VOLUME 27
1 July 1985 to 30 June 1986
FEDERAL AID IN FISH RESTORATION
AND
ANADROMOUS FISH STUDIES

COOK INLET TROUT STUDIES

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Volume 27 Study S-31

STATE OF ALASKA

Bill Sheffield, Governor

Annual Performance Report for

LOWER COOK INLET CREEL CENSUS AND ESCAPEMENT

by

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RESEARCH PROJECT SEGMENT

State: Alaska Name: Sport Fish Investigations of Alaska

Project: F-10-1

Study: S-31 Study Title: COOK INLET TROUT

Job: S-31-1 Job Title: Lower Cook Inlet Creel Census and Escapement

Cooperator: D. Thomas Balland

Period Covered: July 1, 1985 to June 30, 1986

ABSTRACT

A creel census was conducted on the Anchor River in 1985; an estimated 10,851 angler-days of effort were spent during the period August 18 through October 27. It was estimated that anglers retained 36.1 percent of their steelhead trout, *Salmo gairdneri* Richardson, catch, resulting in a harvest of 185 fish. Anglers also harvested an estimated 1,061 Dolly Varden, *Salvelinus malma* (Walbaum) and 1,674 coho salmon, *Oncorhynchus kisutch* (Walbaum).

Samples from adult steelhead trout were comprised of ten age classes. First-spawning fish were of five age classes, and repeat spawners consisted of five age classes. The majority of first-spawning females were Age 3.2 and the majority of first-spawning males were Age 3.1. Repeat spawners comprised 17.6 percent of the fish sampled.

KEY WORDS

Steelhead trout, coho salmon, Dolly Varden, Anchor River, sport fishing effort, harvest, bacterial kidney disease, furunculosis.

BACKGROUND

A vicinity map showing location of the study area is presented in Figure 1, and a list of fish species common to the Anchor River drainage is presented in Table 1.

Anchor River has long been recognized as one of the most popular sport fishing streams on the Kenai Peninsula. The river supports populations of Dolly Varden, chinook, and coho salmon. It also has the largest steelhead trout population of the five Kenai Peninsula streams that produce this species.

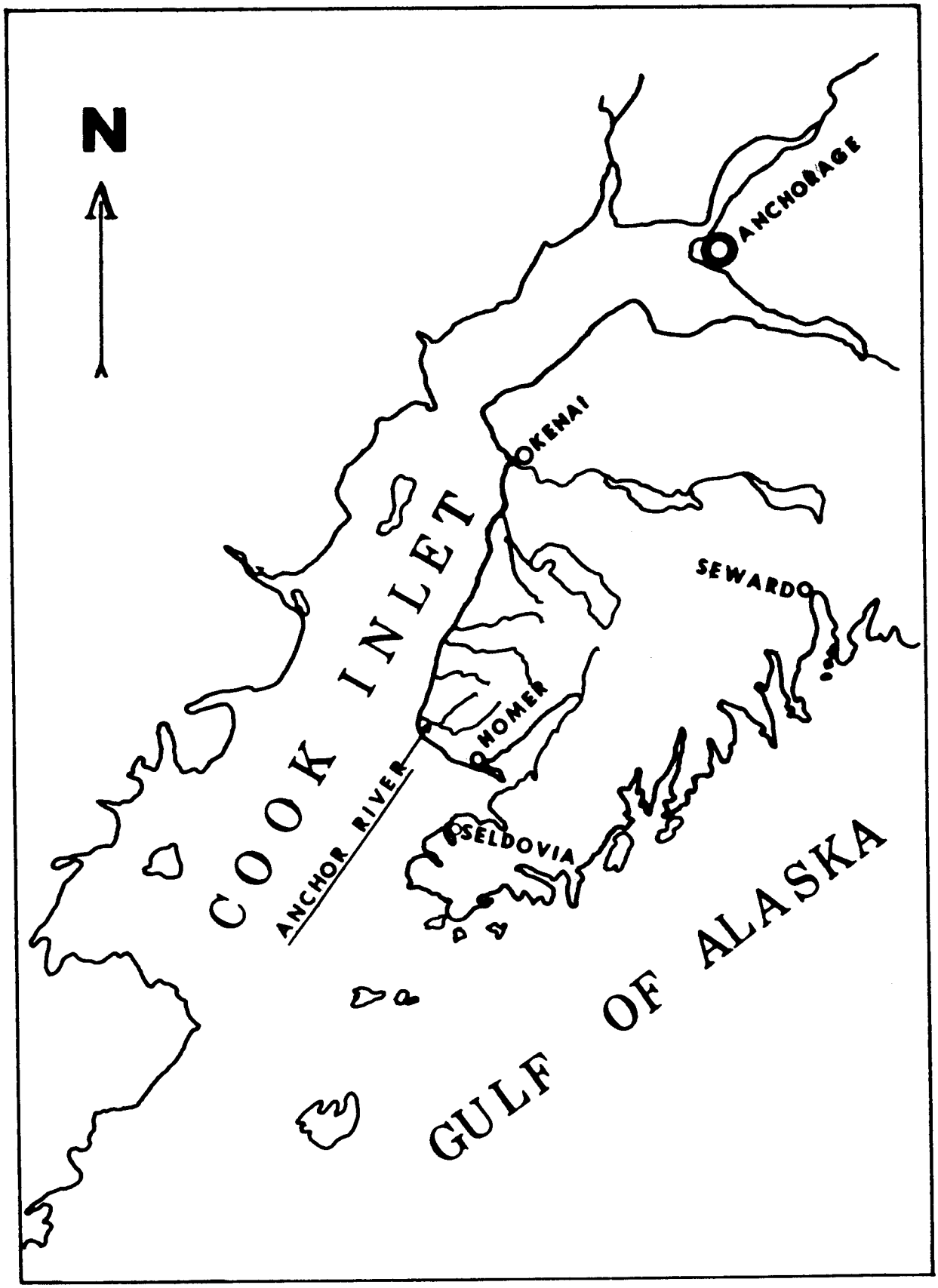

Figure 1. Vicinity map showing location of the study area.

Table 1. List of Common Names, Scientific Names and Abbreviations of Fish Species Commonly Fished for in the Anchor River.

Common Name	Scientific Name and Author	Abbreviation
Chinook Salmon	*Oncorhynchus tshawytscha* (Walbaum)	KS
Coho Salmon	*Oncorhynchus kisutch* (Walbaum)	SS
Dolly Varden	*Salvelinus malma* (Walbaum)	DV
Rainbow Trout	*Salmo gairdneri* Richardson	RT
Steelhead Trout	*Salmo gairdneri* Richardson	SH

Observations indicated a substantial increase in angler effort and harvest on the river from 1970 to 1977. During the period 1978-85, a creel census of the fall sport fishery was conducted to obtain data on harvest and population levels of Dolly Varden, coho salmon and steelhead trout.

Ten thousand to 20,000 angler-days of fishing effort annually are spent on the Anchor River during the period when steelhead trout are caught. Since Dolly Varden, coho salmon and steelhead trout are also caught during this period, it is not feasible to assign fishing effort to any one species. Total harvest of Anchor River steelhead trout has ranged from approximately 200 to 1,700 annually during the past 9 years. This catch has accounted for approximately 12% to 40% of the total combined harvest of steelhead trout in the state.

Steelhead trout stocks in all streams on the Kenai Peninsula are similar to those termed "summer run" throughout the Pacific Northwest. Adults enter the streams throughout the summer and fall, spend the winter in freshwater, spawn the following spring and migrate to the sea.

Some aspects of Anchor River steelhead trout life history and population characteristics have been periodically investigated since the mid-1950's, but the studies have been intermittent and of limited scope. Total run size, adult migrations, spawning characteristics, areas and timing of juvenile rearing and migration, and the potential for supplemental production are a few important aspects that have not been extensively addressed.

A life history study of steelhead trout in the Anchor River was initiated in 1980. Its goal was to gather biological information upon which to base management programs, formulate regulatory guidelines, and evaluate the need and potential for supplemental enhancement of these stocks. During the course of the life history study, juvenile salmonids of all species were captured, thereby providing an opportunity to obtain basic life history data for other species in addition to steelhead trout. These data will provide a better understanding of fish stocks and ultimately lead to better management techniques.

During the course of this investigation, data were compiled that provided a better understanding of the status of steelhead trout stocks in Anchor River and the instream movements of both juveniles and adults. However, there are two areas where techniques require refinement.

1. The method of estimating total population of adult steelhead trout is of marginal value. Endeavors to estimate total population were possible 4 out of 7 years, and confidence intervals of those estimates are great.

2. Methods of capturing steelhead trout smolts have not been satisfactory, resulting in an incomplete assessment of smolt migration timing and size. The most useful data have come from scale analysis of adult steelhead trout.

RECOMMENDATIONS

1. Efforts should be continued to determine angler effort and harvest of steelhead trout in the Anchor River and expanded to include Deep Creek and Ninilchik River.

2. Additional effort should be directed at determining the total steelhead trout population in the Anchor River and expanded to include Deep Creek and Ninilchik River.

3. Collection of life history data for steelhead trout, coho and chinook salmon, and Dolly Varden should be continued in the Anchor River and expanded to include Deep Creek and Ninilchik River.

OBJECTIVES*

1. To determine the adult harvest and in-season run strength of chinook salmon in Anchor River, Deep Creek, and Ninilchik River as well as the angler effort expended during this fishery.

2. To determine the adult harvest of steelhead trout, coho salmon and Dolly Varden in the Anchor River as well as the total angler effort expended to harvest these species.

3. To determine the age structure of the recreational chinook salmon harvest in Anchor River, Deep Creek and Ninilchik River and the age structure of the recreational steelhead trout harvest in Anchor River.

* Objectives addressing chinook salmon are included in the Cook Inlet Chinook and Coho Salmon Study report (S-32).

TECHNIQUES USED

A creel census was conducted during the period from August 18 to October 27. The method employed was a modification of that described by Neuhold and Lu (1957) and further described by Wallis and Balland (1981). For sampling purposes, Anchor River was separated into two sections: Area 1 included the area from the junction of the North and South Forks downstream to salt water; and Area 2 included the area from the forks upstream to the bridge on the Homer end of the North Fork Road. Creel census interviews were conducted in Area 1 during two randomly selected time periods of 2.5 hours each. Once a day at randomly selected times, a vehicle count was made in Area 2, and a creel census was conducted in Area 1. The estimated harvest in Area 2 was based on a comparison of the fishing efforts in Areas 1 and 2.

Scales were collected from adult steelhead trout during creel census and capture of fish for egg-take purposes. Collection techniques, preparation, and interpretations were the same as in 1978-1984 (Balland 1985).

Individual adult steelhead trout were weighed on a hand-held Chatillion scale, and weights were recorded to the nearest 100 g. Fish were measured to the nearest 5 mm.

Kidney and hindgut samples were collected from adult steelhead trout for pathological examination. The samples were collected from fish harvested by sport fishermen and frozen; later they were shipped to the pathology laboratory in Anchorage and examined for the presence of bacterial kidney disease and furunculosis.

To acquire brood stock for an enhancement project, steelhead trout were captured from Anchor River by Alaska Department of Fish and Game (ADF&G) personnel. All fish were captured by gill net. Handling techniques were similar to those used in 1982-1984 and described by Wallis and Balland (1983). Fish were transported to the Trail Lakes Hatchery and held for spawning the following spring.

FINDINGS

Creel Census

A creel census on Anchor River began on August 18 and terminated on October 27. A total of 2,585 anglers were interviewed. Completed anglers fished an average 2.56 hours per day. Total angler effort during this period was estimated at 10,851 man-days.

A weekly interval summary of sportfishing effort and the harvest of Dolly Varden, coho salmon and steelhead trout is presented in Table 2.

Angler effort prior to September is directed toward Dolly Varden and coho salmon. Dolly Varden enter the Anchor River during approximately the second week of July and, prior to the start of the coho salmon run, are the targeted species. The Dolly Varden harvest level is variable; it is dependent on run strength, coho salmon and steelhead trout run strength, and environmental conditions. It is estimated anglers harvested 1,061 Dolly Varden after August 17.

Creel census data collected 1978-1981 (Wallis and Hammarstrom 1979, 1980, 1981, 1982) indicate approximately 1/3 to 1/2 of the coho salmon harvest occurs prior to August 18. Streambank observations prior to the census indicate this was true in 1985. It is estimated that anglers harvested 1,674 coho salmon after August 17.

It is estimated that anglers harvested 185 steelhead trout from the Anchor River after August 17. Observations suggest few steelhead trout were caught prior to commencement of the creel census. Estimated steelhead trout harvest by weekly period and area is presented in Table 3. The 1985 estimated steelhead trout harvest is lower than the mean harvest for 1978-1984. Creel census data collected suggest the lower harvest is indicative of a smaller run. Other factors that may have contributed to the low harvest include:

Table 2. Estimated Sportfishing Effort and Harvest from Anchor River by Species and Weekly Intervals, August 18 to October 27, 1985.

Week Effort	Effort Man-Hours	Estimated Harvest DV	SS	SH
8/18	768	5	15	0
8/25	5,904	38	777	16
9/01	7,720	83	533	0
9/08	3,053	28	261	25
9/15	2,799	33	52	61
9/22	1,377	20	14	31
9/29	1,114	130	19	12
10/06	1,885	246	3	27
10/13	2,035	423	0	13
10/20	845	28	0	0
10/27	278	27	0	0
Total	27,778	1,061	1,674	185

* Effort and harvest estimates for Saturday only.

Table 3. Estimated Sport Fish Effort and Harvest of Steelhead Trout from Anchor River by Weekly Intervals and Area, August 18 to October 27, 1985.

Week Ending	Effort Man-Hours**	Harvest Area 1***	Harvest Area 2****	Total
8/18*	768	0	0	0
8/25	5,904	15	1	16
9/01	7,720	0	0	0
9/08	3,053	23	2	25
9/15	2,799	57	4	61
9/22	1,377	27	4	31
9/29	1,114	9	3	12
10/06	1,885	21	6	27
10/13	2,035	10	3	13
10/20	845	0	0	0
10/27	278	0	0	0
Total	27,778	162	23	185

* Estimates for Saturday only.
** Effort includes coho salmon, Dolly Varden and steelhead anglers.
*** Anchor River below the forks.
**** South Fork Anchor River above confluence of the North Fork.

1. An above average coho salmon harvest just prior to the steelhead trout season.

2. A smaller percentage of steelhead trout were retained.

3. The "artificial lures only after September 15" regulation that was not in effect 1978-1983.

4. A possible change of location by the more experienced steelhead trout angler to fishing upstream of the forks, which is outside the census area.

Information obtained during the 1985 creel census indicates anglers kept 36.1% of the steelhead trout they caught. Creel census information during 1978-1981 indicates anglers kept 45% to 62% of the steelhead trout landed, and interviews in 1982-1984 indicate they kept 36% to 44% of the steelhead trout caught.

Most steelhead angling occurs after September 1, and the effort from that date until freezeup is considered to reflect steelhead angling effort, even though some of the effort is for coho and Dolly Varden. A summary of angling effort and steelhead harvest and catch for the period September 1 until freezeup for 1978-1985 is presented in Table 4.

Table 5 presents a summary of angling effort, harvest estimates, and available population estimates for Dolly Varden, coho salmon and steelhead trout since 1954.

Age/Weight/Length Data

Scales and lengths were collected from 52 adult steelhead trout during creel census interviews and hatchery brood stock collections. Total age was be determined for 44 steelhead trout, and marine history for 51. A summary of age composition and fish lengths is presented in Table 6.

Nine (17.6%) of the steelhead trout had spawned previously, six were returning for a second spawn, and one was returning to spawn for a third time.

Data collected in several years since 1954 indicate repeat spawners represented a range of 3.5% to 33% of the total run in the year that they returned. A summary of the percentage of repeat spawners representing given years is presented in Table 7.

Lengths and weights of adult steelhead trout were collected during the fishery. The length-weight relationship is illustrated in Figure 2.

Pathology

Kidney and hindgut samples were collected from nine adult steelhead trout harvested by anglers. The samples were sent to the pathology

Table 4. Summary of Sportfishing Effort and Harvest and Catch of Steelhead Trout from September 1 Until Freezeup in Anchor River, Area 1 & 2, 1978-1985.

Year	Man-Hours	Man-Days	Hours per Completed Angler	Estimated Catch		Percent of Catch Kept	Estimated Harvest	
				No.	CPUE		No.	CPUE
1978	26,814	9,786	2.74	2,933	.109	44.8	1,314	.049
1979	19,269	5,701	3.38	897	.047	62.0	556	.029
1980	16,775	6,710	2.50	1,285	.077	57.5	739	.044
1981	20,792	6,817	3.05	948	.046	53.9	511	.025
1982	15,665	4,926	3.18	1,022	.065	36.0	368	.023
1983	17,221	5,006	3.44	1,070	.062	38.7	414	.024
1984	17,356	4,889	3.55	630	.036	43.7	275	.016
1985	14,916	5,917	2.52	468	.031	36.1	169	.011

Table 5. Summary of Creel Census Data from Anchor River for Harvest of Dolly Varden, Coho Salmon and Steelhead Trout.

Year	Period Covered In Census	Effort Man-Days	Dolly Varden Harvest	Dolly Varden Total Run	Coho Harvest	Coho Total Run	Steelhead Harvest	Steelhead Total Run
1954	5/29-10/23	3,000	4,000	11,500	395	1,700	247	511
1957	5/01-10/15	5,800	573	7,000	90	801	50	600
1960	5/07-10/02	5,300*	3,300	...	1,000	...	400	...
1968	7/06-10/19	3,045	4,352	...	1,149	...	102	...
1977	Entire Year **	31,515	9,222	...	1,339	...	1,072	...
1978	Entire Year **	42,671	17,357	...	1,559	...	1,754	4,132
1979	Entire Year **	44,220	21,364	...	2,870	5,307	782	...
1980	Entire Year **	33,272	10,948	...	2,649	...	841	2,388
1981	Entire Year **	34,257	15,271	...	2,949	...	777	...
1982	Entire Year **	24,709	10,375	...	2,379	...	551	...
1983	Entire Year **	28,881	17,277	...	1,395	...	1,101	1,762
1984	Entire Year **	26,919	5,599	...	1,135	...	761	1,361
1985***	8/18-10/27	10,851	1,061	...	1,674	...	185	...

* Effort incomplete--covers period 5/07-7/14 only.
** Effort and harvest data from statewide harvest survey (Mills 1979-1985).
*** Effort and harvest data incomplete--covers only period 8/18-10/27.

Table 6. Summary of Age Composition and Lengths of Anchor River Steelhead Trout, 1985.

Age Class	Number	Mean	Length (mm) Range	S.D.*
First-Time Spawners				
Males				
2.1	2	595	555-635	56.6
3.1	7	567	505-615	35.7
2.2	3	702	670-750	42.5
3.2	3	678	645-720	38.2
4.2	1		680	
R.1	1		580	
R.2	3	697	680-720	20.8
Total	20			
Females				
3.1	1		475	
3.2	15	684	635-745	32.4
4.2	3	708	685-740	28.4
R.2	3	687	675-710	20.2
Total	22			
Repeat Spawners				
Males				
3.1s1	1		680	
3.2s1	2	810	790-830	28.3
Total	3			
Females				
3.2s	1		755	
2.2s1	1		775	
3.2s1	3	768	735-815	41.6
2.2s1s	1		770	
Total	6			

* Standard Deviation

Table 7. Summary of Percentages of Repeat Spawning Steelhead Trout in the Anchor River, 1954-1985.

Year	Repeat Spawners % of Sample	Source of Data
1954	26.0	Allin (1954)
1960	3.5	Dunn (1961)
1967	24.3	Redick (1968)
1968	16.2	McHenry (1969)
1978	17.7	Wallis and Hammarstrom (1979)
1979	17.5	Wallis and Hammarstrom (1980)
1980	19.7	Wallis and Balland (1981)
1981	11.1	Wallis and Balland (1982)
1982	33.0	Wallis and Balland (1983)
1983	25.2	Wallis and Balland (1984)
1984	22.6	Balland (1985)

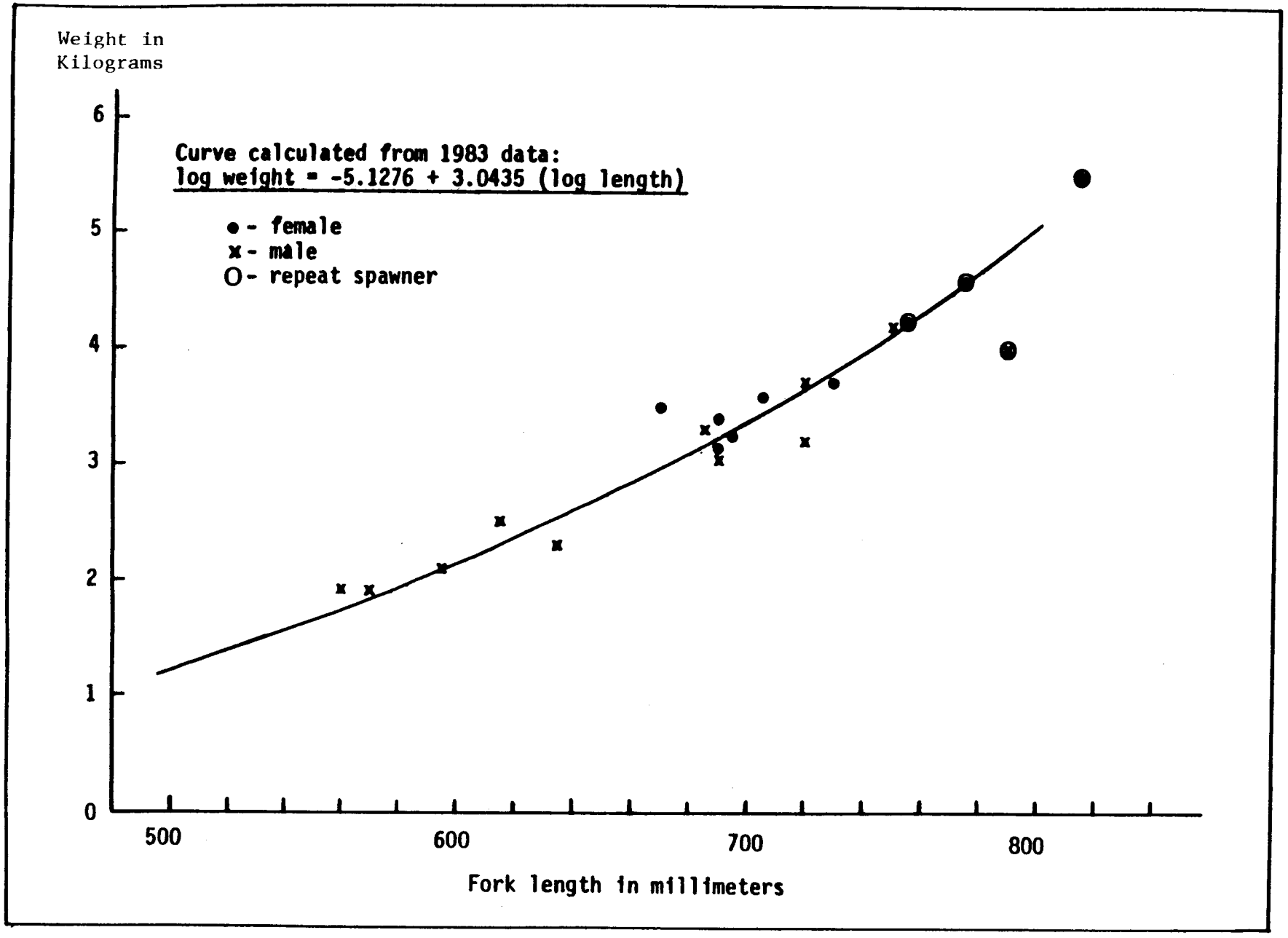

Figure 2. Length-weight relationship of adult steelhead trout in Anchor River, 1985.

laboratory in Anchorage and examined for the presence of *Aeromonas salmonicida* and *Renibacterium salmoninarum*. All samples tested negative.

Hatchery Brood Stock

Twenty adults were captured and transported to the Trail Lakes Hatchery during the fall steelhead trout run (Table 8). They are being held for spawning in the spring of 1986.

Table 8. Numbers of Adult Steelhead Captured in Anchor River and Transported to Trail Lakes Hatchery, 1985.

Date	Females	Males	Total
9/24/85	2	4	6
10/15/85	6	1	7
10/23/85	3	4	7
Total	11	9	20

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