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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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Job: G-III-H Evaluation of Interior Alaska Waters and Sport Fish with Emphasis on Managed Waters - Fairbanks District
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RESEARCH PROJECT SEGMENT

State: Alaska Name: Sport Fish Investigations of Alaska

Project: F-9-17

Study: G-III Study Title: LAKE AND STREAM INVESTIGATIONS

Job: G-III-H Job Title: Evaluation of Interior Alaska Waters and Sport Fish with Emphasis on Managed Waters--Fairbanks District

Cooperator: Jerome Hallberg

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ABSTRACT

A total of 44 area waters was stocked with more than 1 million fish: 351,571 rainbow trout, *Salmo gairdneri* Richardson; 102,000 coho salmon, *Oncorhynchus kisutch* (Walbaum); 365,000 Arctic grayling, *Thymallus arcticus* (Pallas) and 218,341 sheefish, *Stenodus leucichthys* (Güldenstadt). Stocking evaluations of 15 area waters are presented.

Creel-census data collected during the Chatanika River whitefish, *Coregonus* sp., spear season (September 11-October 11) revealed a total effort of 2,548 hours expended to harvest 5,758 whitefish, for a catch rate of 2.2 fish per hour. Discussion is presented in an attempt to conduct a whitefish population estimate on a 1-mile index section of the Chatanika River in 1984.

Movements of four radio-tagged burbot, *Lota lota* (Linnaeus), in the Tanana River are discussed. The results of an on-going migration study of burbot in the Tanana River, along with age and growth data, are presented.

Results of surveys conducted on six lakes in the Kantishna River drainage are presented.

Surveys conducted on four tributaries to the Yukon River between the Dalton Highway bridge and the Hodzana River are summarized.

Creel census conducted on Chena Lake in 1984 revealed that 13,035 angler hours were expended to harvest 12,930 rainbow trout and 8,849 coho salmon, for a combined harvest of 21,779 fish. Catch rate was 1.67 fish

per hour. Year-class contributions to the creel, as well as growth of fish stocked, are discussed.

KEY WORDS

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

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 Elliot 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 (lakes accessible by aircraft) 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: spring comes as early as mid-April, and snowfall with subfreezing temperatures occurs as late as June. The short 3-month summers are characterized by long daylight hours and temperatures occasionally exceeding 90°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°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 because of periods of spring ice melt and, later, summer rains. The streams, fed by groundwater or springs, may either flow 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. Lakes form either by the damming of drainages leading from nearby hills, by the accumulation of silt from the Tanana River, by the melting of a former ice mass buried in the subglacial soil, or by the melting of permafrost after vegetative disturbance. Yearly precipitation regulates the levels of the majority of lakes; only those near the Tanana River are subject to fluctuation by river-regulated water tables.

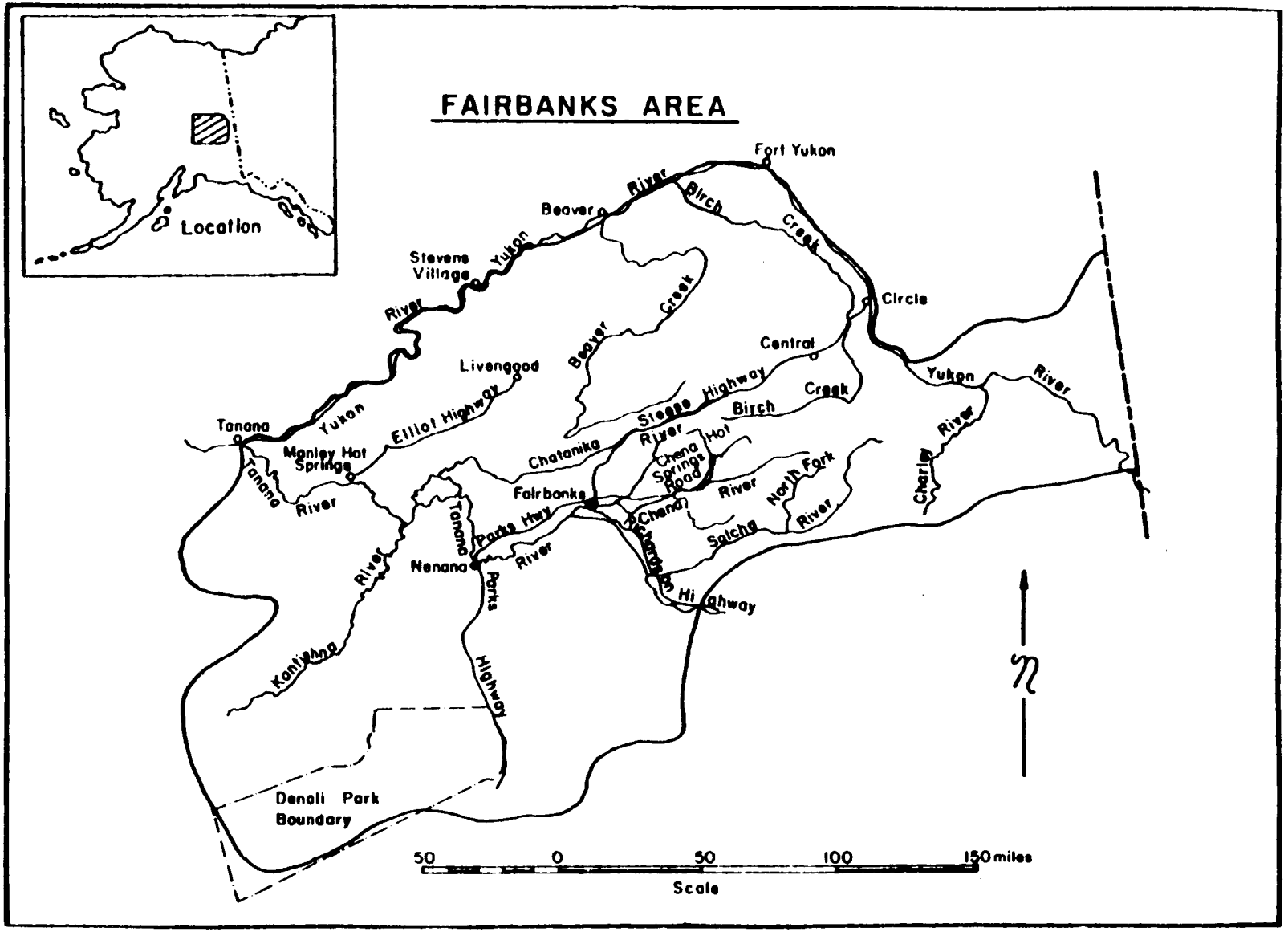

Figure 1. Fairbanks Management Area

Creel-census studies are conducted on all high-use fisheries in the area, 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.

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. Table 1 contains scientific and common names and abbreviations of all fish mentioned in this report.

Fisheries are currently maintained in more than 40 lakes and ponds in the Management Area by stocking rainbow trout, coho salmon, grayling and sheefish. Most of the 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

Research

1. Data should be collected on unsurveyed waters of interior Alaska.

2. The life-history study of the burbot population in the Tanana River near Fairbanks should be continued.

3. Efforts should be made to design a sampling method to be used on popular sport fishing waters in remote areas as an annual index of the population structure.

Management

1. Evaluation of the stocking practices of rainbow trout, coho salmon, grayling and sheefish in Fairbanks area waters should continue.

2. Creel-census efforts on the Chatanika River during the whitefish spear season and on the Chena Lakes rainbow trout and coho salmon should be continued.

OBJECTIVES

1. To evaluate stocking policies for rainbow trout, coho salmon and Arctic grayling in area lakes, and to formulate stocking recommendations for optimum survival.

2. To obtain estimates of angler effort, harvest and make-up of the catch during the whitefish spear season, and to enumerate the whitefish/sheefish spawning migration in the Chatanika River.

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

Common name	Scientific name	Abbreviation
Arctic lamprey	*Lampetra japonica* (Martens)	AL
Arctic grayling	*Thymallus arcticus* (Pallas)	GR
Bering cisco	*Coregonus laurettae* Bean	BCI
Broad whitefish	*Coregonus nasus* (Pallas)	BWF
Burbot	*Lota lota* (Linnaeus)	BB
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
Northern pike	*Esox lucius* Linnaeus	NP
Rainbow trout	*Salmo gairdneri* Richardson	RT
Round whitefish	*Prosopium cylindraceum* (Pallas)	RWF

3. To assess the population status (size and age composition), distribution and habitat utilization of the burbot population of the lower Chena and Tanana Rivers.

4. To continue surveys of the lower Tanana and middle Yukon River waters.

5. Assess the performance of stocked rainbow trout and coho salmon in Chena Lakes, and to monitor the harvest, catch per unit effort and make-up of the catch in this area.

TECHNIQUES USED

A float-equipped Cessna 185 aircraft was used to transport field crews and equipment to remote lakes within the study area. Physiographic data, as well as latitude and longitude, were calculated from U.S. Geological Survey 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 disk was used to determine water clarity. 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.

Multifilament and monofilament graduated-mesh sinking or floating gill nets, measuring 125ft x 6 ft and consisting of five 25-ft panels of 0.5-in through 2.5-in bar mesh, were used to capture fish. 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. 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.

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

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 30 g and had a projected battery life of 6 months. The frequencies of the transmitters ranged from 150.000 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. Burbot greater than 300 mm in length were tagged using numbered Floy internal anchor tags inserted into the dorsal musculature.

A creel census was conducted on Chena Lake. Total angler hours were estimated using counts of fisherman at 7 p.m. on four randomly selected

weekdays per month and at 2 p.m. on two randomly selected weekend days per month (Holmes, 1981). Interviews were made with anglers contacted during the creel survey.

Whitefish were captured using a boat-mounted electrofishing unit described by Van Hulle (1968) and Roguski and Winslow (1969) during the population estimates.

FINDINGS

Fish Stocking Evaluations and Stocking Summary

Fish-population sampling was conducted on 16 waters in the Fairbanks Management Area during 1984 field season. Thirteen of the waters are small gravel pits which the Department of Transportation has abandoned and the Sport Fish Division has stocked with grayling. There are seven gravel pits located along the Steese Highway and six along the Richardson Highway. The test netting results and the stocking histories are summarized in Table 2. Grayling are stocked into these gravel pits almost immediately after hatching. Because the fish are small, the actual number stocked in a water body is often suspect. Their small size also makes them extremely vulnerable to predation by everything from birds and aquatic invertebrates to larger grayling. Because of the uncertainty of the actual number being stocked and the unknown, but suspected, high mortality just after stocking, only test netting results and growth rates are reported. No attempt to address survival rates of the individual year-classes was made.

Grayling fry stocked in all seven gravel pits along the Steese Highway in 1983 exhibited some survival to Age I. While some showed a little better growth rate to Age I than others, the fork length range of all Age-I grayling captured was 125-155 mm, (mean fork length, 141 mm). This represents faster growth than Age-I grayling sampled in the Chena River in 1983, which had a mean fork length of 114 mm (Holmes, 1984). The test netting revealed the presence of Age-III grayling in six of the seven gravel pits. They ranged in length from 220 mm to 270 mm (mean, 278 mm). These fish would have been the result of a 1981 stocking; however, no grayling were stocked that year. Thus, their presence is the result either of natural reproduction or, possibly, flooding from the nearby Chatanika River. Water was so high in June 1981 that the Corps of Engineers had to operate the flood-control structure on the Chena River to protect downstream residents. However, it is not known if the Chatanika River flooded and inundated these pits. These fish could also be the result of successful spawning of grayling stocked in 1978. Only three gravel pits contained Age-VI grayling. These fish were the result of the 1978 stocking and ranged from 265 mm to 325 mm fork length (mean for length, 287 mm).

Johnson Road Pits #1 and #2, Bathing Beauty Pond and 31 Mile Pit showed similar results: fry survival to Age I occurred in all four waters. However, in two small ponds on Eielson Air Force Base, (Hidden Lake and Grayling Lake) which were previously stocked with grayling, only lake chubs and northern pike were captured, with no sign of grayling. The

Table 2. Population characteristics of stocked lakes determined by graduated-mesh gill nets, Fairbanks Management Area, 1984. Abbreviations for species are listed in Table 1. NA = Not Applicable.

Lake	Date sampled	Species	No. captured	Age-class	Length (mm) Range	Length (mm) Mean	Date stocked	Number stocked	No./pound	No./acre
29.6 Mi Steese Hwy	5/30	GR	26	I	127-144	134	6/03/83	15,000	Sac fry	NA
	5/30	GR	13	III	222-270	249				
	5/30	GR	2	VI	265-285	275	6/12/78	10,000	Sac fry	NA
30.6 Mi Steese Hwy	5/30	GR	4	I	141-152	145	6/03/83	15,000	Sac fry	NA
	5/30	GR	1	III	220	220				
	5/30	GR	2	VI	220-280	275	6/12/78	12,500	Sac fry	NA
31.6 Mi Steese Hwy	5/30	GR	7	I	125-143	134	6/03/83	15,000	Sac fry	NA
	5/30	GR	3	III	240-265	251	...*	...	...	...
33.5 Mi Steese Hwy	5/30	GR	4	I	131-146	139	6/03/83	15,000	Sac fry	NA
	5/30	GR	2	VI	291-325	308	6/12/78	10,000	Sac fry	NA
34.6 Mi Steese Hwy	5/30	GR	2	I	146-155	150	6/03/83	15,000	Sac fry	NA
	5/30	GR	1	III		260	...*	...	Sac fry	NA
35.8 Mi Steese Hwy	5/30	GR	6	I	127-144	139	6/03/83	15,000	Sac fry	NA
	5/30	GR	3	III	240-265	251	...*	...	...	...
36.6 Mi Steese Hwy	5/30	GR	3	I	142-152	147	6/03/83	15,000	Sac fry	NA
	5/30	GR	4	III	255-263	259	...*	...	...	...
Johnson Road #1	6/13	GR	6	I	154-164	158	6/02/83	15,000	Sac fry	NA
Johnson Road #2	6/13	GR	3	I	147-153	150	6/02/83	15,000	Sac fry	NA
	6/13	GR	2	VI	291-325	308	6/12/78	12,500	Sac fry	NA

Table 2. (Cont.) Population characteristics of stocked lakes determined by graduated-mesh gill nets, Fairbanks Management Area, 1984. Abbreviations for species are listed in Table 1. NA = Not Applicable.

Lake	Date sampled	Species	No. captured	Age-class	Length (mm) Range	Length (mm) Mean	Date stocked	Number stocked	No./ pound	No./ acre
31 Mi Pit	6/13	GR	5	I	143-151	147	6/02/83	15,000	Sac fry	NA
Bathing Beauty Pond	6/13	GR	4	I	142-154	146	6/02/83	15,000	Sac fry	NA
	6/13	GR	4	II	220-250	237	Possibly natural reproduction			
28 Mile Pit	6/14	SS	9	II	152-195	178	6/17/82	2,000	302/lb	
Dune Lake	8/08	GR	10	0	90-110	102	6/14/84	50,000	Sac fry	NA
	8/08	GR	37	I	210-250	228	6/02/83	50,000	Sac fry	NA
	8/08	GR	5	III	335-355	345	6/11/81	50,300	Sac fry	NA
	8/08	GR	15	VIII	335-400	370	6/28/76	75,000	Sac fry	NA
Geskakmina Lake	8/08	SS	7	IV	310-490	368	5/27/80	19,000	292/lb	78
Chena Lake	8/30	RT	12	0	73-93	83	7/25/84	47,500	262/lb	180
	8/30	RT	12	I	139-192	170	9/14/83	30,700	270/lb	118
	8/30	RT	3	II	219-231	228	5/22/84	18,700	18/lb	72
	8/30	SS	6	II	192-220	207	6/17/82	21,200	252/lb	81
Moose Lake	6/14	SS	10	II	210-251	225	6/17/84	5,500	252/lb	239

* Presence of fish due to either natural reproduction or possible flooding of nearby Chatanika River.

presence of chubs and pike here may be the result of flooding from the nearby Tanana River or anglers introducing these fish into the lakes. The growth of Age-I grayling in the Richardson Highway pits was similar to that of grayling in Pits along the Steese Highway. They ranged in length from 142 mm to 164 mm (mean fork length, 149 mm).

The only other water in the Fairbanks area stocked with grayling fry is Dune Lake, located approximately 25 mi southwest of Nenana. The lake is accessible only by float- or ski-equipped aircraft, and it has been stocked four times, in 1976, 1981, 1983 and 1984. As Table 2 points out, good survival and excellent growth have occurred in all four year-classes. This can be attributed to Dune Lake's abundant nutrients, absence of competitive fish species, and its remoteness, which accounts for light fishing pressure.

Moose Lake and 28 Mile Pit are located on Eielson Air Force Base and were last stocked with coho salmon in 1982. The mean fork length of Age-II cohos stocked here was 178 mm in Moose Lake and 225 mm in 28 Mile Pit. Coho salmon stocked into Geskakmina Lake in 1980 reached a mean fork length of 368 mm at Age IV, their terminal year. This lake has been restocked with rainbow trout.

Sampling results from Chena Lake in late August revealed good growth of fish stocked into this man-made lake since 1982. Age-II coho salmon averaged 207 mm fork length, which is similar to the 219 mm fork length of Age-II cohos stocked in Little Harding Lake (Doxey$_a$, in press). The Age-I rainbow trout in Chena Lake averaged 170 mm fork length. Birch Lake rainbows stocked at the same time ranged from 127 mm to 216 mm and averaged 180 mm fork length (Doxey$_b$, in press).

Lake Stocking Summary

Forty-four waters in the Fairbanks area were stocked in 1984 (Table 3). More than 351,000 rainbow trout were stocked in six area lakes. Slate Lake, a walk-in lake near the Parks Highway at Healy, received an experimental stocking of 2,300 rainbow trout. Dune Lake, a fly-in lake in the Kantishna River drainage which in the past has been stocked with grayling, received a stocking of 2,500 fingerling rainbow trout.

A total of 102,000 coho salmon were stocked in six Fairbanks area lakes, and 365,000 grayling fry were stocked in 24 roadside waters and one fly-in lake.

Harding Lake received a stocking of 211,641 sheefish fingerlings. Six smaller lakes were also stocked with sheefish.

Chatanika River Whitefish Study

A 1-mi section of the Chatanika River below the Elliot Highway bridge was selected as an index area in which we attempted to conduct a Petersen population estimate on least cisco and humpback whitefish, using an electrofishing boat as the capture tool. The river was turbid because of placer mining upstream, and visibility was limited to less than 2 ft (Secchi-disk reading, 20 in). Whitefish captured were

Table 3. Lake stocking summary, Fairbanks Management Area, 1984. Abbreviations for species are listed in Table 1.

Lake	Location	Date	Species	Size	Number
Birch Lake	Richardson Highway	7/25	RT	262/lb	263,498
		8/27	RT	165/lb	6,465
Chena Lake	Flood-control project site	5/22-5/23	RT	20/lb	18,579
Koole Lake	Remote fly-in lake	8/27	RT	165/lb	47,529
Geskakmina Lake	Remote fly-in lake	8/21	RT	200/lb	10,700
Dune Lake	Remote fly-in lake	8/21	RT	200/lb	2,500
Slate Lake	Parks Highway near Healy	8/15	RT	200/lb	2,300
Birch Lake	Richardson Highway	5/24	SS	120/lb	50,000
Chena Lake	Flood-control project	5/25	SS	120/lb	30,000
Moose Lake	Eielson Air Force Base	5/25	SS	120/lb	5,000
Lost Lake	Richardson Highway	5/24	SS	120/lb	5,000
Little Harding L.	Richardson Highway	5/25	SS	120/lb	10,000
28 Mile Pit	28 Mi Richardson Highway	5/25	SS	120/lb	2,000
Walden Pond	Chena Hot Springs Road	6/07	GR	Fry	20,000
30 Mi Pit	Chena Hot Springs Road	6/07	GR	Fry	10,000
30.9 Mi Pit	Chena Hot Springs Road	6/07	GR	Fry	10,000
32.9 Mi Pit	Chena Hot Springs Road	6/07	GR	Fry	15,000
33.3 Mi Pit	Chena Hot Springs Road	6/07	GR	Fry	5,000
38.8 Mi Pit	Chena Hot Springs Road	6/07	GR	Fry	10,000
42.8 Mi Pit	Chena Hot Springs Road	6/07	GR	Fry	10,000
45.5 Mi Pit	Chena Hot Springs Road	6/07	GR	Fry	10,000
45.6 Mi Pit	Chena Hot Springs Road	6/07	GR	Fry	5,000
47.9 Mi Pit	Chena Hot Springs Road	6/07	GR	Fry	10,000

Table 3. (Cont.) Lake stocking summary, Fairbanks Management Area, 1984.

Lake	Location	Date	Species	Size	Number
29.6 Mi	Steese Highway	6/07	GR	Fry	15,000
30.6 Mi	Steese Highway	6/07	GR	Fry	15,000
31.6 Mi	Steese Highway	6/07	GR	Fry	15,000
33.0 Mi	Steese Highway	6/07	GR	Fry	15,000
33.5 Mi	Steese Highway	6/07	GR	Fry	15,000
34.6 Mi	Steese Highway	6/07	GR	Fry	15,000
35.8 Mi	Steese Highway	6/07	GR	Fry	15,000
36.6 Mi	Steese Highway	6/07	GR	Fry	15,000
Bathing Beauty Pond	Richardson Highway	6/08	GR	Fry	15,000
Hidden Lake	Eielson Air Force Base	6/08	GR	Fry	15,000
Grayling Lake	Eielson Air Force Base	6/08	GR	Fry	15,000
31 Mi Pit	Richardson Highway	6/08	GR	Fry	15,000
Johnson Road #1	Richardson Highway	6/08	GR	Fry	15,000
Johnson Road #2	Richardson Highway	6/08	GR	Fry	15,000
Dune Lake	Remote Fly-in Lake	6/08	GR	Fry	50,000
Harding Lake	Richardson Highway	6/08	SF	Fingerlings	211,641
Lost Lake	Richardson Highway	6/07	SF	Fingerlings	5,000
Silver Fox Pit	Richardson Highway	6/07	SF	Fingerlings	200
Weigh Station Pond #1	Richardson Highway	6/07	SF	Fingerlings	400
Weigh Station Pond #2	Richardson Highway	6/07	SF	Fingerlings	400
Grayling Lake	Eielson Air Force Base	8/13	SF	14/lb	500
Earthmover Pit	Clear Air Force Base	8/13	SF	14/lb	200

finclipped and then put into a holding pen and allowed to completely recover before being released back into the river. During the initial marking run, 118 ciscos and 8 humpback whitefish were captured and marked. On the second (recapture) run, 131 ciscos were caught, 2 of which were marked. No humpback whitefish were caught. The Petersen estimate was calculated at 7,729 ciscos. Because of the low recapture rate and wide confidence intervals, this estimate should be approached with caution.

The electrofishing unit performed well in capturing whitefish; however, the fish either left the area immediately or avoided the shocker boat during the second run. Efforts will be made to improve these estimates and obtain a more reliable number.

A creel survey of the whitefish spear season on the Chatanika River began on September 11 and continued until October 11, 1984. During this 31-day period, 131 fishermen were interviewed. They had spent 194 hours spearing and harvested 437 whitefish for a catch per unit effort (CPUE) of 2.2 fish per hour. An expanded effort of 2,548 total hours with a CPUE of 2.2 fish per hour and a harvest of 5,758 whitefish is obtained when these data are expanded to include the total number of fishing periods during the time the survey was conducted and multiplied by the mean number of fishermen per period. This level of harvest approximates a 7-year (1977-1983) average harvest of 4,765 whitefish (Mills, 1984). Harvest during this period ranged from a low of 1,635 fish in 1977 to a high of 6,640 fish in 1982. Also obtained from the interviews was the catch composition by species. The 1984 creel survey revealed that the harvest on the Chatanika River was 83% least ciscos, 16% humpback whitefish and 1% round whitefish. Data on the catch composition and CPUE since 1972 are summarized in Table 4. The mean size of the least ciscos taken during the spear season was 341 mm (range, 285-386 mm). Humpback whitefish ranged from 370 mm to 485 mm, (mean, 424 mm).

During the 1984 spear season, water was not as turbid as in 1983 when spear fishing was virtually impossible for more than 60% of the season. However, conditions were far from ideal in 1984 because the fisherman were able to see only 1-2 ft into the water for most of the season, and not until October 6 did the Chatanika finally become clear. The season ended about October 11, when most of the whitefish had completed spawning and were returning downriver. Cold weather and ice formation on the river also brought the fishery to a close.

Burbot Population Study

A life-history investigation of burbot in the lower Chena and Tanana Rivers was initiated in 1983 (Hallberg, 1984). During that field season, 100 burbot were captured, measured, weighed, tagged and released. The age and length composition of a sample of 87 burbot taken from the area were reported on.

From September 1983 to November 1984, 11 tags were recovered. These burbot had been captured by anglers and were from the 100 burbot tagged in 1983. Two of the 11 fish were caught near the mouth of Moose Creek, 30 mi upstream from the mouth of the Chena River, where one fish was

Table 4. Chatanika River whitefish spear-fishery catch composition by species as a percentage of total catch and overall Catch per Unit Effort* in fish per hour, 1972-1984.

Year	Catch Composition			Overall CPUE*
	HWF (%)	LCI (%)	RWF (%)	
1972	28	62	10	2.32
1973	18	72	10	2.24
1974	24	66	10	1.82
1975	...	...	...	...
1976	72	19	9	1.80
1977	49	42	9	2.37
1978	58	36	6	5.70
1979	15	83	2	2.40
1980	31	64	5	1.50
1981	...	...	...	...
1982	...	...	...	...
1983	8	88	4	1.94
1984	16	83	1	2.26

* CPUE = catch per unit effort = catch per hour.

tagged, and 38 mi above Rosie Creek, where the other fish was tagged. One fish was caught 132 days after it was tagged, and the other was captured 204 days after tagging. The other nine tagged burbot were recaptured from 15 months to 22 days after they were tagged, and all nine were caught within 3 mi of where they had been tagged. All of these fish had been tagged in the Tanana River from about 5 mi upstream to 15 mi downstream of the mouth of the Chena River, an area of heavy burbot fishing pressure.

Based on the recovery information of the fish tagged in 1983, the data suggest that most of the burbot found near the mouth of the Chena River remain in this area. Only 2 of the 11 recaptured fish exhibited extensive movements, while the other nine burbot were captured during the year near the area where they were tagged.

In 1984 the burbot tagging continued; however, most of the burbot (n = 61) were caught, tagged and released about 25-30 mi below the mouth of the Chena River. Another 36 burbot were tagged between 5 mi above the mouth of the Chena River and Moose Creek (30 mi upstream). Both of these locations are outside the area of heavy fishing, and tag recoveries should provide us information about burbot movements in this area. To date we have had only one tag return: a fish that was tagged 25 mi below the mouth of the Chena River on September 25, 1984 and caught 41 days later at the mouth of the Chena River.

The preliminary results of a radio-tagging study to monitor burbot movements through the winter were reported in Hallberg (1984). Four burbot were fitted with surgically implanted radio transmitters in September and October of 1983. By following these fish through the winter months, we had hoped to learn more about their seasonal movements and, because all four fish were considered to be mature, we hoped to identify their spawning locations. Table 5 provides data on the length and weight of the tagged burbot, along with the date and location of tagging and a short synopsis of the fate of the tagged fish.

Tags #1 and 2 began transmitting poor or weak signals by early February, and both had stopped transmitting by the end of that month. Tags #3 and 4 were still functioning on March 7. Both fish were in the Tanana River, and both had exhibited strong upstream movements. No further attempts were made to locate these individuals.

Only one individual, Tag #1, moved into the Chena River, in early October. The other three fish were still in the Tanana River when their transmitters failed or when the fish were last located. Chen (1969) stated he had found sexually mature, ripe burbot in late January and spent females on February 23 near the mouth of the Chena River. He summarized that burbot spawning takes place around February. He also stated that "it is not known whether the burbot spawn in the main Yukon and Tanana Rivers." While the data collected on the radio-tagged burbot are inconclusive, they do suggest that there may be some spawning occurring in the main Tanana River.

Again in 1984, four burbot were radio tagged, three of which were tagged about 30 mi below the mouth of the Chena River and the fourth about 25

Table 5. Tagging date and location and fork length and weight of four radio-tagged burbot in the Tanana River near Fairbanks, 1983-1984.

Tag #	Date tagged	Location tagged	Length (mm)	Weight (kg)	Movement
1	9/22/83	1 mi above mouth of Chena River	750	2.96	Moved 6 mi up the Chena River from mouth by Oct. 4, remained in this area to Feb. 16, when signal became weak. On Feb. 28 tag stopped transmitting.
2	9/22/83	1 mi above mouth of Chena River	780	2,90	By Dec. 5, had moved downstream 18 mi below mouth of Chena River. Ramained here (only short random movements) until Feb. 16, when signal was getting weak. By Feb. 28, tag stopped transmitting.
3	10/4/83	12 mi below mouth of Chena River	585	1.02	Began random up and downstream movements until Dec. 5, when fish moved upstream 7 mi. Then moved another 5 mi upstream by the mouth of the Chena River, and tag was last heard on March 7 in in the same area.
4	10/5/83	12 mi below mouth of Chena River	992	6.69	By Nov. 7, fish had moved 17 mi downstream; by Dec. 5, had moved back upstream 12 mi. Feb. 2, moved another 2 mi upstream, then another 1 mi upstream on March 1. Tag last heard on March 7 about 2 mi above mouth of Chena River.

mi upstream of the Chena. This time, the tags had a slower pulse rate, which is expected to increase the life of the tag. These fish and their movements are being monitored, and the results will be reported next year.

Age and Growth

During the 1983 field season, attempts to capture burbot in side channels and sloughs of the Tanana River began in mid-June and continued in July and August. The method of capture was baited fyke trap. Only 36 burbot were captured and tagged during this period. However, on four net nights between September 22 and October 6, a total of 64 burbot were sampled. It was speculated that, as backwater sloughs and side channels of the Tanana River begin to freeze, the fish which occupy these areas during the summer move into the Tanana River and become more concentrated. Based on this, our trapping efforts in 1984 did not begin until September.

As was previously stated, our netting in the Tanana River in 1984 occurred above and below the area of heavy fishing pressure (where the 1983 tagging occurred). This may be the reason why the average size of burbot in the 1984 sample was considerably larger than that in the 1983 sample. The mean fork length in 1984 was 650 mm (25.5 in) and the mean weight was 1.93 kg (4.2 lb), while in 1983 the burbot averaged 530 mm (21 in) and 1.27 kg (2.8 lb).

The age and length composition of 115 burbot sampled in the Tanana River during the 1983 and 1984 field seasons appears in Table 6. Age-classes III through VII accounted for 69% the total sample. The largest burbot in the sample was a 1,117-mm female that weighed 8.96 kg. Chen (1969) found that burbot mature at Age VI or VII, when the fish reach a length of 40 to 50 cm. In the 1984 sample, a few Age-III fish were found to be mature, while most Age-IV and all Age-V burbot were sexually mature. The 1984 sample of burbot appeared to be maturing at a younger age than those in Chen's 1969 sample; however, the length at maturity had not changed and remained between 40 and 50 cm. The maximum age in the 1984 sample was 18 years, while in 1969 it was 24.

Lake and Stream Surveys

Surveys were conducted on four previously unsurveyed lakes in the Kantishna River drainage in 1984. The following are the results of those surveys.

Lake 84-1:

This lake is located 40 mi west of Nenana, or about 5 mi northwest of the Toklat/Kantishna River confluence, at lat. 64°32'N, long. 150°20'W. The lake is approximately 108 acres in size and has a maximum depth of 25 ft. It is more than a mile long, but only a few hundred yards wide in its widest area. There are no inlets or outlets. The shoreline is mostly covered with dense stands of mature spruce, with some willow in the lower areas and some birch along the hillside. The water clarity here is similar to that found in many lakes in the Kantishna drainage:

Table 6. Age and length composition of 115 burbot sampled from the Tanana River near Fairbanks, 1983–1984.

Fork length (mm)	Age																		n	Length frequency %
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII		
100–149	1	2																	3	2.6
150–199		1																	1	0.8
200–249																				
250–299			1	2															3	2.6
300–349			7	1	1														9	7.8
350–399			5	2															7	6.1
400–449			1	8	2														11	9.5
450–499			1	2	7	1													11	9.5
500–549				1	5	7	1												14	12.7
550–599				1	3	1	5	1											11	9.5
600–649						3	5	3											11	9.5
650–699						2	1	1	2										6	5.3
700–749							1	3	3	1		1							9	7.8
750–799							2		1		1								4	3.5
800–849										2									2	1.7
850–899									2	2	2								6	5.2
900–949												2							2	1.7
950–999													1		1				2	1.7
1000–1049																1		1	2	1.7
1050–1099																		1	1	0.8
1100–1149																				
n	1	3	15	17	18	14	15	8	8	5	3	3	1		1	1		2	115	
Mean fork length (mm)	103	138	349	412	490	569	634	658	756	824	835	861	952		958	1070		1098		
Age Frequency (%)	0.8	2.6	13.0	14.8	15.7	12.7	13.0	6.9	6.9	4.3	2.6	2.6	0.8		0.8	0.8		1.7		100

it has a dark stained color. Bottom composition is silt and sand. Aquatic vegetation was common along the nearshore areas. Water chemistry collected here on August 8 included: pH, 6.5; acidity, 154 ppm; hardness, 52 ppm; and alkalinity, 52 ppm. Water temperature was 64°F. A late winter (April 12, 1984) dissolved oxygen (DO) sample was collected, and the DO ranged from 2.4 ppm at 20 ft to 9.8 ppm just under the ice.

The lake was test netted on August 8, 1984 when a 125-ft graduated-mesh gill net was fished for 24 hours. No fish were captured in the net, and none were observed during a short survey by foot along the northeast end of the lake.

Because the body of water has excellent winter oxygen, is barren of fish and is landlocked, it is a prime candidate for future stocking consideration.

Lake 84-2:

This lake is located 37 mi west of Nenana or about 10 mi north of the confluence of the Toklak and Kantishna Rivers at lat. 64°35'N, long. 150°17'W. The lake is triangular and is more than a half mile long on its north-south axis and slightly less than a half mile wide on its east-west axis. The north end of the lake has a 25 ft-high ridge that is covered mostly with a dense stand of mature birch. The remainder of the shoreline slopes away from this ridge into flat muskeg covered with black spruce. Surface elevation of the lake is 525 ft above sea level. The lake has a maximum depth of 40 ft and an area of 106 acres. It has no inlets or outlets. The remains of an old cabin are on the north shore. No Secchi disk reading was collected during the survey; however, this lake appeared to be lighter in color than many of the lakes in the area. The bottom is composed mostly of soft or sandy material. There is aquatic vegetation around the entire shoreline, with considerably more in the northeast corner. Water chemistry on August 8 was: pH, 7.0; acidity, 120 ppm; hardness, 188 ppm; alkalinity, 52 ppm. Water temperature was 65°F. A DO sample collected here on April 4, 1984 was 0.6 ppm at 40 ft, 7.5 ppm at 20 ft and 11.8 ppm at 5 ft. The lake was test netted on August 8 and no fish were caught in a 24-hour set using a 125-ft graduated-mesh gill net.

With the good winter oxygen levels and no existing fish populations, this landlocked lake can be considered for future stocking.

Lake 84-3:

At a surface elevation of 797 ft, this lake is located about 57 mi west of Nenana or about 9 mi northwest of West Twin Lake at lat. 64°32'N, long. 150°02'W. This lake is about 110 acres in size and is three-fourth mile long and one-half mile wide. A transect across the length of the lake had a maximum depth of 25 ft. The east and west shoreline have a ridge of low hills measured with a fatho-meter, while the shoreline along the south end of the lake is rather flat and has a tiny inlet draining the surrounding area. The north end of the lake has an outlet containing many beaver dams which restrict the flow. However,

further downstream, flow increases, and creates a small tributary that eventually drains into the Zitziana River. The surrounding watershed area is covered with mature stands of black spruce. Aquatic vegetation is limited to the nearshore area around the entire lake. Bottom materials are mostly soft mud or sand. Water color is extremely dark stained, with a Secchi disk reading of 3.5 ft. The remains of what appears to be an old hunting camp are located on the north end of the lake near the outlet. Water chemistry collected here during our survey on August 8 was as follows: pH, 6.5; acidity, 103 ppm; hardness, 34 ppm; alkalinity, 17 ppm. Water temperature was 60°F. No winter DO data are available. Test netting on this lake with a 125-ft graduated-mesh gill net set for 24 hours produced four northern pike. These fish ranged from 225 mm to 494 mm (mean, 353 mm) in fork length and from 85 g to 530 g (mean, 240 g) in weight. Except for the remains of a small northern pike in the stomach of one of the fish, all stomachs were empty.

Lake 84-4:

This lake is located about 56 mi west of Nenana or 4.5 mi west of West Twin Lake at lat. 64°26'N, long. 151°00'W. This lake is surrounded by hills and has an inlet on the south end connecting it with a smaller lake. On the north end, there is an outlet that drains into the Zitziana River. The hilly shoreline is covered with a stand of mature black spruce. A transect across the lake using a fathometer revealed a maximum depth of 28 ft. The lake has an estimated 125 surface acres and a surface elevation of 827 ft above sea level. The water here is dark-tea colored, and a Secchi disk was visible to a depth of 4 ft. The lake has a weedy littoral zone extending about 30 ft from shore and continuing around the entire shoreline. Bottom composition is mostly soft mud or sand. Water chemistry collected on this lake yielded the following: pH, 8.0, acidity, 120 ppm, hardness, 18 ppm, alkalinity, 69 ppm. Water temperature was 60°F. No winter DO data are available. Two small northern pike were collected in one night's netting with a 125-ft graduated-mesh gill net. These pike measured 315 mm and 335 mm fork length and weighed 185 g and 225 g, respectively. The general appearance of these two fish was poor; their bodies were long and slender with very little girth. Stomachs of both fish were empty. The absence of forage species of fish in the lake may account for the poor condition of these pike.

Yukon River Tributary Surveys

The Fairbanks Sport Fish Division receives numerous phone calls from fishermen concerning angling predictions for pike and sheefish in Yukon River tributaries near the Yukon River bridge. Although these rivers are becoming increasingly popular among interior Alaskan anglers, very little recent information on the fish populations is available. Therefore, efforts were made to survey and test net the mouths of all major Yukon River tributaries from the Yukon River bridge upstream to Beaver Creek.

At the mouth of the Dall River, Old Lost Creek, and the Hodzana River (24 mi, 55 mi, and 91 mi, respectively, upstream from the Yukon River

bridge) a 125-ft graduated-mesh gill net was set, and the streams were intensively sampled with hook and line. Burbot set lines were fished at the Dall River and Hodzana River. Sampling with hook and line was also conducted at the mouths of the Little Dall River, Alfred Creek and Nolitna Creek (16 mi, 50 mi, and 77 mi, respectively, upstream). No sampling was done at the mouth of Beaver Creek (97 mi upstream) because of high and muddy water. Test netting and angling results appear in Table 7.

The rivers we visited can be separated into two categories. Beaver Creek and the Hodzana River are large rivers that drain extensive watersheds, similar to the Chena and Salcha Rivers. The Little Dall River, Dall River, Alfred Creek, Nolitna Creek, and Old Lost Creek are slow moving, darkly stained rivers that have smaller drainage basins and are similar to Goldstream Creek in the Minto Flats area.

With the exception of Nolitna Creek and the Hodzana River, hook-and-line sampling was not very successful. This can probably be attributed to the unusually high water conditions: all tributaries surveyed were 2-3 ft above flood stage.

One overnight gill-net that was set a half mile above the mouth of Old Lost Creek produced three humpback whitefish one broad whitefish and one northern pike. All of the whitefish were mature males. A subsistence fisherman's gill net was found set at the confluence of Old Lost Creek and the Yukon River. The net contained four large northern pike and numerous large humpback and broad whitefish.

At the Hodzana River, a gill net set overnight captured 9 least cisco, 9 sheefish, 4 northern pike, and 2 adult longnose suckers. All but one of the sheefish were large; developing females ranged from 548 to 757 mm fork length. Northern pike and sheefish were feeding on Arctic lamprey and immature least cisco. No fish were caught with a two-hook set line fished at the mouth.

The Dall River is by far the most popular stream of those that we sampled. Its location in relation to the Yukon River bridge (24 mi upstream) and its reputation as an excellent northern pike water account for this popularity. However, our test netting and hook-and-line sampling failed to show good numbers of pike. Extremely high water conditions are partially to blame for this. We observed three parties (nine anglers) here during our survey. One party had indicated that they fish at the Dall River often and this was the highest and the dirtiest they had ever seen the water. Only three northern pike were reported caught by the three parties interviewed.

Good fishing potential for northern pike and sheefish exists in the lower 3 mi of the Hodzana River. However, a location 91 mi above the Yukon River bridge makes it too far for most anglers to travel.

Old Lost Creek has a reputation of providing good pike fishing at its mouth. A subsistence net set that was set at the mouth of old Lost Creek may be the reason our net set a half mile upstream caught only five fish. Water conditions may also have affected the results.

Table 7. Sampling results (test netting and hook and line) of six tributary streams of the Yukon River between the Yukon Bridge and the Hodzana River, 1984. Abbreviations for species are listed in Table 1.

Location	Date	Net nights	Species captured								
			HWF	LCI	BC	BWF	SF	BB	NP	LNS	LC
Dall River	6/18-6/22	2	11	10	1		1	3	(1)*	4	1
Old Lost Creek	6/20	1	3	...	...	1	...	...	1(1)	...	...
Hodzana River	6/21	1	...	9	...		9	...	4(14)	2(2)	...
Nolitna Creek	6/22	Angling	...	...	...	...	...	...	(14)		...
Little Dall R.	6/18	Angling	...	...	...	...	...	...	...	...	...
Alfred Creek	6/20	Angling	...	...	...	...	...	...	...	...	...

* Number of fish sampled on hook and line.

Nolitna Creek produced the best hook-and-line sampling success of all the river mouths visited. Fourteen northern pike ranging from 770 g (1.7 lb) to 6,120 g (13.5 lb) were caught in 2 hours of fishing.

Because of the remoteness of most of the rivers we sampled, sport fishing effort and harvest appear too light to have any effect on the populations of sport-fish species. However, we are requesting that the Dall River be added to the waters specifically listed in the sport-fish survey used in the Statewide Harvest Study by Mills to keep better apprised of trends in the pike fishery here.

Chena Lake Harvest Study and Stock Assessment

The Chena Lakes Recreation Area was officially opened to the public on May 26, 1984. The facility was built by the Army Corps of Engineers in conjunction with the Chena River flood-control project. Upon completion of the project, the 2,000-acre recreation area was turned over to the Fairbanks North Star Borough, Parks and Recreation Department, who assumed the responsibility of managing and maintaining the facility. Included within this area are 2 large campsites with 78 units, 92 picnic areas, 3 group shelters, 2 boat-launching areas, a swimming beach and various park concessions. Most of these facilities are located in and around either the Chena River or the 260-acre man-made Chena Lake.

Chena Lake was chemically rehabilitated in 1981 and then stocked with rainbow trout and coho salmon in 1982 and again with rainbow trout in 1983. Four days before the May 26 opening, it was stocked with 18,700 rainbow trout at 18 fish/lb. These fish were stocked in anticipation of heavy angling pressure. The opening weekend (Memorial Day) brought more than 6,300 people to the area. A creel census was initiated on this weekend and was continued until August 31. Results of the 98-day creel census appear in Table 8. During this period, a calculated 13,035 angler hours were expended to harvest 12,930 rainbow trout and 8,849 coho salmon, for a total combined harvest of 21,779. The mean CPUE for the summer was 1.67 fish/hour.

During the 36-day period from May 26 to June 30, more than 60% of the summer's total angler hours were spent harvesting nearly 65% of the total summer's catch. Extremely good weather conditions existed throughout this period, and this had a major effect on use levels. Holmes (1984) rated the weather from very good to very poor on days he conducted creel census on the upper Chena River. Over the summer, he found that the average number of fisherman counted on days with very good weather was more than five times greater than the number counted on days with very poor weather. July and August 1984 were wet, cloudy and cool. Twice during these two months rainfall in the Chena Valley was enough to cause the Corps of Engineers to close the flood control gates on the Chena River.

It is also believed that the novelty and the newness of the area, along with an "opening-day effect", brought considerable attention and people to the area.

Table 8. Creel-census results of the rainbow trout and coho salmon fishery on Chena Lake, May 26 to August 31, 1984.

Period	Angler hours			Harvest			Fish (RT and SS) caught per angler hour
	Weekdays	Weekends	Total	RT	SS	Total	
May 26-June 30	4,032	3,788	7,820	7,279	6,719	13,998	1.79
July 1-31	1,470	1,479	2,949	3,162	790	3,952	1.34
Aug. 1-31	1,058	1,208	2,266	2,489	1,340	3,829	1.69
Totals	6,560	6,475	13,035	12,930	8,849	21,779	1.67

As previously mentioned, just before the recreation area was opened, the lake was stocked with small, but catchable, rainbow trout which were very popular with local anglers and added to the high CPUE during this time. Because of this popularity and the fact that Chena Lake is still a fairly sterile lake, causing slow growth rates of stocked fish, the Sport Fish Division has requested that 30,000 catchable-size rainbow trout be annually stocked in Chena Lake until the lake eutrophies to the point where fingerling fish will grow at a rate adequate to provide sport fishing in a reasonable time.

The 8,849 coho salmon harvested in 1984 were the result of the 1982 stocking of coho fingerlings. These cohos reached an average size of 152 mm fork length at Age I, 174 mm at Age II (when the area was opened to the public May 1984) and 207 mm at the end of their second growing season, (August 1984). No coho salmon were available for stocking in Chena Lake in 1983; however, 30,000 cohos were stocked in 1984.

The class contributions of rainbow trout to the Chena Lake creel census in 1984 by age-class or year-class are confusing because multiple stockings at different sizes that have occurred there since 1982. However, test netting revealed that the rainbow trout stocked as fingerlings in 1983 were 131 mm fork length in June 1984 and, by September averaged 170 mm fork length. Rainbow trout measuring 236 mm fork length sampled in June 1984 were the result either of the 1982 stocking of unsubcatchable fish or the 1984 stocking of catchable fish. These fish were the size group that appeared in the creel census in 1984.

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