface acres, received 4,026 rainbow trout 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 June 1979.

In 1979, both lakes had an existing population of landlocked coho salmon; Tex Smith was last stocked with coho salmon in 1975 and Crater in 1978. In 1981, each lake was fyke-netted for 576 net-hours.

Seventeen coho salmon were captured in Crater Lake for a net frequency of 0.03 fish per net hour. Tex Smith produced no coho salmon so it is assumed they have died. None of the Ennis-Ship Creek rainbow trout planted in Tex Smith in 1976 were captured in 1978 or 1979, also indicating an unsuccessful plant.

In 1980, baited double cone minnow traps were used to capture Swanson rainbow trout. Chapman's Modification of the Schnabel Multiple Census Estimate of Population Size (Ricker, 1975) and adipose clips were used to formulate population estimates.

In 1980, Crater Lake estimates of Age 1+ rainbow trout were 1,651 or a 41% survival with confidence interval of 33 to 51%. In 1981, fyke-netting conducted to support the 1980 estimates and to determine Age II survival estimates produced surprising results. Using 1980 adipose-clipped fish, 1981 estimates of Age 1+ fish were 28% with a 95% confidence interval of 22 to 36% (Table 2). It is felt these intervals are in acceptable ranges to support the 1980 findings. May and June fyke-netting in Crater Lake indicated second year survival of only 320 fish for an 8% survival estimate. In 1979-80, rainbow trout migrated out of Crater Lake through the French drain via a 1-foot x 6-inch stream into Little Crater Lake, which is approximately 200 yards away. It is thought the loss of fish from Crater Lake was again through the French drain even though it was improved in 1980 and 1981. Predation of the Swanson fish by the coho salmon should have been in an equal ratio of clipped to unclipped fish, so the population estimate is considered valid.

In 1980, Age 1+ rainbow trout population estimates in Tex Smith were 1,881 fish for a 40% survival with a 95% confidence interval of 30 to 54%. In 1981, fyke-netting was conducted to support the 1980 estimates. However, second year survival estimates indicated problems with the 1980 estimates. Capture data in May and June 1981 indicated a substantially higher survival than the 1980 data. Support data for 1980 collected in 1981 indicated an Age 1+ rainbow trout population estimate of 3,930 fish for a 84% survival. Second year population estimates of 3,133 rainbow trout or a 67% survival support this data. This high survival is possible because of unique limnological and biological parameters. Tex Smith Lake, with a conductivity of over 400, is quite rich and has had a low biomass of fish for at least 3 years. With low predation, natural fish food would have been allowed excellent growth potential which would greatly enhance rainbow trout survival. It is apparent the outlet control structure has blocked the out-migration of rainbow trout.

In an effort to check minnow trap or fyke net bias, all fish were measured to the nearest millimeter, then comparisons were made between adipose-clipped and all fish captured in 1981 (Figure 2 and 3). These findings indicate no size bias in either capture technique. However, the 1981 findings in Tex Smith Lake support Havens' data (1980) that use of either gear as a single sampling device might lead to erroneous conclusions regarding survival.

Gulkana River Grayling

The Gulkana River had the second highest Arctic grayling sport harvest monitored in Alaska in 1980 (Mills, 1981). An estimated 6,776 grayling were caught and 84% of these were taken by anglers floating the section of the Gulkana River from Paxson Lake to Sourdough (Figure 4). Float fishermen, using rafts, canoes and kayaks, kept only 19% of the grayling they caught (Williams, 1980).

Table 2. Swanson Rainbow Trout Population Estimates in Tex Smith and Crater Lakes, 1980 and 1981*.

Lake	Date Stocked	# Stocked	1980 Population Estimate** Population	% Survival	95% Confidence Interval	1981 Population Estimate Population	% Survival	95% Confidence Interval
Tex Smith	10/10/79	4,697	3,930	84	75-94	3,133	67	36-104
Crater	10/10/79	4,026	1,138	28	22-36	320	8	6-12

* 1980 and 1981 data is compiled from fyke net captured fish.

** 1980 population estimates are from fish captured in minnow traps in 1980, marked, released and recaptured in 1981 fyke nets.

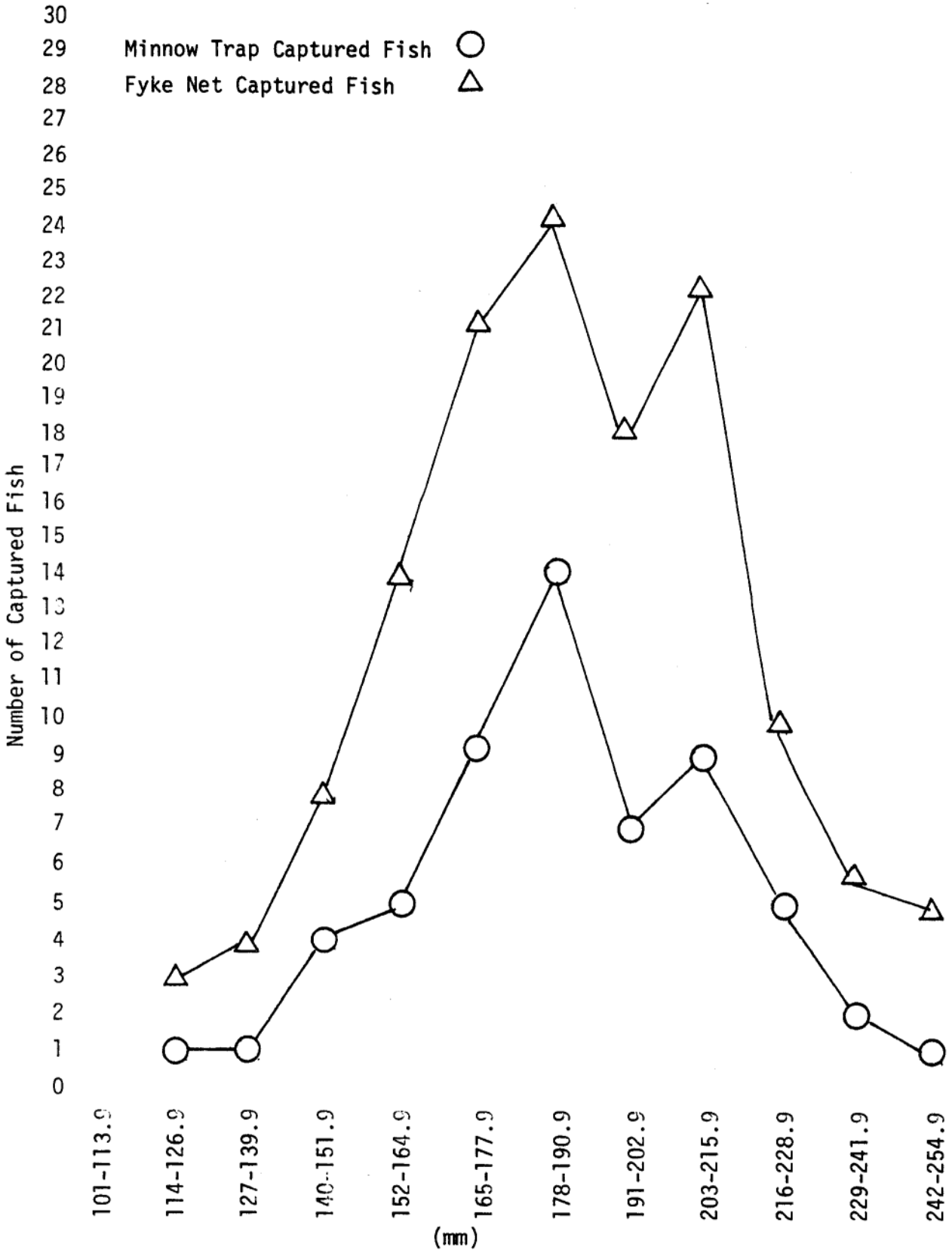


Figure 2. Comparison of Fyke Net and Minnow Trap Catches of Swanson Rainbow Trout in Crater Lake, 1980-1981.

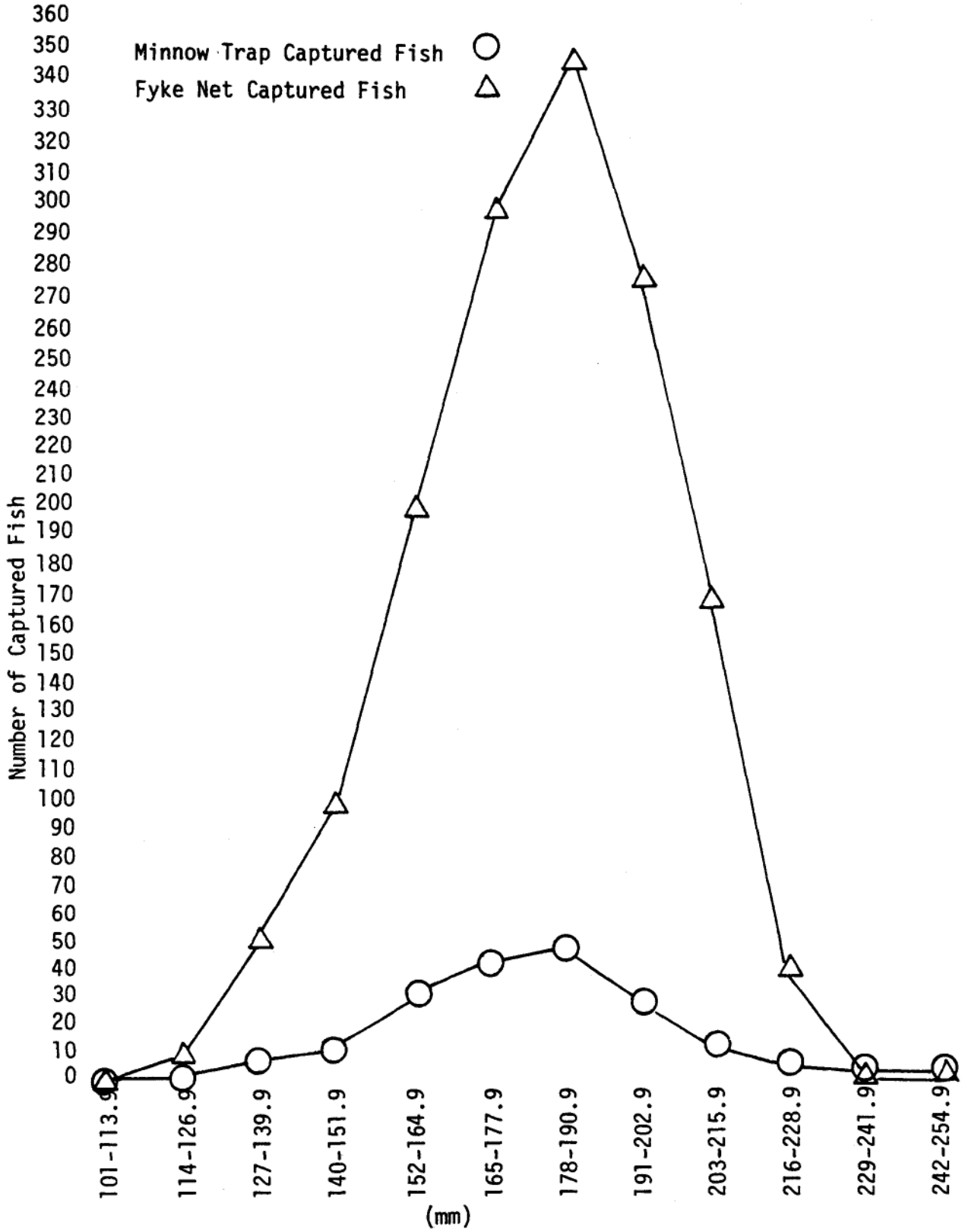


Figure 3. Comparison of Fyke Net and Minnow Trap Catches of Swanson Rainbow Trout in Tex Smith Lake. 1980-1981.

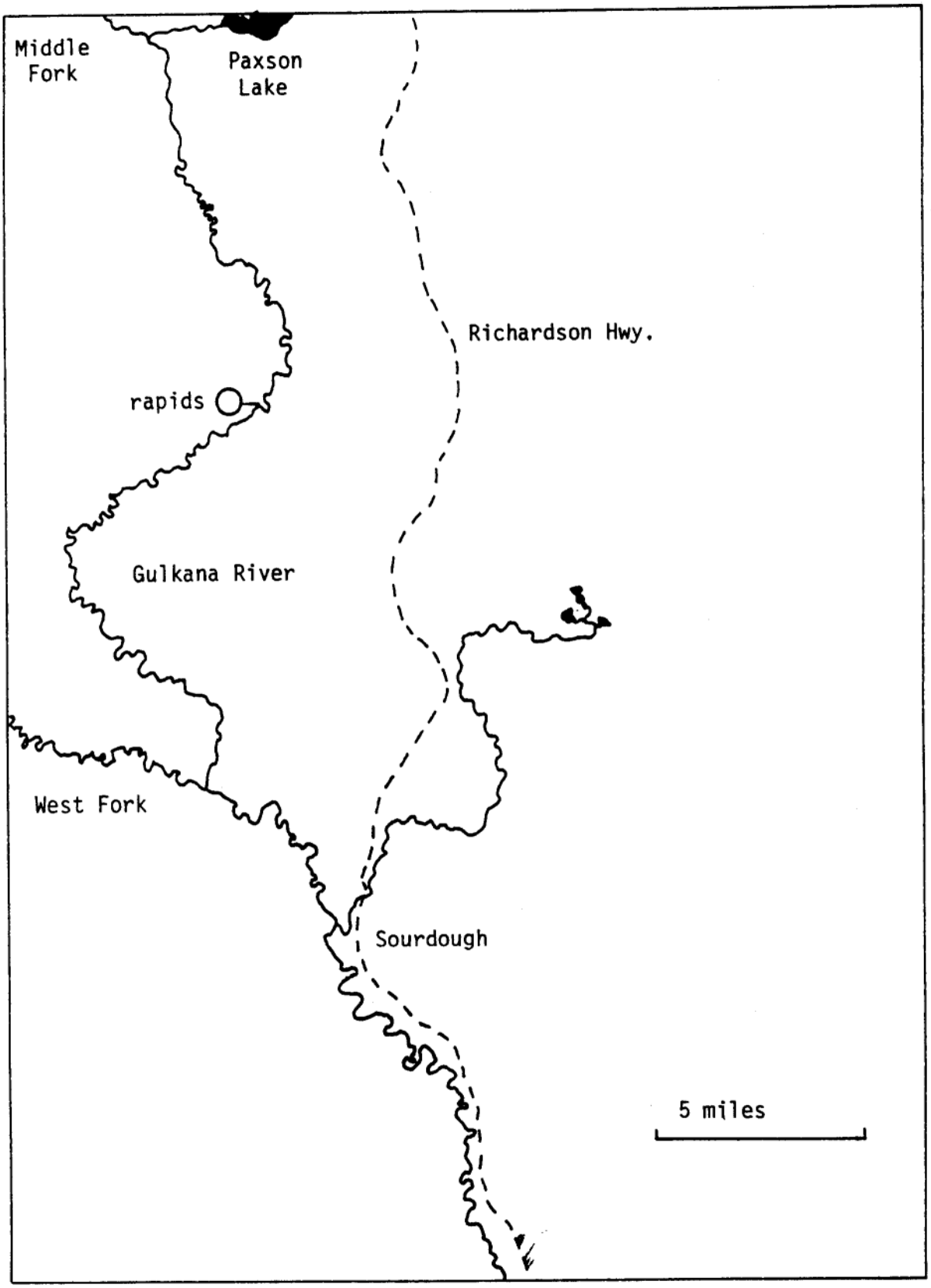


Figure 4. Gulkana River.

Sport Fish personnel of the Alaska Department of Fish and Game have monitored this fishery since 1968 by creel census and test fishing. In 1968 and 1978-1981, the stream was floated and fished by Department personnel. All grayling caught were measured and scaled samples taken. The average length of each float trip was 3 days. Length data from this sampling are shown in Table 3. Although the data indicate a reduction in the maximum size of fish taken, the average fork length is very close for the 5 years recorded. The data from 1978 through 1981 definitely show Age III and Age IV grayling dominate the catch.

In 1979, Age II grayling represented about 18% of the catch (Figure 5); in 1980 this same year class accounted for almost 40% of the creel and, by the time these fish were Age IV in 1981, they represented 61% of the total catch by test fishing. Conversely, Age II fish accounted for 7% of the catch in 1978, 27% Age III in 1979, 23% Age IV in 1980 and 4% Age V in 1981. The 1977 year class much stronger than the 1976 class and is expected to be moderately strong in 1982. The 1978 year class also appears to be stronger than the 1976 year class.

The present bag and possession limit for grayling in the Gulkana River is 10 fish. Reducing this limit would have no effect on the standing crop of grayling since it is essentially a catch and release fishery. Some fishing parties report landing in excess of 100 fish but only keep a few for eating. In spite of an annual increase in angling pressure, this fishery appears to be stable. The catch per unit of effort is impossible to compute since most anglers cannot give an accurate account of how much time they actually fished during a 3- to 4-day float trip.

Population Sampling, Managed Lake

Bear Cub Lake was treated in 1973 with retenone to remove a small population of whitefish, grayling, longnose suckers and burbot. The small outlet is blocked by an old, active beaver dam that appears to be impervious to fish passage.

The lake has been stocked with coho salmon in 1974, 1975, 1977, and 1979. In 1975, on year after the initial stocking 53 coho salmon were captured for a net frequency of 2.20 fish per hour. The test netting in 1979 and 1981 was done two years after coho salmon were stocked (1977 and 1979), and the net frequency was only 0.00 and 0.23 fish per net hour respectively.

The low net catch of coho salmon, two years after being stocked, strongly indicates that they migrate out of the lake during their second year of residency. Unless an outlet control structure can be installed, future stocking of salmon should be curtailed.

Two Mile and Three Mile Lakes, located near Chitina, were stocked in 1979 with 2,000 and 1,900 Talarik Creek rainbow trout fry, respectively. The lakes are approximately 20 acres in size when test netting was conducted in 1981 (Table 4). Six rainbow trout and 99 grayling were taken from Three Mile Lake, and only two grayling were caught in Two Mile Lake.

Table 3. Length Data from Gulkana River Arctic Grayling, 1968, and 1978-1981.

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
1981	145	190-390	287

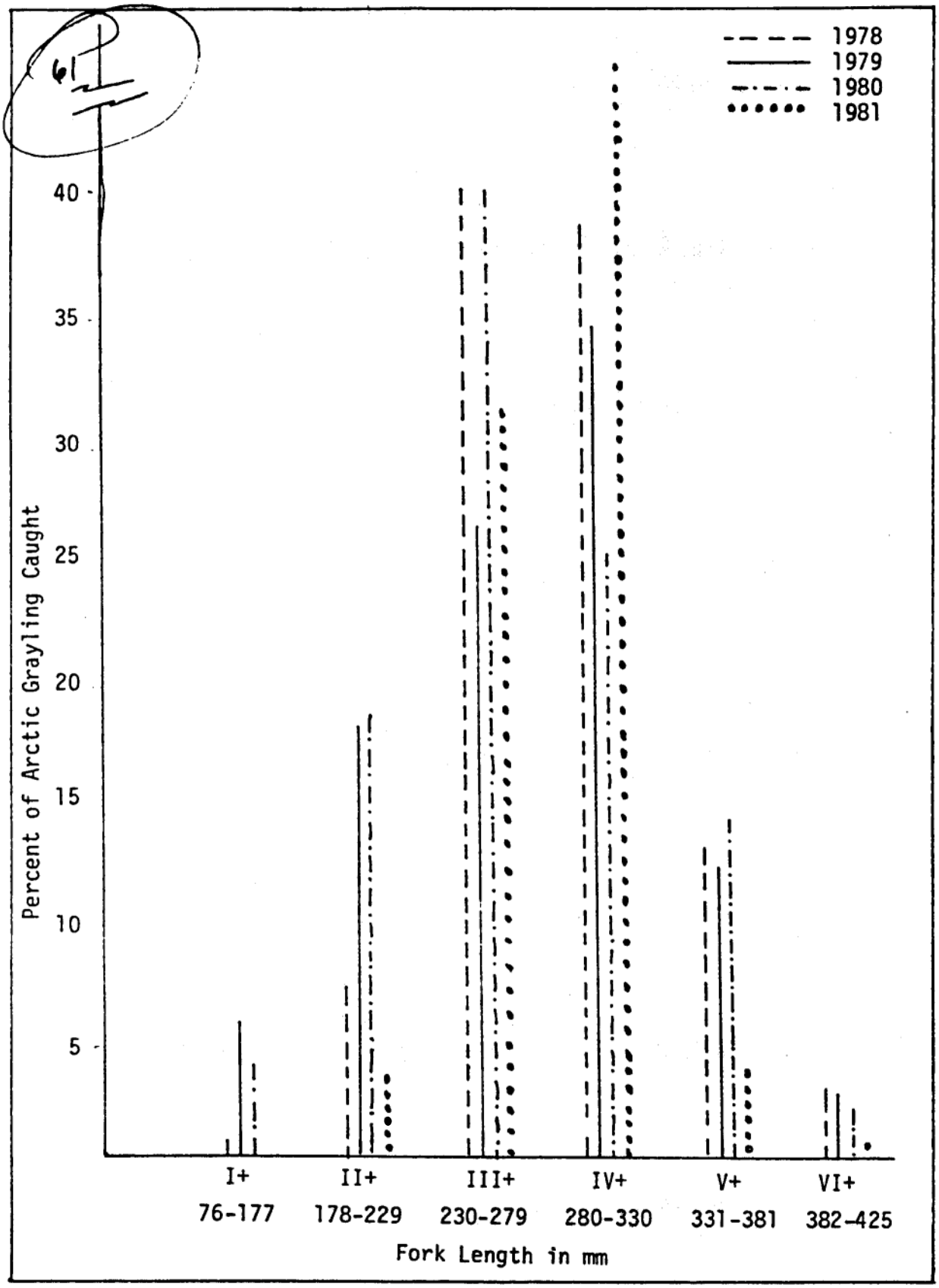


Figure 5. Age and Length Frequency of Gulkana River Grayling, 1978, 1979, 1980, and 1981.

Table 4. Gill Net Summary of Previously Surveyed Lakes, Copper River and Susitna River Drainage, 1981.

Name	Location	Number of Fish	Species*	Length Range (mm)	Mean Length (mm)	Frequency**	Percent Composition
Bear Cub	T12N R9E S29	30	WF	190-305	265	1.13	75
		6	SS	258-285	270	0.23	15
		4	SK	115-225	193	0.15	10
Buffalo	T3N R7W S2 SE 1/4	7	SS	272-335	295	0.30	100
Connor	T6N R7W S28 SW 1/4	15	GR	167-353	202	0.67	100
Dick	T13N R1W S31	1	GR	395	395	0.03	100
Forgotten	T4N R7W S10 NC 1/4	19	GR	130-345	272	0.39	86
		3	BB	235-435	332	0.06	14
Gergie	T3N R7W S14	48	GR	103-390	248	1.05	50
		48	SK	95-510	318	1.05	50
Gillispie	T12N R1W S30	14	GR	176-334	273	0.53	52
		10	SK	195-310	222	0.38	37
		2	RS	605-680	643	0.08	7
		1	WF	300	300	0.04	4
Hallie	T21S R11E S20	23	SS	165-215	186	7.70	100
Kettle	T9N R11E S18	3	SK	195-345	252	0.21	100
Little Junction	T4N R6W S32 SE 1/4	63	GR	211-260	241	2.57	100
Mirror	T3N R8W S23	26	RT	110-135	122	1.12	54
		21	GR	140-390	305	1.03	44
		1	SK	500	500	0.02	2

Table 4 (Cont.). Gill Net Summary of Previously Surveyed Lakes, Copper River and Susitna River Drainage 1981.

Name	Location	Number of Fish	Species*	Length Range (mm)	Mean Length (mm)	Frequency**	Percent Composition
Octopus	T21S R11E S30	22	WF	185-430	306	1.07	79
		6	LT	420-673	545	0.29	21
Old Road	T4N R2W S14,15	0	0	0	0	0	0
Peanut	T4N R7W S16	6	SS	230-305	258	0.27	100
Round	T4N R7W S14,15	3	SS	240-260	248	0.75	75
		1	RT	100-110	105	0.25	25
Sculpin	T4S R7E S16	45	SS	220-275	253	1.08	94
		3	RT	420-440	435	0.07	6
Spring Creek Lake	T12N R1W S4	36	GR	122-410	297	0.76	96
		1	Sc	120	120	0.02	3
Squirrel Crk. Gravel Pit	T2SR1E S26	5	GR	190-330	274	1.66	71
		2	RT	118-128	123	0.66	29
Strelna	T4S R7E S7	35	SS	203-275	227	1.35	97
		1	RT	514	514	0.04	4
Three Mile	T3S R5E S35	104	GR	122-265	231	2.50	92
		9	RT	175-380	274	0.22	8
Tolsona	T4N R5W S24	62	SK	115-420	288	1.30	91
		5	GR	95-195	155	0.11	7
		1	BB	150	150	0.02	2
Two Mile	T4S R5E S2	2	GR	226-315	171	0.12	100

Table 4 (Cont.). Gill Net Summary of Previously Surveyed Lakes, Copper River and Susitna River Drainage, 1981.

Name	Location	Number of Fish	Species*	Length Range (mm)	Mean Length (mm)	Frequency**	Percent Composition
Van	T4S R7E S21	145	SS	210-260	239	4.30	100
Worthington	T9S R3W S1	1	RT	395	395	0.04	100

* Species

GR - Grayling
SS - Coho salmon
Sk - Sucker
BB - Burbot
WF - Whitefish
RT - Rainbow trout
LT - Lake trout
Sc - Sculpin

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

Rainbow trout have been stocked in these lakes during 10 different years since 1960. Test netting six times since 1960 has always produced a preponderance of grayling over rainbow trout in the catch (389 grayling and 47 rainbow trout in total). A small outlet exists in both lakes and the trout are either escaping or are not able to compete with the wild grayling population.

Kettle Lake is a small, 6-acre lake on the Nabesna Road. The lake has a native population of suckers and sculpin. The lake was stocked with lake trout in 1967 and coho salmon in 1976 and 1979. Lake trout were caught during test netting in 1968, 1971, 1973 and 1976. During test netting in 1977 and 1981, only suckers were captured, although two coho salmon were taken by rod and reel in 1977.

Kettle lake has a maximum depth of 32 feet and has no outlet. The inlet runs a short period of time during breakup. While no winter dissolved oxygen tests have been made, the concentration is considered adequate because of the survival of lake trout until at least 1976.

Little Junction Lake, 5 acres in size and barren of fish, was stocked in 1978 with grayling fry. Test netting in 1981 resulted in the capture of 63 fish for a net frequency of 2.57 per hour. Most of the fish appeared to be mature and some of the females extruded eggs during handling. An experimental grayling egg take will be made at this site in 1982. This lake is only about ½ mile from Junction Lake, which will also be used as an experimental egg take site in 1982.

Tolsona Lake has been test netted and dissolved oxygen determinations taken since 1963 (Table 5). During the 19-year period, winter dissolved oxygen concentrations have ranged from 0.5 to 7.0 ppm and averaged 3.0. One partial winter-kill was documented in 1971 when the D.O. concentration went down to 0.5 ppm.

Test gill nets have been set in the same locations and the same approximate time interval each year. The net frequency of grayling has varied from 0.11 to 4.27 fish per hour and averaged 1.80. The lowest catch of grayling was the 0.11 recorded in 1981. The net frequency for suckers has varied over the years from 0.00 to 11.10 and averaged 1.83 fish per hour.

Grayling eggs have been taken from Bessie Creek (tributary to Tolsona Lake) since 1965, with the exception of 1969, 1971, 1980 and 1981. During 1969, the stream was dry and in the other years there were no fish using the stream for spawning.

To supplement the population of grayling, the lake has been stocked 11 times since 1968. The number of grayling fry stocked has ranged from 75,000 to 280,000, with the exception of 1979 when only 35,000 were available. These latter fish were in very poor condition and the survival was questionable. Fifteen of the 23 grayling taken by nets in 1980 were Age II and could have been a result of the 1978 plant. No Age I+ grayling were taken in 1980 which implies that the plant made in 1979 was unsuccessful.

Table 5. Dissolved Oxygen Concentrations and Grayling Population Data for Tolsona Lake, 1963-1981.

Year	Lowest* D.O.'s PPM	Gayling Stocked	Grayling* Trapped at Bessie Cr.	Net Freq.*** for Gayling	Suckers
1963	6.5			0.56	0.00
1964	3.5				
1965	4.0		2,000+	2.3	0.64
1966	3.5		925	4.27	0.71
1967	4.0		671	0.14	1.20
1968	1.5	100,000	204	0.50	1.80
1969	1.0	175,000	Creek dry	1.05	1.36
1970	2.5	100,000	480	2.18	0.24
1971	0.5		Didn't trap	1.66	0.20
1972	3.0	180,000	416	2.10	0.25
1973	1.5	75,000	700	2.74	0.71
1974	1.0		500	2.25	0.45
1975	7.0	80,000	1,000+	2.25	11.10
1976	1.0	280,000	750	2.48	5.44
1977	1.0	80,000	774	4.0	4.00
1978	2.0	80,000	635	2.47	0.73
1979	5.0	35,000	220	0.74	1.58
1980	5.0		26	0.52	1.16
1981	4.0	92,823	Didn't trap	0.11	1.30

* 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 requirments were trapped.

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

Grayling stocked in 1978 were in good condition and during the following winters the lake had good dissolved oxygen concentrations. In 1979, only one Age I grayling was taken and, in 1980, 15 (65%) of the grayling caught were Age II. In 1981, no Age III grayling were taken.

Population Sampling, New Lakes

In 1981, five previously unsurveyed lakes were investigated to determine physical and biological characteristics.

Barbara and David Lakes are located approximately 1 mile from the Lake Louise Lodge and are accessible by trail. These lakes are connected by a small stream and drain into Lake Louise. Test netting captured whitefish (Table 6) from Barbara Lake. Unidentified fish were seen in David Lake, but none were taken with the test gill net. Because the lakes are connected by a stream, it is presumed that the same species are found in both lakes.

These lakes appear to be deep enough to overwinter fish (Table 7). However, winter oxygen determinations will be made to confirm this. David and Barbara Lakes would probably support a population of stocked grayling, coho salmon or rainbow trout, however, outlet structures would be required to retain the latter species.

Mary Lou Lake is located approximately 1/2 mile east of Mile 12.75 Lake Louise Road. The lake is 21 feet deep and has no inlets or outlets. No fish were caught during test netting. Winter dissolved oxygen concentrations of 6-7 ppm are adequate to support trout or salmon populations. A productivity (plankton) study is presently being conducted on this lake. An experimental plant of salmonids will be made when the studies are completed.

Katherine Lake is 3/4 mile east of Mile 12.75 Lake Louise Road. A foot and ATV trail provides easy access. The lake is 26 feet deep and there is a small intermittent outlet which drains into a swamp area. During test netting one burbot was taken. Winter dissolved oxygen concentrations were measured at 9 ppm at a depth of 5 feet. A plankton study is being conducted on the lake at this time. The lake appears to have a good potential for establishing a grayling, rainbow trout or salmon fishery; however, an outlet structure will be required before the latter two species would be introduced.

Little Lake Louise is located 3/4 mile east of Lake Louise and accessible by foot, aircraft or ATV. The lake drains through Little Lake Louise Creek to Lake Louise. During test netting lake trout, whitefish and suckers were taken. Grayling are known to inhabit the outlet so they are considered present in the lake. Little Lake Louise has a maximum depth of 95 feet. There is only light fishing pressure on this lake and is restricted primarily to local residents.

Experimental Egg Take

Junction Lake is a small (18 acres) lake located at 0.5 Mile on the Lake Louise Road. This lake has a maximum depth of 19 feet and has no outlet or inlet. This lake was found to be barren of fish and was first stocked with grayling in 1966, and has been stocked seven times since.

Table 6. Gill Net Summary of Previously Unsurveyed Lakes, Copper River and Susitna River Drainages, 1981.

Name	Location	Number of Fish	Species*	Length Range (mm)	Mean Length (mm)	Frequency**	Percent Composition
Barbara	T6N R7W S22 SE 1/4	39	WF	180-430	308	0.93	100
David	T6N R7W S22 NW 1/4	0	--	Net Tangled - Fish Observed Rising			0
Katherine	T5N R7W S10 SW 1/4	1	BB	254	254	0.01	100
Mary Lou	T5N R7W S10 SW 1/4	0	--	0	0	0	0
Little Lake	T6N R8W S11,12,13	41	SK	210-480	429	0.87	59
Louise		28	WF	200-465	278	0.59	40
		1	LT	585	585	0.02	1

* Species

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

** Frequency is number of fish per net hour.

Table 7. Physical and Biological Data from Previously Unsurveyed Lakes in the Copper River and Susitna River Drainages, 1981.

Lake	Surface Area Acres	Maximum Depth (ft.)	Percent of Shoal Area	Fish Species* Present	Location by Drainage
Barbara	40	35	10	WF	Susitna River
David	20	25	80	?	Susitna River
Katherine	30	26	60	BB	Copper River
Mary Lou	18	21	50	None	Copper River
Little Lake Louise	1,200	95	15	LT,WF,SK,BB	Copper River

* Species

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

? Unidentified fish were seen but not taken in test nets.

Five fyke nets were set in the lake on May 16, 1981, and 316 grayling were caught by May 19. On May 19, 132 grayling were stripped and 87 males were used to fertilize the eggs. A total of 660,190 eggs were obtained for an average fecundity of 5,000 eggs per female. Only 13 of the females were green and 53 of the grayling captured were immature. The surface water temperature was 47°F.

Three hundred nine of the fish captured were marked by removal of the adipose fin. The lake was again trapped 2 days in June and only 33 fish were caught, of which 14 were marked. It was thought the fish were in deeper water because of the rise in the water temperature. The 33 grayling were also marked by removal of the adipose fin.

On September 11, fyke nets were again fished in Junction Lake. In 107 net hours, 28 grayling were caught. Twenty-five of these were Age 0+ fish that ranged in fork length from 80 to 115 mm. Two of the fish were marked and one was unmarked. The Age 0+ fish were stocked as fry on June 11, 1981.

In 1982, fyke-trapping will be continued at Junction Lake to determine the value of the fishery as a continuing egg take source and to conduct populations estimates.

This lake is adjacent to the Lake Louise Road and receives some fishing pressure, although the exact affect on the population is unknown since no creel census is conducted. Regular stocking of this lake will be necessary to maintain the population.

Port Valdez Stream Surveys

Foot surveys were conducted on salmon spawning streams at the eastern end of Port Valdez (Figure 6). Counts were made in July and October. A list of the streams enumerated is shown in Table 8. In 1981, pink salmon counts were made twice during July because of the larger than normal run of fish. The results of these surveys are shown in Table 9. In 1981, a total of 75,069 pink salmon were counted---the highest foot count recorded.

Coho salmon counts were conducted in October. A record count of 7,725 fish was made. The largest increase in coho salmon numbers was noted in 6.5 Mile Creek, a tributary of the Lowe River. The 5-year average was 694 coho salmon and, in 1981, 2,858 were counted. This was the first year since 1977 adult coho salmon numbers in the Lowe River drainage were higher than in the Robe Lake system. In the past, Corbin Creek, tributary to Robe Lake, has always been the greatest producer of coho salmon.

Chum salmon numbers were also the highest recorded since 1973, and 3,292 were enumerated. The sockeye salmon count was low in 1981 because of poor counting conditions in Brownie Creek, the major spawning area for this species. Sockeye salmon were observed schooling in Robe Lake, at the mouth of Brownie Creek, but counts were not possible.

In 1981, two additional streams were counted for the first time. These streams are less than 400 yards long and tributies to 6.5 Mile Creek and Mineral Creek, respectively. A total of 940 adult pink salmon and 16 coho salmon was counted in these two streams.

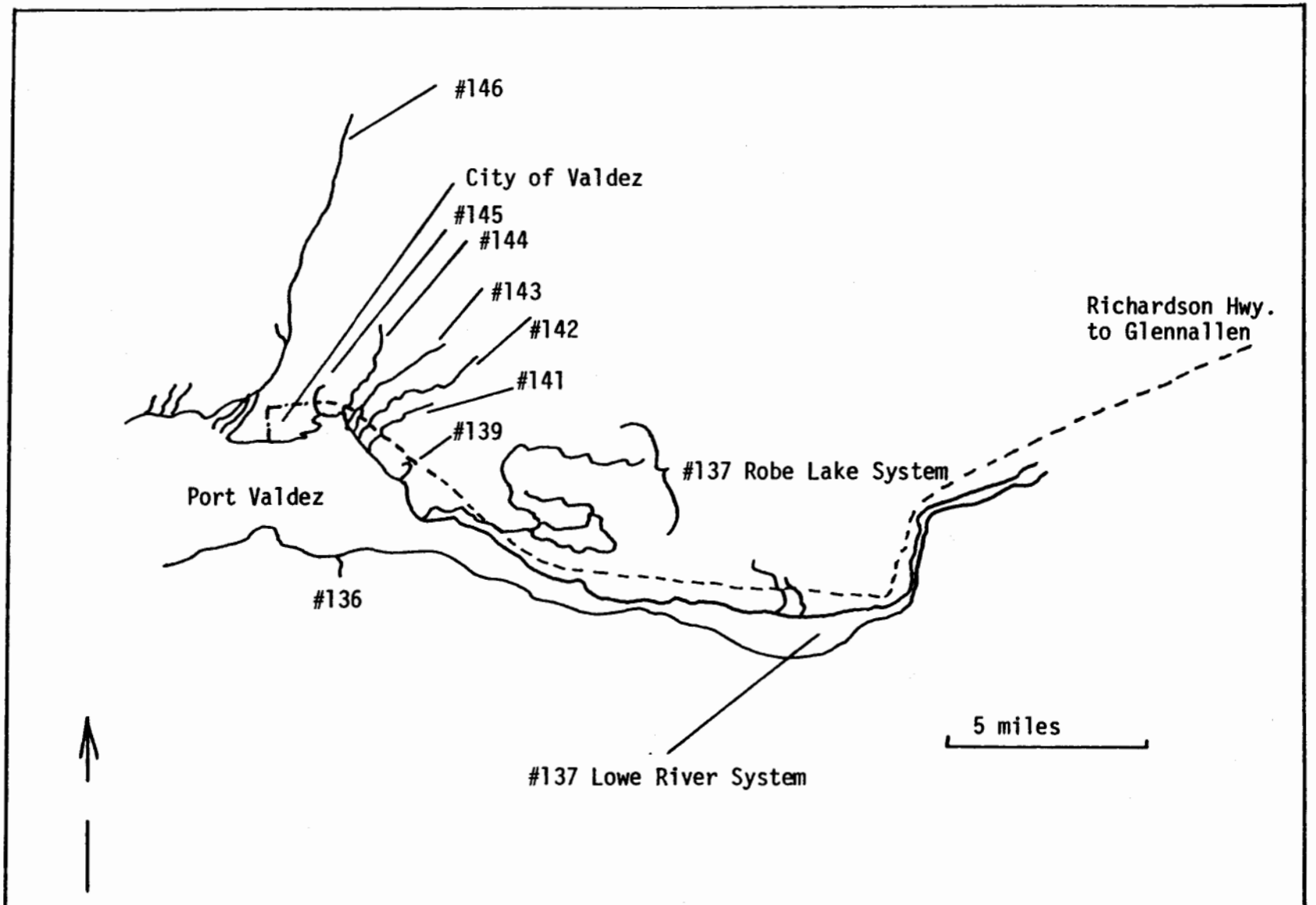


Figure 6. Salmon Spawning Streams in Upper Valdez Bay.

Table 8. Valdez Salmon Enumeration.

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 Blondeau Creek

Table 9. Port of Valdez Salmon Counts, 1974-1981.

	#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
Pink Salmon								
1974		N/C	N/C	262		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	66	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
1981	2,868	6,500	1,557	18,400	10,593	31,045	3,870	418
Chum Salmon								
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
1981	0	114	16	3	0	1	3,000	158
Coho Salmon								
1974		N/C	1,662	0		0	0	0
1975		1,506	1,533	0		0	0	16
1976	0	1,310	1,049	0		0	2	66
1977	0	1,363	1,522	0	0	0	0	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
1981	0	4,516	3,125	0	0	0	0	84

Table 9 (Cont.). Port of Valdez Salmon Counts, 1974-1981.

	#139 Sewarge Lagoon	#139 Lowe River System	#139 Robe Lake System	#141 Loop Road I	#142 Loop Road II	#143 Siwash	#145 City Limits	#147 Mineral Creek System
Red Salmon								
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
1981	0	20	229	0	0	0	0	0

N/C = No count taken

There are several streams on the south side of Valdez Bay that have small runs of pink, chum and coho salmon. Counts are not possible every year due to poor water conditions, and surveys that have been made are not included. In 1981, incomplete counts in these streams showed 275 pink salmon in Solomon Gulch Creek, 4,107 in Abercrombie Creek and 632 in the Dayville Road streams. These are the highest counts recorded for this area.

The Dayville Road streams are very short and most of the spawning occurs in shallow, intertidal ponds which were created when the road to the Alyeska Pipeline Terminal was constructed. The depth and size of these three ponds are dictated by tidal action.

Adult pink salmon returns in Valdez Bay are of a cyclic nature and always much higher during odd years. In early August, heavy rains created flood conditions in the streams at the eastern end of the Bay. The effects on deposited pink salmon eggs are not known; however, a fry sampling program may be initiated in selected streams in early 1982 to secure base data for future evaluations.

Slana River Whitefish Fishery

A length comparison of sport-caught whitefish taken from the Slana River near Mentasta from 1964 through 1981 is shown in Table 10. The population is composed of both round and humpback whitefish. Since there is no apparent size differential between species, they are grouped together.

This fishery occurs at night during October when the glacial-fed river clears. Lanterns are used for illumination and the whitefish are harvested with spears.

Historically, this fishery has generated considerable participation, thus generating fear of overexploitation of the resource. In 1980, however, land ownership changed from the public sector to private ownership. Indications are this change has diminished the effort by sport fishermen. During 5 sample nights in 1981, only 37 anglers were contacted. Fishing conditions were excellent and there appeared to be a good population of whitefish in the river. In 1981, the average length of 370 mm is an insignificant increase of 13 mm over an 18 year period.

Dissolved Oxygen Determinations

Dissolved oxygen determinations were made in 30 lakes in the Copper River and upper Susitna River drainages during February, March and April 1981 (Table 11). Ice thickness ranged from 23 to 45 inches and dissolved oxygen concentrations ranged from 0.0 to 9.0 ppm.

Five of these lakes had D.O.'s less than 3 ppm. Only two of these lakes, Mae West and Moose, support fish populations and both have a history of occasional winter-kill.

Thirteen of the lakes support stocked populations of salmonids, and the dissolved oxygen concentrations in these waters ranged from 4.0 to 9.0 ppm.

Table 10. Length Data of Slana River Whitefish, 1964-1981*.

Date	No.	Fork Length Length Range	Average
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"
10/12/72	50	320 -430 mm 12.5" - 17"	368 mm 14.5"
10/16/74	12	242 - 413 mm 9.5" - 16.3"	380 mm 16.25"
10/21/75	101	283 - 423 mm 11" - 16.4"	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 - 394 mm 10.5" - 15.5"	349 mm 13.75"
10/13/80 - 10/25/80	144	280 - 490 mm 11" - 19"	368 14.5"
10/02/81 - 10/16/81 (5 sample nights)	262	340 - 480 mm 13 3/8" - 18 3/4"	370 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.

Table 11. Dissolved Oxygen Concentrations of Selected Lakes in the Cooper River and Susitna River Drainages.

Lake	D.O.* (ppm)	Ice Depth (in.)	Snow Depth (in.)	Date
Crater	8	23	12	2/26/81
Little Crater	5	23	12	2/26/81
Tex Smith	5	26	9	2/26/81
Three Mile	6	32	2	3/03/81
Two Mile	8	32	2	3/03/81
Buffalo	7	28	13	3/12/81
Smokey	0	26	16	3/12/81
Junction	7	26	12	3/12/81
Cora's Pond	0.5	29	12	3/12/81
Mirror	4	26	12	3/19/81
Connor	9	26	11	3/19/81
Elbow	9	27	10	3/19/81
Forgotten	7	28	12	3/19/81
Tiny	9	26	13	3/20/81
Peanut	7	24	8	3/20/81
Forty Foot	8	24	8	3/20/81
Teal	4	26	8	3/20/81
Stick	1	24	11	3/20/81
Squirrel Cr. Gravel Pit	7	29	6	3/26/81
Round	7	26	8	3/31/81
Old Road	7	27	12	3/31/81
Caribou	6	24	12	4/10/81
Mae West	2	24	7	4/01/81
Bearcub	4	45	3	4/03/81
Mary Lou	6	29	12	4/07/81
Tolsona	4	37	6	4/07/81
Moose	2.5	37	8	4/07/81
Katherine	9	29	12	4/07/81
North Jan	6	29	8	4/14/81
South Jan	5	32	6	4/14/81

* All samples taken at a depth of 5 feet.

Solomon Gulch Hydroelectric Plant and Hatchery

Construction of the Solomon Gulch Hydroelectric complex, near Valdez by the Copper Valley Electric Association, was completed in 1981 and become operational in January 1982. This project included reconstruction and raising of an old existing dam on Solomon Gulch Lake (Figure 7). This increased the maximum surface area from 100 acres to 486 acres and the volume from 1,700 acre feet to 31,500 acre feet. The maximum water level was increased from elevation 608 to elevation 685.

Two 4-foot diameter steel penstocks carry the water 3,700 feet from the dam to the power house, located at tidewater. The annual output of this plant is 45,000,000 kilowatt hours. A 104-mile transmission line connects the power house with the upper Copper River area.

The tailrace empties into Solomon Gulch Creek in the intertidal zone. The maximum flow in the tailrace will be 149 cfs. The length of the tailrace is about 100 yards and is lined with rock to prevent erosion. Observations will be made to determine if the tailrace area can provide an additional spawning area for pink salmon. It is expected that adult salmon will enter the tailrace, but appropriate gravel would have to be added to provide the proper substrate for spawning.

During periods of high energy use and low water flows (late winter), the natural stream could be dewatered. In order to protect eggs and fry in the gravel, the owners of the hydro plant are required to maintain a minimum flow of 9 cfs in the natural stream. This is accomplished by pumping water from the tailrace to a point just above the first fish barrier falls in Solomon Gulch Creek. The operation and maintenance of this additional water supply is the responsibility of the owners. A stream flow gauge will be installed below the dam to measure the natural water flows.

A private non-profit fish hatchery is planned for the Valdez area and will be located on a land fill across the Dayville road from the power plant. The hatchery will be constructed and operated by the Valdez Fisheries Development Association, and water for the hatchery will be taken from the tailrace. Also, 5 cfs of the hydro plant cooling water will be available, at 55°F, for temperature manipulations in the hatchery.

Pink salmon eggs taken at Siwash Creek are to be incubated and hatched at the Valdez Fisheries Development Association scientific and education facility at Crooked Creek. The fry are then to be transferred to Solomon Gulch Creek for imprinting and release.

The returning adults will be trapped and eggs taken for hatchery use. This will probably eliminate the natural run of pink salmon into Solomon Gulch Creek, which averages 50 to 250 fish annually. If the natural run of pink salmon is eliminated, there will be no need for spawning area development in the tailrace or minimum flow requirements in the natural stream.

During a tour of the power plant in January 1982, a strong odor of hydrogen sulfide was noted at the tailrace. The water used for power production is taken 20 feet above the bottom of the reservoir to reduce debris and silt going into the turbines. The Valdez Fisheries Development Association is

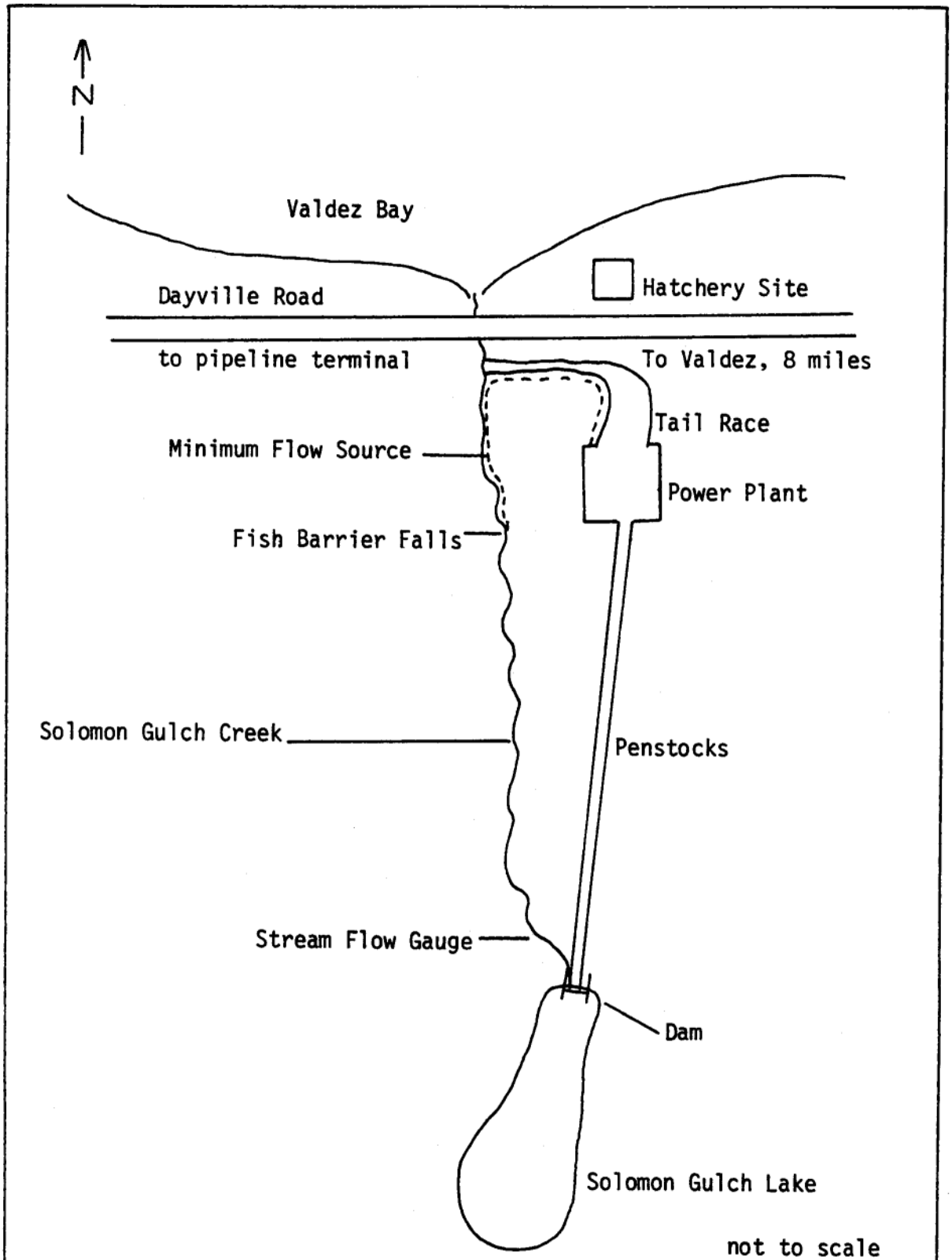


Figure 7. Solomon Gulch Hydro Power Complex

presently conducting tests of the tailrace water to determine the concentrations of the hdyrogen sulfide gas because of its possible detrimental effects on eggs and fry. If the concentrations are high and remain so, mechanical aeration may be needed to purge the gases.

Limnological Sampling

Collecting of limnological data from Katherine and Mary Lou Lakes was initiated in 1981. A basic limnolgical method available for indicating the general nutritive condition of a lake is measurement of plankton abundance. In April 1981, a monthly schedule of collecting zooplankton samples was initiated. This program has been functional through January 1982 except for the months of September, October and December when unsafe ice or extreme cold weather suspended field work.

Two vertical hauls using a 0.15 meter plankton net with a 130u mesh and detachable bucket were taken in the same station in Katherine and Mary Lou Lakes each month (Figures 8 and 9). Plankton are fixed in a 5% formalin solution, then shipped to the Division of Fisheries Rehabilitation and Enhancement Development (FRED) lab for analysis. A summary of captured zooplankton for each lake is given in Tables 12 and 13. In conjunction with the plankton samples, dissolved oxygen and thermal profiles were taken and presented in Tables 14 and 15.

Seasonal plankton variation is of particular noteworthiness. High plankton counts peaking in August are undoubtedly correlated to high nutrient levels and extended solar radiation. The pattern of decline in winter months is contributed to utilization of available nutrients and the loss of solar radiation.

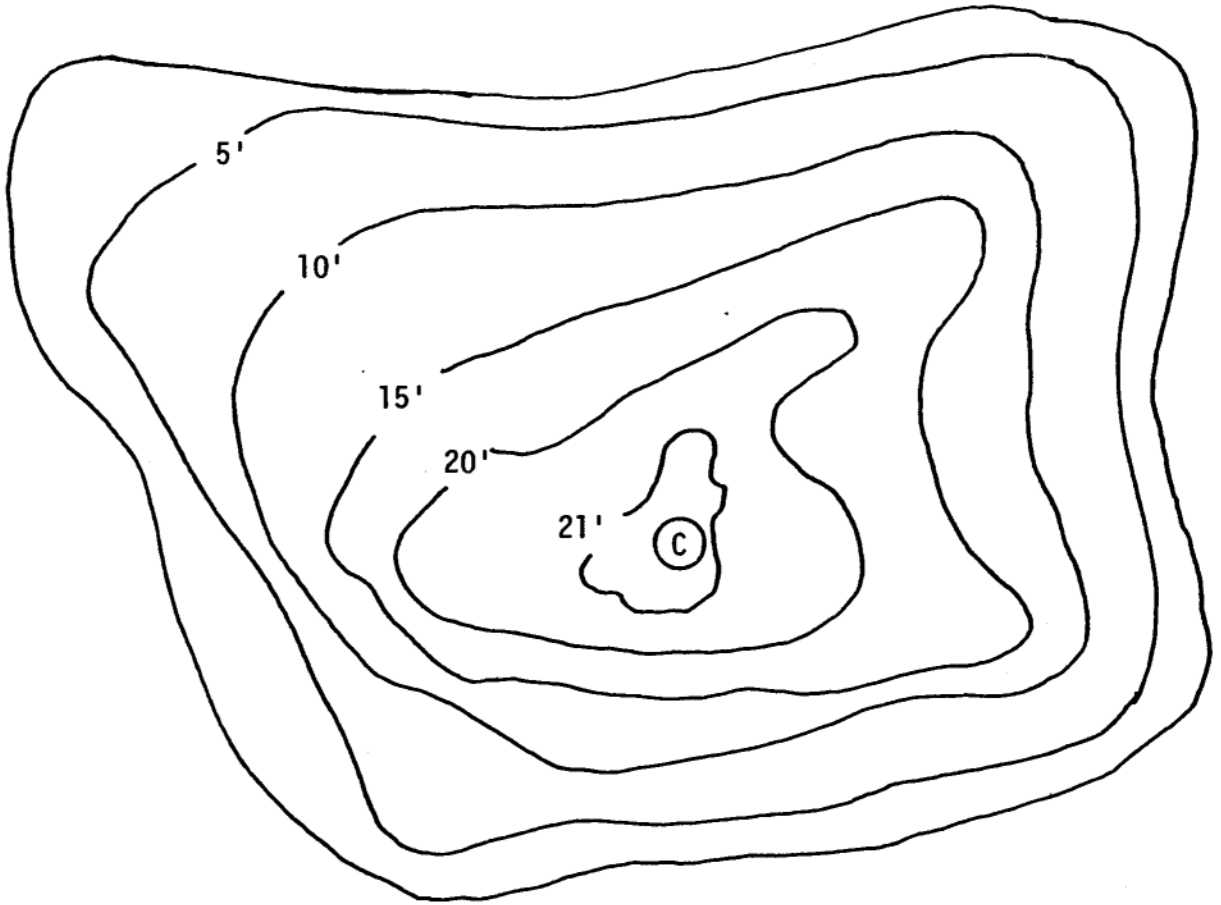
Identification of captured zooplankton is to genus and species with the dominant species being members of Copepoda, Rotifera and Cladocera in descending order. Members of the species Copepoda and Cladocera are considered usable organisms.

In late May, water samples were collected; conductivities using a Hach model 2511 conductivity meter and alkalinities using a Hach pH meter model 2075 were measured. Mary Lou Lake had a conductivity of 62 and a pH of 7.5, while Katherine Lake had a conductivity of 53 and a pH of 7.5.

Chinook Salmon Escapement

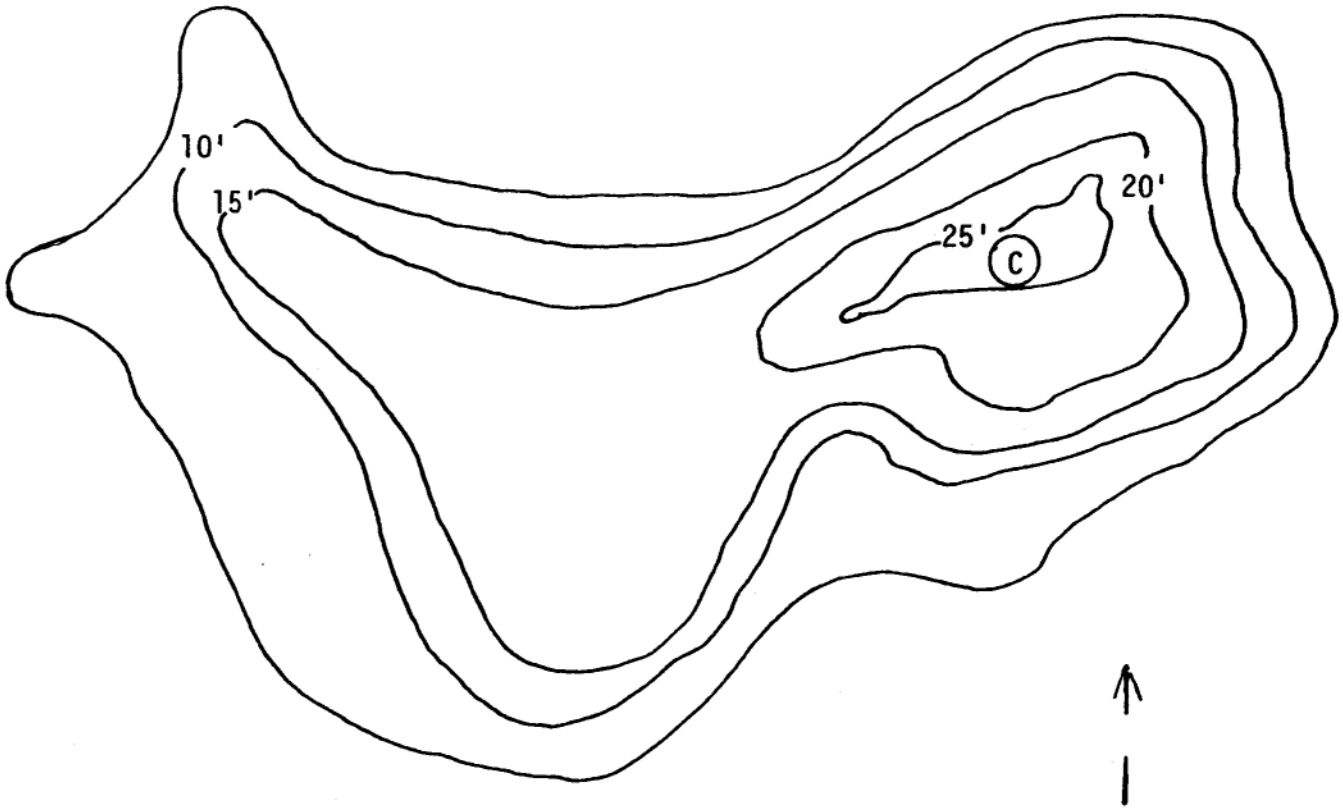
In 1981, aerial surveys of chinook salmon were difficult because of heavy rains, cloudy weather and muddy water. Counts of the Gulkana River were attempted several times but always aborted because of poor conditions. No determination of 1981 chinook salmon escapement was therefore, possible.

Several other selected streams in the area were counted and the data are shown in Table 16. There has been some concern that sport fishing pressure was seriously depleting the chinook salmon run in Mendeltna Creek. High water conditions may have been responsible for more chinook salmon surviving the sport fishery, which generally takes place at the mouth. Only two of the streams shown in the table, Gulkana River and Mendeltna Creek, are subject to sport fishing pressure. The remaining streams are either closed to fishing or inaccessible.



Surface area 18 acres,
not drawn to scale.
C = chemistry station.

Figure 8. Mary Lou Lake.



Surface area 30 acres
Not drawn to scale.
C = chemistry station.

Figure 9. Katherine Lake.

Table 12. Summary of Zooplankton Captured in Mary Lou Lake, 1981.

Date	Station 1 Tow 1 & 2	Area of Net r^2 (m^2)	Depth of Tow (m)	# Organisms per Sample	# Organisms per m^2	# Organisms per m^3	Usalbe Organisms per m^2	Usalbe Organisms per m^3
4/07		0.0177	5.5	1,559	88,079	16,014	59,379	10,796
5/06	#1	0.0177	6	1,481	83,672	13,945	55,141	9,190
	#2	0.0177	6	1,502	84,859	14.143	70,678	11,780
6/22	#1	0.0177	6	3,161	178,588	29,765	67,910	11,318
	#2	0.0177	6	4,255	240,395	40,066	90,395	15,066
7/17	#1	0.0177	6	1,669	94,294	15,716	86,215	14,369
	#2	0.0177	6	1,942	109,718	18,286	109,266	18,211
8/22	#1	0.0177	6	2,233	126,158	21,026	123,333	20,556
	#2	0.0177	6	3,067	173,277	28,879	170,960	28,493
11/15	#1	0.0177	6	1,877	106,045	17,674	86,667	14,444
	#2	0.0177	6	1,863	105,254	17,542	92,938	15,490

Table 13. Summary of Zooplankton Captured in Katherine Lake, 1981.

Date	Station 1 Tow 1 & 2	Area of Net r^2 (m^2)	Depth of Tow (m)	# Organisms per Sample	# Organisms per m^2	# Organisms per m^3	Usable Organisms per m^2	Usable Organisms per m^3
4/06		0.0177	6	2,194	123,955	20,659	70,678	11,780
5/06	#1	0.0177	6	1,053	59,492	9,915	22,429	3,738
	#2	0.0177	6	1,402	79,209	13,202	26,045	4,341
6/22	#1	0.0177	6	1,270	71,751	11,959	50,960	8,493
	#2	0.0177	6	1,364	77,062	12,844	63,729	10,621
7/17	#1	0.0177	6	1,526	86,215	14,369	83,898	13,983
	#2	0.0177	6	1,277	72,147	12,024	70,169	11,695
8/22	#1	0.0177	6	1,246	70,395	11,733	63,616	10,603
	#2	0.0177	6	982	55,480	9,247	48,700	8,117
11/05	#1	0.0177	6	1,233	69,661	11,610	21,638	3,606
	#2	0.0177	6	1,833	103,559	17,260	28,249	4,708

Table 14. Dissolved Oxygen and Temperature Profiles, Mary Lou Lake, 1981-1982.

Date	Depth (ft.)	Temperature (°F)	Dissolved Oxygen (ppm)
3/03/81	5'	34°	7.0
	9'	37.5°	4.0
4/07/81	5'	34°	6.0
	9'	36.5°	7.0
5/06/81	5'	37°	7.0
	9'	37°	6.0
7/17/81	surface	56°	
	5'		10.0
	9'		8.0
8/22/81	5'		9.0
	9'		9.5
11/05/81	surface	33°	
	5'	39°	3.0
	8'	39°	8.0
1/29/82*	2 (m)	2.8° (C)	7.9
	3 (m)	3.3° (C)	7.7
	6 (m)	4.9° (C)	4.5

* Used Yellow Spring Instrument #57 equipment on 1/29/82. All other samples were taken using a standard Hach kit with powder pillows and a Heath kit thermo spotter Model MI-104.

Table 15. Dissolved Oxygen and Temperature Profiles, Katherine Lake, 1981-1982.*

Date	Depth (ft.)	Temperature (°F)	Dissolved Oxygen (ppm)
3/03/81	5'	35°	9.0
	9'	38.5°	7.0
4/07/81	5'	34.5°	9.0
	9'	38°	3.0
5/06/81	5'	39°	8.0
	9'	39°	6.0
7/17/81	surface	56°	
	5'		9.0
	9'		9.0
8/22/81	5'		9.5
	9'		10.0
11/05/81	5'	39°	7.0
	8'	39°	5.0
	18'	39°	8.0
1/29/82*	2 (m)	3.1° (C)	10.3
	3 (m)	3.5° (C)	12.9
	6 (m)	4.2° (C)	7.0

* Used Yellow Springs Instruments #57 equipment on 1/29/82. All other samples were taken using a standard Hach kit with powder pillows and a Heath kit thermo spotter Model MI-104.

Table 16. Chinook Salmon Aerial Surveys, Upper Copper River Tributaries, 1975-1981*.

Stream	1975**	1976	1977	1978	1979	1980**	1981**
Gulkana River	740	994	924	1,136	1,052	696	N/C
East Fork Chistochina River	71	289	132	137	765	575	120
Mendeltna Creek	N/C	35	73	52	5	3	87
Kaina Creek	N/C	37	91	125	279	247	191
Grayling Creek	N/C	17	N/C	92	153	66	107
Little Tonsina	161	98	35	285	285	70	191

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

** Counting conditions in 1975, 1980, and 1981 were generally poor due to high, muddy water during most of the season. Poor water and weather conditions made a count of the Gulkana River impossible in 1981.

N/C No counts made.

Habitat Protection Investigations

The increase in gold prices greatly increased the interest in mining in Alaska. In 1981, 39 mining applications for this area were reviewed. All of these mining ventures required the use of water and, therefore, could have adverse effects on various fisheries. Unfortunately, some of the mining operations are located on small, unnamed tributaries of which we have little or no knowledge. It is also considered likely that many mining operations that exist are not being conducted underauthority of a permit because of disregard, and/or ignorance of the regulations.

During July 1981, a reconnaissance flight of mining activities in the area was made. Representatives of the Bureau of Land Management, Alaska Department of Natural Resources and the Alaska Department of Fish and Game were present. As a result of this trip, the following conclusions were made: (1) water quality in several streams is being degraded. Considerable silting was noted in several streams. The effects of amalgamation chemicals are unknown, but could be serious as these are generally mercury compounds; (2) most of the activity is taking place on lands administered by BLM, although many of these lands are also selected by the Natives and/or the State. Determining exactly how the activities mesh with the claims, or even which claims are valid, would require more investigation on a full time basis and beyond the preview of the people involved in this cursory overview; and (3) the problems observed included blocked streams, diverted streams, increased sediment loads, inadequate or no settling ponds, roads in the streambeds, poorly planned roads, erosion and disturbance of stream banks and others.

These mining operations should be inspected on-site, and other agencies such as the Alaska Department of Environmental Conservation should be involved.

One oil spill in the area was investigated. A tanker truck overturned on the Richardson Highway adjacent to Summit Lake, and an estimated 100 gallons of heavy fuel oil was spilled into the lake. Cleanup crews rapidly boomed off the oil slick and the cleanup was satisfactory.

A field trip of the Denali Highway was conducted with personnel from the Alaska Department of Transportation, Bureau of Land Management, Alaska Department of Environmental Conservation, the U.S. Fish and Wildlife Service and the Alaska Department of Fish and Game. The purpose of the trip was to observe proposed realignment of the road and the proposed replacement of culverts and bridges. Several of the water passage devices were canted, damaged, in the wrong location or too small. These factors have created barriers of fish passage and will be corrected when the road is upgraded.

Much of the habitat protection work conducted was with the Alaska Department of Transportation. Proposed and activated highway projects which were reviewed included the Richardson Highway, Mile 6 to 14, Mile 17 and Mile 115 to 122. These projects all have the potential to impact fisheries. The investigations resulted in changes which would protect the fisheries habitat.

Three meetings were held to resolve a potential problem involving construction of a large dock facility at Valdez. The construction process had the potential of interfering with the migration of pink salmon at the east end of Valdez Arm. Recommendations were implemented to eliminate this potential.

Other habitat protection problems addressed were the effects of a State oil and gas lease program in the area, construction of a dike on the Slana River, airport runway contruction work at Valdez, gravel removal from the Chistochina River, rip-rap along the Copper River and several small private road and bridge projects.

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