

STATE OF ALASKA

WILLIAM A. EGAN, GOVERNOR



Annual Performance Report

For

INVENTORY AND CATALOGING

Inventory and Cataloging
of Arctic Area Waters

by

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RESEARCH PROJECT SEGMENT

State: ALASKA Name: Sport Fish Investigations
of Alaska.

Project No.: F - 9 - 6

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

Job No.: G - I - I Job Title: Inventory and Cataloging of
Arctic Area Waters.

Period Covered: July 1, 1973 to June 30, 1974.

ABSTRACT

Surveys of four mountain lakes (Chandler, Shainin, Itkillik, and Elusive) on the North side of the Brooks Range were conducted to determine biological, chemical, and physical parameters. Major fish species collected included: lake trout, Salvelinus namaycush, Arctic char, Salvelinus alpinus, Arctic grayling, Thymallus arcticus, round whitefish, Prosopium cylindraceum, and least cisco, Coregonus sardinella. Mean gill-raker and pyloric caecae counts for Arctic char from Chandler Lake were 27.0 and 45.3, respectively. Data are presented on age and growth, food habits, length frequency, sex ratios, sexual maturity, gonadal measurements, weights, and fecundity for lake trout, grayling, char, and whitefish.

The subsistence fisheries at the mouth of the Colville River and at Barter Island were briefly monitored. Broad whitefish, C. nasus, was the principal subsistence species in the Colville River. Arctic char and Arctic cisco, C. autumnalis, were the principal subsistence species at Barter Island.

Char life history studies were continued in the Sagavanirktok River system with emphasis on recovery of previously tagged fish and aerial population counts. Of 5,364 adult char captured from tributaries of the Sagavanirktok River, 255 had been tagged in 1971 and 1972. Age, length, sex ratio, and spawning condition of tagged fish are presented. Aerial counts were similar to those of previous years.

RECOMMENDATIONS

1. Continue enumeration of char populations in the Sagavanirktok River system and complete spawning migration aspects of char life history.
2. Begin overwintering life history aspects for char in the Sagavanirktok River system.
3. Continue assessment of the existing and potential fishery waters on the North Slope, especially those adjacent to the proposed Trans-Alaska Oil Pipeline, haul road oil drilling sites, and those adjacent to the proposed Arctic Gas pipeline including important waters of the Arctic National Wildlife Range.
4. Determine present utilization of sport and subsistence fisheries of the North Slope and Brooks Range waters.
5. Monitor and evaluate development projects involving water use and their effects on North Slope waters.

OBJECTIVES

1. To continue assessment of the existing and potential fishery waters on the North Slope, especially those adjacent to the proposed Trans-Alaska Oil Pipeline, haul road, and oil drilling sites.
2. To determine present utilization of fishery populations; subsistence, sport, and commercial, of North Slope waters.
3. To evaluate development projects involving water use and their effects on North Slope lakes and streams.
4. To begin limnological studies of westward area waters and intensify char population studies.

TECHNIQUES USED

A rubber raft with outboard motor was used for transportation on lake surveys. Lake depths were measured with a Ross P-100 fathometer. Discharge in cfs was computed according to the Lake and Stream Survey Manual (Andrews et al, 1971). Velocity was computed by timing a float through a 100 foot section of stream. Water analyses were done with a model AL36B Hach Kit. Water temperature data were taken with a remote sensing thermometer.

Fish populations were sampled with graduated mesh gill nets, minnow traps baited with salmon eggs, and sport fishing gear. Three of the gill nets were 125' x 6' and one 200' x 6'. Two nets were sinking type; two were floating nets. Data from fish samples were taken from fresh fish, except

60 fish from Elusive Lake, and all ovaries were analyzed in the laboratory. Fish up to 2,610 grams were weighed to the nearest gram on a triple-beam balance. Fish exceeding the capacity of the balance were weighed on a Hansen Model 895 spring scale. Fork lengths were measured to the nearest millimeter.

Sex and stage of maturity was determined by examination of gonads. Maturity categories are:

Potential spawner - will spawn in the year of capture.

Non-spawner - A mature fish which will not spawn in the year of capture.

Immature - Fish determined as juveniles by gonadal examination.

Stage of maturity was based on size, color, and consistency of gonads, and egg diameter. Immature fish were sometimes impossible to separate from non-consecutive spawners. Yoshihara (1973) discussed length and age at maturity and correlates egg diameter, ovary weight, and body weight to establish a maturity index.

Egg numbers were determined by volumetric sub-sampling technique described by Lagler (1956).

Occurrence of food items in fish stomachs was determined by field examination.

All meristic measurements were taken according to Hubbs and Lagler (1958).

Otoliths were taken from lake trout and char, and scales were taken from grayling, whitefish, and ciscos. Age determination using otoliths was done as described by Heiser (1966), except that xylene was used as the wetting agent.

Lengths of grayling and round whitefish were back-calculated according to the direct proportion formula (Rounsefell, 1953). A correction factor of 35 mm body length at first scale formation was used, based on observations that this occurs for both species (McCart et al 1972; Tack, 1971; Pearse, 1974).

Aerial counts of adult char in the Sagavanirktok River system were made from a helicopter. Tagged char were captured with bag seines, gill nets, tangle nets, and by rifle.

FINDINGS

Chandler Lake Survey

This survey was conducted from July 17 - 22, 1973. Chandler Lake is located at latitude 68° 14' N and longitude 152° 42' W. The elevation is approximately 884 meters (2,900 feet), surface area 1,255 hectares (3,100 acres), maximum measured depth 17.7 meters (58 feet) and mean depth 9.5 meters (31 feet). Aquatic vegetation was sparse. The major

inlet at the south end of the lake draining from Amiloguk Lake had a discharge of 14 meters³/second (497 cfs) and velocity of 1 meter/second (3.3 feet/second). This inlet was 15 - 25 centimeters (6 - 9 inches) above normal flow level due to heavy rains in the Brooks Range during and preceding the survey. Other smaller tributaries were not measured for flow. The outlet had an estimated discharge of 14 - 17 meters³/second (500 - 600 cfs) which was unusually high. The lake temperature on July 21, was 5°C from the surface to the bottom at 12 meters. The major inlet, outlet, and lake bottom were composed of coarse-to-fine gravel which provide extensive spawning area. Aquatic insects, especially mosquitos, other diptera, and trichoptera were abundant.

Fourteen net nights (360 net hours) yielded a catch of 74 lake trout, Salvelinus namaycush, 71 round whitefish, Prosopium cylindraceum, 38 grayling, Thymallus arcticus, and 30 Arctic char, Salvelinus alpinus. The minnow traps captured four sculpins, Cottus cognatus. Fifteen man hours of sport fishing captured 4 lake trout, 7 Arctic char, and 2 grayling (Table 1). Burbot, Lota lota, are reported by the Eskimos but none were caught.

No immature fish were captured and few small salmonids were present in lake trout stomachs. Evidently fish rear outside the lake at that time of the year. Kogi (1971) found rearing char, lake trout, round whitefish, and grayling in Ikagiak Creek which drains into Little Chandler Lake, indicating that small tributary streams are important rearing areas in the Chandler Lake system.

Fishing in the past has been done largely by hunters at guide camps on the lake and occasional native subsistence fishermen from Anak-tuvuk Pass. All guide camps were unused in 1973. It appears that less fishing was done at Chandler Lake in 1973 than in past years. No fishermen were observed during the survey period.

TABLE 1. Length, Weight Data and Sex Ratio For Chandler Lake Fish Samples, July, 1973.

Species	n	Length (mm)		Weight (gm)		Sex		
		Range	Mean	Range	Mean	♂	♀	Unknown
Lake Trout	78	375-927	528	506-12,474	1,754	38	39	1
Round Whitefish	71*	292-459	382	217-796	527	30	40	1
Arctic Grayling	40	301-396	333	330-655	430	20	20	-
Arctic Char	37**	331-590	492	409-2,196	1,279	24	13	-

*n = 68 for weight data

**n = 36 for weight data

TABLE 2. Length, weight, sex, and maturity of coho lake trout, Grandeur Lake, July, 1970.

Age Class	n	Length (mm)		Weight (gm)		Sex		Maturity	
		Range	Mean	Range	Mean	Male	Female	Non Spawner	Potential Spawner
XII	1	520		1,374		1	0	1	0
XIII	3	375-545	452	506-1,324	779	0	3	2	1
XIV	9	378-498	426	563-1,177	754	3	6	8	1
XV	15	418-505	447	648-1,271	904	7	8	11	4
XVI	5	389-578	464	506-1,700	1,024	3	2	2	3
XVII	4	460-605	509	916-1,899	1,293	0	4	5	1
XVIII	6	412-545	470	639-1,616	1,008	5	1	5	1
XIX	2	460-461	460	835-901	868	1	1	2	0
XX-XLII	22	442-927	627	784-12,474	3,099	9	13	9*	12
Total	67	375-927		506-12,474		29	38	43	23

*One maturity was not recorded.

Lake Trout:

The Chandler Lake lake trout population is comprised of a high proportion of old fish (58% over fifteen years old, 32% over twenty years old). Three fish appeared to be 30 - 38 years old and one was 42 years old (Table 2).

Gonadal parameters (gonad weight/body weight) were distinctly separated for non-spawners and potential spawners (Table 3). Two of 37 female lake trout collected from Chandler Lake were determined to be consecutive spawners. Five were classed as non-consecutive spawners having retained eggs and small re-developing eggs (2.0 mm). Egg counts of eight lake trout ranged from 1,088 - 6,371, averaging 3,117 (Table 4). Egg diameters ranged from 3.5 - 4.7 mm, averaging 4.03 mm.

TABLE 3. Egg Diameters and Gonad Weight-Body Weight Ratio for Non-Spawners and Potential Spawner Lake Trout from Chandler Lake, July, 1973. (Data collected from unpreserved specimens.)

	n	Egg Diameter (mm)	Percent of Gonad Weight To Body Weight	
			Range	Mean
<u>Non-Spawner*</u>				
Male	9		0.06-2.1	0.6
Female**	20	1.0-2.0	0.20-1.8	0.9
Total	29		0.06-2.1	0.8
<u>Potential Spawners***</u>				
Male	7		2.50-5.2	3.5
Female	8	4.0-5.0	4.80-9.0	6.7
Total	15		2.50-9.0	5.2

* Non-spawners consist of immature and mature fish that could not always be separated.

** Five non-spawning females had retained eggs indicating they were mature and had spawned the previous year.

*** All mature adults that would spawn in year of capture.

TABLE 4. Egg Counts of Lake Trout from Chandler Lake, July, 1973.

Fish Length*	Fish Weight* gm	Gonad Width* mm	Gonad Weight* gm	Egg Diameter** mm	Number of Eggs
420	870	28	47.2	3.7	1,088
455	994	32	64.1	4.0	1,230
452	958	31	45.7	3.5	1,240
445	972	--	68.1	3.6	1,598
540	1,831	39	124.2	4.1	2,352
820	5,400	52	302.2	4.0	5,460
800	6,000	55	434.5	4.7	5,598
748	4,800	64	408.1	4.6	6,371

*measured before preservation.

**measured after preservation in formalin. (Measurements after preservation were slightly different from those made fresh.)

The food item occurring most often in lake trout stomachs was mosquito larvae (84.1%) (Table 5). Sculpins were the most numerous identified fish species, occurring in 10.2% of all stomachs. Unidentified zooplankton (probably copepoda) occurred in 31.9% of stomachs.

TABLE 5. Occurrence of Food Items in Lake Trout Stomachs, Chandler Lake, July, 1973. (Five of 74 (6.8%) stomachs were empty.)

Food Item	Stomachs Containing Food Item	
	Number	Percent
<u>Insects</u>		
Diptera larvae and pupae - Culicidae	58	84.1
Diptera larvae - Chironimidae	4	5.8
Diptera - unidentified larvae & adults	6	8.7
Trichoptera larvae & pupae	3	4.4
Coleoptera adults	3	4.4

TABLE 5. (cont.) Occurrence of Food Items in Lake Trout Stomachs, Chandler Lake, July, 1973. (Five of 74 (6.8%) stomachs were empty.)

Food Item	Stomachs Containing Food Item	
	Number	Percent
Hymenoptera - adult wasp	1	1.5
Unidentified	2	2.9
<u>Fish</u>		
Sculpins (50-65 mm)	7	10.2
Round Whitefish (140, > 250 mm)	2	2.9
Lake Trout (250 mm)	1	1.5
Arctic char (> 400 mm)	1	1.5
Unidentified Fish Remains (<75 mm)	7	10.2
Unidentified Fish Remains (unknown size)	16	23.2
<u>Unidentified Zooplankton</u> (Copepoda?)	22	31.9
<u>Aquatic Snails</u> (Gastropoda)	11	15.9
<u>Unidentified Rodents</u> (vole, lemmings?)	6	8.7
<u>Other*</u>	7	10.2

*Consists of roundworm, fish eggs, immature bird, plant matter, sticks, and detritus.

Round Whitefish:

Age, length, weight, sex, and maturity of 63 round whitefish are presented in Table 6. Ages ranged from VII - XVI with 76.2% age XI - XIII.

Mean *back-calculated lengths* and mean *annual growth increments* are presented in Table 7. Growth averages 31 - 34 mm per year between ages I - VII, then declines by an average of 3 mm per year after age VII.

The most abundant food items in round whitefish stomachs were trichoptera adults (47.4%) and mosquito larvae (45.6%), Table 8.

TABLE 6. Length, Weight, Sex, and Maturity of 65 Round Whitefish, Chandler Lake, July, 1975.

Age Class	n	Length (mm)		Weight (gm)		Sex		Maturity	
		Range	Mean	Range	Mean	Female	Male	Non-Spawner	Potential Spawner
VII	1	293		217		1		1	0
VIII	0								
IX	1	319		321			1	1	0
X	4	292-402	349	236-605	429	2	2	2	2
XI	15	319-387	368	310-601	482	5	10	4	11
XII	20	315-423	377	283-668	503	9	11	6	14
XIII*	13	373-428	401	513-657	646	5	7	3	9
XIV	7	387-439	413	524-784	644	2	5	0	7
XV	1	415		638		0	1	0	1
XVI	1	399		647		1	0	0	1
Total	63	292-439		217-784		25	37	17	45

*One fish in age class XIII was not checked for weight, sex, or maturity.

TABLE 7. Back-calculated length at each year of life and Mean Annual Growth Increment of 68 Round Whitefish, Chandler Lake, July, 1958.

Age At Capture	n	Mean Fork Length at Annulus Formation (mm)																	
		L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	L ₁₂	L ₁₃	L ₁₄	L ₁₅	L ₁₆		
VII	1	68	107	152	205	243	270	290											
VIII	6	67	84	112	143	174	220	249	283	312									
X	4	63	94	131	169	202	240	273	302	322	341								
XI	15	68	100	131	163	196	227	262	291	317	340	360							
XII	20	66	100	133	165	196	229	261	288	314	335	354	370						
XIII	13	60	87	119	153	190	220	251	282	309	336	379	395						
XIV	7	60	94	122	155	186	218	245	277	305	332	355	374	408					
XV	1	66	98	144	190	229	260	284	305	327	341	359	378	400	410				
XVI	1	50	69	103	143	167	207	236	260	281	293	305	350	367	381	396			
		68																	
Weighted Mean Length		64	96	128	162	194	227	258	287	313	336	356	373	392	403	396	596		
Mean Annual Growth Increment		64	32	32	34	32	33	31	29	26	23	20	17	19	11	---	---		

TABLE 8. Occurrences of Food Items in Round Whitefish Stomachs From Chandler lake, July, 1973. (Two of 59 (3.4%) stomachs were empty.)

<u>Food Item</u>	<u>Stomachs Containing Food Items</u>	
	<u>Number</u>	<u>Percent</u>
<u>Insects</u>		
Trichoptera adults	27	47.4
Trichoptera larvae	17	29.8
Diptera larvae-Culicidae	26	45.6
Diptera larvae-Chironomidae	6	10.5
Plecoptera nymph	1	1.8
Unknown	7	12.4
<u>Gastropods (snail)</u>	5	8.8
<u>Nematodes</u>	3	5.3
<u>Detritus</u>	8	14.0

Egg counts for two round whitefish (mean length 409 mm) averaged 5,318 eggs. One of 39 females had retained eggs and was classified as a consecutive spawner since the large ova indicated it would spawn in the year of capture.

Arctic Grayling:

Age ranged from VI - XI with 83.3% ages VIII, IX, and X, (Table 9). Lengths ranged from 301 - 385 mm.

Mean *back-calculated lengths* and mean *annual growth increments* are presented in Table 10. Growth averages 33 - 45 mm per year from age I - V, then declines rapidly after age VI.

Insects were the most important food item in grayling stomachs, (Table 11). Mosquito larvae occurred most often (42.4%).

TABLE 9. Length, Weight, Sex, and Maturity of 50 Arctic Grayling, Chaudler, Lake, July, 1973.

Age Class	n	Length (mm)		Weight (gm)		Sex		Maturity	
		Range	Mean	Range	Mean	Female	Male	Non Spawner	Potential Spawner
VI	1	311		561		0	1	1	0
VII	4	301-325	318	302-375	349	3	1	5	1
VIII	13	312-372	339	331-530	412	7	6	11	2
IX	9	309-353	339	358-485	435	5	4	5	4
X	8	315-385	350	330-642	468	5	3	3	5
XI	1	344		438		1	0	1	0
Total	56	301-385		302-642		21	15	24	12

TABLE 10. Back-calculated Length at Each Year of Life and Mean Annual Growth Increment of 56 Grayling
Chandler Lake, 1975.

Age At Capture	n	L1	Mean Fork Length At Annulus Formation (mm)												
			L2	L3	L4	L5	L6	L7	L8	L9	L10	L11			
VI	1	72	106	179	238	264	296								
VII	4	87	111	151	192	233	269	300							
VIII	13	70	113	159	202	239	273	305	329						
IX	9	69	109	148	185	224	257	286	309	331					
X	8	68	105	145	180	214	243	275	302	324	324				
XI	1	66	112	156	185	205	241	266	292	313	327	359			
Weighted Mean Length		71	110	147	192	229	262	291	315	327	340	359			
Mean Annual Growth Increment		71	39	37	45	37	33	29	24	12	15				

TABLE 11. Occurrence of Food Items in Grayling Stomachs, Chandler Lake, July, 1973. (One of 34 (2.9%) stomachs was empty.)

Food Item	Stomachs Containing Food Item	
	Number	Percent
<u>Insects</u>		
Diptera larvae - Culicidae	14	42.4
Diptera adults - Culicidae	3	9.1
Plecoptera larvae	8	24.2
Plecoptera adults	6	18.2
Coleoptera - terrestrial adult	6	18.2
Coleoptera - aquatic adult	4	12.1
Hymenoptera - adults	4	12.1
Trichoptera - adults and larvae	4	12.1
Unidentified Diptera	6	18.2
Unidentified	13	39.4
<u>Nematodes</u>	5	15.2
<u>Gastropods</u>	1	3.0
<u>Detritus</u>	2	6.1

Arctic char:

Char ranged in *age* from IX - XVI; 69.7% were non-spawners, (Table 12).

Insects were the most important *food item* in char stomachs, (Table 13). Mosquito larvae occurred most often (89.7%).

TABLE 13. Occurrence of Food Items in Arctic Char Stomachs, Chandler Lake, July, 1973. (All 29 stomachs contained food.)

Food Items	Stomachs Containing Food Items	
	Number	Percent
<u>Insects</u>		
Diptera larvae - Culicidae	26	89.7

TABLE 13.(cont.) Occurrence of Food Items in Arctic Char Stomachs, Chandler Lake, July, 1973. (All 29 stomachs contained food.)

Food Items	Stomachs Containing Food Items	
	Number	Percent
Diptera pupae - Culicidae	16	55.2
Diptera adults and larvae	12	41.4
Coleoptera - aquatic adults	5	17.2
Hymenoptera - adults	4	13.8
Plecoptera - adults and larva	3	10.4
Trichoptera - pupa	1	3.5
Orthoptera	1	3.5
Unidentified	5	10.4
<u>Plant Matter</u>	2	6.9
<u>Gastropods</u>	1	3.5

Total *gill raker counts* from the first left gill arch ranged from 25 - 30 rakers with a mean of 27.0 and *pyloric caecae counts* ranged from 37 to 54 with a mean of 45.3 (Table 14). Kogl (1971) found a mean gill raker count of 27.2 for rearing char in Ikagiak Creek, a tributary of Little Chandler Lake. He surmised these fish were rearing forms of the Chandler Lake resident population. McCart et al (1972) found similar gill raker (24 - 35) and pyloric caecae (35 - 52) counts for resident Arctic char in headwater lakes of the Sagavanirktok River system. A mean gill raker count of 27 - 29 has been reported for lacustrine Arctic char from Peters Lake (Behnke, 1972).

TABLE 14. Meristic Counts of Arctic Char, Chandler Lake, 1973.

	Gill Rakers		Total	Pyloric Caecae
	Upper Limb	Lower Limb		
Range	9-13	14-18	25-30	37-54
Mean	11.25	15.77	27	45.3
n	36	36	36	29

TABLE 17. Length, Weight, Sex, and Maturity of Arctic Char, Chandler Lake, July, 1973.

Age Class	n	Length (mm)		Weight (gm)		Sex		Maturity	
		Range	Mean	Range	Mean	Male	Female	Non-Spawner	Potential Spawner
IX	1	372		569		0	1	1	0
X	2	416-432	424	813-836	825	1	1	2	0
XI	11	331-505	455	409-1346	1007	6	5	9	2
XII	6	485-510	499	1198-1373	1293	4	2	4	2
XIII	8	481-566	532	1184-2196	1612	7	1	4	4
XIV	4	508-552	537	1117-1709	1510	3	1	2	2
XV	1	532		1648		1	0	0	1
XVI	1	590		1808		1	0	1	0
Total	54	372-590		569-1808		23	11	23	11

Shainin Lake Survey

This survey was conducted from July 22 - 25, 1973. Shainin Lake, also known as Willow Lake, is located at 68° 20' N latitude and 151° 3' W longitude at an elevation of 838 meters (2,750 feet). Surface area is 405 hectares (1,000 acres), maximum depth 18 meters (60 feet), and mean depth 10.4 meters (34 feet). Shoal area and aquatic vegetation are minimal. Alapah River (the only large inlet), extremely high and turbid due to recent rains, had an estimated flow of 5.7 meters³/second (200 cfs). A pH of 8.0 - 8.5 and total hardness of 86 ppm were recorded. Surface temperature was 6.3°C. Temperature at 3 meter depth was 6.2°C and temperature below 3 meters to 11 meters depth was a uniform 6.0°C.

The lake is occasionally used by hunting and fishing guides and Eskimos from Anaktuvuk Pass. Lake trout and grayling fishing have been reported as excellent in August.

Five net nights (152 net hours) yielded 37 round whitefish, 14 lake trout, and 12 grayling (Table 15). Two minnow traps fished over one night (60 trap hours total) caught 4 sculpin. Two man hours of sport fishing did not yield any samples. No char were captured but they have been reported in low numbers (Kog1, 1971).

TABLE 15. Length, Weight, and Sex Data for Shainin Lake Fish, July, 1973.

Species	n	Net Nights	Length (mm)		Weight (gm)		Sex	
			Range	Mean	Range	Mean	Male	Female
Lake trout	14	5	255-758	468	168-4,000	1,318	9	5
Round Whitefish	37	5	137-405	348	21-703	460	10	25
Grayling	12	5	135-394	330	23-735	443	4	6

Lake Trout:

Age of 14 lake trout sampled ranged from VI - XXV (Table 16). Lake trout over age XV were common and similar information was reported by Kog1 (1971). None of the females collected were consecutive spawners.

Detritus, snails, and mosquito larvae were the most commonly occurring *Food Items* in lake trout stomachs (Table 17).

TABLE 16. Length, Weight, Sex, and Maturity of Lake Trout, Shannin Lake, July, 1975.

Age Class	n	Length (mm)		Weight (gm)		Sex		Maturity	
		Range	Mean	Range	Mean	Male	Female	Non-spawner	Potential spawner
VI	1	255		168		1	0	1	0
XI	3	354-377	369	469-565	502	1	2	3	0
XII	2	427-484	456	726-1363	1,045	2	0	1	1
XIII	1	642		2,600		1	0	1	0
XIV	3	441-493	469	1,102-1,344	1,248	3	0	0	3
XV	3	446-516	490	1,237-1,617	1,449	1	2	1	2
XXV	1	758		4,000		0	1	1	0
Total	14	255-758		168-4,000		9	5	8	6

TABLE 17. Occurrence of Food Items in Lake Trout Stomachs, Shainin Lake, July, 1973. One of 14 (7.1%) was empty.

Food Item	Stomachs Containing Number	Food Item Percent
<u>Insects</u>		
Diptera larva - Culicidae	3	23.1
Diptera larva and adult	2	15.4
Trichoptera pupa	1	7.7
Unidentified	2	15.4
<u>Fish</u>		
Sculpin	1	7.7
Unidentified remains (< 100 mm)	2	15.4
<u>Gastropods</u>	4	30.1
<u>Zooplankton - unidentified</u>	2	15.4
<u>Rocks and Detritus</u>	5	38.5
<u>Miscellaneous*</u>	3	23.1

*Rodent, web-footed bird, stomach of sampled fish.

Round Whitefish:

Ages of whitefish sampled ranged from II - XIV, with 64.5% ages XI, XII, and XIII (Table 18). Female potential *spawners* had eggs 1.0 - 1.5 mm in diameter, with a mean of 1.1 mm. *Non-spawners* had egg diameters ranging from 0.5 - 1.0 mm, with a mean of 0.77 mm.

Mean *back-calculated lengths* and mean *annual growth increments* for 31 round whitefish are presented in Table 19.

Snails were the most frequently occurring food item (42.4%) in round whitefish stomachs (Table 20). Trichoptera larvae occurred in 33.3% of stomachs.

TABLE 18. Length, Weight, Sex, and Maturity of 51 Round Whitefish, Sharam Lake, July, 1975.

Age Class	n	Length (mm)		Weight (gm)		Sex		Maturity	
		Range	Mean	Range	Mean	Male	Female	Non-spawner	Potential spawner
II	1	137		21		?	?	Immature	0
III	1	173		41		?	?	Immature	0
V	2	290-296	293	239-270	25	0	2	Immature (2)	0
VII	1	329		371		1	0	0	1
IX	4	361-391	374	459-609	547	0	4	0	4
X	1	350		469		1	0	0	1
XI	4	318-366	350	283-503	446	1	3	0	4
XII	11	328-390	357	356-598	449	2	9	1	10
XIII	5	347-397	371	435-617	529	2	3	2	3
XIV	1	405		703		1	0	0	1
Total	31	137-405		21-703		8	21	7	24

TABLE 10. Back-Calculated Length at Each Year of Life and Mean Annual Growth Increment of 31 Round Whitefish, Shainin Lake, 1975.

Age At Capture	n	Mean Fork Length at Annulus Formation (mm)														
		L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	L ₁₂	L ₁₃	L ₁₄	
II	1	69	120													
III	1	68	94	147												
IV	0	--	--	--												
V	2	58	108	181	251	276										
VI	0	--	--	--	--	--										
VII	0	--	--	--	--	--										
VIII	1	51	75	109	222	257	285	317								
IX	4	71	99	147	200	244	287	320	347	366						
X	1	66	100	161	214	250	277	302	320	334	347					
XI	4	57	81	114	149	185	216	250	278	300	322	340				
XII	11	60	84	121	164	196	223	245	275	295	317	335	349			
XIII	5	63	92	132	172	205	227	252	272	295	309	333	351	365		
XIV	1	60	88	110	137	169	202	226	248	277	299	337	362	381	400	
Weighted Mean Lengths		62	89	131	174	210	235	261	288	307	316	335	350	368	400	
Mean Annual Growth Increments		62	27	42	43	56	25	26	27	19	9	19	15	18	52	

TABLE 20. Occurrences of Food Items in Round Whitefish Stomachs from Shainin Lake, July, 1973. (Two of 35 (5.7%) stomachs were empty.)

Food Item	Stomachs Containing Food Item	
	Number	Percent
<u>Insects</u>		
Diptera larvae - Culicidae	12	36.4
Trichoptera larvae	11	33.3
Diptera larvae	8	24.2
Diptera adult	3	9.1
Plecoptera larvae	1	3.0
Coleoptera aquatic adult	1	3.0
Unidentified insects	2	6.1
<u>Gastropods</u>	14	42.4
<u>Round worms</u>	1	3.0
<u>Unidentified Zooplankton</u>	1	3.0
<u>Detritus</u>	2	6.1

Arctic Grayling:

Grayling samples from Shainin Lake ranged from age II - X, with 83.3% age VIII - X (Table 21). Mean *back-calculated length* data indicated a mean fork length of 74 mm at age I and mean *annual growth increment* ranged from 26 - 45 mm each year from age I - X (Table 22). Annual growth is substantial even in the older age classes.

The principal food items for Shainin Lake grayling were insects and snails. Aquatic adult coleoptera occurred in 66.7% of all stomachs and snails occurred in 55.6% (Table 23).

TABLE 21. Length, Weight, Sex, and Maturity of Arctic Grayling, Shainin Lake, July, 1975.

Age Class	n	Length (mm)		Weight (gm)		Sex			Maturity	
		Range	Mean	Range	Mean	Male	Female	Non-spawner	Pot. Spawner	
II	1	135		23		?	?	Immature	0	
VI	1	295		271		0	1	1	0	
VIII	2	321-323	322	357-381	369	0	2	1	1	
IX*	6	322-379	350	357-674	480	2	3	0	5	
X	2	392-394	393	661-735	698	2	0	0	2	
Total	12	135-394		23-735		4	6	3	8	

*One sample was not checked for sex and maturity.

TABLE 22. Back-Calculated lengths at each year of life and Mean Annual Growth Increments for 11 Shannin Lake Grayling, 1973.

Age At Capture	n	Mean Fork Length At Annulus Formation (mm)																		
		L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀									
II	1	81	123																	
III	0																			
IV	0																			
V	0																			
VI	1	64	112	163	205	242	281													
VII	0																			
VIII	2	75	119	160	197	226	258	282	311											
IX	5	74	116	152	191	226	262	295	320	344										
X	2	75	128	173	211	250	293	324	349	370	385									
Weighted Mean Length		74	119	159	198	232	269	298	324	351	385									
Mean Annual Growth Increment		74	45	40	39	34	37	29	26	27	34									

TABLE 23. Occurrences of Food Items in Grayling Stomachs from Shainin Lake, July, 1973. (All nine samples contained food.)

Food Item	Stomachs Containing Food Item	
	Number	Percent
<u>Insects</u>		
Coleoptera aquatic adults	6	66.7
Coleoptera terrestrial adult	5	55.6
Diptera larvae and pupae - Culicidae	4	44.4
Trichoptera adult	3	33.3
Diptera adult	3	33.3
Diptera larvae	2	22.2
Tipulidae larvae	1	11.1
Hymenoptera (adult wasp)	1	11.1
Unidentified	1	11.1
<u>Gastropods</u>	5	55.6
<u>Detritus</u>	2	22.2

Itkillik Lake Survey

This survey was conducted from July 25 - 28. Itkillik Lake is located at 68° 25' N latitude and 149° 55' W longitude, the elevation is approximately 752 meters (2,400 feet), surface area 538 hectares (1,330 acres), maximum depth 13 meters (43 feet), and mean depth 6.3 meters (20.4 feet). There is extensive shoal area at the south end and in the center. Three small inlets discharge approximately .03 meters³/second (1 cfs). The only outlet has a measured discharge of 0.95 meters³/second (33.6 cfs) and velocity of 1 meter/second (3.4 feet per second). A stable water level indicates considerable ground water enters the lake. Temperatures recorded were: surface 11°C; 3 meters to 12 meters, a uniform 10°C. Results of water analysis included: pH 8.5 - 9.0; total hardness 137 ppm. The lake bottom is composed of clean gravel suitable for spawning. Snails were extremely abundant on the lake bottom.

Fish collected from Itkillik Lake in three net nights (66 net hours) included 15 lake trout, 4 grayling, 2 round whitefish. A total of three and one half man hours of sport fishing yielded 24 lake trout and 3 grayling (Table 24). One sculpin was caught with a dip net. Arctic char and burbot have been rumored but this survey did not capture either species. If present, they are rare or seasonal.

TABLE 25. Length, Weight, Sex, and Maturity of Lake Trout, Itkillik Lake, July, 1973.

Age Class	n	Length (mm)		Weight (gm)		Sex		Maturity	
		Range	Mean	Range	Mean	Male	Female	Non-Spawner	Potential Spawner
VII	1	328		356		0	1	Immature	0
VIII	4	325-377	361	362-490	455	4	0	Immature (4)	0
IX	4	367-391	381	500-583	544	1	3	4	0
X	1	389		602		1	0	1	0
XI	2	432-442	437	897-947	922	1	1	1	0
XIII	4	429-470	451	814-1,083	921	1	3	3	1
XIV	1	449		1,005		1	0	0	1
XV	1	445		924		0	1	1	0
XVI	2	485-507	496	1,005-1,291	1,148	1	1	2	0
XVII	4	449-530	492	959-1,370	1,148	3	1	3	1
XVIII	2	485-502	494	1,176-1,354	1,265	2	0	1	1
XX-XXV	6	515-777	610	1,250-5,600	2,474	4	2	5	1
Total	32	325-777		356-5,600		19	13	26	6

During the survey, two surveyors for an oil company landed in a helicopter to sport fish. Itkillik Lake has been one of the most popular and highly utilized sport fisheries by oil-related workers on the North Slope. Vehicle tracks around the north end of the lake indicated that workers at nearby Galbraith Lake camp have driven to Itkillik Lake in the past, probably to fish. Remains of two abandoned guide camps litter the shore.

TABLE 24. Length, Weight, and Sex Data for Itkillik Lake Fish Samples, July, 1973.

Species	n	Length (mm)		Weight (gm)		Sex	
		Range	Mean	Range	Mean	Male	Female
Lake Trout	39	325-777	464.3	362-1,364	1,118.2	23	16
Round Whitefish*	2	321		476		1	0
Grayling	6	342-380	357.0	419-583	489.7	4	2

*Data from one was not recorded.

Lake trout:

Lake trout ages ranged from VII - XXV (Table 25). Non-spawning adults and immature fish comprised 81.3% of the sample.

Most important *food items* were Trichoptera pupae, mosquito larvae, and snails (Table 26).

TABLE 26. Occurrences of Food Items in Lake Trout Stomachs, Itkillik Lake, July, 1973. (Two of 39 (5.1%) were empty.)

Food Item	Stomachs Containing Food Item	
	Number	Percent
<u>Insects</u>		
Trichoptera pupae	28	75.7
Diptera larvae - culicidae	25	67.6
Diptera - unknown	3	8.1
Hymenoptera (adult wasp)	1	2.7

TABLE 26. (cont.) Occurrences of Food Items in Lake Trout Stomachs, Itkillik Lake, July, 1973. (Two of 39 (5.1%) were empty.)

Food Item	Stomachs Containing Food Item	
	Number	Percent
Plecoptera - adult	1	2.7
<u>Fish</u>		
Sculpin (30 - 70 mm)	7	18.9
Round Whitefish (240 mm)	1	2.7
Unidentified remains	6	16.2
<u>Gastropods</u>	17	46.0
<u>Plant Matter</u>	8	21.6
<u>Leeches</u>	4	10.8
<u>Pelecypods (bivalves)</u>	3	8.1

Round Whitefish

Only two round whitefish were captured in three net nights of fishing. The larger fish was an age class VII (321 mm, 310 gm) male which was classed as a potential spawner. The other fish was an age class I, 160 gm, immature of undetermined length. Round whitefish did not appear to be abundant in Itkillik Lake, although they were reported in "good numbers" by Kogl (1971). Snails were the only food items recorded in the stomach samples.

Arctic Grayling:

Six grayling were collected from Itkillik Lake; four were age VIII and two age IX. All were classed as potential spawners. *Back-calculated lengths* and mean *annual growth increments* are similar to those of Shainin Lake grayling (Table 27).

Insects comprised the entire *stomach contents* of Itkillik Lake grayling. Trichoptera pupae occurred most often (80%). Other occurrences included Diptera and Hymenoptera adults (60% each), mosquito larvae, and Plecoptera adults (40% each).

TABLE 27. Back-Calculated Lengths at Each Year of Life and Mean Annual Growth Increments for Six Itkkikk Lake Grayling, 1973.

Age At Capture	n	Mean Fork Length At Annulus Formation (mm)								
		L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉
VIII	4	83	123	164	202	238	270	302	337	
IX	2	71	108	144	182	223	260	295	325	352
Weighted Mean Length		79	118	157	195	233	267	300	333	352
Mean Annual Growth Increment		79	39	39	38	38	34	33	33	19

Elusive Lake Survey

This survey was conducted from July 28 - 31, 1973. Elusive Lake is located at 68° 40' N latitude and 148° 30' W longitude, elevation 536.5 meters (1,760 feet), surface area 372 hectares (920 acres), maximum depth 16.8 meters (55 feet), average depth 9 meters (29.7 feet). Water temperatures were: surface, 10°C; 3 meters, 10°C; 6 meters, 10°C; 9 meters, 10°C; 12 meters, 9°C; 15 meters (bottom), 7°C. Water analysis gave a pH of 8.5 - 9.0 and total hardness of 188 ppm. Two small inlets discharge about .05 meters³ (1 cfs total). The outlet is wide, deep, and has a velocity less than 0.15 meter per second (0.5 fps). There is extensive shoal area at the east end. Aquatic vegetation is sparse. Suitable spawning gravel is located along the south and west shores. The bottom along the east shore is composed of fine sand, and is probably important for cisco spawning.

A total of 6 net nights (96 net hours) of fishing yielded 47 lake trout, 59 round whitefish, 28 least cisco, and 5 grayling (Table 28). One hour of sport fishing yielded 2 lake trout. One nine-spine stickleback, Pungitius pungitius, was dip netted.

Elusive Lake provides a popular sport fishery for oil-related workers on the North Slope. A hunting and fishing guide operates a camp on the north side. The owner estimates that six large lake trout are taken yearly for mounting purposes. At present, he does little fishing there. A 450-foot air strip has been constructed on the east end, making this one of the few lakes accessible by wheel plane. Elusive Lake is highly productive and well-known as an excellent lake trout sport fishery.

A sizeable population of least cisco inhabit the lake; this is unique for mountain lakes on the North Slope.

Lake Trout:

Lake trout ages ranged from VII - XXI (Table 29). No retained eggs were observed in ovaries from 27 females sampled, indicating no consecutive spawners.

Snails and mosquito larvae were the most frequently occurring food item in lake trout stomachs from Elusive Lake (Table 30).

Round Whitefish:

Ages ranged from II - XIII. *Potential spawners* comprised 71.4% of the sample (Table 31). *Back-calculated length* at first annulus was 61 mm. *Average annual growth increment* was 42 - 61 mm per year for the first 5 years of life, then slowed considerably after that (Table 32).

No retained eggs were found in female ovaries. Egg diameter for mature females classed as potential spawners ranged from 1.0 - 1.8 mm, mean 1.2 mm. Egg diameters for non-spawners were less than 0.6 mm.

Snails were the most often occurring *food item* in 55 round whitefish stomachs, (54.6%). Trichoptera larvae, pupae, and adults were also frequent food items (Table 32).

TABLE 28. Length, weight, and sex data for Elusive Lake Fish Samples, July, 1975.

Species	n	Length (mm)		Weight (gm)		Sex		Unknown
		Range	Mean	Range	Mean	Male	Female	
Lake Trout	49	318-867	510	359-7,954	1,685	27	22	0
Round Whitefish	59	147-510	383	265-1,037	665	24	31	4
Arctic Grayling	5	258-357	322	179-620	413	4	0	1
Least Cisco*	28	150-385	286	207-302	263	13	13	2

*n = 17 for weight measurements

TABLE 29. Length, weight, sex, and maturity of lake trout, Chusick Lake, July 1970

Age Class	n	Length (mm)		Weight (gm)		Sex		Maturity	
		Range	Mean	Range	Mean	Male	Female	Non-Spawner	Potential Spawner
VII	5	518-576	341	574-640	507	5	0	5-Immature	0
VIII	5	549-441	395	516-843	650	1	2	3	0
IX	4	527-411	365	359-674	527	2	2	4	0
XI	3	481-513	492	1,109-1,256	1,184	2	1	2	1
XII	2	456-475	466	1,042-1,140	1,091	0	2	2	0
XIII	4	445-542	480	1,002-1,732	1,228	3	1	1	3
XIV	2	535-540	538	956-1,731	1,344	2	0	2	0
XV	4	460-516	497	1,122-1,416	1,268	1	3	3	1
XVI	4	493-600	540	1,340-2,363	1,792	2	2	2	2
XVIII	1	480		1,289		0	1	0	1
XIX	1	586		1,987		0	1	1	0
XX	5	558-645	594	1,657-3,300	2,316	1	4	2	3
XX+	4	552-867	735	1,427-7,954	4,970	2	2	1	3
Total	40	318-867		374-7,954		19	21	26	14

TABLE 30. Occurrences of Food Items in Lake Trout Stomachs, Elusive Lake, July, 1973. (Two of 49 (4.0%) stomachs were empty.)

Food Item	Stomachs Containing Food Item	
	Number	Percent
<u>Insects</u>		
Diptera larvae - Culicidae	29	61.7
Trichoptera larvae	5	10.6
Hymenoptera - adult wasp	4	8.5
Diptera - unknown adult	2	4.3
Coleoptera - adults	2	4.3
Diptera larva - Tipulidae	1	2.1
Unidentified	3	6.4
<u>Fish</u>		
Round Whitefish	1	2.1
Unidentified	11	23.4
<u>Gastropods</u>	31	66.0
<u>Nematodes</u>	7	14.9
<u>Plant Matter</u>	4	8.5
<u>Pelecypods (bivalve)</u>	2	4.3
<u>Rodents (vole)</u>	1	2.1

TABLE 31. Age, Length, Weight, Sex, and Maturity of 19 Round Whitefish, 1960-61, Lake Ontario.

Age Class	n	Length (mm)		Weight (gm)		Sex		Maturity	
		Range	Mean	Range	Mean	Male	Female	Non-Spawner	Potential Spawner
II	1	147		26		?	?	Immature	0
V	9	255-539	285	169-319	225	1	5	Immature (9)	0
VI	1	295		255		1	0	Immature	0
VII	2	507-558	555	581-477	429	0	2	1	1
VIII	2	528-585	557	558-585	462	0	2	1	1
IX	8	549-587	576	507-695	651	5	5	0	8
X	6	588-454	417	713-1,057	859	5	5	0	6
XI	12	588-449	416	676-996	825	6	6	1	11
XII	6	411-510	436	765-868	825	2	4	0	6
XIII	2	426-449	458	892-1,013	955	0	2	0	2
Total	49	147-510		26-1,057		18	27	14	35

TABLE 52. Back Calculated Lengths at Each Year of Life and Mean Annual Growth Increment at 30 Plusive Lake, Round Whitefish, 1975.

Age At Capture	n	Mean Fork Length at Annulus Formation (mm)																
		L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	L ₁₂	L ₁₃				
II	1	66	151															
III	0	0	0															
IV	0	0	0	0														
V	9	56	112	161	214	268												
VI	1	34	81	136	181	228	280											
VII	2	28	55	118	176	228	264	315										
VIII	2	64	90	128	186	239	279	318	344									
IX	8	59	94	132	183	230	271	308	338	365								
X	6	71	119	165	214	261	300	331	359	387	407							
XI	12	65	105	147	192	237	275	311	338	365	387	407						
XII	6	66	103	139	188	237	281	316	338	362	385	406	428					
XIII	2	70	104	144	199	254	291	318	337	356	373	389	409	427				
Weighted Mean Lengths		61	103	146	196	245	280	315	342	367	390	405	423	427				
Mean Annual Growth Increments		61	42	43	50	49	55	55	27	25	23	15	18	4				

TABLE 33. Occurrences of Food Items in Round Whitefish Stomachs From Elusive Lake, July, 1973. (One of 56 (1.8%) stomachs was empty.)

Food Item	Stomachs Containing Food Item	
	Number	Percent
<u>Insects</u>		
Trichoptera pupae and larvae	23	41.8
Trichoptera adults	19	34.6
Diptera larvae and pupae - Culicidae	6	10.9
Diptera larvae - Chironomidae - Tipulidae	2	3.6
<u>Gastropods</u>	30	54.6
<u>Plant Matter</u>	3	5.5
<u>Detritus</u>	1	1.8
<u>Unknown eggs</u>	1	1.8

Arctic Grayling:

The grayling population in Elusive Lake is small, only 5 grayling were captured with six net nights (96 hours). Two of the fish were age class V, two were age VI and one was age IX. Lengths ranged from 262 - 381 mm; weight ranged from 179 - 620 gm. All five samples were females; two were classed as non-spawners and three as potential spawners.

Occurrences of food items in three grayling stomachs included: surface insects (2), trichoptera larvae (1), snail (1), and nine-spine stickleback (1).

Least Cisco:

Age classes of 28 least cisco ranged from II - IX. Potential spawners comprised 71.4% of the sample (Table 34).

Nineteen least cisco stomachs were examined, two were empty. Zooplankton were the most important food item, occurring in 76.5% of all stomachs. Culicidae larvae occurred in 29.4% and plant matter occurred in 11.8% of all stomachs.

TABLE 34. Length, Weight, Sex, and Maturity of Least Cisco, Flusive Lake, 1973.

Age Class	n	Length (mm)		Weight (gm)		Sex		Maturity	
		Range	Mean	Range	Mean	Male	Female	Non-Spawner	Potential Spawner
II	1	166	---	---	---	?	?	Immature	0
IV	1	255	---	---	---	1	0	Immature	0
V*	23	274-300	286	207-302	263	10	13	6	17
VIII	1	362	---	---	---	1	0	0	1
IX	2	382-385	384	---	---	1	1	0	2
Total	28	166-385	---	207-302	---	14	13	8	20

Colville River Delta Trip

On July 31, a flight was made to the Colville River delta to investigate fisheries utilization at the newly established Eskimo village of Nuiqsut. Approximately 200 - 250 Eskimos from Barrow were living in 55 wall tents. Fifteen fish drying racks has been constructed and an estimated 1,000 broad whitefish Coregonus nasus were being dried for subsistence use. Nineteen fishing boats were observed. A Sagavanirktok River tagged char was recovered from an Eskimo who had been fishing in the Colville River.

Barter Island Fishery Utilization Survey

August 17 - 20 was spent at Kaktovik on Barter Island to assess fishery utilization. Village fishing effort is primarily for subsistence. The two major fisheries are the Hula Hula River and saltwater lagoons adjacent to the island. The Hula Hula River is fished at three historical sites close to the mountains from mid-April to the end of May. The catch is made on hook and line through the ice and consists of small resident char and grayling. During July and August, subsistence gill net fishing occurs in saltwater adjacent to the island. The main catch in July is anadromous Arctic char. Six char tagged in Canada (probably the Firth River), one tagged by Williams Brothers of Canada Ltd. in the Canning River, and one from the Sagavanirktok system were recaptured in the subsistence fishery. Indications are that this area is a major summer feeding ground for anadromous Arctic char which migrate from freshwater systems east and west of the area. During August, char fishing is poor but Arctic cisco (koktok), which are preferred by the Eskimos, are caught in abundance. Subsistence fishing by Kaktovik Eskimos in 1973 was considerably above previous years due to lack of caribou in the area. Several Eskimos expressed an interest in establishing a commercial fishery. Sport fishing effort in the area is minimal. A few people from the DEW site fish the shores of the island in July and early August for char.

Walt Audi Air Service flies fishermen to Schrader Lake in the spring for lake trout. Lake trout fishing is reported to be excellent, with the largest fish caught measuring 38 inches. A few lake trout 20 - 30 pounds are caught each spring.

Natural Gas Pipeline Survey

A week in July and a week in September were spent surveying fisheries resources in the vicinity of the southern route of the proposed natural gas pipeline from Prudhoe Bay to Canada. These trips were valuable in developing a better understanding of fisheries investigations being carried out by Williams Bros., providing information and familiarity with fisheries resources in the vicinity of the Canning and Kavik Rivers, and developing a better liaison between the two organizations.

Sagavanirktok River Char Study

Work was continued on the Arctic char study begun in 1971. Emphasis was placed on recovery of tagged char in the Sagavanirktok River system and aerial population counts.

In 1971 and 1972, a total of 6,759 Arctic char were tagged in the Sagavanirktok River system and the Beaufort Sea adjacent to the Sagavanirktok River mouth. To date, 317 tagged char have been recovered. Recapture data have been punched on computer cards to facilitate analysis. Final analysis of the data will be done after the last year of recovery effort, planned for 1974, is completed.

1973 Char Recovery

Char recapture and aerial surveys were conducted from September 8 - 20 and were based from Alyeska Pipeline Service Company camp at Happy Valley. Weather conditions for aerial surveys of char populations were ideal with clear, sunny skies and no wind. Between 14,000 - 16,000 char were counted by two aerial observers (Table 35). In most cases, aerial counts are similar to those made in 1971 and 1972 by Yoshihara (1972 and 1973).

Of 5,364 adult char captured in the Sagavanirktok system during 1973, 255 (4.8%) had been previously tagged (Table 36). The majority of recovery work was done at Accomplishment Creek, Lupine River, Ivishak River, and Echooka Springs. A few hours of seining, gill-netting, and observation were spent at Flood Creek, Saviukviayak River, and Ribdon River to determine if tagged char were present in these spawning populations. The fish were spread out and difficult to capture in these latter areas, which resulted in low recoveries. Even though few fish were caught, observation of large numbers of fish in the three rivers indicated that tagged char were nearly absent. No tagged char were captured and only one was observed (Saviukviayak River). In Accomplishment Creek and Lupine River where large numbers of tagged char were present, the tagged fish were readily visible to observers on the shore. Since no fish were tagged in the Saviukviayak River or Flood Creek and only 92 fish were tagged in the Ribdon River in 1972, few fish were expected to be recovered. Netting results combined with visual observation confirmed this expected lack of tagged fish in Flood Creek, Saviukviayak River, and Ribdon River.

Of 550 anadromous char captured and carefully examined at Accomplishment Creek on September 9, only 3 (0.06%) were classed as non-spawners. Yoshihara (1972) found that 96 - 97% of all fish captured on the spawning grounds were potential spawners. Of 71 tagged fish recovered from the main stem of the Sagavanirktok River, below Saviukviayak River, 97% were non-spawners and 3% were immature. The sex ratio was heavily weighted to females (Table 37) and was similar to that found by Yoshihara for 1971 but higher than 1972 (Yoshihara 1972, 1973).

Since 1971 mean length of Accomplishment Creek spawning char has increased yearly. In 1971 mean length was 507 mm (n = 268), 1972 mean length was 517 mm (n = 392) and in 1973 mean length was 542 mm (n = 355). The increased size is most likely due to a shift to older age fish, probably due to a lack of recruitment to the spawning population by younger age classes. In 1971, 81.7% of char from Accomplishment Creek were age class VII, VIII, IX, with 41% age IX. In 1973, 89.5% char were age IX, X, and XI, with 45% age X (Table 38). Yoshihara (1973) noted this same phenomenon when comparing age and length frequency data of 1972 to that of 1971, for the entire Sagavanirktok River system.

TABLE 35. Aerial Estimates of Adult Chinook Salmon in the Sagavanirktok River System, 1978.

Date	Stream	Spawners	Observed Adult Count*		Duration of Survey	Observation Conditions
			Non-spawners	Total		
9/10	Accomplishment Cr.	574-553	0	574-553	65 minutes	Excellent
9/10	Ribdon River	1,095-1,506	0	1,095-1,506	85 minutes	Excellent
9/10	Lupine River	310-327	0	310-327	80 minutes	Excellent
9/10	Saviukviayak River	226-298	0	266-298	65 minutes	Excellent
9/11	Flood Creek	473-551	0	473-551	20 minutes	Excellent
9/11	Ivishak River	946-1,088	8,811-9,174	9,757-10,262	190 minutes	Excellent
9/12	Echooka River	<u>1,644-2,072</u>	<u>185-504</u>	<u>1,829-2,376</u>	85 minutes	Excellent
Totals		5,068-6,195	8,996-9,478	14,104-15,673		

*Figures are independent counts by two observers from helicopter.

TABLE 36. Tagged and Untagged Char Recovered in the Sagavanirktok River System, September, 1975.

Location	Date	Adult Char Captured	Tagged Char Recovered
Accomplishment Cr.	9/9	550	66
	9/15	<u>237</u>	<u>26</u>
	Total	787	92
Lupine River	9/11	250	27
	9/14	341	53
	9/16	<u>21</u>	<u>4</u>
	Total	612	84
Ivishak River	9/13*	125	2
	9/17**	30	2
	9/18**	1,675	30
	9/19**	<u>1,256</u>	<u>39</u>
	Total	3,086	73
Echooka River	9/12	458	6
Flood Creek	9/13	79	0
Saviukviayak R.	9/13	45	0
Ribdon River	9/16	42	0

*Recapture was made on the upper spawning area.

**Recapture was made between Flood Creek and Gilcad River.

TABLE 3: Sex Ratio, Spawning Condition, and Length Data of 253 Tagged Arctic Char Recaptured on the Sagavanilktok River System, 1975.

Location	Total Recaptures	Sex Ratio (Percent)		S.O.	Spawning Condition (percent)			Length (mm)		
		Male	Female		R.	GR	N-S	IM	Range	Mean
Accomplishment Cr.	92	16	77	51	49	0	0	0	467-659	542
Lupine River	84	26	74	51	68	1	0	0	467-667	543
Main Stem Ivishak	71	27	73	0	0	0	97	3	357-604	509
Ivishak River Spawning Ground	2	0	100	0	100	0	0	0	442-459	451
Echooka Springs	6	33	66	0	17	83	0	0	495-602	547

S.O. = spawned out
R = ripe - actively spawning
GR = green - not quite ripe but will spawn soon
N-S = Non-spawner - mature
IM = Immature

In Accomplishment Creek mean fork length of 92 tagged fish was 541.5 mm and was identical to the mean fork length fo 263 untagged adult spawners captured at the same time. This similarity in mean length for tagged and untagged fish indicates that tagging does not affect growth rate of anadromous char.

The only other fish species captured during the recovery work were grayling, round whitefish, and slimy sculpin, but none were caught in abundance.

Ten grayling were caught at Accomplishment Creek, nine at the main stem of the Ivishak River, and eight a Lupine River.

Eight round whitefish were captured at the main stem of the Ivishak River and three at Echooka Springs.

Table 38. Age-length Composition of 76 Tagged Char Recovered at Accomplishment Creek, 1973.

Age Class	n	Percent	Length (mm)	
			Range	Mean
VIII	2	2.6	479-575	527
IX	17	22.4	469-588	528
X	34	44.7	467-605	536
XI	17	22	507-616	555
XII	2	3	562-582	572
XIII	3	4	530-592	564
XV	1	1	583	

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