

STATE OF ALASKA

Jay S. Hammond, Governor



Annual Performance Report for

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

by

Stanley W. Kubik
Roger Wadman

ALASKA DEPARTMENT OF FISH AND GAME
James W. Brooks, Commissioner

SPORT FISH DIVISION
Rupert E. Andrews, Director
W. Michael Kaill, Chief, Sport Fish Research

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RESEARCH PROJECT SEGMENT

State: ALASKA Name: Sport Fish Investigations
of Alaska.

Project No. : F-9-9

Study No. : G-1 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 River and Central
Cook Inlet Drainages.

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

ABSTRACT

Rainbow trout, Salmo gairdneri Richardson, were experimentally stocked in 14 Anchorage area lakes and Arctic grayling, Thymallus arcticus (Pallas), planted in two lakes.

Creel census of four military lakes in the Anchorage area indicated high returns of catchable rainbow trout to the creel. Estimated percent return of 1976 trout plants to the angler was 78.6, 65.8, 57.7, and 46.9 in Gwen, Green, Hillberg, and Otter lakes, respectively.

The 1976 escapement of chinook salmon, Oncorhynchus tshawytscha (Walbaum), in west side Susitna streams was studied. All surveyed streams revealed 1976 escapements were substantially higher than any previous year.

Coho salmon, O. kisutch (Walbaum), were sampled from various Cook Inlet fisheries. Data were collected on timing and location of catch and size of coho. Scales were also obtained for comparison with those from known spawning systems.

A creel census program designed to determine harvest of and effort for eulachon, Thaleichthys pacificus (Richardson), of the Twenty Mile River dip-net sport fishery was conducted. An estimated 54,000 eulachon were harvested, providing approximately 4,000 man-days of recreation.

Creel census activities conducted at Eshamy Creek in Prince William Sound revealed a total recreational harvest of 759 sockeye salmon, O. nerka, (Walbaum), in 666 man-days of fishing effort.

BACKGROUND

The magnitude of the chinook salmon, Oncorhynchus tshawytscha (Walbaum), run into upper Cook Inlet cannot be evaluated because of the many turbid, glacial streams in which the salmon cannot be detected visually. Enumeration of salmon in the Susitna River drainage is confined to the clear water tributaries. Since 1964, chinook salmon escapement surveys have been made annually on selected streams in the Susitna basin.

To gain information on coho salmon, O. kisutch (Walbaum), stocks in Cook Inlet, a study of this species was **undertaken** in 1976. Coho salmon in Cook Inlet are intensively harvested by both commercial and sport fishermen. Stocks originating from lake and river systems further north in Cook Inlet are fished longer and more intensively than stocks from systems located in more southern portions of the inlet.

Commercial pressure on coho salmon is increasing and likely will further increase in the future due to increased demand in the fresh fish market coupled with sharply increased prices for all fish products.

Coho salmon escaping the commercial fishery are also subjected to a sport fishery, which becomes intense in streams having highway access. Effort is lighter in "**fly-in**" situations.

Only the king salmon compares in popularity with the coho salmon, and the importance of the coho as a sport species cannot be stressed enough.

During 1976 a creel census program was conducted at Eshamy Creek in western Prince William Sound to establish sport fish effort and harvest levels. Recreational access to Eshamy is primarily by small boat craft originating from **Whittier** and float planes for access to both Eshamy Lake and Lagoon. Present recreational use is light, but is expected to increase significantly as facilities at **Whittier** and Valdez develop.

As in previous years, the program for restocking Anchorage area lakes was continued in 1976. Test netting to determine population trends within managed lakes was also conducted.

Since 1968 the Department of Fish and Game has maintained a cooperative agreement with Elmendorf and Ft. Richardson whereas the State of Alaska on an annual basis provides fish for restocking purposes. During 1976 lakes on the military reservation received 46,072, or 63% of the total catchable size rainbow trout planted. The general public is granted access to all fishing areas on the military installations, however the majority of participants are military personnel and dependents.

Although most of the military lakes have been stocked with game fish for many years, information on the sport fishery and success of the stocking program on these lakes has never been collected. A creel census program utilizing military and Fish and Game personnel to evaluate current fishing pressure and harvest on four lakes was initiated in 1976.

A statistically selected sample of anglers at Twenty Mile River was interviewed and counted to determine harvest of and effort for eulachon,

Thaleichthys pacificus (Richardson). This is a short (May 15 - June 6, 1976) and intense fishery near Anchorage. The purpose of the creel census was to assess the importance of the fishery and maintain a continuing data base.

RECOMMENDATIONS

1. Investigation of spawning runs of eulachon, their biological characteristics and the sport fishery in the Turnagain Arm area be continued.
2. Creel census in the western Prince William Sound area be conducted in conjunction with other activities. Angler interviews be specifically conducted on **Coghill**, Eshamy and Shrode creeks for catch information to establish sport fish effort and harvest levels.
3. Investigation of waters between the Chakachatna River on Cook Inlet and the headwaters of the Talachulitna River be conducted on a continuing basis due to anticipated effects of proposed coal and gas field development in the area.
4. Emphasis of the coho program be directed to obtaining sport fish harvest data from selected west side Cook Inlet drainages.

The coho programs should also be directed towards obtaining information on spawning escapements and early life history of this species in selected watersheds.

5. Continuation of chinook salmon escapements counts.
6. Experimental stocking evaluations on area lakes to be continued.

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

1. Fish population sampling throughout the Anchorage-western Susitna River area was accomplished with 125 ft. variable mesh gill nets, a Smith-Root Type V backpack electrofishing unit, hook and line, and dip nets. Measurements on fish collected included total lengths to the nearest millimeter (mm), and weight to the nearest gram (g). Scale samples from fish were pressed on cellulose acetate sheets and projected on the screen of a Micro-Design C.O.M. 200 scale reader to determine age.
2. Data were collected from coho salmon entering the Cook Inlet commercial set and drift net fisheries. Location and date of harvest were obtained from fishermen, salmon processors, and fish tickets. Length, weight, sex and scales were obtained from the salmon on the fishing grounds, at the processors, and from selected watersheds throughout Cook Inlet.
3. Escapement surveys were conducted from July 11 through August 12. Streams were low and clear, thus affording excellent visibility conditions. Most of the major stream systems were surveyed at least twice to determine the peak period of abundance. Two basic methods, aerial and ground surveys, have been utilized to obtain distribution, numbers and time of arrival of chinook salmon in upper Cook Inlet streams. Other counting methods have included counting towers, weirs and sonar salmon counters. However, since it is not economically feasible to have a weir or tower on each stream, aerial and ground methods will continue as the only source of information for most streams of the area.

Generally, aerial surveys are accomplished by light, fixed-wing aircraft (super-cub) capable of following winding stream courses. During the 1973 season, a small helicopter was included and since then has proven to be an effective and reliable method for salmon enumeration.

4. A statistically selected sample of anglers was interviewed and counted to determine harvest of and effort for eulachon in of the Twenty Mile River dip-net sport fishery.

For the period May 15 - June 6, the day was stratified into two seven-hour periods (8:a.m. - 3 p.m. and 3 p.m. - 10 p.m.). The week was stratified into a weekday division and a weekend-holiday division. Each week two of the seven-hour periods were randomly chosen from each of the week divisions. During these randomly chosen periods, counts of anglers were made hourly, and all anglers who had completed their fishing trip were interviewed.

Angler hours effort for the season was estimated by multiplying the mean hourly count for each stratum by the number of hours in the fishing season for that stratum and summing over all strata. Harvest was estimated by multiplying catch per hour (from interviews) by estimated effort for each stratum and summing over all strata.

5. A creel census was also conducted at **Eshamy** Creek to determine angler effort and harvest data. This census was also designed to contact 100% of the anglers.
6. On selected military reservation lakes, a 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 hours during the selected census periods.

FINDINGS

Results

Sport Fish Stocking:

Eighteen lakes in the area of incorporating metropolitan Anchorage, Elmendorf Air Force Base, and the U.S. Army reservation at Ft. Richardson, were experimentally stocked with game fish in 1976. The location of each lake, date stocked, species, size and number of fish released are shown in Table 1.

Creel Census Program:

A creel census program to evaluate current fishing levels (angler-hours) and an estimate of total harvest on four military reservation lakes in Anchorage was conducted in 1976. Information from the sport fishery and success of the stocking program on the lakes has never been collected, although each one has been stocked with rainbow trout for many years.

The lakes checked are small, ranging from 11 to 99 acres in size, and consequently, anglers may be observed on all points of the shoreline from a single observation station on each lake. Instantaneous counts of anglers at randomly selected hours during the census day from 6 a.m. to 10 a.m. permitted collection of fishing effort information on all four lakes during the creel census day. Spot checks and interviews of part of the anglers observed during each creel census series were made to obtain data necessary to calculate a harvest rate of fish per hour.

The creel census conducted on the four military lakes indicated returns of catchable trout to the creel was quite high. Estimated return of 1976 trout plants to the angler was 78.6%, 65.8%, 57.7%, and 46.9% in Gwen, Green, Hillberg, and Otter lakes, respectively. Dates of the census, number of days creel checked, total angler hours, catch rate and total estimated harvest are shown in Table 2.

Harvest and effort estimates for 1976 by sampling periods for the four military **reservation** lakes are presented in Tables 3 through 6.

Test Netting:

The eight lakes in the Anchorage area test netted in 1976 are shown in Table 7 with fish species present and size composition of fish caught.

Table 1. Experimental Fish Stocking in Anchorage Area Lakes, 1976.

Lake	Location	Date	Species Stocked*	Number Stocked	Size (Fish/lb.)
Beach	Anchorage	6- 2	RT	4,000	4.0
Campbell Pt.	Anchorage	5-24	RT	2,000	4.4
	Anchorage	7- 1	RT	1,800	3.7
Cheny Pond	Anchorage	6-11	SS	20,000	Fry
C St. Gravel Pit	Anchorage	6-16	SS	20,000	Fry
Jewell	Anchorage	2- 3	RT	494	1.8
	Anchorage	5-24	RT	4,600	4.4
	Anchorage	6-11	RT	15	Adults
	Anchorage	6-29	RT	2,000	4.0
Lower Fire	Anchorage	3-8	RT	330	2.4
	Anchorage	5-24	RT	4,000	4.4
	Anchorage	6-11	RT	16	Adults
	Anchorage	6-29	RT	2,200	4.0
	Anchorage	7- 1	RT	2,000	3.7
Mirror	Anchorage	6-25	GR	100,000	Fry
Rabbit Creek	Anchorage	6-25	GR	25,000	Fry
Sand	Anchorage	5-24	RT	2,000	4.4
	Anchorage	6-29	RT	2,200	4.0
Fish	Elmendorf	6- 2	RT	2,100	4.3
Green	Elmendorf	1-27	RT	459	1.7
	Elmendorf	5-24	RT	2,500	4.4
	Elmendorf	6-11	RT	10	Adults
	Elmendorf	6-28	RT	2,500	3.7
Hillberg	Elmendorf	5-24	RT	2,600	4.4
	Elmendorf	6-28	RT	2,500	4.2
	Elmendorf	7- 1	RT	800	3.7
Six Mile	Elmendorf	6- 3	SS	20,000	Fry
Triangle	Elmendorf	5-25	RT	1,000	4.6
	Elmendorf	6-28	RT	1,000	4.0
Clunie	Ft. Richardson	5-24	RT	5,000	4.4
	Ft. Richardson	6-29	RT	4,000	4.0
Gwen	Ft. Richardson	5-21	RT	2,000	4.4
	Ft. Richardson	6-29	RT	2,000	3.8
Otter	Ft. Richardson	1-30	RT	493	1.7
	Ft. Richardson	5-21	RT	6,200	4.4
	Ft. Richardson	6-11	RT	10	Adults
	Ft. Richardson	6-28	RT	5,000	4.2
	Ft. Richardson	7- 1	RT	400	3.7
Thompson	Ft. Richardson	5-25	RT	2,500	4.6
	Ft. Richardson	6-29	RT	2,600	3.8
Total stocked:	RT - 73,327				
	SS - 60,000				
	GR -125,000				

*Note: RT = rainbow trout
SS = silver salmon
GR = grayling

Table 2. Fishing Effort, Catch Per Hour, and Harvest of Rainbow Trout on Four Military Lakes, 1976.

Lake and Location	Census Period	No. Days In Census Period	Total Angler Days	Total Angler Hours	Harvest	Catch Per Hour
Green Elmendorf	5/31-8/22	84	3,461	7,574	3,599	0.48
Hillburg Elmendorf	5/31-8/22	84	2,704	6,336	3,168	0.50
Gwen Ft. Richardson	5/29-8/31	95	5,010	9,586	3,146	0.33
Otter Ft. Richardson	5/29-8/31	95	7,134	18,568	5,671	0.31

Table 3. Green Lake Rainbow Trout Harvest and Effort Estimates, 1976.

Dates	Angler-Hours	Angler-Days	Catch	<u>Hours</u> Angler-Day	<u>Catch</u> Hour
5/31-6/13	1,026	515	282	1.99	0.27
6/14-6/27	1,005	466	594	2.16	0.59
6/28-7/11	2,170	661	1,884	3.28	0.87
7/12-7/25	1,636	808	548	2.02	0.33
7/26-8/ 8	800	420	257	1.90	0.32
8/ 9-8/22	<u>937</u>	<u>591</u>	<u>34</u>	<u>1.59</u>	<u>0.04</u>
Total	7,574	3,461	3,599	2.19	0.48

Table 4. Hillberg Lake Rainbow Trout Harvest and Effort Estimates, 1976.

Dates	Angler-Hours	Angler-Days	Catch	<u>Hours</u> Angler-Day	<u>Catch</u> Hour
5/31-6/13	2,768	1,222	1,562	2.27	0.56
6/14-6/27	716	345	37	2.07	0.05
6/28-7/11	740	319	449	2.32	0.61
7/12-7/25	723	273	395	2.65	0.55
7/26-8/ 8	842	294	477	2.86	0.57
8/ 9-8/22	<u>547</u>	<u>251</u>	<u>248</u>	<u>2.18</u>	<u>0.45</u>
Total	6,336	2,704	3,168	2.34	0.50

Table 5. Gwen Lake Rainbow Trout Harvest and Effort Estimates, 1976.

Dates	Angler-Hours	Angler-Days	Catch	<u>Hours</u> Angler-Day	<u>Catch</u> Hour
5/29-6/11	2,137	1,404	932	1.52	0.44
6/12-6/25	1,440	790	255	1.82	0.18
6/26-7/ 9	2,187	957	786	2.29	0.36
7/10-7/23	1,733	898	813	1.93	0.91
7/24-8/ 6	1,258	606	209	2.08	0.17
8/ 7-8/20	327	172	51	1.90	0.16
8/21-8/31	<u>504</u>	<u>183</u>	<u>100</u>	<u>2.75</u>	<u>0.20</u>
Total	9,586	5,010	3,146	1.91	0.33

Table 6. Otter Lake Rainbow Trout Harvest and Effort Estimates, 1976.

Dates	Angler-Hours	Angler Days	Catch	<u>Hours</u> Angler-Day	<u>Catch</u> Hour
5/29-6/11	6,116	2,370	2,193	2.58	0.36
6/12-6/25	3,612	1,245	1,514	2.90	0.14
6/26-7/ 9	3,379	1,340	1,129	2.52	0.33
7/10-7/23	2,223	883	826	2.52	0.37
7/24-8/ 6	1,571	611	608	2.57	0.39
8/ 7-8/20	1,047	429	258	2.44	0.25
8/21-8/31	<u>620</u>	<u>256</u>	<u>143</u>	<u>2.42</u>	<u>0.23</u>
Total	18,568	7,134	5,671	2.60	0.31

Table 7. Test Netting Results, Anchorage Area Lakes, 1976.

Lake	Date	Species*	Number of fish	Length (mm)	
				Range	Mean
Mirror	10-13	GR	18	225-296	256
Otter	10-16	RT	10	305-533	387
Gwen	10-17	RT	25	254-381	338
Hillberg	10- 8	RT	4	270-330	296
Green	10- 8	RT	9	275-385	343
Six Mile	10- 8	SS (Adult)	1	520	520
		RT	4	330-540	450
		SS (Jvenile)	17	110-140	127
South Pond (20 Mile)	10-13	SS	17	47-175	107
		DV	2	122-275	198
		FL	1	320	320
North Pond (20 Mile)	10-13	SS (Jvenile)	8	76-139	120
		FL	1	320	320

* GR - Grayling
 RT - Rainbow trout
 SS - Coho salmon
 DV - Dolly Varden
 FL - Starry flounder

All of the lakes shown except the north and south ponds at Twenty Mile are part of the Sport Fish **Division's** experimental stocking program.

The presence of Dolly Varden, Salvelinus malma, coho, O. kisutch, and starry flounder, Platichthys stellatus in the **Twenty Mile River ponds** is the result of natural introduction from Turnagain Arm during high tide periods.

Eulachon Investigations:

A creel census program designed primarily for determination of total harvest and effort information was conducted for the eulachon dip net sport fishery at Twenty Mile River. The main channel of Twenty Mile was ice-free by May 3, 1976. First reports of eulachon in the river occurred on May 13. The peak of the smelt dip net fishery in 1976 **occurred during the last week in May. The run of eulachon spanned a period of 25 days** between May 13 and June 6, 1976.

In 1976 recreational anglers fished an estimated 4,155 man-hours to harvest 54,061 fish. The mean success rate of anglers was 13.0 fish per hour. This was a considerable improvement over the 1975 season when a poor eulachon run occurred and fishermen were noticeably absent.

Mean length and weight of smelt in the 1976 population, as collected from 240 fish samples between **May** 15 and June 2, was 227 mm and 65.8 gm, respectively. Smelt in Twenty Mile River during 1976 had a sex ratio of **5:1** males per females.

The mean length (mm), weight (gm), and sex ratio of smelt in the 1976 samples are shown by sex and date of collection in Table 8.

Upper Cook Inlet-Anchorage West Side Susitna River Chinook Salmon Escapement:

A dramatic increase of chinook salmon in upper west side Cook Inlet and Anchorage area streams was observed during-1976; a total of 39,435 salmon (Table 9), over four times the previous high of 9,203 (1974), was recorded.

For the fourth successive year, chinook salmon escapement surveys of sufficient magnitude to estimate total spawning escapements were conducted on all major clearwater tributaries of the western Susitna River. A minimum estimate of the total spawning population was 51,300 chinook salmon. The 1976 escapement level was approximately 4-1/2 times the previous high of 11,700 estimated for 1974.

The 1976 escapement of chinook salmon into west side Susitna streams was substantially higher than 1975 levels. A total of 38,312 salmon were observed in 18 streams during 1976, a 389% increase over the 7,842 chinook salmon enumerated during 1975.

Table 10 shows chinook salmon counts on 10 streams where reliable comparisons can be drawn between years 1973-1976.

Table 8. Mean Weight, Length and Sex of Eulachon from Twenty Mile River by Day, 1976.

Date	Length Range (mm)		Mean Total Length		Weight Range (g)		Mean Weight		Sex Ratio
	Male	Female	Male	Female	Male	Female	Male	Female	Male/Female
5/15	211-240	218-240	226	229	54-82	59-82	67	72	3:1
5/16	211-245	214-242	232	227	54-91	64-95	69	77	5.7:1
5/18	224-241	202-225	230	217	59-82	45-73	68	59	0.8:1
5/21	215-245	219-246	230	226	59-91	54-86	69	66	2.3:1
5/22	217-247	210-239	228	226	54-91	54-77	65	65	2.3:1
5/23	215-249	220-235	231	226	50-91	64-77	72	70	1.9:1
5/26	211-239		225		50-82		64		All males
5/28	205-248		223		54-86		65		All males
5/29	216-235	237	226	237	54-82	82	65	82	19:1
5/30	208-241	217	227	217	45-91	45	64	45	19:1
5/31	202-244		225		41-77		62		All males
6 / 2	<u>217-251</u>	<u> </u>	<u>230</u>	<u> </u>	<u>54-86</u>	<u> </u>	<u>66</u>	<u> </u>	<u>All males</u>
Season Total	202-249	210-246	228	224	41-91	45-95	66 (N=200)	66 (N=40)	5:1

N = Males - 22. Females - 40

Table 9. Chinook Salmon Counts, Anchorage and West Side Upper Cook Inlet, 1976.

Alexander Creek	5,412
Deshka River	21,693
Chuit River	1,984
Lewis River	380
Theodore River	1,032
Peters Creek	1,489
Martin Creek	791
Olson Creek	247
S. F. Eagle River (Anchorage)	81
N. F. Eagle River (Anchorage)	20
Campbell Creek (Anchorage)	210
Lake Creek	3,735
Canyon Creek	44
Ship Creek (Anchorage)	806
Cache Creek	61
Straight Creek	59
Bear Creek	15
Coal Creek	17
Bishop Creek	12
Nikolai Creek	11
Drill Creek	11
Bird Creek (Anchorage)	6
Talachulitna River	<u>1,319</u>
Total Count	39,435

Table 10. Comparative Chinook Salmon Survey Counts - West Side Susitna River, 1973-1976.

Stream	1973	1974	1975	1976
Deshka River System	2,381 tower	5,279	4,737	21,693
Alexander Creek System	875 ground	2,193	1,878	5,412
Lake Creek System	761 aerial <u>1/</u>	535	281	3,375
Chuit River	149 "	171	629	1,984
Theodore River	205 "	205	95	1,032
Lewis River	173 "	135	75	380
Talachulitna River	333 tower	303	120	1,319
Peters Creek	59 ground	124	8	1,489
Canyon Creek	29 aerial	10	2	44
Martin Creek	<u>2/</u>	<u>23</u>	<u>6</u>	<u>791</u>
	4,965	8,978	7,831	37,519

1/ All aerial counts by helicopter. (1974 through 1976 all aerial counts)

2/ No count.

Indications are the 1976 chinook salmon escapement into the Deshka River, Lake and Alexander creeks is one of the highest recorded. A summary of chinook salmon counts presenting record highs and lows for some of the **Anchorage/Susitna** streams is presented in Table 11.

A sample of 778 chinook salmon carcasses from the Deshka River were examined for sex and length composition. The salmon ranged in length from 290 to 1,190 mm, with a mean of 916 mm. Males averaged 883 mm and females 952 mm. Sex ratio of males to females was 1.1:1. The 1976 carcass sample was composed predominately of six-year old fish (1.4) ranging in length from 965 to 1,190 mm. Age composition determined by length frequencies indicated 55.3% were six years old; 33.8% were five years old; 9.5% were four years old; and 1.4% were three-year old fish. (Table 12).

A total of 165 chinook salmon carcasses were also sampled on Alexander Creek. The fish ranged in size from 419 to 1,058 mm, with an average of 794 mm. Males averaged 702 mm and females 933 mm. Sex ratio of males to females was 1.5:1. Age composition indicated 63.7% were five years old; 22.4% were four years old; 13.3% were six years old; and 0.6% were three-year-old fish (Table 13).

In addition to the west side Susitna River streams, Eagle River tributaries and Sheep and **Campbell** creeks, located in the Anchorage area, were surveyed for spawning populations of chinook salmon.

In summary, a total of 39,435 chinook salmon were observed in west side Susitna and Anchorage area streams. A minimum estimate of the total spawning population was 51,300. The 1976 escapement levels were approximately 4-1/2 times the previous high of salmon estimated in 1974.

Coho Investigations:

Preliminary findings indicate a separation of coho stocks can be made between upper and lower Cook Inlet. This may be obtained by comparing the size of salmon and the date of harvest. Commercial catches were monitored and it was found that lower Inlet coho peaked at a later date and were of a larger size. To aid the reader, the following map (Figure 1) of the commercial fishing districts is provided. In this text, the districts will commonly be referred to as:

<u>Name</u>	<u>District Number</u>
East side set net	244-20-30-40
East side drift net	244-50-60-70
West side drift net	245-70-80-90
Kalgin Island	246-10-20
Northwest set net	247-10-20-30
Northeast set net	247-70-80-90

Magnitude of subdistrict Fisheries:

With knowlege of the location of the fishing areas, it is **necessa:ry** to define the coho harvest levels for each of the districts. The following list is based on a seven year average (1969-1975).

Table 11. Comparative Chinook Salmon Escapement Counts, West Side Susitna River and Anchorage Area Streams.

Stream	1976 Escapement	Record High	Previous High	Record Low
Deshka River	21,693	21,693 (1976)	5,279 (1974)	933 (1966)
Alexander Creek	5,412	5,412 (1976)	2,193 (1974)	202 (1972)
Lake Creek	3,375	3,375 (1976)	920 (1972)	147 (1966)
Ship Creek	806	1,746 (1970)		94 (1964)
Chuit River	1,984	1,984 (1976)	629 (1975)	13 (1969)
Theodore River	1,032	1,032 (1976)	205 (1973)	8 (1964)
Lewis River	380	380 (1976)	173 (1973)	7 (1972)
Campbell Creek	210	300 (1967)		15 (1966)
S.F. Eagle River	81	159 (1965)		28 (1968)

Table 12. Age and Length Data from Chinook Salmon Carcasses, Deshka River, 1976.

Age Class	No. this Age in Sample	Percent this age of Total Sample	Male Length (mm)		Female Length (mm)		Sex Ratio Male-Female
			No. in Sample	Range	No. in Sample	Range	
III	11	1.4	11	290- 508			All male
IV	74	9.5	73	508- 660	1	640	1:0.01
V	263	33.8	123	660- 965	140	686- 965	1:1.14
VI	<u>430</u>	<u>55.3</u>	<u>197</u>	<u>965-1,190</u>	<u>233</u>	<u>966-1,132</u>	<u>1:1.18</u>
Total	778	100.0	404	290-1,190	374	640-1,132	1.1:1

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Table 13. Age and Length Data from Chinook Salmon Carcasses, Alexander Creek, 1976.

Age Class	No. this Age in Sample	Percent this age of Total Sample	Male Length (mm)		Female Length (mm)		Sex Ratio Male-Female
			No. in Sample	Range	No. in Sample	Range	
III	1	0.6	1	419			All male
IV	37	22.4	37	508- 660			All male
V	105	63.7	58	660- 965	47	666- 965	1.2:1
VI	<u>22</u>	<u>13.3</u>	<u>3</u>	<u>965-1,043</u>	<u>19</u>	<u>966-1,058</u>	<u>1:6.3</u>
Total	165	100.0	99	419-1,043	66	666-1,058	1.5:1

<u>District</u>	<u>Number</u>	<u>Percent Total Harvest</u>
East side set net	28,073	21%
East side drift net	43,346	32%
West side drift net	9,556	7%
West side set net	7,646	6%
Kalgin Island	12,058	9%
Northwest set net	26,605	20%
Northeast set net	6,156	5%
Total	133,440	100%

During this seven-year period, the harvest has ranged from a low of 67,517 to a high of 246,801 coho salmon.

Timing of Commercial Fishery:

One of the first aspects investigated was the timing of coho salmon in the commercial fishery. The initial findings show that coho do not enter the commercial fishery in any significant numbers prior to July 10. From July 10, they rapidly build to a peak in the drift net fishery, Kalgin Island; the west side set net fishery at approximately July 21; at approximately July 23 in the northern set net fishery; and at approximately August 6 in the east side set net fishery. After reaching their peak, the **number** of coho salmon gradually decline, but continue to contribute to the catch throughout the remainder of the commercial season.

Past commercial catch statistics were analyzed to **determine if** the possibility of species separation was possible through timing. It was found that this may be accomplished on odd numbered years. Table 14 will illustrate this timing separation by species by area.

During the odd numbered years, the sockeye salmon, O. nerka (Walbaum) and the pink salmon, O. gorbuscha (Walbaum) reach **their** highest catch period approximately **one** to one and one-half weeks earlier than the coho salmon. The chum salmon, O. keta (Walbaum) follow the peak of the coho by approximately one week with the exception of the east side set net.

This separation is not nearly so clear on the even numbered **year** cycles, however. During these years overlapping occurs between several species.

Size of Fish:

To determine if a difference in size of coho salmon existed within Cook Inlet drainages, samples were collected from selected watersheds. The watersheds, ranging from north to south, were: Knik Arm, Wasilla, Cottonwood, Fish Creek, Little Susitna River, Susitna River, Swanson River, and Kenai River. Lower Peninsula streams included the Ninilchik River, Deep Creek, and Anchor River. Weight was found to be the best determining factor. The findings are presented in Table 15.

This table supports two conclusions: (1) Northern Cook Inlet coho salmon are smaller than southern Cook Inlet and, (2) the coho salmon entering

Table 14. Cook Inlet Salmon Catch by Date, 1969-1976.

	Coho		Chum		Pink		Red	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
ODD YEAR								
Date 50% Catch Reached								
E. Set	8/ 1-8/12	8/ 8	7/25	7/25	7/11-7/14	7/13	7/ 9-7/18	7/14
E. Drift	7/17-7/23	7/21	7/25-7/27	7/26	7/13-7/18	7/15	7/ 2-7/14	7/10
W. Drift	7/17-7/21	7/19	7/26-7/30	7/28	7/ 9-7/15	7/13	7/ 9-7/14	7/11
N.W. Set	7/24-7/28	7/26	7/25-8/ 5	7/30	7/13-7/18	7/16	7/14-7/18	7/16
Date of Highest Catch								
E. Set	7/27-8/ 9	8/ 1	7/28	7/28	7/11-7/16	7/14	7/11-7/23	7/16
E. Drift	7/13-7/25	7/20	7/25-8/ 1	7/29	7/13-7/18	7/15	7/ 2-7/18	7/10
W. Drift	7/13-8/ 1	7/22	7/30-8/ 2	8/ 1	7/ 9-7/19	7/14	7/ 6-7/21	7/12
N.W. Set	7/23-7/28	7/26	7/28-8/ 5	8/ 1	7/ 9-7/25	7/17	7/ 9-7/25	7/18
EVEN YEAR								
Date 50% Catch Reached								
E. Set	7/31-8/10	8/ 5	7/19-8/ 8	8/ 1	7/31-8/ 7	8/ 5	7/15-7/21	7/19
E. Drift	7/19-7/26	7/21	7/21-7/26	7/25	7/19-7/23	7/22	7/15-7/19	7/ 7
W. Drift	7/20-7/26	7/23	7/14-7/23	7/19	7/12-7/23	7/18	7/10-7/15	7/12
N.W. Set	7/20-7/26	7/24	7/28-8/ 2	7/30	7/23-7/26	7/24	7/15-7/24	7/19
Date of Highest Catch								
E. Set	7/26-8/14	8/ 5	7/19-8/ 8	7/29	8/ 4-8/14	8/ 8	7/15-7/22	7/19
E. Drift	7/19-7/28	7/22	7/17-8/ 5	7/25	7/19-7/28	7/23	7/16-7/20	7/18
W. Drift	7/16-7/28	7/23	7/12-7/23	7/17	7/11-7/27	7/22	7/11-7/20	7/17

Table 15. Average Weight of Coho Salmon in Cook Inlet Drainages.

Drainages	Number Sampled	Average Weight in Pounds
Knik Arm	269	5.8
Susitna River	233	5.6
Swanson River	614	6.5
Kenai River [August]	197	7.9
Lower Peninsula	564	8.2
Kenai River (September)	219	10.2

Table 16. Average Weight in Pounds of Coho Salmon by Commercial Fishing Districts, Cook Inlet, 1976.

District	Number Sampled	Weight
East and west drift net		
Prior to 7/23	267	5.8 lbs.
7/23-8/21	301	7.8 lbs.
Northern set net		
Prior to 7/23	54	5.2 lbs.
7/23-8/16	131	5.4 lbs.
West side set net		
7/9-8/23 (245-60)	82	5.0 lbs.
7/28-8/17 (245-10-20)	111	7.7 lbs.
East side set net		
Prior to 7/23	132	5.9 lbs.
7/29-8/17	140	7.5 lbs.

the Kenai River in September are much larger than those entering in August, again indicating the possibility of two separate runs.

The table also illustrates a gradual, but significant decrease in size of coho salmon entering watersheds from south to north Cook Inlet. The reason for this decrease is not known at this time.

Size of Coho Salmon in Commercial Harvest:

During the 1976 commercial fishing periods, samples were collected from salmon processing plants and commercial fishermen throughout the subdistrict in Cook Inlet. These fish were weighed, measured, and scales were collected for age determination. Time and weight were again found to be the best separation factor. Table 16 presents the findings.

Table 16 illustrates that coho in northern Cook Inlet average under six **pounds** through the season and are the same size as those found in Upper Cook Inlet drainages. It also shows that these size fish occur in all fisheries prior to July 23. Following July 23 the weight increases dramatically in all but the northern district.

Early Tagging:

In July of 1958 "**at almost daily intervals**" 486 coho salmon were tagged and released from a Kalgin Island trap by Tyler and Norenberg (unpublished). Slightly over 100 of these fish were recovered in the **commercial** fishery immediately adjacent to the tagging site. As to recoveries from other areas, **it** was stated "**considering** coho returns distant from Kalgin Island, the West Forelands to Susitna River area is the most important source. These returns include three stream recoveries, and although no stream escapement records are available for this area, **it** is likely that some are good coho salmon **producers.**" This report indicates the majority of coho salmon in the central area of Cook Inlet in July are bound for northern Cook Inlet drainages.

Eshamy - Western Prince William Sound:

Creel census activities conducted at Eshamy Creek revealed a total recreational harvest of 759 sockeye salmon in 666 man-days of fishing effort. Catch per angler-day increased from 0.17 in 1975 to 1.14 fish in 1976.

As discussed in a previous report (Kubik, 1975), Eshamy Lake outlet where **it** enters salt water has been the site of a small but growing sport fishery. Salmon fishing is the most popular fishing activity with sockeye the primary species caught. Prior to 1975, fishing was concentrated at the creek mouth (intertidal area) where the fish school prior to entering the creek, and was basically a snag fishery.

Until 1974 the sport fish catch was considered to have been insignificant compared to escapement and commercial harvest figures (Table 17). Sockeye catches by sport anglers ranged from 151 fish in 1966 to 2,698 in 1973. In 1974, however, escapement dropped to a record low, and

Table 17. Eshamy Lagoon Salmon Catch, 1966-1976.

Year	Census Period	Sport Harvest				Total Salmon	Sockeye Escapement	Sockeye Commercial Catch
		Sockeye	Pink	Coho	Chum			
1966	7/01-9/05	151	42	6		199	26,593	20,876
1968	6/30-8/27	316	5	8		329	68,048	closed
1969	6/26-9/11	452	40	9	1	502	60,196	61,728
1970	6/25-9/01	448	49	1		489	11,460	17,292
1971	7/12-9/05	297	29	23		349	3,000	closed
1972	7/01-9/10	1,413	141	60		1,614	28,750	52,888
1973	6/29-9/10	2,698	182	0		2,880	10,202	16,439
1974	6/23-8/27	1,472	364	0		1,836	637*	19,037
1975	6/21-9/19	53	139	14		206	1,754	closed
1976	6/25-9/11	759	140	24		923	19,360	closed

* Escapement count incomplete, weir panels pulled early.

sport fishermen took twice the **number** of sockeye that passed through the Eshamy fish weir to spawn upstream in Eshamy Lake.

During 1975, stricter sport fishing regulations were instituted which prohibited snagging in freshwater and in a 100-yard area of the intertidal zone where the salmon were vulnerable. During the 1975 season, 53 sockeye were harvested by sport fishermen. Table 18 presents angler effort information from 1972 through 1976.

The 1975 decrease in effort and harvest on sockeye salmon over the previous three-year levels can be attributed to stricter regulations, improved enforcement, and a poor run.

Since 1972, pink salmon harvest has been at a higher level than in prior years (Table 18). Coho catches have been very small, averaging less than 20 fish annually, over an eight year period. Not much effort is expended for coho salmon as few anglers fish in September when the cohos are entering the creek. Increased fishing pressure on coho is not anticipated due to small stocks in the area. Escapement data from 1966 through 1976 indicate an average run of less than 200 coho.

Cutthroat trout, Salmo clarki Richardson, and Dolly Varden are also present in the Eshamy system, but generally receive little fishing effort and most catches are made incidentally to salmon fishing. During 1976, 194 Dolly Varden and 193 cutthroat trout were creel checked.

DISCUSSION

A statistically selected sample of anglers was interviewed and counted to determine harvest and effort for eulachon from Twenty Mile River. This is a short (May 15 - June 6) this year intense fishery near Anchorage. The purpose of the creel census is to assess the importance of the fishery and maintain an historical data base on it.

This year an estimated 54,000 eulachon were harvested, providing approximately 4,000 angler-days of fishing.

In the Eshamy Lagoon area red salmon have declined. In 1972 the sport harvest exceeded escapement. In 1974 the Board of Fish and Game considered closing the lagoon to sport fishing. However, in 1975 stricter sport fishing regulations were instituted which prohibited snagging in fresh water and in a restricted area at the creek mouth where the fish concentrated at low water. During the 1976 season, 759 sockeye were harvested by sport fishermen.

Chinook salmon counts in upper Cook Inlet revealed a very large escapement. A total of 39,435 chinook salmon were observed in 23 local (Anchorage) and west side Susitna streams during 1976, providing a total escapement estimate of 51,300.

At the present time, there is no sport fishing for chinook salmon in upper Cook Inlet waters. Although the high count in 1976 showed considerable improvement over previous **years!** escapement levels, further monitoring

Table 18. Eshamy Lagoon Sport Effort (angler-days) and Catch/Angler, 1972-1976.

Year	Angler Days	Catch/Angler-Day			All Salmon
		Sockeye	Pink	Coho	
1972	380	3.71	0.37	0.16	4.25
1973	949	2.84	0.19		3/03
1974	771	1.91	0.47		2.25
1975	302	0.17	0.46	0.05	0.68
1976	666	1.14	0.21	0.03	1.39

is required to determine if this **year's** escapement is indicative of years to come. Until the chinook salmon populations have materially increased, no relaxation of the sport fishing regulations are to be recommended.

Coho Investigations Revealed:

1. The majority of Cook Inlet coho salmon are commercially harvested in the east side drift net, east side set net, and northwest set net fisheries (73%).
2. The east side set net fishery harvests coho salmon at a later date than other Cook Inlet fisheries.
3. Coho salmon bound for **northern** Cook Inlet drainages are smaller in size than those bound for central drainages.
4. Coho salmon harvested prior to July 23 are of the same size as those found in northern Cook Inlet drainages.
5. Coho salmon harvested after July 23 correspond to the size of those found in central Cook Inlet drainages.
6. Historic tagging data show that the majority of coho salmon in central Cook Inlet during July are bound for northern drainages.
7. To aid coho salmon escapement in northern Cook Inlet streams, **it** will be necessary to regulate the drift and northwest set net fisheries during mid and late July.

Data analyzed to date show that coho stock separation may be possible in Cook Inlet through the size (weight) and timing in the fishery. The report does not take into account the problem of other species of salmon entering the fishery during the same periods. Further studies are required prior to presenting management recommendations due to the complexity of timing variations found in individual years and the influence of the other species of salmon entering the catch. It is felt, however, that these problems can be overcome and increased escapement of coho salmon can be provided to northern Cook Inlet drainages in the immediate future.

A total of 18 lakes in the immediate Anchorage, Ft. Richardson and Elmendorf A.F.B. vicinity were stocked with game fish in 1976. In recent years stocking programs in this area have relied heavily on plants of catchable size rainbow trout.

During 1976 military reservation lakes received 46,072, or **63%**, of the total catchable size rainbow trout planted in the Anchorage area. A creel census program to determine current fishing pressure levels and harvest on four lakes indicated 42,064 man-hours were expended on the fishery from **May 29** to August 31, 1976, with a total estimated harvest of 15,584 rainbow trout.

LITERATURE CITED

Kubik, Stanley W. 1975. Inventory and cataloging of sport fish waters of the lower Susitna River and central Cook Inlet drainages. Annual Report of Progress, 1975-1976, Project F-9-8, 17(G-I-H): 147.

Prepared by:

Approved by:

Stanley W. Kubik
Fishery Biologist

s/Wm. Michael Kaill, Chief
Sport Fish Research

Roger Wadman
Fishery Biologist

s/Rupert E. Andrews, Director
Sport Fish Division