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STATE OF ALASKA

Jay S. Hammond, Governor

Annual Performance Report for

INVENTORY AND CATALOGING OF THE SPORT FISH AND SPORT FISH WATERS IN UPPER COOK INLET

by

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Job No. G-1-D Inventory and Cataloging of the Sport Fish and Sport Fish Waters in Upper Cook Inlet
By: David Watsjold

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RESEARCH PROJECT SEGMENT

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ABSTRACT

Fall gill-netting was conducted to assess the effect of current stocking techniques on survival and growth of stocked coho salmon, Oncorhynchus kisutch (Walbaum), in Matanuska-Susitna Valley lakes. A reduction in stocking densities (ranging from 50-80 fish per acre) and an increase in stocking size from, 650 per pound to 140-254 per pound resulted in increased growth rates of Age 0+ coho salmon planted in early summer. Coho salmon stocked in September at 59 per pound exhibited high growth and survival rates during their first year of lake residency.

Coho salmon stocking guidelines cannot be established without further assessment of stocking size, density and time of stocking.

A creel census, conducted on five streams open to chinook salmon, Oncorhynchus tshawytscha (Walbaum), fishing, estimated a harvest of 1,420 chinook salmon in 7,229 man-days of effort. Catch rates averaged .041 chinook salmon per hour and ranged from .023 per hour on the Little Susitna River to .060 per hour on Caswell Creek. The average length of a man-day was 3.90 hours for bank anglers and 7.10 hours for boat anglers.

Examination of 637 chinook salmon scales revealed a change from predominately Age 1.3 and 1.4 to Age 1.2 fish in Montana, Willow and Chunilna Creeks. The change was generated by a strong showing of Age 1.2 chinook salmon, which returned from the 1976 parent year; the first year substantial increases in Susitna River chinook escapements were recorded.

Angler-caught chinook salmon were classified into age groups utilizing length frequency distribution and scale examination methods to determine the accuracy of length frequency analysis. It was determined that length

frequency distribution accurately predicted the frequency of Age 1.2 chinook salmon. Overlapping of length classes was encountered with Age 1.3 and 1.4 chinook salmon on all streams. Alternate age prediction methods are being investigated.

Coho salmon escapement counts, conducted in established index areas, revealed above average numbers in most streams. Record escapements were recorded on Fish and Cottonwood Creeks.

BACKGROUND

A coho salmon stocking program was initiated in 1960 to provide angling opportunities in waters lacking game fish populations. Presently, 12 Matanuska-Susitna Valley lakes are stocked yearly with approximately 200,000 coho salmon.

Seven of the stocked lakes were rehabilitated to remove threespine sticklebacks, which resulted in increased growth and survival rates for salmon. Four of the lakes have since been reinfested by threespine sticklebacks with a resultant reduction in coho salmon growth and survival.

Coho salmon population sampling is conducted each fall to evaluate survival, growth and stocking densities. During winter months, chemical parameters are monitored in lakes having a history of low dissolved oxygen. The results of these evaluations are used to determine future management procedures to maintain or improve the quantity and quality of coho salmon fishing.

Probable overharvest of Cook Inlet chinook salmon in the 1940's and 50's resulted in drastic declines in chinook salmon numbers in the 1960's. Attempts to restore Upper Cook Inlet chinook salmon populations, through intense management, were initiated in 1973 when these fish were protected by complete closures on both sport and commercial fisheries. Prior to 1973 a very limited sport and commercial fishery was allowed in some areas of Upper Cook Inlet.

Results of these management efforts first appeared in 1976 when large increases in chinook salmon numbers were noted in Susitna River spawning streams. High escapements were again observed in 1977 and 1978.

In 1979 the Alaska Board of Fisheries allowed a limited chinook salmon fishery on five streams in the Matanuska-Susitna Valleys. A punch card was required of each angler and a maximum catch quota established for each of the following streams: Willow, Montana and Chunilna Creeks (300 each), Little Susitna River (1,000), and Caswell Creek (200). The bag limit was one chinook salmon per day and five per season over 20 inches in length. In 1980 the bag limit was changed to two chinook salmon per day, but only one could exceed 28 inches in length. Stream harvest quotas remained the same.

Effective management of these chinook salmon populations requires creel census programs and various enumeration techniques to determine yearly harvest and escapement levels.

If current management procedures continue to enhance Susitna River chinook salmon populations a relaxation of existing stringent restrictions could occur.

Coho salmon runs during the early 1970's declined to very low levels in Matanuska-Susitna Valley streams. Environmental conditions combined with an intense Cook Inlet commercial fishery were probable causes of the decline. From 1968 to 1970 extremely low rainfall resulted in reduced stream flows, which are known to be deleterious to coho salmon. Since coho salmon run timing through the Cook Inlet commercial fishery coincides with that of all other species except chinook salmon, it is difficult to specifically manage coho salmon by manipulation of the mixed stock commercial fishery.

Management of Upper Cook Inlet coho salmon has primarily been conducted through regulation of sport fisheries. Various techniques that are used include: protection of spawning grounds; regulation of sport fishing methods and means; restriction to weekend-only fishing; and emergency closures when runs appear to be lagging.

Coho salmon populations are monitored on selected Matanuska-Susitna Valley streams. In 1975, coho salmon populations increased substantially and since then it appears that populations are slowly recovering from early 1970 declines.

Continued use of present management techniques is expected, but may be altered if successful enhancement of coho salmon populations is attained by the Fisheries Rehabilitation and Enhancement Development Division.

Table 1 lists all the species mentioned in this report and Figure 1 is a map of the study area.

RECOMMENDATIONS

1. A creel census should be continued on those streams opened to chinook salmon fishing to determine angler effort and harvest.

2. Angler effort and harvest data on Little Susitna River coho salmon should be obtained since upgrading of the Burma Road in 1981 will greatly increase angling pressure.

3. Monitoring coho and chinook salmon escapements in selected streams of the area should be continued to evaluate results of current management practices.

4. Catalog and inventory of waters in the rapidly developing Point McKenzie area should be initiated to provide management guidelines for these waters.

Table 1. List of Common Names, Scientific Names and Abbreviations.

Common Name	Scientific Name and Author	Abbreviation
Chinook salmon	Oncorhynchus tshawytscha (Walbaum)	KS
Coho salmon	Oncorhynchus kisutch (Walbaum)	SS
Rainbow trout	Salmo gairdneri Richardson	RT
Threespine Stickleback	Gasterosteus aculeatus Linnaeus	TST

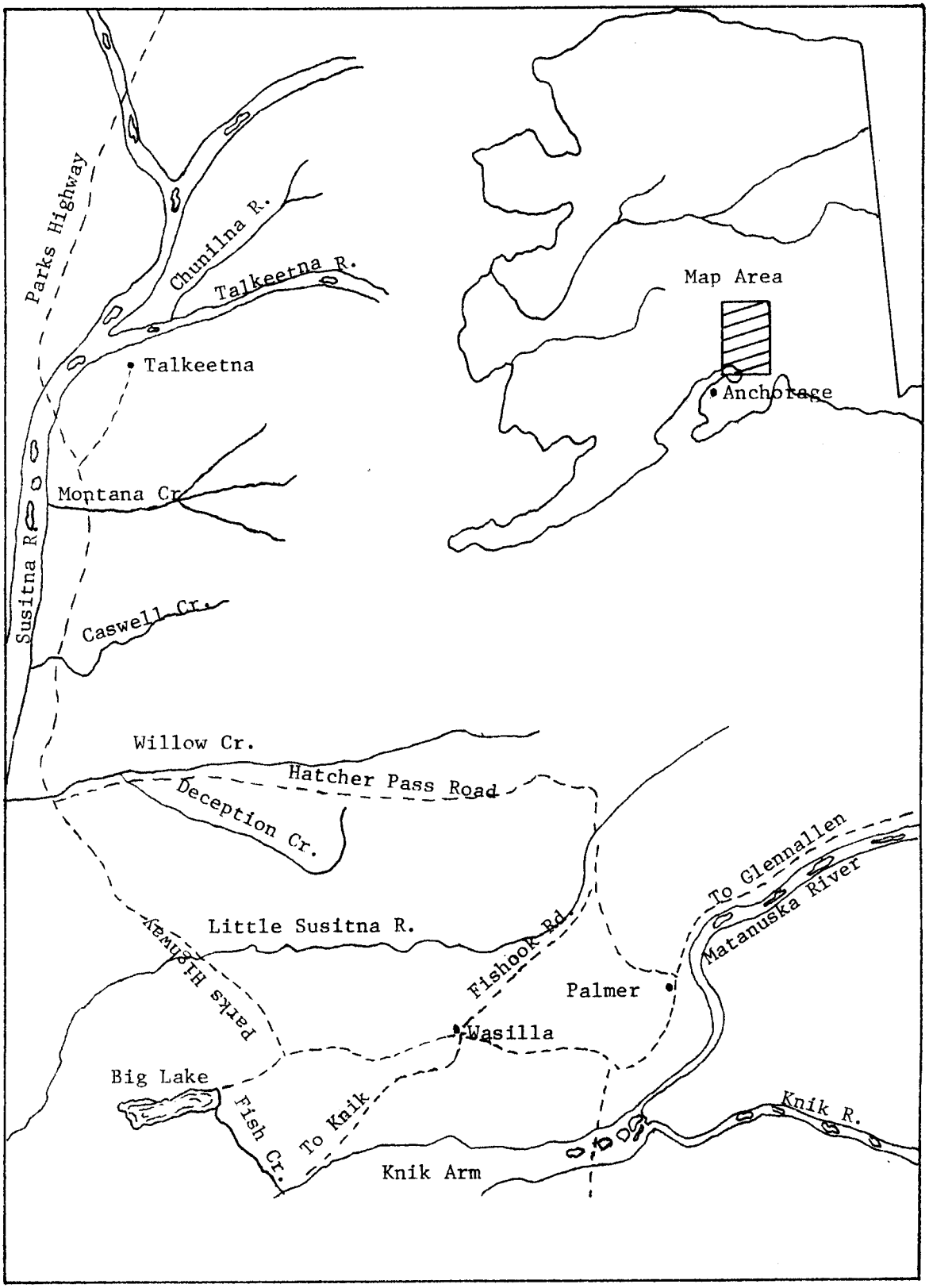

Figure 1. Study Area in Matanuska-Susitna Valleys.

OBJECTIVES

1. To determine levels of abundance of anadromous and resident fish stocks and to evaluate densities to determine optimum levels necessary for maintenance of these stocks.

2. To determine anadromous fish harvest levels and fishing effort on selected streams in the job area.

3. To determine and record environmental characteristics of existing and potential fishery waters of the job area.

4. To make recommendations for the proper management of various sport fish waters in the area and to direct future studies.

TECHNIQUES USED

Fish specimens were collected with monofilament gill nets 6 ft x 125 ft, having five mesh sizes ranging from 1/2 in to 2 in bar measure. All gill-netted fish were weighed to the nearest gram and fork lengths recorded to the nearest millimeter.

The creel census conducted during the chinook salmon fishery was statistically designed to estimate harvest and effort on five streams. On those streams opened on weekdays and weekends, the sampling day was divided in five 4-hour periods between the hours of 4:00 a.m. and 12:00 midnight. Two randomly selected periods were sampled each day on 4 weekdays while on each weekend day and holiday all five periods were sampled. On those streams open on weekends only the entire 24-hour period was sampled each day.

During sampling periods angler counts were conducted on those areas of the stream that received the greatest fishing intensity. Frequency of angler enumerations were dependent upon the length of the established count section on each stream.

The Little Susitna River census was conducted at two major access points. Catch and effort estimates were calculated separately for each access and then summed.

During sampling periods only completed anglers were interviewed. Information collected from anglers included: number of hours fished; number and species of fish caught; punch card numbers; and whether they were boat or bank anglers. Chinook salmon over 20 inches in length were weighed to the nearest pound and scales collected and placed in coin envelopes with appropriate biological data recorded on each envelope. Chinook salmon were measured from the tip of snout to fork and from mid-eye to fork. Both measurements were recorded to the nearest 0.5 cm. All lengths in this report are from tip of snout to fork of tail measurements.

The European method was used to denote anadromous salmon age groups. This method uses a decimal mark to separate the number of years spent in freshwater from the number of years spent in the sea.

Chinook salmon scales were mounted on gum paper and pressed onto plastic acetate. Scales were examined using a Bruning Model 200 microfiche reader. Coho salmon spawning populations were enumerated by foot surveys within established index areas.

FINDINGS

Lake Stocking Evaluations

In 1980 landlocked coho salmon were sampled with variable mesh gill nets in eight stocked lakes (Table 2). Gill net catches of Age 0+ and Age I+ coho salmon were high in most lakes. Catch rates of Age 0+ coho salmon ranged from 0.32 fish/hour in Finger Lake to 2.35 fish/hour in Memory Lake. Catch rates of Age I+ coho salmon ranged from 0.78 fish/hour in South Rolly Lake to 2.31 fish/hour in Echo Lake.

After 6 months residency in the lakes Age 0+ coho salmon averaged from 139 mm to 154 mm in length, which is much larger than the 110 mm size that has been recorded in past years. This greater than normal growth is attributed to a reduction in stocking densities and larger planted fish. In 1980 fewer coho salmon were available for stocking, but they averaged 140 to 254 fish/lb as compared to 500 to 650 fish/lb that were stocked in past years.

After 17 months residency in five lakes, Age I+ coho salmon averaged from 208 mm to 236 mm in length which is average for Matanuska-Susitna Valley lakes. Victor Lake Age I+ coho salmon, however, average 343 mm after 17 months residency. Watsjold (1980) noted that when coho were stocked in Victor Lake in 1979 the lake was almost barren after a severe winter kill. The coho salmon stocked in 1979 reached 172 mm in length after only 5 months and this growth rate continued, thus producing larger than normal Age I+ fish in 1980.

Surplus coho salmon were available for stocking in the fall of 1979. Echo and South Rolly Lakes were stocked in September at 200 per acre with coho averaging 59 fish/lb and 67 fish/lb, respectively. These were both the largest and latest coho ever planted in the Matanuska-Susitna Valleys.

A large rainbow trout population was present in Echo Lake during the fall of 1979. Gill-netting on November 1, 1979 resulted in Age 0+ coho salmon and Age I+ rainbow trout catch rates of 0.74 and 5.70 fish/hr, respectively. A total of 17 coho were captured at this time and averaged 110 mm in length, which was almost identical to the average length of Age 0+ coho that had been stocked 4 months earlier. Echo Lake was again sampled in October 1980 to evaluate these coho that were now Age I+. They had attained an average length of 296 mm after only 13 months in the lake, which was significantly larger than the Age I+ coho that had spent 17 months in other stocked lakes. The catch rate of 2.31 fish/hr was also much greater than recorded in the other sampled lakes.

Table 2. Gill Net Results and Stocking Histories of Managed Lakes, Matanuska-Susitna Valleys, 1980.

Lake	Date Sampled	Species	Age Class	Length (mm) n	$\bar{x}$	± SD	Range	Catch/ Net Hr.	Date Stocked	Total Number	Per Lb.	Per Acre
Echo	10/24/80	SS	I+	56	296	16.228	243-327	2.31	9/19/79	4,606	59	200
Finger	10/29/80	SS	0+	7	139	10.792	127-156	0.32	5/7/80	44,177	140	120
			I+	40	236	19.269	189-288	1.80	5/21/79	73,030	670	200
Loon	10/28/80	SS	I+	44	216	12.764	181-238	1.91	5/21/79	10,800	670	100
Lucille	10/29/80	SS	I+	26	232	28.037	163-264	1.18	5/21/79	72,500	670	200
Memory	10/28/80	SS	0+	54	153	27.528	124-242	2.35	5/7/80	8,285	254	100
			II+	2	328	9.192	322-335	.09	7/11/78	12,500	277	150
Rocky	10/28/80	SS	I+	37	208	25.235	159-245	1.60	5/23/79	5,900	650	100
South Rolly	10/29/80	SS	I+	17	228	33.453	170-290	0.78	9/7/79	22,378	67	200
Victor	10/24/80	SS	0+	37	154	12.580	112-185	1.50	6/19/80	2,800	231	200
			I+	25	343	18.750	311-385	1.01	5/23/79	2,800	650	200

Previous higher density introductions in Echo Lake of smaller coho salmon in July and August produced smaller fish (195-241 mm) with catch rates ranging from 0.48 to 0.91 fish/hr. From these limited data, it appears that size and stocking densities may over-ride stocking time as a factor influencing growth and survival of coho salmon. Further investigation is necessary to substantiate these conjectures.

Evaluation of South Rolly Lake coho salmon is not possible due to limited background information and the stocked coho salmon may have been able to leave the lake because high water overflowed the outlet control structure.

Chinook Salmon Studies

Creel Census:

A chinook salmon fishery was scheduled from May 24 through July 6 on the Little Susitna River and Chunilna Creek, and on Caswell, Montana and Willow Creeks during four consecutive weekends commencing June 14.

Since it was apparent during the 1979 fishery that few fish were available at the beginning of these fisheries, the census schedule was shortened to coincide with chinook salmon run timing. The census on the Little Susitna River Burma Road access site was conducted from May 30 to July 6. The census on the Little Susitna River at the Parks Highway crossing and on Chunilna Creek was conducted from June 14 to July 6. On the weekend-only streams, the census was scheduled for the last 3 weekends on Willow and Montana Creeks and all 4 weekends on Caswell Creek.

Since the census covered only the period when chinook salmon were available to anglers, recorded angler effort is somewhat less than what occurred during the entire fishery.

Angler effort and catch estimates were derived from interviews with 3,097 completed anglers, which represented 42.8% of the total estimated effort. The best coverage occurred on Montana Creek where 64.6% of the total estimated number of anglers were interviewed, while the lowest number checked was on Caswell Creek (33.9%). Completed anglers caught 977 chinook salmon, which represents 68.8% of the total estimated catch. On weekend-fishing-only streams, which were censused 24 hours daily, 85% of the total estimated harvest was checked.

The total chinook salmon harvest for the five east side Susitna River streams was estimated at 1,420, and 7,229 man-days of effort were expended with a mean catch per hour of .041 (Table 3). Catch rates on the five streams ranged from .023 chinook salmon per hour in the Little Susitna River to .060 per hour on Caswell Creek.

The area catch quota of 2,100 chinook salmon was not attained. Individual stream quotas were reached on Willow, Montana and Caswell Creeks, however, prior to the end of the scheduled fishery. To remain within established catch quotas emergency orders were issued closing Willow and Montana Creeks on the last day of the scheduled fishery. Caswell Creek was closed the last 3 days of the scheduled season.

Table 3. Effort and Harvest Data of the Chinook Salmon Sport Fishery, Matanuska-Susitna Valleys, 1980.

Stream	Quota	Harvest	Sex Ratio Male : Female	Effort Man-Days	Catch/Hour	Harvest Per Man-Day
Caswell Creek	200	255	5.3 : 1.0	1,038	.060	0.25
Chunilna Creek	300	161	1.8 : 1.0	801	.038	0.20
Little Susitna River	1,000	337	1.2 : 1.0	2,877	.023	0.12
Montana Creek	300	375	2.6 : 1.0	1,901	.050	0.20
Willow Creek	300	292	1.5 : 1.0	612	.059	0.48
Total	2,100	1,420	2.3 : 1.0	7,229	.041	0.20

Tables 4 and 5 show angling effort and catch by weekly period. Effort and catch started out slow on all streams and peaked the week of 6/23-6/29 when 35.6% of the seasonal effort was recorded and 37.8% of the seasonal catch was taken. The reduction in effort and catch the last week was the result of the stream closures. Had all the streams remained opened the last week of the fishery the highest effort and catch would have occurred during this time. The effects of the stream closures on effort and catch is graphically depicted in Figure 2.

On those streams opened throughout the week, 86.9% of the effort and 87.4% of the catch occurred from 12 noon to 12 midnight. On weekend fishing only streams periods of highest effort and catch varied considerably on each stream. On Caswell Creek, 50.3% of the catch occurred between midnight and 8:00 a.m. while 43.7% of the effort occurred from midnight to 4:00 a.m. and 8:00 p.m. to midnight. The catch on Montana Creek was distributed equally throughout the day but 63% of the effort was from 12 noon to 12 midnight. The highest catches (33.8%) and effort (30.1%) were recorded from 8:00 p.m. to 12 midnight on Willow Creek.

The average length of an angler-day varied considerably between streams and appeared to be dependent on accessibility and availability of fish. Bank anglers and boat anglers averaged 3.90 and 7.10 hours per day, respectively, on all streams combined.

Since three streams were closed prior to the scheduled season and the census schedules were shortened, very little comparison can be made between 1979 and 1980 census data. Although the catch per hour on all streams combined of .041 in 1980 was almost identical to the 1979 rate of .040, catch rates on individual streams were completely opposite on all but Willow Creek. Catch rates on Caswell and Montana Creeks in 1980 were two and three times, respectively, higher than those recorded in 1979. Conversely, 1980 catch rates on Chunilna Creek and Little Susitna River were only half of the 1979 rate.

The high catch rates on Willow, Montana and Caswell Creeks reflect the apparent strong runs that occurred in Susitna River tributaries. Low catch rates on Chunilna Creek and Little Susitna River do not necessarily indicate weak escapements in these streams. Chinook salmon did not show up at Chunilna Creek until the last week of the fishery, therefore, were available for only a short harvest period. Heavy rains in both drainages resulted in abnormally high and turbid stream flows throughout most of the fishery. Road conditions on the only access to the Lower Little Susitna River were severe and restricted to all-terrain vehicles. These conditions undoubtedly had a negative impact on catch rates and angler effort in both streams.

Escapement:

Chinook salmon escapements in Upper Cook Inlet streams were not determined in 1980 due to extremely high rainfall that persisted throughout the spawning period. The high rainfall resulted in the second wettest summer since recordings were initiated in 1916. Table 6 shows chinook salmon escapements in past years.

Table 4. Angling Effort by Weekly Period During the Chinook Salmon Fishery, Upper Cook Inlet, 1980.

Date	Chunilna Creek Man-Days	%	Little Susitna River Man-Days	%	Willow Creek Man-Days	%	Caswell Creek Man-Days	%	Montana Creek Man-Days	%	Total Man-Days	%
5/24-6/1	No Census		156	5.4	...	...	...	...	...	...	156	2.2
6/2-6/8	No Census		314	10.9	...	...	...	...	...	...	314	4.3
6/9-6/15	83	10.3	668	23.2	No Census		275	26.5	No Census		1,026	14.2
6/16-6/22	120	15.0	563	19.6	28	4.6	455	43.8	308	16.2	1,474	20.4
6/23-6/29	264	33.0	619	21.5	275	44.9	308	29.7	1,106	58.2	2,572	35.6
6/30-7/6	334	41.7	557	19.4	309	50.5	Closed	...	487	25.6	1,687	23.3
	801		2,877		612		1,038		1,901		7,229	

Table 5. Chinook Salmon Catch by Weekly Period, 1980.

Date	Chunilna Creek Catch	%	Little Susitna River Creek	%	Willow Creek Catch	%	Caswell Creek Catch	%	Montana Creek Catch	%	Total Catch	%
5/24-6/1	0	0	19	5.6	...	...	...	...	...	...	19	1.3
6/2-6/8	0	0	12	3.6	...	...	...	...	...	...	12	0.9
6/9-6/15*	0	0	62	18.4	6	2.1	31	12.2	10	2.7	109	7.7
6/16-6/22	0	0	58	17.2	40	13.7	120	47.0	57	15.2	275	19.4
6/23-6/29	48	29.8	72	21.4	139	47.6	104	40.8	174	46.4	537	37.8
6/30-7/6	113	70.2	114	33.8	107	36.6	...	...	134	35.7	468	32.9
	161		337		292		255		375		1,420	

* Although no census was conducted during this week on Willow and Montana Creeks, chinook salmon harvests were recorded from angler punch cards.

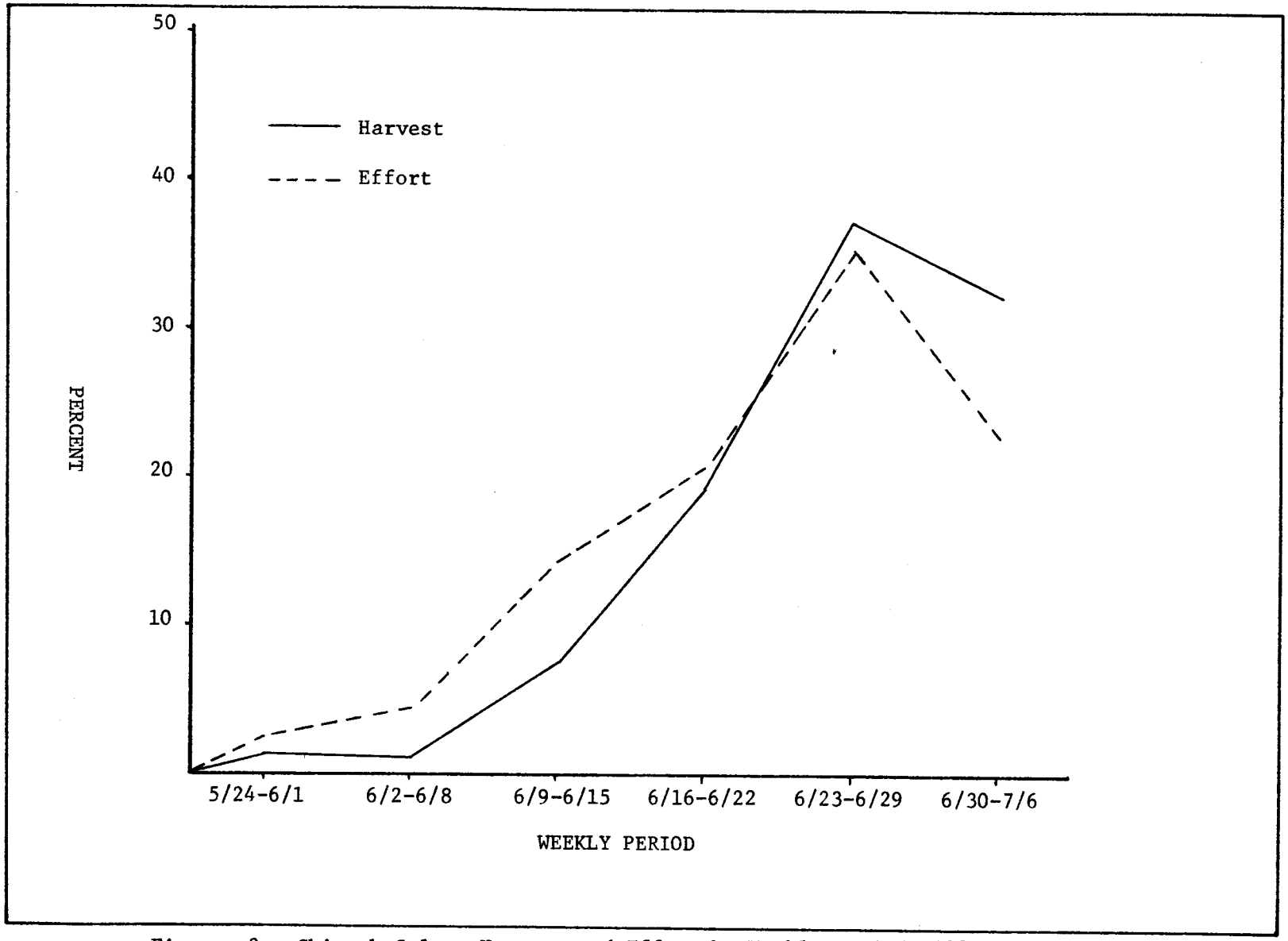

Figure 2. Chinook Salmon Harvest and Effort by Weekly Period, 1980.

Table 6. Chinook Salmon Escapement Counts and Population Estimates, East Side Susitna River Tributaries and Tributaries of the Chulitna and Talkeetna Rivers, 1973-1980.

Year	Observed Counts	Estimated Counts
1973	8,086	8,900
1974	3,556	4,100
1975	1,247	1,500
1976	16,753	19,900
1977	14,199	17,028
1978	12,853	15,365
1979	5,454*	15,000
1980**		

* Count does not include six streams which, in the past 3 years, represented 53% of the observed escapement.

** High water cancelled all counts.

The 1980 chinook salmon escapements probably approximated the high escapements recorded during the 1976-1979 period. This assumption is based on comparisons between the 1979 and 1980 sport fish harvest and effort levels. Comparisons were made on Willow, Caswell and Montana Creeks where high water conditions did not adversely affect the fisheries as they did on Chunilna Creek and the Little Susitna River. The harvest on the three streams increased from 565 in 1979 to 922 in 1980, while the effort declined from 4,515 man-days in 1979 to 3,551 man-days in 1980. This increased harvest level would not have occurred if the 1980 run had been substantially below 1979 levels.

Population Structure:

Length measurements from chinook salmon carcasses supplied the necessary data for analysis of the age structure of spawning populations. Since no chinook salmon scales have been available for aging from east side Susitna River tributaries prior to 1979, length frequency classes developed from scale aged west side tributary chinook salmon have been used throughout the Susitna River.

A chinook salmon fishery in 1979 and 1980 on east side Susitna River tributaries has permitted collection of scales to determine the accuracy of assessing age soley by length frequency distribution. Although scale analysis is the most accurate method, it is very time consuming and costly when compared to recording lengths. The Little Susitna River is not a Susitna River tributary but was included in the analysis because it is an Upper Cook Inlet stream.

The length frequency classes that are used to determine age structure are as follows: Age 1.2 (51-75 cm), Age 1.3 (76-95 cm), and Age 1.4 (96 cm and over). Although these are the dominant age groups of Susitna River chinook salmon, there are occasionally other age groups with an additional year in freshwater and saltwater. Minor error will exist because these additional age groups cannot be accounted for using the length frequency method.

Watsjold (1980) analyzed the scales collected during the 1979 chinook salmon fishery and assessed the accuracy of the length frequency classes. He grouped angler caught chinook salmon according to age soley on the basis of length frequency distribution and compared the results with age structure as determined by scale analysis. This same procedure was repeated for data collected during the 1980 chinook salmon fishery.

Table 7 shows the comparison of the two methods used in determining age composition of 1980 chinook salmon populations. It is apparent that the length frequency method is extremely accurate in predicting the occurrence of Age 1.2 chinook salmon, as there was only 1.4% difference between the two methods. In 1979 there was only 0.1% difference in this age group. As in 1979 the 1980 analysis showed some inconsistency in predicting frequency of Age 1.3 and Age 1.4 chinook salmon. The length frequency method predicted 2.5% fewer Age 1.3 and 3.9% more Age 1.4 chinook salmon than actually occurred. In 1979 this method predicted 5.6% fewer Age 1.3 and 7.5% more Age 1.4 chinook salmon. In 1980 the greatest disparity occurred on the Little Susitna River while the differences on the other four streams were very small. In 1979 Chunilna Creek had the largest error. In both these streams Age 1.3 chinooks were the dominant age group.

Table 7. Comparison of Scale Analysis and Length Frequency Distributions to Determine Chinook Salmon Age Composition, 1980.

Age	Willow Creek				Little Susitna River				Chunilna Creek			
	Length Frequency		Scale Analysis		Length Frequency		Scale Analysis		Length Frequency		Scale Analysis	
	n	%	n	%	n	%	n	%	n	%	n	%
1.2	31	29.5	27	25.7	9	10.0	9	10.0	32	43.2	31	41.9
1.3	17	16.2	17	16.2	28	31.1	42	46.7	15	20.3	18	24.3
1.4	57	54.3	54	51.4	53	58.9	37	41.1	27	36.5	24	32.4
1.5	...	...	5	4.8	...	...	2	2.2	...	...	...	...
2.2	...	...	2	1.9	...	...	...	...	...	...	1	1.4
Total	105		105		90		90		74		74	

Age	Caswell Creek				Montana Creek				Total			
	Length Frequency		Scale Analysis		Length Frequency		Scale Analysis		Length Frequency		Scale Analysis	
	n	%	n	%	n	%	n	%	n	%	n	%
1.2	78	46.1	78	46.1	88	44.2	84	42.2	238	37.4	229	36.0
1.3	38	22.5	39	23.1	51	25.6	49	24.6	149	23.4	165	25.9
1.4	53	31.4	49	29.0	60	30.2	61	30.7	250	39.2	225	35.3
1.5	...	...	...	...	...	...	2	1.0	...	...	9	1.4
2.2	...	...	3	1.8	...	...	3	1.5	...	...	9	1.4
Total	169		169		199		199		637		637	

From the 2 years of data, it appears that Age 1.3 chinook salmon are the source of the largest error when using the length frequency distribution method. In 1979 and 1980, 31% and 18.2%, respectively, of Age 1.3 chinook salmon fell into the 96 cm and over class while only 3.7% and 6.2%, respectively, of Age 1.4 chinook salmon were in the the 76-95 cm class. The length frequency method is most accurate when assessing predominately Age 1.4 chinook salmon populations.

It was noted during both years of scale analysis that those Age 1.3 chinook salmon exceeding 95 cm in length have atypical growth patterns. The pattern of widely spaced circuli indicates that these chinook salmon were exposed to favorable saltwater growing conditions that were not encountered by the majority of Age 1.3 fish.

Methods other than length frequency may more accurately predict age groups. These methods include the use of different length measurements, weights and sex. A statistical analysis of available data is being conducted to determine which factors or combination of factors will most accurately predict age groups. Since the analysis will take considerable time, the results will not be included in this report.

Analysis of the age structure of 1980 chinook salmon spawning populations by measurement of carcasses was not possible due to persistent high water conditions. The 1980 age stucture was determined from ageing of angler-caught chinook salmon.

Watsjold (1980) stated that data collected from either carcasses or angler-caught chinook salmon resulted in slightly biased age determinations. He stated that carcass recoveries reflect a higher percentage of Age 1.4 chinook salmon than were caught by anglers and the sport catch reflects a larger number of Age 1.2 and Age 1.3 fish than did carcass recoveries. Regardless of which method is used, they both reflect general age structures of spawning populations.

The age composition of the chinook salmon sport harvest in five streams is shown in Table 7. Age 1.2 chinook dominated the catch in Chunilna, Caswell and Montana Creeks with over 40% of the fish falling into this age group. The Little Susitna River was the only stream which did not have a significant number of Age 1.2 chinook salmon represented in the catch. The strong runs of Age 1.2 chinook salmon are from the 1976 parent escapement of 20,000, which was 125% higher than the previous high escapement of 8,900 recorded in 1973.

The abrupt change in chinook salmon age structure between 1979 and 1980 on Montana, Willow and Chunilna Creeks is graphically depicted in Figure 3 and 4. Past data have shown that 80% and 70% of the chinook salmon populations in Willow and Montana Creeks, respectively, were Age 1.4 fish. Although 1980 chinook salmon age structure has changed, it is expected that with favorable survival of succeeding years offspring there will be a return to the normal Age 1.4 dominance.

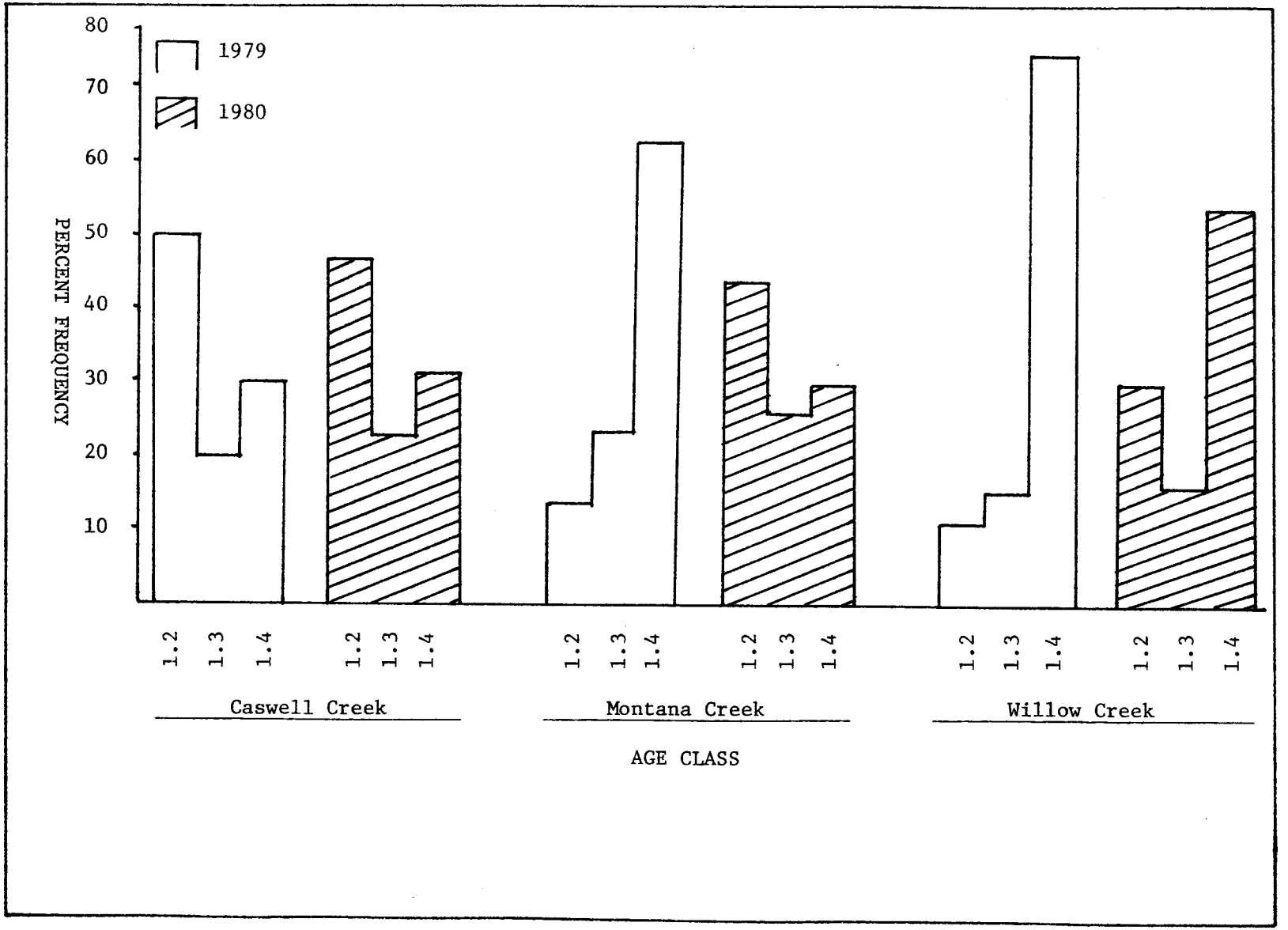

Figure 3. Comparison of Chinook Salmon Age Composition, as Determined by Length Frequency Analysis, of the 1979 and 1980 Sport Harvest.

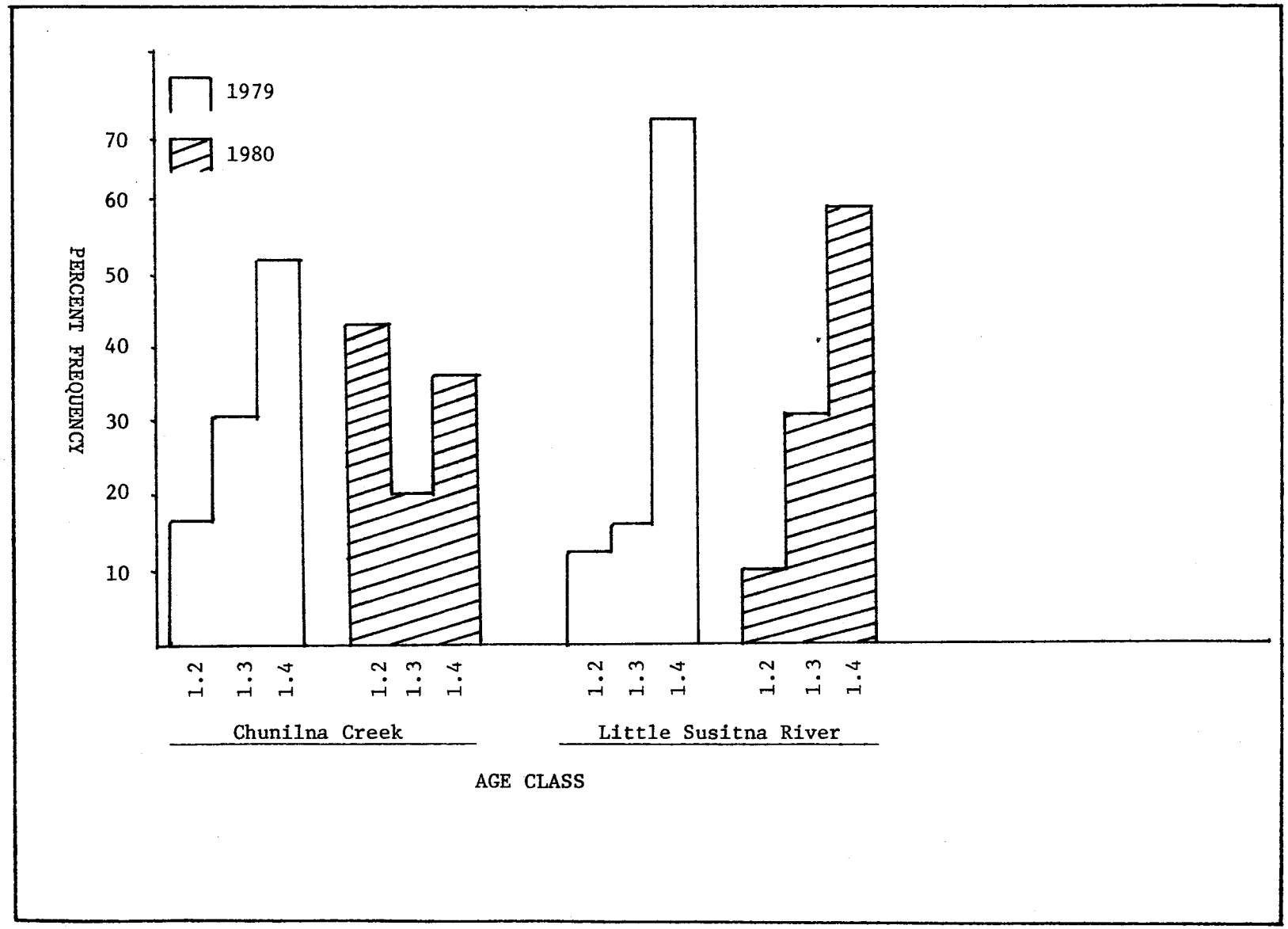

Figure 4. Comparison of Chinook Salmon Age Composition, as Determined by Length Frequency Analysis, of the 1979 and 1980 Sport Harvest.

The Little Susitna River did not experience a large influx of Age 1.2 chinook salmon in 1980. Due to glacial runoff, chinook salmon counts cannot be obtained on this stream, therefore, it was not known whether a large increase in chinook salmon number was experienced in 1976. The low number of Age 1.2 chinook salmon indicates that either there was not a large increase in 1976 escapement or there was poor survival of the offspring. Subsequent years of data collected from angler-caught fish may indicate a population trend in the Little Susitna River.

Coho Salmon Studies

Coho salmon spawning populations were enumerated by foot surveys in escapement index areas. Heavy rains precluded surveys on Wasilla and Rabideaux Creeks and flooding conditions occurred on Wasilla Creek during the spawning migration. Waters flowed over streambanks, flooding roads and threatening homes. Coho salmon were observed downstream from several highway crossings; apparently unable to migrate upstream because of high water velocities present in the culverts. The effects of flooding on coho salmon populations in Wasilla Creek are unknown at this time. Counting conditions on the remaining streams were favorable since flows are regulated by lake systems, which absorb excess runoff thus reducing flooding conditions.

A summary of coho salmon escapement counts in index areas is presented in Table 8. An additional index area was included for Cottonwood Creek. Cottonwood (a) is the traditional counting area which covers the section from the outlet of Wasilla Lake to Edlund Road crossing. Cottonwood (b) has been counted for several years and includes stream sections connecting the lakes between Wasilla and Cornelius Lakes.

The 1980 coho salmon returns were from the 1976 parent escapement and were, in all cases, substantially above 1976 levels. Coho salmon escapement in Cottonwood Creek in 1980 was the highest recorded (870) since initiation of foot counts in 1968, and was 230% greater than the previous high count of 264 coho salmon in 1978. High counts were also recorded on Question Creek, which has 321 coho as compared to the previous high of 384 in 1979.

A record 8,832 coho salmon were counted through a weir operated on Fish Creek by the Fisheries Rehabilitation and Enhancement Development Division (Table 9). These coho are primarily offspring from the 1976 escapement of 765. This extreme increase is not attributable to an increase in smolt outmigration which is monitored each year by the Fisheries Rehabilitation and Enhancement Development Division. It was probably a combination of two factors: high smolt to adult survival rates; and the commercial fishery may have failed to intercept a portion of the run.

Physical and chemical data were collected during the past year from numerous lakes and streams. Data include periodic stream flows on selected anadromous fish streams and dissolved oxygen levels in numerous lakes throughout the Matanuska Valley. These data are available in the Alaska Department of Fish and Game file in the Palmer office.

Table 8. Number of Coho Salmon in Escapement Index Areas (foot counts), Upper Cook Inlet, 1971-1980.

Stream	1971	1972	1973	1974	1975	1976	1977*	1978	1979	1980*
Wasilla (a)	104	19	28	30	49	151	...	74	61	...
Wasilla (b)	...	...	...	...	158	162	...	76	187	...
Cottonwood (a)	29	21	10	2	73	100	25	100	64	340
Cottonwood (b)	...	...	...	19	163	104	90	164	...	530
Birch	138	69	106	49	92	27	96	103	120	121
Question	...	...	59	3	111	126	87	45	384	321
Rabideaux	...	...	...	...	67	91	...	88	...	...
Total	271	109	203	103	713	761	298	650	816	1,312

* High water conditions made several index areas uncountable.

Table 9. Adult Coho Salmon Escapement Counts, Fish Creek, 1969-1980.

Year	Dates of Operation	Weir Counts
1969	July 31 - September 2	4,253
1970	July 19 - August 8*	1,048
1971	July 8 - August 7*	583
1972	July 2 - September 10	710
1973	July 1 - September 6	210
1974	July 8 - September 6	1,154
1975	July 3 - September 11	1,601
1976	July 5 - September 11	765
1977	July 6 - August 15*	930
1978	July 7 - September 30	3,121
1979	July 8 - August 30	2,511
1980	July 4 - September 1	8,832

* Weir was not operated long enough to enumerate the entire coho escapement.

LITERATURE CITED

Watsjold, D. A. 1980. Inventory and cataloging in the sport fish and sport fish waters in Upper Cook Inlet. Alaska Department of Fish and Game. Fed. Aid in Fish Restoration, Annual Report of Performance, 1979-1980, Project F-9-12, 21 (G-I-D): 91-120.

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