

STATE OF ALASKA

Bill Sheffield, Governor

Annual Performance Report for

INTERIOR WHITEFISH PROGRAM

by

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## BACKGROUND

The Chatanika River originates at the confluence of Smith and McManus Creeks, approximately 48 mi northeast of Fairbanks in the White Mountains. It flows in a southwesterly direction for 130 mi before joining the Tolovana River, about 7 mi below the village of Minto. Fish species common to the Chatanika River are found in Table 1. The study area and Alaska location map are found in Figure 1. In 1970 the Sport Fish Division opened the Tanana River drainage to spear fishing for least cisco, humpback whitefish, and round whitefish. This spear fishery allowed sportsmen to harvest an abundant population of fish that had been largely unused. Whitefish are difficult to catch with conventional sport fishing gear and, consequently, are not heavily pursued by the angler. Since 1970 spearfishing has become increasingly popular among Interior fishermen. The Chatanika River was recognized as having an excellent fall-spawning migration of whitefish, and the anglers were quick to target on the area around the Elliott Highway bridge; harvests there are now approaching 5,000 whitefish annually.

Accompanying the resurgence of placer gold mining in the late 1970s were water-quality problems. Sluicing activities from placer mines located in the headwaters of the Chatanika River were creating turbid water conditions downstream. These muddy-water conditions delay the spear fishery until the river finally clears up with cessation of mining activity, often just prior to freeze-up. In 1983, for example, spearfishing could not take place until 1 October. Problems associated with placer mining have yet to be resolved, and the impact it is having on the fishery resource remains unanswered.

The Sport Fish Division, for a third straight year, conducted a creel census there to estimate total harvest effort and catch per unit effort (CPUE). Plans are currently being formulated to determine the run abundance and composition.

The sheefish enhancement program had always centered on stocking landlocked lakes during the early years of the program, but in 1985 a river containing a small, natural population was stocked for the first time. The 1985 lake stocking program concentrated on stocking both barren lakes (Texas and Ridgetop Lakes) and ponds containing lake chubs (North and South Weigh Station Pits and Silver Fox Pit).

Harding Lake is a 2,470-acre lake 45 mi southeast of Fairbanks along the Richardson Highway. Indigenous species include northern pike, burbot, least cisco, and slimy sculpin. Lake trout, *Salvelinus namaycush* (Walbaum), were introduced by the Alaska Department of Fish and Game in the mid-1960s and have established a small, naturally reproducing population.

Harding Lake was selected for sheefish-stocking experiments because the lake had not been producing its potential amount of sport fish, and sheefish have demonstrated ability to reproduce in lakes and to coexist with the mix of indigenous species present in Harding Lake. Sheefish were stocked into Harding Lake in 1982 and 1984. Details and evaluations of those stocking efforts are outlined by Doxey (1983, 1984, 1985).

Table 1. List of common names, scientific names and abbreviations of fish species common to the Chatanika River.

Common Name	Scientific Name and Author	Abbreviation
Arctic grayling	<i>Thymallus arcticus</i> (Pallas)	GR
Arctic lamprey	<i>Lampetra japonica</i> (Martens)	AL
Broad whitefish	<i>Coregonus nasus</i> (Pallas)	BWF
Burbot	<i>Lota lota</i> (Linnaeus)	BB
Chinook salmon	<i>Oncorhynchus tshawytscha</i> (Walbaum)	KS
Chum salmon	<i>Oncorhynchus keta</i> (Walbaum)	CS
Humpback whitefish	<i>Coregonus pidschian</i> (Gmelin)	HWF
Inconnu (sheefish)	<i>Stenodus leucichthys</i> (Guldenstadt)	SF
Lake chub	<i>Couesius plumbeus</i> (Agassiz)	LC
Least cisco	<i>Coregonus sardinella</i> Valenciennes	LCI
Longnose sucker	<i>Catostomus catostomus</i> (Forster)	LNS
Northern pike	<i>Esox lucius</i> Linnaeus	NP
Round whitefish	<i>Prosopium cylindraceum</i> (Pallas)	RWF
Slimy sculpin	<i>Cottus cognatus</i> Richardson	SSC

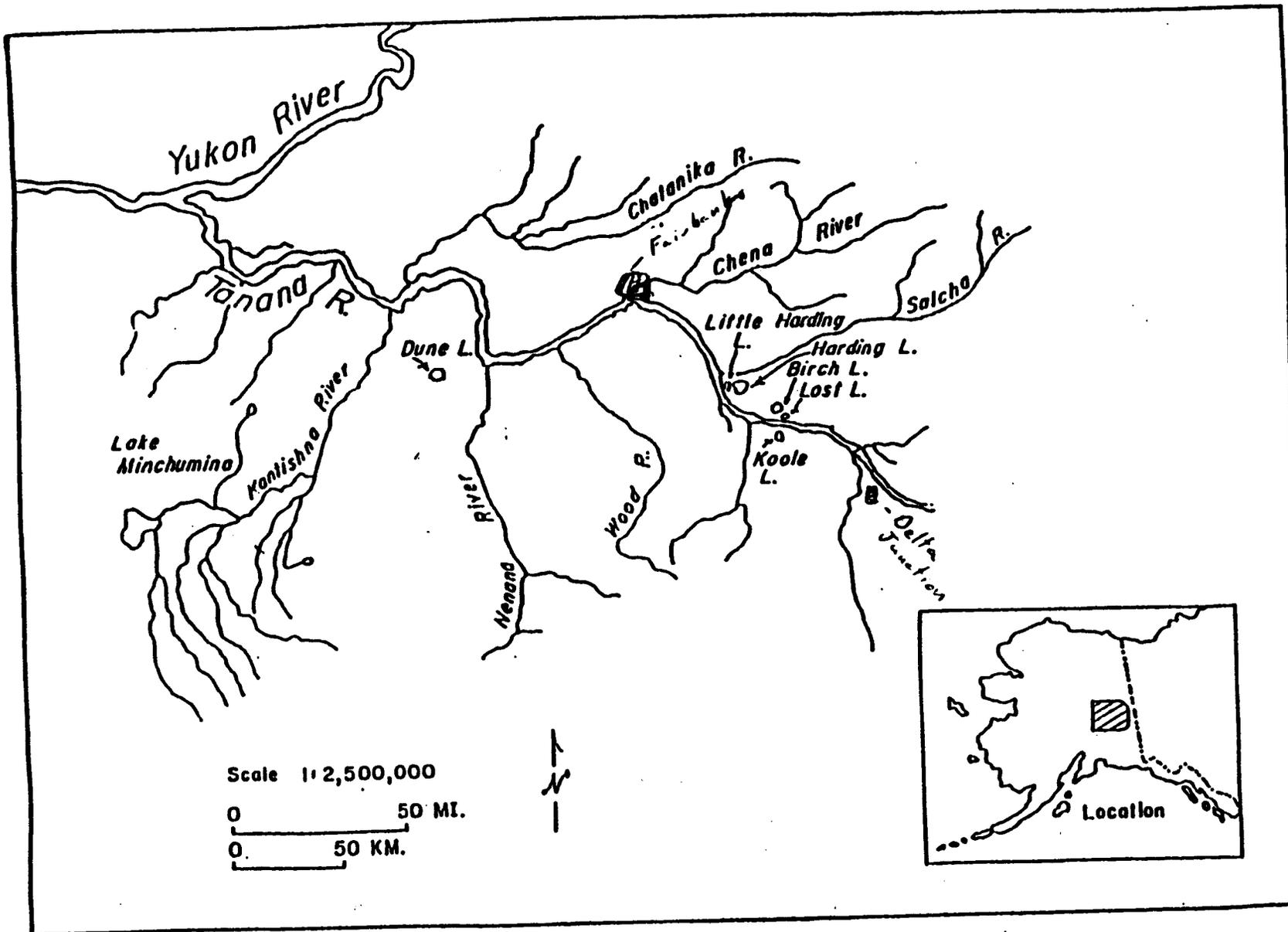


Figure 1. Chatanika River and interior Alaska whitefish/sheefish study area.

## RECOMMENDATIONS

### Research

1. Evaluate the use of sonar fish-counting equipment to enumerate the spawning migration of whitefish in the Chatanika River.
2. Determine species composition of the spawning migration of whitefish in the Chatanika River.
3. Evaluate the effects of stocking 12 g sheefish in waters containing chubs and other competitor species.
4. Stock 12 g sheefish fingerlings into Harding Lake in late summer when extensive gull predation should be ended by their migration south.
5. Continue to attempt to locate sheefish from the previous stockings in Harding Lake and evaluate the 1986 stocking in conjunction with the stocked lakes evaluation and lake trout projects.

### Management

1. Continue creel-census efforts on the Chatanika River whitefish spear season, to obtain total harvest, effort, CPUE, and catch composition.
2. Stock sheefish of 12 to 15 g in waters containing chubs.

## OBJECTIVES

### A. Chatanika River Whitefish Studies

1. To estimate (90% CI  $\pm$  10% of  $\bar{x}$ ) effort, CPUE and harvest of whitefish in the Chatanika River whitefish spear fishery.
2. To estimate size, sex, age and species composition of the Chatanika River whitefish spear fishery harvest based upon a sample of at least 300 harvested whitefish.

### B. Sheefish Enhancement

1. To estimate growth rate of stocked sheefish in various Interior waters.
2. To experimentally stock sheefish fingerlings in the Chatanika River and assess their survival.
3. To experimentally stock sheefish fingerlings in various Interior ponds and lakes.

4. To determine whether sheefish stocked into Harding Lake in 1982 and 1984 survived, and, if so, to assess their distribution, angling potential and some life history aspects.
5. To assess the survival of sheefish stocked into Craig Lake in 1984.

#### TECHNIQUES USED

The Chatanika River whitefish creel census was divided into weekday (Monday–Thursday) and weekend (Friday–Sunday) strata. The optimal time allocations for each stratum were 60% on weekends and 40% for weekdays. The period making up a fishing day was from 2000 to 2400 hours. On five randomly selected weekend nights and four randomly selected weekdays, angler counts were made hourly at 2030, 2130, 2230, and 2330 hours for a total of 36 counts. This level of sampling normally results in estimates of effort and harvest (90% confidence interval [CI]) that are within  $\pm 10\%$  of the average total and a CPUE estimate (90% CI) that is within  $\pm 0.5$  fish/hour.

Catch composition of whitefish harvested in the spear fishery was obtained from a sample of 652 whitefish from the anglers' creels.

Harding Lake was divided into four quadrants of approximately equal size. Four 125-ft experimental sinking monofilament gill nets were set on the bottom in a line that started at a depth of about 10 ft and extended outward into deeper water. One net sampled the thermocline; the deepest net in the series sampled 85 to 125 ft of water, depending on the quadrant. The nets were approximately evenly spaced; they were set for 24 hours, pulled, and then moved to the next quadrant.

Vertical gill nets were set experimentally in 70 ft of water in Harding Lake during July.

#### FINDINGS

##### Chatanika River Whitefish Studies

##### Chatanika River Whitefish Spear Season Creel Census Results, 1985:

The spear season for whitefish in the Tanana drainage opens officially on 1 September each year. The Chatanika River, however, is the most popular whitefish spearing location in interior Alaska because of its close proximity to Fairbanks, good road access, and large population of whitefish that migrate upstream to spawn every fall. In 1985 spearing activity first began at the Elliott Highway Bridge crossing of the Chatanika River on about 15 September. A statistically based creel census designed to monitor the spear fishery there started on 15 September and continued through 14 October, when the Chatanika began to freeze up.

The 30-day creel census revealed that a total of 2,012 hours was spent spearing a total of 4,561 whitefish; a CPUE of 2.27 fish per hour. A summary of the creel-census results appears in Table 2.

The angler hours and harvest in 1985 are approximately 21% lower than 1984 when 2,548 angler hours and a total catch of 5,758 whitefish were estimated (Hallberg 1985). However, the CPUE remained nearly the same; 2.26 and 2.27 fish per hour in 1984 and 1985, respectively. The decrease in effort and total harvest in 1985 may have been the result of high, turbid water conditions and wet, inclement weather.

During the 1985 spear season, water conditions in the Chatanika River were considered poor because the visibility was limited to 1 ft or less until about 21 September. From 21 September to approximately 3 October conditions improved slightly; fair visibility (up to 24 in) occurred during this period. From 3 October to 14 October, when the census was terminated, the Chatanika River remained clear, providing good visibility. The improvement in water clarity was largely due to the shutting down of placer-mining operations upstream and because water levels were dropping and beginning to stabilize after an extremely wet August and September.

The 1985 total harvest of 4,561 whitefish approximates an 8-year (1977 to 1984) average harvest of 4,875 whitefish (Mills 1985). Harvest totals during this period ranged from a low of 1,635 fish in 1977 to a high of 6,640 fish in 1982.

Catch-composition analysis (Table 3) revealed that 78% of the harvest in 1985 was least cisco, 19% humpback whitefish, and 3% round whitefish. Data summarizing the catch composition and CPUE since 1972 appear in Table 3. Least cisco taken during the 1985 spear fishery averaged 303 mm fork length and the humpback whitefish averaged 353 mm (Table 2).

#### Sheefish Enhancement

##### Growth of Stocked Sheefish in Various Interior Waters:

Four Mile Lake. Located near Tok, this lake had originally been stocked with sheefish in 1968 and 1969. The growth and survival of this species were good, and they provided a sport fishery through the 1970s. Rainbow trout were stocked in 1976 and 1983 to provide a mixed fishery. Five thousand sheefish fingerlings averaging 92 mm were stocked in August 1984.

In mid-September 1985 during 3 hours of test fishing with three variable-mesh gill nets (9 total hours), 14 sheefish were captured. Ten fish were from the 1984 plant, while the other four were 8 and 9 year olds.

The age-1 fish averaged 260 mm in fork length (232-290) mm FL) and 200 g in weight (130-250 g); all had been feeding on *Daphnia* sp. The one age-9 fish (629 mm FL and 3.4 kg weight) and three age-8 fish (540-590 mm FL and 1.6-2.3 kg weight) had been naturally reproduced in

Table 2. Creel census summary, catch, sex, and size composition, Chatanika River whitefish spear season, 1985.

Period	Angler Hours	Harvest	CPUE (fish/hr)
15 September thru 14 October	2,012 90%CI, $\pm 14\%$ =277	4,561 90%CI, $\pm 17\%$ =794	2.27 90%CI, $\pm 11\%$ =0.24

Catch Composition \*

Species	No. Harvested	Percent
Least cisco	3,557	78%
Humpback whitefish	867	19%
Round whitefish	<u>137</u>	3%
Total:	4,561	

Sex and size composition of least cisco and humpback whitefish \*\*

Species	No.	Percent	Fork Length	
			Range (mm)	Mean (mm)
Least cisco males	116	51%	248-400	301
Least cisco females	<u>110</u>	<u>49%</u>	225-400	312
Least cisco total:	226	100%	225-400	303

(Continued)

Table 2. (Cont'd) Creel census summary, catch, sex, and size composition, Chatanika River whitefish spear season, 1985.

Period	Angler Hours	Harvest	CPUE (fish/hr)
Humpback whitefish males	23	40%	265-462
Humpback whitefish females	<u>34</u>	<u>60%</u>	278-485
Humpback whitefish total:	57	100%	265-485

\* Catch composition was obtained from a sample of 652 whitefish examined from the creel

\*\* Sex composition was obtained from a sample of 283 whitefish examined from the creel

Table 3. Chatanika River whitefish spear season catch composition by species as a percentage of total catch and CPUE of whitefish, 1972-1985.

Year	Catch Composition			Whitefish Catch Per Angler Hour
	LCI (%)	HWF (%)	RWF (%)	
1972	62	28	10	2.32
1973	72	18	10	2.24
1974	66	24	10	1.82
1975	...	...	...	...
1976	72	19	9	1.80
1977	42	49	9	2.37
1978	36	58	6	5.70
1979	83	15	2	2.40
1980	64	31	5	1.50
1981	...	...	...	...
1982	...	...	...	...
1983	88	8	4	1.94
1984	83	16	1	2.26
1985	78	19	3	2.27
11 year $\bar{x}$	68	26	6	2.41

the lake in 1976 and 1977, respectively; all four fish were mature females that would spawn in 1985, but on 12 September their eggs were not freely running. All older fish had also been feeding on *Daphnia* sp.

Lost Lake. This lake near Birch Lake was stocked in 1982 with 40-mm fingerlings. One net night of fishing with a 125-ft experimental monofilament gill net on 12 June produced no sheefish. An angler caught an 826-mm, 4.5-kg sheefish on 26 October 1984. This age-5 fish was a spent male and was probably naturally reproduced in the lake.

Bullwinkle Lake (formerly South Greely Pond). This 9-acre lake located on Fort Greely was stocked in August 1984 with fingerling sheefish averaging a 92-mm fork length. Three hours of test netting in mid-July 1985 resulted in seven sheefish; average fork length and weight were 235 mm (224-248 mm) and 108 g, respectively. Three of the seven fish had deformed jaws, a fairly common occurrence among hatchery fish stocked in 1985.

Nenana Pond. Nenana Pond is located in the floodplain of the Nenana River. Nine hundred sheefish fingerlings were stocked in early June 1985. A 125-ft variable-mesh gill net was set for 4 h in October, but no fish were captured.

Earthmovers Pit. This 4-acre pit was formed in 1981 when the Alaska Department of Transportation removed gravel for renovation of the Parks Highway near Clear. Dissolved oxygen concentration in March 1983 was 5 ppm, and 200 sheefish fingerlings were stocked there in August 1983. Two gill nets set for 16 h each (32 net h) in late May 1985 took seven sheefish; their average length was 211 mm (range 190 to 227 mm), and the average weight was 96 g. The water level of Earthmovers Pit rose 5 ft in May because of flooding from an inlet stream. The influx of nutrient-rich water is one explanation for the good growth exhibited by these fish.

Personnel of Clear Hatchery reported that a local angler had caught two sheefish on hook-and-line in August from Earthmovers Pit. The fish were reportedly 350 mm long. In early October 1985, 90 age-1 sheefish (0.5 to 1.5 kg) were placed in Earthmovers Pit.

Gull Lake. This lake on Fort Greely (20 acres) was stocked with 20,000 sheefish fry in 1981. Survival was good and fish became stunted. A variable-mesh gill net was set overnight in Gull Lake, but no sheefish were captured. It is assumed that they have completed their natural life cycle. It is recommended that Arctic char, *Salvelinus alpinus* (Linnaeus), be stocked in Gull Lake.

Grayling Lake. Fourteen hundred fingerling sheefish were stocked in this 10-acre lake near Eielson Air Force Base in June 1985. A 125-ft variable-mesh net was set for 52 hours in October. No sheefish were captured, but the net contained 1 grayling, 1 humpback whitefish, 11 least cisco, and 2 northern pike.

Silver Fox Pit. This 1-acre pit located near Mile 50 Richardson Highway was stocked with sheefish in 1982 and 1985; on 12 June it was test netted and a 2.3-kg, age-3 mature male sheefish (610 mm fork length) was taken. A 200-mm, age-1 sheefish was also taken. A 2.3-kg sheefish was caught on hook-and-line by an angler in July 1985. The larger fish were from the 1982 stocking; three hundred sheefish fingerlings were stocked there in June 1985.

Weigh Station Ponds. These two ponds are located 6 mi from Fairbanks on the Richardson Highway. Fish were first stocked in these 2-acre ponds in 1982. A gill net was set overnight in both North and South Weigh Station Ponds. Two sheefish and 20 chubs were taken in the net in South Weigh Station Pond, and six suckers and fifteen chubs were taken in the net set in North Weigh Station Pond. The sheefish taken were very thin and had fork lengths of 132 and 142 mm. These fish grew only 40 to 50 mm in the year since being stocked. Both fish had only dipteran larvae in their stomachs. It is assumed that these fish did not learn to prey on the abundant chubs and suckers and were outcompeted by them.

In June 1985 three hundred 80- to 90-mm sheefish fingerlings were stocked in South Weigh Station pond; 50 fingerlings were also stocked in North Weigh Station Pond.

Harding Lake. Harding Lake was netted during 10 to 13 July and 15 to 18 October. Four 125-ft experimental gill nets were set in a different quadrant of the lake each day. Depth ranges of net sets during July were 15 to 111 ft; during October they were 6 to 85 ft. A total of 32 net nights was expended; no sheefish were captured. Species taken included northern pike, burbot, lake trout, coho salmon, *Oncorhynchus kisutch* (Walbaum), and least cisco.

For experimental purposes two vertical gill nets were set for four nights in July. No fish were captured. Net width was 10 ft, mesh size was 0.5 and 1 in, and the nets were set in 70 ft of water.

#### Chatanika River Experimental Stocking

In early June 160,000 sheefish were stocked in the upper Chatanika River at the site of the old power plant near Mile 36 on the Steese Highway. The release site was approximately 5 mi above known spawning grounds of Chatanika River sheefish.

The sheefish were released in lots of 40,000 each on 4, 5, 6 and 8 June. Fish averaged 5 g in weight and 70 to 90 mm fork length. Water temperature at release was 46° F. Water level was above normal and somewhat turbid. Water velocity was 5.6 ft per second. The fish were swept downstream immediately after being stocked. Their downstream progress was monitored by river boat from 3 to 7 June. Seining was conducted at various points downstream to the Elliott Highway bridge, a distance of about 12 mi. One hour after stocking, sheefish were captured by seine 2 mi below the release site (Table 4). Small mesh gill nets and hoop nets were set in various locations in the vicinity of the Elliott Highway bridge. Young-of-the-year sheefish were taken by fyke net and gill net at various locations (Table 5). All of these sheefish were hatchery fish. The hoop-net set 1 mi below the Elliott Highway bridge did not contain any sheefish (9.5 hours after release), but by the following morning (18 hours after release), two sheefish were in the hoop net and ten sheefish were in the stomach of a burbot in the hoop net. Anglers fishing the Chatanika River for pike and burbot during the summer also reported small sheefish in stomachs of fish caught.

Five days of test netting in the Chatanika River from the Elliott Highway bridge down to Hardluck Creek in late June failed to take any sheefish (Table 6).

In mid-September extensive test netting in the heart of the Minto Flats failed to take any sheefish (Table 7). Large numbers (over 100) young-of-the-year least cisco were captured, and many were observed surfacing in the areas netted. Larger-sized ciscoes consisted almost entirely of prespawning adults; they were migrating up the Chatanika River to spawn in the area near the Elliott Highway bridge. Although no young-of-the-year sheefish were captured, we feel that many of them have survived and are rearing in the Minto Flats. No young-of-the-year humpback whitefish were captured either. We recommend that the 1986 netting effort be directed in the area of lower Goldstream Creek.

Hatchery sheefish stocked in the Chatanika River were larger on 4 June than naturally produced sheefish; thus, their scales should act as markers. Hatchery fish had from four to eight circuli on a scale when stocked; these fish may also lay down a false annulus immediately after stocking. Table 8 lists sheefish stocked in the Fairbanks area in 1985.

#### Craig Lake Sheefish Survival

This 17-acre lake, located 20 mi southeast of Delta Junction has been stocked twice with sheefish. Two 125-ft variable-mesh gill nets were set overnight in Craig Lake in October. Sixty lake chubs, but no sheefish, were captured. Apparently the May 1984 plant of 3,400 sheefish fingerlings did not succeed. We recommend that Arctic char fingerlings be stocked in this lake.

Table 4. Sheefish catch by 50-ft seine off gravel bar 2 mi below release site on Chatanika River, June 1985.

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Time	Minutes After Release	No. of Sheefish caught
1245 hours	15	26
1300 hours	30	38
1315 hours	45	103
1330 hours	60	92
1345 hours	75	83
1400 hours	90	61
1415 hours	105	47
1430 hours	120	23

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Table 5. Net and seine catches in Chatanika River, vicinity of Elliott Highway Bridge, 4-7 June 1985.

Location	Gear	Net Hrs	Species Captured							
			SF	RWF	HWF	LCI	GR	LNS	BB	SSC
2 mi below release site	seine	8-10 min hauls	473	2	...	...	6	0	1	4
Slough below Elliott Bridge	125' gill net	14	1	...	...	13	8	19	...	...
Slough below Elliott Bridge	25' gill net	30	...	1	...	3	4	2	...	...
3 mi above Elliott Bridge	125' gill net	21	1	12	2	6	16	...	...	...
3 mi below Elliott Bridge *	25' gill net	19	1	...	...	...	...	...	...	...
Slough 1 mi below Elliott Bridge	hoop net	96	9	...	...	...	...	...	1*	...
4 mi below Elliott Bridge	hoop net	16	...	...	...	...	...	...	...	...

\* Had 10 sheefish in stomach

Table 6. Net catches in Chatanika River from Elliott Highway Bridge down to Hard Luck Creek, 18-21 June 1985.

Location	Gear	Net Hrs	Species Captured					
			RWF	GR	LNS	NP	SSC	CS Smolts
4 mi below Elliott Highway Bridge	seine	5-10 minute hauls	...	...	3	...	6	11
8 mi below Elliott Highway Bridge	seine	5-10 minute hauls	1	...	1	...	3	2
15 mi below Elliott Highway Bridge	seine	5-10 minute hauls	2	1	...	...	4	...
20 mi below Elliott Highway Bridge	30' gill net ½", ¾", 1" mesh	12	...	3	...	...	...	...
	hoop trap	12	...	...	...	...	...	...
Shovel Creek	125' gill net	12	...	...	...	...	...	...
Shovel Creek	hoop trap	12	...	...	...	1	...	...
3 mi below Shovel Cr.	seine	5-10 minute hauls	2	1	2	...	3	4
6 mi below Shovel Cr.	seine	5-10 minute hauls	1	...	...	2	1	1
9 mi below Shovel Cr.	seine	5-10 minute hauls	...	1	...	1	1	3
12 mi below Shovel Cr.	seine	5-10 minute hauls	...	...	1	2	1	1

Table 7. Gill-net catches Minto Flats, 5-10 September 1985.

Location	Gear	Net Hrs	Species Captured							
			SF	HWF	BWF	LCI	CS	NP	LNS	BB
Tatalina Mouth	125' variable mesh net	35	1	5	1	6	...	14	1	3
" "	25' small mesh net	35	...	...	...	3	...	5	...	...
Lower Tatalina R.	75' small mesh net	35	...	1	...	3	...	7	...	...
" "	50' small mesh net	35	...	...	...	2	...	4	...	...
Tolovana above Chatanika R.	125' variable mesh net	22	...	1	1	...	...	7	...	1
" "	25' small mesh net	22	...	1	...	...	...	2	...	...
" "	30' small mesh net	22	...	...	...	2	...	4	...	...
In Rock Is. Sl.	125' variable mesh net	22	...	6	...	56	...	16	...	...
Rock Island Slough	75' small mesh net	47	...	1	...	1	...	16	2	...

(Continued)

Table 7. (Cont'd) Gill-net catches Minto Flats, 5-10 September 1985.

Location	Gear	Net Hrs	Species Captured							
			SF	HWF	BWF	LCI	CS	NP	LNS	BB
Below Rock Is. Slough	125' variable mesh net	24	...	2	...	50	...	17	...	1
Slough below Fish and Game Cabin	50' small mesh net	24	...	...	...	...	...	2	...	...
Chatanika at Fish and Game Cabin	50' small mesh net	24	...	...	...	2	...	6	...	...
2 mi below Rock Island Slough	125' variable mesh net	21	...	5	...	30	2	3	...	...
Below Rock Is. Sl.	75' small mesh net	21	...	1	...	16	1	3	...	1

Table 8. Sheefish stocking summary, Fairbanks area, 1985.

Date	Waterbody	Size	Number Stocked
June	Nenana Pond	70-90 mm fingerlings	900
October	Earthmovers Pit	1-3 lbs.	90
June	Silver Fox Pit	70-90 mm fingerlings	300
June	N. Weigh Station Pond	70-90 mm fingerlings	300
3-7 June	Chatanika River	70-90 mm fingerlings	160,000

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