Volume 25 Study G-III

STATE OF ALASKA

Bill Sheffield, Governor

Annual Performance Report for

EVALUATION OF INTERIOR ALASKA WATERS AND SPORT FISH WITH EMPHASIS ON MANAGED WATERS - FAIRBANKS DISTRICT

By

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Volume 25 Study No.: G-III

RESEARCH PROJECT SEGMENT

State: Alaska Name: Sport Fish Investigations of Alaska

Project No.: F-9-16

Study No.: G-III Study Title: LAKE AND STREAM INVESTIGATIONS

Job No.: G-III-H Job Title: Evaluation of Interior Alaska Waters and Sport Fish with Emphasis on Managed Waters - Fairbanks District

Cooperator: Jerome Hallberg

Period Covered: July 1, 1983 to June 30, 1984

ABSTRACT

Stocking of 26 Fairbanks area lakes is evaluated. The stocking practices on three area waters, along with test netting results, are discussed.

Creel census information collected from September 30 through October 16 on the Chatanika River whitefish, Coregonus nasus (Pallas), spearing season revealed that 93 fishermen spent 223 hours to harvest 431 whitefish. Extremely turbid water conditions through the month of September, as the result of placer mining operations upstream, were the reason for the low harvest. Whitefish investigations in the Minto Flats, Chatanika River area are discussed.

Northern pike, Esox lucius Linnaeus, investigations in the Minto Flats area are discussed. The movements of pike during the winter months and a description and location of the overwintering habitat of four radio-tagged northern pike are presented.

Baseline data on the burbot, Lota lota (Linnaeus), population in the lower Chena and Tanana Rivers is presented. A total of 100 burbot captured and tagged and four radio-tagged burbot are discussed.

Results of lake surveys conducted on four popular northern pike waters in the Kantishna River drainage are presented.

KEY WORDS

Fairbanks area, lower Chena/Tanana River, lake stocking, burbot, lake surveys, Minto Flats, northern pike, test netting, radio tags, Chatanika River, whitefish, creel census, spear season.

BACKGROUND

The Fairbanks Management Area (Fig. 1) of approximately 52,000 sq mi includes waters of the Tanana drainage from the Little Delta River downstream to the Tanana River mouth, including roadside waters of the Parks Highway south to the Denali Highway, the Richardson Highway south to Birch Lake, the Steese and Elliott Highways, and the Chena Hot Springs Road. Also in the area are all north-flowing tributaries of the upper Yukon River from Tanana to the Canadian Border.

This area includes some of the most highly used fisheries in the Interior, including the Chena, Chatanika, and Salcha Rivers, Minto Flats and Harding and Birch Lakes. There are many popular fly-in lakes in the Tanana Flats. Communities served include Fairbanks, North Pole, Central, Circle, Eagle, Livengood, Minto, Manley Hot Springs, Rampart, Nenana, Anderson, Healy and Cantwell. Fort Wainwright Army Post, Eielson Air Force Base, and Clear Air Force Site are also included in this area.

The climate is one of harsh contrasts, with spring coming as early as mid-April and snowfall, with subfreezing temperatures, occurring as late as June. The short, 3-month summers are characterized by long daylight hours and temperatures occasionally exceeding 90^{o}F. The fall may extend through early October, with snowfall and decreasing temperatures. During the dead of winter, from mid-November to mid-March, temperatures may plummet below -70^{o}F. Annual precipitation averages around 11 inches, with most falling between June and September.

The lakes are generally iced-over by late October and breakup can occur as late as June. Seasonal surface runoff streams flow from May through September, due to periods of spring ice melt and later summer rains. The streams, fed by groundwater or springs, may either run with marginal ice cover, or occasionally form glaciers over the streambed.

The Tanana Valley is relatively unglaciated. However, large quantities of gravel, sand and silt are discharged by nearby glacial melt. Lake formation occurs either from the damming of drainages leading from nearby hills, by silt from the Tanana River, by the melting of a former ice mass buried in the subglacial soil, or by the melt of permafrost brought upon by vegetative disturbance. Yearly precipitation regulates the levels of the majority of lakes, with only those near the Tanana subject to fluctuation by river-regulated water tables.

Creel census studies are conducted on all high-use fisheries in the areas including the Chatanika, Salcha, Little Salcha, and Chena Rivers, Badger Slough, Minto Flats and stocked lakes such as Birch, Harding, Little Harding and Lost Lakes.

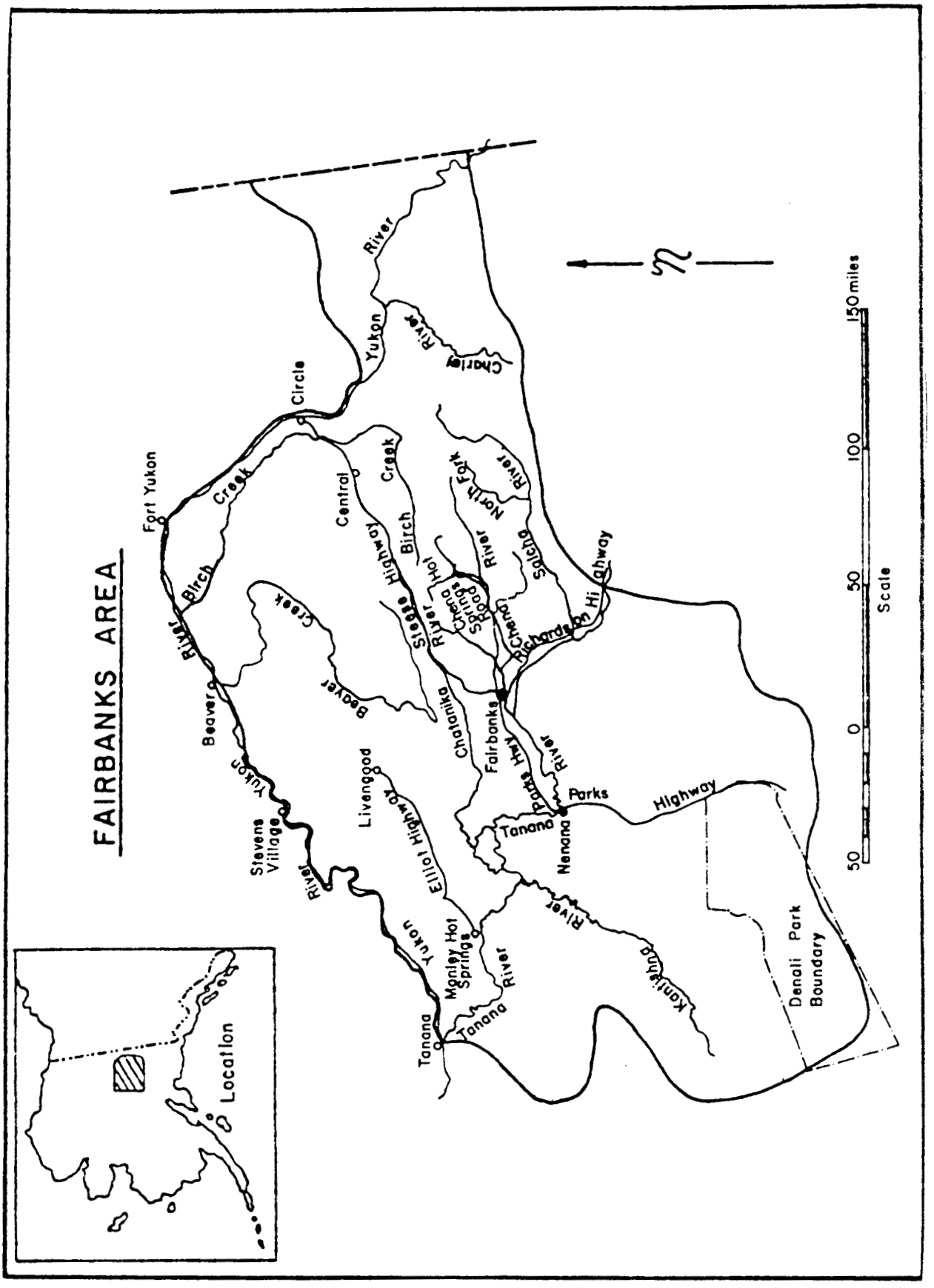


Figure 1. Fairbanks Management Area

Nearly all of the important waters near the major road systems have been surveyed. A number of fly-in waters have not been surveyed or need additional data. Future emphasis will be placed on surveys of lower Tanana drainage waters. Data will be collected on previously unsurveyed waters. Table 1 contains scientific and common names and abbreviations of all fish mentioned in this report.

Fisheries are currently maintained in 27 lakes and ponds in the management area by stocking rainbow trout, coho salmon and grayling. Most waters stocked are adjacent to the road system; however, several remote lakes, accessible only by snow machine or aircraft, have also been stocked with rainbow trout, coho salmon and grayling. The remote water stocking program is well-received by sportsmen.

RECOMMENDATIONS

1. The evaluation of the stocking success of rainbow trout, coho salmon and grayling in area waters should continue.

2. Investigations into the population status of natural fish stocks in several high-use fisheries should be continued, specifically the Minto Flats northern pike fishery, Chatanika River whitefish spear fishery and the lower Chena/Tanana River burbot fishery. Efforts should be made to assess angling pressure and sport fish harvest.

3. Data should be collected on unsurveyed waters within the study area.

OBJECTIVES

1. To evaluate stocking policies for rainbow trout, coho salmon and Arctic grayling in eight area lakes and to formulate stocking recommendations for optimum survival and growth. Emphasis will be placed on assessing growth and survival of fish stocked in Dune, Chena, Moose and Geskakmina Lakes, and 31 Mile, 28 Mile, Johnson Road #1 and Johnson Road #2 Pits. Evaluations will be made on other waters being considered for enhancement.

2. To assess existing natural fish stocks in several high-use fisheries throughout the year to determine the population status (size and age composition) and distribution (where they are found at different times of the year). These include the Minto Flats northern pike fishery, Chatanika River whitefish fishery and the lower Chena/Tanana River burbot fishery.

3. To enumerate the whitefish/sheefish spawning migration in the Chatanika River and to obtain estimates of angler effort, harvest and make-up of catch during the whitefish spear season. This will be done from August to freeze-up.

Table 1. Scientific and common names of fish mentioned in this report.

Common Name	Scientific Name	Abbreviation
Arctic lamprey	Lampetra japonica (Martens)	AL
Arctic grayling	Thymallus arcticus (Pallas)	GR
Burbot	Lota lota (Linnaeus)	BB
Chinook salmon	Oncorhynchus tshawytscha (Walbaum)	KS
Coho salmon	Oncorhynchus kisutch (Walbaum)	SS
Humpback whitefish	Coregonus pidschian (Gmelin)	HWF
Inconnu (sheefish)	Stenodus leucichthys (Güldenstadt)	SF
Lake chub	Couesius plumbeus (Agassiz)	LC
Least cisco	Coregonus sardinella Valenciennes	LCI
Longnose sucker	Catostomus catostomus (Forster)	LNS
Ninespine stickleback	Pungitius pungitius (Linnaeus)	NSB
Northern pike	Esox lucius Linnaeus	NP
Rainbow trout	Salmo gairdneri Richardson	RT
Round whitefish	Prosopium cylindraceum (Pallas)	RWF

4. To conduct surveys on popular fly-in lakes which have not been previously surveyed, including East and West Twin Lakes, Wien Lake and Mucha Lake in the Kantishna drainage. Five unnamed lakes of the Yukon Flats are also scheduled for basic surveys during the summer, if time permits.

TECHNIQUES USED

A float-equipped Cessna 185 aircraft was used to transport field crews and equipment to remote lakes within the study area, and to monitor northern pike movements.

Physiographic data, as well as latitude and longitude, were calculated from 1956 U.S. Geological Survey (USGS) 1:250,000 maps.

Water chemistry data were measured using a Hach AL-36B field test kit. Water depths were determined with a Lowrance fathometer, and a standard 10-in Secchi disc was used for water clarity.

Multifilament and monofilament graduated mesh sinking or floating gill nets, measuring 125 x 6 ft and consisting of five 25-ft panels of 1/2-in through 2 1/2-in bar mesh, were used to capture fish.

All data were recorded on standard Alaska Department of Fish and Game stream and lake survey forms.

All fish samples were grouped by date and location. Weights were recorded to the nearest gram using a Chatillon spring scale. Fork lengths were measured to the nearest millimeter, and sex and stage of maturity were determined by examining gonads.

Ice, water and snow depths were measured to the nearest inch. Dissolved oxygen levels were measured using a Hach AL-36B field test kit and the low-range titration procedure.

Scales used for age determination were cleaned and mounted between glass slides. A Bruning 200 microfiche reader was used to read the scales.

Cleithrum bones as described by Casselman (1980) were used for aging northern pike.

Telonics RB-5 radio transmitters were surgically implanted into the body cavity of burbot and northern pike using the technique outlined by Ross (1981). The transmitters ("tags") were imbedded in wax and had 250 mm teflon-coated wire antennae. The tags weighed approximately 30g and had a battery life of about 6 months. The frequencies of the transmitters ranged from 150.000 MHz to 151.220 MHz.

The signals from the transmitters were received using a Telonics TS-1 Scanner/Processor, a Telonics TR-2 Biomedical Telemetry Receiver and a Telonics RA-2AK antenna mounted on the wing strut of a Cessna 185 aircraft.

FINDINGS

Minto Flats Northern Pike Investigations

Radio Telemetry and Overwintering Study:

The Minto Flats (Fig. 2) has long been recognized by residents of interior Alaska as an excellent sport fishing area for northern pike. Its four major river systems, along with the numerous sloughs connecting a myriad of mostly shallow lakes and ponds, create prime northern pike habitat. However, studies have pointed out that this "prime habitat" is only available during the open water periods and that the northern pike are forced out during the winter months. Roguski (1967) reported that North and South Minto Lakes have no overwintering capacity and by mid-March are totally devoid of oxygen with very little water left unfrozen. Cheney (1971) documented low (less 2.5 ppm) dissolved oxygen in the Chatanika and Tolovana Rivers and that pike probably move out of these areas into the lower Tolovana and possibly the Tanana River. Dissolved oxygen levels collected during the winter of 1982-83 in the Minto Flats area are summarized in Table 2. Oxygen levels remain low in most areas; however, there is good dissolved oxygen in certain areas such as the upper Chatanika River, Grassy Slough and the Tanana River.

In an attempt to identify overwintering locations of Minto Flats northern pike, four pike were radio-tagged in September 1982 and their movements monitored during the following winter months. Tagging procedures, techniques and movements until the end of 1982 appear in Hallberg (1983).

Table 3 provides data on the length and weight of the pike tagged and the date and location of the tagging. Table 4 summarizes the movements from one tracking flight to the next from the initial tagging until the tag stopped transmitting. Figure 3 shows the Minto Flats area with the tag and release sites, along with the overwintering areas.

Sampling at the overwintering sites of tags #1, 2 and 4 was accomplished between March 10-16, 1983. The sites were located using the radio transmitters, which at this time were still functioning. Along with test netting under the ice and angling at all three locations, dissolved oxygen readings were collected.

Tag #1 fish, which moved the farthest (about 63 mi) from its release site to its overwintering location, did so within 7 weeks, from September 17 to November 12. However, the first major movement occurred the week of October 6 and this strong movement continued for the next 4 weeks. After November 12 the fish remained in this same area throughout the winter. The overwintering area of fish #1 was a large, deep hole along the base of the first bluff in the Tanana River below the mouth of the Tolovana River. There was approximately 8 ft of swift-flowing water under 4-5 ft of ice. The dissolved oxygen level on March 14, 1983 was 8.0 ppm. A 125-ft graduated mesh gill net was set here for 24 hours but caught no fish. A tracking flight on March 4 pinpointed the pike to

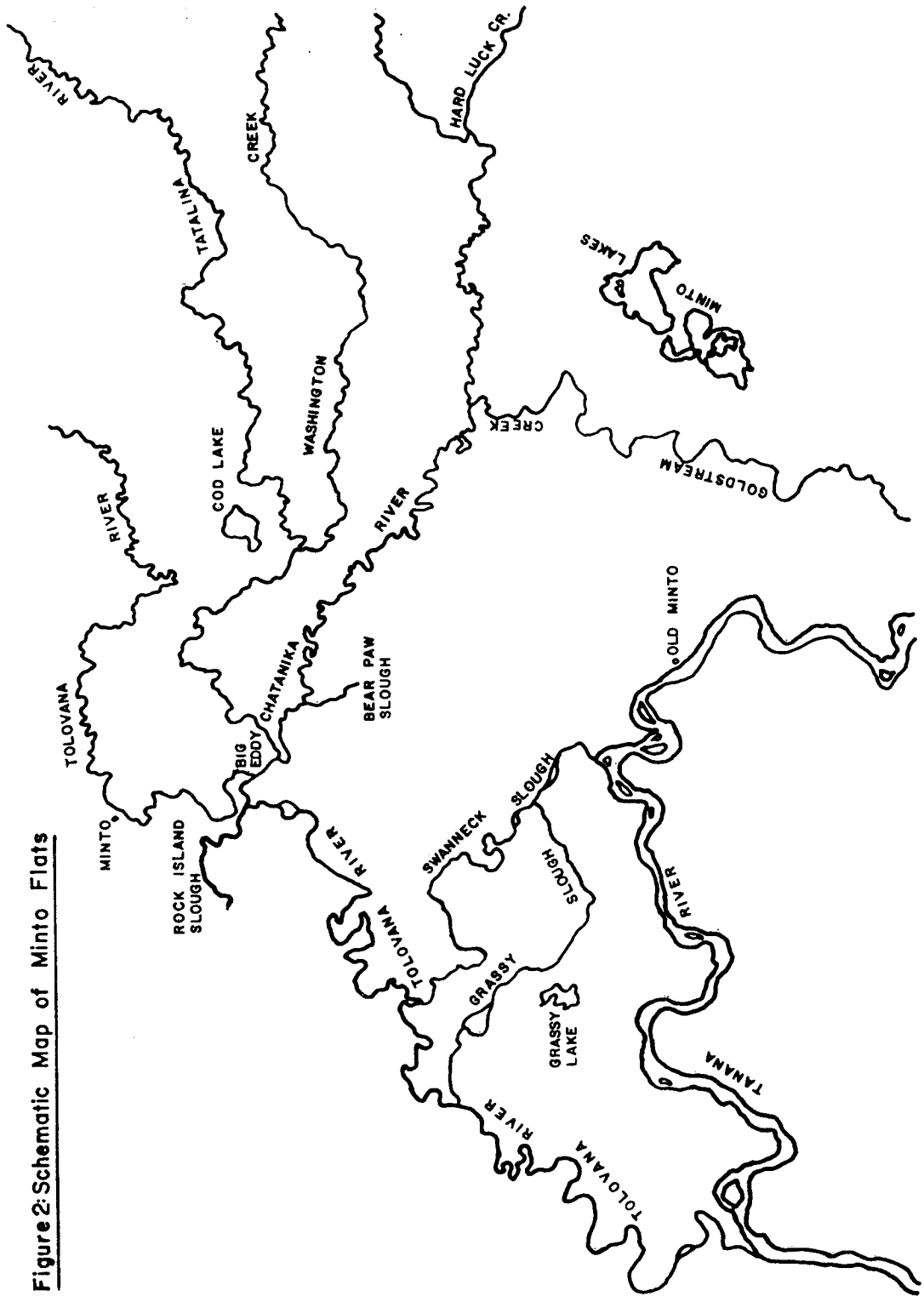


Figure 2: Schematic Map of Minto Flats

Table 2. Minto Flats area waters tested for dissolved oxygen, 1983.

Location	Date	D.O. ppm	Ice Depth (in.)	Snow Depth (in.)	Water Depth (ft)	Sample Depth (ft)
Chatanika River: Below Hard Luck Creek.	1/26/83	4.0	30	12	5.0	3.5
Chatanika River: 6 mi below Hard Luck Creek.	1/28/83	0.8	24	10	3.0	2.5
Chatanika River: mouth of Goldstream Creek.	1/28/83	1.0	24	10	4.5	3.5
Tolovana River: at Rock Island Slough.	2/16/83	0.8	28	2	4.0	3.0
Tolovana River: 100 yds above Grassy Slough.	2/16/83	0.6	37	6	8.0	5.0
Tolovana River: mouth of Grassy Slough.	2/16/83	4.2	26	4	3.0	2.5
Tolovana River: 1 mi above mouth.	2/16/83	0.7	20	12	3.5	3.0
Tolovana River: 200 yd above mouth.	4/14/83	2.5	40	10	3.0	2.0

(Continued)

Table 2. (Cont'd) Minto Flats area waters tested for dissolved oxygen, 1983.

Location	Date	D.O. ppm	Ice Depth (in.)	Snow Depth (in.)	Water Depth (ft)	Sample Depth (ft)
Tanana River: 1st bluff below Tolovana.	3/14/83	8.0	48	0	8.0	5.0
Grassy Slough: near Grassy Lake	3/13/83	4.8	40	8	7.0	5.0
Swanneck Slough:	3/13/83	0.8	30	10	2.0	1.0
Goldstream Creek: 50 yd above mouth.	1/28/83	1.0	24	10	2.5	2.0

Table 3. Date, location, length, weight, of four northern pike radio tagged in the Minto Flats area, 1982; Also transmitter expiration date.

Tag #	Tagging Date	Location Tagged	Fork Length		Weight		Transmitter Expiration Date
			in.	mm	lbs.	grams	
1	9/17/82	Tatalina/Chatanika River confluence	25.5	650	5.5	2,495	3/25/83
2	9/17/82	Tatalina Chatanika River confluence	25	640	4.8	2,154	3/25/83
3	9/18/82	Goldstream/Chatanika River confluence	27.5	700	6.3	2,835	3/12/83
4	9/20/82	1½ mi above Tolovana River/Swanneck Slough confluence	35.5	900	12	5,443	3/25/83

this area; however, we were unable to pick up a signal on the ground at the time of test netting. It was suspected that the transmitter expired, as further tracking flights also failed to pick up a signal.

Tag #2 fish showed strong movements during the first 3 weeks of October, then movements slowed considerably. This fish did not go downstream to the Tanana River as did fish #1 but stopped at Grassy Slough 25 mi above the mouth of the Tolovana River. Grassy Slough is a small slough off of Swanneck Slough and flows in a westerly direction, eventually draining into the Tolovana River. On March 14 the transmitter in fish #2 led us to the area with a minimum of difficulty. A 25-ft gill net was set in 6-8 ft of water under 40 inches of ice. Although the radio-tagged fish was not recovered in 3 net nights, we caught 8 northern pike, 2 humpback whitefish and 1 burbot. Angling efforts here also produced three more pike and two burbot. The eleven pike ranged from 25 to 33 inches fork length, and weighed from to 3 1/2 lbs to 10 1/4 lbs. Dissolved oxygen here was 4.8 ppm on March 13, 1983.

Grassy Slough may provide substantial overwintering habitat. Flow was evident at the time of our sampling and the records from the tracking flight show that on December 29 fish #2 was in the Tolovana River at the mouth of Grassy Slough, then on January 20 it was 9 mi up Grassy Slough. This indicates that flows even in late January are such to allow for the passage of fish. Good oxygen levels at the overwintering site and in the Tolovana River just below the mouth of Grassy Slough also suggest that the slough is putting out a substantial flow of water.

Fish #4 was tagged 1.5 mi above the Swanneck Slough-Tolovana River confluence. It was the largest (12 lb) of the four pike tagged. Its movements were similar to those of fish #1 and 2 in that most of its movement occurred between October 6 and November 1. On the November 12 tracking flight the fish could not be located. It was not until December 29 that we located the fish in Swanneck Slough. The fish remained in this area of Swanneck Slough for the remainder of the winter. During our on-site investigation of this area it was determined that conditions here for overwintering fish were marginal. There appeared to be no flow in Swanneck Slough at this location. The dissolved oxygen level here on March 13, 1983 was very low at 0.8 ppm. After drilling numerous holes through 3 ft of ice we were able to locate a maximum of 30 in of water. A 5-ft-deep gill net, 25 ft long was rolled up to a depth less than 30 in to prevent it from freezing to the bottom of the ice. This net was then set under the ice and fished for 3 nights. It caught no fish. Angling here produced one 10-in pike. The radio receiver picked up a strong signal being emitted by the transmitter in this location. Upon drilling a hole in the ice with a power ice auger the location of signal would move, indicating that the fish was alive and moving around. One could also look down the hole in the ice and observe small northern pike swimming in a slow, lethargic manner. A baited hook or lure when lowered in front of the fish neither frightened them nor enticed them to strike. This behavior is very atypical of northern pike which are known for their voracious feeding habits and swift swimming ability when alarmed. The reason for the inactivity of the northern pike in this situation may lie with the low

oxygen concentration found here. Casselman (1978) reported that "angler success in winter is directly related to oxygen concentrations and is adversely affected if the O_2 falls below approximately 2 ppm and the northern pike cease feeding". Also that "while northern pike were captured alive in stationary gear (gill net) at oxygen concentrations as low as 0.04 ppm, activity in oxygen concentrations below 0.7 ppm was extremely low". As stated above, the dissolved oxygen concentration here was 0.8 ppm, a level which northern pike can tolerate but which apparently affects their activity. Approximately 7 mi downstream from our netting site in Swanneck Slough we noted clear ice that was frozen to the bottom of the slough. Small fish frozen in the column of ice, including grayling, humpback whitefish, round whitefish, northern pike and lamprey could easily be identified. Large numbers of water boatmen (Corixidae) were also observed both frozen in the ice column and on the surface. Three such areas were located where fish winterkill could be observed.

Fish #3 was tagged and released at the confluence of Goldstream Creek and the Chatanika River. This individual, unlike the other three, moved upstream and overwintered in the "canyon area" of the Chatanika River below Hard Luck Creek. Because of the distance between tag #3 and the other tagged fish we could not sample its overwintering area in March when the other areas were investigated. However, two trips were made to the site near Hard Luck Creek in January, 1983. Once again the transmitter led us to the area and, as with tag #4, when the hole was cut in the ice using a power auger the fish (signal) would move. In this case the movement was as much as 100 yds. The ice here was 30 in thick with 5 ft of water flowing beneath and the dissolved oxygen concentration here was 4.0 ppm.

No net was set at this location but angling with hook and line for approximately 10 man hours produced seven northern pike ranging from 21 to 26 in fork length and weighing from 2 to 4.5 lbs. The area which tag #3 was occupying appeared to be a large pool along a cutbank of the Chatanika River. It was not determined just how far upstream this condition (good flow and adequate oxygen) existed but as one continued downstream these conditions deteriorated. Table 2 shows that at 6 mi below this area the Chatanika River had 3 ft of water under 24 in of ice with only 0.8 ppm oxygen. Flows at this location were undetectable. The presence of northern pike in the area below Hard Luck Creek during the winter months was not completely unknown. Area anglers often spoke of this area and reports of good catches of pike here in the winter have circulated. It is interesting that the pike we tagged chose to migrate upstream about 12 mi to overwinter here instead of migrating 75-100 mi downstream as did the other 3 tagged pike.

It is also of interest that, while four individual northern pike were tagged and released at three different locations, each overwintered in a different location. Three fish, tags #1, 2 and 3 were found in fairly good winter habitat, while fish #4, the largest and the oldest, wintered in the worst of conditions. None of our sampling efforts showed large concentrations of overwintering fish. Our best results were the moderate catches in Grassy Slough and only after 3 nights of netting.

All four fish exhibited strong movements in early October, which coincided with ice formations on sloughs, ponds and lakes, along with large ice flows on the major rivers. Dissolved oxygen concentrations appear to play an important role in where fish go to overwinter and for some individuals the oxygen levels drastically affect their activity, while others succumb due to the total lack of oxygen.

A summary of fish movements appears on Table 4. Fish movements are shown in Figure 3.

Minto Flats Northern Pike Investigation, Summer 1983:

In late May 1983 a riverboat trip into the Minto Flats was conducted. Most of the northern pike here had completed spawning at this time. Only one female netted at the Swanneck Slough-Tolovana River confluence exuded eggs as we removed her from the net. She was 80% spawned-out. Cheney (1971) reported that spawning occurred in the Minto Flats from May 10 to June 15 and identified Bear Paw Slough, (Fig. 2) as a known pike spawning area. A thorough survey of Bear Paw Slough was conducted on May 24, 1983 and no pike were evident at this time. Water temperature was 13.5°C. Cheney also pointed out that temperatures on the Minto Lakes spawning grounds ranged from 5.6° to 11.7°C.

Netting was done at three locations. Six pike were caught at the Swanneck Slough-Tolovana River confluence. They ranged in size from 18-29 in fork length and from 1 1/2 to 6 lbs in weight. Two pike were caught at the confluence of the Chatanika River and Goldstream Creek, weighing 1 1/4 and 8 lbs. No fish were netted in a set approximately 5 mi up the Tatalina River.

A second trip to the Minto Flats area was completed in early August 1983.

Test netting at the Chatanika-Goldstream confluence on August 9 and 10 produced seven pike ranging from 24.5 to 36.5 in fork length and from 4 to 14 lbs in weight. Test netting at the mouth of the Tatalina River produced two fish weighing 4 and 6 lbs, respectively. Three northern pike were also sampled in a net set in the Chatanika River about 6 mi above its confluence with the Goldstream Creek. These three fish average 28½ in fork length and 6 lbs.

Lower Chena and Tanana River Burbot Fishery

One of the fastest growing fisheries in the Fairbanks area is the lower Chena and Tanana River burbot fishery using baited set lines. The harvest of burbot in this area has gone from 600 fish in 1977 to nearly 1,500 in 1982, Mills (1983). To learn more about the population structure of burbot in this area a tagging study was begun in 1983. Fyke nets were used to capture burbot. They were set in the side channels and backwater slough systems of the Tanana River from about 5 mi above to 15 mi below the mouth of the Chena River.

Figure 3: Schematic Map of Minto Flats Showing Initial Tag and Release Site and Overwintering Area of Four Radio Tagged Northern Pike

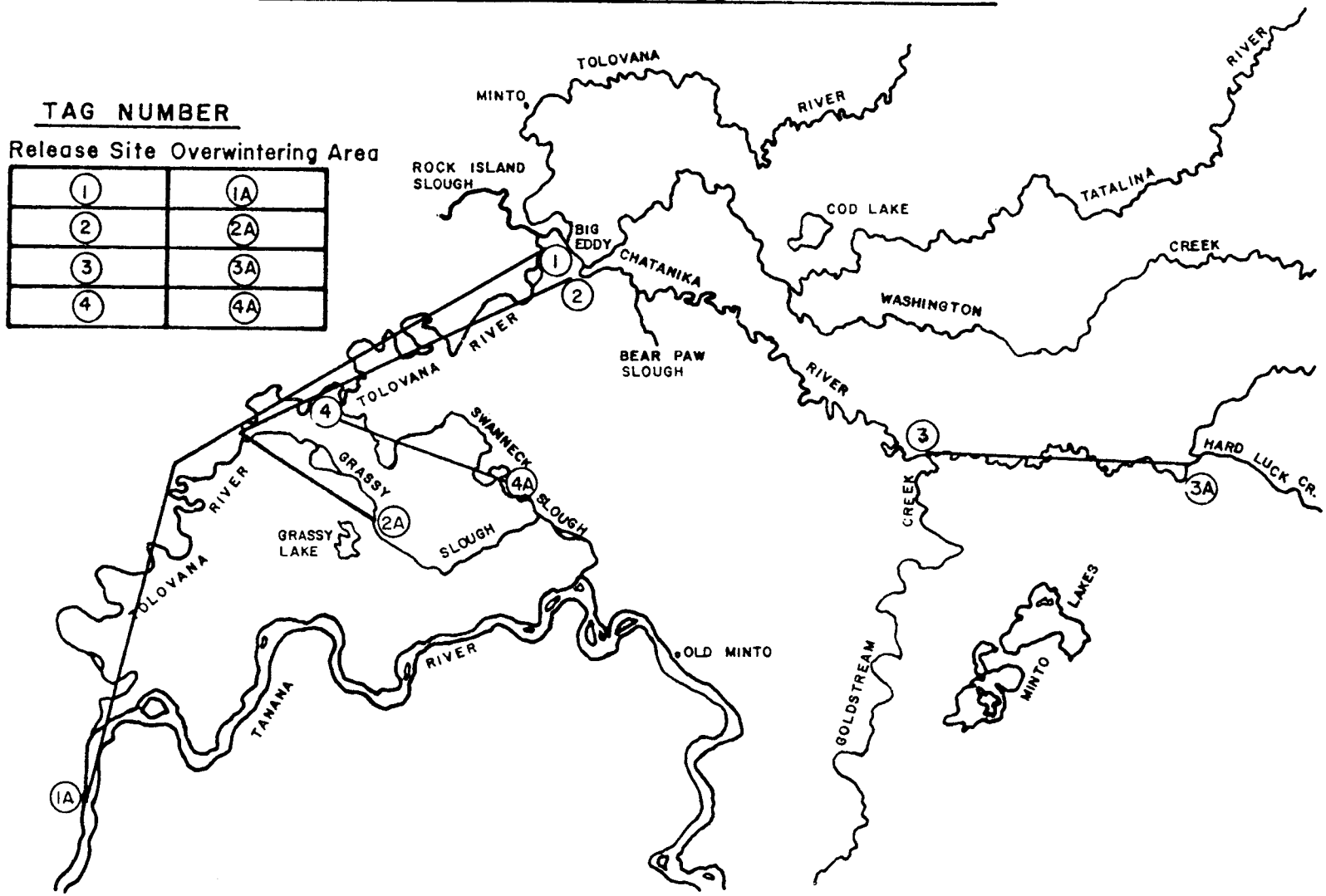


Table 4. Summary of movements of four radio-tagged northern pike collected during tracking flights in the Minto Flats area, 1982/83.

Tag Number, Date & Location of Release	Progressive movements in miles from time of release until transmitter expired. + = upstream movement - = downstream movement. Date of Tracking Flights																Overwintering Location *
	9/23	9/28	10/6	10/13	10/21	11/1	11/12	11/17	12/3	12/14	12/29	1/20	2/16	3/4	3/12	3/25	
#1, 9/17/82, Tatalina-Chatanika River confluence	+1.5	-0.7	-10	-9	-14	-22	-3	0	0	0	0	0	0	0	**	...	Tanana River below below mouth of Tolovana River.
#2, 9/1782, Tatalina-Chatanika River confluence	+1.5	-0.7	-13	-7	-14.5	0	+3	-1	-3	+4	+1	+9	0	0	0	**	Grassy Slough near Grassy Lake.
#3, 9/18/82, Gold-stream -Chatanika River confluence	+1.0	+5.5	- 6	+0.5	+0.5	+7.5	-0.5	0	+4	0	0	0	0	0	0	**	Chatanika River below Hard Luck Creek.
#4, 9/20/82, 1.5 mi above Tolovana-Swan-neck Slough confluence	+2.5	+1.5	-6.5	+0.5	-2	-7.5	Lost Tag				+18	+2	0	0	0	**	Swanneck Slough

* See Figure 3 for overwintering site

** Transmitter expired

Three fyke nets were fished at three different locations from June 14 to 16, August 3 to 5, September 22 to 23 and again from October 4 to 6. In a total of 29 net nights, 100 burbot were caught, tagged and released. Of these, 50 were caught in the last 3 nights from October 4 to 6. At this time much of the backwater area of the Tanana River was freezing up, limiting the habitat and forcing the burbot to move out the main river. Seventeen burbot were caught on set line in addition to the 100 captured with fyke nets. These 17 fish were sampled for aging, food habits and sex information. Robert D. Mecum, a fisheries graduate student at the University of Alaska, donated 70 burbot otoliths, along with lengths and weights of fish he had sampled from the same area during his field research. The age and length composition of the total sample (87 burbot) appear in Table 5. Age Classes III through VII account for 83% of the total sample, with Age V being the dominant age class. The mean total length of the burbot in the sample was 21 inches. This was also the mean length of the 100 burbot that was captured in the fyke nets.

The sex ratio of 63 burbot was nearly 1 female to 1 male, as 32 were females and 31 were males. Females averaged slightly larger than the males and reached a larger maximum size, with one female measuring 42 in and weighing 14.5 lbs.

The stomach contents of 60 burbot were analyzed. Longnose sucker, humpback whitefish, lake chubs and round whitefish young-of-the-year or juveniles accounted for 65% of all the identifiable food items in the sample. The remainder was made up of lamprey, burbot, chinook salmon smolts, grayling, northern pike, insects, a single shrew and unidentifiable material. The high percentage of the four major species of fish in the burbot diet was not unexpected, as these fish share the same backwater and side channel habitats as the burbot. Often the fyke trap would produce good catches of these four species along with the burbot.

As part of the burbot investigation in the lower Chena and Tanana River, four burbot ranging from 23 in and 2¼ lbs to 39 in and 14 3/4 lbs were radio-tagged. The transmitters were surgically implanted in the body cavity by the technique described by Ross (1981).

The burbot were radio-tagged to monitor their fall and winter movements and, hopefully, locate their spawning area. It has been well documented that burbot spawn under the ice between January and March; however, very little is known as to specific spawning locations in the Chena-Tanana area. Chen (1969) reported that burbot as small as 20 mm were taken in the Chena River from river mile 30 to mile 90 in June of 1963 and speculated that burbot may spawn in the main Chena River.

As with the radio-tagged pike, burbot movements were monitored using an airplane equipped with an antenna and a radio receiver unit. All four fish exhibited some movement both up and downstream. Two individuals moved as far as 15 to 18 mi down the Tanana River from where they were tagged and then slowly moved back upstream. The third fish moved approximately 6 mi up into the Chena River from the mouth and remained

Table 5. Age and length composition of 87 burbot sampled from the Tanana River below Fairbanks 1981-1983.

	Age												Total No.	Length Frequency %
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XVI		
100-149	1												1	1.1
150-199														
200-249														
250-299			1	1									2	2.3
300-349			7	1	1								9	10.4
350-399			5	2	...								7	8.0
400-449			1	7	2								10	11.5
450-499			1	2	7	1							11	12.7
500-549				1	4	6							11	12.7
550-599				1	2	2	4						9	10.4
600-649						3	5	2					10	11.5
650-699						1	1						2	2.3
700-749							1	2	2				5	5.7
750-799							2						2	2.3
800-849										1			1	1.1
850-899									2	2			4	4.6
900-949											2		2	2.3
950-999														
1000-1049														
1050-1099												1	1	1.1
n	1		15	15	16	13	13	4	4	3	2	1	87	
Age Frequency %	1.1		17.3	17.3	18.4	14.9	14.9	4.6	4.6	3.5	2.3	1.1		100
$\bar{x}$ Fork Length	103		349	421	484	562	646	681	797	848	921	1,070	535	

there through December 1983. The fourth individual slowly moved about 7 mi up the Tanana River from where it was tagged and remained in the area near the mouth of the Chena River through December, 1983.

Tracking flights are scheduled to continue through the 1983-1984 winter or until all tags have stopped transmitting. If spawning areas can be located these areas will be visited and subsequent sampling will follow to document the fish species present and to delineate the spawning habitat.

Chatanika River - Minto Flats Whitefish Investigation and Spear Season Summary

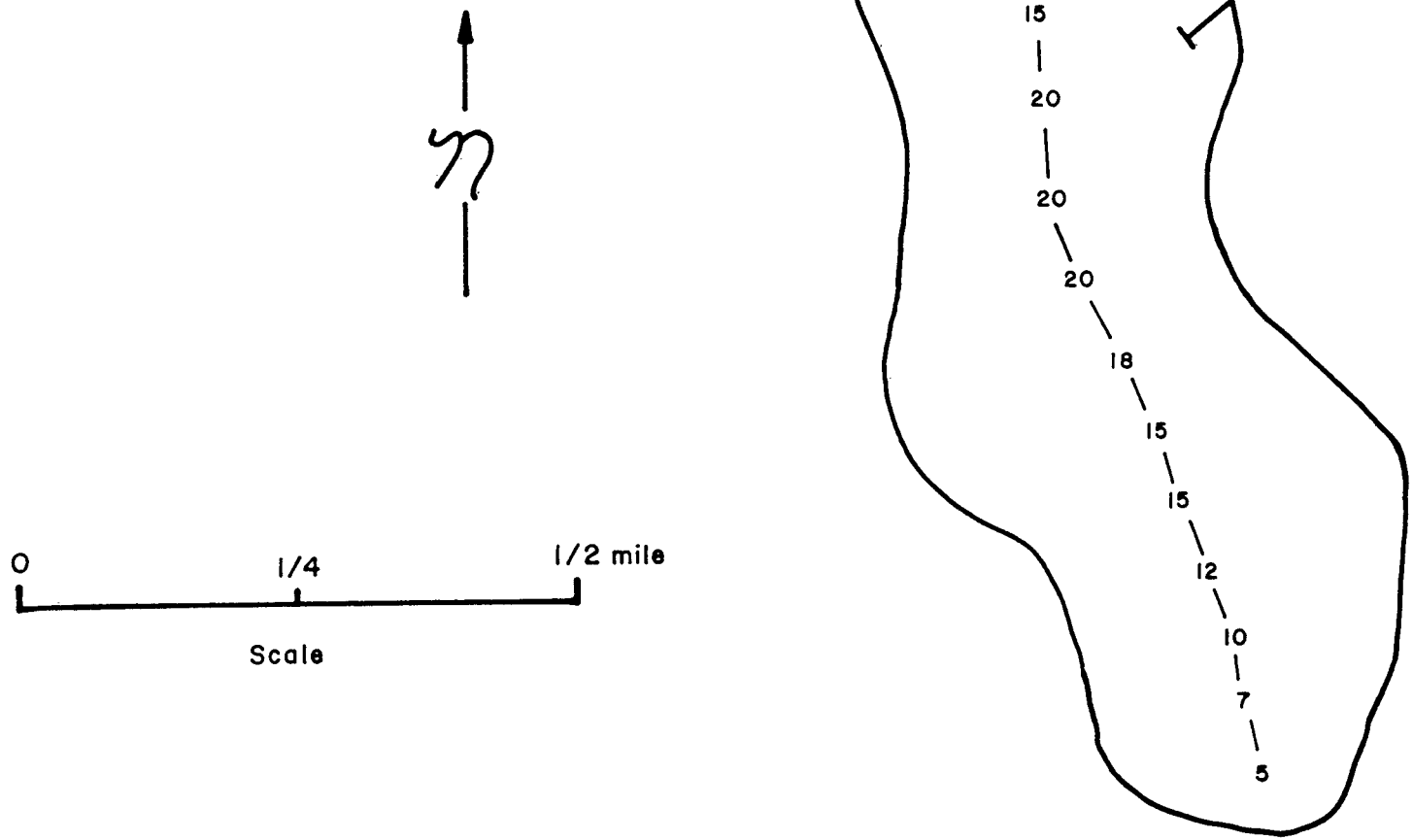
Humpback whitefish and least cisco are the two target species in the Chatanika River whitefish spear fishery. Kepler (1972) described numerous spawning areas above and below the Olnes bridge, which is the Elliott Highway crossing of the Chatanika River. It is in this area that the bulk of the spearfishing occurs. In recent years the Chatanika River has remained extremely turbid throughout the fall spear season. This turbid condition has been caused by placer mining operations in the headwaters of the Chatanika River. Water conditions in 1981 and 1982 were so bad that no creel census was conducted in those 2 years. Creel census on the spear fishery was first done in 1972. The spear season opens on September 1 and continues usually until freeze-up, which in 1983 was on October 16. During this 48-day period, there were 28 days (or 61% of the season), of severe water turbidity precluded spearfishing. And on many of those days when it was possible to take whitefish, conditions were less than favorable, which reduced the effectiveness of the spearfishermen.

The creel census efforts in 1983 started on September 30 and ended on October 16. The census was conducted from 8:30 to 10:30 pm on 3 weekend and 2 weekday evenings. A total of 93 anglers was interviewed. They spent 223 hours to harvest 431 whitefish for a catch rate of 1.93 fish/hr. During the interviews it was also learned that approximately 300 additional fish were harvested prior to our creel census. This brought the total take of whitefish to approximately 731. Of these, 88% were least cisco, 10% were humpback whitefish and 2% were round whitefish. In 1971 Least cisco were found to represent 71% of spawning whitefish in the Chatanika, while humpback whitefish accounted for 29% (Kepler 1972). Kepler also pointed out that the peak spawning period occurred the last week of September. The turbid water condition persisted through September, prohibiting spearing and consequently, any creel census. Because of this, no expansion was made of the data collected to estimate total harvest as in former years.

Test netting in the Minto Flats area from the Swanneck Slough/Tolovana confluence up to the mouth of Goldstream Creek in mid May captured 11 humpback whitefish. Seven males and one female were pre-spawners and would spawn in the fall of 1983. A 15 1/2 in redeveloping non-consecutive spawning female and two Age I juvenile fish were also captured. No least cisco were captured.

Figure 4: DUNE LAKE

Depths are Shown in Feet



In early August, 13 least cisco were sampled in the Chatanika River between the mouth of Goldstream Creek and Hard Luck Creek. Eleven were females and two were males, and all were found to be pre-spawning adults. Kepler (1973) reported that the least cisco spawning migration begins as early as July 2 and continues into September, while the humpback whitefish spawning migration begins in June.

No index sampling was done in the Elliot Highway bridge area of the Chatanika River in 1983. Once again the water turbidity made it impossible to employ either electrofishing or visual counts in attempt to obtain rough indices of abundance of whitefish in the spawning area.

Four adult sheefish were sampled in the Chatanika River above the Goldstream confluence in August, 1983. They ranged in size from 6 1/4 lbs to 13 1/4 lbs. Two were pre-spawning females, one a prespawning male and the fourth was released. Sheefish were present at the Tolovana River/Swanneck Slough confluence on May 24. Three fish were caught here on hook and line. They weighed 5 1/2 lbs, 7 3/4 lb and 14 lbs. They were all released. One other sheefish was captured in May, an 11-lb prespawning female taken at the Goldstream Chatanika confluence.

Lake Surveys

Dune Lake:

Dune Lake (Fig. 4) is located approximately 25 mi southwest of Nenana or 6 mi east of the confluence of the Toklat and Kantishna Rivers at lat. 64° 25'N, long. 149° 53'W. The lake, accessible by float or ski-equipped aircraft, is 1.3 mi long, about 1/2 mi wide, has a surface elevation of 440 ft and has approximately 180 surface acres. A depth transect along the length of the lake showed a maximum depth of 20 ft. Dune Lake has an extensive littoral zone (20%) around its perimeter which contains some emergent aquatic vegetation. Many invertebrates are found in this area, especially amphipods which are very abundant in the lake. There are no inlets or outlets and the shoreline is fairly flat, with some hilly relief along the northeast side of the lake. The bottom is composed of soft, sandy material. Water chemistry on June 21 was: temperature, 64°F; conductivity 210, µMhos; alkalinity 68, ppm; acidity, 51 ppm; hardness, 86 ppm, and; pH 8.5.

In 1976, after test netting results revealed no fish present in the lake, Dune Lake received an initial stocking of 75,000 Arctic grayling fry. No further sampling was done until June of 1978 when eight grayling were captured by hook and line (Kramer 1979). The fish ranged from 280-305 mm and averaged 289 mm fork length. This growth rate to Age II far exceeds that of indigenous stocks of grayling found in the rivers of interior Alaska. For example, 88 Age II grayling sampled during a population estimate on the Chena River in 1982 averaged 136 mm fork length, (Holmes 1983). The fork length range of 26 Age II grayling on the Goodpaster River was 132-184 mm, with a mean of 156 mm (Peckham, 1981). This accelerated growth to Age II is due to the lake's high fertility and rich crop of invertebrates, coupled with a lack of competition from indigenous fish. The lake was stocked again in 1981

and test netting results on June 22, 1983 showed growth to Age II similar to the 1976 stocking. Twenty-four Age II grayling were sampled and ranged from 248-295 mm, with an average of 270 mm fork length. Also during 1983 test-netting nine Age VII grayling (1976 stocking) were captured. However, growth rates from Age II to Age VII slowed down considerably, as the fork length of the nine fish ranged from 344-390 mm and averaged 362 mm. Thus the grayling in Dune Lake grew only 92 mm in the past 5 years. The reason for this slower growth may be that after Age II more of the energy formerly expended in growth goes into production of sex products with sexual maturity. While no evidence of natural reproduction in Dune Lake was found, all of the Age VII fish were mature.

Dune Lake was again stocked in 1983 with 50,000 grayling fry. Dune Lake has been extremely popular with fly-in anglers. Portions of the land around the lake have been made available through the Alaska Department of Natural Resources, Division of Lands in their land disposal program. This, along with the possibility that a proposed agricultural project in the Nenana area may soon become a reality, makes it imperative that enhancement efforts in this area continue.

Chena Lake:

Chena Lake is located approximately 18 mi south of Fairbanks on the Army Corps of Engineers, Chena River Lakes flood control project. A complete description of the lake, along with the history of the Sport Fish Division involvement in this area is reported in Hallberg (1982). The lake has been the subject of much controversy in the past few years because the Corps of Engineers closed access to the lake until all construction activities were completed. Rainbow trout and coho salmon were stocked in Chena Lakes for the first time in 1982. Test netting revealed that both species survived well and were exhibiting fairly good growth. Nineteen coho salmon were sampled ranging from 142-156 mm fork length, with a mean of 147 mm. Coho salmon stocked in other area waters at the same time showed similar growth. Little Harding Lake cohos, for example, ranged from 105 to 152 mm fork length and averaged 137 mm (Mike Doxey pers. comm.). A sample of 21 Age I coho salmon collected from 28 Mile Pit ranged from 130 to 150 mm, with an average of 140 mm fork length.

The rainbow trout stocked in Chena Lake in June of 1982 as sub-catchables (59/lb) did not grow as well as those stocked into Birch Lake, which were the same size and were stocked at the same time. While the Chena Lake rainbows averaged 167 mm fork length and ranged from 160 to 174 mm, the Birch Lake fish ranged from 174 to 232 mm fork length and averaged 196 mm (Doxey, 1983). Chena Lake, which consists of six gravel pits that were joined together to create one large lake, shows signs that it will become more productive with time, as both invertebrate life and aquatic vegetation are increasing annually.

The lake was stocked in August, 1983 with 30,691 rainbow trout fingerlings. No coho salmon were available for Chena Lake in 1983. The Army Corps of Engineers has completed the majority of the construction

associated with the project and will be turning over maintenance and management of the recreational area of the project to the Fairbanks North Star Borough in the spring of 1984. The lake is scheduled to open to the public on Memorial Day weekend.

Geskakmina Lake:

Geskakmina Lake (Fig. 5), located at lat. 64° 37'N, long. 150° 15'W is located approximately 12 mi southwest of the confluence of the Kantishna and Tanana Rivers. This 256-acre lake was first surveyed in 1976 and after 48 hours of gill-netting no fish were caught. Dissolved oxygen readings in late winter ranged from 5 to 9 ppm. In summer 1977 the lake was stocked with 75,000 fingerling coho salmon. The lake was not sampled again until 1979 when eight Age II cohos were caught on hook and line. These fish ranged from 170 to 205 mm fork length and averaged 186 mm. This growth rate appears somewhat slower than Age II cohos from other interior Alaska lakes. Peckham (1981), reported that Age II coho salmon from Lisa Lake averaged 253 mm. Age II cohos from Little Harding Lake averaged 240 mm, and those sampled in Lost Lake averaged 242 mm fork length (Doxey, 1983).

The lake was again stocked in 1980 with 20,000 coho fingerlings. No follow-up sampling occurred until June 1983. The test netting results appear in Table 6. Twenty-two cohos, all Age III, were caught in a single overnight gill net set. These fish ranged from 275 to 365 mm fork length and averaged 320 mm. Unlike the growth rates of the initial stocking which, as stated above, appeared somewhat slower at Age II than other lakes, the growth rate of the second planting is fairly normal at Age III. Age III cohos from Lisa Lake in 1980 averaged 323 mm fork length (Peckham, 1981).

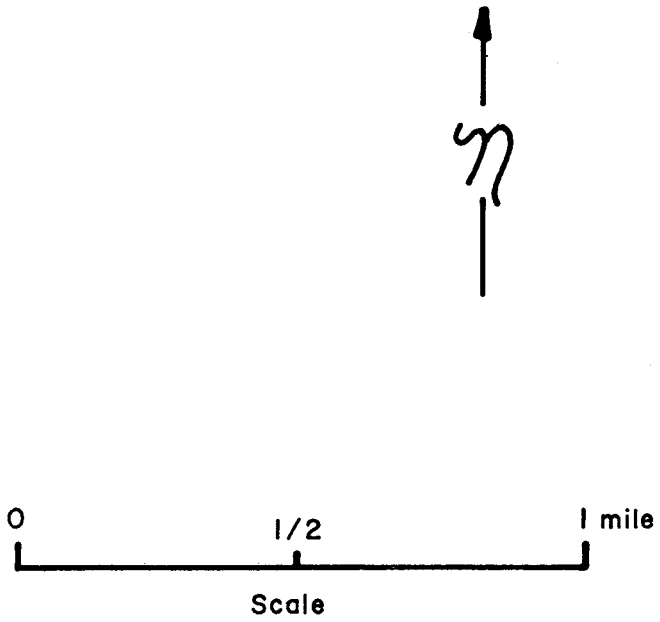
Geskakmina Lake has recently received considerable public attention because portions of the land around the lake have been made available for private acquisition through the Alaska Department of Natural Resources, Division of Lands, land disposal program. Property owners, aircraft pilots and other anglers have expressed interest in our stocking program and have encouraged us to continue our management efforts on the lake.

Wien Lake:

Wien Lake (Fig. 6), located at lat. 64° 21'N, long. 151° 18'W, is approximately 110 mi southwest of Nenana. It is one of the largest lakes in the Kantishna River drainage with more than 3,500 surface acres. A depth transect taken along the length of the lake showed a maximum depth of 110 ft. Surface elevation is slightly more than 1,000 ft above sea level. Extensive sandy shallow areas are found near the south and east corners of the lake. Aquatic vegetation is found intermittently around the perimeter of the lake. The shoreline is quite hilly with extensive stands of spruce and birch. The lake has an outlet at the southwest end which when surveyed in late June, 1983 was flowing slightly. During spring melt and after heavy rains flows would increase considerably. This outlet eventually flows into the Kantishna River. There is one small inlet on the north end of the lake that appears to flow intermittently.

Figure 5: GESKAKMINA LAKE

Depths are Shown in Feet



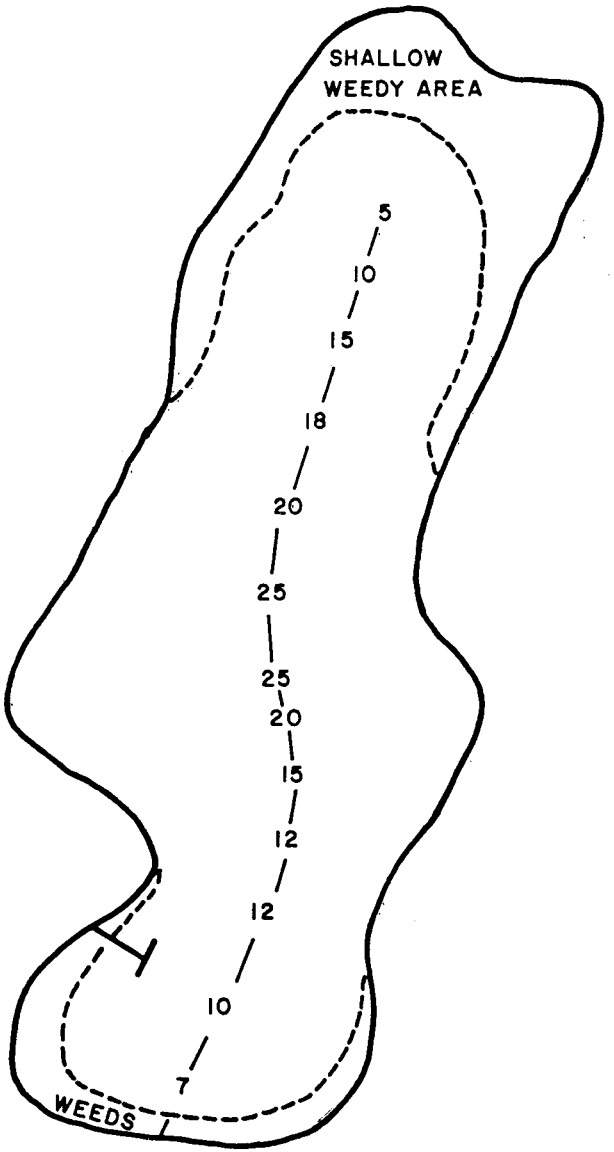


Figure 6: WIEN LAKE

Depths are Shown in Feet

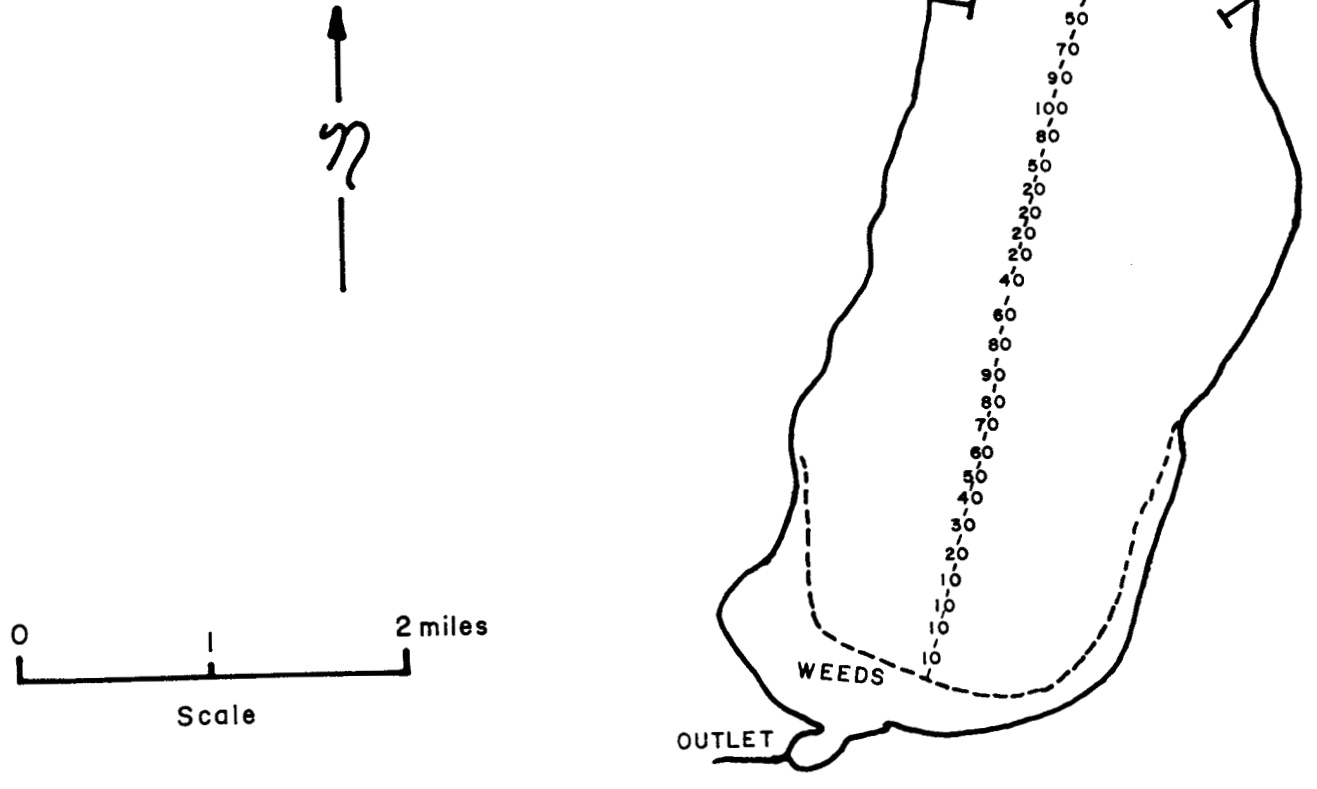


Table 6. Lake stocking summary, Fairbanks area.

Lake	Location	Date	Species	Size	Number
Birch Lake	Richardson Hwy	June 14-17	RT	10/lb	19,482
		Aug. 29	RT	243/lb	125,218
Spencer Lake	Richardson Hwy near Harding Lake	June 28	RT	7/lb	3,610
		Oct. 27	RT	74/lb	5,100
Chena Lake	Flood Control Project Site	Sept. 14	RT	271/lb	30,691
Koole Lake	Remote fly-in lake	Sept. 14	RT	271/lb	34,700
Geskakmina L.	Remote fly-in lkae	Sept. 14	RT	271/lb	10,026
Little Harding Lake	Richardson Hwy	May 23	SS	170/lb	10,000
Lost Lake	Richardson Hwy	June 2	GR	Fry	45,000
Johnson Rd. #1	Richardson Hwy	June 2	GR	Fry	15,000
Johnson Rd. #2	Richardson Hwy	June 2	GR	Fry	15,000
31 Mi Pit	Richardson Hwy	June 2	GR	Fry	15,000
Grayling Lake	Eielson AFB	June 2	GR	Fry	15,000
Hidden Lake	Eielson AFB	June 2	GR	Fry	15,000
Bathing Beauty Lake	Richardson Hwy	June 2	GR	Fry	15,000
29.6 Mi Steese Hwy	Steese Highway	June 3	GR	Fry	15,000

(Continued)

Table 6. (Cont'd) Lake stocking summary, Fairbanks area.

Lake	Location	Date	Species	Size	Number
30.6 Mi Steese Hwy	Steese Highway	June 3	GR	Fry	15,000
31.6 Mi Steese Hwy	Steese Highway	June 3	GR	Fry	15,000
33.0 Mi Steese Hwy	Steese Highway	June 3	GR	Fry	15,000
33.5 Mi Steese Hwy	Steese Highway	June 3	GR	Fry	15,000
34.6 Mi Steese Hwy	Steese Highway	June 3	GR	Fry	15,000
35.8 Mi Steese Hwy	Steese Highway	June 3	GR	Fry	15,000
36.6 Mi Steese Hwy	Steese Highway	June 3	GR	Fry	15,000
Dune Lake	Remote fly-in lake	June 3	GR	Fry	50,000
30 Mi Chena Hot Springs Road	Chena Hot Springs Rd.	June 3	GR	Fry	15,000
30.9 Mi C.H.S.R.	Chena Hot Springs Rd.	June 3	GR	Fry	15,000
42.8 Mi C.H.S.R.	Chena Hot Springs Rd.	June 3	GR	Fry	15,000
45.5 Mi C.H.S.R.	Chena Hot Springs Rd.	June 3	GR	Fry	15,000
47.9 Mi C.H.S.R.	Chena Hot Springs Rd.	June 3	GR	Fry	15,000

The lake was test netted on June 29, 1983. Two 125-ft graduated mesh gill nets were set for a 24-hour period. The first net, which was set in a small bay along the west side of the lake, produced eight northern pike ranging from 12 oz to 15 lb in weight (14 to 41 fork length) six (15-18 in) humpback whitefish. The second net, set at the north end of the lake, caught 75 least cisco, all 5-6 in long. No burbot were captured, but are reported by local residents to be in the lake. One ninespine stickleback was found in the stomach of a northern pike.

Wien lake has always been popular with residents of interior Alaska, as is evident by more than 20 cabins on the lake, mostly along the west side. There are two resorts on the lake, but only one is currently in use. The lake also has two year-round residents; they do very little fishing and did not know what species were present in the lake.

Because of its large size, Wien Lake is difficult to fish successfully on a one-trip basis. The sport fishing potential is certainly there, but one may have to spend some time to familiarize himself with the lake. No fish were landed and no strikes occurred in about 4½ hours of fishing.

Water is very clear and free of any stained color. Secchi disk reading was 22 ft. Water chemistry data were: acidity, 85.5 ppm; alkalinity, 17 ppm; hardness, 52 ppm; pH 7.0 and water, 64°F.

West Twin Lake:

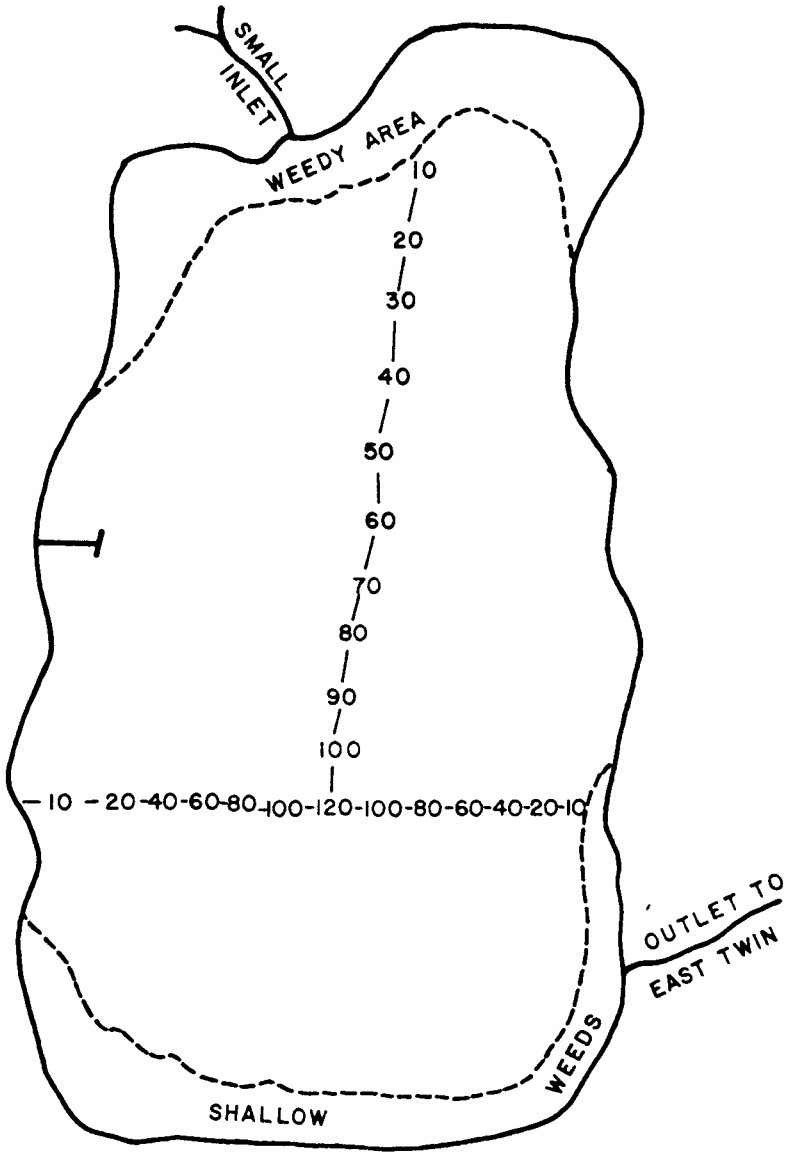
West Twin (Fig. 7) is named for its location, approximately 5 mi west of East Twin Lake at lat. 64° 27'N, long. 150° 50'W. A relatively large lake with over 2,000 surface acres, an elevation of 748 ft and a maximum depth of 120 ft, West Twin is usually the last of the Kantishna lakes to freeze up. A reconnaissance flight over this area on November 12, 1982 found West Twin free of ice while all other lakes in the area were completely ice-covered. The lake is accessible only by aircraft. Its shoreline has dense stands of spruce and birch and is fairly hilly along the east and west sides. West Twin does not have an extensive littoral zone; however, the north and southern ends do have some shallow areas with a small amount of aquatic vegetation. The lake's outlet is at the southeast corner and it flows intermittently into East Twin Lake. Water color is clear with little stain and the Secchi disk reading was 15 ft.

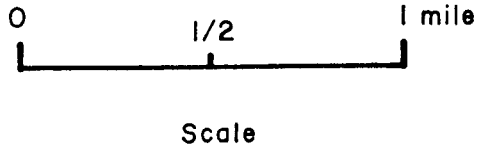
West Twin Lake has long been known as a good northern pike fishing area. In a single 24-hour netting period using a 125 ft graduated mesh gill net 10 northern pike and seven humpback whitefish were captured. While no burbot were caught in the net or on set lines, small burbot were observed in the nearshore areas.

The northern pike ranged in fork length from 17 to 30 inches and from 1 to 7.5 lbs in weight. Anglers fishing West Twin Lake report that northern pike over 20 lb have been caught here. Test angling efforts produced only three small pike 1-3 lbs in 6 hours of fishing. It

Figure 7: WEST TWIN

Depths are Shown in Feet





appears that the humpback whitefish in West Twin are the forage fish for the northern pike, as juvenile whitefish were found in the stomachs of four of the pike sampled.

The lake was receiving considerable fishing activity during the time we spent surveying it. At least one fish guide was flying clients into the lake daily, and other aircraft were observed on the lake. As with East Twin Lake, a large segment of the land surrounding West Twin lake has been available for private ownership through the state's land disposal program. This will certainly draw more attention to the lake. The water chemistry data collected on West Twin Lake on June 30 are as follows: acidity 34, ppm; alkalinity, 54 ppm; hardness, 69 ppm; pH 7.5, and; water, 65°F.

East Twin Lake:

East Twin Lake (Fig. 8), is located approximately 50 miles southwest of Nenana, at lat. 64° 26'N, long. 150° 40'W. Accessibility to East Twin is limited to float or ski-equipped aircraft as no roads or trails are available. The lake is at an elevation of 692 ft and has a surface area of 1,600 acres. It has one small inlet near its southeast end which drains only a few square miles from surrounding hills. A second inlet along the west shore drains from West Twin Lake, located 8 mi to the west. The outlet of East Twin Lake is at the north end of the lake. While flows here are small, it appears that during high water years this outlet stream flows into the Kantishna River.

East Twin Lake has an extensive littoral area with dense aquatic vegetation. The shoreline is mostly black spruce with some birch and willow mixed in.

Water color here is stained somewhat brown; however, the Secchi disk reading was 11 ft. Water chemistry data here on June 29, 1983 are as follows: acidity, 51 ppm; alkalinity, 77 ppm; hardness, 51 ppm; pH, 7.5, and; water 67°F.

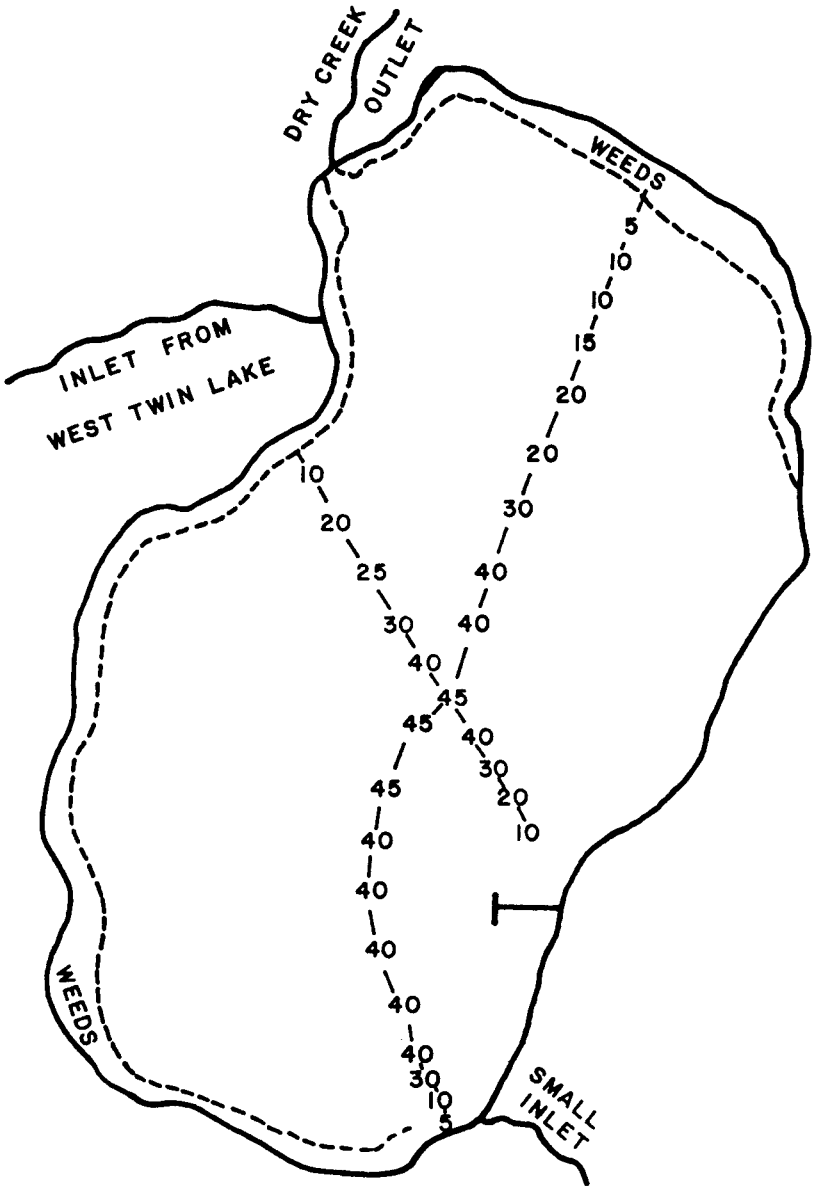
A single 125-ft gill net was set along the east shore for a 24-hour period. A total of 16 northern pike and 24 humpback whitefish were captured. Fifteen of the northern pike ranged from 6 oz to 2 lbs 14 oz, while the 16th fish weighed 20 lbs 8oz. Aside from this fish no pike larger than 3 lbs were captured either by netting or by angling, but nine 1-3 lb northern pike were caught in 3 man-hours of fishing.

The 24 humpback whitefish captured ranged from 15 to 21 in fork length and 1 3/4-3 3/4 lbs. Pike may be responsible for keeping small whitefish numbers down, but, once a whitefish reaches 15 in, it may be too large for the average pike to consume. Humpback whitefish play an important role in the diet of northern pike in East Twin Lake; the stomachs of three northern pike contained identifiable small whitefish and many others contained unidentifiable fish remains.

East Twin Lake is one of the most popular fly-in northern pike lakes in the Interior, both summer and winter. Many pike caught in East

Figure 8: EAST TWIN

Depths are Shown in Feet



0 1/2 1 mile

Scale

Twin are brought in to the ADF&G office to be weighed and certified for the Trophy Fish program. Recent land sales in this area by the State of Alaska will bring more attention to the lake. It becomes increasingly important that we keep abreast of both the development of East Twin land and the pike populations found in the lake.

Mucha Lake:

Located approximately 100 miles southwest of Nenana at lat. 64° 13'N, long. 150° 55'W, this lake is the smallest (525 surface acres) of the four lakes surveyed in the Kantishna River drainage. Its surface elevation is 605 ft and its maximum depth is only 17 ft. The lake has no appreciable inlet and only a small intermittent outlet which flows into Lynx Creek (a tributary to the Kantishna River) during the highest of flows. Mucha Lake (Fig. 9), appears to be receding in size; much of the shoreline is made up of new vegetative growth (grass) on what appears to be former lake bottom. In some places the water line is 75 to 100 yards from the treeline. This drying-up condition has created considerable littoral area. An estimated 30-40% of the surface area of the lake is less than 8 ft deep.

Only two small northern pike were captured in a 24 hour net set. Both weighed less than 2 lbs each. Two hours of angling here produced no fish. Mucha Lake is reported to produce trophy size northern pike, but this could not be substantiated by our sampling. The water of Mucha Lake is extremely dark and stained. The Secchi disk reading was only 9 ft. Water chemistry here is as follows: acidity, 69 ppm; alkalinity, 17 ppm; hardness, 34 ppm; pH, 7.0, and; water 68°F.

Other Area Waters:

Limited investigations were conducted on several small gravel pits in the Fairbanks Area. Data on these will be presented in future reports as appropriate.

Lake Stocking Summary

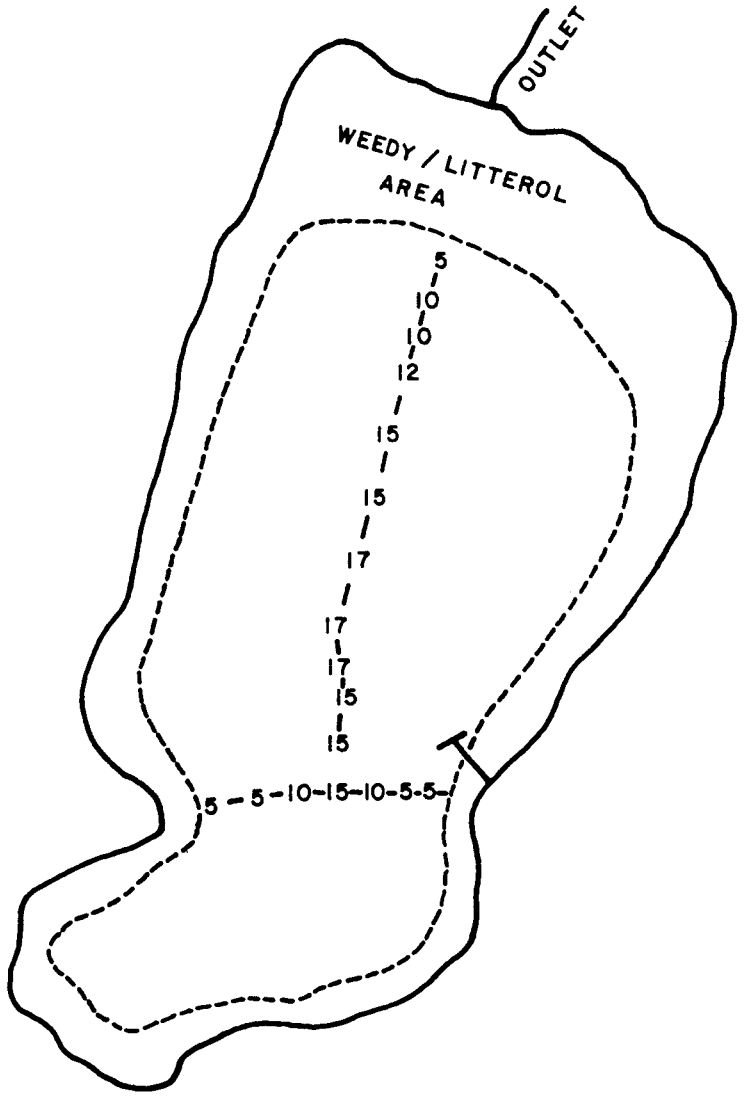
Twenty-seven waters in the Fairbanks area were stocked with 618,827 fish in 1983 (Table 6). Rainbow trout were stocked in three roadside lakes: Birch, Spencer, and Chena Lakes; and in two remote lakes, Koole and Geskakmina. A total of 228,827 rainbow trout was stocked.

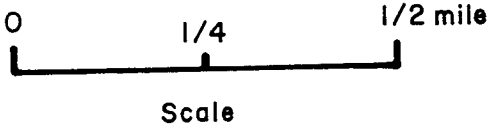
Coho salmon were available only for Little Harding Lake (10,000) due to problems at the hatchery.

Grayling fry were available for the first time in 3 years. Eight small 2 to 5 acre gravel pits along the Steese Highway north of Fairbanks were stocked. Five similar gravel pits along the Chena Hot Springs Road and six along the Richardson Highway between Fairbanks and Harding Lake were stocked. Dune Lake, a remote fly-in lake, and Lost Lake, near Birch Lake, were also stocked with grayling fry. A total of 380,000 grayling fry was stocked.

Figure 9: MUCHA LAKE

Depths are Shown in Feet





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