

STATE OF ALASKA

*Jay S. Hammond, Governor*



Annual Performance Report for

INVENTORY AND CATALOGING OF  
INTERIOR WATERS WITH EMPHASIS  
ON THE UPPER YUKON AND THE  
HAUL ROAD AREAS

by

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## RESEARCH PROJECT SEGMENT

State: Alaska Name: Sport Fish Investigations  
of Alaska

Project No.: F-9-10

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

Job No.: G-I-N Job Title: Inventory and Cataloging  
of Interior Waters with  
Emphasis on the Upper  
Yukon and the Haul Road  
Areas

Period Covered: July 1, 1977 to June 30, 1978

## ABSTRACT

This report summarizes lake surveys conducted in an approximate 41,000 square mile district of northeastern Alaska. Fifteen key lakes were selected on the basis of habitat and fishery types. Seventeen fish species were either captured in 1977 or reported present from previous surveys.

Standard Alaska Department of Fish and Game lake surveys were conducted and are summarized with a narrative. Length and weight data on captured fish species as well as back-calculated lengths at age are presented.

Documented use levels were low and are discussed along with a background description.

Detailed survey forms and life history data are on file in the Fairbanks office.

## BACKGROUND

During the fiscal year 1977-1978, lake inventory and cataloging surveys were conducted in an approximate 41,000 square mile area. The area is bordered on the south by the Yukon River, on the north by the Brooks Range and extends east from the headwaters of the Alatna River to the Canadian border. The Arctic Circle bisects the study area which lies in northeastern Alaska (Fig. 1).

The area encompasses a wide range of climatic and habitat types that vary primarily with altitude. Latitude, mountain barriers and wind are other contributing factors. Elevations vary from approximately 2,400 m (8,000') above sea level in the central Brooks Range to just over 90 m (300') along the Yukon River. At the higher elevations, vegetation is

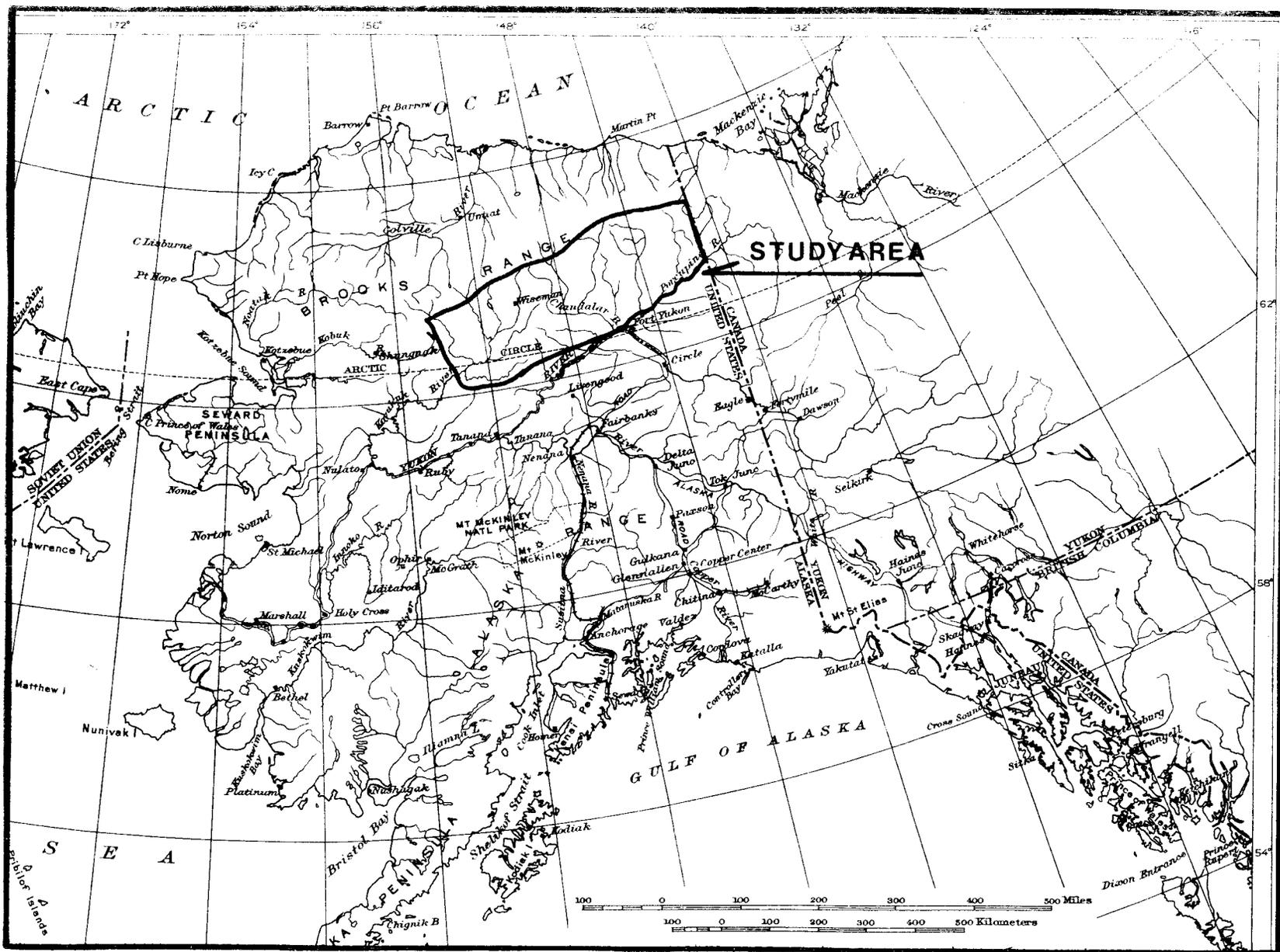


FIGURE 1. Study Area in Northeastern Alaska, 1977-78.

scant and tends to increase in both species and density below 760 m (2,500'). Spruce, cottonwood, alder and willow predominate at lower elevations when soil types permit. Low lands are characterized by poorly drained soils, water and ice-rich bases and an abundance of shallow, seasonal ponds. Habitat also varies markedly with reference to north or south facing slopes. The latter exhibit different floral density and diversity. In summary, a vegetative cover that will change markedly within a given watershed will often affect nutrient input into adjacent lake systems and hence productivity.

The climate is one of harsh contrasts. Summer temperatures often enter the 80's F (27°C) during the months of June, July and early August. Fall temperatures usually show continual below freezing levels by late September. Midwinter extremes may reach below -70°F (-57°C.) Springs are often long, and continual above freezing temperatures may not occur until late May. Mean annual temperatures average in the mid 20's°F (-5°C). Daylight varies from a nearly continual photoperiod in late June to almost complete darkness in December. Growing seasons for most flora and fauna are thus limited by the daylight extremes. Cloud cover varies with season and probably occurs most frequently during the periods of moist air uplifting and subsequent condensation associated with the long, warm summer days. Typical annual precipitation for the study area averages around 12 inches a year. Typical freezeup of the rivers that drain the southern Brooks Range occurs by early October and thaw is usually complete by early May. Lakes experience a similar freeze-thaw schedule, with ice cover present by early October and open water leads showing by late May.

The early people of the area consisted of Eskimos and Athapascan Indians. The Eskimo influence was seen in the northwestern segment of the study area while various Athapascan groups populated and migrated through the central and eastern portions. Their lifestyle was nomadic the majority of the time with movements coinciding with food availability and yearly climactic changes. Game species movements as well as fish migration and availability dictated the lifestyle and survival success. White traders, either Russian or North American, entered the area in search of valuable fur. The gold rush period of the late 1800's drew many adventurers into the area in search of the numerous gold deposits and other valuable minerals. World War II precipitated further land mapping and airfield construction. With the discovery of oil and natural gas on Alaska's North Slope, portions of the study section have become an avenue for transportation.

Present development consists of the small towns of Allakaket, Bettles, Wiseman and Arctic Village. Smaller mining camps have been created near mineral deposits, primarily in the central Brooks Range near Wiseman and Chandalar Lake. The avenues for initial oil exploration and logistic transportation consisted of a winter road that ran through Bettles and northward in the late 1960's. With the confirmation of commercial oil reserves on the North Slope, a haul road, oil pipeline and several construction camps were built in the middle 1970's to allow for oil transportation to the port of Valdez. This represents the greatest

development to date, although a planned natural gasline down the same corridor will again lead to increased development within the study area. The only other commercial resource use consists of guiding operations that center on concentrations of game and fish.

The following fish species are generally distributed or reported throughout at least a portion of the lakes and rivers in the study area: Arctic char (AC), Salvelinus alpinus (Linnaeus); Arctic grayling (GR), Thymallus arcticus (Pallas); burbot (BB), Lota lota (Linnaeus); broad whitefish (BWF), Coregonus nasus (Pallas); chum (dog) salmon (CS), Oncorhynchus keta (Walbaum); coho salmon (SS), Oncorhynchus kisutch (Walbaum); humpback whitefish (HWF), Coregonus pidschian (Gmelin); king salmon (KS), Oncorhynchus tshawytscha (Walbaum); lake chub (LC), Couesius plumbeus (Agassiz); lake trout (LT), Salvelinus namaycush (Walbaum); least cisco (LCI), Coregonus sardinella Valenciennes; longnose sucker (LNS), Catostomus catostomus (Forster); ninespine stickleback (NS), Pungitius pungitius (Linnaeus); northern pike (NP), Esox lucius Linnaeus; round whitefish (RWF), Prosopium cylindraceum (Pallas); sheefish (SF), Stenodus leucichthys (Guldenstadt); and slimy sculpin (SSC), Cottus cognatus Richardson. The salmon are limited to the major rivers while all others above may be found in both lakes and streams, with the exception of lake trout which generally dwell in the area's lakes.

Use levels for all species remain minimal. Documented sport use during the six week survey conducted in July and August 1977 was very low. Fifteen fishermen were contacted and their catch totalled fewer than 25 lake trout. Low catches of northern pike and grayling were also recorded. The census was not 100% complete, yet reflects present effort and catch. Our survey data also reflect low sport gear catch success on the part of the survey crew. A possible reason is that mid summer fishing probably results in lower success than fishing conducted just after breakup and before ice-up, at least for lake dwelling species.

Documented subsistence use also remains at a low level (Fred Andersen, Division of Commercial Fisheries, 1977, pers. comm.). He relates that netting and line fishing occurs near all villages and townsites. Chum and silver salmon along with various whitefish species and northern pike are taken. In all lakes and the majority of streams, permits and quotas are not required or established. However, certain streams adjacent to the pipeline corridor are closed and in others permits are required. Hand held lines are presently legal for subsistence purposes only when fishing through the ice.

Selection for examination of the 15 lakes in this survey was done on the basis of their relation to various habitats within the area as well as their relative importance and potential for fishery use. Data obtained from selected lakes would be applicable at present to other lakes possessing similar fish species composition, limnological qualities and geographical location.

## RECOMMENDATIONS

1. Future use levels and user groups in the area's waters should be documented as a means of determining the need for future fisheries studies on impacted systems. Studies should be conducted at times when fishing use and potential is highest.
2. A study station should be established on a representative lake in the area. Intensive studies on limnology and fisheries should be conducted to extend the knowledge of northern ecosystems. Data so collected would then be applied to similar lakes and fisheries as a means of furthering the understanding of population dynamics and developing management programs.

## OBJECTIVES

1. To conduct surveys of waters adjacent to the North Slope haul road.
2. To conduct surveys of remote waters in the job area.
3. To continue aerial index counts of Arctic char in the upper Sagavanirktok drainage.
4. To monitor the sport fishery in the study area.

## TECHNIQUES USED

The data collected for this report were obtained through methods employed in standard Alaska Department of Fish and Game lake surveys. Map references and elevations were taken from U.S.G.S. 1:63,360 and 1:250,000 topographic maps and U.S. Department of Commerce sectional and world aeronautical charts. Lake locations were described in statute miles and magnetic compass bearings ( $^{\circ}$ M) from the nearest major community. The Dictionary of Alaska Place Names, Geological Survey Professional Paper 567, was also called upon for location references. Acreages were determined by the use of a polar planimeter and the above maps. Secchi readings were taken using the standard black and white disc. Flows and discharges of inlet and outlet streams were computed by the drift method. Fish were captured with either experimental 125' x 6' graduated mesh gill nets (1/2"-2 1/2" bar in five panels) or by the use of hand held or beach-set sport lines. Usually two nets were set for 18 hours on each lake. Fish so captured were measured for fork length to the nearest millimeter, weight to the nearest five grams and a scale or otolith was taken for aging purposes. Most fish were autopsied to determine sex and maturity composition and classified to their year of maturity. When maturity or sex was uncertain (U), it was noted. Water quality measurements were obtained with the use of a Hach AL-36B drop titration and color comparator kit. Visual methods were used to collect the remainder of the field data. Scale samples were soaked, cleaned and mounted on

gummed cards, from which plastic impressions were taken. The scales were read on a microprojector. Ages were determined by totaling the scale annuli. Back-calculations were accomplished by comparing the relative distance from the scale focus to each annulus with the overall scale radius along the dorsal field. The following linear formula by Rounsefell, 1953, p. 324 was used in conjunction with a Friden 1155 computer:

$$L^1 = \frac{C + S^1}{S} (L - C)$$

Where:

- $L^1$  = Length at annulus formation - unknown
- $S^1$  = Scale radius from focus to annulus
- L = Length at capture
- S = Total scale radius
- C = Length at scale formation

Previous experience has shown that most whitefish and grayling complete scalation by 35 mm (C). Lake trout and burbot were aged by the use of otoliths. The otoliths were cleaned and the convex side was sanded flat and cleaned in a xylene solution. They were then placed in a black dish under direct light and the annuli were read with a dissecting scope at 30X. Back-calculations were conducted with the aid of a micrometer eyepiece where one unit = 0.0625 mm. A regression of total otolith radius (at 30X) against fork length showed an  $R = 0.855, 112DF$  and a  $R$  test value of greater than 99%. Lake trout reportedly average 15 mm at hatching so a safe value of 20 mm was used for C in the above back-calculation formula. The same value was used for burbot. Only summed back-calculated length values for each species were presented. The back-calculated length by age groups are on file in the Fairbanks office.

In comparing growth rates between systems, it was arbitrarily decided to use fish of an age old enough to reflect sufficient growth but not so old as to have too few samples for valid comparison. Condition factors or K values were determined by the formula:  $K = \text{weight divided by fork length}^3 \times 10^5$  and applied to the averaged length and weight by species.

Previous survey data referenced in the text was included in the final survey summary whenever possible.

A float equipped DeHavilland Beaver aircraft was operated by the survey crew and provided the field travel and logistics support.

Char surveys were not conducted due to scheduling and equipment difficulties.

## FINDINGS

### Lake Surveys

Following are survey summaries of waters adjacent to the North Slope haul road. Previous investigations have been presented by Yoshihara

(1972, 1973), Furniss (1974, 1975), Netsch (1975), Hallberg (1976), and Pearse (1977). Surveys during the field season were limited to two lakes, Galbraith and Toolik, along the north side of the Brooks Range adjacent to the haul road.

Name of Lake: Galbraith Lake River System: Atigun-Sagavanirktok

Location: North Slope Brooks Range on the pipeline right-of-way,  
123 miles 360°M from Bettles

Position: 68°28'N 149°25'W Elevation: 802 m (2,632')

Surface Area: (417 ha) (1,030 acres) Maximum depth: (7 m) (23')

Water Chemistry:

Date: 8/24/77

Temperature: 12°C

DO (ppm): ...

CO<sub>2</sub> (ppm): ...

pH (ppm): 8.3

MOA (ppm): 103

Hardness (ppm): 103

Fish Sampling Summary:

Date	No.	Species	Length (mm)		Weight (g)		K*	% Comp.
			Range	Mean	Range	Mean		
8/29/77	22	LT	120-755	543	20-4,400	1,737	1.140	53
	16	RWF	150-375	266	20- 480	191	1.014	38
	4	AC	400-450	438	692-1,160	858	1.021	9

\* Coefficient of condition.

Maturity and Sex Ratio:

Species	Mature Male			Mature Female			Immature		
	1977	1978	U*	1977	1978	U	♂	♀	U
RWF	4	3	0	3	0	0	1	3	2
AC	0	0	0	1	0	0	0	2	1
LT	4	3	0	1	10	0	0	0	0

\* Uncertain

Remarks:

Galbraith Lake is located adjacent to the North Slope haul road near Pump Station #4. It lies near the end of the Atigun River valley which opens to the northwest. Elevations vary from 790 m (2,600') at lake

level to 1,520 m (5,000') in the surrounding hills. The watershed is typical of the foothills on the north side of the Brooks Range and rolling tundra predominates. Numerous small lakes adjoin the nearby Atigun River. Vegetation consists of grasses and sedges with little firewood available. Sandy shoals occupy a good percentage of the lake bottom and a single hole to 7 m (23') was recorded. The water displays a high level of turbidity, reflected by a Secchi reading of 2 m (7'). Aquatic vegetation is sparse and limited to the shallowest areas. Suitable spawning habitat should be found in the three major inlets and single outlet as well as near the rocky shore on the southwest corner. Access is via airplane directly to the lake or nearby airstrip.

Road access via the nearby haul road would also be possible. Present fishery usage is prohibited by the recent 5 mile lateral sport fishing closure along the pipeline alignment, but was previously very light. Nearby development includes Galbraith pipeline camp and Pump Station #4. Past investigations were conducted by Roguski and Winslow (1970) and Furniss in 1975.

Fish sampling with nets and angling resulted in the capture of three fish species. Lake trout, Salvelinus namaycush (Walbaum), were most abundant in the catch. Their growth rates to age IX were highest of 11 lakes where captured (Table 1). but condition coefficients ranked ninth of eleven. Round whitefish, Prosopium cylindraceum Pallas), were the second most abundant species caught and showed a growth rate ranked sixth of nine (Table 2). Their fatness at survey time was eighth of nine lakes. Four Arctic char, Salvelinus alpinus (Linnaeus), probably resident forms or types, were caught on hook and line and were the only examples taken during this season's survey.

Angling success proved good on Galbraith Lake with 18 lake trout and 4 char taken in 45 minutes. Fishing location was critical, yet this was the best success experienced during all lakes surveyed. As development progresses and when the 5 mile closure is lifted, monitoring of this lake's fishery should be undertaken.

<i>Name of Lake:</i> Toolik Lake	<i>River System:</i> Kuparuk
<i>Location:</i> North Slope pipeline right of way 132 miles 355°M from Bettles.	
<i>Position:</i> 68°38'N 149°36'W	<i>Elevation:</i> 722 m (2,370')
<i>Surface Area:</i> (145 ha) (358 acres)	<i>Maximum depth:</i> 23.5 m (77')
<i>Water Chemistry:</i> Data lost.	

Fish Sampling Summary:

Date	No.	Species	Length (mm)		Weight (g)		K*	% Comp.
			Range	Mean	Range	Mean		
8/26/77	26	LT	115-475	363	20-1,190	603	1.261	55
	13	RWF	310-450	292	300-1,220	247	1.253	28
	8	GR	140-385	284	30- 680	339	1.480	17

\* Coefficient of condition.

Table 1. Summarized back-calculated lengths at age for lake trout, 1977.

Lake	Mean Length Mean Annual Growth n	L	L	L	L	L	L	L	L	L*	L	L	L	L	L	L	L	L	L	L	L	L	L	L
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	>22	
Ackerman	11	119 119	161 42	195 34	226 31	252 26	282 30	308 26	329 21	351 22	365 14	381 16	391 10	408 17	419 11	428 9	431 3	434 3	449 15	471 22	479 8	479 0	486 7	
Bob Johnson	4	137 137	187 50	204 17	238 34	271 33	305 34	336 31	371 35	388 17	405 17	438 33	455 17	472 17	463 0	463 0	478 15	494 16	510 16	510 0	526 16	699 173		
Chandalar	20	128 128	182 54	236 54	271 35	307 36	343 36	379 36	397 18	415 18	451 36	469 18	487 18	505 18	505 0	523 18	523 0	523 0	505 0	559 54	505 0	523 18		
Galbraith	22	131 131	187 56	243 56	280 37	336 56	376 40	410 34	429 19	466 37	484 18	484 0	521 37	540 19	559 19	562 3	586 24	607 21	670 63					
Helpmejack	1	111 111	138 27	166 28	192 26	219 27	247 28	264 17	292 28	310 18	336 26	365 29	382 17	410 28	445 35	465 20	482 17	500 18	519 19	528 9	537 9	546 9	600 54	
Iniakuk	3	125 125	176 51	218 42	256 38	288 32	319 31	352 33	376 24	399 23	419 20	444 25	463 19	502 39	546 44	564 18	582 18	600 18						
Old John	6	109 109	164 55	206 42	246 40	287 41	321 34	352 31	379 27	400 21	427 28	446 19	464 18	485 21	496 11	506 10	519 13	535 16	535 0	556 21	567 11	577 10	714 137	
South Twin	13	123 123	170 47	208 38	241 33	268 27	290 22	316 26	339 23	358 19	344 0	358 0	406 48	417 11	429 12	447 18	460 13	469 9	476 7	494 18	497 3	512 15	572 60	
Squaw	1	158 158	194 36	211 17	228 17	254 26	281 27	307 26	349 42	377 28	394 17	411 17	437 26	445 8	454 9	472 18	481 9	498 17	507 9	515 8				
Toolik	25	93 93	133 40	159 26	187 28	213 26	236 23	257 21	270 13	287 17	304 17	314 10	327 13	338 11	349 11	361 12	372 11	376 4	379 3	391 12	402 11	401 0	453 52	
Wild	6	126 126	178 52	220 42	262 42	297 35	322 25	351 29	386 35	419 33	444 25	473 29	493 20	520 27	539 19	559 20	584 25	602 18	610 8	624 14	639 15	646 7	675 29	
Total	112	124 124	170 46	206 36	239 33	272 33	302 30	330 28	356 26	379 23	398 19	416 18	439 23	458 19	473 15	486 13	498 12	511 13	514 3	516 2	517 1	526 9	600 74	

\* Age used for growth comparisons between systems.

Table 2. Summarized back-calculated lengths of round whitefish, 1977.

Lake	Mean Length	L	L	L	L	L	L	L	L*	L	L	L	L	L	L
	Mean Annual Growth	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	n														
Ackerman	28	98	155	209	260	307	347	382	406	425	474				
		98	57	54	51	47	40	35	24	19	49				
Bob Johnson	5	97	136	173	202	237	268	291	328	355					
		97	39	37	29	35	31	23	37	27					
Chandalar	13	87	124	160	192	229	257	291	319	340	340	344	360		
		87	37	36	32	37	28	34	28	21	0	4	16		
Galbraith	16	94	131	166	201	237	270	289	335	317					
		94	37	35	35	36	33	19	46	0					
Iniakuk	8	92	138	187	229	265	292	313	343	338					
		92	46	49	42	36	27	21	30	0					
South Twin	18	83	114	143	178	205	236	263	286	313	330	342	363	377	396
		83	31	29	35	27	31	27	22	27	17	12	21	14	19
Squaw	1	98	137	173	208	242	275	318	348	368	389				
		98	39	36	35	34	33	43	30	20	21				
Toolik	13	95	141	184	224	265	311	343	373	396	411	435			
		95	46	43	40	41	46	32	30	23	15	24			
Wild	11	83	126	166	211	247	280	309	338	363	369	392	387		
		83	43	40	45	36	33	29	29	25	6	23	0		
Total	113	92	134	174	212	249	282	311	342	358	386	379	370	377	396
		92	42	40	38	37	33	29	31	16	28	0	0	7	19

\* Age used for growth comparisons between systems.

Maturity and Sex Ratio:

Species	Mature Males			Mature Females			Immature		
	1977	1978	U*	1977	1978	U	♂	♀	U
LT	6	0	0	3	6	0	4	4	3
RWF	3	1	0	8	1	0	0	0	0
GR	0	2	0	0	4	0	1	0	1

\* Uncertain.

Remarks:

Toolik Lake lies adjacent to the North Slope haul road and pipeline right of way. It is typical of northern Brooks Range foothill lakes with a watershed consisting of rolling tundra and numerous shallow ponds. Vegetation consists of grasses and sedges, with an occasional willow associated with watercourse. Shoals occupy a good portion of the lake's area with irregular patterns that divide the lake into several basins. The water had a brown pigment coloration when surveyed. Secchi disc readings to 12' were recorded. Aquatic vegetation was sparse when compared with other lakes and was present only along the most immediate lake margins. Two inlets are shown on aerial photos but only one had measurable flow during the survey, draining a series of shallow ponds to the south. A single outlet flows through a similar habitat to the north and eventually enters the Kuparuk River. Both the inlet and outlet, as well as the numerous shoals should provide suitable spawning and rearing habitat. Access is either by the adjacent haul road or with airplane to the main lake or nearby airstrip. The University of Alaska's Institute of Marine Science and associated institutions have been studying Toolik Lake for some time, mainly in the realm of limnological research.

Netting was extended over a 2-day period due to poor weather. Lake trout were the most numerous fish species captured and ranged in age from II to an estimated XXXIX. Growth rates to age IX (Table 1) were slowest of the fish populations studied. Their condition factor rated sixth of the eleven lakes. Thirteen round whitefish were examined. Their ages ranged from V to XI and growth rate (Table 2) rated second. Eight grayling, Thymallus arcticus (Pallas), were netted and aged from II to VII. Their back-calculated growth rate (Table 3) was third to age V and condition factors reached fourth of eight populations.

Due to poor weather no angling was undertaken. The potential for success is probably good for all species, however. Recommendations call for further cooperative efforts at assessing the productivity of this system and use surveys when the public is allowed sport fisheries access.

Table 3. Summarized back-calculated lengths for Arctic grayling, 1977.

Lake	Mean Length Mean Annual Growth n	L	L	L	L	L*	L	L	L	L	L
		1	2	3	4	5	6	7	8	9	10
Ackerman	16	80 80	108 28	139 31	174 35	204 30	212 8	231 24	257 36	282 34	
Bob Johnson	1	94 94	126 32	166 40	201 35	239 38					
Chandalar	13	93 93	129 36	165 36	201 36	223 22	248 25	276 28	315 39	347 32	368 21
Old John	22	89 89	133 44	178 45	224 46	270 46	305 35	332 27	340 8		
South Twin	20	91 91	129 38	164 35	200 36	240 40	278 38	311 33	338 27	360 22	
Squaw	1	78 78	108 26	134 26	197 63	220 23	258 38	314 58	357 40	390 33	
Toolik	7	89 89	123 34	163 40	211 48	248 37	282 34	286 4			
Wild	5	92 92	133 41	178 45	213 35	249 36	266 17				
Total	85	89 89	124 35	161 37	203 42	237 34	265 28	292 27	322 30	345 23	368 23

\* Age used for growth comparisons between systems.

Survey Summaries of Remote Waters

Following are survey summaries of remote waters studied during the past field season. Previous lake investigations have been carried out by Heckart (1964, unpublished), Roguski and Spetz (1968), Roguski and Winslow (1970), Craig and Wells (1975), Ward and Craig (1974), and Kramer (1975, unpublished). Stream surveys of the majority of the area's major waters were conducted by Alt (1974, and unpublished 1974 and 1976) and Craig and Wells (1975). Summaries and discussions are included with each system description.

*Name of Lake:* Ackerman Lake                      *River System:* Chandalar River  
*Location:* 24 miles east of Chandalar Lake and 120 miles 040°M from Bettles  
*Position:* 67°32'N 147°32'W                      *Elevation:* 518 m (1,700')  
*Surface Area:* 746 ha (1,843 acres)              *Maximum depth:* 25.6 m (84')  
*Water Chemistry:*  
    Date: 8/18/77  
    Temperature (°C): 16  
    DO (ppm): ...  
    CO<sub>2</sub> (ppm): ...  
    pH (ppm): 8.5  
    MOA (ppm): 68  
    Hardness (ppm): 85

*Fish Sampling Summary:*

Date	No.	Species	<u>Length (mm)</u>		<u>Weight (g)</u>		K*	% Comp.
			Range	Mean	Range	Mean		
8/18/77	41	RWF	120-460	251	20-1,090	307	1.941	58
	12	LT	100-560	438	680-1,920	981	1.167	17
	16	GR	110-340	239	90- 280	220	1.611	23
	2	BB	150-305	228	25- 180	103	0.867	3

\* Coefficient of condition.

*Maturity and Sex Ratio:*

Species	<u>Mature Males</u>			<u>Mature Females</u>			<u>Immature</u>		
	1977	1978	U*	1977	1978	U	♂	♀	U
RWF	7	1	5	1	0	3	1	4	19
LT	1	0	2	0	6	3	0	0	0
GR	0	1	1	0	0	5	2	2	5
BB	0	2	0	0	0	1	0	0	1

\* Uncertain.



Table 4. Summarized back-calculated lengths of burbot, 1977.

Lake	Mean Length	L	L	L	L	L	L	L	L	L*	L	L	L	L	L	L	L	L
	Mean Annual Growth	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	n																	
Ackerman	2	69 69	131 62	152 21	173 21	193 20	228 35	242 14	256 14	263 7								
Chandalar	3	100 100	179 79	248 69	293 45	339 46	396 57	441 45	475 34	510 35	555 45	589 34	589 0					
Squaw	2	120 120	257 137	307 50	356 49	394 38	444 50	481 37	518 37	568 50	606 38	643 37	668 25	705 37	730 25	755 25	780 25	830 50
Totals	7	97 97	189 92	236 47	274 38	309 35	356 47	388 32	417 29	447 30	581 134	616 35	629 13	705 76	730 25	755 25	780 25	830 50

\* Age used for growth comparisons between systems.

Fish Sampling Summary:

Date	No.	Species	Length (mm)		Weight (g)		K*	% Comp.
			Range	Mean	Range	Mean		
8/2/77	12	NP	355-740	608	220-2,125	1,299	0.811	40
	8	LCI	230-281	250	140- 210	167	1.069	27
	5	RWF	290-365	328	225- 530	364	1.032	17
	4	LT	326-720	589	907-4,300	2,914	1.426	13
	1	GR	255	255	200	200	1.206	3

\* Coefficient of condition.

Maturity and Sex Ratio:

Species	Mature Males			Mature Females			Immature		
	1977	1978	U*	1977	1978	U	♂	♀	U
NP	0	0	6	0	0	6	0	0	0
LCI	0	0	2	0	0	7	0	0	0
RWF	0	0	3	0	0	2	0	0	0
LT	0	0	1	0	0	3	0	0	0
GR	0	0	1	0	0	0	0	0	0

\* Uncertain

Remarks:

Bob Johnson Lake is located in a northwest-southeast valley. Steep hills adjoin the lake with elevations ranging from approximately 500 m (1,700') at lake level to 1,200 m (4,000') on nearby peaks. The watershed is typically valley shaped and vegetation consists of alpine taiga with black spruce and a few hardwoods predominating. A large portion of the northwest end of the lake is shoal area, as are the shore margins, both totaling 15% of the lake area. Lake sides facing steep slopes drop off quite rapidly. The water was clear when surveyed in early August and Secchi readings to 7 m (23') were recorded. Moderate aquatic vegetation occurred in the shoal areas. Six inlets were noted but flows were minimal when surveyed. A single outlet drains the northwest end and flows through the Bettles River into the Middle Fork Koyukuk River. The outlet was not surveyed. Spawning areas would be found around most inlets, in the outlet and around the small island located one-third of the lake's length from the outlet. The lake margin would also supply good pike spawning habitat. Access is either through aircraft both summer and winter or a foot trail from the Middle Fork Koyukuk River. Past use has included both recreational and mining development. Several old dwellings line the western shore. Nobody was living on the lake when surveyed. Past surveys were conducted by Kramer in 1975.



Table 5. Summarized back-calculated lengths for least cisco, 1977.

Lake	Mean Length Mean Annual Growth		L 1	L 2	L* 3	L 4
	n					
Bob Johnson	5		112 112	182 70	224 42	254 30
Chandalar	14		81 81	107 26	126 19	
Sithylenkat	5		87 87	104 17	119 15	
Total	24		94 94	131 37	157 26	254 97

\* Age used for growth comparisons between systems.

Maturity and Sex Ratio:

Species	Mature Males			Mature Females			Immature		
	1977	1978	U*	1977	1978	U	♂	♀	U
HWF	0	0	37	0	0	17	4	3	0
LT	0	0	11	0	0	8	1	4	0
GR	0	0	4	0	0	5	0	0	7
LCI	0	0	7	0	0	6	0	0	1
RWF	0	0	5	0	0	5	0	1	2
NP	0	0	0	0	0	3	0	1	0
BB	0	0	2	0	0	1	0	0	0
BWF	0	0	0	0	0	1	0	0	0
LNS	0	0	1	0	0	0	0	0	0

\* Uncertain

Remarks:

Chandalar Lake lies in a basin in the valley of the North Fork Chandalar River. Elevations vary from 548.6 m (1,800') at lake level to 1,828.8 m (6,000') in the surrounding watershed. Spruce and mixed hardwoods surround the lake with an occasional break into low muskeg and open tundra. Shoal areas take up a good portion of the inlet (north) and outlet (southwest) ends as well as in the occasional extension near prominent land points. The water color had cleared at the time of survey in early August from its usual turbidity. Secchi readings to 10' were recorded. Higher turbidities are often noted in spring during snow melt periods which cause lake levels to vary up to several feet. Aquatic vegetation is scant, probably due to shallow depths of light penetration and wide lake level fluctuations. The North Fork Chandalar River provides the major inlet and outlet to the lake, entering on the north shore and exiting to the southwest. It connects downstream with the Yukon River. Four smaller inlets enter the lake but flows were negligible during the survey. The inlets and outlets and their associated shoal areas probably provide the majority of suitable spawning habitat. Numerous gravel beds rim the lake also providing good spawning areas. Access is either by airplane to the lakeside gravel airstrip or by foot. Numerous mining claims surround the lake. Several dwellings adjoin the airstrip and are in active use. Past investigations have been conducted by Roguski in 1968 and Kramer in 1975.

Nine species of fish were captured in past surveys. Humpback whitefish, Coregonus pidschian (Gmelin), were the most numerous. They ranged in age from II to XI but were the slowest growing species (Table 6) in the lakes surveyed at age VIII. Their condition factors ranked number one, however. Twenty-four lake trout were captured, ranging in age from VII to XXI. Their growth up to age IX was third (Table 1) but their K value ranked 10th of 11. Sixteen grayling, ages I to X, were captured, their

Table 6. Summarized back-calculated length for humpback whitefish, 1977.

Lake	Mean Length	L	L	L	L	L	L	L	L*	L	L	L	L	L
	Mean Annual Growth	1	2	3	4	5	6	7	8	9	10	11	12	13
	n													
Chandalar	35	90	125	157	192	224	259	290	324	349	371	402	416	471
		90	35	32	35	32	35	31	34	25	22	31	14	55
Old John	53	104	149	193	238	285	329	371	408	441	463	485	510	540
		104	45	44	45	47	44	42	37	33	22	22	25	30
Sithylenkat	7	103	145	186	224	258	296	330	368					
		103	42	41	38	34	38	34	38					
Squaw	45	96	142	187	226	266	301	341	369	392	412	434	473	566
		96	46	45	39	40	35	40	28	23	20	22	39	93
Total	140	99	141	181	220	259	297	333	368	394	416	441	467	526
		99	42	40	39	39	38	36	35	26	22	25	26	59

\* Age used for growth comparisons between systems.

growth to age V (Table 3) was sixth of eight but their condition ranked first. Least cisco captured varied from II to III and showed the best growth rate to age III. Their K value ranked second. Round whitefish, ages I to XII, grew eighth of nine up to age VIII. Their K values ranked eighth of nine. Three northern pike were captured but were not successfully aged. Their relative condition ranked fifth of eight. Three burbot, IV to IX, grew second of three up to age IX but had the lowest K value.

Fishing success on Chandalar Lake is often variable. During the survey no fish were caught on rod and reel except three burbot on set lines. Local residents report best luck just before freezeup with clearer water conditions. The inlet and outlet are also reported good when turbidity is low. Some subsistence usage occurs in the fall and burbot fishing should be good year-round. This lake should be closely monitored if future use increases are detected.

Name of Lake: Helpmejack River System: Alatna River  
 Location: South Slope Brooks Range, 57 miles 245°M from Bettles.  
 Position: 66°56'N 153°33'W Elevation: 228.6 m (750')  
 Surface Area: ≈ 176.5 ha (436 acres) Maximum depth: 25.3 m (83')  
 Water Chemistry:

Date: 7/26/77  
 Temperature (°C): 19  
 DO (ppm): 10  
 CO<sub>2</sub> (ppm): 15  
 pH (ppm): 8.5  
 MOA (ppm): 103  
 Hardness (ppm): 120

Fish Sampling Summary:

Date	No.	Species	Length (mm)		Weight (g)		K*	% Comp.	
			Range	Mean	Range	Mean		♂	♀
7/26/77	10	LCI	...	< 150	...	...	...		59
	6	NP	320-680	546	220-2,125	1,299	0.798		35
	1	LT		600		2,780	1.278		6

\* Coefficient of condition.

Maturity and Sex Ratio:

Species	Mature Males			Mature Females			Immature		
	1977	1978	U*	1977	1978	U	♂	♀	U
NP	0	0	2	0	0	3	0	0	1
LT	1	0	0	0	0	0	0	0	0

\* Uncertain.



Maturity and Sex Ratio:

Species	Mature Males			Mature Females			Immature		
	1977	1978	U*	1977	1978	U	♂	♀	U
RWF	0	0	7	0	0	1	0	0	0
NP	0	0	1	0	0	3	0	0	0
LT	0	0	1	0	0	1	1	0	0

\* Uncertain.

Remarks:

Iniakuk Lake lies in a northwest-southeast valley to the east of and adjoining the Alatna River valley. Steep hills line the east and west banks, rising from 200 m (700') at the lake level to over 1,200 m (4,000') to the west. Spruce and birch are the main tree species. Smaller lakes and rolling muskeg surround the southern end. Shoal areas are limited to the immediate lake margin, with more extensive areas near the less steeply rising inlet and outlet areas. The outlet area has several shoals offshore suitable for spawning. The water was clear at survey time with Secchi readings to 36' recorded. Aquatic vegetation is sparse except on the extreme north and near the lake inlet, Tobuk Creek. The outlet drains into the Malemute Fork of the Alatna River. The inlet and outlet are approximately 6 m (20') wide and outlet flows allow for boat passage during most years. Suitable spawning areas would include the shoals mentioned above as well as the inlets and outlet streams. Access is presently via aircraft or boat from the Alatna River. A lodge is present on the north end of the lake. Survey crews were stationed on the southwest corner during summer 1977. Past investigations have been conducted by Heckart in 1964 and Roguski and Spetz in 1967.

Three fish species were captured during this survey. Reported present but not captured were humpback whitefish, slimy sculpin, Cottus Cognatus Richardson, burbot and ninespine stickleback, Pugnitiuus pugnitiuus (Linnaeus). Of those captured, round whitefish were the most numerous. Their growth up to age VIII was fourth of nine (Table 2) but their condition at the time of survey ranked last. The four northern pike captured were not successfully aged and had condition values seventh of eight. The three lake trout grew fifth of eleven up to age IX (Table 1) and also ranked fifth in K values.

All fish captured were netted. Ten man-hours of sport fishing yielded no fish. Fishing may be better at other times of the year. Future surveys should be conducted during those times.

Name of Lake: Norutak River System: Kobuk River  
 Location: South Slope Brooks Range, 76 miles 240°M from Bettles.  
 Position: 66°48'N 154°18'W Elevation: ≈ 238 m (780')  
 Surface Area: 1,689 ha: (4,173 acres) Maximum depth: 5.2 m (17')

Water Chemistry:

Date: 7/21/77  
 Temperature (°C): ...  
 DO (ppm): 10  
 CO<sub>2</sub> (ppm): 8  
 pH (ppm): 7.5  
 MOA (ppm): 34  
 Hardness (ppm): 34

Fish Sampling Summary:

Date	No.	Species	Length (mm)		Weight (g)		K	% Comp.
			Range	Mean	Range	Mean		
7/21/77								
Hook and Line								
	20	NP	Not sampled					
		BWF	Reported					

Remarks:

Norutak Lake was briefly looked at during this survey. It lies on the divide between the upper Kobuk and Hogatza rivers. The watershed is rolling spruce muskeg. From the air, the lake appears to consist of extensive shoal areas with a central basin sounded to 17 feet. The water was somewhat algae colored and Secchi readings could be taken to the maximum depths. Aquatic vegetation was abundant with a good portion of the lake's surface covered by vegetation. A single inlet was observed on the northwest corner, no outlets were seen. Access is by airplane. A trapper's cabin was on the northeast shore and represents the only development. The inlet as well as rocky shoals adjacent to small islands or near the east shore would be good spawning areas.

We caught 20 small (<24") northern pike in the lake's center but they were not sampled. Broad whitefish are also reported to be present. More detailed surveys are recommended.

*Name of Lake:* Old John Lake                      *River System:* Sheenjek-Porcupine Rivers

*Location:* 10 miles southeast of Arctic Village, 106 miles 333°M from Fort Yukon

*Position:* 68°04'N 145°03'W                      *Elevation:* 685 m (2,247')

*Surface Area:* 2,267 ha (5,600 acres)              *Maximum depth:* 24 m (78')

Water Chemistry:

Date: 6/23/77  
 Temperature (°C): 10  
 DO (ppm): 11

CO<sub>2</sub> (ppm): ...  
 pH (ppm): 8.0  
 MOA (ppm): 85  
 Hardness (ppm): 103

Fish Sampling Summary:

Date	No.	Species	Length (mm)		Weight (g)		K*	% Comp.		
			Range	Mean	Range	Mean				
6/23/77	53	HWF	390-	510	448	700-	1,750	1,060	1.178	62
	22	GR	123-	390	309	20-	580	350	1.233	25
	11	LT	375-	1,041	636	460-	12,268	4,199	1.632	13

\* Coefficient of condition.

Maturity and Sex Ratio:

Species	Mature Males			Mature Females			Immature		
	1977	1978	U*	1977	1978	U	♂	♀	U
HWF	0	0	20	0	0	23	9	1	0
GR	9	0	0	10	0	0	1	2	0
LT	0	0	4	0	0	3	1	0	0

\* Uncertain.

Remarks:

Old John Lake lies on the eastern edge of the area surveyed during 1977. It is located southeast of Arctic Village and near the East Fork Chandalar River. Tundra and smaller lakes predominate in the rolling hills surrounding Old John. A few spruce and mixed hardwoods rim the lake shore and surrounding hills. Shoal areas probably occupy no more than 10% of the lake bottom and are primarily found along the west, north and eastern ends. The water was turbid at the time of survey, probably due to high winds and rough wave action. Secchi readings to 10' were recorded. Aquatic vegetation was moderate in the areas looked at but would surely develop more by the end of the open water period. Two major inlets were observed, one on the northern shore and one in the southwest corner. Both discharged at less than 1 fps. Smaller inlets were present but were not looked at. A single outlet drains the southeast corner and flows into the Sheenjek River. Width was approximately 15' and flows averaged 3.5 fps. All shoals as well as inlets and outlets would be good spawning areas. Specific locations have not been identified. Access is either by foot from Arctic Village or by airplane. Several native allotments

have been filed around the lake. One permanent cabin is located on the southern shore near the outlet. This, plus several old campsites, represent the extent of development. Past fishery investigations have been conducted by Craig and Wells, 1975.

Fish sampling in this lake was limited by poor weather during the late June survey. Two nets were set for a standard net night (18 hours) but catch success may have been reduced by high winds and wave action. Angling supplemented the catch data, with eight lake trout caught in 8 man-hours of effort. Humpback whitefish were the most numerous species captured. Their ages ranged from VII to XIII and growth rates (Table 6) ranks first of four up to age VIII. Their condition factors were last of four, however. Twenty-two grayling were captured and ranged in age from II to VIII. Their growth rates (Table 3) up to age V also ranked first of eight lakes when captured. Condition values were fifth of eight. Eleven lake trout were captured and ranged in age from XI to XXXIII. The largest trout (104.1 cm, 12.3 kg) was not aged due to unreadable otoliths. Growth rates of those aged were fourth of eleven up to age IX. Broad whitefish, northern pike, burbot and slimy sculpin are reported present but were not captured.

This lake has good fishing potential. All species showed good growth rates and with the extensive outlet system should be open to the influx of prey species stocks. Reports of good catches of lake trout indicate this lake should be monitored for future increases in sport pressure. Subsistence use is considered light to moderate but is expected to increase, further emphasizing the need for assessment of a use that probably will exceed sport harvest of the resource if it has not already done so.

*Name of Lake:* Sithylemenkat                      *River System:* Koyukuk  
*Location:* 55 miles 150°M from Bettles  
*Position:* 66°07'N 151°12'W                      *Elevation:* 219.5 m (720')  
*Surface Area:* 614 ha (1,517 acres)              *Maximum depth:* 11 m (37')  
*Water Chemistry:*  
    Date: 7/19/77  
    Temperature (°C): 18  
    DO (ppm): 9  
    CO<sub>2</sub> (ppm): 15  
    pH (ppm): 7.0  
    MOA (ppm): 34  
    Hardness (ppm): 34

Fish Sampling Summary:

Date	No.	Species	Length (mm)		Weight (g)		K*	% Comp.
			Range	Mean	Range	Mean		
7/19/77	29	LCI	120-145	131	...	17.6	0.783	51
	20	HWF	260-375	326	200- 640	439	1.267	35
	8	NP	285-600	494	1,340-3,450	2,585	0.822	14

\* Coefficient of condition.



Surface Area: 497.5 ha (1,229 acres) Maximum depth: 14 m (47')

Water Chemistry:

Date: 8/17/77  
 Temperature (°C): 18  
 DO (ppm): ...  
 CO<sub>2</sub> (ppm): ...  
 pH (ppm): 7.5  
 MOA (ppm): 51  
 Hardness (ppm): 85

Fish Sampling Summary:

Date	No.	Species	Length (mm)		Weight (g)		K*	% Comp
			Range	Mean	Range	Mean		
8/17/77	54	HWF	290-505	414	300-1,480	800	1.240	89
	2	BB	770-840	805	2,500-3,200	2,850	0.546	3
	1	RWF	405	405	700	700	1.053	2
	1	NP	650	650	1,640	1,640	0.597	2
	1	GR	400	400	680	680	1.062	2
	1	LT	515	515	1,332	1,332	0.975	2

\* Coefficient of condition.

Maturity and Sex Ratio:

Species	Mature Males			Mature Females			Immature		
	1977	1978	U*	1977	1978	U	♂	♀	U
HWF	13	12	1	24	0	0	3	1	0
BB	2	0	0	0	0	0	0	0	0
RWF	0	0	0	1	0	0	0	0	0
NP	0	1	0	0	0	0	0	0	0
GR	0	0	0	0	1	0	0	0	0
LT	0	1	0	0	0	0	0	0	0

\* Uncertain.

Remarks:

Squaw Lake lies in an east-west facing valley in the east central Brooks Range. Elevations vary from approximately 640 m (2,100') at the lake level to over 1,524 m (5,000') in the adjacent hills. The watershed is typical of Brooks Range foothill lakes and consists of open rolling tundra mixed with black spruce and willow. The lake is essentially a two basin system with shoal areas bordering the lake shore as well as

surrounding the central island in the lake. At the time of survey, the water was clear and Secchi disc readings of 16' were taken. Aquatic vegetation edged the lake and was dominant in most shallow bays and near the inlets and outlet. The shoals surrounding the central island and the above weedy areas would be suitable for spawning. Access is either by aircraft or by foot travel from nearby gold mine airstrips. Use is presently light for both sport and subsistence groups. Several mining claims have been actively worked in the area as indicated by the trails and cabins on and near the lake. Past investigations have been conducted by Roguski and Spetz (1968) and Kramer in 1975.

Test netting resulted in six fish species being captured. Sport fishing produced no fish although one sport fisherman contacted during the survey had caught one lake trout and one northern pike in 2 hours of fishing near one of the inlets. Three such inlets enter the lake and all were flowing less than 1 fps during the survey. The single outlet flows northwesterly into Lake Creek then onward to the North Fork Chandalar River.

Humpback whitefish were the most numerous species captured. They ranged in age from VI to XIII and had growth rates ranking second of four populations sampled during the survey (Table 6). Condition values rated third of four. Two burbot that were caught were aged XVII and XVIII. Growth rates were highest of those back-calculated (Table 4) and condition factors ranked second of three. One age X round whitefish captured grew third of nine populations sampled and was sixth fattest. A single northern pike was netted that had a K value ranking eighth of nine. A single grayling was aged at IX and grew seventh of eight grayling populations netted. One age XIX lake trout was netted. His growth to age IX ranked seventh of eleven and his condition value was last.

Fishing potential was poor at the time of survey but discussions with local residents concluded it is better in both early summer and late fall. Nearby development may necessitate further population monitoring even though use levels are presently light.

*Name of Lake:* Twin Lakes                      *River System:* Koyukuk River  
*Location:* 15 miles west of Chandalar Lake in the Brooks Range, and  
79 miles 030°M from Bettles.  
*Position:* 67°30'N 149°04'W                      *Elevation:* 642 m (2,105')  
*Surface Area:* 953 ha (2,355 acres)              *Maximum depth:* 57.6 m (189')  
*Water Chemistry:*

<i>Date:</i>	8/3/77
<i>Temperature (°C):</i>	18
<i>DO (ppm):</i>	...
<i>CO<sub>2</sub> (ppm):</i>	...
<i>pH (ppm):</i>	7.8
<i>MOA (ppm):</i>	51
<i>Hardness (ppm):</i>	68

Fish Sampling Summary:

Date	No.	Species	Length (mm)		Weight (g)		K*	% Comp.
			Range	Mean	Range	Mean		
8/3/77	24	GR	250-405	336	90- 280	220	0.956	39
	19	BWF	130-410	336	25- 710	484	1.275	31
	18	LT	315-820	505	340-7,031	1,903	1.477	30

\* Coefficient of condition.

Maturity and Sex Ratio:

Species	Mature Males			Mature Females			Immature		
	1977	1978	U*	1977	1978	U	♂	♀	U
GR	0	1	13	0	0	3	2	0	0
RWF	2	4	0	7	2	0	2		2
LT	1	1	2	3	2	4	3	1	1

\* Uncertain.

Remarks:

The Twin Lakes lie in a north-south valley in the south central Brooks Range. Elevations vary from 640 m (2,100') at lake level to over 1,520 m (5,000') in the adjacent hills. The watershed is typical of high mountain lakes and is distinguished by little tree cover and an abundance of rolling tundra. A series of smaller ponds adjoin the southern end of the Twin Lakes. Due to poor weather conditions, north Twin Lake was not surveyed. It should, however, possess the same fish species and limnological features described below for south Twin Lake.

Shoal areas were limited to the northern end of south Twin Lake near the outlet and around the southern end, both totaling less than 10% of the lake's acreage. The water was quite clear with a Secchi reading of over 20' recorded. Aquatic vegetation was sparse and limited to the above shoal areas. Three major inlets were observed. All had low flows during the survey. A single outlet drains northerly into north Twin Lake which itself drains westerly into the Bettles River. Principal spawning areas would probably include the inlets and outlet as well as the shoal areas. Access is via aircraft and fishery use at present is light. A single cabin on one of the inlet streams represents the sole result of development. Past fishery investigations were conducted in 1975 by Kramer.

Fish sampling resulted in the catch of three species. Grayling were the most numerous in the catch. They ranged in age from V to IX and showed back-calculated growth rates that ranked fourth of eight populations (Table 3). Their fatness ranked last of all lakes where captured. Nineteen round whitefish were captured, ranging in age from II to XIV. Their growth (Table 2) ranked last of nine populations yet K values were third of the lakes studied. The lake trout were aged from VIII to XXXI and grew (Table 1) eighth of eleven up to age IX.

Sport fishing potential ranked fair to good. Both lake trout and grayling were available in fair numbers. The clarity of the water allowed the sighting of several fish schools when flying over the shoal areas. Until use levels rise, further work on this lake should be limited to use monitoring and limnological sampling of the northern lake.

Name of Lake: Vunittsieh River System: Chandalar River  
 Location: 29 miles east of Chandalar Lake, South Slope Brooks Range  
 and 120 miles 040°M from Bettles  
 Position: 67°32'N 47°24'W Elevation: ≈ 518 m (1,700')  
 Surface Area: 248.6 ha (614 acres) Maximum depth: 31 m (102')  
 Water Chemistry:

Date: 7/31/75  
 Temperature (°C): 17  
 DO (ppm): ...  
 CO<sub>2</sub> (ppm): ...  
 pH (ppm): 8.0  
 MOA (ppm): 68  
 Hardness (ppm): 68

Fish Sampling Summary:

Date	No.	Species	Length (mm)		Weight (g)		K*	% Comp.	
			Range	Mean	Range	Mean			
7/31/75	3	NP	390-800	537	453-3,175	1,268	0.819	100	

\* Coefficient of condition.

Maturity and Sex Ratio:

Species	Mature Males			Mature Females			Immature		
	1977	1978	U*	1977	1978	U	♂	♀	U
NP	0	0	1	0	0	2	0	0	0

\* Uncertain.



Maturity and Sex Ratio:

Species	Mature Males			Mature Females			Immature		
	1977	1978	U*	1977	1978	U	♂	♀	U
RWF	4	1	0	5	1	0	0	0	0
NP	0	3	0	0	2	0	0	0	0
LT	4	0	0	0	1	0	1	0	0
GR	0	2	0	0	2	0	1	0	0

\* Uncertain.

Remarks:

Wild Lake is located at the head of a north-south facing river valley on the south slope of the central Brooks Range. The watershed is typical of mountainous south slope drainages, with alpine-tundra habitat on the higher elevations and mixed spruce with birch and cottonwood at the lower levels. Elevations vary from 335 m (1,100') at the lake to 1,830 m (6,000') in the surrounding mountains. Shoal areas are limited to less than 5% of the surface acreage and are found primarily adjacent to the outlet and up the southwest corner. The water was clear when surveyed with Secchi readings to 15' being recorded. Aquatic vegetation was sparse and limited to emergent types in the shoal areas. Five inlets enter the lake; all flowed less than 5 cfs in mid summer. A single outlet drains the south end of the lake and forms the Wild River which empties into the Middle Fork Koyukuk River. It flowed approximately 15 cfs during the survey. Spawning areas are probably limited to the shoals off the various inlets, the outlet, and in the shallow vegetation area along the south shore. Access is presently by aircraft. Several privately owned lots rim the lake and a few dwellings edge the lake shore. Use levels, both for recreation and sport fishing are considered light at present due to the seasonal nature of the fishery. Past fishery investigations were carried out by Roguski, 1968.

Test netting and sport fishing during this survey resulted in the combined catch of five fish species. Round whitefish were most numerous and ranged in age from IV to XII. Their growth up to age VIII (Table 2) ranked fifth of nine populations sampled. Their K values were second. Six northern pike were captured but were not successfully aged. Their condition coefficient ranked first of eight populations.

Six lake trout were caught and aged from XI to XXVI. Their growth rate ranked second for eleven systems and K values were eighth. Five grayling caught in the outlet stream aged from II to VIII and showed growth rates second of eight systems. Their K values also ranked second.

The fishing potential of Wild Lake is reportedly good just after breakup in late May and is probably good just before freezeup in the fall. Our success was marginal possibly due to the lack of a suitable boat. Numerous lake trout could be seen surface feeding in the evening and would no doubt be available. Further work on this system should be dictated by use increases and be limited to monitoring sport harvest.

#### LITERATURE CITED

- Alt, K. T. 1974. A life history study of sheefish and whitefish in Alaska. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, Project F-9-6, 15(R-II): 20p.
- \_\_\_\_\_. 1976. Inventory and cataloging of North Slope waters. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, Project F-9-8, 17(G-I-0): 129-149.
- Craig, P. C. and J. Wells. 1975. Fisheries investigations in the Chandalar River region, northeast Alaska. Canadian Arctic Gas Study Limited (Calgary, Alberta), Biological Report Series.
- Furniss, R. A. 1974. Inventory and cataloging of Arctic area waters. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, Project F-9-6, 15(G-I-I): 1-45.
- \_\_\_\_\_. 1975. Inventory and cataloging of the Arctic area waters. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, Project F-9-7, 16(G-I-I): 1-47.
- Hallberg, J. E. 1976. Second interim report of the Sport Fish technical evaluation study. Special Report Number 7. Joint State/Federal Fish and Wildlife Advisory Team. 38pp.
- Heckart, L. 1965. Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, Project F-5-R-6, 6(15-A): 291-305.
- Netsch, N. F. 1975. Fishery resources of waters along the route of the Trans-Alaska pipeline between Yukon River and Atigun Pass in north central Alaska. U.S. Fish and Wildlife Service. Resource Publ. 124. 45pp.
- Pearse, G. A. 1977. Inventory and cataloging of Arctic area waters. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, Project F-9-9, 18(G-I-I): 55-93.

- Roguski, E. A. and C. Spetz. 1968. Inventory and cataloging of the sport fish and sport fish waters of the interior of Alaska. Alaska Dept. of Fish and Game, Federal Aid in Fish Restoration, Annual Report of Progress, Project F-5-R-9, 9(15-A): 265-285.
- Roguski, E. A. and P. Winslow. 1970. Inventory and cataloging of the sport fish and sport fish waters of the Interior of Alaska. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, Project F-9-2, 11(15-C): 279-301.
- Rounsefell, G. and W. Everhart. 1953. Fishery Science. pp322-324.
- Ward, D., and P. Craig. 1974. Catalogue of streams and lakes and coastal areas in Alaska along routes of the proposed gas pipeline from Prudhoe Bay to the Alaskan/Canadian border. Canadian Arctic Gas Study Limited, Biological Report Series. Vol. 19: 381 p.
- Yoshihara, H. T. 1972. Monitoring and evaluation of Arctic waters with emphasis on North Slope drainages. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, Project F-9-4, 13(G-III-A): 1-49.
- \_\_\_\_\_. 1973. Monitoring and evaluation of Arctic waters with emphasis on North Slope drainage. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, Project F-9-5, 14(G-III-A): 83p.

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