RESEARCH PROJECT SEGMENT

State:	ALASKA	Name:	Sport Fish Investigations of Alaska.
Project No.:	F-9-7		
Study No.:	G-I	Study Title:	INVENTORY AND CATALOGING
Job No.:	G-I-H	Job Title:	Inventory and Cataloging of Sport Fish and Sport Fish Waters of the Lower Susitna and Central Cook Inlet Drainages.

Period Covered: July 1, 1974 - June 30, 1975.

ABSTRACT

Eleven lakes were tested in the Anchorage Management Area for fish population data. General characteristics of water chemistry in nine lakes are reported. One lake was treated with 2.5% emulsified rotenone to eradicate a population of threespine stickleback, Gasterosteus aculeatus.

Rainbow trout, Salmo gairdneri were stocked in 15 lakes, and Arctic grayling, Thymallus articus, were planted in two lakes.

An estimated 630 eulachon, Thaleichthys pacificus were harvested from Twenty Mile River at a rate of 0.3 fish per hour by recreational fishermen in 1974. This is less than the 1972 and 1973 harvest rates of 9.02 and 20.76 fish per hour, respectively.

A study on the Talachulitna River was conducted to provide population estimations, growth information, and age data for Arctic grayling, T. articus, and rainbow trout, S. gairdneri, stocks.

The 1974 escapement of chinook salmon, Oncorhynchus tshawytscha, into west side Susitna streams was studied. Escapement was generally improved over 1973 levels.

RECOMMENDATIONS

1. Evaluation of fishery resources in stream waters of the Greater Anchorage Area Borough be conducted on a continuing basis. Watersheds of special importance are Campbell and Ship creeks.

2. Creel census in the western Prince William Sound area will be conducted as possible in conjunction with other activities. Angler interviews will be specifically conducted on Eshamy and Shrode creeks for catch information to establish sport fish effort and harvest.

3. Investigation of waters between the Chakachatna River on Cook Inlet and headwaters of the Talachulitna River be intensified due to anticipated effects of proposed timber sales, coal exploration, and gas field development in the area. Environmental impact analysis will be required from the Department of Fish and Game.

4. Future studies are recommended for the upper Talachulitna River to provide a more complete data base in discussing population trends. Sampling bias for grayling as opposed to trout should be explored, as well as location of I and II age classes of grayling. More scale samples and lengths from creel censused fish should be collected. A comprehensive approach to management planning necessitates that general life history information, e.g., timing of migration, spawning maturity, timing of out-migration for grayling and trout, in-stream habitat, food studies, and food competition studies with other species be collected and evaluated to determine inherent characteristics of grayling and trout populations.

OBJECTIVES

1. To survey existing and potential recreational fishing waters, establish and record their basic biological, physical, and chemical characteristics.

2. To assist in determining the status of public access on waters of the area and recommend selection of specific public fishing access sites.

3. To evaluate the impact of multiple water use and urban development projects on fisheries, aquatic life, and water quality of lakes and streams in the area.

4. To determine stocking measures, formulate management practices, and direct the course of future studies on area waters.

5. To investigate, evaluate, and develop plans for the enhancement of anadromous and resident fish stocks.

TECHNIQUES USED

Fish population sampling throughout waters of the Beluga Forelands and local Anchorage lakes were conducted with 125 x 6 foot variable mesh gill nets, Smith-Root Type V electrofisher, dip net, and hook and line methods. Measurements on fish collected included total lengths to the nearest millimeters (mm), and weight to the nearest gram (g). Scale samples from fish were pressed on cellulose acetate sheets and projected by scale reader to determine ages.

Water samples collected from lakes by a Kemmerer water sampler were analyzed for the water quality constituents of pH, total alkalinity, and total hardness with a Hach AC-36-WR test kit.

On selected area streams, creel census for data on catch rates of sport fish was conducted by angler interview. Fishing pressure was determined from instantaneous counts during the angling day on randomly selected weekend and weekdays during the census periods.

An alternating current shocker boat (described by Van Hulle, 1968) was used to capture grayling for population estimations and age-growth studies in the Talachulitna River. Throughout the study area, a voltage of 225 and amperage of 2.5 were maintained. In some sections, particularly where clay bottom was encountered, voltage and amperage increased to 350 and 4.5, respectively. In such cases the pulsator was readjusted to 225 volts and 2.5 amps.

Of the 9.2 mile study area length, a 5.3 mile length was divided into 19 study sections.

Captured fish were treated and examined by species: rainbow trout, Arctic grayling, round whitefish, burbot, longnose suckers, slimy sculpins, rainbow trout, and grayling were anesthetized with tricaine methanesulfonate to aid in recording length measurements, collecting scale samples, and fin punching. After data collection, anesthetized fish were placed in a recovery bucket. No mortalities were observed and all fish were released within the study section. The Petersen mark and recapture population estimator was used.

A creel census was conducted from Judd Lake to the gorge area. Length measurements and scale samples were collected from grayling and trout. Fishermen were questioned as to number of hours spent fishing, total catch, and catch by species.

Age-length data for fish from both the creel census and electro-sample were worked up separately. Length data from the two samples were analyzed separately through use of a body-scale regression.

A Micro-Design Scale Reader was used in determining age of scales and a nomograph was used in measurement of annuli.

Aerial and ground surveys were utilized to observe distribution, numbers and time of arrival of adult chinook salmon in Upper Cook Inlet streams.

FINDINGS

Anchorage Area Lakes-Test Netting

The total length, weights, and fish species present in each of the 11 lakes test netted in 1974 are shown in Table 1. All of the lakes shown, except Green and Sand, were stocked with game fish in 1974 and are part of the Sport Fish Division stocking programs and/or have management potential.

Table 1. Test Netting Results, Anchorage Area Lakes, 1974.

Lake	Date	Species	Number of Fish	Length (mm) Range	Length (mm) Mean	Weight (g) Range	Weight (g) Mean	Net-Hours	Fish/ Net-Hours
Campbell Pt.	10/22/74	-	0	-	-	-	-	43.00	0.00
Clunie	10/24/74	RT	10	270-481	365	194- 998	463	42.00	0.24
DeLong	10/22/74	RT	2	492-572	532	1,306-1,776	1,541	42.50	0.05
Green*	10/15/74	-	0	-	-	-	-	49.50	0.00
Gwen	10/25/74	RT	18	356-431	398	703-1,358	1,000	22.50	0.80
Jewell	10/21/74	RT	2	275-283	279	183- 200	192	21.50	0.09
Lower Fire	10/17/74	-	0	-	-	-	-	48.25	0.00
Mirror	10/17/74	-	0	-	-	-	-	49.00	0.00
Sand	10/22/74	-	0	-	-	-	-	49.25	0.00
Thompson	10/24/74	RT	11	323-560	346	348- 824	567	36.50	0.30
Triangle	10/15/74	-	0	-	-	-	-	48.50	0.00

*Note - Green Lake rehabilitation September 7, 1974.

Anchorage Area Lakes - Water Chemistry

Data on water chemistry was taken and recorded prior to breakup for nine lakes in the Anchorage area (Table 2). Linear relationships between conductance, total hardness, and total alkalinity indicate correlations between specific conductance and total hardness, specific conductance and total alkalinity, and total hardness and total alkalinity. Future regression analyses and chemical data will aid in determination of specific ion levels.

Table 2. Water Chemistry in Anchorage Area Lakes, 1974.

Lake Name	Date	pH	Total Alkalinity (ppm)	Total Hardness (ppm)	Conductivity micromhos/cm
Campbell Pt.	4/11/74	6.9	51	51	89
DeLong	4/11/74	6.4	26	17	47
Jewell	4/11/74	6.7	43	34	92
Six-Mile	4/17/74	7.7	145	162	240
Lower Fire	4/17/74	7.2	137	137	220
Otter	4/17/74	7.9	180	188	280
Green	4/17/74	7.1	86	86	154
Mirror	4/17/74	7.4	120	137	250
Hillberg	4/17/74	6.8	68	80	120

Anchorage Area Lakes-Lake Rehabilitation and Sport Fish Stocking

Green Lake, (Elmendorf Air Force Base) a lake of 19 surface acres, was treated with 2.5% emulsified rotenone during 1974 to eliminate a threespine stickleback, Gasterosteus aculeatus, population. A concentration of 1.0 ppm rotenone was used. Depending upon lake detoxification, 5,000 3-4 fish per pound of rainbow trout, Salmo gairdneri, are tentatively scheduled for stocking in the spring of 1975.

Fifteen lakes in the Anchorage management area were planted with a total of 109,640 rainbow trout during 1974. Arctic grayling, Thymallus arcticus, were stocked in two lakes. The lakes stocked, the species planted, their size and number of fish released, are shown in Table 3.

Table 3. Fish Stocking in Anchorage Area Lakes, 1974.

Lake Name	Date	Species Stocked*	Number Stocked	Size (Fish/Lb.)
Beach	5/16	RT	3,900	4.0
Campbell Point	5/20	RT	5,000	3.6
Children's Pond	6/19	RT	100	1.2
Clunie	5/16	RT	10,100	3.9
DeLong	5/22	RT	1,000	1.9
Gwen	5/10	RT	3,000	7.1
	5/15	RT	700	2.0
Hercules	6/25	RT	1,100	7.2
Hillberg	5/17	RT	2,600	2.6
	5/17	RT	2,300	4.0
Jewell	5/13	RT	4,500	1.9
	5/22	RT	300	1.4
	5/22	RT	1,200	6.9
	5/22	RT	500	1.9
	7/25	RT	5,000	313
Lower Fire	7/ 8	RT	9,600	112
	7/25	RT	15,600	313
Mirror	6/11	GR	20,300	Fry
	6/13	GR	25,000	Fry
Otter	6/10	RT	4,050	5.6
	6/11	RT	3,490	4.6
	6/19	RT	500	1.2
Settling Pond (Derby)	6/10	RT	1,000	3.1
Sixmile	6/12	GR	75,300	Fry
	6/13	GR	25,000	Fry
Thompson	5/20	RT	5,000	3.6
Triangle	5/17	RT	1,000	2.6
	5/17	RT	500	3.7

*RT - Rainbow Trout
GR - Arctic grayling

Multiple Water-Use and Urban Development Projects

Chester Creek Investigation:

Chester Creek, a small stream flowing through Anchorage, has a long history of abuse through the processes of urban development. Water-use developments, channelization, and pollution have been directly responsible for significant changes in the characteristics of the creek and, ultimately, depletion of the fisheries resources.

An investigation to evaluate Chester Creek as fisheries habitat, its naturally existing fish populations, and a population of stocked rainbow trout was developed during 1972. Information collected on this project is presented by Trent (1973).

The Department of Fish and Game initiated a study in 1973 (Kubik and Trent, 1974), at the request of the Alaska State Legislature to assess the suitability of Chester Creek for salmonid fish production and to determine if the stream offers any benefits to the community through a managed fishery program. This special report reviews the findings of this investigation, outlines the capabilities of the stream to produce salmonid fish, and assesses the effects of land use development along the creek regarding fish habitat.

Data obtained from the two aforementioned studies suggest the following recommendations be applied to Chester Creek:

1. Chester Creek should not be managed for anadromous fish because:

    a. The stream has been so altered that it lacks the necessary water quality and required spawning and rearing habitat.

    b. The combined effects of reservoir dams, unproven fish passage facilities, and road culverts will inhibit both upstream and downstream migrations.

    c. The establishment of salmon in a "high-density" urban area stream of Chester Creek's size will result in snagging and molestation problems of a magnitude negating any opportunity for recreational fishing. Inevitable harassment of the salmon population will work against its aesthetic value.

    d. The past and current pattern of land-use adjacent to Chester Creek is developmental (involving a cost of millions of dollars) including stream bank and stream bed alterations to enhance rapid water runoff. This development will not and cannot be reversed to establish the rearing areas, ponds, etc., required for anadromous fish.

    e. The cost of physically rehabilitating even small areas of Chester Creek are prohibitively expensive and not warranted by the potential of the stream habitat and decreasing stream flows.

2. Rainbow trout should not be introduced for establishment of a recreational fishery because:

    a. Rainbow trout are not and have never been native to this system.

b. Survival and growth of experimentally stocked rainbow trout has been unsatisfactory.

c. Stocked rainbow trout would compete with the native Dolly Varden, Salvelinus malma.

d. Angler harvest of stocked rainbow trout in Chester Creek has been unsatisfactory.

e. Access to Chester Creek is so reduced by private ownership of streamside areas that recreational anglers have limited areas to fish.

f. The attraction of stocked rainbow trout would greatly increase the incidence of trespass over private property, subsequently increasing land-owner-angler conflicts.

3. Dolly Varden trout should be maintained in the remaining natural portions of Chester Creek because:

   a. Dolly Varden are native to the system.

   b. A population currently exists in Chester Creek and is adapted to the existing conditions.

   c. The Dolly Varden present offer nearly as much recreational opportunity as the stream can provide considering the landowner-access limitations.

4. It is recommended that no further fisheries enhancement projects be undertaken because Chester Creek has already been substantially altered from its natural state. Rehabilitation to a flood-safe, natural condition would be prohibitively expensive, perhaps impossible.

Eulachon Investigations

Investigation of the Twenty-Mile River eulachon, Thaleichthys pacificus, populations and the dip-net fishery continued for the third consecutive year. The main channel of Twenty-Mile River was ice-free by April 19, 1974. First recorded 1974 entrance of eulachon into Twenty-Mile River was on May 18.

In 1972, recreational fishermen dip netted an estimated 1,259 man-hours to harvest 15,870 fish (Trent, 1972). The stronger and more extended run of smelt in 1973 resulted in an estimated harvest of 72,950 fish in 3,514 angler-hours of effort from May 16 to June 12, 1973.

The 1974 smelt run into Twenty-Mile River did not materialize as evidenced by the low number of dip-net fishermen. An estimated 2,100 man-hours of effort was recorded in the harvest of 630 fish. Dip netters were on the fishing grounds from May 11 to June 7. The mean success rate of anglers

in 1974 was 0.3 fish per hour as compared to 20.76 fish per hour in 1973 (Trent, 1973) and 9.02 fish per hour in 1972 (Trent, 1972).

Talachulitna River Investigation

Introduction:

The Talachulitna River, (Figure 1), is located northwest of Beluga Mountain and is approximately 35 miles in length. There are two main tributaries comprising the upper Talachulitna system; one originating from the southwest side of Beluga Mountain and the other at the outlet of Judd Lake. The two join at a confluence approximately 11 miles downstream from Judd Lake.

Float fishermen begin at Judd Lake, float Talachulitna Creek to the confluence, then float Talachulitna River to the first gorge area (Figure 1). Most float fishermen are picked up by charter aircraft prior to reaching the gorge area.

The Arctic grayling-rainbow trout population study area is located from the confluence to the gorge, a distance of 9.2 miles. Because of low water conditions, population studies were not conducted on Talachulitna Creek. Areas below the gorge are physically inaccessible for available methods of estimating fish population size.

The project was initially intended to provide population estimations, growth information, and age data for Arctic grayling, and rainbow trout stocks. Since rainbow trout were found to be unavailable with present methods and means for conducting population estimations, most data collected was from grayling. Information collected from trout, however, will be included here. While collecting data for population estimations, other fish species were observed and were noted by species and number. No age-growth data was collected from these fish.

Results:

The initial electrofishing time capturing fish to be marked was 399 minutes. Recovery shocking time was 798 minutes. Two rainbow trout and 67 Arctic grayling were marked. Of the 29 grayling captured, only five were marked. One unmarked rainbow trout was captured.

Using Petersen's population estimation equation, a value of 389 was calculated as the estimate of grayling in the study sections. Values of 186 and 957 are the lower and upper population estimate bounds of grayling in the study sections.

There were four and one-tenths miles, or 45%, of the river within the study area not shocked and therefore not available for population estimate. Extrapolation of the estimate to include unshocked and shocked areas increases the estimate of grayling to 864 with lower and upper limits of 413 and 2,126, respectively. No population estimate for rainbow trout was made.

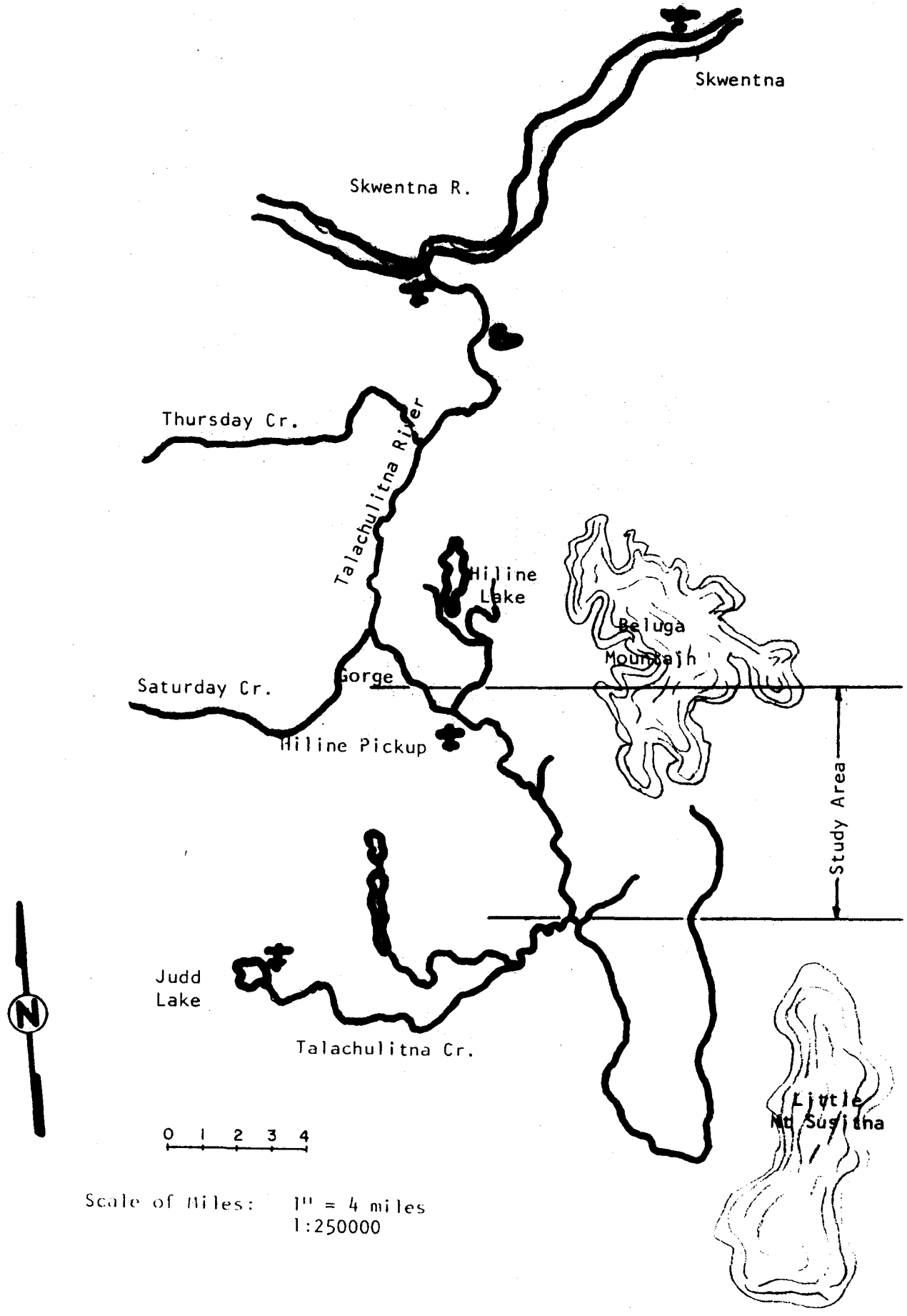

Figure 1. Talachulitna River

The collected sample size was 91 excluding recaptured marked grayling. Scales from five grayling were regenerated, consequently 86 fish were aged with a predominant age class of III (Figure 2). Length frequency and variation in length per age group are shown in Figures 3 and 4, respectively. A seriation to determine a body-scale regression of Y=70.1+1.29X was calculated. This value was used in comparing the average length for each scale size class with the calculated average length for the class center (Figure 5). The value was also used in back calculations of length from measurements at previous annuli. Numbers of grayling in each age class determined from previous annuli and variation in back-calculated length per age group are presented in Figures 6 and 7.

Creel census on upper Talachulitna River began on June 30 and ended on September 30. Of the 130 float fishermen making the trip from Judd Lake to Hiline pickup (Figure 1), 122 were censused for accurate harvest data.

A total of 366 man days (Figure 8) were spent from Judd Lake to Hiline pickup with the average float trip lasting three days. Each fisherman averaged six hours of fishing per day, totaling 2,196 hours of fishing effort. There were 560 grayling and 300 trout caught, of which 371 grayling and 212 trout were put in the creel (Figure 9). Mortality factor of released fish is unknown. Grayling and trout catches were uniform for the effort involved. However, marked changes began occurring in July when more grayling than trout were caught. This trend continued through the duration of the creel census period (Figure 9).

Of the 371 total creel censused grayling only 39 samples were provided for scale and length measurement data. Additional samples were not available due to: (1) consumption of fish; (2) desire of many fishermen to keep the fish they had caught; and (3) lack of sampling materials early in the summer.

A seriation to determine the body-scale regression was calculated to be Y=75.4+1.37X. This value was used in comparing the average length for each scale size class with the calculated average length for the class center Figure 10). The value was also used in back calculations of length from scale measurements at previous annuli. Numbers of grayling in each age class determined from previous annuli and variation in back-calculated length per age group are presented in Figures 11 and 12.

Discussion:

This is the first study involved with age, growth, and abundance analysis of grayling and trout in the Talachulitna River system. A study area was established on the upper Talachulitna, an area of float fishing pressure. Rainbow trout were either not available or our present methods for estimating abundance was not appropriate. Arctic grayling were available and a population computed of 564 fish. The grayling sample used in age determination consisted of 91 grayling of which 86 could be aged. The creel census of 130 fishermen yielded a harvest of 371 grayling and 212 rainbow trout for 2,196 hours of fishing effort.

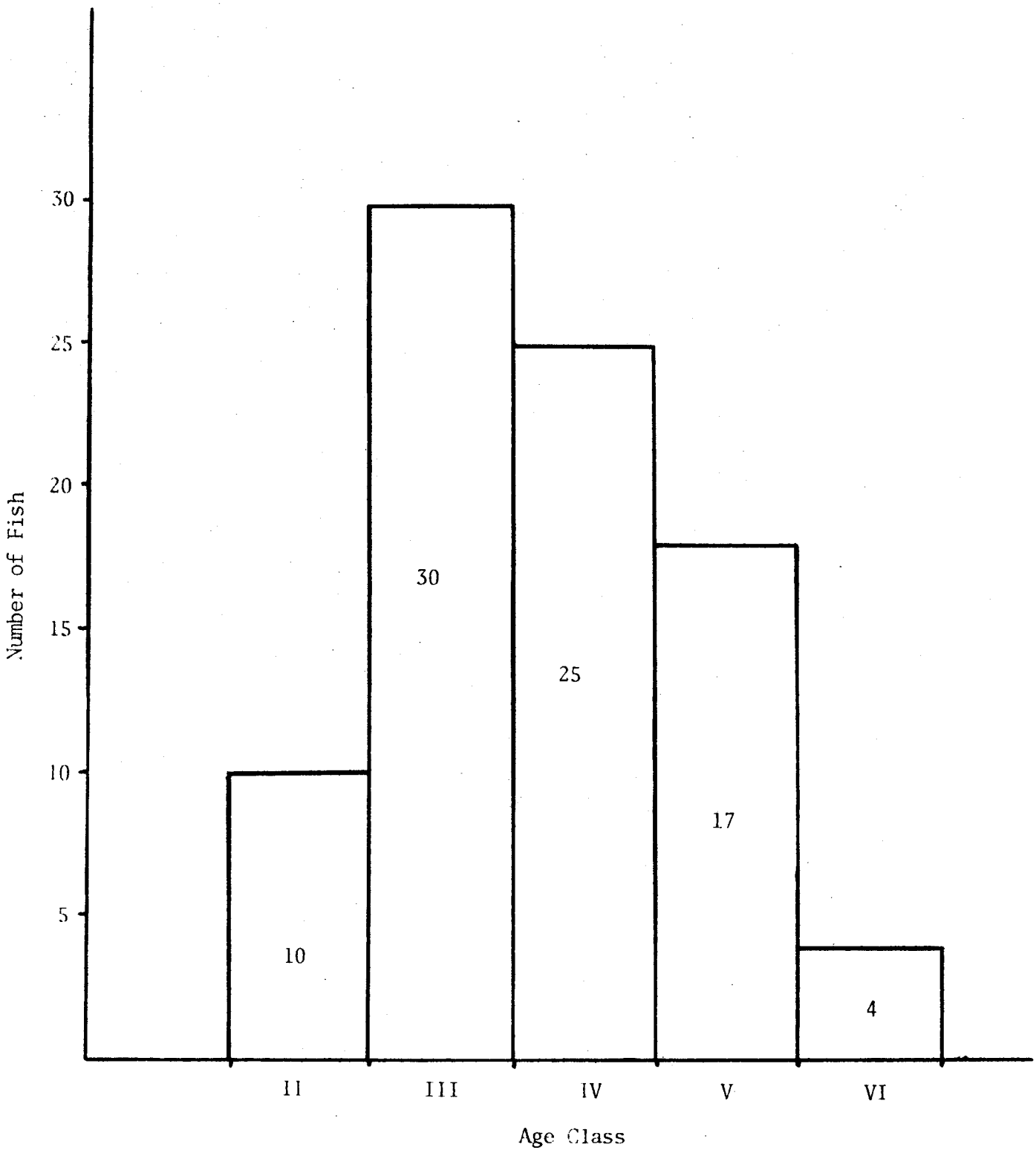

Figure 2. Number of fish in each age class.

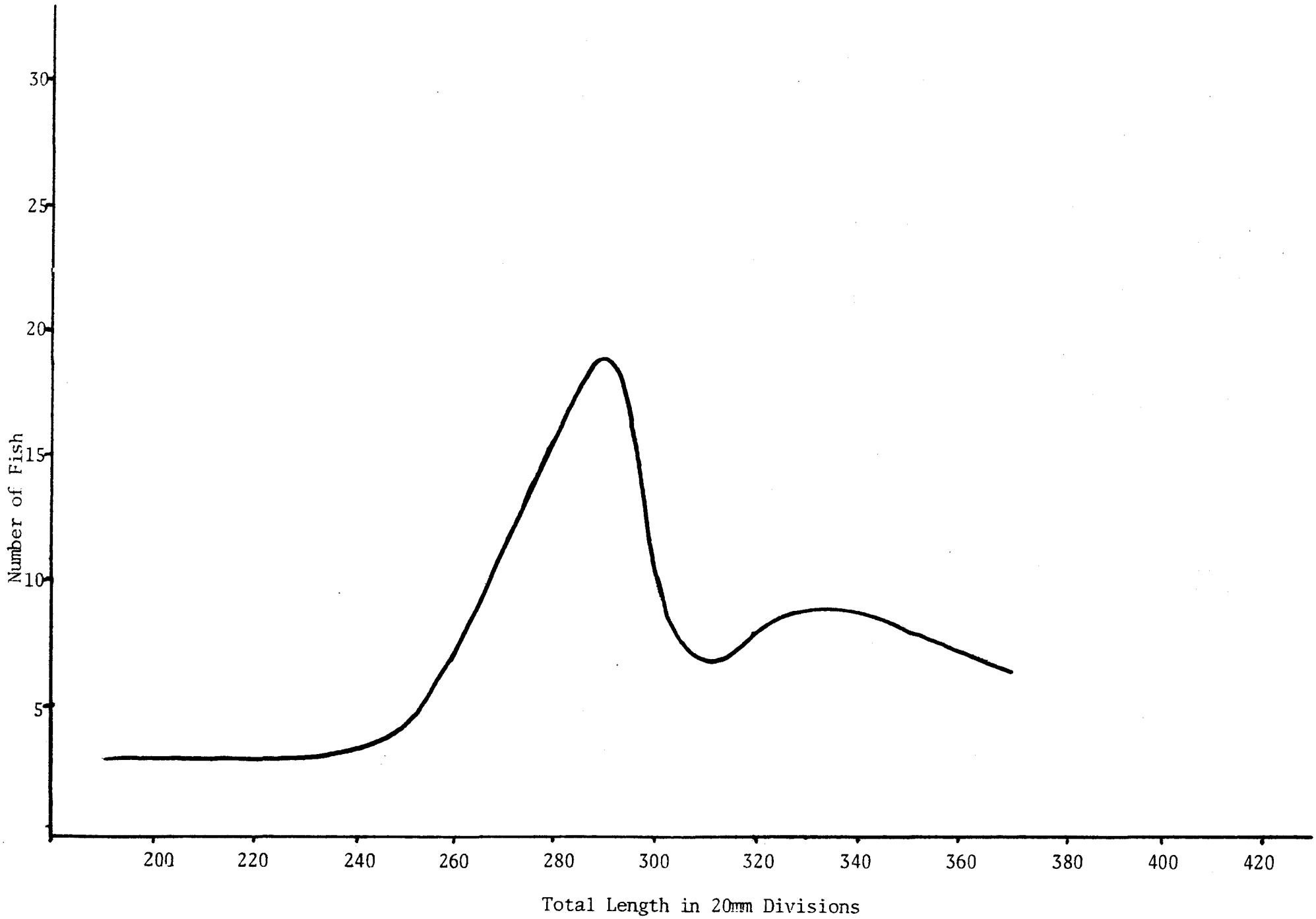

Figure 3. Length frequency of Arctic grayling in Talachulitna River, 1974.

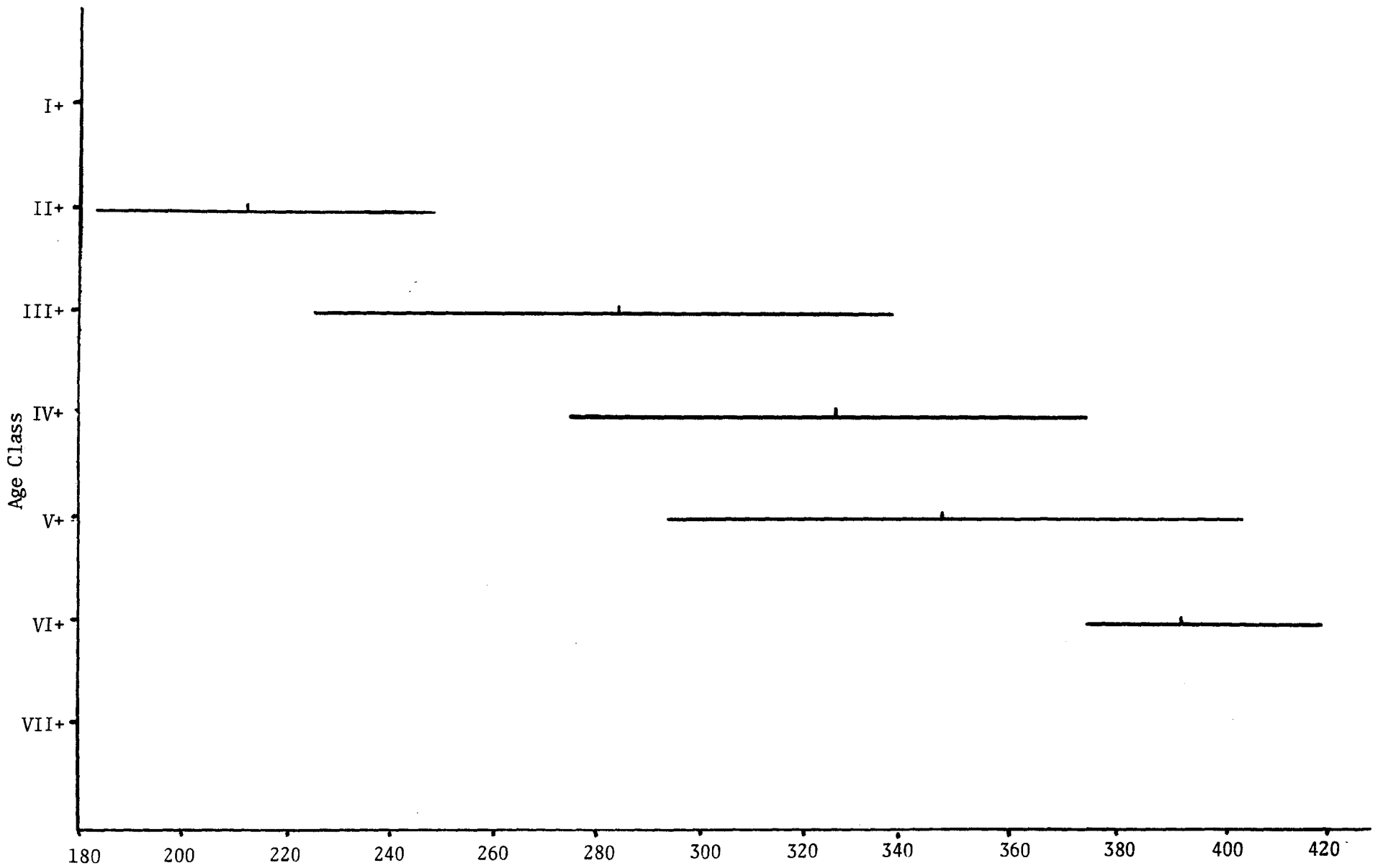

Figure 4. Variation in length per age group for Arctic grayling, Talachulitna River, 1974.

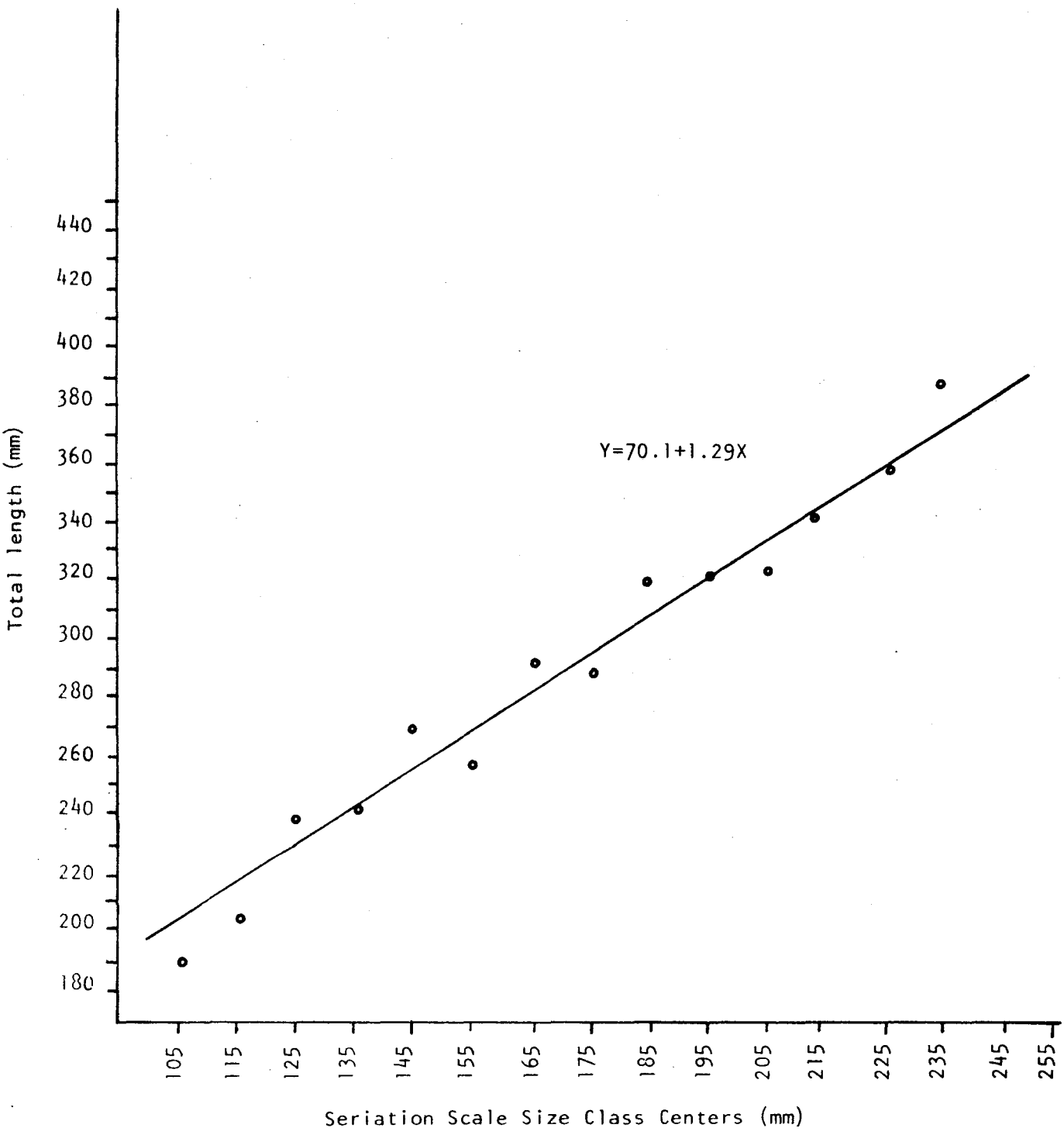

Figure 5. Comparison of the Average Length for Centers of Scale Size Classes (circled black dots) With The Calculated Length for the Class Centers (solid line) for Arctic Grayling, Talachulitna River, 1974.

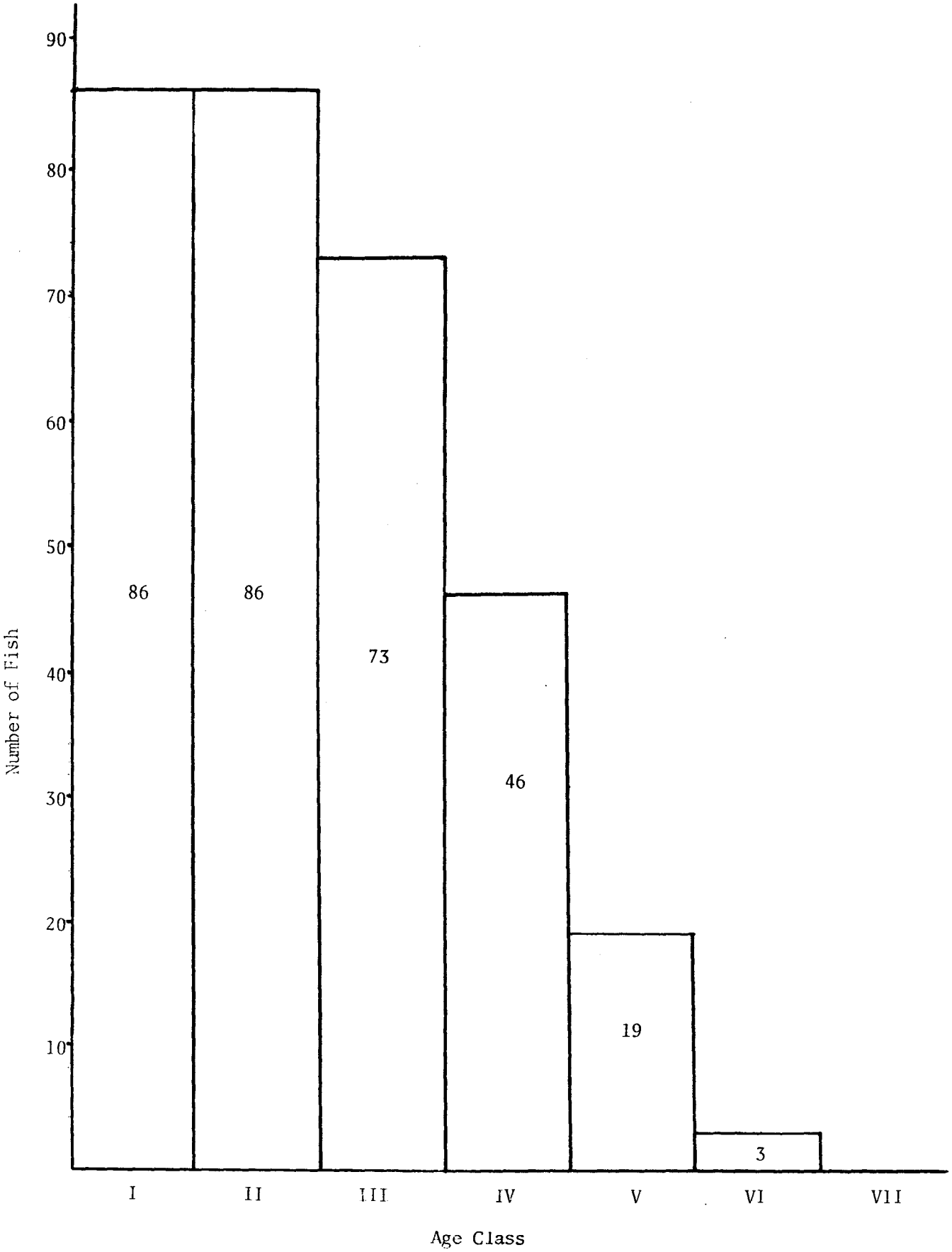

Figure 6. Number of Arctic grayling in each age class determined from previous annuli; Talachulitna River, 1974.

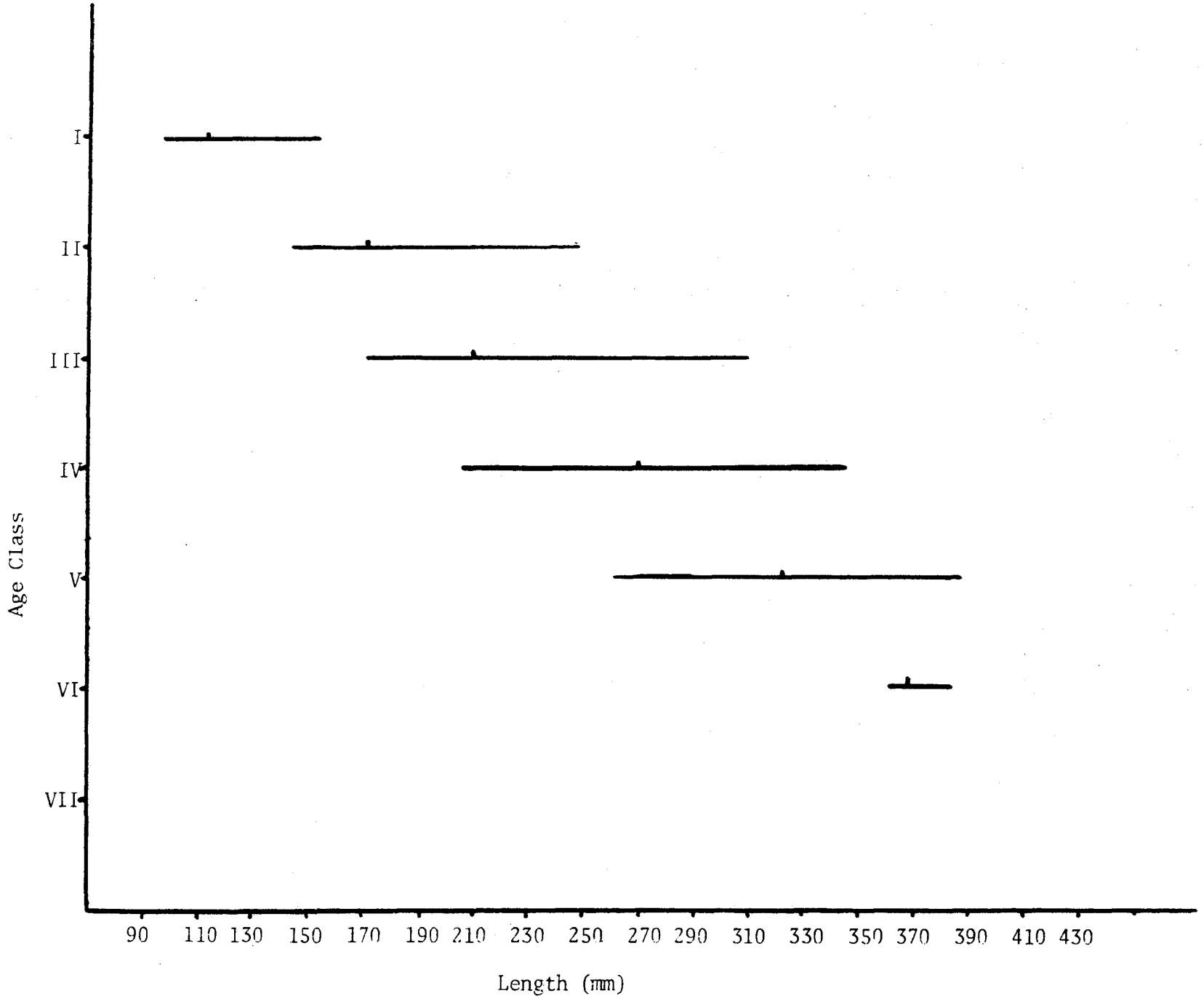

Figure 7. Variation in length per age class for Arctic grayling, Talachulitna River, 1974.

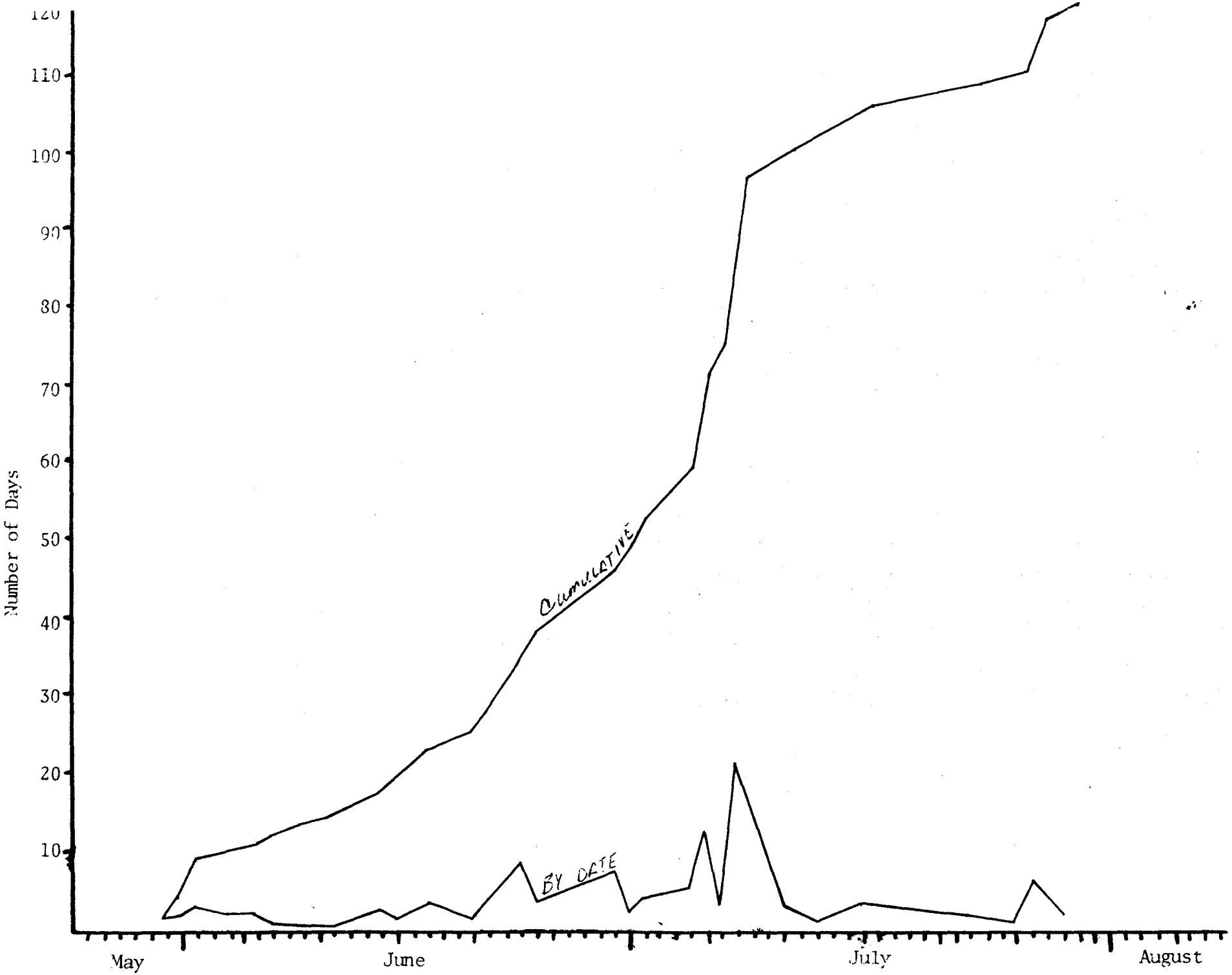

Figure 8. Cumulative float fishermen by date and numbers of float fishermen by date from Judd Lake to Hiline Pickup.

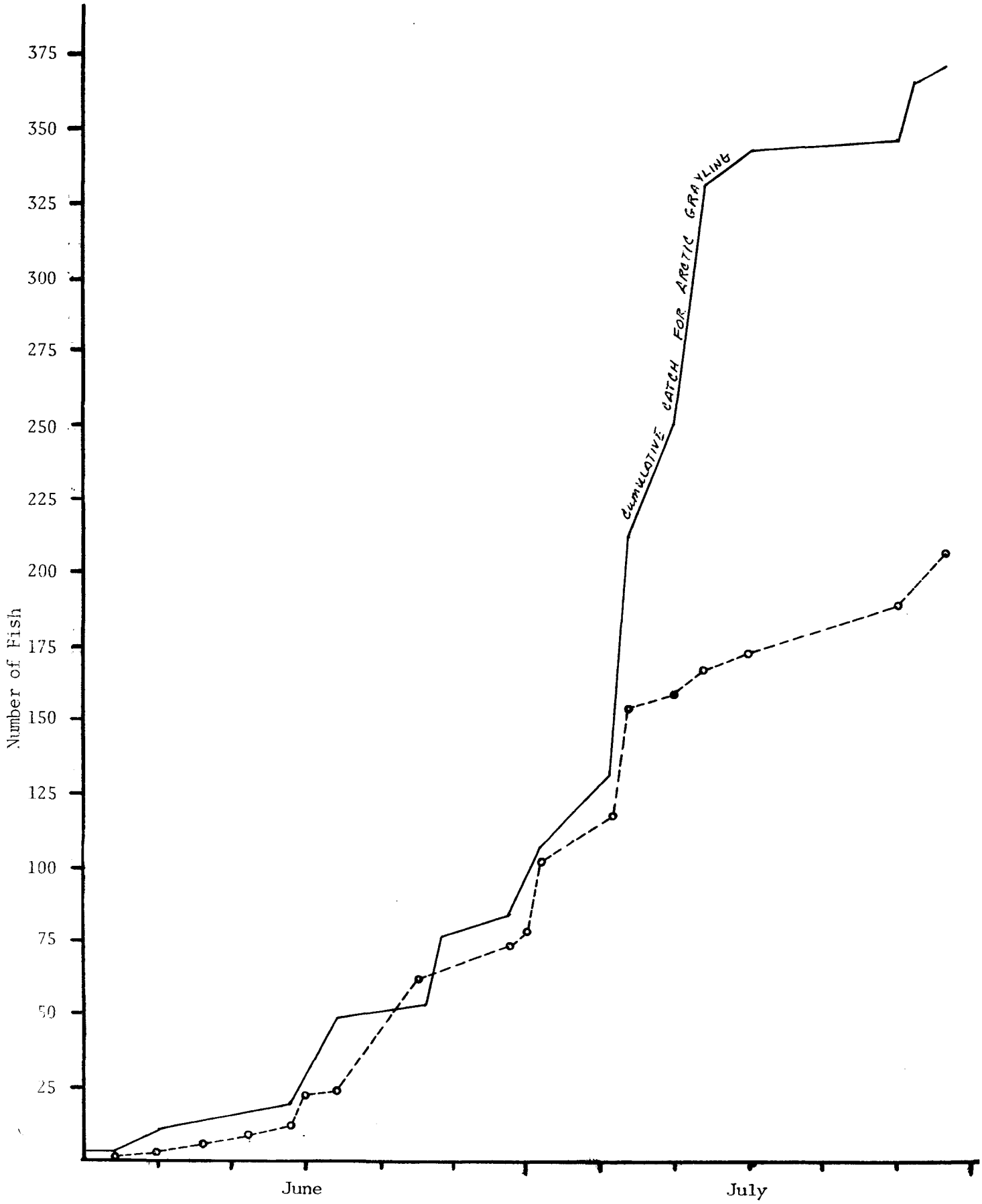

Figure 9. Cumulative Catch of Arctic Grayling & Rainbow Trout from Judd Lake to Hiline Pickup, Talachulitna River, 1974.

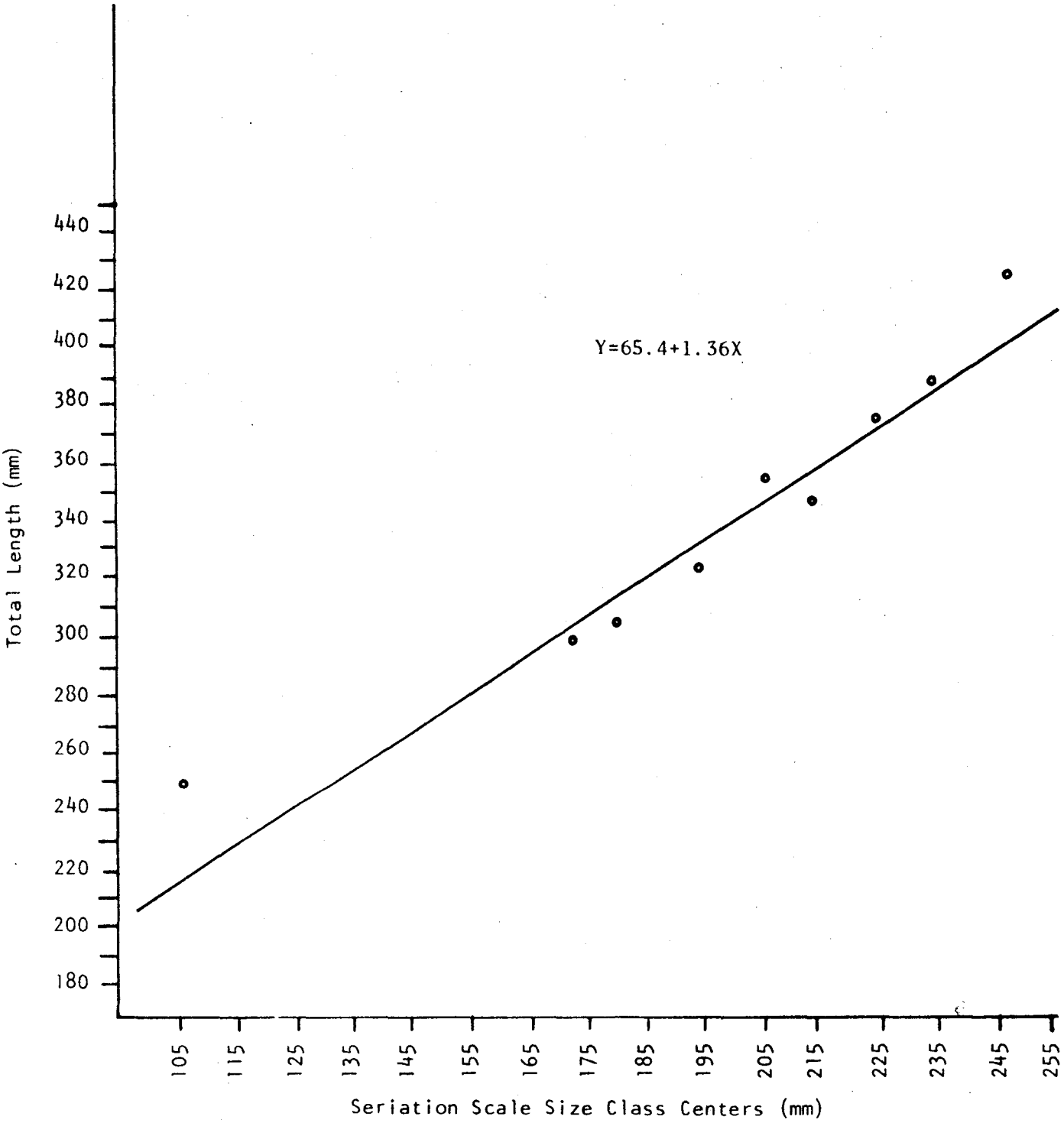

Figure 10. Comparison of the Average Length for Centers of Scale Size Classes (circled black dots) with the Calculated Length for the Class Centers (solid line) for Creel Censused Arctic Grayling, Talachulitna River, 1974.

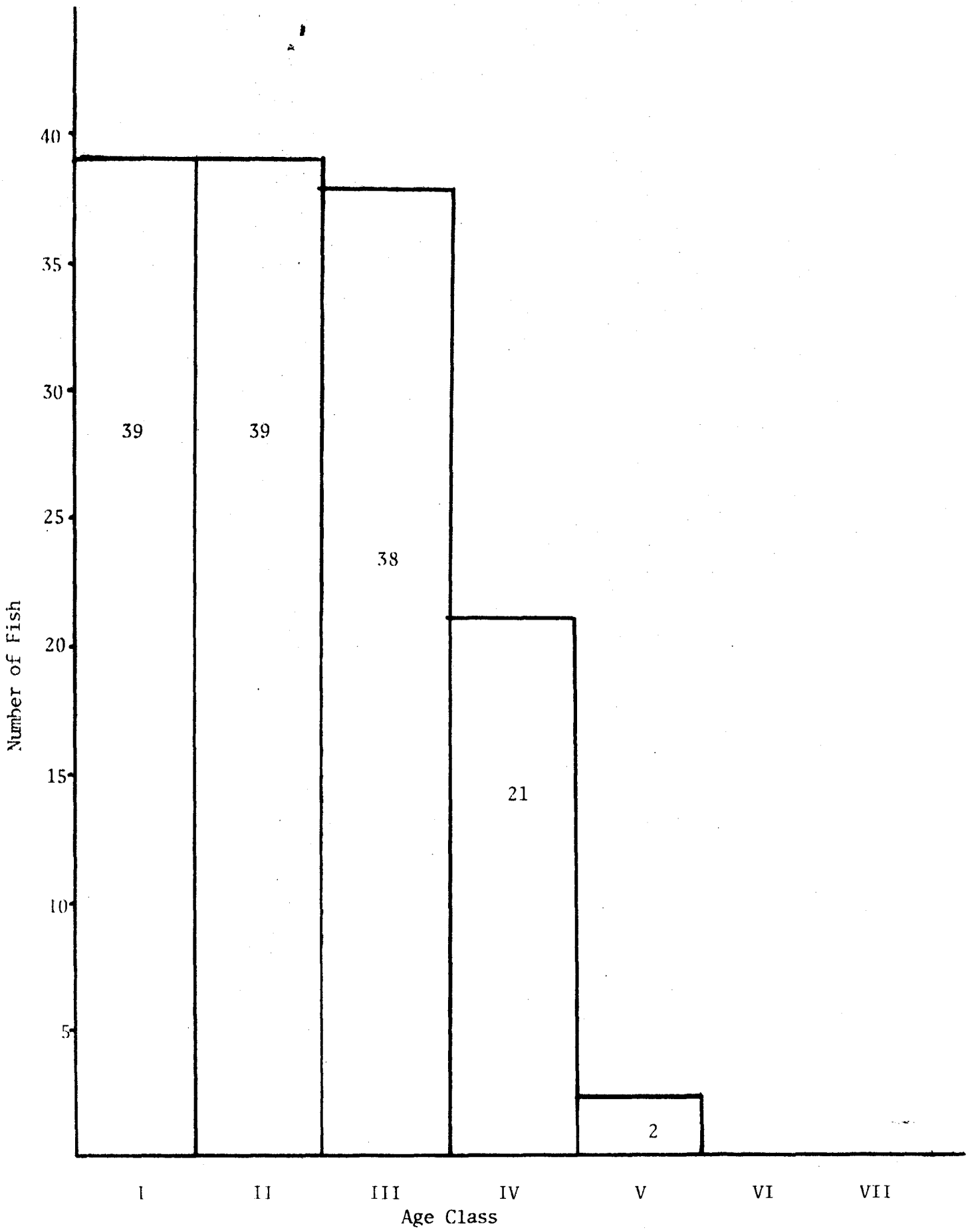

Figure 11. Number of Creel Censused Arctic Grayling in Each Age Class Determined from Previous Annuli, Talachulitna River, 1974.

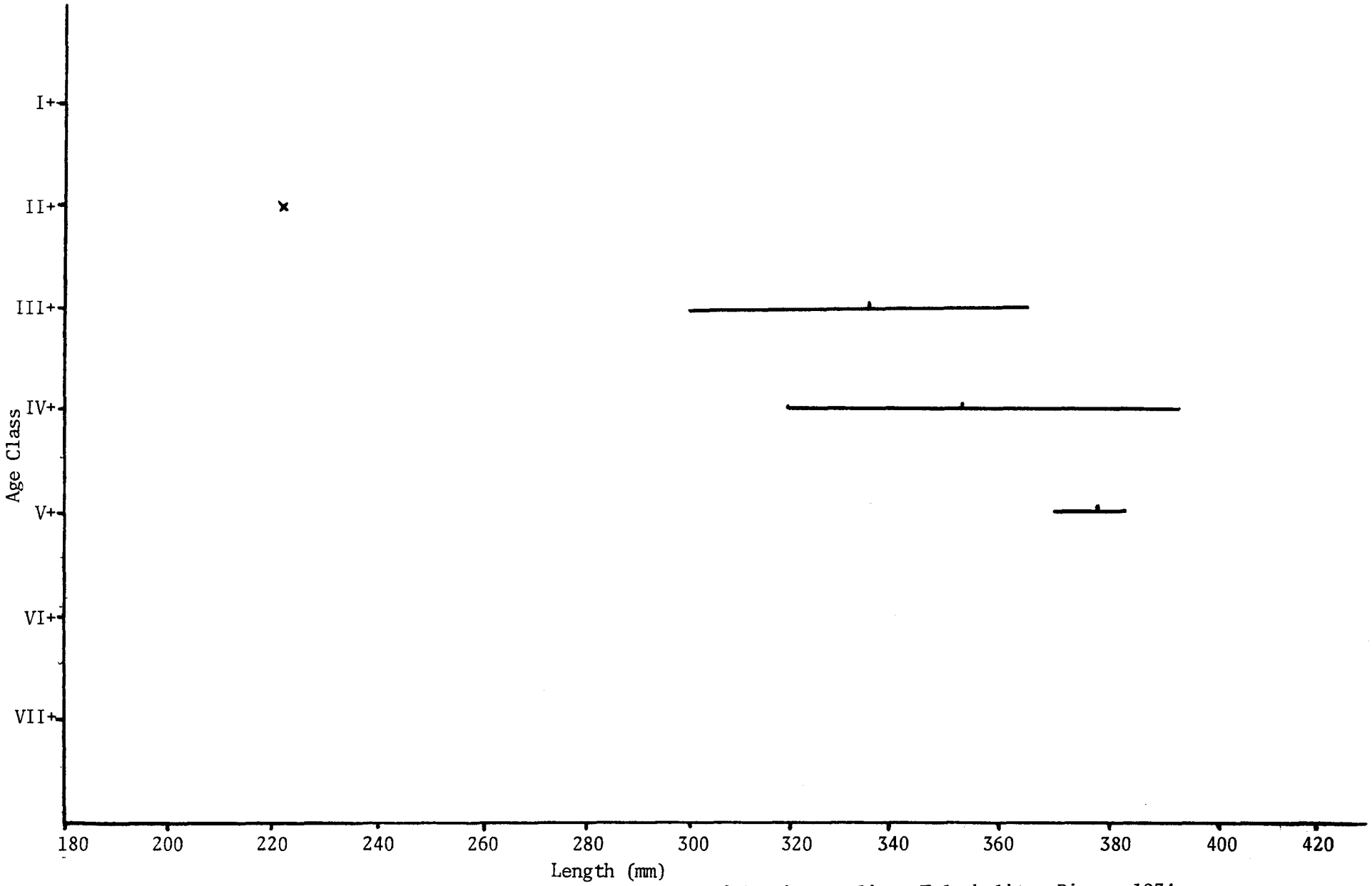

Figure 12. Variation in length per age group for creel censused Arctic grayling, Talachulitna River, 1974.

Upper Cook Inlet-West Side Susitna Chinook Salmon Escapement

Enumeration of chinook salmon, Oncorhynchus tshawytscha, escapement in key upper Cook Inlet streams was conducted in 1974 for the second consecutive year. Most west side tributaries of the Susitna River averaged higher counts in 1974 than in 1973; however, some streams contained fewer chinook salmon in 1974.

Enumeration of salmon in the Susitna River drainage is confined to the clear water tributaries. The magnitude of the chinook salmon run into upper Cook Inlet cannot be evaluated because the salmon cannot be detected visually in the many turbid glacial streams. Total escapement counts are not practical on these large streams so on some streams standard index areas are counted each year. This type of count, covering a fraction of the spawning area of a stream, provides only relative escapement values for a comparison from one year to another. The data collected is not intended as an index to total escapement.

Escapement surveys were conducted from July 29 through August 18 while the streams were low and clear, which resulted in excellent counting conditions throughout the survey period. All surveys were conducted with a Bell 47-G-2 helicopter.

A total of 8,980 chinook salmon were observed in 11 west side streams during 1974; in the streams where comparisons can be drawn between 1973 and 1974 (Table 4) there were 8,957 salmon counted in 1974 as compared to 4,977 in 1973.

Indications are that the 1974 chinook salmon escapement into the Deshka River and Alexander Creek is one of the highest recorded. A summary of chinook salmon survey counts for streams west of the Susitna River for 1973 and 1974 is shown in Table 4.

In addition to the west side Susitna streams, 3 creeks in the Anchorage area were surveyed for spawning populations of chinook salmon (Table 5).

Access Investigations

Matanuska-Susitna Borough:

The Department of Fish and Game submitted two requests to the Matanuska-Susitna Borough to set aside or otherwise dedicate water-oriented sites for public access. Both requests were favorably acted upon.

1. Resolution 74-83 established a 50-foot wide public use easement between Coal Creek and Coal Creek Lake with Section 15, T16N, R13W, S.M.

2. The Matanuska-Susitna Borough, by Resolution 74-83, established a 200-foot public access easement on either side of Talachulitna Creek in the north one-half of Section 14, T17N, R13W, S.M.

Table 4. Chinook Salmon Survey Counts - West Side Susitna River 1973-1974.

Stream	1973	Type Survey	1974	Type Survey
Deshka River System	2,381	Tower	5,279	Aerial
Alexander Creek System	875	Ground	2,193	"
Lake Creek System	761	Aerial-Ground	535	"
Chuit River	149	Aerial	171	"
Theodore River	205	Aerial	205	"
Lewis River	173	Aerial	135	"
Talachulitna River	333	Tower	303	"
Peters Creek	59	Ground	124	"
Canyon Creek	29	Aerial	10	"
Nakochna River	12	Aerial	2	"
Martin Creek	--	No count	23	"
Total	4,977		8,980	

Table 5. Chinook Salmon Survey Counts - Anchorage Area Streams 1973-1974.

Stream	1973	Type Survey	1974	Type Survey
Ship Creek	165	Ladder-Ground	146	Ladder
Campbell Creek	201	Ground	79	Aerial
Bird Creek	2	Ground	3	Aerial
Total	368		228	

Alaska Division of Lands:

A request was submitted to the Alaska Division of Lands asking for a 200-foot public easement on either side of Sections 14 and 15, T17N, R13W, S.M., from the Matanuska-Susitna Borough lands to the shores of Talachulitna Lake. This request is presently pending approval by the Department of Natural Resources.

LITERATURE CITED

Trent, T.W. 1973. Inventory and cataloging of sport fish and sport fish waters of the Lower Susitna and Central Cook Inlet drainages. Alaska Dept. of Fish and Game. Fed. Aid in Fish Restoration, Annual Report of Progress, 1972-1973, Project F-9-5, 14:53-73.

Kubik, S.W. and Trent, T.W. 1974. Chester Creek investigation report to Alaska State Legislature, on file at the Anchorage Fish and Game office. 32 pp. (Unpublished).

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