STATE OF ALASKA

Jay S. Hammond, Governor

Annual Performance Report for

DISTRIBUTION, ABUNDANCE AND NATURAL HISTORY OF THE ARCTIC GRAYLING IN THE TANANA RIVER DRAINAGE

by

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RESEARCH PROJECT SEGMENT

State: ALASKA Name: Sport Fish Investigations of Alaska

Project No.: F-9-9

Study No.: R-I Study Title: Distribution, Abundance and Natural History of the Arctic Grayling in the Tanana River Drainage

Period Covered: July 1, 1976 to June 30, 1977

ABSTRACT

Population estimates of Arctic Grayling, Thymallus arcticus (Pallas), greater than 150 mm fork length were conducted in four sections of the lower 80 km (50 mi) of the Chena River. Three of these areas showed an increase in numbers while the other indicated a decrease. Grayling in the four sections were predominantly immature in that 91.8% were less than 270 mm fork length.

Recruitment of Age Class III grayling in the lower Chena was 28.9%, the highest since 1973.

The many development projects currently underway which could affect the Chena River were monitored closely and a status report is presented.

A creel census on Badger Slough showed 3,056 total angler hours during the month of May, yielding a harvest of 3,117 grayling. Another high intensity creel census covering the upper Chena River along the Chena Hot Springs Road from mile 26 to 56 was conducted during June, July and August 1976. Results showed 10,762 total angler hours and a harvest of 4,161 grayling.

RECOMMENDATIONS

It is recommended that:

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

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

3. Recruitment and survival rates for grayling in the Chena River continue to be monitored.

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

JOB R-I-A Population Structure, Migratory Patterns and Habitat Requirements of the Arctic Grayling.

BACKGROUND

The Chena River, a clear water tributary to the Tanana River, flows through the City of Fairbanks and represents the heaviest fished grayling stream in Interior Alaska.

In order to keep abreast with the ever fluctuating numbers of Arctic grayling found within the mainstem of the Chena River, index sections were established as areas to be studied to determine trends in population structure.

Standard mark and recapture methods to determine grayling populations were started in 1968 by Van Hulle and continued by Roguski 1969-1970 and by Tack 1971-1976.

Information also obtained during the population estimates are length frequencies, annual survival rates and age and length composition, all of which is useful in determining the distribution, abundance and natural history of the Arctic grayling in the Tanana River drainage.

OBJECTIVES

1. Determine Arctic grayling populations and age class structure in index sections of the Chena River.

2. Determine the effects of capturing and handling techniques on Arctic grayling with emphasis on development of electrofishing apparatus and methods that are less harmful to the fish captured.

3. To keep abreast of the development projects affecting the fish habitat of the Chena River.

TECHNIQUES

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).

Table 1. Chena River study sections

Section Number	Section Name	River Miles*	Section Length km	Section Length mi
1	River Mouth to University Ave.	0-6 (0-9.7)	9.7	6
2a	University Ave. to Peger Road	6-8 (9.7-12.9)	3.2	2
2b	Peger Road to Wendell Street	8-11 (12.9-17.7)	4.8	3
3	Wendell St. to Wainwright RR Bridge	11-14.5 (17.7-23.3)	5.6	3.5
4	Wainwright RR Bridge to Badger Slough	14.5-21.5 (23.3-34.6)	11.3	7
5	Badger Slough		26.6	16.5
6	Badger Slough to Little Chena	21.5-24.5 (34.6-39.4)	4.8	3
7	Little Chena River		99.0	61.5
8	Little Chena to Nordale Slough	24.5-31 (39.4-49.9)	10.5	6.5
9a	Nordale Slough to Bluffs	31-55.5 (49.9-89.3)	39.4	4.5
9b	Bluffs to Bailey Bridge	55.5-63 (89.3-101.4)	12.1	7.5
10	Bailey Bridge to Hodgins Slough	63-79 (101.4-127.1)	25.7	16
11	Hodgins Slough to 90 Mi. Slough	79-90 (127.1-144.8)	17.7	11
12	90 Mi. Slough to First Bridge	90-92 (144.8-148.0)	3.2	2
13	First Bridge to Second Bridge	92-94.5 (148.0-152.1)	4.0	2.5

Table 1. (Cont.) Chena River study sections.

Section Number	Section Name	River Miles*	Section Length km	mi
14	Second Bridge to North Fork	94.5-102 (152.1-164.1)	12.1	7.5
15	East Fork of Chena River		56.3	35
16	East Fork of Chena River		99.8	62

* km in parentheses

Table 2. Grayling population estimates in four sections of the Chena River, 1976.

River Section	Date	Length of Section GR/km	Length of Section GR/mi	No. Marked	No. Recaptured	Petersen GR/km	Petersen GR/mi	Schnabel GR/km	Schnabel GR/mi	Schumacher-Eschmeyer GR/km	Schumacher-Eschmeyer GR/mi	90% Confidence Limits for Schumacher-Eschmeyer GR/km
2a	7/19-21	3.2	2	154	20	210	335	241	385	258	413	223-307
2b	7/22-24	4.8	3	232	18	309	495	373	596	409	654	323-556
6	7/28-30	4.8	3	203	49	164	262	161	258	163	262	153-175
Dam Site km 71-76	8/4-6	4.8	3	189	16	281	449	290	464	306	489	285-329

Table 3. Grayling population estimates for various sections of the Chena River, 1968-1976.

River Section	Year*	Dates	GR/km	GR/mi
2a	1971	Aug 30-Sept 3	684	1,095
	1972	June 22-26	416	666
	1973	July 20-13	293	469
	1974	June 26-28	56>	89
	1976	July 19-21	258	413
2b	1968		684	1,095
	1969		1,181	1,890
	1970	July 2-10	1,540	2,465
	1971a	June 2-7	2,036	3,257
	1971b	Aug 30-Sept 3	2,338	3,741
	1972	June 22-26	919	1,471
	1973	July 3-14	424	679
	1974	June 25-28	401	642
	1976	July 22-24	395	654
6	1968		282	452
	1969		571	913
	1970	May 26-30	481	769
	1971	June 21-24	368	589
	1972	June 19-20	207	331
	1973	July 16-17	243	389
	1974	Aug 13-15	86	138
	1975**	July 10-14	191	306
	1976	July 28-30	158	262
9a at Dam Site (km 71-76)	1972	June 27-29	1,140	1,824
	1973	July 18-19	500	800
	1974	July 9-11	260	416
	1976	Aug 4-6	298	489

* Data prior to 1976 from Tack (1976).

** Only 63 fish used in this estimate - results should be regarded with caution.

Population estimates were made using the techniques of the Schumacher-Eschmeyer, Schnabel and Petersen as described in Ricker (1958). Calculations of survival rates also follow those outlined in Ricker. Dorsal fin punches were used in all marking during population studies. The section designations for the Chena River are defined in Table 1.

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

FINDINGS

Population Estimates

Population estimates of Arctic grayling, Thymallus arcticus (Pallas), greater than 150 mm fork length were conducted in sections 2a, 2b, 6 and in the area of the proposed Chena River Lakes flood control dam site, km 71 to 76 (Table 1). Sections 2a and 2b which lie adjacent to Fairbanks, and the dam site which will be directly impacted by construction of the Chena River dam are critical areas needing yearly information. Section 6 is a 3 mile section of the Chena River which is located between the mouth of the Little Chena River and Badger Slough. This area has been used as a control section in our population estimates because it has been relatively unaffected by development or angling and is easily accessible. However in February of 1976 the Trans-Alaska Pipeline buried its 48" diameter pipe under the bottom of the Chena River in section 6. It is not known at this time if this crossing has had any effects within this area and population estimates did not reveal any significant changes in the grayling population.

The population levels in each of the four sections were calculated by using the Petersen, Schnabel and the Schumacher-Eschmeyer methods and those results are presented in Table 2. Table 3 compares the population estimates obtained from 1968 to the present. The 1976 estimates show an increase from 1974 in sections 2a, 2b, 6 and the dam site. There is no single reason for this increase except that if a cyclic condition does exist in grayling populations as was suspected in 1973 (Tack, 1974) then what we might be observing is an upswing in the cycle and this will be closely monitored.

Length Frequency

The length frequency of grayling captured during population estimation sampling in section 2a, 2b, 6 and at the dam site is shown in Table 4. The mean length of the lower three sections are similar, but the average length of fish captured in the area of the dam site is substantially greater.

The area near the dam site also has the greatest percentage (20.5%) of mature grayling (greater than 270 mm - Roguski and Tack, 1970). This

percentage decreases with each further downstream section. Thus sectio has 5%, section 2b has 3.5% and section 2a has 2.1% mature fish.

Age and Length Composition

To obtain a representative sample of grayling in the lower Chena River, 256 fish were randomly subsampled from section 2a, 2b, 6 and the dam site during our population estimation work. The subsampling was done by collecting the necessary data (fork length measured and scales taken) from approximately every third fish sampled during the population work. The age and fork length frequency determined from the subsample appear in Table 5. The mean fork length of 197 mm of the subsample corresponds relatively closely to the mean fork lengths of the original samples (Table 4).

Annual Survival Rates

Age Class III has reestablished itself as the dominant age class after two depressed years. The 1976 Age Class III made up 28.9% of the Chena River sample while the 1975 sample was 24.7% (Tack, 1976) and the 1974 sample was a low 12.1% (Tack, 1975). Age Class III has been considered the minimum recruitment age that can be calculated as these fish are readily captured by electrofishing and are considered to be representatively sampled.

Annual survival rates between age classes since 1973 are presented in Table 6. The variable recruitment between year classes makes the calculated survival rates appear erratic. In an attempt to obtain a clearer picture of what the survival rate condition in a natural situation is, the mean percent frequency of each age class from 1973 to 1976 was calculated and from this a survival rate was recalculated. These figures should be regarded with caution as they are not an accurate assessment of the actual survival rate, but rather an early indication of what may exist. Several more years of this type of data are needed to verify trends in both survival and recruitment rates.

Refinement of Electrofishing Gear for the Capture of Arctic Grayling

The Sport Fish Division has utilized alternating current electrofishing units for the capture of Arctic grayling since 1967 (Van Hulle, 1968). Though it has proven itself a valuable tool in conducting population estimates and tagging studies, its total effect upon the fish is not fully understood.

Short term holding experiments conducted by Tack (1974, 1975) indicated a higher rate of mortality and injury among grayling captured by ac electrofishing than among those captured by seine.

In 1976 attempts were made to test the feasibility of utilizing pulsed direct current as an alternative source in electrofishing, and to assess effects of dc capture on grayling by holding them in pens for 72 hours after capture.

Table 4. Length frequency (in percent of sample) of grayling in four sections of the Chena River 1976.

Fork Length (mm)	Chena River Section			
	2a	2b	6	Dam Site
100 - 109				
110 - 119				
120 - 129				
130 - 139	5.3	2.9	2.4	.5
140 - 149	4.7	4.4	.5	5.5
150 - 159	3.5	1.5	3.8	10.0
160 - 169	2.9	4.4	9.6	11.4
170 - 179	8.8	9.5	16.3	2.3
180 - 189	17.6	15.2	15.3	6.4
190 - 199	14.1	12.4	11.9	3.5
200 - 209	8.8	13.9	7.2	3.5
210 - 219	12.9	5.1	6.2	3.0
220 - 229	9.4	10.9	4.8	4.5
230 - 239	5.9	4.4	5.7	2.5
240 - 249	1.8	5.1	5.3	7.4
250 - 259	1.2	4.4	3.8	7.4
260 - 269	1.2	2.2	1.9	11.9
270 - 279	.6	.7	2.9	6.9
280 - 289	.6	1.5	.5	4.9
290 - 299	...	1.5	1.4	4.5
300 - 309	.6			1.9
310 - 319			.5	1.5
320 - 329				
330 - 339				
340 - 349				
350 - 359				
360 - 369				
370 - 379				.5
n	170	137	209	202
$\bar{x}$	194	201	198	220
Range	130-305	130-290	130-310	130-375

Table 5. Age and length composition of random subsample of grayling captured in sections 2a, 2b, 6 and at the Chena River Dam Site, 1976.

Length (mm)	Age Class I	II	III	IV	V	VI	VII	Total No.	Length Frequency %
100-109									
110-119									
120-129	1							1	0.4
130-139	10							10	3.9
140-149	13	1						14	5.4
150-159	2	6	1					9	3.5
160-169		11	1					12	4.6
170-179		13	3					16	6.2
180-189		21	12	1				34	13.2
190-199		6	20	1				27	10.5
200-209		3	16	3				22	8.5
210-219			13	9	1			23	8.9
220-299			6	15	1			22	8.5
230-239			1	5	2			8	3.1
240-249			1	2	9	2		14	5.4
250-259				3	4	3		10	3.9
260-269					3	7		10	3.9
270-279					2	7	1	10	3.9
280-289					2	7		9	3.5
290-299						2		2	.7
300-309									
310-319							2	2	.7
320-329									
330-339							1	1	.4
340-340									
350-359									
n	26	61	74	39	24	28	4	256	
Age Frequency %	10.1	23.8	28.9	15.2	9.3	10.9	1.5		
$\bar{x}$ Fork Length	144	175	194	221	249	270	308	197	

Table 6. Survival rates of grayling in lower 76 km of the Chena River based on age frequency data from 1973, 1974, 1975 and 1976.

Age Class	Percent Frequency*				$\bar{x}$ Frequency	Annual Survival Rate				Survival Rates Calculated from $\bar{x}$ Age Class Frequency
	1973	1974	1975	1976		1973	1974	1975	1976	
III	60.5	12.1	24.7	28.9	31.5					
						.298		.546	.525	.721
IV	18.0	44.1	13.5	15.2	22.7					
						.167	.567		.611	.692
V	3.0	24.8	25.8	9.3	15.7					
							.157	.740		.536
VI	0.0	3.9	19.1	10.9	8.4					
							.077	.115	.137	.131
VII	0.5	0.3	2.2	1.5	1.1					

* Data prior to 1976 taken from Tack (1976).

The positive dc electrodes (anode) consisted of two 3' diameter rings with six 3' dropper cables evenly spaced around each ring. The rings were suspended from a boom 10' in front of the boat, with a spacing of 12' between ring centers. The negative dc electrodes (cathode) consisted of two 4' pieces of PVC piping suspended along each side of the boat near the stern. Five evenly spaced drop cables 3' in length were attached to each and hung in the water. Power was supplied from a 3,500 watt ac single phase gas generator and was converted to pulse dc at various pulse frequencies and voltages by a Coffelt Model VVP-3E variable voltage pulsator.

Two groups of 25 grayling were captured in the Chena River by dc electrofishing and 25 seined fish were used as controls. All fish were held in 4' x 4' x 8' nylon pens in the Chena River. Table 7 lists the time required to capture and transport each group of fish as well as the voltages, amperes and pulse rates used in the initial capture. The grayling used in the experiment ranged in length from 115 mm to 335 mm with an average of 193 mm.

The condition of fish in each group when placed in the pens, during the 72-hour holding period and at the conclusion of the experiment, is shown in Table 8.

No fish died in either of the experimental groups, however one grayling died in the control group. Reason for death was undetermined. The numbers of injured fish increased during the confinement period in one of the experimental groups and in the control group. This may reflect delayed effects of capturing or may have resulted from injury in the holding pens.

While the results of the holding experiments were very promising, the capture rate of the fish was extremely low, approximately 10.5 fish per hour. Capture rate with the ac shocker boat in the Chena River (Tack, 1974) was as much as 10 times as great. Low capture rates may have been partially due to decreased effective range of dc as compared to ac and probably could be increased with more refinement of gear, including the use of a 3 phase, 4.5 kw, 230V, 180 Hz generator as outlined by Novotny and Preigel (1974). Time limitations in 1976 precluded further testing of dc equipment but future testing and refinement should be attempted when time permits.

Development Projects Affecting the Chena River

During the reporting period, work continued on the Chena River Lakes flood control project which is approaching the half way completion mark. The 30' high earthen dike from the Chena River to the pipeline crossing was completed as was the Pile Driver Slough blockage and the Moose Creek Channel change. The concrete control structure for the dam is scheduled for completion in 1977. An "Alaska steeppass" fish ladder is to be installed and tested in the spring of 1977 at Poplar Grove Creek. This test is designed to determine if grayling will use this type of structure. If tests are favorable, this type of fish passage structure will be considered and further tested for the Chena Dam project.

Table 7. Capture and handling information for test groups used in short term experiment to test effect of dc electroshock on Arctic grayling, 1976.

Date of Capture	Pen No.	No. of Fish	Treatment	Time to Capture	Time to Transfer and Enter into Pens	Water Temp.
7-12	1	25	Seined	30 min.	10 min.	14.5°C
7-12	2	25	150-200V* 3-4A** 40-80 PPS ***	3.5 hrs.	15 min.	14.5°C
7-12	3	25	200-250V 3.5-5A 40-60 PPS	1.25 hrs.	10 min.	14.5°C

* Volts
** Amperes
*** Pulses Per Second

Table 8. The condition of grayling at entry to the holding pens, during the 72 hour holding period and at the conclusion of the holding period, 1976.

Capture Treatment	Pen No.	Condition of Fish Entered: Healthy	Injured	Belly Up	Black Marks	Other Injuries	Condition of Fish During Experiment (Time Increments in Hours): 0-12 D*	0-12 BU**	12-24 D	12-24 BU	24-48 D	24-48 BU	48-72 D	48-72 BU	Results after 72 Hours: Healthy	Near Death	Dead	Injured	Remarks and Extent of Injury
Seined	1	23	2	0	0	1-split caudal fin 1-bulged red eye	0	0	0	0	0	0	0	1	19	0	1	5	2-bloodshot areas 2-split caudal fins 1-split dorsal fin
150-200 Volts dc 3-4 Amps 40-60PPS***	2	22	3	0	2	3-bloodshot eyes	0	0	0	0	0	0	0	0	19	0	0	6	1-black marks 4-bloodshot areas 1-swollen area
200-250 Volts dc 3.5-5 Amps 40-60PPS	3	18	7	0	4	2-minor lacerations	0	0	0	0	0	0	0	0	18	0	0	6	1-minor lacerations 5-bloodshot areas 1-split dorsal fin 1-split caudal fin 1-fish escaped*

* Dead
** Belly up
*** Pulses Per Second

Construction activity on the Chena Hot Springs Road from Mile 26 to Mile 52 was completed in October 1976. This project called for the rerouting of the North Fork Chena River and the installation of small dikes and placement of rip-rap in the river alongside the road, to help protect the road in times of flooding.

The bridge crossing the lower Chena between the Parks Highway and Airport Way was completed in June 1976.

Another bridge crossing the Chena River and between the Steese and Richardson highways is about one-half completed with the placement of rip-rap and the removal of fill, the only instream work left.

In February of 1976 the Trans-Alaska Pipeline crossed the Chena River upstream from the mouth of Badger Slough. The pipe was buried in a trench under the river bottom.

The Fairbanks city and Ft. Wainwright sewage discharge no longer empties into the Chena River. In July of 1976 a new disposal plant became operational and began discharging primary treated sewage into the Tanana River.

JOB R-I-B Creel Census of the Sport Fishery in the Tanana River Drainage.

BACKGROUND

Because of their close proximity to Fairbanks and their easy access from the adjacent road systems, the upper Chena River and Badger Slough offer the public an excellent opportunity to fish Arctic grayling. This, along with the fact that the Fairbanks area, like many areas within the state, is currently undergoing marked increases in human population as a result of the Trans-Alaska pipeline, has prompted the Sport Fish Division to continue its creel census program to monitor the fishing pressure. Programs such as these have been ongoing since 1968 and have yielded information pertinent to the management of this fishery.

OBJECTIVES

1. Determine the fishing pressure and catch in the upper Chena River and Badger Slough to evaluate the fishery from year to year.

2. Determine the age and size make up of the catch.

TECHNIQUES

Estimates of angler usage on Badger Slough and the upper Chena River area were made utilizing randomized angler counts. The creel census was

conducted on a randomly selected two weekdays and one weekend day per week. Only interviews with those anglers having completed their trip were used to compute the catch statistics and angler profile information.

FINDINGS

Badger Slough Creel Census

Badger Slough is a 26 km (16 miles), spring-fed tributary that flows into the Chena River at km 34. Because of the warm spring action, parts of the slough become ice-free and provide angling opportunities as early as the middle of April.

The fishery on Badger Slough in 1976, due to a slow and moderate breakup, did not begin until late April. A creel census program was initiated on May 1 and ran through May 31. A randomized method of angler counts was used to determine total angler hours. The creel census was conducted on randomly selected two weekdays and one weekend day per week. Only those fishermen having completed their trip were used to calculate the fishery statistics and angler composition.

Results of the creel census (Table 9) show 3,056 angler hours of effort, yielding 3,117 grayling in the one month that was censused. It also points out that since the average length of angler trip was 1.6 hours, that there was about 1,910 angler trips.

Table 10 summarizes the creel census results on Badger Slough since 1968. The number of angler hours in 1976 is the lowest ever recorded. One possible reason was the slow breakup that occurred. Another reason for the decrease in angler hours may be due to a closure to fishing of a popular road crossing area after May 10. This was an area 100 yards above and below the new Nordale Road crossing Badger Slough. This area became a partial barrier to fish when the water through a 6' diameter 100' long culvert reached velocities exceeding 10 fps. In order to protect the spawning population of grayling in Badger Slough the emergency closure was put in effect.

The average length of grayling taken was 235 mm, with a range of 170-305 mm (Table 11). This compares closely with fish sampled in 1972, (Tack, 1973) which averaged 232 mm and ranged from 150 to 305. Information on angler composition and types of sport fishing gear and lures used is also included in Table 9.

Upper Chena River Creel Census

The sport fishery on the upper Chena River where it parallels the Chena Hot Springs Road was censused during the months of June, July and August. The creel census was conducted on randomly selected two weekdays and one weekend day per week.

Table 9. Creel census results from Badger Slough, May 1976.

Angler Hours	
Weekdays	1,589
Weekends	1,467
Totals	3,056
Fishery Statistics	
Number of completed anglers interviewed	125
Mean hours fished/angler interviewed	1.6
Total grayling kept by angler interviewed	209
Grayling kept/angler hour	1.02
Total grayling harvest	3,117
Mean grayling fork length (mm)	235
Angler Composition	
Local	70.5
Military	29.4
Male	90.6
Female	9.3
Adult	77.1
Youth	22.8
Gear	
Fly fishermen	21.7
Spinning gear (other)	78.2
Lure	
Bait (shrimp, salmon eggs, corn, etc.)	38.2
Artificial lure (mepps spinners, spoons, etc.)	41.1
Artificial fly (Royal coachman, black gnat, etc.)	20.5

Table 10. Summary of creel census results for Badger Slough 1968 to 197

Year*	Inclusive Dates of Census	Days	Total Angler Hrs	Total GR Harvest	GR/day	GR per Angler Hr
1968	4/17-5/31	45	8,199	7,335	163	.82
1969	4/12-5/31	50	6,139	5,542	111	.80
1970	5/01-5/31	31	6,200	2,669	86	.43
1971	No census					
1972	4/08-5/24	47	7.153	6.170	131	.86
1973	4/05-5/31	57	8,149	9,958	175	1.17
1974	No census					
1975	4/09-5/31	53	5,112	5,639	106	.95
1976	5/01-5/31	31	3,117	3,056	100.5	1.02

* Data prior to 1976 from Tack (1975).

Table 11. Length frequency (in % of sample) of grayling sampled from creel census areas, Chena River, 1976.

Fork Length (mm)	Upper Chena River	Badger Slough
100-109		
110-119		
120-129	1.6	
130-139	1.6	
140-149	1.6	
150-159	13.3	
160-169	5.0	
170-179	3.3	9.6
180-189	1.6	2.4
190-199	10.0	7.3
200-209	1.6	2.4
210-219	6.7	4.8
220-229	8.3	12.0
230-239	3.3	12.0
240-249	8.3	13.2
250-259	1.6	9.6
260-269	1.6	12.0
270-279	1.6	6.0
280-289	10.0	1.2
290-299	8.3	3.5
300-309	6.7	3.5
310-319	3.3	1.2
320-329		
330-339		
340-349		
n	60	83
$\bar{x}$	230	235
Range	129-310	

Table 12. Creel census of the grayling fishery on the upper Chena River adjacent to Chena Hot Springs Road, 1976

	Angler Hours		
Period	Weekdays	Weekends	Total
June	1,758	2,239	3,997
July	1,608	3,434	5,042
August	805	918	1,723
Total	4,171	6,591	10,762

Fishery Statistics	June	July	August	Total
Number of completed angler interviews	83	59	30	172
Mean hours fished/angler interviewed	2.9	3.5	3.4	3.2
Total GR kept by angler interviewed	65	108	30	203
GR kept/angler hour	.26	.52	.29	.36
Total GR harvest	1,039	2,622	500	4,161
Mean GR fork length				230 mm

Angler Composition	
Local resident	80.3
Military	9.3
Tourist	10.3
Male	71.9
Female	28.0
Youth	21.0
Adult	78.9

Table 13. Summary of creel census results for the upper Chena River, 1970-1976.

Year	Inclusive Dates of Census	Days	Total Angler Hours	Total GR Harvested	GR per Angler/Hour
1970*	5/1-5/31 7/14-8/29	78	12,518	6,770	.56
1974**	7/ -7/31	62	11,680	18,049	1.72
1975***	6/1-7/31	92	22,657	14,067	.62
1976	7/1-8/31	92	10,762	4,161	.36

* Tack, 1971
** Tack, 1975
*** Tack, 1976

Interviews were obtained from anglers having completed their trip to determine the length of time fished and their success, as well as the composition of the angling public. The results of the creel census appear in Table 12.

An estimated 10,762 angler hours were expended during the three months yielding 4,161 grayling. A summary of 4 years creel census information is presented in Table 13. The total angler hours for 1976 is considered a little below average and the total harvest appears extremely low with a catch rate of 0.36 grayling per hour. These figures do, however, coincide fairly closely with the creel census conducted in 1970. The angler hours then were about 12,000, the catch rate 0.56 grayling/angler hour, and the yield about 6,000 grayling (Tack, 1971). There is no single apparent reason for the observed decline in 1976.

The census in 1975 (Tack, 1976) was conducted on every other week whereas in 1976 it was conducted every week, thus the sampling intensity was greater and our catch rate figures are considered real. Construction activity along the Chena Hot Springs Road may have discouraged some angling activity, thus affecting the results.

Table 12 shows the average length of grayling caught on the upper Chena to be 230 mm (about 9 1/2"). Tack in 1975 found that the average size was about 10".

LITERATURE CITED

Novotny, D. W. and G. R. Priegel. 1974. Electrofishing boats. Improved designs and operational guidelines to increase the effectiveness of boom shockers. Tech. Bull. No. 73, Wisc. Dep. of Natur. Resour., 48 pp.

Ricker, W. E. 1958. Handbook of computations for biological statistics of fish populations. Fish. Res. Board of Can., Narrain, B.C. Canada, Bull. 119.

Roguski, E. A. and P. C. Winslow. 1969. Investigations of the Tanana River and Tangle Lakes grayling fisheries: migratory and population study. Alaska Dept. of Fish and Game. Fed. Aid in Fish Restoration, Annual Report of Progress, 1968-1969, Project F-9-1, 10:333-351.

_____ and S. L. Tack. 1970. Investigations of the Tanana River and Tangle Lakes grayling fisheries: migratory and population study. Alaska Dept. of Fish and Game. Fed. Aid in Fish Restoration, Annual Report of Progress 1969-1970, Project F-9-2 11:303-319.

Tack, S. L. 1971. Distribution, abundance and natural history of the Arctic grayling in the Tanana River drainage. Alaska Dept. of Fish and Game. Fed. Aid in Fish Restoration, Annual Report of Progress, 1970-1971, Project F-9-3, 12(R-I)35 pp.

_____. 1972. Distribution, abundance and natural history of the Arctic grayling in the Tanana River drainage. Alaska Dept. of Fish and Game. Fed. Aid in Fish Restoration, Annual Report of Progress, 1971-1972, Project F-9-4, 13(R-I)36 pp.

_____. 1973. Distribution, abundance and natural history of the Arctic grayling in the Tanana River drainage. Alaska Dept. of Fish and Game. Fed. Aid in Fish Restoration, Annual Report of Progress, 1972-1973, Project F-9-5, 14(R-I)34 pp.

_____. 1974. Distribution, abundance and natural history of the Arctic grayling in the Tanana River drainage. Alaska Dept. of Fish and Game. Fed. Aid in Fish Restoration, Annual Report of Progress, 1973-1974, Project F-9-6, 15(R-I)52 pp.

_____. 1975. Distribution, abundance and natural history of the Arctic grayling in the Tanana River drainage. Alaska Dept. of Fish and Game. Fed. Aid in Fish Restoration, Annual Report of Progress, 1974-1975, Project F-9-7, 16(R-I)35 pp.

_____. 1976. Distribution, abundance, and natural history of the Arctic grayling in the Tanana River drainage. Alaska Dept. of Fish and Game. Fed. Aid in Fish Restoration, Annual Report of Progress, 1975-1976, Project F-9-8, 17(R-I)27 pp.

Van Hulle, F. D. 1968. Investigations of the fish populations in the Chena River. Alaska Dept. of Fish and Game. Fed. Aid in Fish Restoration, Annual Report of Progress, 1967, 1968, Project F-5-R-9, 9:287-304.

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