

STATE OF ALASKA

Jay S. Hammond, Governor

Annual Performance Report for

INVENTORY AND CATALOGING OF THE SPORT FISH WATERS
OF THE LOWER SUSITNA RIVER AND CENTRAL COOK INLET DRAINAGES

by

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of Sport Fish Waters of
the Lower Susitna River
and Central Cook Inlet
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ABSTRACT

A creel census conducted on three west side Susitna River streams open to chinook salmon, Oncorhynchus tshawytscha (Walbaum), fishing estimated that anglers spent 8,610 man-days to harvest 3,166 chinook salmon. The total chinook salmon harvest and effort figures were sharply reduced from previous years. Reductions were also recorded in the average seasonal catch per angler.

Efforts to estimate the total chinook salmon escapements in upper Cook Inlet were unsuccessful for the second consecutive year. The three major west side chinook salmon producers (Deshka River, Alexander and Lake Creeks) remained high and turbid throughout most of the 1981 spawning period. Water conditions did allow, however, escapement counts in a number of the smaller drainages. In those tributaries where counting was possible, escapements generally fell within the post-1976 range.

A release of 50,000 coho salmon, Oncorhynchus kisutch (Walbaum), smolts at Whittier in 1980 produced a dismal adult return of less than 100 coho salmon, an approximate 0.2 percent return. In the past, two to three percent of the total number of coho smolts released have returned as adults. One important difference between the 1980 smolt release from previous years is Age 0+ smolts were released instead of Age 1+ smolts.

Eighteen lakes in the Anchorage area were stocked with a total of 52,040 rainbow trout, Salmo gairdneri (Richardson), 32,900 coho salmon and 20,788 chinook salmon. A list of scientific names appears in Table 1.

Fall test-netting in four Fort Richardson lakes showed that Clunie Lake had the highest catch per net-hour and Otter Lake had the largest average size rainbow trout of the lakes sampled.

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

Common Name	Scientific Name	Abbreviation
Coho salmon	<u>Oncorhynchus</u> <u>kisutch</u> (Walbaum)	SS
Chinook salmon	<u>Oncorhynchus</u> <u>tshawytscha</u> (Walbaum)	KS
Rainbow trout	<u>Salmo</u> <u>gairdnari</u> Richardson	RT
Threespine stickleback	<u>Gasterosteus</u> <u>aculeatus</u> (Linnaeus)	TST

BACKGROUND

The Anchorage community is the largest single metropolitan area within the State. The upper Cook Inlet area is currently a rapidly developing region in terms of urban growth, mineral and hydro development and new transportation corridors. Approximately 50% of the State's anglers now inhabit this geographical area and the number is expected to increase. The upper Cook Inlet resident and anadromous fish stocks are being subjected to dramatic increases in angling pressure, both on the roadside fisheries and, more recently, the "remote area" fisheries. A substantial increase in the use of aircraft and a variety of watercraft by sport fishermen has increased the number of users in the remote areas.

The majority of the area's angling effort occurs on the west side Susitna River tributaries. In 1981, for the third consecutive year, three streams on the west side were opened during a special chinook salmon season. A seasonal quota of 11,000 chinook salmon has been established for the three streams by the Board of Fisheries. Other pertinent historical data are presented in Reports of Progress by Kubik (1976-1980) and Stock Status of Upper Cook Inlet Chinook Salmon (Division of Sport Fish, Alaska Department of Fish and Game).

Western Prince William Sound is developing into a popular recreational and sport fishing area. There is a limited number of natural fish stocks in Prince William Sound waters that can sustain a sport fishery. In 1978, the Alaska Department of Fish and Game Fisheries Rehabilitation and Enhancement Division (FRED) initiated a coho salmon smolt stocking program at Whittier, located in Passage Canal, to supplement the wild fish stocks. In theory, when the coho salmon returned from their seaward migrations, they were expected to gather at their release sites and mill around for some time making them available to the sport angler. Since 1979, Whittier has been the site of a creel census program to determine the recreational effort and harvest levels, if any, of returning hatchery released coho salmon.

The program of stocking Anchorage area lakes was continued in 1981. In recent years, the stocking program has relied heavily on plants of catchable size rainbow trout, but was expanded in 1981 to include plants of subcatchable size coho and chinook salmon. A test-netting program was conducted in the fall on a number of local lakes to obtain growth data and estimates of relative survival of the stocked fish after the summer-long fishery.

KEYWORDS

Southcentral Alaska, Cook Inlet drainages, Susitna River, chinook salmon, Oncohyinchus tshawytscha, coho salmon, O. kisutch, rainbow trout, Salmo gairdneri, creel census, escapements, stocked fish evaluation.

RECOMMENDATIONS

1. Creel census programs should be continued on the Deshka River, Alexander Creek and Lake Creek to monitor sport angling effort and obtain harvest estimates of chinook salmon.

2. Chinook salmon enumerations should be continued on west side upper Cook Inlet streams to ascertain the abundance, timing and distribution of chinook salmon escapements in the spawning streams.
3. A creel census program should be continued at Whittier to determine the angling effort and obtain harvest estimates from western Prince William Sound fisheries, and determine the overall success of the salmon stocking programs.
4. Evaluations of experimental stocking in Anchorage area lakes should be continued to assess the success of the stocking programs and to aid in determining future stocking levels.

OBJECTIVES

1. To determine the environmental characteristics of the existing and potential recreational fishing waters of the job area and, where practical, obtain estimates of the sport fish harvest and angler participation rates.
2. To evaluate the impact of water use and urban development projects on fisheries, aquatic life and water quality of lakes and streams in the area.
3. To determine stocking measures, formulate management practices and direct the course of future studies on area waters.
4. To investigate, evaluate and develop plans for the enhancement of salmon stocks.

TECHNIQUES USED

In 1981, a creel census program was utilized to obtain effort and harvest data from the chinook salmon sport fisheries of three west side Susitna River streams. The period from May 23 through July 6 was stratified by week, weekday and weekend/holiday. Interviews of anglers who had finished fishing were conducted through the period from 4:00 a.m. to 10:00 p.m. on weekends and holidays. All 5 days of the week were sampled. The weekday sampling was divided into six 3-hour interview periods. Two 3-hour periods were randomly chosen for sampling each day. Interview procedures consisted of contacting anglers having completed their fishing and recording the number of hours fished and chinook salmon kept by each angler. Total length (tip of snout to tip of tail), weight and scale samples were obtained from the anglers' catches whenever possible. Angler counts were conducted throughout the creel census program. Angler counting times were randomly chosen and were conducted from fixed-wing aircraft and riverboats. Angler counts utilizing riverboats were conducted four times a day throughout the weekends/holidays, and twice a day during the weekdays. An aerial angler count was conducted for each weekend/holiday period and each weekday (5-day) period.

Chinook salmon scales, collected from the sport fish harvest, were mounted on gum paper and pressed onto plastic acetate. Scales were later examined using a microfische reader to determine the age class frequencies for the chinook salmon sport fish harvest.

The Whittier coho salmon creel census was designed to obtain effort and harvest data and evaluate the success of the 1980 FRED coho salmon smolt release. The period from August 1 through September 30 was stratified by weekday and weekend/holiday. The schedule called for interviewing anglers during a randomly chosen 8-hour period on all weekends, holidays and three randomly chosen weekdays each week. Interviews of all anglers who had completed the day's fishing were attempted. The statistical design is similar to that used in the 1978-1979 Deshka River coho salmon creel census. In addition to recording hours fished and the catch, length and weight data along with scale samples were collected. Each fish was checked for the adipose fin clip and the heads were retained from a number of clipped fish for examination purposes.

The European method was used to denote salmon age class groups. A decimal mark is used to separate the number of years spent in freshwater from the number of years spent in saltwater.

The chinook salmon escapement surveys on the west side Susitna River tributaries were accomplished by 2-passenger helicopter from July 16 through August 11.

Fall fish population sampling in Fort Richardson and Anchorage area lakes was accomplished with 125 ft variable mesh gill nets. Minnow traps baited with salmon roe were fished in conjunction with the gill nets in selected lakes. Measurements on the fish collected include total lengths to the nearest millimeter (mm) and weight to the nearest ounce (oz). The gill nets and minnow traps were fished for a period of approximately 24 hours in each lake.

FINDINGS

West Side Susitna Chinook Salmon Fishery

For the third consecutive year, three west side Susitna River streams were open to the taking of chinook salmon 20 inches (508 mm) and over in length. No additional areas within the three streams were opened during 1981, and the west side's collective harvest quota of 11,000 remained unchanged from previous years. The seasonal harvest quota is allocated to stream as follows: Deshka River, 7,000; Lake Creek, 2,000; and Alexander Creek, 2,000. Scheduled seasons also remained identical to previous years.

A king salmon/steelhead permit and a non-transferable harvest record sticker or card were required to participate in the chinook salmon fishery. As in the past, a five fish (over 20 inches in length) yearly bag limit was continued on the west side Susitna streams.

The chinook salmon fishery was monitored closely on a day-to-day basis for both enforcement purposes and to collect biological data such as angler effort, harvest, sex and age composition data from sport caught chinook salmon.

The 1981 chinook salmon sport fishing season differed from past seasons in many aspects. The total chinook salmon harvest for the west side streams was sharply reduced from previous years. Three thousand, one hundred sixty-six chinook salmon were harvested in 1981 as opposed to 7,348 in 1980 (Table 2). Reductions were also recorded in the fishing effort and the average seasonal catch per angler. Low, clear water conditions prevailed during the first half of the 1981 season, whereas high turbid flows characterized the initial portion of past seasons. This resulted in favorable fishing success during the first half of the season. At about midpoint in the season, west side Susitna streams became rain swollen and remained high and turbid throughout the season, and angler catch rates fell off (Table 3). The poorer angling success during the latter part of the season was attributed to not only the high water conditions but also the paucity of chinook salmon.

Efforts to estimate the total chinook salmon escapements in upper Cook Inlet were unsuccessful for the second consecutive year. The three major west side chinook salmon producers (Deshka River, Alexander and Lake Creeks) remained high and turbid throughout most of the 1981 spawning period. Water conditions did allow, however, escapement counts in a number of the smaller drainages. In those tributaries where counting was possible, escapements generally fell within the post-1976 range (Table 4).

Even though escapement counts were not available for the three major producers, the staff feels the chinook escapement this year could have been 20% to 30% below mean post-1976 levels. The factors influencing the staff assumptions were: (1) reduction in total harvest and effort figures; (2) catch per unit of effort dropped; and (3) field staff observations of the chinook salmon migrations throughout the chinook salmon season.

Population Status

Susitna River chinook salmon have three dominant age classes--Age 1.2, 1.3 and 1.4, although there are other age groups with an additional year in freshwater or saltwater. The 1981 age structure was determined solely by scale analysis from sport caught chinook salmon. Data from carcasses were not available this year due to persistent high water conditions.

Table 5 shows that Age 1.3 chinook salmon dominated the harvest as in previous years. Alexander Creek again had the high percentage of Age 1.2 chinook, but showed a shift in the age class frequency of Age 1.3 and 1.4 chinook salmon from 1980 (Table 6). In 1980, the Alexander Creek chinook salmon harvest was comprised of 77% Age 1.3 and 7% Age 1.4, whereas, in 1981, the harvest was comprised of 54% Age 1.3 and 30% Age 1.4 chinook salmon. As Alexander Creek's population trend is toward an older age class of chinook salmon, Lake Creek is exhibiting a decline in Age 1.4 chinook from 53% in 1979 to only 25% in 1981. Correspondingly, the average length of Lake Creek chinook salmon have declined from 829 mm in 1980 to only 787

Table 2. West Side Susitna Chinook Salmon Sport Fishery Effort and Harvest Estimates, 1979-1981.

Stream	Quota	Harvest			Angler-Days			Harvest per Angler-Day		
		1979	1980	1981	1979	1980	1981	1979	1980	1981
Alexander Creek	2,000	1,277	2,281	630	2,778	4,411	1,714	0.46	0.52	0.37
Deshka River	7,000	2,954	4,023	1,895	6,451	8,397	5,086	0.46	0.48	0.37
Lake Creek	<u>2,000</u>	<u>2,045</u>	<u>1,044</u>	<u>641</u>	<u>3,954</u>	<u>2,237</u>	<u>1,810</u>	<u>0.52</u>	<u>0.47</u>	<u>0.35</u>
TOTAL	11,000	6,276	7,348	3,166	13,183	15,045	8,610	0.48	0.49	0.37

Table 3. Harvest and Effort Data From the Combined Sport Caught Chinook Salmon Fisheries of Alexander Creek, Lake Creek and Deshka River, by Weekly Periods, 1979-1981.

Weekly Periods	1979			1980			1981		
	Harvest ^{1/}	Effort ^{2/}	CPUE ^{3/}	Harvest	Effort	CPUE	Harvest	Effort	CPUE
1	261	5,022	0.05	880	9,418	0.09	246	2,140	0.11
2	1,147	8,552	0.13	1,021	15,545	0.07	645	6,007	0.11
3	2,194	17,484	0.12	1,271	14,910	0.09	927	8,470	0.11
4	1,384	11,415	0.12	2,066	18,829	0.11	666	8,415	0.08
5	898	8,515	0.10	1,160	11,163	0.10	418	5,847	0.07
6	390	5,183	0.07	570	5,832	0.10	197	3,446	0.06
7	*	*	*	280	3,477	0.08	67	855	0.08
Totals	6,274	56,171	0.11	7,348	79,174	0.09	3,166	35,186	0.09

^{1/} Expanded harvest estimates.

^{2/} Expanded effort estimates.

^{3/} Catch per angler hour.

* Days of weekly periods vary from year to year, since the season commences on the fourth Saturday in May.

Table 4. Chinook Salmon Escapement Counts for Upper Cook Inlet/West Side Susitna River, 1976-1981.

Stream	1976	1977	1978	1979	1980	1981
Alexander	5,412	13,385	5,854	6,215	*	*
Deshka	21,693	39,642	24,639	27,385	*	*
Lake	3,735	7,391	8,931	4,196	*	*
Chuit	1,984	1,891	1,130	1,246	*	1,362
Theodore	1,032	2,263	547	512	*	535
Lewis	380	454	561	546	*	560
Talachulitna	1,319	1,865	1,375	1,648	*	2,025
Olson	247	1,229	94	17	*	116
Coal	17	*	1,551	178	*	223
Red	*	1,511	385	*	*	749
Straight	59	24	108	*	*	126
Nikolai	11	143	*	*	*	26
Bishop	12	468	*	30	*	174

* No count available.

Table 5. Combined Sport Caught Chinook Salmon Age Class Frequency for Alexander Creek, Lake Creek and Deshka River, 1979-1981.

Year	Sample Size	Age Group By Percent		
		1.2	1.3	1.4
1979	517	9.7	55.7	34.6
1980	293	13.0	54.6	32.4
1981	300	13.0	57.0	30.0

Table 6. Comparative Age Class Frequency From Chinook Sport Harvest for Alexander Creek, Lake Creek and Deshka River, 1979-1981.

	Year	Sample Size	Age Group By Percent		
			1.2	1.3	1.4
Deshka River	1979	297	7	60	33
	1980	181	10	51	39
	1981	159	10	57	33
Alexander Creek	1979	97	20	63	17
	1980	43	16	77	7
	1981	68	16	54	30
Lake Creek	1979	123	7	40	53
	1980	69	19	50	31
	1981	73	16	59	25

mm in 1981 (Table 7). In the past, Lake Creek had a reputation for large sport caught chinook salmon, but the data indicate the trend is toward smaller chinook salmon.

Table 8 illustrates the large overlap in the length ranges between the three dominant age classes. This overlap is most evident between age groups 1.3 and 1.4. The size overlap makes it difficult to age west side Susitna chinook salmon by length as opposed to scale analysis. A statistical analysis of available data is being conducted to determine which factors will most accurately determine age groups. The statistical study will not be concluded in time for the results to be included in this report.

The upper Cook Inlet/west side Susitna River chinook salmon stocks appear to be in a healthy state even though the escapements in three big west side chinook salmon producers dropped off from previous years. In 1982, all the dominant age classes are returning from high parent escapement years. After the 1982 chinook salmon season, the question of whether high parent escapements beget big returns can be answered, and then maybe it can be established whether or not upper Cook Inlet chinook salmon stocks have recovered to their historic levels.

Whittier Coho Salmon Creel Census

The Division of FRED released 50,000 coho smolts at Whittier in 1980, to produce an adult return of less than 100 coho salmon, an approximate 0.2% return. In the past, 2% to 3% of the total number of coho smolts released have returned as adults. One important difference between the 1980 smolt release from previous years is that Age 0+ smolts were released instead of Age 1+ smolts. The rearing facilities at the Fort Richardson hatchery were limited in 1980-1981 because of an ongoing construction project. Because the rearing space was limited, the hatchery personnel accelerated the growth of the juvenile coho, so the coho attained the "normal" smolt release size at Age 0+ instead of Age 1+.

The staff does not completely understand why the Age 0+ smolt release did not produce the projected adult return. One suggestion is that the coho salmon were not physiologically ready to smolt before they were released.

The Division of FRED released over 200,000 Age 0+ coho smolts at Whittier again in 1981. There could be a good adult return from this release if the coho follow the normal pattern of spending one winter in saltwater before returning to their release site.

The Division of FRED, in 1981, also released for the first time 100,000 Age 1+ chinook salmon smolts. The chinook salmon are expected to return in 1983 as Age 1.2 adult chinook salmon.

Lake Stocking Program

In 1981, the Division of FRED stocked 18 lakes in the Anchorage area with a total of 52,040 rainbow trout, 32,900 coho salmon and 20,788 chinook salmon (Table 9). In previous years, the stocking program relied upon planting catchable sized fish which numbered approximately 6-8/lbs. This year the

Table 7. Mean Total Length (mm) of 1979-1981 West Side Susitna Drainage Sport Caught Chinook Salmon by Sex and Stream.

Stream	Year	Male	Female	Mean
Alexander Creek	1979	734	884	798
	1980	708	885	751
	1981	813	889	838
Deshka River	1979	851	919	889
	1980	744	914	806
	1981	889	864	881
Lake Creek	1979	912	983	*
	1980	772	972	829
	1981	838	762	787

* Data not available.

Table 8. Age and Length Data From Sport Caught Chinook Salmon for Deshka River, Alexander Creek and Lake Creek, 1981.

Age Class	No. In Sample	% of Total Sample	Range mm	Sex Ratio Male:Female
Deshka River				
1.2	16	10.1	533-737	All Male
1.3	91	57.2	686-1003	1.1 : 1.0
1.4	<u>52</u>	<u>32.7</u>	<u>864-1168</u>	<u>1.5 : 1.0</u>
TOTAL	159	100.0	533-1168	1.5 : 1.0
Alexander Creek				
1.2	11	16.2	483-648	All Male
1.3	37	54.4	686-1003	1.0 : 1.8
1.4	<u>20</u>	<u>29.4</u>	<u>800-1372</u>	<u>1.0 : 1.5</u>
TOTAL	68	100.0	483-1372	1.0 : 1.1
Lake Creek				
1.2	12	16.4	559-698	All Male
1.3	43	58.9	660-927	1.0 : 1.0
1.4	<u>18</u>	<u>24.7</u>	<u>813-1060</u>	<u>1.0 : 1.6</u>
TOTAL	73	100.0	559-1060	1.0 : 1.2

Table 9. Fish Stocked in Anchorage Area Lakes, 1981.

Lake	Location	Species Stocked	No. Stocked
Jewel	Anchorage	RT Catchables	5,991
Sand	Anchorage	RT Catchables	5,255
Delong	Anchorage	RT Catchables	2,680
Campbell Point	Anchorage	RT Catchables	5,356
Lower Fire	Eagle River	RT Catchables	5,000
Beach	Birchwood	RT Catchables	5,000
C Street	Anchorage	SS Subcatchables	10,000
Mirror	Peters Creek	SS Subcatchables	10,400
Cheny	Anchorage	KS Subcatchables	20,778
Otter	Ft. Richardson	RT Catchables	6,553
Clunie	Ft. Richardson	RT Catchables	5,000
Gwen	Ft. Richardson	RT Catchables	4,937
Thompson	Ft. Richardson	RT Catchables	999
Hillberg	Elmendorf	RT Catchables	2,680
Green	Elmendorf	RT Catchables	2,589
Six-Mile	Elmendorf	SS Subcatchables	5,500
Triangle	Elmendorf	SS Subcatchables	3,500
Fish	Elmendorf	SS Subcatchables	3,500

Total Stocked:

RT - 52,040

SS - 32,900

KS - 20,778

RT = rainbow trout
 SS = coho salmon
 KS = chinook salmon

hatchery rearing facilities were limited due to the ongoing construction project at the Fort Richardson hatchery. All the planted coho and chinook salmon were in the subcatchable size range or 28 to 33/lb.

Expansion of the Fort Richardson hatchery is not supposed to be completed until late 1982, so the Elmendorf hatchery will solely be responsible for fish production in the Anchorage area. Since the hatchery production facilities will be limited, the outlook for the 1982 stocking program will be for a reduction in the total number of planted fish and an increase in percentage of planted subcatchable fish.

Test Netting

In September, Fort Richardson Wildlife personnel test-netted Thompson, Gwen, Otter and Clunie Lakes to evaluate fish growth following stocking, fall feeding habits and the effects of parasites. This information will be used to develop recommendations for stocking in the spring of 1982. Table 10 summarizes the test-netting results.

Lengths and weights of the fish sampled showed little variation from test netting results collected in previous years. Scale samples were taken from the largest fish caught in Clunie and Otter Lakes. While growth rings are unreliable in predicting the age of hatchery reared fish, the number of winters these fish have spent in the lake can readily be determined. In Clunie Lake, rainbow trout 300-350 mm in length have spent at least 2 years in the lake, and fish 400-450 mm in length have overwintered at least 3 years. In Otter Lake, fish which were 350-400 mm had spent at least 2 years in the lake, and those resident for 3 or more years were approximately 410-470 mm in length. It appears that fish in Otter Lake are exhibiting a comparatively higher annual growth rate.

Clunie Lake fish were heavily parasitised with cestoid flatworms. Cysts and adult tapeworms were present throughout the abdominal cavity in 70% of the fish sampled. A small cestoid parasite was also found in approximately 30% of the fish sampled from Otter and Thompson Lakes. No parasites were observed in fish from Gwen Lake.

In June 1981, three lakes, Mirror Lake, C Street and Cheny's Pond, were stocked with subcatchable salmon which averaged 23-33/lb. These lakes were test-netted in October to evaluate the seasonal growth and abundance of stocked fishes.

Test-netting results indicate the salmon increased their weight over the summer to an average of 4-10/lb (Table 11).

The important fact to point out is that in the fall the salmon were just entering into a size range which is acceptable to the sport angler. It will be important to sample these same lakes in the spring to evaluate overwinter survival of the stocked fishes.

Table 10. Test-Netting Results for Fort Richardson Lakes, 1981.

Lake	Species	Sample Size	Length (mm)*		Weight (oz)	
			Mean	Range	Mean	Range
Otter	RT ^{1/}	13	350	165-475	22	3-47
Clunie	RT	19	310	200-460	12	4-36
Gwen	RT	16	327	180-391	14	2-25
Thompson	RT	9	266	244-310	8	* ^{2/}

^{1/} RT = rainbow trout.

^{2/} Data not available.

Table 11. Test-Netting Results for Anchorage Area Lakes, 1981.

Lake	Species	Sample Size	Length (mm)*		Weight (oz)	
			Mean	Range	Mean	Range
Mirror	SS ^{1/}	137	197	117-275	2.5	0.3-7.0
C Street Pond	SS	14	160	117-265	1.5	0.5-5.0
Cheny's Pond	KS ^{1/}	13	189	164-355	3.7	1.3-2.8

1/ SS = coho salmon.

2/ KS = chinook salmon.

* Total length.

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