

Job No. G-II-A  
G-II-B  
G-II-D  
G-II-H  
G-II-J

STATE OF ALASKA

*William A. Egan, Governor*



Annual Progress Report for

*LAKE AND STREAM INVESTIGATIONS*

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## TABLE OF CONTENTS

Page No.

---

Job No. G-II-A	Silver Salmon Studies in the Resurrection Bay Area. Edward T. McHenry.	1
Job No. G-II-B	Anadromous Fish Population Studies - Upper Cook Inlet Drainage. Stanley W. Kubik.	23
Job No. G-II-C	<i>Inactive.</i>	
Job No. G-II-D	Salmonid Rearing and Migration Study: Ship Creek System. Stanley W. Kubik.	35
Job No. G-II-E	<i>Life History Studies of Rainbow Trout in the Kvichak Drainage of Bristol Bay</i> <i>D. L. Siedelman, P. B. Cunningham,</i> <i>and R. B. Russell - published as a</i> <i>separate report.</i>	
Job No. G-II-F	<i>Inactive.</i>	
Job No. G-II-G	<i>Studies on the Russian River Salmon Sport Fishery. David C. Nelson. -</i> <i>published as a separate report.</i>	
Job No. G-II-H	Anadromous Fish Population Studies - Matanuska Valley and East Side Tributaries of the Susitna River and Tributaries of the Chulitna River. D. Watsjold.	45
Job No. G-II-I	<i>Inactive.</i>	
Job No. G-II-J	Population Studies of Northern Pike and Whitefish in the Minto Flats Complex with Emphasis on the Chatanika River. P. Kepler.	59

## RESEARCH PROJECT SEGMENT

State: Alaska

Project No.: F-9-5

Name: Sport Fish Investigations of  
Alaska.

Study No.: G-II

Study Title: Lake and Stream Investigations.

Job No.: G-II-J

Job Title: Population Studies of Northern  
Pike and Whitefish in the Minto  
Flats Complex with Emphasis on  
the Chatanika River.

Period Covered: July 1, 1972 to June 30, 1973.

### ABSTRACT

Information is presented on the summer distribution, movements and abundance of whitefish, Coregonus sp., sheefish, Stenodus leucichthys, and northern pike, Esox lucius, in the Minto Flats and the fall spawning ecology of whitefish in the upper Chatanika River.

Five netting cycles conducted during the summer months showed that least cisco, Coregonus sardinella, northern pike and humpback whitefish, C. pidschian, were present at all netting sites at various times throughout the summer, while broad whitefish, C. nasus, and sheefish were absent from some sites.

Results of total netting for the summer showed least cisco to be the most abundant species, followed by northern pike, humpback whitefish, broad whitefish and sheefish, respectively. Area II (Minto Lakes) showed the greatest catch per unit effort with 25 fish per net night.

Approximately 24,000 spawners were present in the upper Chatanika River including 16,000 least cisco, 8,000 humpback whitefish and 100 sheefish. Sixteen hundred and one spawners were tagged. Size of spawning fish ranged from 590-875 mm for sheefish; 290-413 mm for least cisco; and 330-510 mm for humpback whitefish. Mature female

least cisco ranged from 291-413 mm and from 2+ to 7+ years old. Total egg counts ranged from 27,825 to 93,500.

Minto Flats creel census data show 726 pike and 3 sheefish caught by anglers during July and August. Chatanika River creel census data show 14 whitefish and 22 sheefish taken by anglers September 16-17 and 23-24. Approximately 700 whitefish were taken in the spear fishery October 1-16.

#### RECOMMENDATIONS

1. Continue netting program May - August, 1973 in the Minto Flats to compile comparative data on the distribution, movements, and abundance of whitefish, sheefish and pike.
2. Conduct pike spawning studies in early May.
3. Monitor spawning migration of humpback whitefish up the Chatanika River during June.
4. Continue summer creel census on pike and sheefish in the Minto Flats.
5. Monitor subsistence utilization of fish by New Minto residents.
6. Continue creel census on sheefish and the whitefish spear fishery on the Chatanika River.

#### OBJECTIVES

1. To study the timing and movements of the fishes of the Chatanika River and Minto Flats.
2. To study the spawning ecology of the Minto Flats whitefish, sheefish and pike.
3. To assess utilization of fish in the Chatanika River and Minto Flats.

#### TECHNIQUES USED

The distribution and movements of northern pike, whitefish and sheefish were studied in the Minto Flats area, using 125-foot graduated mesh monofilament gillnets. For the purpose of sampling, the Flats were divided into three areas to include: I) Rock Island Slough area, II) Minto Lakes area and III) New Minto Village area (Figure 1). Within these three areas specific netting sites (numbers 10 to 32) were selected on the basis of prior knowledge of summer fish distribution to include feeding areas (lakes and sloughs) and migration routes (main rivers). These sampling sites are, therefore, considered representative of the fish habitat in the Flats. Data on length, weight, sex and maturity were recorded and placed on computer cards.

A shocker boat as described by Van Hulle (1968) was used in the Chatanika River to capture fish for tagging. Least cisco were tagged with green FT-2 Floy internal anchor tags; humpback whitefish and sheefish were tagged with yellow Floy dart tags. Spawning populations of least cisco, humpback whitefish and sheefish were estimated above and below the Olnes Bridge on the Chatanika River both by the Schnabel (1938) tag and recovery method and visual fish counts. A deep pool one km below the Olnes Bridge and another pool seven km above the bridge were arbitrarily chosen to represent all the pools of the area for the Schnabel estimates.

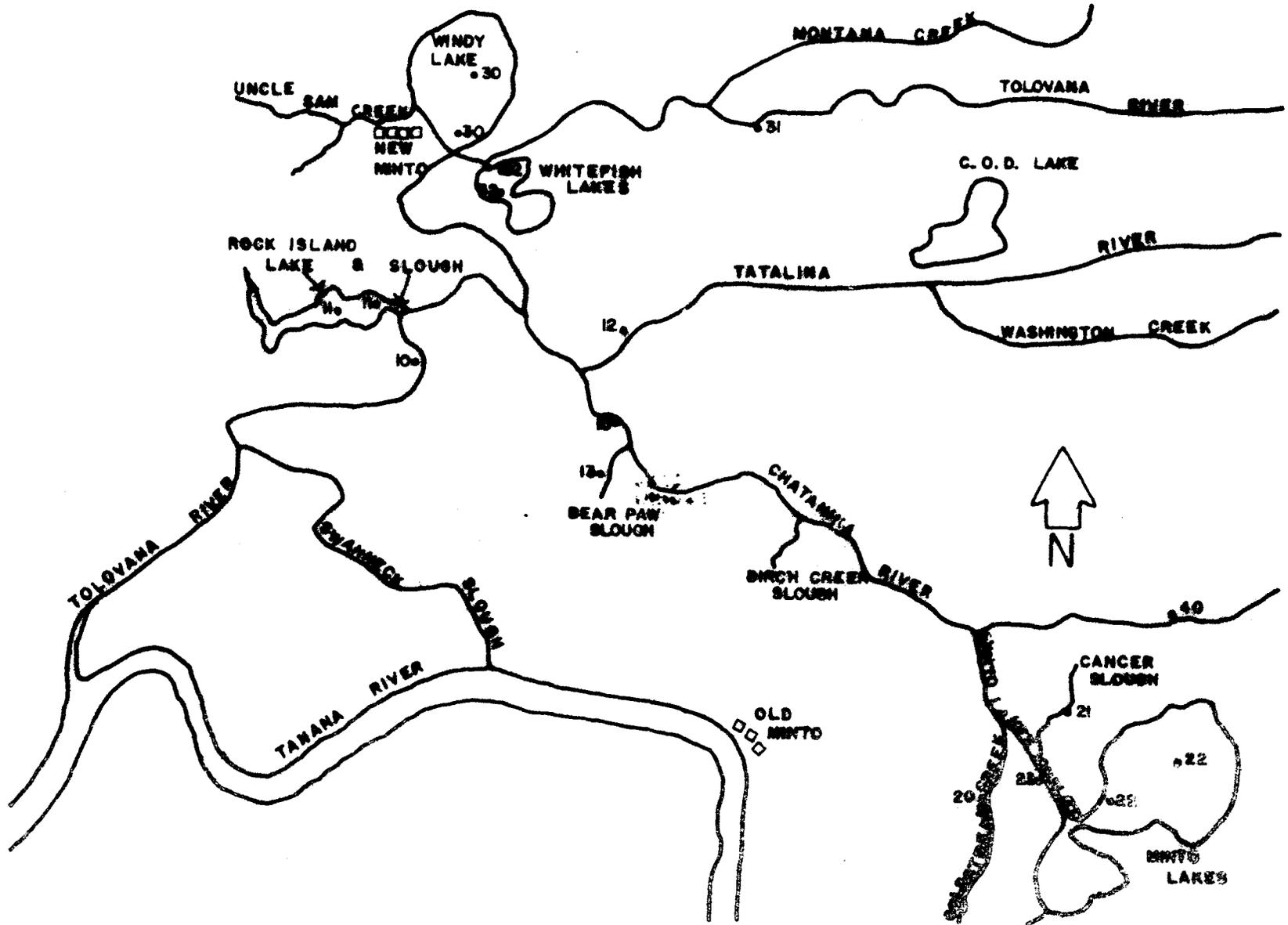


FIGURE 1 Schematic Map of Minto Flats. Numbers Represent Netting Sites.

The average mid-stream water velocity through a representative spawning pool was determined using a velocity rod. Readings were taken daily for four days and the values averaged to derive velocity.

Spawning areas were located by foot and boat surveys. Fecundity samples were taken by electro-fishing. Least cisco fecundity was determined using the volumetric method. Ovaries were removed and preserved in 4% formalin prior to counting. Three - 1 ml egg samples were counted for each fish. The average number of eggs per ml was then multiplied by the volume of water displaced by the total number of eggs in both ovaries.

New Minto Village subsistence fishermen were contacted weekly throughout July and August to assess the number of fish caught. The number of nets and sites were located by boat. Sport fishing pressure was determined by angler interviews and weekend aerial boat surveys.

A creel census was conducted above and below the Olnes Bridge (located 11 mile Elliott Highway) on weekends 1 to 5 p.m. for the period September 15-28. The Chatanika River whitefish spear fishery was monitored 8 to 12 p.m. October 1-16.

## FINDINGS

### Summer Distribution and Abundance

Permanent netting sites (Fig. 1 and Table 1) were established in 1972 in the Minto Flats to determine the relative abundance, distribution and movements of fishes during the spring and summer. Site #40 was considered outside of the main part of the Flats and data from it were used only in determining the upstream spawning migration.

Table 2 shows the total catch of fish for five netting cycles at sites (10 to 32) and all random netting. No sampling was conducted during June. Tables 3, 4 and 5 give catch statistics for the five cycles in areas I - III. A cycle during July and August represents one night's fishing at each site during which either one or two nets were set at specific sites. The one cycle conducted in May represents two nights fishing at each site. During July and August the cycle was reduced to one night's fishing at each site because it provided adequate samples. Two cycles were run during both July and August.

Least cisco, Coregonus sardinella, composed the largest part of the total catch, followed by northern pike, Esox lucius; humpback whitefish, C. pidschian; broad whitefish, C. nasus; and sheefish, Stenodus leucichthys, respectively. Less than five each of burbot, Lota lota; longnose sucker, Catostomus catostomus and black fish, Dallia pectoralis, were caught. Eight chum salmon, Oncorhynchus keta, and one king salmon, O. tshawytscha, were taken. Area II produced the greatest number of fish caught during the netting periods, with 25 fish per net night.

TABLE 1 Locations of Minto Flats Netting Sites.

Area	Site No.	Location
1	10	Tolovana River below Rock Island Slough
	11	Rock Island Slough and Lake
	12	Tatalina River
	13	Bear Paw Slough
	15	Chatanika River above Tatalina River confluence
2	20	Goldstream Creek
	21	Cancer Slough, off Minto Lake outlet
	22	Minto Lake
	23	Minto Lake outlet between Cancer Slough and Minto Lake
	40	Chatanika River, 3 km upriver from Chatanika-Goldstream confluence
3	30	Windy Lake
	31	Tolovana River, upriver from mouth of Montana Creek
	32	Whitefish Lakes

TABLE 2 Total Gillnet Catch in Minto Flats, May-August, 1972,  
Fish per Net Night in parentheses.

Date	Net Nights	Species Captured*					Total
		LCi	HWF	BWF	SF	NP	
May	22	312 (14.2)	206 (9.4)	22 (1.0)	2 (.10)	57 (2.6)	599
July	58	184 (3.2)	119 (2.1)	178 (3.1)	30 (0.5)	326 (5.6)	837
Aug.	62	444 (7.2)	161 (2.6)	131 (2.1)	24 (0.4)	322 (5.2)	<u>1,082</u>
							2,518

\*LCi - Least cisco  
 HWF - Humpback whitefish  
 BWF - Broad whitefish  
 SF - Sheefish  
 NP - Northern pike

TABLE 3 Gillnet Catch for Area I (Sites 10-13 and 15) of Minto Flats for five Cycles\*. Mean Fork Length (mm) for each Species is listed in Parentheses after Total Catch per Site\*.

Month	Site No.	Net Nights	Species Captured**					Total
			LCi	HWF	BWF	SF	NP	
May	10	1	1 (277)	1 (343)	0 (0)	0 (0)	0 (0)	2
	11	4	28 (287)	34 (383)	4 (584)	2 (821)	7 (494)	75
	12	2	13 (338)	1 (301)	1 (595)	0 (0)	2 (563)	17
	13	2	41 (268)	6 (361)	2 (554)	0 (0)	3 (343)	52
	15	0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
July	10	3	1 (355)	5 (424)	5 (556)	5 (690)	1 (890)	17
	11	6	11 (341)	34 (276)	8 (519)	0 (0)	60 (473)	113
	12	3	5 (318)	6 (425)	0 (0)	1 (620)	20 (352)	32
	13	3	0 (0)	0 (0)	1 (560)	0 (0)	23 (393)	24
	15	1	10 (319)	1 (450)	0 (0)	0 (0)	4 (585)	15
Aug.	10	2	0 (0)	4 (414)	3 (569)	1 (765)	2 (785)	10
	11	4	19 (223)	19 (318)	8 (574)	0 (0)	29 (555)	75
	12	2	2 (300)	3 (261)	1 (490)	1 (730)	8 (641)	15
	13	2	0 (0)	0 (0)	0 (0)	0 (0)	9 (509)	9
	15	<u>2</u>	4 (326)	0 (0)	0 (0)	1 (660)	2 (420)	<u>7</u>
		37						463

- \* 1 Netting cycle conducted during May ( a cycle in May was two nights of fishing at each site)  
 2 Netting cycles conducted during July and August ( A cycle in July and August was one night of fishing at each site.)

\*\*LCi - Least cisco  
 HWF - Humpback whitefish  
 BWF - Broad whitefish  
 SF - Sheefish  
 NP - Northern pike

TABLE 4 Gillnet Catch for Area II (Sites 20-23) of Minto Flats for Five Cycles. Mean Fork Length (mm) for each Species is listed in Parentheses after Total Catch per Site\*.

Month	Site No.	Net Nights	Species Captured					Total
			LCi	HWF	BWF	SF	NP	
May	20	1	18(322)	24(432)	4(473)	0(0)	4(0)	50
	21	1	61(321)	21(407)	3(500)	0(0)	7(407)	92
	22	2	76(334)	52(429)	0(0)	0(0)	18(316)	146
	23	1	9(311)	8(395)	0(0)	0(0)	0(0)	17
July	20	2	21(333)	18(370)	23(537)	1(670)	15(524)	78
	21	3	29(314)	6(335)	9(526)	1(101)	35(440)	80
	22	4	27(322)	7(399)	38(531)	1(535)	40(454)	113
	23	2	1(380)	0(0)	6(562)	0(0)	0(0)	7
Aug.	20	2	10(115)	11(281)	3(0)	1(710)	15(611)	40
	21	2	6(349)	3(392)	2(610)	0(0)	14(487)	25
	22	4	46(295)	22(339)	18(547)	0(0)	59(516)	145
	23	<u>2</u>	0(0)	2(365)	2(530)	0(0)	3(754)	<u>7</u>
		26						800

\*LCi - Least cisco  
HWF - Humpback whitefish  
BWF - Broad whitefish  
SF - Sheefish  
NP - Northern pike

TABLE 5 Gillnet Catch for Area III (Sites 30-32) of Minto Flats for Five Cycles. Mean Fork Length (mm) for each Species is Listed in Parentheses after Total Catch per Site\*.

Month	Site No.	Net Nights	Species Captured					Total
			LCi	HWF	BWF	SF	NP	
May	30	4	23(314)	36(400)	4(514)	0(0)	4(571)	67
	31	1	0(0)	0(0)	0(0)	0(0)	0(0)	0
	32	2	36(326)	18(383)	4(487)	0(0)	5(531)	63
July	30	4	19(292)	13(358)	19(532)	1(760)	7(614)	59
	31	4	4(329)	1(0)	1(485)	0(0)	29(455)	35
	32	6	6(288)	13(363)	38(514)	0(0)	20(529)	77
Aug.	30	4	251(176)	28(255)	25(529)	7(725)	25(494)	336
	31	2	2(335)	1(340)	0(0)	0(0)	12(605)	15
	32	<u>4</u>	37(258)	25(279)	32(566)	0(0)	46(453)	<u>140</u>
		31						792

\*LCi - Least cisco  
HWF - Humpback whitefish  
BWF - Broad whitefish  
SF - Sheefish  
NP - Northern pike

Least cisco, northern pike and humpback whitefish were caught at all sites at various times throughout the season. Northern pike were more abundant during the summer in area II based on catch per sampling period and total catch. Broad whitefish were caught at all sites except 15. Sheefish were not caught at sites 13, 23, 31 and 32.

### Summer Movements

Three obvious movements were detected by the netting program. The first was broad whitefish moving from the Tanana River up the Tolovana River past site 10 in mid-July to feed in the lakes and sloughs.

Young-of-the-year and yearling least cisco and humpback whitefish were first detected moving downstream at site 20 August 4. Seven immature least cisco, 105-130 mm in length, were caught in one net night at site 31 August 8. Six of these were oriented downstream in the net. Two hundred sixty-two least cisco and humpback whitefish, 110-130 mm in length, were caught in Windy Lake and Whitefish Lakes (Sites 30 and 32) August 19 during two net nights.

The third movement was the spawning migrations of least cisco and sheefish up the Chatanika River past site #40 in July and August (Table 6).

### Upstream Spawning Migration

#### Least Cisco and Sheefish:

Eight nights of fishing at site 40 beginning July 8 resulted in capture of 34 cisco and 3 sheefish. All fish captured at site 40 were potential spawners. Although no least cisco were captured at site 40 on August 11, several hundred were observed on this date in a quiet pool at the mouth of Hardluck Creek, located 22 km above the confluence of Goldstream Creek, and 19 km above site 40.

Netting and visual stream observations revealed that least cisco and sheefish generally move upstream at night and rest in quiet pools during daylight hours. A catch of ten or fewer least cisco per net night suggests that they move upriver in small groups. Similarly, sheefish migrate singly or in maximum groups of two or three. After initial spatial distribution of spawners in the deep pools on the spawning grounds in the first part of September, very little movement occurs.

Least cisco were caught on the spawning grounds of the upper Chatanika River August 10 (no earlier sampling). One thousand two hundred seventy were tagged September 9-22. Fifty-one tag recoveries were made September 6- October 20 but showed no significant movement.

Beginning September 1 electro-fishing and netting was conducted on the upper Chatanika River. The first sheefish were caught September 7 in a net set 3 km below Olnes Bridge. Twenty-three sheefish were tagged September 11-October 1. Seven tag recoveries from previous year' tagging were made September 12-October 10, including five tagged on the spawning grounds in 1968.

TABLE 6 Fish Caught at Site #40\* July and August, 1972.  
 Each Date is Represented by 1 Net Night.

Date	Species**		
	LCi	HWF	SF
7-8	4	0	0
7-15	9	0	0
7-18	6	0	1
7-22	0	0	0
7-27	3	0	0
7-28	2	0	1
8-11	0	0	1
8-23	<u>10</u>	<u>0</u>	<u>0</u>
	34	0	3

\*3 km upriver from Chatanika-Goldstream confluence.

\*\*LCi - Least cisco  
 HWF - Humpback whitefish  
 SF - Sheefish

## Humpback Whitefish:

Apparently, mature humpback whitefish migrate up the Chatanika River in June as no potential spawners were caught at site 40 or in the Flats during July and August. As with least cisco, humpback whitefish were captured on the spawning grounds on August 10. Three hundred eight humpback whitefish were tagged September 6-22; 36 were recovered but showed no significant movement.

## Broad Whitefish:

Broad whitefish were not taken at site 40 or upstream, but mature broad whitefish were present in all areas of the Flats May 20-26 (Tables 3, 4 and 5). The broad whitefish catch per effort doubled in July. This increase in catch is attributed to broad whitefish migration during June from the Tanana, Tolovana and Chatanika rivers into the lakes and sloughs to feed. By the third week of August, the majority of broad whitefish sampled were classed as potential spawners, based on gonad examination. Testes were well developed and egg diameters averaged 1.9 mm. Broad whitefish were still abundant in the lakes the third week of August but it is suspected they leave the lakes later on and spawn elsewhere because:

1. No broad whitefish less than 3 years old were taken in the Flats.
2. Winter anoxic conditions prevail in the Minto Flats Lakes.

There was no movement of mature broad whitefish out of the lakes the third week of August and they were not taken in the upper Chatanika or Tolovana rivers during September. Their movements in the Minto Flats in September were not followed as project emphasis shifted to the upper Chatanika River. The possibility that they leave the Minto Flats to spawn will be investigated as a separate objective in future years.

## Population Estimates

Population estimates of humpback whitefish and least cisco in the upper Chatanika River were made using the Schnabel equation:

$$N = \frac{E y_i \cdot M_i}{E x_i + 1}$$

Where: N = population estimate  
E = sum  
y<sub>i</sub> = No. of fish captured during run  
M<sub>i</sub> = No. of fish marked at start of run  
x<sub>i</sub> = No. of marked recaptures

The Schnabel estimates are valid only when these conditions are met:

1. Number of fish per pool remains relatively constant.
2. Species composition per pool is similar.

The Schnabel estimate conditions were not met with 100% compliance because of the possibility of movements of fish into and out of connecting pools during the estimating period and some variance in species composition per pool. The estimates, therefore, represent only relative numbers of whitefish present.

Schnabel estimates were conducted in two pools; one located at 1.6 km (Table 7) below the Olnes Bridge contained 1,500 least cisco and 500 humpback whitefish and another at 11.5 km above the bridge showed 2,000 humpback whitefish and 30 sheefish present. Eight capture runs were made in the first pool September 6-9 and five runs were made in the second pool September 12. Independent visual counts of these pools from a boat agreed quite closely with the Schnabel estimates, although the latter showed approximately 100 fish fewer in both pools. Numbers in all other pools were approximated by visual observations from a boat only during mid-day when light was best. Clear, nonturbulent water during counting periods aided in making estimates.

A total estimated population of 24,000 least cisco and humpback whitefish spawners were present on the upper Chatanika River (Table 7). The composition and locations were 16,000 least cisco - 10,000 below the Olnes Bridge, 6,000 above; and 8,000 humpback whitefish - 3,000 below, 5,000 above the bridge. A population of 75 - 100 sheefish was present.

### Spawning Locations

Eight spawning concentrations in the upper Chatanika River were located above the Olnes Bridge and 11 below (Fig. 2). Spawning areas ranged from 100-800 m in length and 15-22 m in width. Surface water temperatures on the spawning grounds September 18 - October 15 ranged from 3.0° to 0.0°C. Water depth ranged from 1.3-2.6 m with an average stream velocity of 0.5 m per second. Water depth and stream velocity seem to be critical because both least cisco and humpback whitefish move toward the surface, perpendicular to the current during spawning. No sheefish spawning was observed, although it is suspected that spawning occurred in at least two pools located 4.7 and 11.5 km above Olnes Bridge, because ripe and partially spent fish were caught at these locations September 29 and October 1.

### Spawning Times and Duration:

Spawning began as early as September 19 when grayling, Thymallus arcticus, stomachs were found to contain whitefish eggs. Spawning observations September 24 to October 13 revealed that least cisco and humpback whitefish are night spawners, with most spawning activity occurring from 10 p.m. to midnight. The peak spawning period was the last week of September.

Size of spawning fish ranged from 590-875 mm for sheefish, 290-413 mm for least cisco, and 330-510 mm for humpback whitefish (Table 8).

TABLE 7 Concentrations of Spawning Fish on the Upper Chatanika River, 1972.  
 Numbers refer to Kilometers above and below the Bridge (see Fig. 2).  
 Plus (+) = upstream from Olnes Bridge, Minus (-) = downstream distance.

km #	Species present	Length of spawning area in m	Estimates of abundance
(+) 2.62	LCi, HWF	100	1,000 LCi, 500 HWF
(+) 2.82	LCi, HWF	100	500 LCi, 500+ HWF
(+) 3.38	LCi, HWF	200	1,000 LCi, 500+ HWF
(+) 3.86	LCi, HWF, SF	300	mainly HWF, 20 SF
(+) 4.43	LCi, HWF	300	1,000 LCi, 500 HWF
(+) 7.24	LCi, HWF	200	1,000+ LCi
(+) 11.47	HWF, SF	500	≈ *2,000 HWF, 30 SF
(+) 11.64	LCi, HWF	200	500 LCi, 300 HWF
(-) 1.01	LCi, HWF	100	500 LCi, 400 HWF
(-) 1.61	LCi, HWF, SF	400	≈ *1,500 LCi, 500 HWF
(-) 2.01	LCi, HWF	200	1,000+ LCi
(-) 2.61	LCi, HWF	800	2,000 LCi, 500 HWF
(-) 5.54	LCi, HWF	300	500+ LCi
(-) 7.34	LCi, HWF	200	1,000 LCi
(-) 7.74	LCi, HWF	200	1,000 LCi, 500 HWF
(-) 9.56	LCi, HWF	200	1,000 LCi
(-) 11.37	LCi, HWF	100	500 LCi
(-) 13.78	LCi	200	1,500 LCi, 500+ HWF
(-) 15.91	LCi	200	1,000 LCi
TOTALS			LCi - 16,500 HWF - 6,700 SF - 50

\*Estimated by Schnabel tag-recovery method; other estimates by visual counts.

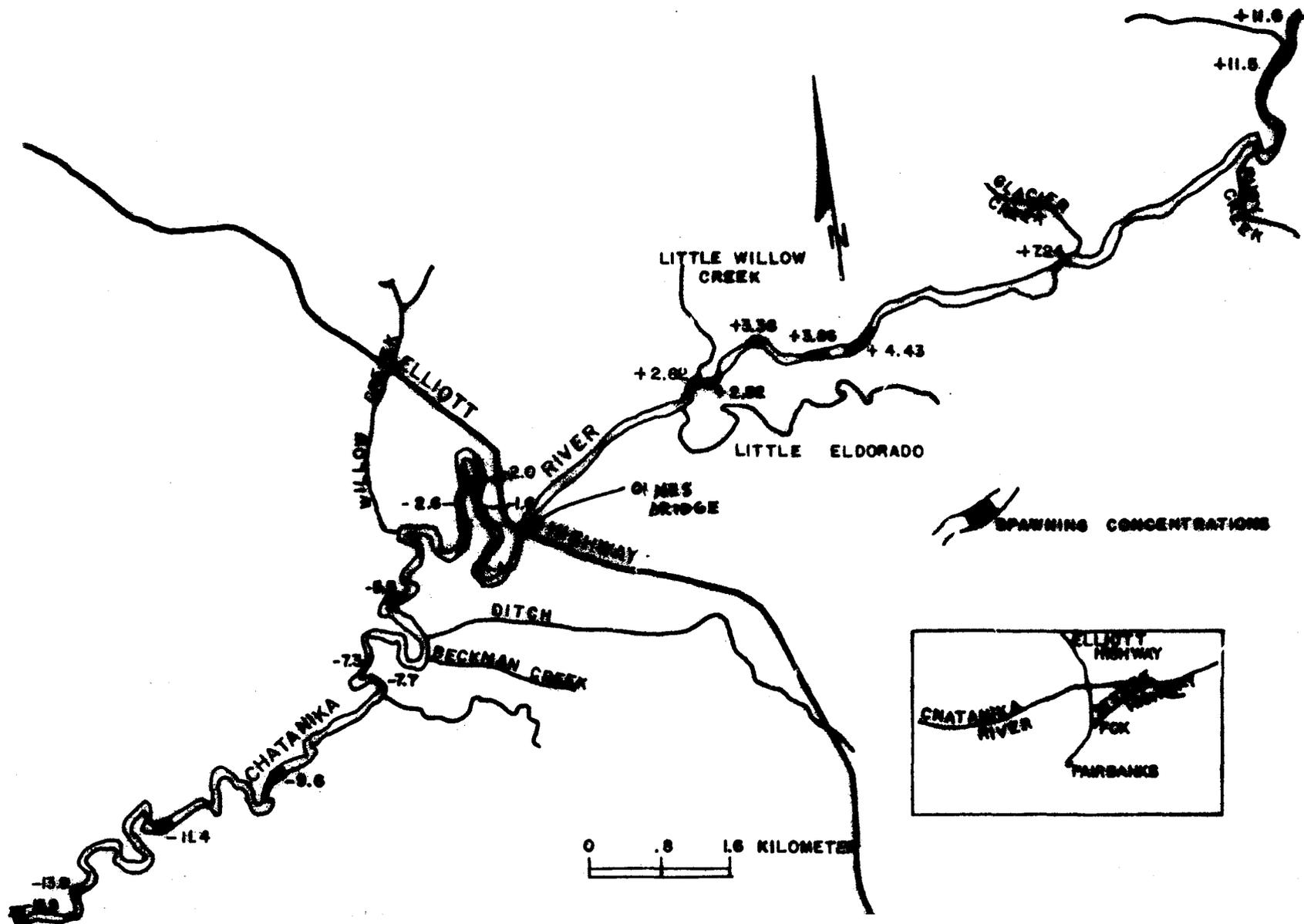


FIGURE 2 Upper Chatanika River. Numbers Represent Distance in Kilometers above (+) or below (-) Olmes Bridge.

TABLE 8 Fork Length of Spawning Sheefish and Whitefish in Upper Chatanika River, September, 1972.

Species*	Sex	n	Length range (mm)	Mean length (mm)
SF	♂♂	19	590 - 875	720
	♀♀	4	765 - 875	808
LCi	♂♂	40	290 - 375	331
	♀♀	42	291 - 413	360
HWF	♂♂	40	330 - 505	409
	♀♀	40	350 - 510	437

\*SF - Sheefish  
 LCi - Least cisco  
 HWF - Humpback whitefish

### Least Cisco Fecundity

Samples for fecundity were selected on the basis of fish length. An attempt was made to obtain four or five fish in each centimeter size group (Table 9). The 42 fish ranged from 291-413 mm and from 2+ to 7+ years old. Total egg counts ranged from 27,825 to 93,500. Fecundity was more closely correlated with age (Corr. coeff. 0.86) than length (Corr. coeff. 0.77).

### Consecutive Spawning

During July and August the ovaries of 228 mature whitefish and sheefish were examined (Table 10). The presence of retained eggs plus those which could develop fully by mid-September suggests that some whitefish and sheefish are consecutive spawners. Conclusive evidence will be collected if spawning whitefish and sheefish tagged September, 1972 in the upper Chatanika River return in 1973. All whitefish examined in the upper Chatanika River return in 1973. All whitefish examined in the upper Chatanika River were spawners.

### Tolovana River - West Fork Survey

A foot survey of 10 km of the West Fork of the Tolovana River was made September 20. The shocker boat was not used because of low water conditions. Numerous deep pools 2 - 3 m deep, having sand and gravel bottoms, were present along the 10 km of river surveyed. The pools and current are similar to whitefish spawning grounds in the Chatanika River, and, therefore, seem suitable for whitefish spawning. No whitefish or sheefish were observed 5 km above or below the West Fork Bridge. The surface water temperature was 2.0°C. Many grayling young-of-the-year were seen in shallow pools along the river.

### Pike Spawning

From May 21-26, 49 Minto Flats northern pike were caught and examined to determine sex and gonad condition. The catch consisted of 29 immature; 10 mature males - 5 ripe, 5 spent; and 10 mature females - 4 ripe and 6 spent. Nearly equal numbers of ripe and spent spawners indicate that spawning had commenced prior to May 20 and suggests that spawning had progressed to or beyond its peak. Both ripe and spent pike were caught during this period in Rock Island Slough, Goldstream Creek, Windy Lake and Whitefish Lakes. No spawning observations were possible because of extreme flooding in the Flats.

### Sport Fishery

Periodic creel census and weekend aerial boat counts during July and August provided an index to sport fishing pressure in the Minto Flats. The expanded aerial counts in Table 11 are based on the following assumptions:

TABLE 9 Fecundity of 42 Least Cisco Spawners, Upper Chatanika River, 1972.

Fork Length mm	Age	Total Egg Count	Mean	Fork Length mm	Age	Total Egg Count	Mean
291	2+	9,800		351	5+	62,500	
				357	5+	87,500	69,333
300	3+	31,900	27,825				
305	4+	23,750		359	5+	58,000	
311	4+	26,125		367	6+	53,760	
315	4+	35,490	32,363	368	5+	72,250	68,670
316	3+	30,000		369	4+	80,000	
318	4+	37,840					
				371	5+	62,160	
322	3+	26,400		372	6+	87,500	
322	4+	37,820		373	5+	82,875	70,702
322	4+	44,175	37,519	377	5+	62,775	
325	3+	26,700		378	5+	58,200	
328	4+	52,500					
				383	5+	60,750	
331	2+	35,880		383	5+	60,000	60,833
337	4+	46,000		387	6+	61,750	
337	4+	40,000	41,861				
338	4+	43,200		390	6+	78,750	
339	4+	44,225		396	5+	82,500	76,500
				398	6+	68,250	
341	4+	45,900					
342	4+	45,000		404	8+	92,650	86,645
344	4+	75,000	50,584	406	8+	80,640	
347	5+	39,520					
348	4+	47,500		413	7+	93,500	93,500

TABLE 10 Mature Whitefish Ovary Examination, Minto Flats, July and August, 1972

Species *	No.Fish	Potential Spawners				Non-Spawners			
		Retained Eggs		No Retained Eggs		Retained Eggs		No Retained Eggs	
		No.	%	No.	%	No.	%	No.	%
LCi	106	16	15	90	85	0		0	
HWF	26	10	38	16	62	0		0	
SF	14	7	50	3	21	4	29	0	
BWF	82	63	77	16	19.3	3	3.6	0	

\*LCi - Least cisco  
 HWF - Humpback whitefish  
 SF - Sheefish  
 BWF - Broad whitefish

TABLE 11 Aerial Angler Counts\*, Minto Flats, 1972.

	No. boats	No. planes	No. boat fishermen	No. plane fishermen
July	36	2	110	4
August	<u>49</u>	<u>4</u>	<u>139</u>	<u>8</u>
Totals	85	6	249	12

\*Figures are expanded to 100% from an assumed 80% actual count.

1. In 1972 there was virtually no fishing on the weekdays. Aerial boat counts flown during weekdays in July and August counted only 12 anglers in July and 17 in August.
2. Fishermen counted from the air on Saturday afternoons constitute approximately 80% of the fishermen present in the Flats on weekends.

Catch statistics from weekend angler interviews gave the average hours per angler trip as 6.0 for July, and 5.0 for August (Table 12). Table 13 gives a calculated total pike catch of 726 for July and August, which is considerably higher than the 246 from 1971 (Cheney, 1972).

Approximately 300 duck hunters in the Minto Flats during the first week of September did considerable pike fishing and it is estimated that an additional 100 pike were taken during this time.

#### Chatanika River Creel Census

A creel census conducted on the upper Chatanika River four hours per day on the weekends of September 16-17 and 23-24 showed 20 anglers had fished 54 hours, mostly in the evening. It was estimated that about half the anglers were contacted. The calculated total catch was 14 whitefish and 22 sheefish.

A creel census nightly October 1-16 on the whitefish spear fishery showed 175 spear fishermen contacted fished 302 hours, usually between 8-12 p.m. It is estimated that 90% of the anglers were contacted. Most spear fishing was done near deep holes within 1.5 km downriver from the Olnes Bridge. The calculated total catch was 701 whitefish, including 433 least cisco, 197 humpback whitefish and 71 round whitefish.

#### Subsistence Fishery

During July and August, approximately 200 fish were taken for subsistence purposes in the Minto Flats. White cotton nets, 15 to 20 feet in length, consisting of 4 to 5 inch stretched mesh, were employed. Two to five nets set periodically throughout July and August amounted to 72 and 37 net nights of fishing effort per month, respectively. Although a few nets were observed at the Chatanika-Tolovana confluence and Minto Lakes, approximately 90% of the effort was expended in the Tolovana River and Whitefish Lakes near New Minto Village. The nets were selective for larger fish, which probably accounts for the relatively low number of fish caught per unit effort. A small portion of the subsistence catch was sampled for species composition and weight. Over half the catch was northern pike, the remainder being whitefish and sheefish. Northern pike caught averaged 6 pounds. Humpback and broad whitefish and sheefish averaged 3 pounds, 8 pounds and 10 pounds, respectively. Estimated total weight of the subsistence catch was approximately 1,300 pounds.

TABLE 12 Results of Angler Interviews, Minto Flats, July and August, 1972.

	<u>Anglers Interviewed</u>	<u>Hours Fished</u>	<u>Hour/ Trip</u>	<u>Total Pike</u>	<u>Pike/ Hour</u>	<u>Pike/ Trip</u>
July	95	585	6.0	250	0.43	2.5
August	83	415	5.0	252	0.61	3.0
Total	178	1,000				

TABLE 13 Estimates of Northern Pike Fishing Pressure and Catch, Minto Flats, July and August, 1972.

	<u>Angler Hours</u>		<u>Total Pike Catch</u>	
	<u>Boat</u>	<u>Plane</u>	<u>Boat</u>	<u>Plane</u>
July	660	10.4	284	5
August	695	20.8	424	13
Total	1,355	31.2	708	18

**LITERATURE CITED**

**Cheney, W. L. 1972. Life History Investigations of Northern Pike in the Tanana River Drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1970-1971, Project F-9-3, 12: 9-11.**

**Schnabel, Z. E. 1938. The estimation of the total fish population in a lake. Am. Math Monthly 45 (6): 348-352.**

**Van Hulle, Frank. 1968. Investigation of the Fish Populations in the Chena River. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1967-1968, Project F-5-R-9, 9: 288-290.**

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