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Jay S. Hammond, Governor

Annual Performance Report for

POPULATION STRUCTURE, MIGRATORY PATTERNS AND HABITAT REQUIREMENTS OF THE ARCTIC GRAYLING

by

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RESEARCH PROJECT SEGMENT

State:	ALASKA	Name:	Sport Fish Investigations of Alaska
Project No.:	F-9-12		
Study No.:	R-I	Study Title:	DISTRIBUTION, ABUNDANCE AND NATURAL HISTORY OF THE ARCTIC GRAYLING IN THE TANANA DRAINAGE
Job No.:	R-I-A	Job Title:	Population Structure, Migratory Patterns and Habitat Requirements of the Arctic Grayling

Period Covered: July 1, 1979 to June 30, 1980

ABSTRACT

Survey data including physical, chemical, and biological features of four clearwater tributaries to the Tanana River are presented.

Arctic grayling, Thymallus arcticus (Pallas), utilize the Fivemile Clearwater River only during the summer months for feeding and rearing; no evidence of spawning was found.

A creel census on the upper Chena River showed that 12,744 total angler hours were expended to harvest 10,459 grayling for a catch rate of 0.82 grayling per hour. Grayling Age Classes III and IV represented over 60 percent of the creel sample.

Population estimates of Arctic grayling greater than 150 millimeters fork length, conducted in four sections of the lower 50 miles of the Chena River, showed an increase in only one area, while populations in other three areas remained fairly stable or declined.

The predominant age class of the sample was Age III, representing 45.5 percent of the total.

A status report on the construction of the Chena River Lakes Flood Control Project, now in its final stage, is presented.

BACKGROUND

The principal fish species of recreational importance in area streams is the Arctic grayling. Table 1 lists common and scientific names of all fish species mentioned in the report.

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

Common Name	Scientific Name and Author	Abbreviation
Arctic grayling	Thymallus arcticus (Walbaum)	GR
Burbot	Lota lota (Linnaeus)	BB
Coho salmon	Oncorhynchus kisutch (Walbaum)	SS
Humpback whitefish	Coregonus pidschian (Gmelin)	HWF
Least cisco	Coregonus sardinella Valenciennes	LCI
Longnose sucker	Catostomas catostomas (Forster)	LNS
Northern pike	Esox lucius Linnaeus	NP
Round whitefish	Prosopium cylindraceum (Pallas)	RWF
Sheefish	Stenodus leucichthys (Güldenstadt)	SF
Slimy sculpin	Cottus cognatus Richardson	SSC

While many clearwater tributaries of the Tanana River, originating from ground water seepage and spring action, are found between the Richardson Clearwater River and the Chena River, very little is known about them. Most of these streams flow out of the Tanana Flats and are located across the Tanana River from Fairbanks and the adjacent road systems, restricting access mainly to riverboats.

Clear, Bear, and McDonald Creeks, which drain into Salchaket Slough, a branch of the Tanana River approximately 10 mi southwest of Fairbanks, were surveyed along with Fivemile Clearwater River, also located across the Tanana River, southwest of Harding Lake. Nagata (1966) found sheefish in Clear Creek, the largest of the four streams surveyed, during the summer months. Clear Creek was again netted in August of 1977. Net catches included: sheefish, longnose sucker, humpback whitefish, round whitefish, least cisco, grayling, burbot, and northern pike. Bear and McDonald creeks have had no past survey work done on them, only reports from anglers indicating good grayling fishing in the summer months.

The Fivemile Clearwater River was surveyed by Bendock (1975). He reported that grayling, round whitefish, slimy sculpin and coho salmon fry inhabit the stream from late April through September and that coho salmon spawn in Fivemile Clearwater from October to December. With only a limited amount of data collected from these streams in the past and because they offer an excellent sport fishing potential to local residents it became necessary that more information be collected.

The Chena River is a rapid runoff stream originating in the Tanana Hills 90 mi east of Fairbanks at lat. 65°10'N, long. 144°45'W. It flows in a westerly direction for approximately 150 mi and drains an area of 1,980 mi^2 before emptying into the Tanana River 7 mi below the City of Fairbanks. The maximum measured flow of the Chena River occurred in the August, 1967 flood when a measured 74,400 cfs was recorded. Minimum flows of around 200 cfs have also been recorded.

The Chena Hot Springs Road, which parallels the Chena River from Mile 26 to its terminus at Mile 60, crosses the river seven times, providing easy access for fishermen and recreationists alike. It is this area of intense fishing pressure that the 1979 creel census was conducted. Also within this area the Alaska Department of Natural Resources, Division of Parks, has recently appropriated 250,000 acres to be used as a recreation area. The U.S. Army Corps of Engineers is presently constructing a flood control project on the Chena River at River Mile 47. The project is due to be completed in 1980 and is designed to channel flood waters from the upper Chena River directly into the Tanana River, bypassing the City of Fairbanks and the lower Chena, thus protecting both from damaging flood waters.

With the expected increased use of the Chena River due to the development of the recreation area and improved access, along with ongoing construction projects such as the flood control structure, it becomes important that we keep abreast of the numbers of Arctic grayling in the most heavily fished grayling stream in Alaska.

The river was divided into 17 sections (Fig. 1, Table 2); from these, four index sections were selected and population estimates were made to determine changes in the population structure. The Chena River sections referred to in this report are repeated for convenience.

Standard mark and recapture methods to estimate grayling numbers were initiated by Roguski and Winslow (1969), and continued by Roguski and Tack (1970), Tack (1971-1975) and Hallberg (1976-1979).

Information obtained during the population estimates also includes length frequencies, age and length composition, and annual survival rates, all of which aid in understanding grayling life history.

RECOMMENDATIONS

Research

It is recommended that:

1. Population estimates on index sections of the Chena River should be continued.

2. Investigations should continue on spring-fed streams and headwaters of major river systems in the Tanana drainage.

3. Investigations should be conducted on tributaries of the Chena River.

4. Creel census programs should be continued on the Chena River system with emphasis on obtaining statistically based catch data.

5. Grayling population structure in the upper Chena River should be investigated.

Management

Monitoring of development projects affecting the Chena River should be continued.

OBJECTIVES

1. To conduct surveys on clearwater streams tributary to the Tanana River between the Richardson Clearwater and the Chena Rivers.

2. To determine angler use and harvest of grayling in the upper Chena River adjacent to the Chena Hot Spring Road.

3. To determine Arctic grayling populations and age class structure in index sections of the Chena River.

4. To keep abreast of the development projects affecting the fish habitat of the Chena River and other tributaries of the Tanana drainage.

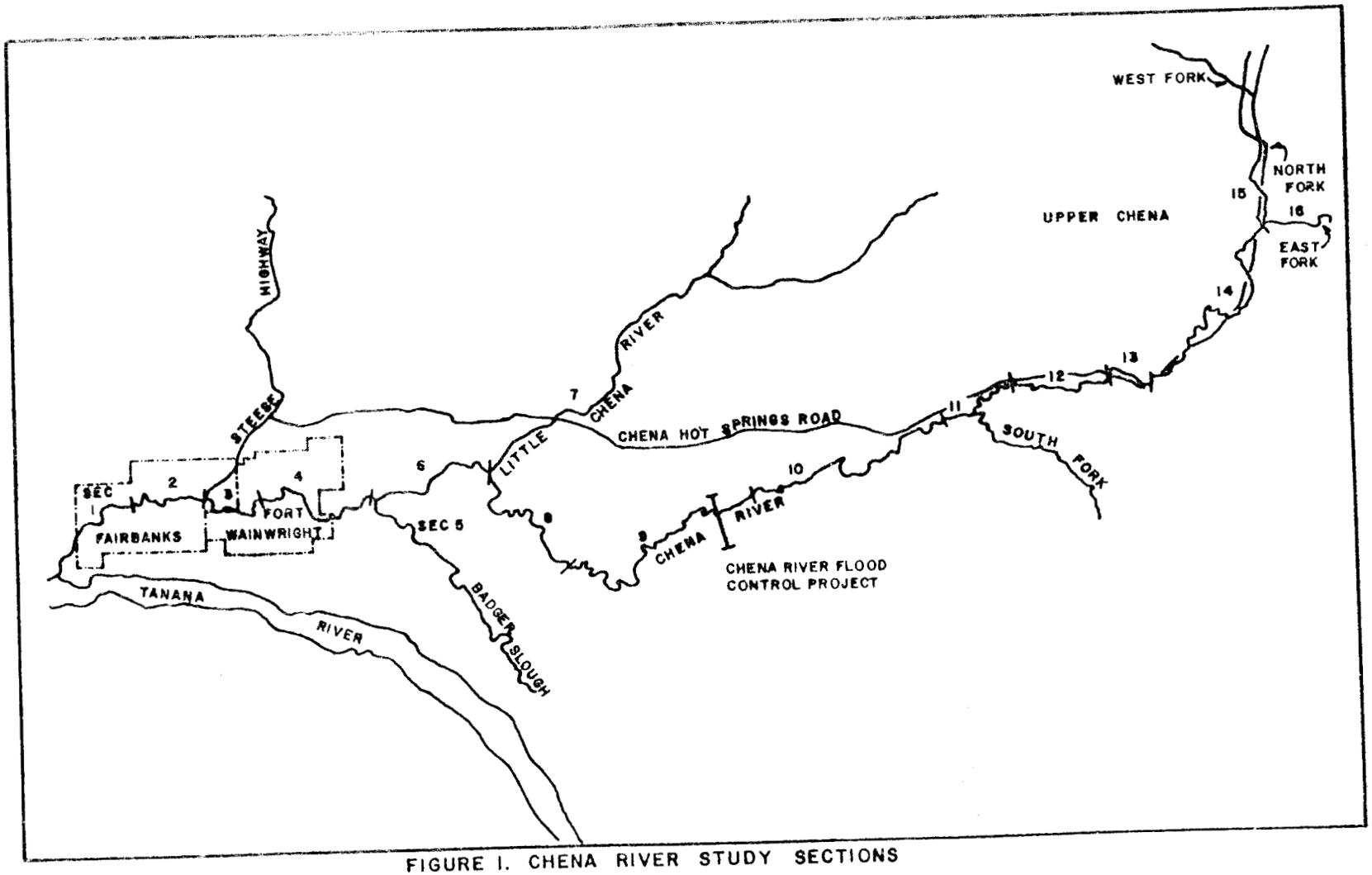

FIGURE I. CHENA RIVER STUDY SECTIONS

Table 2. Chena River study sections.

Section Number	Section Name	River Miles	Section Length Miles
1	River Mouth to University Ave.	0-6	6.0
2a	University Ave. to Peger Road	6-8	2.0
2b	Peger Road to Wendell Street	8-11	3.0
3	Wendell St. to Wainwright Railroad Bridge	11-14.5	3.5
4	Wainwright Railroad Bridge to Badger Slough	14.5-21.5	7.0
5	Badger Slough		16.5
6	Badger Slough to Little Chena	21.5-24.5	3.0
7	Little Chena River		61.5
8	Little Chena to Nordale Slough	24.5-31	24.5
9a	Nordale Slough to Bluffs	31-55.5	24.5
9b	Bluffs to Bailey Bridge	55.5-63	7.5
10	Bailey Bridge to Hodgins Slough	63-79	16.0
11	Hodgins Slough to 90 Mi. Slough	79-90	11.0
12	90 Mi. Slough to First Bridge	90-92	2.0
13	First Bridge to Second Bridge	92-94.5	2.5
14	Second Bridge to North Fork	94.5-102	7.5
15	North Fork of Chena River		35.0
16	East Fork of Chena River		62.0
17	West Fork of Chena River		35.0

TECHNIQUES USED

Grayling for population and length composition studies were captured by a boat-mounted electrofishing unit described by Van Hulle (1968) and Roguski and Winslow (1969). Passes were made through each section on three successive days and grayling greater than 150 mm fork length were marked by punching a small hole through the dorsal fin. Population estimates were made using the techniques of the Schumacher-Eschmeyer and Schnabel, as described in Ricker (1958).

Grayling scales used for age determination were individually cleaned and mounted on 20 ml acetate using a Carver press at 20,000 psi, heated to 200°F for 30 seconds. The scales were read on a Bruning 200 microfiche reader.

A roving creel census was conducted along the upper Chena River utilizing randomized angler counts. The census was conducted on 3 randomly selected weekdays per week and 2 weekend days per week. Only interviews with those anglers having completed their trip were used to compute the catch statistics and angler profile information.

Several types of other equipment were used in our research. A Hach Model AL-36-B water test kit was used to obtain water chemistry data. An aluminum riverboat powered by twin 50 hp motors equipped with jet units was used to survey the clearwater tributaries to the Tanana River. Multifilament and monofilament sinking or floating gill nets measuring 125 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.

FINDINGS

Clearwater Stream Surveys

Fivemile Clearwater:

The Fivemile Clearwater River located at lat. 64°22'N, long. 147°00'W, flows in a northerly direction out of the Tanana Flats and into the Tanana River approximately 10 mi upstream from the mouth of the Salcha River.

The stream is approximately 7 mi long, its average width is 50 ft, and the average depth is about 18 in. The stream meanders through spruce muskeg with intermittent stands of birch and alder. The stream bottom consists mostly of coarse gravel and sand, with dense growths of aquatic vegetation and algae in the upper 3 mi. Bendock (1975) measured the flows in Fivemile Clearwater at 140 cfs in March and 135 cfs in August, indicating a fairly constant volume of water flowing at all times. Pool and riffle formations are common in Fivemile Clearwater, with the pools seldom exceeding 6 ft in depth.

The stream was surveyed on three different occasions during the late spring and summer, 1979. In mid-May, shortly after breakup, schools of round whitefish were observed in the lower 5 mi, with only a occasional grayling observed. Coho salmon fry were also observed. A gill net set at the mouth

of Fivemile Clearwater for 12 hours collected 20 round whitefish and 10 grayling. Autopsy of the grayling revealed that one large male and one large female had recently spawned and the other eight fish were immature. In late April, 1975, using a fixed wing aircraft, Bendock observed schools of fish entering the stream and believed them to be mostly round whitefish, with some grayling mixed in. During a second visit to the Fivemile Clearwater River in mid-June 1979, grayling and round whitefish were distributed throughout the lower 5 mi. Grayling were sampled with hook and line. A total of 27 grayling sampled with hook and line ranged from 205-340 mm fork length. Several boat loads of anglers were noted on the stream.

Fivemile Clearwater was visited again in mid-August. Only a few concentrations of fish were observed at this time and most of them were round whitefish. It appeared that most of the grayling had left the Fivemile Clearwater, as extensive sampling with hook and line produced only seven grayling, and a 125 ft net set for 24 hours produced no fish. Interviews with three groups of anglers who had caught no fish were further evidence that the grayling had left the river.

The grayling population of Fivemile Clearwater is similar to that of other spring-fed systems, in that there is little or no spawning occurring in these streams. Grayling apparently spawn in other tributaries to the Tanana River or in the main channel of the Tanana itself, then move into the Fivemile Clearwater for approximately 3 months, and leave in late summer or early fall.

The age and length composition of 47 grayling sampled in the Fivemile Clearwater River appear in Table 3. The mean fork length of the sample was 272 mm, and the predominant Age Class was VI. The peak of the length distribution occurred between 240-300 mm, which represented 76% of the total sample. Bendock (1975), from a sample of 179 grayling in Fivemile Clearwater, calculated mean fork length at 298 mm (11.7 in). Pearse (1974) reported that the mean fork length for grayling captured in the Richardson Clearwater River was 280 mm and in the Delta Clearwater River was 355 mm. All three of these streams are similar spring-fed systems, with little or no grayling spawning and in which grayling (mainly subadults and adults) spend the summer months feeding, then leave and overwinter elsewhere.

Clear Creek:

Clear Creek (Nelson Clearwater) is situated approximately 15 mi south of Fairbanks, originating from springs, ground water seepage, and a small outlet of Blair Lake. It is the largest (36-mi long) of the four streams surveyed; however, navigability by riverboat is limited to the lower 15 mi due to the numerous log jams and sweepers found further upstream. The average width of Clear Creek in the lower 15 mi surveyed was about 35 ft, and average depth was approximately 20 inches. The stream is colorless for most of the summer, but does become somewhat silty or muddy during and after heavy rains and when the Tanana River level rises. The bottom is coarse gravel with some sand. Pools are 3-4 ft deep and are infrequent. Its banks are covered with dense stands of birch, spruce, willow and alder. No gravel bars are present and the water levels appear fairly stable, without any large fluctuation during the summer months.

Table 3. Age and length composition of 47 Arctic grayling captured in Fivemile Clearwater River, 1979.

Fork Length (mm)	Age Class III	IV	V	VI	VII	Total No.	Length Frequency Percent
200-209	1					1	2
210-219	1					1	2
220-229		2				2	4
230-239		2	1			3	6.5
240-249		4	2			6	13
250-259		1	3	2		6	13
260-269			1	1		2	4
270-279			1	4		5	11
280-289			1	3	3	7	15
290-299				5	1	6	13
300-309				1		1	2
310-319					1	1	2
320-329				1		1	2
330-339				1	2	3	6.5
340-349					2	2	4
350-359							
N	2	9	9	18	9	47	5
Age Frequency Percent	4.5	19	19	38.5	19		
Mean Fork Length (mm)	207	238	255	285	311		272

Clear Creek was surveyed on two occasions during the field season, the first in late May shortly after breakup. Water temperatures were 48-50°F. Grayling ranging from 178-294 mm were distributed throughout the lower 15 mi and were captured by hook and line. Adult grayling that were autopsied had recently spawned. It was not determined if spawning had occurred in Clear Creek or elsewhere. A 125-ft gill net was set for 1 night about 2 mi from the mouth and produced 12 suckers, 1 round whitefish, 3 humpback whitefish, 1 burbot, 1 sheefish, and 1 grayling. Northern pike and slimy sculpin were observed in the river, but were not sampled. The second visit to Clear Creek was in late August when two nets, one set at the mouth of Clear Creek and one about 5 mi upstream, caught 1 least cisco, 1 round whitefish, 1 burbot, 1 longnose sucker, and 2 grayling. Grayling were again found throughout the lower stream, but were not as abundant as in our first survey. This may be an indication of a downstream migration similar to that observed in the Fivemile Clearwater River. Water chemistry data collected in Clear Creek are as follows; pH 8, hardness 120 ppm, CO_2 15 ppm, alkalinity 120 ppm, and total acidity 34.2 ppm.

Clear Creek experiences light to moderate fishing pressure during the summer months. Most of this pressure is directed at grayling, with some sheefish, pike, and burbot also taken.

McDonald and Bear Creeks:

McDonald and Bear creeks, both spring-fed streams, are located approximately 10 mi east of Clear Creek. McDonald Creek is the larger of the two streams, flowing for about 23 mi, while Bear Creek is only 15 mi long. Both are extremely narrow (15 ft wide) and are difficult to locate, as the mouths of both creeks enter small sloughs which flow into the larger Salchaket Slough. Because of their small size, both creeks are navigable with the conventional riverboat for only the lower 4-8 mi, and consequently receive little fishing pressure.

McDonald Creek was surveyed in late May. Grayling, round whitefish, and suckers were observed in the lower 6 mi. Twelve grayling were sampled, ranging from 175-380 mm in fork length, with a mean of 264 mm. The physical appearance of the Creek is similar to that of Clear Creek, except that it is smaller. Bottom composition is coarse gravel, pools are 3-4 ft deep, average depth is 15 in, its banks have dense stands of spruce, willow, and birch, and the water is colorless and very transparent. Water chemistry data collected on McDonald Creek are as follows; temperture 39°F, total acidity 34 ppm, alkalinity 119 ppm, CO2 15 ppm, hardness 137 ppm, and pH 8.5.

Only the lower 4 mi of Bear Creek were surveyed in late August, as the stream was extremely difficult to navigate due to numerous sweepers, log jams, and its narrow winding configuration. Bear Creek is very similar to McDonald Creek, differing only in size. Grayling and round whitefish were the most abundant fish species, with some slimy sculpins also present and longnose suckers observed near the mouth. Fifteen grayling ranging from 197-320 mm fork length (mean of 255 mm) were sampled. Again no evidence of spawning by grayling was found. Water chemistry in Bear Creek was as follows: temperature 39°F, total acidity 26 ppm, alkalinity 119 ppm, CO_2 15 ppm, hardness 126 ppm, and pH 8.

Upper Chena River Creel Census

The Sport Fish Division entered into an agreement with the newly founded Alaska Cooperative Fisheries Research Unit of the University of Alaska, to employ graduate student Roland Holmes in conducting creel census on the upper Chena River as part of Mr. Holmes' research requirement toward an M.S. degree.

While his study encompasses may facets of creel census and creel census design, only first year findings that could be used comparatively with census work conducted on the Chena in past years will be reported at this time.

Results of the 3-month long creel census appear in Table 4. During this time it was calculated that a total 12,744 angler hours were expended to harvest nearly 10,500 grayling. The catch was 0.82 grayling caught and kept per angler hour. A summary of creel census results for the upper Chena River since 1970 appears in Table 5. The effort, harvest, and success rate showed slight increases in 1979, but coincided fairly well with previous years. The age and length composition of 86 angler-caught grayling in the upper Chena River appear in Table 6. The average size of the grayling taken was 219 mm (8.5 in). This compares extremely closely with the average size grayling caught in 1978, (221 mm) and also with that of a 4-year average from 1976 through 1979, which was 219 mm. Age Classes III and IV grayling accounted for better than 60% of the creel sample.

Population Estimates

Grayling population estimates were conducted in sections 2a, 2b, 8a, and in the area just above the Chena River Lakes Flood Control Project presently being constructed near River Mile 45 (Fig. 1). Section 2, which lies adjacent to Fairbanks, and the area near the dam site, which will be directly impacted during times of flooding, are both important areas needing yearly information. Since 1968, Section 6 has been used as an index area in our population estimates. However, heavy development of this area in recent years, has caused considerable impacts. Because of this, Section 8a, an area beginning 2 mi above the mouth of the Little Chena River and continuing upstream for 3 mi, was adopted as a new index area. While this section remains easily accessible, it has not been exposed to heavy development or increasing angling pressures.

Results of the 1979 population estimates are presented in Table 7, and a summary of population estimates conducted on these four index sections of the Chena River from 1968 to 1979 appears in Table 8.

Table 8 indicates that while slight increases or decreases in grayling numbers from year to year have been observed, the overall trend in each area during the past 10 years has been a decrease in the grayling population.

The estimates in 1979 show a decrease in Section 2a for the second consecutive year and the section is now at a record low. Section 2b shows a slight increase in 1979 over a record low in 1978. The estimate in the area above the dam site was also the lowest since the estimates began.

Table 4. Creel census of the grayling fishery on the upper Chena River adjacent to Chena Hot Spring Road, 1979.

Angler Hours

Period	Weekdays	Weekends	Total
June	1,892	2,907	4,799
July	2,753	2,094	4,846
August	1,319	1,779	3,098
Total	5,964	6,780	12,743

Fishery Statistics

	June	July	August	Total
Number of completed angler interviews	44	20	33	97
Mean hours fished/ angler interviewed	2.4	3.0	2.3	2.5
Total grayling kept by angler interviewed	116	38	51	205
Grayling kept/ angler hour	0.92	0.73	0.81	0.82
Total grayling harvest	4,434	3,528	2,497	10,459
Mean grayling fork length =				219

Angler Composition

	June	July	August	Total
Local Residents	76%	69%	69%	73%
Military	19%	16%	19%	18%
Tourists	5%	15%	12%	9%
Male	72%	68%	76%	72%
Female	28%	32%	24%	28%
Youth	77%	75%	68%	75%
Adult	23%	25%	32%	25%

Table 5. Summary of creel census results for the upper Chena River, 1970-1979.*

Year	Dates	Days	Total Angler Hours	Total Grayling Harvest	Grayling Caught & Kept Per Angler Hour
1970	May 1-31 July 14-Aug. 29	78	12,518	6,770	0.54
1974	July 1-Aug. 31	62	11,680	18,049	1.55
1975	June 1-Aug. 31	92	22,657	14,067	0.62
1976	June 1-Aug. 31	92	10,762	4,161	0.39
1977	June 1-Aug. 31	92	13,536	9,406	0.69
1978**	May 29-Aug. 31	95	10,508	6,898	0.65
1979	June 1-Aug. 31	92	12,744	10,459	0.82

* Data before 1978 taken from Hallberg, 1978.
** Data taken from Kramer, 1978.

Table 6. Age and length composition of 86 grayling sampled from creel census on upper Chena River, 1979.

Fork Length (mm)	Age Class III	VI	V	VI	VII	VIII	Total No.	Length Frequency Percent
160-169	3						3	3.5
170-179	8	2					10	11.6
180-189	3	3					6	6.9
190-199	3	5					8	9.3
200-299	2	9	3				14	16.3
210-219		5					5	5.8
220-229	1	8					9	10.5
230-239		5	2				7	8.2
240-249		4	4				8	9.3
250-259			1				1	1.2
260-269			3	1			4	4.6
270-279				3	1		4	4.6
280-289				1	2		3	3.5
290-299					3		3	3.5
300-309								
310-319								
320-329						1	1	1.2
Total Nmber	20	41	13	5	6	1	86	100%
Age Frequency Percent	23.3	47.7	15.1	5.8	6.9	1.2		
Mean Fork Length (mm)	183	212	238	273	286	325	215	

Table 7. Grayling population estimates in four sections of the Chena River, 1979.

River Section	Date	Length of Section (mi)	Schnabel Estimate Gr/mi	Schumacher-Eschmeyer Estimate Gr/mi	90% Confidence Limits For Schumacher-Eschmeyer Gr/mi
2a	July 1-3	2	88	91	72-122
2b	June 26-30	3	316	321	301-345
8a	Aug. 20-23	3	269	283	257-315
Dam Site	July 17-20	3	261	308	231-460

Table 8. Population estimates for grayling greater than 150 mm fork length in index section of the Chena River 1968-1979.

River Section	Year	Dates	Grayling per Mile
2a	1971	Aug 30-Sept 3	613
	1972	June 22-26	497
	1973	July 10-13	469
	1974	June 26-28	104
	1976	Aug 19-21	413
	1977	Aug 5-8	511
	1978	Aug 14-17	110
	1979	July 1-3	91
2b	1968		1,095
	1969		1,890
	1970	July 2-10	1,479
	1971	Aug 30-Sept 3	2,095
	1972	June 22-26	978
	1973	July 3-10	679
	1974	June 25-28	642
	1976	July 22-24	654
	1977	July 11-14	511
	1978	July 25-28	259
	1979	July 26-30	321
8a	1979	Aug 20-23	283
Dam Site	1972	June 27-29	1,306
	1973	July 18-19	800
	1974	July 9-11	416
	1976	Aug 4-6	489
	1977	July 26-30	507
	1978	Aug 8-11	553
	1979	July 17-20	308

Poor electrofishing conditions due to silty waters may have contributed to the low estimate in the area above the dam site. The silt was entering the Chena from a mining operation upstream on the south fork of the Chena River. There is no single apparent reason for the continued decline in the other index sections.

It has been theorized in the past that when fluctuations occur in populations of lower Chena River grayling, these changes should be reflected in the upper Chena River creel census, either in the total number harvested or in the average size of the catch. Tack (1971) indicated that rearing grayling of Ages I and II are concentrated in the lower 50 mi of the river and move upstream during their second and third year of life, thus entering the upper river fishery. This would support the theory that if population numbers change in the lower river this would show up in the creel. Such has not been the case. While the lower river population trend has been on the decline, creel census on the upper run has indicated no reduction in the numbers of fish being caught or in their average size. What may be occurring in the Chena River is a wider distribution of young fish than was previously noted, or more than one discrete population of grayling may inhabit the river.

Another consideration is the effect a new sewage disposal plant has on the lower river. Prior to July, 1976, when the plant was put into operation, the City of Fairbanks and Ft. Wainwright discharged up to 3 million gallons of sewage effluent daily into the river. Because the new system discharges into the Tanana River instead, a significant decrease has doubtlessly occurred in nutrients reaching the lower Chena. This in turn could be depressing numbers of rearing grayling through a decrease in available food organisms. Studies addressing this possibility are needed and should be conducted as soon as is feasible, since the invertebrate population of the lower river has now had time to stabilize at a new, lower level.

Length And Age Structure:

The length frequency in percent of sample in each individual section appears in Table 9. While the mean fork lengths of the four samples are similar, it is apparent that the lower Chena River harbors predominately immature grayling (less than 270 mm - Roguski and Tack 1970).

Age determinations by scale analysis were made from a random subsample of 218 grayling (scales collected from every fourth fish captured). Age and length information presented in Table 10 shows that Age Class III was the predominant Age Class, comprising 45.5% of the entire sample, with Age Class II having 20.2% and Age IV 17.4%. The mean fork length of the subsample was 191 mm (7.5 in).

It should also be pointed out that while Age Classes III and IV represent 62% of the sample, with mean fork lengths of 197 and 236 mm respectively, these figures compare closely with the age-length data collected from the creel (see previous section on creel census), in which Age III and IV fish accounted for 60% of the creel sample and had mean fork lengths 212 and 238 mm.

Table 9. Length Frequency (in percent of sample) of 917 grayling from four sections of the Chena River, 1979.

Fork Length (mm)	Chena River Section			
	2a	2b	8a	Dam Site
70-79		0.3		
80-89		2.5	0.4	
90-99	1.2	5.5	0.4	3.7
100-109	9.2	6.6	2.1	1.1
110-119	3.4	1.4	1.4	
120-129		0.3		
130-139	1.2	0.5		
140-149		1.4	0.4	
150-159	5.8	13.3	2.5	6.9
160-169	8.0	8.1	8.2	17.3
170-179	12.7	4.7	12.9	19.9
180-189	3.4	8.1	15.8	8.9
190-199	11.5	10.8	15.5	4.2
200-109	11.5	11.6	14.7	5.2
210-219	3.4	8.8	9.3	6.9
220-229	13.8	4.7	5.0	6.3
230-239	3.4	5.3	4.8	4.2
240-249	4.6	1.1	2.9	6.9
250-259	1.2	3.3	2.9	2.7
260-269	2.3	0.8	0.4	2.7
270-279		0.3		0.5
280-289	3.4	0.3	0.4	1.6
290-299				
300-309		0.3		
310-319				1.0
Number	87	361	278	191
Length	188	178	193	192
Range	95-285	79-303	85-280	90-316

Table 10. Age and length composition of 218 randomly subsampled grayling captured in sections 2a, 2b, 8a, and the Chena River dam site, 1979.

Fork Length (mm)	Age Class						Total Number	Length Frequency Percent
	I	II	III	IV	V	VI		
80-89	1						1	0.4
90-99	7						7	3.2
100-109	10						10	4.6
110-119	4						4	1.8
120-129								
130-139	1						1	0.4
140-149		1					1	0.4
150-159	2	15					17	7.8
160-169		13	4				17	7.8
170-179		11	16				27	12.4
180-189		2	14				16	7.4
190-199		2	11	1			14	6.5
200-209			32	2			34	15.6
210-219			12	4			16	7.4
220-229			5	7			12	5.5
230-239			5	10	1		16	7.4
240-249				6	1		7	3.2
250-259				5	3		8	3.7
260-269				1	2		3	1.4
270-279								
280-289				2	3		5	2.3
290-299								
300-309					1		1	0.4
310-319						1	1	0.4
Total Number	25	44	99	38	11	1	218	
Age Frequency Percent	11.5	20.2	45.5	17.4	5.0	0.4		100.0
Mean Fork Length (mm)	107	165	197	236	266	310	191	

Development Projects Affecting the Chena River:

The Chena River Lakes Flood Control Project, now in its final stages of construction, was the major construction project affecting the Chena River in 1979. Upgrading of the road crossings on Badger Slough, as well as installation of a new crossing, were the other projects, and these were completed with little impact on the resource.

Work conducted on the flood control project included sculpturing of the shoreline and littoral zone around a lake which was originally four borrow pits that have since been connected to form a single large (approximately 250 a) lake. Dissolved oxygen levels of the gravel pits were tested in late March and concentrations of 6-8 ppm were found in three larger pits, while the fourth had only 1-1.5 ppm. The lake was test netted in September and was found to contain five species of fish. In 3 net-nights using 125 ft experimental gill nets, 44 least cisco, 3 humpback whitefish, 1 grayling, 1 burbot, and 1 longnose sucker were caught. Consequently, before any sport fish stocking of this lake can be conducted, a complete rehabilitation is necessary to remove the undesirable species. Also needed is assurance that reinfestation of the lake will not occur.

During a reconnaissance flight over the project on May 1, 1979, at breakup, the water level downstream of the control structure near the mouth of the seepage channel was approaching the top of its banks. It is probable that during this period of high water fish from the Chena River were able to find their way into the lake. Other construction work consisted of installing the interior drainage facilities, which are designed to handle surface runoff and seepage water inside the levee utilizing three separate channels that will drain into the Tanana and Chena rivers and Badger Slough. Work also began on the fish ladder installed near the control structure. This vertical slot type ladder is designed to allow migrating fish to pass the control structure (dam) during the time flooding occurs. A shortage of materials required to construct the ladder has postponed its completion until 1980. A Corps of Engineers proposal to extend the Tanana levee to the mouth of the Chena River and to install training structures (groins and groin fields) in the Tanana River to divert its flows away from the Fairbanks International Airport, thus protecting it, met with much opposition from private citizens, the Fairbanks North Star Borough, and State agencies. All were concerned that this activity would reduce water levels and navigability of the lower Chena River, possibly accelerate bank erosion along the Tanana River downstream of the Chena river, and increase future maintenance costs to the Borough. A decision was made to study alternative plans and to gather more information about this phase of the project. Construction here is not expected to begin until the winter of 1980-1981.

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