

1984

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES

ANNUAL MANAGEMENT REPORT

1984

NORTON SOUND-PORT CLARENCE-KOTZEBUE

Staff

Nome Field Office - P.O. Box 1148

Len Schwarz (Area Management Biologist)

Charles Lean (Assistant Area Biologist)

Joe Dinnocenzo (Assistant Area Biologist)

Brian Bigler (Kotzebue Research Biologist)

Sue Merkouris (Norton Sound Catch Monitor)

Marie Wyatt (Nome CT III)

Judy Stien (Kotzebue CT III)

Table of Contents

	Page
Table of Contents.....	i
Index to Figures, Tables and Appendix Tables.....	ii
Preface.....	xi

Section 1 - SALMON

Introduction.....	1
Boundaries.....	1
Salmon Resource.....	1
Commercial Fishery.....	1
Subsistence Fishery.....	2
Management.....	3

NORTON SOUND DISTRICT

District Boundaries.....	4
Commercial Fishery.....	4
District Summary 1984.....	6
Commercial Fishery.....	6
Subsistence Fishery.....	7
Escapement.....	7
Subdistrict Summaries 1984.....	8
Nome (Subdistrict 1).....	8
Golovin Bay (Subdistrict 2).....	10
Moses Point (Subdistrict 3).....	12
Norton Bay (Subdistrict 4).....	13
Shaktoolik (Subdistrict 5).....	13
Unalakleet (Subdistrict 6).....	14
Norton Sound District Outlook for 1985.....	16

PORT CLARENCE DISTRICT

District Boundaries.....	49
Commercial Fishery.....	49
Subsistence Fishery.....	49
Escapement.....	50

KOTZEBUE DISTRICT

District Boundaries.....	54
Commercial Fishery.....	54

Index to Figures, Tables and Appendix Tables

Section 1 - Salmon

<u>Figures</u>		<u>Page</u>
Figure 1.	Norton Sound commercial salmon fishing subdistricts.....	18
Figure 2.	Port Clarence district.....	51
Figure 3.	Kotzebue District.....	62
Figure 4.	Kotzebue District commercial salmon fishing statistical areas.....	63
Figure 5.	Kotzebue Sound chum salmon harvests and escapements, 1962-1984.....	64
Figure 6.	Norton Sound herring district (333) and statistical boundaries.....	88
Figure 7.	Herring age class composition of the commercial catch as depicted by percentage of total catch, Norton Sound District, 1980-1984.....	98
Figure 8.	Herring age class composition as depicted by percentage of total catch from variable mesh gillnet test catches, Norton Sound District, 1980-1984.....	99
Figure 9.	Statistical areas for the Northern District red king crab fishery.....	108
Figure 10.	Statistical areas for the Norton Sound red king crab fishery.....	109
Figure 11.	Red king crab catch samples for the Norton Sound summer fishery, 1978-84.....	116
Figure 12.	Size Structure of the male red king crab population, Norton Sound , ADF&G pots, 1980-1982.....	117

	Page
Table 9. Commercial salmon catches from Shaktoolik, subdistrict 5, Norton Sound, set gillnets, 1984.....	29
Table 10. Commercial salmon catches from Unalakleet, subdistrict 6, Norton Sound, set gillnets, 1984.....	30
Appendix	
Table 1. Number of commercial fishermen fishing Norton Sound, 1970-1984.....	31
Appendix	
Table 2. Commercial and subsistence salmon catches by species by subdistrict, Norton Sound District, 1964-1984, Nome (subdistrict 1).	32
Appendix	
Table 3. Commercial and subsistence salmon catches by species by subdistrict, Norton Sound District, 1962-1984, Golovin (subdistrict 2).....	33
Appendix	
Table 4. Commercial and subsistence salmon catches by species by subdistrict, Norton Sound District, 1962-1984, Moses Point (subdistrict 3).....	34
Appendix	
Table 5. Commercial and subsistence salmon catches by species by subdistrict, Norton Sound District, 1962-1984, Norton Bay (subdistrict 4).....	35
Appendix	
Table 6. Commercial and subsistence salmon catches by species by subdistrict, Norton Sound District, 1961-1984, Shaktoolik (subdistrict 5).....	36
Appendix	
Table 7. Commercial and subsistence salmon catches by species by subdistrict, Norton Sound District, 1961-1984, Unalakleet (subdistrict 6).....	37

	Page
Table 13. Reported subsistence catches of salmon by village, Kotzebue District, 1984.....	67
Appendix	
Table 16. Comparative commercial chum salmon catch statistics, Kotzebue District, 1962-1984.....	68
Appendix	
Table 17. Salmon pack by species and type of processing, Kotzebue District, 1962-1984.....	71
Appendix	
Table 18. Dollar value estimates of Kotzebue District commercial fishery, 1962-1984.....	72
Appendix	
Table 19. Estimated mean prices paid to salmon fishermen by species, Kotzebue District, 1962-1984.....	73
Appendix	
Table 20. Kotzebue District subsistence chum salmon catches by village, 1962-1984.....	74
Appendix	
Table 21. Mean subsistence chum salmon catch per fisherman, by village, Kotzebue District, 1962-1984.....	76
Appendix	
Table 22. Comparative chum salmon aerial survey escapement estimates, Kotzebue District, 1962-1984.....	77

Section 2 - Pacific Herring

Table 14. Herring harvest by date, Norton Sound District, 1984.....	89
Table 15. Daily observed peak herring biomass estimates in metric tons, by subdistrict, Norton Sound District, 1984.....	90

	Page
Appendix Table 30.	Commercial harvest of red king crabs from Norton Sound summer, fishery, (1977-1984)..113
Appendix Table 31.	Winter commercial and subsistence red king crab harvests, Norton Sound, 1978-1984....114
Appendix Table 32.	Catch of red king crabs in Norton Sound during research surveys and resulting population estimates, 1976-1984..... 32
<u>Section 4 - Miscellaneous Species</u>	
Table 19.	Village subsistence Inconnu catches, Kotzebue District, 1984.....123
Table 20.	Period incidental Arctic Char catches in the Kotzebue District commercial salmon fishery, 1984..... 131
Table 21.	Village subsistence catches of Arctic Char, May through October, Kotzebue District, 1984..... 132
Table 22.	Village subsistence catches of whitefish as reported May-September, 1984 in the Kotzebue District..... 138
Appendix Table 33.	Inconnu harvested incidentally during the Kotzebue commercial salmon fishery and sold, 1962-1984..... 124
Appendix Table 34.	Winter commercial Inconnu harvest statistics, Kotzebue, 1966-1984..... 125
Appendix Table 35.	Reported subsistence Inconnu catches, Kotzebue District, 1966-1984..... 126
Appendix Table 36.	Annual aerial survey counts of Inconnu in the Kobuk and Selawik Rivers, 1966-1984.. 127

Section 1 - SALMON

INTRODUCTION

Boundaries

The Norton Sound-Port Clarence-Kotzebue management districts include all waters from Canal Point Light in southern Norton Sound to Point Hope and includes St. Lawrence Island. These management districts comprise over 65,000 square miles, with a coastline exceeding that of California, Oregon and Washington combined.

Salmon Resource

All five species of Pacific salmon are indigenous to the area with chum (Oncorhynchus keta) and pink salmon (O. gorbuscha) being the most abundant. Chum, pink and chinook (king) salmon (O. tshawytscha) have been found as far north as Barrow; however, these species are uncommon north of the Kotzebue Sound drainages. The northernmost large concentrations of chum salmon are found within the Kotzebue Sound drainages, while large numbers of pink, chinook and coho (O. kisutch) salmon are not found north of Norton Sound. Very small sockeye (red) salmon (O. nerka) populations exist within a few Seward Peninsula drainages and in Kelly Lake on the Noatak River near Kotzebue.

Commercial Fishery

In 1959 and 1960, Department biologists conducted resource inventories which indicated harvestable surpluses of salmon available in several areas. The Department liberalized various regulations and encouraged processors to explore and develop new fishing grounds. As a result, commercial salmon fishing activity has grown significantly since statehood, enabling many local residents to obtain a cash income.

The majority of commercial fishermen and processing plant workers are resident Eskimos. Commercial fishermen operate set gillnets from outboard powered skiffs to capture salmon. All commercial salmon fishing is done in coastal marine waters.

Salmon effort and catch per unit effort data (CPUE) presented throughout this section have been derived as follows. Boat (or fisherman) hours have been computed after arbitrarily assuming that if a fishing boat delivers during

(1978-1982) the average subsistence catch in Norton Sound was 73,000 salmon of all species, while in the Kotzebue area this average was 17,000 salmon. These reported harvests are primarily based on village household surveys. Since not all fishermen are contacted, these harvests should be considered minimum figures.

Management

The Division of Commercial Fisheries of the Alaska Department of Fish and Game is responsible for the management of commercial and subsistence fisheries in this vast area. The permanent full-time staff assigned to this area during 1984 consisted of two management biologists stationed in Nome, a research and a management biologist stationed in Kotzebue and a clerk typist assigned to both the Nome and Kotzebue field offices. In addition, approximately 20 summer employees were hired to assist in conducting various management and research activities.

The main objective of the Department's program is to manage the commercial salmon fishing on a sustained yield basis. Various field projects are conducted to provide information on salmon abundance, migration and stock composition. Summaries of these projects are presented in Addendum 2.

Management of the salmon fishery is complicated by the difficulty in obtaining valid escapement data in this large area and by insufficient comparative catch and return information. Management problems are compounded by the need to provide not only for adequate escapements, but for the needs of several different user groups. Past Alaska Department of Fish and Game policy has been to provide for subsistence as the primary beneficial use of the fishery resource. This policy is now State law. If the subsistence harvest or demands increase, commercial fishing may be restricted. It should be pointed out that increases in commercial fishing efficiency are expected and may balance any immediate decline in subsistence utilization or increase in run size with the result that present regulations will be maintained or made even more restrictive.

The basic regulation that governs the commercial salmon harvest in all districts is the scheduled weekly fishing period. Commercial fishing is provided by regulation for a total of two to four days a week during the open season depending on area and season. The department attempts to spread fishing effort throughout the entire run to avoid

shipment. Until recent years, insufficient tendering and processing facilities had resulted in sporadic fishing efforts; however, gradual improvements in processing facilities have promoted a more consistent and intensive fishery in most subdistricts.

The commercial salmon fishing season opens by emergency order between June 8 and June 20, depending on run timing. The season closes by regulation on August 31, but processors have usually terminated their operations earlier in August. Two 48-hour fishing periods normally occur each week unless changed by emergency order.

Commercial fishing gear is restricted to set gillnets, with a maximum aggregate length of 100 fathoms allowed for each fisherman. There are no mesh or depth restrictions during the normally scheduled periods. The majority of the gillnets fished are approximately 5 1/2 inch stretched measure. In the Unalakleet and Shaktoolik subdistricts, 8 1/2 inch stretched mesh gillnets are commonly used during the chinook salmon run in June through early July. During years when large pink salmon runs occur, the Department provides fishing periods when only 4 1/2 inch mesh nets or less may be set or drifted. These special pink salmon periods are an attempt to target pink salmon without over harvesting the other larger sized species.

Most fishermen do not tend their nets continuously once they are set, leaving them unattended overnight. Fish quality suffers due to the length of time fish may be left in the nets and is especially poor when storms prevent fishermen from checking their gear for extended periods of time.

The Norton Sound district is managed on the basis of comparative commercial catch data, escapements and weather conditions. A single factor or combination of factors may result in issuance of emergency orders affecting seasons, fishing periods, mesh size and areas.

Aerial surveys are used to monitor escapements in the majority of the Norton Sound streams. Weather conditions, time of day, type of aircraft, water conditions, bottom conditions, date of survey and efficiency of the surveyor must be taken into account when comparing annual aerial surveys. A sonar salmon counter was operated for the third time in the Unalakleet River and a counting tower on the Kwiniuk River has been operated since 1965. A second counting tower was also operated on the North River, a major

1984. Nome subdistrict fishermen also sold salmon locally to individuals, restaurants and grocery stores. In addition to the 6 domestic processors, a joint venture between Three Native Corporation (3NC) and the North Pacific Longline Gillnet Association also operated. Under a permit issued by the Governor, two Japanese freezer ships were allowed to buy Norton Sound pink salmon. The original intention of the joint venture was to purchase pink salmon in the Unalakleet and Shaktoolik subdistricts. However, federal regulations only permit foreign processing to occur in internal waters, which in Norton Sound the federal government defines as Norton and Golovin Bays. Therefore, the two freezer ships began operations in Golovin and Norton Bays. Due to the lack of a domestic market for chum salmon, the permit was amended to allow the Japanese freezer ships to also purchase chum salmon directly from Norton Sound fishermen.

Subsistence Fishery

For the second time since 1964, house-to-house subsistence fishermen interviews were not conducted throughout the entire district due to budgetary restrictions. House-to-house surveys were conducted in Unalakleet where the Department operates a summer field office. Subsistence harvest data was tabulated from subsistence permits in the Nome subdistrict where permits are required. Subsistence fishermen were not contacted in subdistricts 2-5. Even in the Nome and Unalakleet subdistricts, not all fishermen were contacted or returned permits, so these figures should be considered as minimum estimates (Tables 2 and 3).

Escapement

Table 4 lists aerial survey escapement counts in major index streams. Pink salmon escapements were at record levels throughout most of Norton Sound and made enumeration of other species difficult.

Chum salmon escapement in the Nome subdistrict was only slightly below average. During the past 2 seasons chum salmon escapement had been significantly below average. Chum salmon escapement in the Golovin, Moses Point, and Norton Bay subdistricts was above average, partly because the runs were above average and partly because of the lack of commercial fishing effort. Aerial surveys in the Shaktoolik and Unalakleet subdistricts were limited by poor weather; however, commercial catch statistics and test net

Due to poor chum salmon escapement during the 1982 and 1983 seasons, the Board of Fisheries, in response to an advisory committee petition, directed the Department to manage the commercial fishery so that chum salmon escapement could be optimized. In order to comply, the commercial fishery was restricted in the following ways:

- 1) The commercial fishing season was not opened until July 2.
- 2) Fishing periods were restricted to two 24 hour periods per week.
- 3) Waters west of Cape Nome were closed to commercial fishing.
- 4) The chum salmon harvest was to be limited to 5,000 chum salmon, the lower end of the 5-15,000 harvest guideline, until at least average escapement in local streams could be assured.

Subsistence permit limits in the Nome and Snake Rivers were also restricted to 20 chum and 20 coho. The remainder of the permit limit could be filled with salmon other than coho or chum.

Subsistence Fishery

Due to increased access, effort and limited chum and coho salmon stocks in local streams, subsistence fishing has been conducted in this subdistrict on a permit system since 1974. Subsistence fishermen are required to record the number of fish taken by permit and return it at the end of the season, thereby documenting the harvest. The permit system also distributes fishing effort by limiting the number of fish that each family can harvest from each river. There is no catch limit in ocean waters. Fishing is restricted by regulation to 4 days per week from June 15 through August 31. The pink salmon run was near record levels and as a result subsistence fishing time was increased by emergency order from 4 days per week to 7 days per week from July 14 through August 6. Permit limits were also increased by 1,000 salmon in subdistrict 1 streams.

Two hundred and thirty-six subsistence permits were issued for the Nome subdistrict in 1984 compared to the previous 5-year average of 214. The reported harvest from the 183 permits returned was 83 chinook, 16 sockeye, 1,795 coho, 17,182 pink and 4,883 chum salmon for a total of 23,949 fish (Table 3, Appendix Table 2).

harvest was 28,000 chum salmon with record high catch per unit effort statistics indicating a very strong chum salmon run. After the domestic buyer stopped operations on June 30, subdistrict 2 was without a buyer until July 10. On July 10 a Japanese freezer ship began buying operations. Because fishermen were not able to fish from July 1 through July 9, usually the peak of the chum run, and because a strong chum and pink salmon run were in progress, commercial fishing time was increased to 7 days from July 11 to August 1.

On August 1 the normal 4 day per week fishing schedule resumed for the coho run. A domestic buyer operated from August 8 through August 16. Approximately 8 fishermen delivered 2,462 coho during this time.

Subsistence Fishery

Commercial fishermen in Golovin Bay often retain a portion of their catch for subsistence purposes. Several Golovin residents maintain subsistence fishing camps along the Kachavik River. Subsistence fishing within the Niukluk and Fish Rivers is done by residents of White Mountain and Council. House-to-house interviews were not conducted in any of the villages that utilize salmon in Golovin Bay or the Fish River drainage. During the last 5 years in which surveys were conducted (1978-82), an average of 23 households were contacted reporting an average harvest of 9,079 salmon.

Escapement

The major salmon spawning areas in subdistrict 2 are the Fish and Niukluk Rivers. Average escapement for these two drainages is 28,000 chum salmon (Appendix Table 13). Aerial surveys documented an escapement of 83 chinook, 398,303 pink, and 3,072 coho in these drainages (Table 4). The large number of pink salmon present made it difficult to identify chinook and chum salmon. Since no ground truth foot or boat surveys were conducted, accurate estimates of the chinook and chum salmon escapements were not possible. Commercial catch statistics indicated a very strong chum run. Pink salmon escapement was excellent. Little comparative coho escapement data is available; however, field observations in late September as well as this year's survey results indicated above average coho escapement.

Norton Bay - (Subdistrict 4)

Commercial Fishery

Eight commercial fishermen caught 1,162 pink and 3,442 chum salmon. Both the number of fishermen and the harvest were far below average (Appendix Tables 1 and 5).

The Norton Bay subdistrict has had problems during the past several years keeping a buyer throughout the season. During the 1984 season fishermen were only able to fish for 9 days when a Japanese freezer ship was in the subdistrict (Table 8). Similar to the Moses Point subdistrict, Norton Bay was open to commercial fishing 7 days a week from July 4 to August 1.

Subsistence Fishery

Most subsistence fishing activities occur near Ungalik River, although limited fishing takes place near the Inglutalik and Koyuk Rivers.

From 1978-1982 an average of 15 subsistence fishermen have been contacted during village surveys reporting a harvest of 5,137 salmon. Village surveys were not conducted in 1984 (Appendix Table 5).

Escapement

Aerial surveys were limited in this subdistrict due to poor weather. A survey flown on the Ungalik River documented 2 chinook, 220 chum and 85,040 pink salmon (Table 4). Large numbers of pink salmon made identification of other species difficult.

Shaktoolik - (Subdistrict 5)

Commercial Fishery

Twenty-four fishermen caught 1,613 chinook, 10,730 coho, 1,596 pink and 32,309 chum salmon for a total catch of 46,278 fish (Table 9). All of these harvests were very close to the 5 year average with the exception of the pink salmon harvest which was below the average catch of 16,000.

Due to the extremely late ice break up and timing of the chinook salmon run, the Shaktoolik subdistrict did not open

A total of 3 processors bought fish in the Unalakleet subdistrict. These fish were flown out iced, gutted or in the round, to fresh markets and canneries.

Due to the late ice break up salmon runs were late and similar to the Shaktoolik subdistrict, commercial fishing was not opened until June 25. Initially, periods were set at two 24 hour periods per week because the run was just beginning and run strength was unknown. Also, large subsistence fishing effort was noted in the Unalakleet River. Commercial fishing time was increased to two 48 hour periods per week on July 2 when run strength indicators appeared to be above average and subsistence effort declined.

Due to the very large pink salmon runs both the Unalakleet and Shaktoolik subdistricts were opened for two additional fishing periods when only gillnets with 4 1/2 inch mesh or less could be fished. These "pink salmon" periods were opened from July 4 to August 1. These openings were an attempt to allow the harvest of the abundant pink salmon without overharvesting other species. Due to the lack of a pink salmon market no fishermen fished during these periods.

During the coho run in August, several fishing periods in the Unalakleet and Shaktoolik subdistricts were extended to compensate fishermen for lost fishing time due to poor weather. Due to the large coho run the season was extended from the regulation closing date of August 31 until September 8.

Subsistence Fishery

Subsistence fishermen interviews were conducted in Unalakleet by Department personnel stationed at the seasonal field office. Seventy-one subsistence fishermen reported taking 1,651 chinook, 1 sockeye, 6,675 coho, 17,418 pink and 3,348 chum for a total reported harvest of 29,092 salmon (Table 2). Over the previous five years an average of 58 fishermen have been interviewed with an average harvest of 1,067 chinook, 5,564 coho, 13,127 pink and 4,031 chum salmon (Appendix Table 7). During the chinook salmon run, Department personnel noted large concentrations of gillnets in the lower Unalakleet River for the second consecutive year. More than 30 nets were counted in the lower mile of the river during late June. Of the 1,651 chinook harvested, over 1,000 were taken in the river. The subsistence chinook

compared to the last 5 returns which contained several record years. Although the 1985 return will be below average there should be a harvestable surplus of pink salmon.

The 1985 Norton Sound chum salmon return will be produced by progeny of the 1980-82 escapements, with the bulk of the run being composed of the four-year old age class from the 1981 escapement. Chum salmon escapement in 1981 was average to above average and therefore the 1985 chum return is expected to be at least average.

Coho salmon returning in 1985 will also be mainly comprised of four year old fish (1981 brood year). Aerial surveys have not been regularly flown in Norton Sound during the coho season. However, commercial and subsistence catches during 1981 would indicate the largest parent year on record and the 1985 return can be expected to be above average if average survival conditions were experienced.

Chinook salmon returning to Norton Sound in 1985 are mainly 5 and 6 year old fish from the 1979 and 1980 parent years. Chinook escapements were judged to be average during these years, and the 1985 chinook return may be expected to be average.

Table 1. 1984 Norton Sound commercial salmon catch by subdistrict.

Subdistrict	Chi- nook	Sock- eye	Coho	Pink	Chum	Total
Nome	7	--	820	--	3744	4571
Golovin	31	--	2462	88588	54153	145234
Moses Point	--	--	5959	28035	9477	43471
Norton Bay	--	--	--	1162	3442	4604
Shaktoolik	1613	--	10730	1596	32309	46248
Unalakleet	6804	6	47904	--	43317	98031
District Totals	8455	6	67875	119381	146442	342159

Table 3. Nome (subdistrict 1) subsistence salmon catches, 1984.

River or Location	Permits Issued	Permits Returned	Permits Actually Fished	Chi-nook	Sock-eye	Coho	Pink	Chum	Total
Nome R.	75	57	43	1	0	402	6645	212	7260
Marine Waters	79	62	45	80	16	825	5130	2820	8871
Sinuk R.	3	2	0	-	-	-	-	-	-
Eldorado R.	20	16	14	0	0	161	1488	1054	2703
Flambeau R.	8	6	5	0	0	16	416	383	815
Snake R.	28	25	23	0	0	268	2603	84	2955
Penny R.	5	2	1	0	0	0	75	0	75
Solomon R.	9	7	2	0	0	35	88	24	147
Feather R.	0	-	-	-	-	-	-	-	-
Bonanza R.	6	4	3	2	0	14	447	266	729
Cripple R.	0	-	-	-	-	-	-	-	-
Safety Sound	3	2	2	0	0	74	280	40	394
Totals	236	183	138	83	16	1795	17182	4883	23949

Table 5. Commercial salmon catches from Nome, subdistrict 1, Norton Sound, set gillnets, 1984.

Date of Landing	Hours Fished	Number Boats	Total Catch (Catch/Boat Hour)				Cumulative Catch			
			Chi-nook	Coho	Pink	Chum	Chi-nook	Coho	Pink	Chum
7/02-7/03	24	3	2 (.03)	--	--	1593 (22.1)	2	--	--	1593
7/05-7/06	24	NO ONE FISHED - STORMY					2	--	--	1593
7/09-7/10	24	2	2 (.04)	--	--	326 (6.8)	4	--	--	1919
7/12-7/14	48	4	--	--	--	1119 (5.8)	4	--	--	3038
7/16-7/18	48	NO ONE FISHED - STORMY					4	--	--	3038
7/19-7/21	48	1	--	--	--	74 (1.5)	4	--	--	3112
7/23-7/25	48	3	2 (.01)	144 (1.0)	--	609 (4.2)	6	144	--	3721
7/26-7/28	48	NO ONE FISHED - STORMY					6	144	--	3721
7/30-8/01	48	NO ONE FISHED - STORMY					6	144	--	3721
8/02-8/03	24	NO ONE FISHED - STORMY					6	144	--	3721
8/06-8/07	24	1	--	107 (4.5)	--	--	6	251	--	3721
8/09-8/11	48	4	1 (.01)	436 (2.3)	--	23 (.12)	7	687	--	3744
8/13-8/14	24	NO ONE FISHED - STORMY					7	687	--	3744
8/16-8/18	48	NO ONE FISHED - STORMY					7	687	--	3744
8/20-8/21	24	NO ONE FISHED - STORMY					7	687	--	3744
8/23-8/25	48	2	--	39 (.41)	--	--	7	726	--	3744
8/27-8/29	48	2	--	94 (.98)	--	--	7	820	--	3744
8/30-9/01 1/	48	NO ONE FISHED - STORMY					7	820	--	3744
Totals	360	8	7	820	--	3744	7	820	--	3744

1/ Season closed 9/01.

Table 6. Commercial salmon catches from Golovin, subdistrict 2, Norton Sound, set gillnets, 1984.
(continued)

Date of Landing	Hours Fished	Number Boats	Total Catch (Catch/Boat Hour)				Cumulative Catch			
			Chi-nook	Coho	Pink	Chum	Chi-nook	Coho	Pink	Chum
7/23	24	10	--	--	4498 (18.7)	739 (3.1)	30	--	83790	53340
7/24	24	9	--	--	3182 (14.7)	491 (2.3)	30	--	86972	53831
7/25	24	9	--	--	1348 (6.2)	231 (1.1)	30	--	88320	54062
7/26	24	3	--	--	268 (3.7)	57 (.79)	30	--	88588	54119
7/27	24	NO ONE FISHED - NO BUYER					30	--	88588	54119
7/28	24	NO ONE FISHED - NO BUYER					30	--	88588	54119
7/29	24	NO ONE FISHED - NO BUYER					30	--	88588	54119
7/30	24	NO ONE FISHED - NO BUYER					30	--	88588	54119
7/31	24	NO ONE FISHED - NO BUYER					30	--	88588	54119
8/01	18	NO ONE FISHED - NO BUYER					30	--	88588	54119
8/02-8/04	48	NO ONE FISHED - NO BUYER					30	--	88588	54119
8/06-8/08	48	NO ONE FISHED - NO BUYER					30	--	88588	54119
8/09-8/11	48	8	1 (.01)	1174 (3.1)	--	31 (.08)	31	1174	88588	54150
8/13-8/15	48	7	--	1058 (3.2)	--	3 (.01)	31	2232	88588	54153
8/16-8/18 1/	48	6	--	230 (.80)	--	--	31	2462	88588	54153
Totals	678	22	31	2462	88588	54153	31	2462	88588	54153

1/ No buyer after 8/18. Season closed 9/01.

Table 7. Commercial salmon catches from Moses Point, subdistrict 3, Norton Sound, set gillnets, 1984.
(continued)

Date of Landing	Hours Fished	Number Boats	Total Catch (Catch/Boat Hour)				Cumulative Catch					
			Chi-nook	Coho	Pink	Chum	Chi-nook	Coho	Pink	Chum		
7/26	24		NO ONE FISHED - NO BUYER				--	--	28035	9348		
7/27	24		NO ONE FISHED - NO BUYER				--	--	28035	9348		
7/28	24		NO ONE FISHED - NO BUYER				--	--	28035	9348		
7/29	24		NO ONE FISHED - NO BUYER				--	--	28035	9348		
7/30	24		NO ONE FISHED - NO BUYER				--	--	28035	9348		
7/31	24		NO ONE FISHED - NO BUYER				--	--	28035	9348		
8/01	18		NO ONE FISHED - NO BUYER				--	--	28035	9348		
8/02-8/04	48		NO ONE FISHED - NO BUYER				--	--	28035	9348		
8/06-8/08	48	7	--	609 (1.8)	--	15 (.04)	--	609	28035	9363		
8/09-8/11	48	15	--	1780 (2.5)	--	50 (.07)	--	2389	28035	9413		
8/13-8/15	48	13	--	956 (1.5)	--	4 (.01)	--	3345	28035	9417		
8/16-8/19	72	14	--	1338 (1.3)	--	49 (.05)	--	4683	28035	9466		
8/20-8/22 2/	48	12	--	1276 (2.2)	--	11 (.02)	--	5959	28035	9477		
Totals	648	25	0	5959		28035		9477	0	5959	28035	9477

1/ No buyer before 7/9.

2/ No buyer after 8/22. Season closed 9/01.

Table 9. Commercial salmon catches from Shaktoolik, subdistrict 5, Norton Sound, set gillnets, 1984.

Date of Landing	Hours Fished	Number Boats	Total Catch (Catch/Boat Hour)				Cumulative Catch			
			Chi-nook	Coho	Pink	Chum	Chi-nook	Coho	Pink	Chum
6/25-6/26	24	8	169 (.88)	--	--	431 (2.2)	169	--	--	431
6/28-6/29	24	14	515 (1.5)	--	--	4087 (12.2)	684	--	--	4518
7/02-7/04	48	18	574 (.66)	--	--	7308 (8.5)	1258	--	--	11826
7/05-7/07	48	NO ONE FISHED - STORMY					1258	--	--	11826
7/08-7/09 1/	24	2	--	--	1596 (33.2)	--	1258	--	1596	11826
7/09-7/11	48	15	250 (.35)	--	--	4966 (6.9)	1508	--	1596	16792
7/12-7/14	48	14	85 (.13)	8 (.01)	--	5051 (7.5)	1593	8	1596	21843
7/16-7/18	48	7	5 (.01)	1 (+)	--	430 (1.3)	1598	9	1596	22273
7/19-7/21	48	8	--	46 (.12)	--	511 (1.3)	1598	55	1596	22784
7/23-7/25	48	15	7 (.01)	731 (1.0)	--	2591 (3.6)	1605	786	1596	25375
7/26-7/28	48	7	2 (.01)	327 (.97)	--	2027 (6.0)	1607	1113	1596	27402
7/30-8/01	48	5	--	179 (.75)	--	154 (.64)	1607	1292	1596	27556
8/02-8/05	72	12	1 (+)	1959 (2.3)	--	1792 (2.1)	1608	3251	1596	29348
8/06-8/08	48	15	3 (+)	2072 (2.9)	--	758 (1.0)	1611	5323	1596	30106
8/09-8/11	48	18	1 (+)	2013 (2.3)	--	1421 (1.6)	1612	7336	1596	31527
8/13-8/15	48	6	--	475 (1.7)	--	264 (.92)	1612	7811	1596	31791
8/16-8/19	72	8	--	753 (1.3)	--	234 (.41)	1612	8564	1596	32025
8/20-8/22	48	15	--	957 (1.3)	--	133 (.18)	1612	9521	1596	32158
8/23-8/25	48	8	--	942 (2.4)	--	127 (.33)	1612	10463	1596	32285
8/27-8/29 2/	48	11	1 (+)	267 (.51)	--	24 (.05)	1613	10730	1596	32309
Totals	888	24	1613.	10730	1596	32309	1613	10730	1596	32309

1/ Special pink gear period (4 1/2" mesh or less). No one fished any other "pink periods" after 7/09 due to lack of a pink salmon market. Pink periods provided an extra 36 hours per week from 7/04 to 8/01.

2/ No buyer after 8/29. Season closed 9/08.

Appendix Table 1. Number of commercial salmon fishermen fishing in Norton Sound, 1970-1984.

Year	SUBDISTRICT						DISTRICT 1/ Totals
	1	2	3	4	5	6	
1970	6	33	21	0	12	45	2/
1971	7	22	45	6	19	72	2/
1972	20	20	48	32	20	71	2/
1973	21	34	57	30	27	94	2/
1974	25	25	60	8	23	53	2/
1975	24	42	67	42	39	61	2/
1976	21	22	54	27	37	60	2/
1977	14	25	52	24	30	45	164
1978	16	24	44	26	26	51	176
1979	15	21	41	22	29	63	175
1980	14	17	26	13	26	66	159
1981	15	19	33	10	26	73	167
1982	18	17	28	10	32	68	164
1983	19	21	39	15	34	72	170
1984	8	22	25	8	24	74	141

1/ District total is the number of fishermen that actually fished in Norton Sound. Subdistrict totals may exceed the District total because a fisherman may have fished in more than one district.

2/ Data not available.

Appendix Table 3. Commercial and subsistence salmon catches by species by subdistrict, Norton Sound District, 1962-1984.

Year	Commercial					Subsistence					Combined						
	Chi-nook	Sock-eye	Coho	Pink	Chum	Chi-nook	Coho	Pink	Chum	Total	Chi-nook	Sock-eye	Coho	Pink	Chum	Total	
GOLOVIN BAY (SUBDISTRICT 2)																	
1962	45	11	264	10276	68720	79316	-	-	-	-	45	11	264	10276	68720	79316	
1963	40	40	-	19677	49850	69607	-	118	5702	9319	15139	40	40	118	25379	59169	84746
1964	27	40	3	7236	58301	65607	-	-	-	-	-	27	40	3	7236	58301	65607
1965	-	-	-	-	-	-	2	49	1523	3847	5421	2	-	49	1523	3847	5421
1966	17	14	584	4665	29791	35071	4	176	1573	3520	5273	21	14	760	6238	33311	40344
1967	10	-	747	5790	31193	37740	3	185	2774	4803	7765	13	-	932	8564	35996	45505
1968	12	-	205	18428	10011	28656	4	181	4955	1744	6884	16	-	386	23383	11755	35540
1969	28	-	1224	23208	20949	45409	2	190	2760	2514	5466	30	-	1414	25968	23463	50875
1970	13	-	3	18721	20566	39303	4	353	2046	2614	6017	17	-	356	20767	23180	45320
1971	37	-	197	2735	33824	36793	7	191	1544	1936	3678	44	-	388	4279	35760	40471
1972	36	-	20	6562	27097	33715	4	62	1735	2028	3829	40	-	82	8297	29125	37644
1973	70	-	183	14145	41689	56087	1	48	9	74	132	71	-	231	14154	41763	56219
1974	30	-	3	28340	30173	58546	3	-	967	205	1175	33	-	3	29307	30379	58722
1975	17	-	206	10770	41761	52754	-	1	2011	2025	4037	17	-	207	12781	43786	56791
1976	12	-	1311	24051	30219	55593	-	-	1995	1128	3123	12	-	1311	26046	31347	58716
1977	26	-	426	7928	53912	62292	3	80	703	2915	3701	29	-	506	8631	56827	65993
1978	22	-	94	72033	41462	113611	1	-	2470	1061	3532	23	-	94	74503	42523	117143
1979	75	49	1606	45948	30201	77879	-	845	2546	2840	6231	75	49	2451	48494	33041	84110
1980	36	36	328	10774	52609	63783	12	692	10727	4057	15488	48	36	1020	21501	56666	79271
1981	23	5	13	49755	58323	108119	8	1520	5158	5543	12229	31	5	1533	54913	63866	120348
1982	78	5	4281	39510	51970	95844	7	1289	4752	1868	7916	85	5	5570	44294	53838	103760
1983	52	10	295	17414	48283	66054	-	-	-	-	-	3/	-	-	-	-	-
1984	31	-	2462	88588	54153	145234	-	-	-	-	-	3/	-	-	-	-	-
5-Yr Avg.																	
1/	53	21	1305	32680	48277	82336											
10-Yr Avg.																	
2/	37	10	856	30652	43891	75447											

1/ 1979-1983

2/ 1974-1983

3/ Subsistence surveys not conducted.

Appendix Table 5. Commercial and subsistence salmon catches by species by subdistrict, Norton Sound District, 1962-1984.

Year	Commercial					Total	Subsistence					Total	Combined				
	Chi-nook	Sock-eye	Coho	Pink	Chum		Chi-nook	Coho	Pink	Chum	Total		Chi-nook	Sock-eye	Coho	Pink	Chum
NORTON BAY (SUBDISTRICT 4)																	
1962	387	7	40	4402	24380	29216	-	-	-	-	-	387	7	40	4402	24380	29216
1963	137	2	-	17676	12469	30284	-	-	5097	-	5097	137	2	-	22773	12469	35381
1964	50	3	-	988	5916	6957	-	-	-	-	-	50	3	-	988	5916	6957
1965	-	-	-	-	-	-	4	22	252	3032	3310	4	-	22	252	3032	3310
1966	-	-	-	-	-	-	7	41	929	3612	4589	7	-	41	929	3612	4589
1967	-	-	-	-	-	-	12	14	1097	2945	4068	12	-	14	1097	2945	4068
1968	-	-	-	-	-	-	28	71	1916	1872	3887	28	-	71	1916	1872	3887
1969	26	-	-	4849	3974	8849	59	189	2115	3855	6218	85	-	189	6964	7829	15067
1970	-	-	-	-	-	-	3	10	840	3500	4353	3	-	10	840	3500	4353
1971	-	-	-	-	-	-	5	47	92	2619	2763	5	-	47	92	2619	2763
1972	43	-	-	1713	7799	9555	30	44	2089	2022	4185	73	-	44	3802	9821	13740
1973	28	-	-	1645	4672	6345	1	-	10	130	141	29	-	-	1655	4802	6486
1974	21	-	-	654	3826	4501	-	-	17	900	917	21	-	-	671	4726	5418
1975	68	-	89	1137	17385	18679	1	-	93	361	455	69	-	89	1230	17746	19134
1976	102	-	95	4456	7161	11814	2	-	41	236	279	104	-	95	4497	7397	12093
1977	158	-	1	2495	13563	16217	14	-	420	2055	2489	172	-	1	2915	15618	18706
1978	470	-	144	8471	21973	31058	12	21	1210	1060	2303	482	-	165	9681	23033	33361
1979	856	-	2547	6201	15599	25203	12	697	735	1400	2844	868	-	3244	6936	16999	28047
1980	340	-	-	47	7855	8242	22	33	4275	1132	5462	362	-	719	5052	16158	22268
1981	63	-	-	177	3111	3351	7	82	2314	3515	5918	70	-	82	2491	6626	9269
1982	96	-	2332	2535	7128	12091	1	1835	3785	3537	9158	97	-	4167	6072	10665	21249
1983	215	-	204	3935	17157	21511	-	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	1162	3442	4604	-	-	-	-	-	-	-	-	-	-	-
5-Yr Avg.																	
1/	314	-	1017	2579	10170	14080											
10-Yr Avg.																	
2/	239	-	541	3011	11476	15267											

1/ 1979-1983

2/ 1974-1983

3/ Subsistence surveys not conducted.

Appendix Table 7. Commercial and subsistence salmon catches by species by subdistrict, Norton Sound District, 1961-1984.

Year	Commercial						Subsistence					Combined					
	Chi-nook	Sock-eye	Coho	Pink	Chum	Total	Chi-nook	Coho	Pink	Chum	Total	Chi-nook	Sock-eye	Coho	Pink	Chum	Total
UNALAKLEET (SUBDISTRICT 6)																	
1961	5160	35	13807	5162	23586	47750	-	-	-	-	-	5160	35	13807	5162	23586	47750
1962	5089	-	6739	6769	30283	48880	-	-	-	-	-	5089	-	6739	6769	30283	48880
1963	5941	18	16202	11140	27003	60304	-	-	-	-	-	5941	18	16202	11140	27003	60304
1964	1273	1	79	1	19611	20965	488	2227	7030	6726	16471	1761	1	2306	7031	26337	37436
1965	1321	-	2030	24	26498	29873	521	4562	11488	8791	25362	1842	-	6592	11512	35289	55235
1966	1208	-	4183	5023	16840	27254	90	789	6083	3387	10349	1298	-	4972	11106	20227	37603
1967	1751	-	1544	21961	8502	33758	490	484	9964	-	10938	2241	-	2028	31925	8502	44696
1968	960	-	6549	41474	14865	63848	186	1493	11044	2982	15705	1146	-	8042	52518	17847	79553
1969	2276	-	5273	40558	22032	70139	324	1483	4230	4196	10233	2600	-	6756	44788	26228	80372
1970	1604	-	4261	30779	40029	76673	495	3907	10104	7214	21720	2099	-	8168	40883	47244	98393
1971	2166	-	2688	1196	37543	43593	911	3137	2230	7073	13351	3077	-	5825	3426	44616	56944
1972	2235	-	412	28231	20440	51318	643	1818	3132	4132	9725	2878	-	2230	31363	24572	61043
1973	1397	-	8922	13335	25716	49370	323	213	6233	3426	10195	1720	-	9135	19568	29142	59565
1974	2100	-	1778	93332	36170	133380	313	706	7341	588	8948	2413	-	2484	100673	36758	142328
1975	1638	-	3167	12137	48740	65682	163	74	4758	2038	7033	1801	-	3241	16895	50778	72715
1976	1211	1	5141	37203	24268	67824	142	694	4316	2832	7984	1353	1	5835	41519	27100	75808
1977	2691	1	2781	21001	32936	59410	723	1557	8870	6085	17235	3414	1	4338	29871	39021	76645
1978	7525	5	5737	136200	37079	186546	1044	2538	13268	3442	20292	8569	5	8275	149468	40521	206838
1979	6354	8	23696	49647	30445	110150	640	3330	6960	1597	12527	6994	8	27026	56607	32042	122677
1980	4339	3	21512	203142	64198	293194	1046	4758	19071	5230	30105	5385	3	26270	222213	69428	323299
1981	6157	47	29845	123233	39186	198468	869	5808	5750	4235	16686	7026	71	35650	128983	43421	215154
1982	3768	2	61343	142856	44520	252489	913	7037	20045	4694	32691	4681	4	68380	162901	49214	285090
1983	7022	13	36098	26198	109220	178551	1868	6888	13808	4401	26998	8890	46	42986	40006	113621	205549
1984	6804	6	47904	-	43317	98031	1650	6675	17418	3348	29092	8454	7	54579	17418	46665	127123
5-Yr Avg.	1/ 5528	15	34499	109015	57514	206570	1067	5564	13127	4031	23801	6595	26	40062	122142	61545	230354
10-Yr Avg.	2/ 4280	8	19110	84495	46676	154569	772	3339	10419	3514	18050	5053	14	22448	94914	50190	172610
1/	1979-1983																
2/	1974-1983																
3/	Includes 24 sockeye salmon																
4/	Includes 2 sockeye salmon																
5/	Includes 33 sockeye salmon																
6/	Subsistence catches from 1966-1972 includes fish taken at St. Michael.																
7/	Includes 1 sockeye salmon																

Appendix Table 9. Mean salmon weights, Norton Sound District, 1962-1984. 1/

Mean Round Weight in Pounds 2/

Year	Chinook	Coho	Pink	Chum
1962	-	-	-	-
1963	-	-	-	-
1964	-	-	-	7.0
1965	-	-	2.3	7.1
1966	-	-	3.5	7.8
1967	23.7	7.0	3.6	7.2
1968	20.0	7.0	4.0	7.5
1969	19.3	7.5	3.6	6.4
1968	20.0	7	3.5	7.8
1967	23.7	7.0	3.6	7.2
1968	20.0	7.3	2.8	6.9
1973	20.3	6.8	3.9	7.1
1974	18.2	6.7	3.4	6.6
1975	10.8	7.4	2.9	6.5
1976	15.2	7.2	3.1	7.0
1977	22.7	7.6	3.3	7.0
1978	22.8	6.9	3.6	7.4
1979	22.9	7.1	3.6	7.2
1980	21.5	6.8	3.2	7.2
1981	20.7	6.7	3.5	7.6
1982	16.5	7.1	2.9	7.3
1983	17.4	7.2	3.6	7.4
1984	20.0	7.7	2.9	7.0

1/ Information not available for some species.

2/ Based on age-weight-length samples or fish tickets.

Appendix Table 11. Dollar estimates of Norton Sound District commercial salmon fishery, 1961-1984.

Year	Gross Value of Catch to Fishermen	Wages Earned 2/	License and Tax Revenues to State (License Fees Only)
1961	\$ 1/	\$ 1/	\$ 2,010.00
1962	105,800.00	1/	16,341.00
1963	104,000.00	1/	18,009.00
1964	51,000.00	1/	11,305.00
1965	21,483.00	1/	5,084.00
1966	68,000.00	1/	4,680.00
1967	44,038.00	58,000.00	3,500.00
1968	63,700.00	1/	4,000.00
1969	95,297.00	72,145.00	1/
1970	99,019.00	55,100.00	5,595.00
1971	101,000.00	65,500.00	5,730.00
1972	102,225.00	68,700.00	7,000.00
1973	308,740.00	81,000.00	15,400.00
1974	437,127.00	129,600.00	20,028.00
1975	413,255.00	172,800.00	28,230.00
1976	285,283.00	1/	10,133.00
1977	528,610.00	1/	11,386.00
1978	814,221.00	1/	12,002.00
1979	876,547.00	1/	11,780.00
1980	583,388.00	1/	11,640.00 3/
1981	758,471.00	1/	11,940.00
1982	988,588.00	1/	7,155.00 3/4/
1983	1,038,967.00	1/	10,700.00 3/
1984	721,055.00	1/	9,690.00 3/

1/ Information not available.

2/ Includes wages paid to tender boat operators, processing plant employees in district.

3/ Includes only permit renewals and vessel license fees.

4/ The Alaska state legislature lowered all resident permit renewal fees and vessel license fees to poverty level fees for 1982.

Appendix Table 13. Comparative salmon escapement estimates of Norton Sound streams, 1961-1984. 1/

Year	Chi- nook	Chum	Pink	Pink & Chum 2/	Coho
Eldorado River					
1974	13	2,143	6,185	--	--
1977	--	1,835	125	--	--
1978	--	10,125	12,800	--	--
1980	6	9,900	55,520	--	--
1981	--	15,605	495	--	--
1982	2	1,095	163,300	--	--
1983	11	994	270	--	100
1984	14 9/	4,361 7/9/	1,924,935 7/9/	--	261
Flambeau River					
1976	--	375	1,994	--	--
1977	--	1,275	10	--	--
1978	--	7,110	--	--	--
1979	--	283	291	--	--
1980	--	--	--	29,190	--
1981	1	12,031	2,710	--	--
1982	1	5,097	25,001	--	--
1983	2	1,195	200	--	--
1984	--	3,150 7/	20,200 7/	--	--
Nome River					
1971	--	75	7,765	--	--
1972	--	710	14,960	--	--
1973	6	1,760	14,940	--	--
1974	--	854	17,832	--	--
1975	1	2,161	3,405	--	--
1977	5	3,046	1,726	--	--
1978	2	5,242	34,900	--	--
1980	5	--	--	179,095	920
1981	15	1,195	12,565	--	--
1982	--	700	327,570	--	--
1983	2	198	9,170	--	365
1984	--	2,084 8/	178,870	--	839

Appendix Table 13. Comparative salmon escapement estimates
of Norton Sound streams, 1961-1984. 1/

(continued)

Year	Chi- nook	Chum	Pink	Pink & Chum 2/	Coho
Fish River					
1961	1	--	--	14,100	--
1962	48	--	--	28,918	--
1963	21	--	--	25,728	--
1964	--	18,670	10,935	14,550	--
1966	7	--	--	17,955	--
1967	20	--	--	13,610	--
1968	10	--	--	164,000	--
1969	--	2,080	124,000	--	--
1970	33	76,550	198,000	--	--
1971	1	13,185	1,670	--	--
1972 2/	--	3,616	13,050	--	--
1973	31	6,887	15,564	--	--
1974	7	10,945	15,690	--	--
1975	26	20,114	15,840	--	--
1976	1	8,390	15,850	8,550	--
1977	9	9,664	2,430	--	--
1978	29	26,797	140,640	--	--
1979	11	6,893	9,132	--	--
1980	--	19,100	33,500	--	--
1981	90	24,095	450	--	--
1982	--	--	--	241,700	--
1983	87	20,037	300	--	--
1984	42	--	--	293,245	--
Kachauik Creek					
1963	--	16,000	16,000	--	--
1964	--	5,284	3,675	--	--
1966	--	758	1,788	--	--
1967 3/	--	--	--	1,780	--
1969	--	600	4,525	--	--
1970	--	500	--	--	--
1971	--	1,000	5,323	--	--
1972	--	3,100	16,950	--	--
1973	--	10,325	22,275	--	--
1974	--	1,645	2,723	--	--
1975	--	1,735	23,360	--	--
1977 4/	--	9,564	30,432	--	--
1978 4/	--	3,481	26,533	--	--
1979	--	2,650	23,850	--	--
1982	--	1,111	72,235	--	--

Appendix Table 13. Comparative salmon escapement estimates of Norton Sound streams, 1961-1984. 1/

(continued)						
Year	Chi- nook	Chum	Pink	Pink & Chum 2/	Coho	
Kwiniuk River						
1962	3	--	--	23,249	--	
1963	2	11,340	3,779	--	--	
1964	--	14,533	--	--	--	
1965	4/ 14	26,634	8,301	--	--	
1966	4/ 7	32,786	10,629	--	--	
1967	4/ 13	24,444	3,508	--	--	
1968	4/ 27	18,813	126,764	--	--	
1969	4/ 12	19,687	56,683	--	--	
1970	4/ --	68,004	235,131	--	--	
1971	4/ 37	39,046	16,742	--	--	
1972	4/ 65	30,686	62,461	--	--	
1973	4/ 57	28,617	38,420	--	--	
1974	4/ 62	35,899	40,816	--	--	
1975	4/ 44	14,344	57,317	--	--	
1976	4/ 12	6,977	29,471	--	--	
1977	4/ 84	22,757	46,234	--	--	
1978	3/4/ 74	14,408	72,270	--	--	
1979	4/ 107	12,355	167,492	--	--	
1980	4/ 177	19,374	320,389	--	--	
1981	4/ 136	34,561	566,417	--	--	
1982	4/ 138	44,036	469,674	--	--	
1983	4/ 267	56,907	251,965	--	--	
1984	4/ 736	54,043	736,544	--	983 6/	
Tubutulik River						
1962	3	--	--	16,690	--	
1963	9	16,069	4,355	--	--	
1964	--	15,469	10,043	3,420	--	
1966	--	5,514	26,000	--	--	
1967	1	--	--	22,475	--	
1969	3	12,040	12,788	3,045	--	
1970	--	53,290	136,590	--	--	
1971	--	16,820	7,500	5,065	--	
1972	3/ --	8,070	21,100	--	--	
1973	131	5,383	15,665	--	--	
1974	136	9,560	17,940	--	--	
1975	7	17,141	38,003	--	--	
1976	--	1,095	6,095	2,600	--	
1977	--	8,540	4,685	--	--	
1978	2	5,865	1,364	--	--	
1979	--	812	1,624	--	--	
1980	5/ 405	21,616	663,937	--	--	
1982	3/ 49	2,044	53,605	--	--	
1983	135	16,345	40,790	--	--	
1984	139	56,210	93,600	--	--	

Port Clarence District

District Boundaries

The Port Clarence district encompasses all waters from Cape Douglas north to Cape Prince of Wales including the Salmon Lake and Pilgrim River drainages (Figure 2). Salmon, saffron cod, whitefish and herring are the major subsistence species; however, other fishery resources are also utilized.

Commercial Fishery

Commercial salmon fishing in this district has been prohibited since 1967. In 1966 a total of 1,216 salmon consisting of 93 sockeyes, 131 pinks and 992 chums was taken commercially in the Grantley Harbor/Tuksuk Channel area. This was the only bona fide commercial fishery, but a few salmon are sold or bartered each year in Teller and Nome. Due to the relatively small runs in this area and the existence of an important subsistence fishery, commercial salmon fishing has not been reopened.

Subsistence Fishery

A traditional subsistence salmon fishery has probably occurred within this district for centuries; however, subsistence fishing within Salmon Lake and upper Pilgrim River has only been known to occur since the 1930's and 1962 respectively. Data collected by Department personnel has indicated a majority of the fishermen of Brevig Mission fish the northern and northeastern sections of Port Clarence, while Teller fishermen utilize Grantley Harbor and Tuksuk Channel (Figure 2). Interviews with local residents have also indicated substantial fishing effort within the Agiapuk River. Salmon Lake and Pilgrim River stocks have been utilized primarily by Nome residents. However, the Alaska Board of Fisheries in 1972 adopted a regulation which closed Salmon Lake and its tributaries to subsistence salmon fishing from July 15 through August 31 to conserve declining sockeye salmon stocks. One subsistence permit was issued to a Nome resident in 1984 for the Pilgrim River. That permit reported a harvest of 20 chum salmon.

Personal interviews of fishermen seem to indicate a decline in subsistence fishing effort, due primarily to the absence of younger fishermen entering the fishery. A majority of the subsistence fishing effort appears to be conducted by elder residents who gather fish for an entire family.

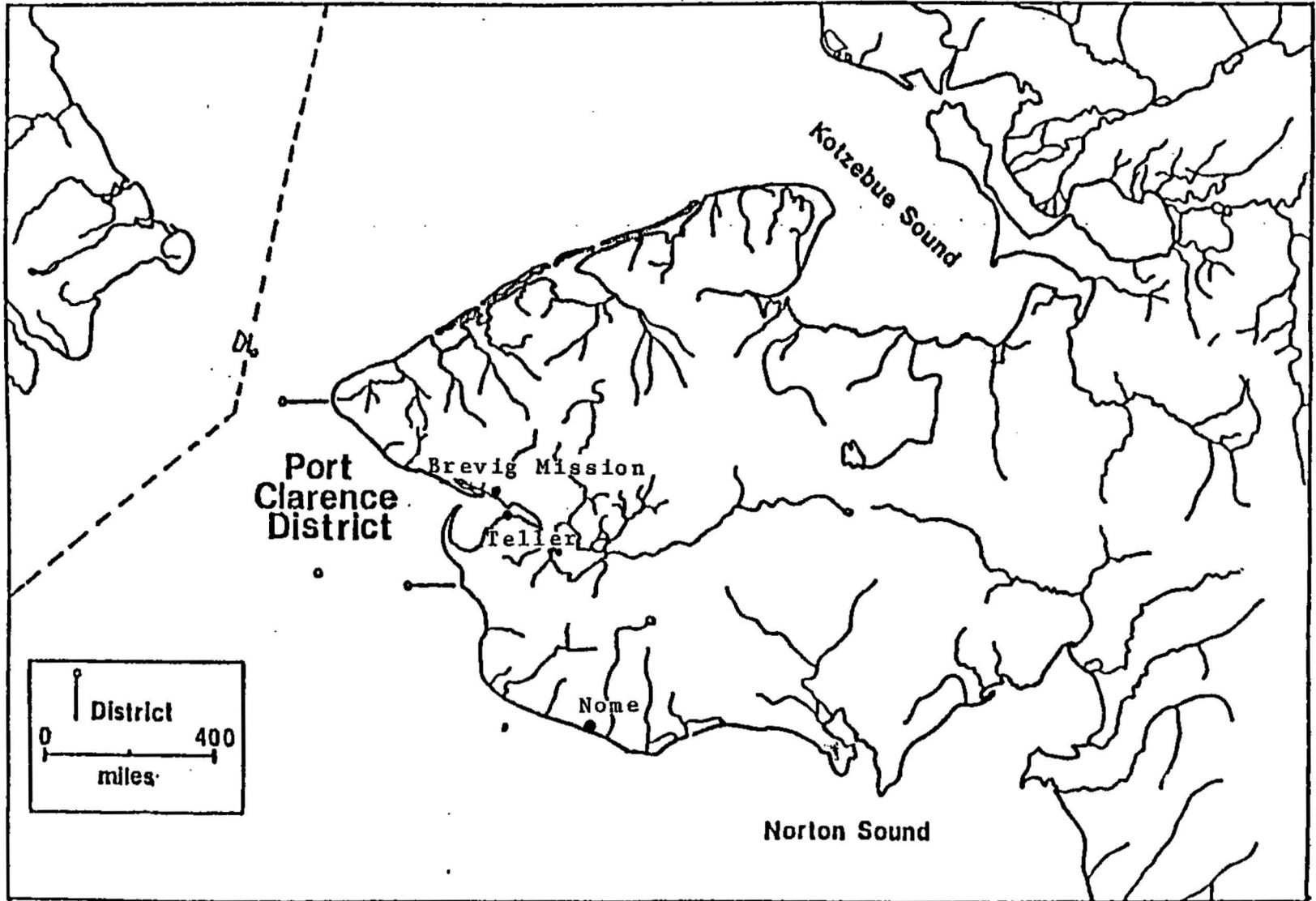


Figure 2. Port Clarence district.

Appendix Table 15. Comparative sockeye salmon aerial survey estimates, Port Clarence District, 1963-1984.

Aerial Survey Estimates

Year	Salmon Lake	Grand Central River	Total
1963	866	620	1486
1964 3/	76	590	666
1965	250	160	410
1966	1120	370	1490
1967	129	280	409
1968 3/	830	645	1475
1969	24	171	195
1970 1/	-	-	-
1971	538	512	1050
1972 3/	680	300 2/	980
1973	1747	607	2354
1974	820	0	820
1975	537	123	660
1976	132	22	154
1977	317	235	552
1978	822	280	1102
1979	1250	261	1511
1980 3/	512	175	687
1983	-	-	970
1984	445	30	475

1/ No survey made.

2/ Boat survey.

3/ Poor survey.

is assumed that the salmon processed were chum.

The next commercial effort was not documented until 1962 when a harvest of 129,948 chum salmon was recorded. The catches from 1962-1984 are presented in Appendix Table 16.

Commercial fishing effort is restricted to ocean waters near the town of Kotzebue (Figure 4) in order to minimize interception of salmon bound for other distant streams. Fishermen can legally operate set gillnets of up to 150 fathoms in length. Open skiffs powered by outboard motors are used to operate the fishing gear and deliver the fish to buyers.

Department tagging studies indicate that the bulk of the fish returning to this district are bound for the Kobuk and Noatak Rivers. Lower Kobuk River chum salmon have been identified as arriving first in the commercial fishery, peaking in mid to late July. Noatak River chum salmon, which are more abundant than Kobuk River chums, peak in the commercial fishery during early to mid August. There is evidence that chum salmon bound for the upper Kobuk River pass through the commercial fishery during middle to late August and are intermixed with Noatak River fish.

Commercial catches averaged 84,000 chum salmon during 1962-1972 while the number of fishermen averaged 64. Due to apparent excellent brood year survival rates, returns were above average during 1973-1975 when commercial catches averaged 524,500 chums and effort averaged 186 fishermen. During 1976-1979, returns were more similar to pre-1973 levels, but effort remained high. In 1978 the chum salmon run decreased to one of the lowest levels recorded (Appendix Table 16).

The Alaska Board of Fisheries adopted the following regulations which became effective in 1979, to insure that future spawning and subsistence fishing requirements are met.

1. The opening date of the commercial salmon season is July 10.
2. Commercial fishing periods are established by emergency order during July and set at two 36 hour periods per week during August.

The major objective of these regulations was to reduce exploitation of Kobuk River chums which are less abundant,

guted their fish, iced them and flew them out of the district. The other buyer iced fish in the round and flew them out of the district.

The combination of the poor 1983 harvest and a poor salmon run forecast for 1984 discouraged many fishermen from fishing at the beginning of the season. However, increases in the ex-vessel price of chum salmon from an average of 25 cents per pound in 1983 to an average of 44 cents per pound this year, and better than average fishing success early in the season, encouraged many late entrants into the fishery. Overall, the number of fishermen participating in 1984 was 5 below the recent 5 year average of 186 fishermen, and 8 fishermen less than in 1983.

The commercial fishery opens by regulation on July 10, but to provide for the normal scheduling of fishing periods, on Mondays and Thursdays, the 1984 season opened on Monday, July 9. Commercial fishing time consisted of two 24 hour periods per week during most of July. By regulation, commercial fishing time is set at two 36 hour periods per week in August, after the majority of the lower Kobuk River chum salmon run is thought to have passed through the fishery. Fishing time was increased this year to 36 hours during the period that started on July 30, when comparative catch and escapement figures indicated that the Noatak River run was strong. Extremely poor weather and fishing conditions during this fishing period resulted in a low fishing effort and a small harvest. Since the chum salmon run still seemed strong, the next fishing period, which started on August 4, was extended to 48 hours to compensate the fleet for lost fishing time due to poor weather. After this fishing period, comparative catch and escapement statistics continued to indicate that the Noatak River chum run was above average in strength and fishing time was extended to two 48 hour periods per week starting on August 6. Beginning on August 10 the chum salmon run began to decline. The fishing periods which occurred from August 16 through 18 and August 20 through 22 were substantially below average and the salmon run appeared to be largely over. This rapid decline in chum salmon abundance indicated that the run was not as large as earlier anticipated. To allow the remaining fish to escape and spawn the season was closed on August 23, 8 days before the regulatory closure of August 31.

Based on information gained from salmon tagging studies conducted in the past, and catch and effort statistics

During the 1984 season a fleet survey was conducted by the staff in order to describe the present equipment and fishing methods used in the fishery. If fishing methods or equipment change substantially over time, it is possible that catch statistics may not be comparable with past years and large catches may be due to increased efficiency and not large runs. Interviews were conducted with 15% of the fleet. The average fisherman was a Kotzebue resident using a 22 foot wooden boat with an outboard motor between 100 and 200 horsepower. The average net was 150 fathoms long, 29 meshes deep, with a mesh size of 5 7/8 inches. There are usually two crew members assisting and no hydraulic gear, radios or depth sounders on board.

Subsistence Fishery

Subsistence salmon fishing has long been an important food gathering activity for the Eskimo people of the Kotzebue district. Remnants of salmon spears and nets have been found in old village sites on the Kobuk River that date back to 1250 A.D. At present, subsistence fishermen use set gillnets and beach seines to catch salmon in the bays and rivers. Nearly all of the catch is dried for later consumption.

It is difficult to calculate the value of the subsistence fishery in terms of dollars to the residents of this area. However, if subsistence fishermen had to purchase a protein food in the place of their subsistence salmon catch, the dollar value of this fishery would be considerable.

The 1957 studies of Raleigh documented estimates of average annual subsistence catches for several years prior to 1957. The methods and completeness of this survey were not fully documented. The catch estimates were obtained from interviews of a percentage of each village population. The interview data was then expanded to include the entire village. Possible large errors in the estimation of total catches could have occurred.

Documentation of catches from 1962 through 1984 was conducted by the Alaska Department of Fish and Game. Reported chum salmon harvests averaged 24,800 during this period in the Kotzebue District (Appendix Tables 20 and 21). Subsistence surveys measured catches by direct counts, by interviews of fishermen, or by the return of catch forms that were distributed to fishermen. Since not all fishermen

conditions. Although this figure represents less than the average escapement of 80,000 chum salmon in the main river, high catches of bright fish after this date in subsistence nets in the lower Noatak River and Kotzebue Sound are evidence that significant amounts of chum salmon were still moving onto the spawning grounds.

During 1984, a new type of sonar equipment was tested in the lower Noatak River. As the results of this testing are analyzed and as the Department staff gains the knowledge necessary to interpret the sonar data, this project may have use for indexing salmon escapement in this river system.

Kotzebue District for 1985

The Department is no longer publishing a run "forecast", which attempts to predict the exact number of fish returning, until the relatively large error associated with recent forecasts can be reduced to acceptable levels. The Department will continue to develop and refine the forecast model in an attempt to improve its accuracy.

A run "outlook" is an attempt to predict general run magnitude, based on the size of brood year escapements and assuming average survival. The 1985 run will be returning from the large 1980-1982 brood years and is expected to be above average when compared to the past 10 years. The 10 year average commercial harvest is 313,000 chum salmon. Relatively large numbers of 3 year old chum salmon were documented in 1984 which indicated that 1981 brood year fish experienced good survival. This is promising since the bulk of the 1985 return should be composed of fish from this brood year. The run outlook is intended only as a possible pre-season indication of return size. Returns in Kotzebue are not easy to project because return size is often based on environmental conditions affecting the survival of eggs and young fish, a difficult parameter to measure. The allowable 1985 commercial harvest will be based on the actual size of the return. Management actions will be implemented to ensure adequate escapement occurs for reproductive purposes and subsistence harvests. Additional information regarding the anticipated chum salmon return can be obtained from the Nome or Kotzebue staff upon request.

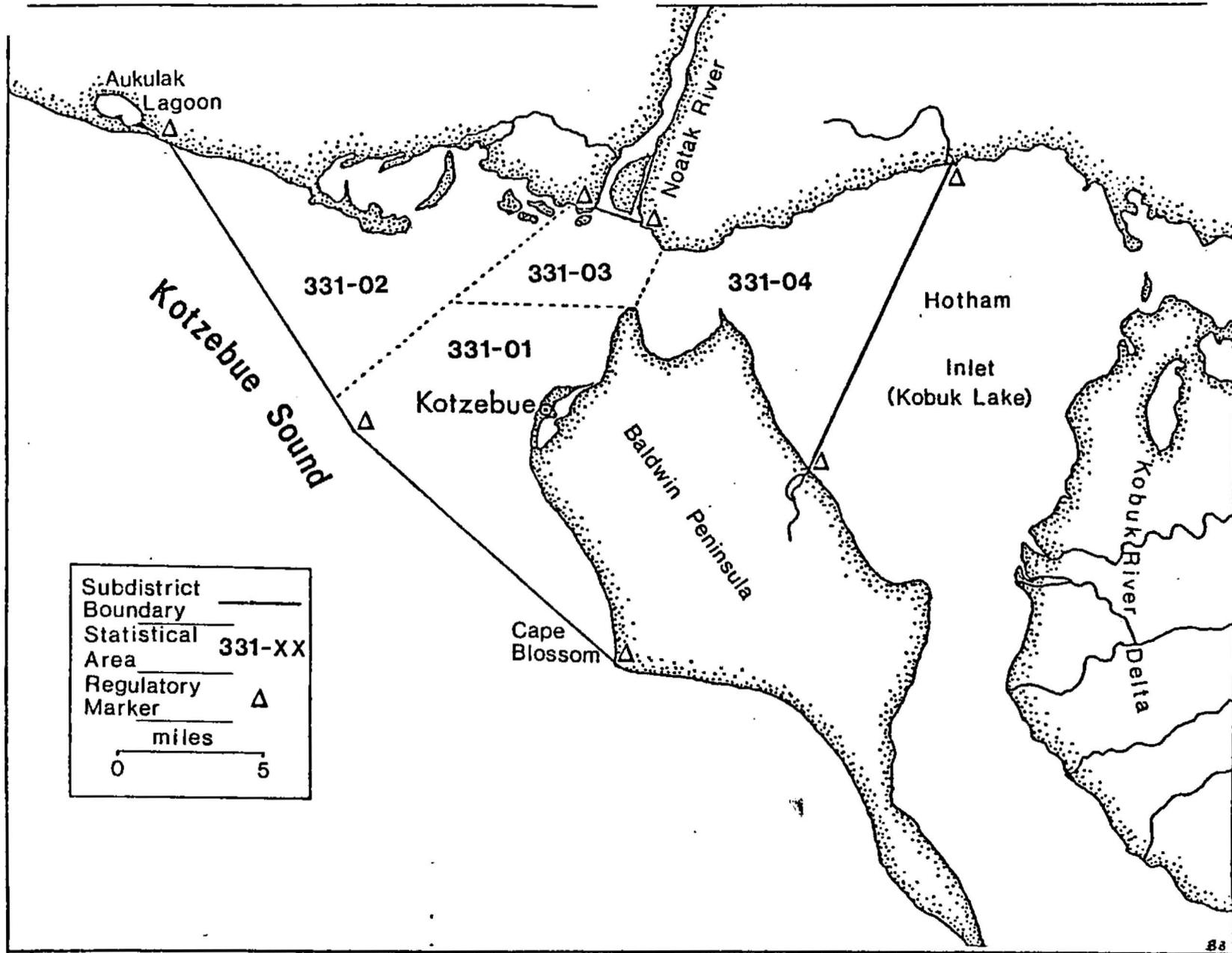


Figure 4. Kotzebue District commercial salmon fishing statistical areas.

Table 11. Commercial catches of finfish delivered during the 1984 salmon season in the Kotzebue District (331).

Period Dates	Hours Fished	Number Boats	Period Catch (CPUE)			Cumulative Catch (Cum CPUE)		
			Chum	Chinook	Char	Chum	Chinook	Char
7/09-7/10	24	12	482 (1.7)			482 (1.7)		
7/12-7/13	24	30	2,334 (3.2)			2,816 (2.8)		
7/16-7/17	24	93	10,255 (4.6)	1		13,071 (4.0)	1	
7/19-7/20	24	120	22,145 (7.7)	2		35,216 (5.8)	3	
7/23-7/24	24	137	22,573 (6.9)	9		57,789 (6.1)	12	
7/26-7/27	24	151	39,951 (11.0)	6		97,740 (7.5)	18	
7/30-8/01	36	107	14,001 (3.6)	7		111,741 (6.6)	25	
8/02-8/04	48	160	66,477 (8.7)	24		178,218 (7.3)	49	
8/06-8/08	48	161	52,943 (6.9)	19		231,161 (7.2)	68	
8/09-8/11	48	167	42,362 (5.3)	20		273,523 (6.8)	88	
8/13-8/15	48	156	28,149 (3.8)	8		301,672 (6.3)	96	
8/16-8/18	48	135	14,287 (2.2)	4		315,959 (5.8)	100	
8/20-8/22 1/	48	85	4,247 (1.0)	7	347	320,206 (5.5)	107	347
Totals	468	181	320,206	107	347	320,206	107	347

1/ Season closed 8/22 by emergency order.

Table 13. Reported subsistence catches of salmon by village, Kotzebue District, 1984.

Village	# of Catch Calendars Mailed in	# Fishermen Interviewed	# of Known Fishermen Not Contacted	Reported Salmon Catches				
				Chum	Pink	Coho	Chinook	Sockeye
Kobuk	0	0	4	-	-	-	-	-
Shungnak	0	14	6	4241	-	-	-	-
Ambler	0	14	3	2990	-	-	1	-
Kiana	0	0	23	-	-	-	-	-
Noorvik	0	0	26	-	-	-	-	-
Kotzebue	2	0	?	88	12	2	-	1
Noatak	0	35	0	6049	-	-	-	-
Kivalina	0	5	?	200	-	-	12	-
Deering	1	10	0	1940	113	16	8	-
Totals	3	78	?	15508	125	18	21	1

Appendix Table 16. Comparative commercial chum salmon catch statistics,
Kotzebue District, 1962-1984 (continued).

	1971	1972	1973	1974 4/	1975 5/	1976	1977	1978	1979
Total catch	154956	169664	375432	627912	563345	159656	195895	111533	141545
Total days 1/	29	35	25	32	39	16	21	23	21
Total boat days 2/	1468	2095	2217	3769	4301	2236	2353	2738	2462
Average seasonal catch/boat day	106	81	169	167	131	71	83	41	57
No. of fishermen making at least one delivery 3/	91	104	148	185	267	220	224	208	181
Average seasonal catch per fisherman	1781	1631	2537	3394	2110	726	875	536	782

1/ Day = 24 hours of open fishing time.

2/ Boat days standardized in 1983 for all past years. Boat days = number of boats fishing X period length in hours divided by 24. Total boat days = total season boat hours divided by 24.

3/ During 1962-1966 and 1968-1971 figures represent the number of vessels licensed to fish in Kotzebue Sound, not the number of fishermen.

4/ Includes 6,567 chum salmon from the Deering experimental fishery.

5/ Includes 10,704 chum salmon from the Deering experimental fishery.

Appendix Table 17. Salmon pack by species and type of processing, Kotzebue District, 1962-1984 1/

Year	Cases (48 lb.) Chum	Fresh-Frozen (rnd. wt. in lbs.) Chum	Other 4/	Salmon Roe (lbs) Fresh-Frozen	Cured
1962	14,500	--	--	--	--
1963	5,396	--	--	--	--
1964	5,421	202,993	--	--	--
1965	1,929	207,350	--	--	--
1966	--	310,716	--	13,600	3,065
1967	--	273,420	--	--	11,488
1968	--	288,500	--	--	11,850
1969	--	455,013	--	--	8,183
1970	--	1,240,000	--	--	48,377
1971	--	1,264,753	--	--	27,542
1972	--	1,547,041	--	--	55,376
1973	--	3,416,431	--	--	144,768
1974	--	5,361,130 2/	--	--	--
1975	--	4,877,313 3/	--	--	--
1976	--	1,415,549	487	--	--
1977	--	1,846,340	1,075	--	--
1978	--	1,009,121	32,419	--	--
1979	--	1,236,429	6,155	--	--
1980	--	3,160,984	7,828	--	--
1981	--	6,139,518	2,210	--	--
1982	--	3,833,051	790	100	--
1983	--	1,647,160	2,449	--	--
1984	--	2,631,582	1,593	--	--

1/ Pack represents type of processing when fish were shipped out of district.

2/ Includes 36,775 lbs from the experimental commercial fishery at Deering.

3/ Includes 80,801 lbs from the experimental commercial fishery at Deering.

4/ Chinook and pink salmon.

Appendix Table 19. Estimated mean prices paid to salmon fishermen by species, Kotzebue District, 1962-1984. 1/4/

Years	Chums Avg.Round Weight	Average Price	Kings	Pinks	Inconnu	Char
1962 3/	--	\$0.35				
1963 3/	--	0.35				
1964 3/	8.3	0.45				
1965 3/	9.0	0.45			\$1.30 3/	
1966	10.1	0.11			1.40 3/	\$0.55 3/
1967	9.3	0.11			1.50 3/	0.75 3/
1968	9.7	0.14			0.91 3/	0.98 3/
1969	7.5	0.15			1.30 3/	2.84 3/
1970	8.1	0.15				
1971	8.1	0.16			0.16	0.17
1972	9.1	0.17			0.20	0.17
1973	9.1	0.25			0.30	0.16
1974 2/	8.5	0.34			0.30	0.16
1975 2/	8.6	0.28			0.30	0.30
1976	8.9	0.41			0.30	0.30
1977	9.6	0.56			0.30	
1978	9.1	0.57			0.30	0.25
1979	8.8	0.80				0.25
1980	8.6	0.46			0.10	0.20
1981	9.1	0.53			0.75 5/	0.17
1982	9.3	0.51	\$1.25	\$0.15	0.75 5/	0.20
1983	9.4	0.25	1.08	0.13		0.20 5/
1984	8.2	0.44	1.03			0.25 5/

- 1/ Information not available for some species.
- 2/ Includes price paid to fishermen of Deering during experimental commercial fishery.
- 3/ Price per fish.
- 4/ Figures from previous reports recomputed to yield price per pound.
- 5/ Limited market with one buyer.

Appendix Table 20. Kotzebue District subsistence chum salmon catches, by village, 1962-1984 (continued).

Village	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 ^{5/}	1984 ^{6/}
Noorvik	2312	6809	4620	1555	891	2034	2155	2229	3488	7433	277	2/
Kiana	4470	2726	4320	1579	766	1493	1225	2551	1439	4918	223	2/
Ambler	1529	1651	3390	2000	385	2224	2400	660	782	2506	1062	2990
Shungnak	4406	6243	9060	4213	1760	4766	2947	2704	2800	4191	3556	4241
Kobuk	1917	2251	1755	562	325	852	651	350	950	600	360	2/
Kobuk River												
TOTAL	14634	19680	23145	9909	4127	11369	9378	8500	9449	19648	5486	7231
Noatak River												
TOTAL	216	4330	1515	4448	2125	1495	2227	2135	5465	5479	4035	6049
Kotzebue	1172	2/	2/	2/	2/	2/	2/	2/	2387	4099	347	88 1/
Deering	1098	1880	1175	1358	3500	2/	2000	2/	295	807	219	1940
Kivalina	2/	2/	2/	2/	2/	2/	2/	2/	110	100	200	200
Buckland	1722	639	1540	2/	2/	2/	1000	2/	50	2/	2/	2/
Candle	50	15	2/	2/	2/	50	2/	2/	2/	2/	2/	2/
Shishmaref	100	200	230	2/	2/	2/	2/	2/	2/	2/	2/	2/
DISTRICT												
TOTAL	18942	26729	27605	15765	9752	12864	14605	10635	17766 ^{1/3/}	30133 ^{1/4/}	10287	15508

1/ No household survey; information from return of mail questionnaires.

2/ Not surveyed.

3/ Does not include 310 chum taken in Selawik.

4/ Does not include 110 chum salmon taken in Kivalina.

5/ During 1983 household surveys were conducted in Noatak, Kivalina and Shungnak only. Other harvest information is from limited return of mail-in calendars. Harvest data should be considered minimums only.

6/ During 1984 household surveys were conducted in Noatak, Kivalina, Shungnak, Ambler and Deering only. Other harvest information is from a limited return of mail-in questionnaires. Harvest data should be considered minimums only.

Appendix Table 22. Comparative chum salmon aerial survey escapement estimates, Kotzebue District, 1962-1984. 9/

	1962	1963	1964	1965	1966	1967	1968	1969
Noatak River System								
Noatak River (below Kelly River)	168,000 4/	1,970 1/	89,798	6,152 1/	101,640	29,120	39,394	33,945
Eli River	9,080 4/	35 1/	-	-	120	-	5,502	68 1/
Kelly River & Lake	1,818 4/	600	-	3,155	570	225	375	150
TOTAL	178,898	2,605	89,798	9,307	102,330	29,345	45,271	34,163
Kobuk River System								
Main Kobuk River								
Mouth to Kobuk	-	-	-	-	-	-	-	-
Kobuk to Pah River	-	-	-	1,750	266	-	530	-
Pah River to just below Selby River	-	400	-	500	-	-	50	-
Selby River mouth and Slough	-	2,575	-	500	630	1,625	70	-
Selby River mouth to just below Beaver River	-	-	-	-	-	75	170	-
Beaver River mouth	-	1,095	-	-	460	795	1,550	-
Above Beaver River	-	465	-	-	118	-	-	-
Main Kobuk River TOTAL	23,150 2/	4,535	7,985 7/	2,750	1,474	2,495	2,370	7,500 3,
Squirrel River	16,050 4/	2,200	8,009	7,230	1,350	3,332	6,746	6,714
Salmon River	12,936 4/	1,535	9,353	1,500 1/	3,957	2,116	3,367	2,561
Tutuksuk River	10,841 4/	670	2,685	-	1,383	169	823 1/	159
Kobuk River System Total	62,977 3/	8,940	28,032	11,480	8,164	8,112 3/	13,306	16,934

1/ Poor survey conditions or incomplete survey.

2/ Probably represents over-estimates and includes some inconnu.

3/ Counts have been revised and are now correct.

4/ These fish are unidentified salmon although most are chums.

5/ This figure includes fish observed from just above Selby Slough to the mouth of the Reed River.

6/ Unresolvable discrepancies in historical data put this figure in question.

7/ Unclear where these fish were observed.

8/ Foot survey.

9/ The figures in this table have been corrected and supercede figures in previous reports.

Appendix Table 22. Comparative chum salmon aerial survey escapement estimates, Kotzebue District, 1962-1984 (continued). 9/

	1977	1978	1979	1980	1981	1982	1983	1984
Noatak River System								
Noatak River (below Kelly River)	11,221	37,817	19,655	164,474	116,352 1/	20,682 1/	79,773	67,873
Eli River	742	5,525	1,794	10,277	-	295	3,044	5,027
Kelly River & Lake	290	168	3,200	7,416	13,770 3/	11,604	12,137	3,499
TOTAL	12,253 1/	43,510	24,649	182,167	130,122	32,581	94,954	76,399
Kobuk River System								
Main Kobuk River	-	-	-	-	-	-	-	-
Mouth to Kobuk	-	-	-	-	-	-	-	-
Kobuk to Pah River	-	269	75	1,694	18	2,643 1/	2,147	402
Pah River to just below Selby River	-	1,448	183	2,063	309	598 1/	2,433	257
Selby River mouth to Slough	-	211	1,110	-	8,321 2/5/	2,454	11,683	-
Selby River mouth to just below Beaver River	-	53	640	6,925 2/	-	7,268	13,011	5,910
Beaver River mouth	-	-	-	784	-	1,711	3,059	-
Above Beaver River	-	-	-	-	-	-	1,413	4,052
Main Kobuk River TOTAL	-	1,981	2,008	11,466	8,648	14,674	33,746	10,621
Squirrel River	1,964 1/	1,863	1,500 1/	13,536	9,854	7,690	6,075	5,473
Salmon River	-	814	674 1/6/	8,456	4,709	5,392 8/	1,677	1,471
Tutuksuk River	-	368	382 1/	1,165	1,114	1,322	2,637	1,132
Kobuk River System TOTAL	1,758	5,026	4,628	34,623	24,325	29,078	44,135	18,571

1/ Poor survey conditions or incomplete survey or late survey.

2/ Probably represents over-estimate and includes some inconnu.

3/ Foot survey.

4/ These fish are unidentified salmon but mostly chums.

5/ This figure includes fish observed from just above Selby Slough to the mouth of the Reed River.

6/ Unresolvable discrepancies in historical data put this figure in question.

7/ Unclear where these fish were observed.

8/ Foot survey.

9/ The figures in this table have been corrected and supercede figures in previous reports.

✓ In 1979, a domestic herring fishery for sac roe began on a larger scale in Norton Sound when approximately 1,172 metric tons of herring were taken by 63 fishermen (13 purse seiners, 50 gillnetters). Purse seiners took 70% of the total catch.

After the 1979 season, the Alaska Board of Fisheries adopted a public proposal which made gillnets and beach seines the only legal gear. A purse seine fishery could only be opened if the gillnet fleet could not take the allowable harvest. This regulation was an attempt to encourage involvement of local fishermen in this new fishery. During the 1980 season 294 gillnet fishermen harvested 2224.6 metric tons of herring (Appendix Table 23). Gillnet fishermen demonstrated that they were capable of taking the available harvest and in 1981 a regulation was passed which disallowed any purse seine season opening. Catches in 1981, 1982, and 1983 were 3,964, 3,567 and 4,156 m.t. respectively.

Management Strategies

✓ The overall statewide management strategy is to harvest 0-20% of the herring biomass. The upper end of the exploitation range is applied to stocks in good condition. The lower end of the exploitation range is applied to stocks that are exhibiting a trend of decreasing abundance and poor recruitment.

✓ Herring are long lived fish and will usually remain harvestable for at least 4 years after recruiting into the fishery. Harvesting only a percentage of the biomass ensures that some fish will be held over for following years. This type of strategy helps mitigate population fluctuations caused by successive years of poor recruitment, a common occurrence in marine spawning fish. Harvests have been regulated on a subdistrict basis so harvests would be dispersed over the entire fishing grounds, preventing harvest from concentrating in one area on what might be a distinct stock of fish.

COMMERCIAL FISHERY

Sac Roe Fishery Summary

The 1984 Norton Sound herring season opened by regulation on April 15 with the first commercial delivery made June 6. The entire district was closed by June 12 resulting in a harvest of 3,240 metric tons (m.t.) of herring (Table 14).

maximized to both the state and industry. During past years, fishermen have fished early on unripe fish. In 1984 processors were asked at what roe percentage they would buy fish. All registered processors stated they would not buy fish until an 8% roe recovery was reached. Fishermen were told that the season would remain open so they could test fish, however, the season would be closed if wastage was documented or if fishing was to begin on low roe percentage/low priced fish. On June 6, 15 m.t. of herring with 9.7 roe recovery and 4 m.t. of bait fish were landed; however, no ripe fish were present after this and fishing stopped. Two Department crews were on the grounds and no wastage or dumped loads were observed during the test fishing stage of the fishery. On June 8, test fish loads were graded at above 8% and fishing started. A total of 57 m.t. at 9.7% were landed. Had the fishery been closed due to fishing on green fish or wastage, the Department would have monitored ripeness by chartering commercial fishermen to test fish.

The historical major spawning grounds were iced in throughout the commercial fishery, causing fish to concentrate in the Cape Denbigh area. Shorefast ice extended south of a line from Unalakleet to Stuart Island. Loose drifting ice was present north of Unalakleet to Shaktoolik extending up to 10 miles off the beach (Figure 6). The entire harvest was taken in the Cape Denbigh subdistrict (3) where fish were concentrated. Due to extremely clear waters and net avoidance the fishery proceeded at a slow pace. By 6:00 A.M. June 12 the fishery was closed when a 20% exploitation rate was projected. After the closure was announced and about 8 hours before the fishery actually closed, loose ice drifted north, completely covering gear on the southeast side of Cape Denbigh. The ice turned the corner on Cape Denbigh and by the time of the closure extended about half way up the northwest side (Figure 6). An estimated 20 shackles of gear were abandoned due to ice movement resulting in an estimated 80 tons of wastage. The overall average sac roe percentage of 10.3 was the highest on record and if fishing had not started when it did the allowable catch may not have been taken due to ice movement.

Aerial survey conditions were excellent in ice free areas; however, ice covered approximately 90% of the traditional fishing grounds making inseason surveys impossible in these areas. The peak aerial survey flown during the commercial season estimated the biomass at 10,500 m.t. Because most of

factor to arrive at the total biomass. The Relative Abundance Index (RAI) is the standardized unit of surface area measurement used and is based on 50m² (Appendix Table 28). Inseason tonnage conversion factors of 3.0 m.t./RAI, 2.2 m.t./RAI, and 1.2 m.t./RAI were used depending on the water depth in which herring schools were sighted. Herring schools which were in typical spawnout configurations were assigned the lowest conversion factor. These surface area biomass conversion factors were derived from past research studies conducted in the Togiak district where purse seiners were contracted to make sets on herring schools for which the surface area was known. The average conversion factor used in 1984 was 1.36 m.t./RAI. This relatively low conversion factor reflects shallow water sightings and the spent condition of the observed herring.

During the 1984 Norton Sound herring season 27 aerial surveys totaling 59 hours of flight time were flown between May 24 and June 26 (Table 15). One hundred and thirty-five spawn sightings (milt) were observed distributed over 43.1 linear miles (Table 16). The total district biomass was estimated to be 21,000 m.t. and was not sighted until well after the commercial fishery was over. This estimate is based on aerial surveys made on June 18, 19, and 25 and the commercial harvest of 3,240 m.t. with the associated waste of 80 m.t. (Table 15).

Although there were six days between subdistrict peak observations in northern and southern Norton Sound areas it is assumed double counting was not significant since the fish were well segregated spatially. It appears the fish observed in Norton Bay on June 19 were distributed within Norton Bay and Elim subdistrict estimates of June 26. Although the Norton Bay and Elim subdistrict estimates of June 26 did not equal those of June 19, it is conceivable that large concentrations of fish were within Norton Bay but were not assessed due to the large size of Norton Bay and the difficulty associated with surveying offshore areas.

Other Research

Two herring field crews operated in subdistricts 1-3 from June 6 to July 1. Field personnel were involved in collection of herring age, length, weight and relative gonad maturity composition through operating variable mesh test gillnets and commercial catch sampling. Other duties included spawn deposition and substrate surveys, monitoring the spawn on kelp harvest, recording climatological

herring. Six year old herring are expected to comprise over 40% of the population, followed by eight and then seven year old fish. A 20% exploitation of this biomass would result in a harvest of 3,400 m.t. Since older age fish will continue to dominate the population, a roe recovery similar to 1984 (10.3%) can also be expected in 1985.

Table 14. Herring harvest by date, Norton Sound District, 1984. 1/

Date	Daily Herring (m.t.)	Cumulative Herring (m.t.)	Daily 2/ Roe %	Daily Sac Roe (m.t.)	Daily Bait (m.t.)	#FM
6/06	19	19	9.7	15	4	6
6/07	-	-	-	-	-	-
6/08	69	88	9.7	57	12	17
6/09	562	650	10.1	494	68	93
6/10	1106	1756	10.3	1017	89	150
6/11	1079	2835	10.4	1013	66	135
6/12	405	3240	10.6	395	10	93
Season Totals		3240	10.3	2991	249	194

1/ Entire harvest from Cape Denbigh Subdistrict (3).

2/ Daily and season roe % includes sac roe only.

Table 16. Norton Sound herring spawn estimates by subdistrict (s.d.), 1984.

Date	S.D. 1 # Miles		S.D. 2 # Miles		S.D. 3 # Miles		S.D. 4 # Miles		S.D. 5 # Miles		S.D. 6 # Miles		S.D. 7 # Miles		Total # Miles	
5/24	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/29	-	-	0	0	0	0	-	-	-	-	-	-	-	-	0	0
5/30	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0
6/01	-	-	0	0	0	0	-	-	-	-	-	-	-	-	0	0
6/02	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/03	-	-	0	0	0	0	0	0	0	0	0	0	-	-	0	0
6/05	-	-	0	0	0	0	-	-	-	-	-	-	-	-	0	0
6/08	-	-	0	0	0	0	0	0	1	0.2	0	0	0	0	1	0.2
6/09	-	-	0	0	2	0.1	0	0	5	0.6	1	0.3	1	0.1	9	1.1
6/10	0	0	0	0	2	3.0	0	0	10	1.4	4	0.3	4	0.3	20	5.0
6/11	-	-	0	0	10	1.8	0	0	27	1.5	2	0.2	1	0.1	40	3.6
6/12	3	0.8	0	0	4	4.5	-	-	-	-	-	-	-	-	7	5.3
6/17	30	23.8	0	0	-	-	-	-	2	0.9	0	0	-	-	32	24.7
6/18	-	-	-	-	10	0.4	0	0	2	0.1	0	0	0	0	12	0.5
6/19	3	0.1	-	-	6	1.5	0	0	-	-	-	-	-	-	9	1.6
6/25	3	0.5	3	1.0	0	0	0	0	-	-	-	-	-	-	6	1.5
6/26	-	-	0	0	0	0	0	0	0	0	0	0	1	0.1	1	0.1
Totals	39	25.2	3	1.0	34	11.3	0	0	47	4.7	7	0.8	7	0.6	137	43.6

Appendix Table 24. Japanese gillnet herring catches in Norton Sound 1968-1977. (North of 63 N. Latitude and East of 167 W. Longitude)

Year	Gillnet Catch (MT)	Remarks
1968	119	First foreign effort on herring in Norton Sound
1969	1,270	Peak catch with large effort (about 40 ships). Two vessels apprehended.
1970	63	
1971	638	
1972	14	
1973	35	
1974	693	
1975	0	
1976	-	Data unavailable at time of writing this report.
1977	-	Herring fishery closed to foreign nations.
Total	2,832	Excludes 1976 catches.

Appendix Table 26. Norton Sound commercial herring harvest (m.t.)
by subdistrict by year, 1979-1984. 1/

Subdistrict	1979	1980	1981	1982	1983	1984
1 (St. Michael)	289.4	1066.4	2782.5	1870.0	394.0	--
2 (Unalakleet)	367.2	573.6	754.2	858.0	1147.0	--
3 (Cape Denbigh)	503.8	573.6	427.8	839.0	2479.0	3240.0
4 (Norton Bay)	--	4.6	0.6	--	--	--
5 (Elim)	--	--	--	--	59.0	--
6 (Golovin)	--	6.4	--	--	77.0	--
7 (Bluff/Nome)	12.6	--	--	--	--	--

Norton Sound District Totals	1173.0	2224.6	3965.1	3567.0	4156.0	3240.0

1/ Includes herring taken for sac roe and bait.

Appendix Table 28. Relative abundance indices (R.A.I.) of herring in Norton Sound used to calculate district biomass, 1980-1984. 1/

Index Area	Sub-district	1980 4/	1981	1982 4/	1983	1984
St. Micheal	1	1088	2578	1070	698	4121
Unalakleet	2	304	3425	629	2290	286
Cape Denbigh	3	597	828	1846	4369	3025
Norton Bay	4	289	899	54	269	6363
Elim 2/	5	-	127	534	253	87
Golovin	6	43	194	102	277	73
Nome 3/	7	67	524	171	356	201
Total RAI 5/		2388	8575	4406	8512	14156

1/ Number represents counts of schools standardized by surface area (50m²).

2/ Prior to 1983 the Elim area was part of the Norton Bay area. Starting in 1983 the Norton Bay area coincides with sub-district 4 and Elim with subdistrict 5.

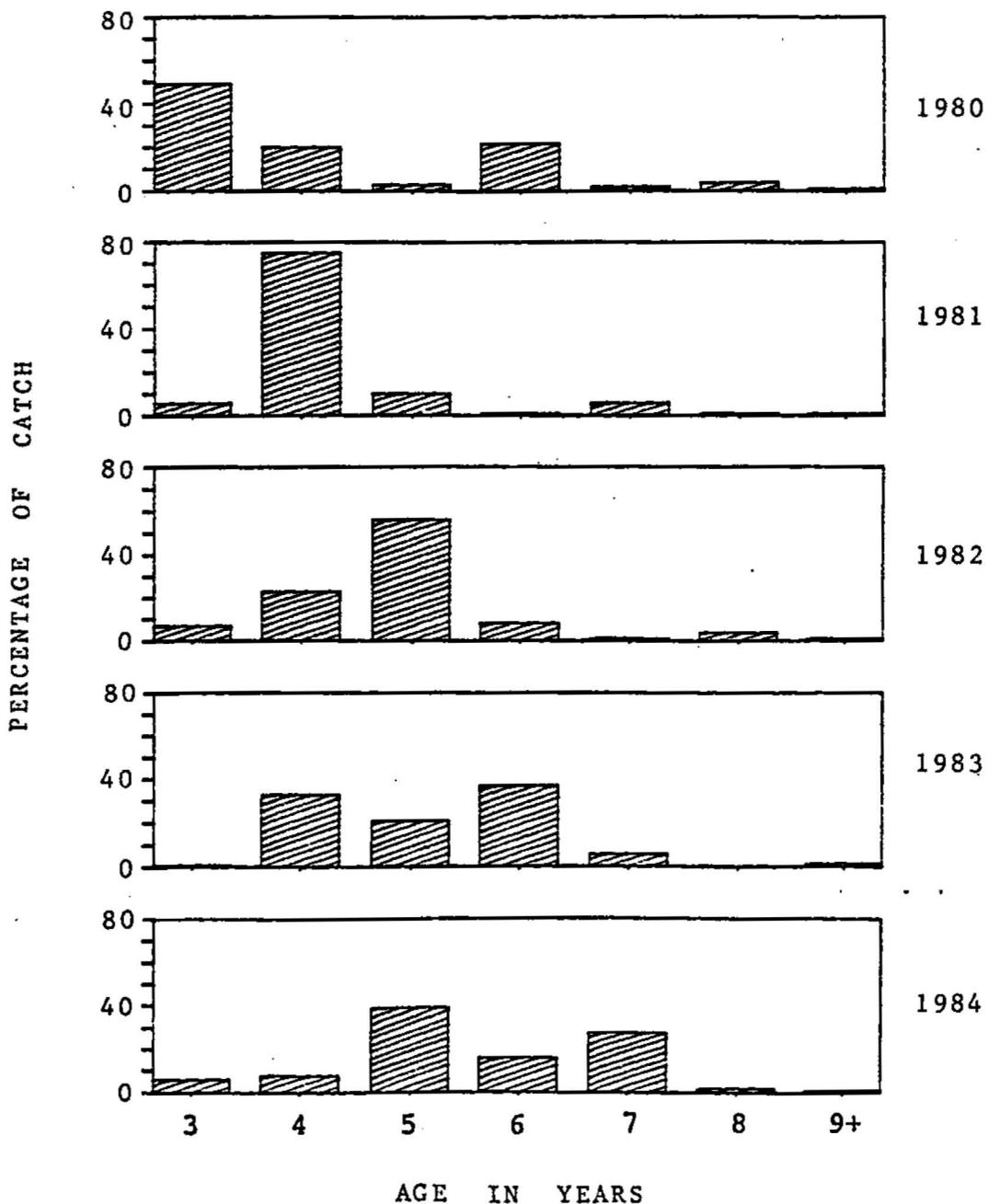
3/ Major capelin spawning grounds; counts probably contain high abundance of capelin schools.

4/ Poor survey years; counts represent minimal estimates.

5/ Harvest up to and including the peak aerial survey date was added to the RAI counts for each respective subdistrict.

Harvest was converted to RAI units by dividing the harvest by a conversion factor of 3 m.t./RAI, which has been the average factor used between 1979 and 1984.

Figure 8. Herring age class as depicted by percentage of total catch from variable mesh gillnet test catches, Norton Sound District, 1980-1984 (% of age class making up total catch).



Age in Years	3	4	5	6	7	8	9+
1980	49	20	3	22	2	4	1
1981	6	75	10	1	6	1	1
1982	7	23	56	8	1	4	1
1983	1	33	21	37	6	+	2
1984	2	5	37	18	33	3	2

time was composed of mainly prerecruit and recruit crab. This population structure indicated that natural mortality, which is greatest for older postrecruit crab, should not have greatly affected the 1984 population. Losses of crab due to disease epidemics are impossible to predict, and introduce another potential source of error when attempting to forecast population levels.

The abundance of prerecruit males captured during the last two research surveys that would grow to legal size in 1984 was the basis for predicting recruitment into the fishery. Recruitment in 1984 should have been similar to the level of recruitment that occurred in 1983, about 1.5 million pounds.

The legal male population was estimated to be 2.1 million pounds just prior to the 1983 fishery. Allowing for the 1983 commercial harvest, natural mortality, growth and recruitment, the 1984 legal male population should have been approximately 2.6 million pounds. Approximately 58% of the legal male population was expected to be recruit crab.

As will be discussed in a subsequent section, the 1984 Norton Sound legal male population had declined substantially from former levels, had a stable abundance of prerecruit crab, and a moderate abundance of postrecruit crab. According to 5AAC 34.080, crab populations with these characteristics should be exploited at 30%. Since the OY for Norton Sound was set at one-half the normal exploitation rate, a 15% harvest was mandated. A 15% exploitation rate of the projected 2.6 million pound population, set the harvest guideline at approximately 400,000 pounds.

Other important regulations for the summer commercial fishery include:

1) A fishing season from August 1 to September 3 or until closed by emergency order. These dates afford protection to soft shell and breeding crabs and are also timed to occur prior to severe winter weather.

2) A minimum size of 4 3/4 inches (121mm.) for males. This is for the purpose of allowing males to breed for 1 to 2 years prior to exposure to commercial harvest, although the size at which male crab reach sexual maturity has not been verified by any specific study in the area.

occurred in 1979 and 1981. During each of these years approximately 35 vessels made 34,000 pot lifts. The crab catch per pot steadily declined from a high of 64 in 1978 to 6 in 1982 as a result of declining crab abundance. Average weight of crab ranged from 2.7 to 3.0 pounds during 1977-1979 and increased to 3.6-3.7 pounds in 1980-1982 as the population declined due to lack of recruitment and older postrecruit crab became proportionately more abundant. Since 1983, recruit crab have dominated the fishery as the population has begun to recover and older postrecruit crab have passed through the fishery.

A winter commercial crab season from January 1 through April 30 is also provided for in the regulations. Local fishermen participate in this very limited fishery and operate pots and handlines through the ice. Fishing effort, which usually occurs within 5 miles of Nome, is greatly influenced by ice conditions and the abundance of crab in near-shore waters. The 1984 harvest of 856 crab was taken by 8 fishermen. The largest recorded catch and effort occurred in 1978 when 9,625 crab was landed by 37 fishermen (Appendix Table 31).

Subsistence Fishery

Red king crab are utilized for subsistence purposes by Norton Sound residents mainly during the winter (December-April). Fishing occurs through holes or cracks in the ice with the use of handlines and pots. In order to document trends in the subsistence harvest, the Board of Fisheries enacted a regulation in 1977 requiring subsistence fishermen in Norton Sound to obtain a permit prior to fishing and record daily effort and catches on these permits. A catch of 12,506 crab was reported during the 1977-1978 winter season (Appendix Table 31). Catches were at substantially reduced levels during the 1978-1979 through 1981-1982 winter season. Effort was low during this period which was probably the result of poor ice conditions and low abundance of crab in nearshore waters.

The lack of success in the winter crab fishery has been attributed to a declining crab population caused by removal of crab by the summer commercial fishery, low recruitment, poor ice conditions and changes in the nearshore distribution of crab during the winter. All

population first began, the population was mainly composed of sublegal and recruit crab (Figure 11). The legal male crab population peaked in 1978 with an estimate of 11 million pounds. During the preceding 4 years, recruitment into the legal male population was very small and the population was composed predominantly of postrecruit crab. Due to low recruitment and commercial removals from the fishery, the legal male population declined to a record low of 1.3 million pounds in 1982. Beginning in 1981 sublegal crab began to increase and by 1983 recruitment into the legal male population also began to increase. The 1984 population was similar to the 1976 population in that it was composed of mainly sublegal and recruit crab, however, the 1984 population had considerably fewer crab than the 1976 population.

Although no large vessel research was conducted in 1984, data on stock status was collected during the commercial fishery by onboard department personnel. Of 963 crab sampled from commercial catches, 55% were recruits and the remainder were postrecruits (Figure 11). The preseason population estimate of 2.6 million pounds projected 58% recruitment. This close agreement indicates that the population estimate was fairly accurate.

Egg samples were taken from 79 females during the 1984 fishery and checked for fertilization and development. During the 1983 fishery 98 egg samples were checked and all eggs were between 2 and 3 months old. Eggs taken during 1984 indicated molting and mating had been delayed when compared to 1983. Eleven of the 79 crab sampled had soft shells with 30% of the total sample having eggs less than 1 month old. One egg sample had not undergone cell division, 57% of the eggs sampled were between 1 and 2 months old, with the remaining 11% between 2 and 3 months old. This data would put peak mating at early June, later than the 1983 expected peak of mid May. Blue king crab usually occur only rarely in Norton Sound, however in 1984 twenty-one blue crab were sampled for egg development. Eighty one percent of the egg clutches sampled were found to be 2 months old. Fifteen percent had only empty egg cases, with one sample (5%) having eyed eggs that were ready to hatch. This data suggests that blue king crab mating occurs at a date similar to red king crab mating.

females in this size group, found only 25% to be barren. General comments from subsistence fishermen also indicated that barrenness was not as noticeable as it had been the previous winter.

Outlook for 1985

Since no large vessel research has been done since 1982, the 1985 population size cannot be estimated with confidence. However, some general observations about the legal male population size can be made. The estimated 1984 population of 2.6 million pounds was reduced by approximately 400,000 pounds through commercial harvest. Since nearly 80% of the catch was composed of recruits and postrecruit ones, a large reduction in the legal size population due to natural mortality is not expected. If the 1984 population estimate was accurate and no major losses of crab due to disease or other factors occur, a minimum of 2.2 million pounds of legal crab should be available for the 1985 season.

Predicting the amount of crab that will recruit into the fishery in 1985 is very difficult without current research data. Looking back to the most recent research conducted in Norton Sound, crab between 77-89 mm captured on the September 1982 NMFS trawl survey should recruit into the fishery during 1985. A total of 10% of the population sampled in 1982 fell into this category. By contrast, 22% of the population sampled by the 1982 NMFS trawl was in the age class that would recruit into the 1984 fishery, or approximately 1.25 million pounds of recruitment into the 1984 population. Therefore, fewer recruits are expected in 1985 than in 1984.

Because recent large vessel research assessment has not been conducted, the 1985 outlook is intended only as a preliminary estimate as to the possible population size. At this time the estimate is 2-3 million pounds of legal crab at the start of the 1985 fishery. A population of this size would allow a harvest of between 300,000 to 450,000 pounds. The 1985 "outlook" will be further refined based on the results from large vessel research which should be completed by early July 1985.

Table 18. Winter subsistence red king crab catches and effort by gear type, Norton Sound, 1984.

Gear type	# Fishermen	# Males Caught	# Males Kept	# Females Caught	# Females Kept	Total Crab Captured	Total Crab Kept	Average 1/ Harvest/fm
Pots	83	11,474	8,501	1,413	228	12,887	8,729	105
Handlines	44	1,281	1,197	170	62	1,451	1,259	29
Both	12	1,280	1,072	110	42	1,390	1,114	93
Unknown	4	180	118	15	0	195	118	29
Totals	143	14,215	10,888	1,708	332	15,923	11,220	78

1/ Harvest refers to crab that are kept.

Appendix Table 30. Commercial harvest of red king crabs from Norton Sound, summer fishery, 1977-1984. 1/

Year	Land-ings	Fishing Vessels	Crabs Processed Number	Crabs Processed Pounds	Deadloss Number	Deadloss Pounds	Total Harvest Number	Total Harvest Pounds	Pot Lifts	Crab/Pot	Avg. Wt.	Ex-vessel Price
1977	13	7	116,162	305,639	79,715	212,148	195,877	517,787	5,457	36	2.7	0.75
1978	54	8	656,887	1,996,936	33,523	95,025	690,410	2,091,961	10,817	64	3.0	0.95
1979	76	34	819,115	2,503,998	151,847	427,674	970,962	2,931,672	34,773	28	3.0	0.75
1980	50	9	329,778	1,186,596	0	0	329,778	1,186,596	11,199	29	3.6	0.75
1981	108	36	376,228	1,378,702	85	312	376,313	1,379,014	33,745	11	3.7	0.85
1982	33	11	57,565	202,547	6,384	26,374	63,949	228,921	11,230	6	3.6	2.00
1983	26	23	132,205	368,032	48	134	132,157	367,898	11,195	12	2.8	1.50
1984	21	8	139,695	387,248	64	179	139,759	387,427	9,706	14	2.8	1.02
All	381	--	2,627,635	8,329,698	271,666	761,846	2,899,253	9,091,410	128,122	23	3.2	--

- 1/ Fishery in 1977 occurred during July and August.
 Fishery in 1978 occurred during August and September.
 Fishery in 1979 occurred during last half of July.
 Fishery in 1980 occurred during last half of July.
 Fishery in 1981 occurred July 15-August 22.
 Fishery in 1982 occurred August 9-September 1.
 Fishery in 1983 occurred August 1-August 4.
 Fishery in 1984 occurred August 1-August 15.

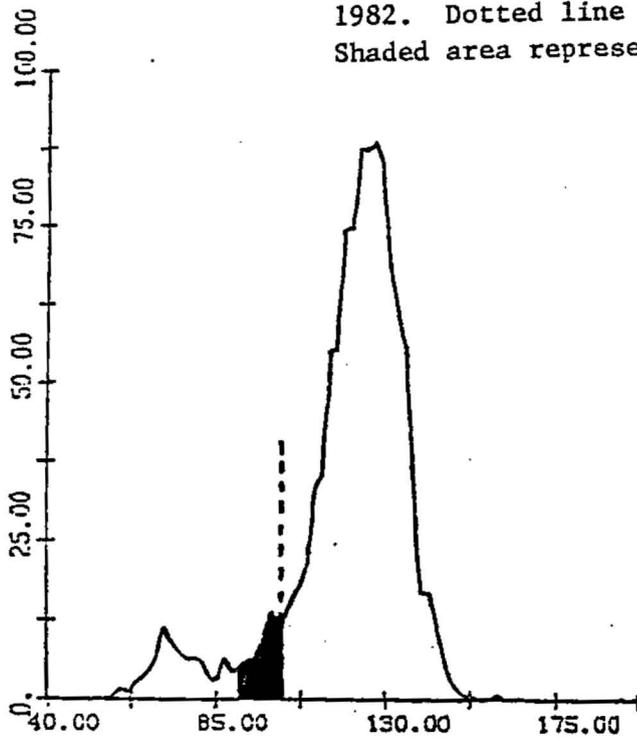
Appendix Table 32. Catch of red king crabs in Norton Sound during research surveys and resulting population estimates, 1976-1984.

King Crab Survey					# Crabs Captured 1/			Avg. Legal Crab per Pot	Population Estimates		Commercial Harvest	
Date	Days	Agency	Vessel	Method	Sub-legal Males	Legal Males	Fe-males		Legal Males	Pounds	Pounds	Weight
1976 9/2-9/5 9/16-10/7	13	NMFS	Miller-Freeman	Trawling 158 tows	768	555 ^{2/}	180	--	3,119,800	8,111,480	None	--
1979 7/26-8/5	11	NMFS	Miller-Freeman	Trawling 71 tows	46	194 ^{3/}	40	--	837,241	2,511,723 ^{5/}	2,931,672	3.0
1982 9/5-9/11	7	NMFS	Miller-Freeman	Trawling 50 tows	322	107 ^{4/}	265	--	970,646	2,620,744 ^{6/7/}	228,921	3.6
1980 7/4-7/14	11	ADF&G	Altair	Pots-397	443	3,290 ^{8/}	158	8	1,900,000	6,600,000 ^{9/10/}	1,186,596	11/ 3.4
1981 6/28-7/14	17	ADF&G	Altair	Pots-718	4,097	3,415	1,933	5	1,285,195	4,755,221	1,379,014	3.7
1982 7/6-7/20	16	ADF&G	Aleutian #1	Pots-689	5,019	2,001	424	3	353,273	1,271,783	228,921	3.6

- 1/ Number of crab captured on ADF&G surveys represents data standardized for a 24-hour soak period. these data are edited and finalized.
- 2/ Legal males include crab of 106 mm and greater carapace length.
- 3/ Legal males include crab of 105 mm and greater carapace length.
- 4/ Legal males include crab of 103 mm and greater carapace length. ADF&G research has shown 103 mm is the point where over 50% of the crab that length are of legal width.
- 5/ Estimate of crab immediately after the 1979 summer commercial fishery.
- 6/ Estimate of crab immediately after the 1982 summer commercial fishery. The molt was in progress during the survey so this estimate also includes some recruitment as well as the remaining legal crab.
- 7/ The poundage for the 970,646 estimated legal crab was derived by comparing the 1982 research average legal crab length of 113 mm to the 1977 commercial fishery which had a similar average length of 115 mm and an average weight of 2.7 pounds.
- 8/ Legal male crab captured on ADF&G research surveys are crab with carapace width equal to or greater than 4 3/4 inches regardless of length.
- 9/ ADF&G estimates are calculated using the Peterson mark and recapture methods. Estimates are for legal male crab prior to the summer commercial fishery.
- 10/ The 1980 estimate has been revised from the original estimate of 13.4 million pounds. The original estimate was inaccurate due to inadequate recovery of tagged crab.
- 11/ Obtained from actual samples taken aboard the catcher/processor, BILLIKIN.

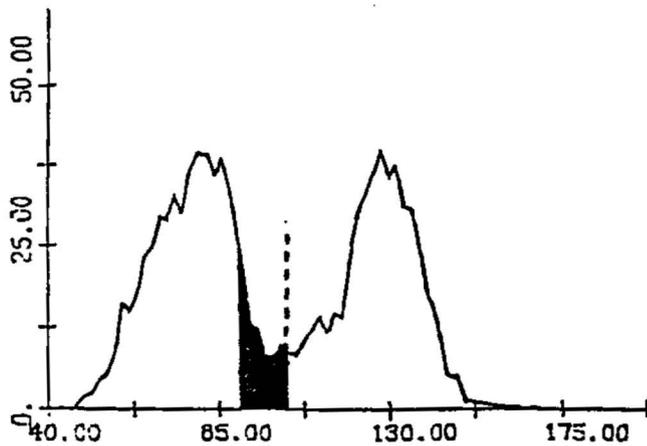
Figure 12. Size structure of the male red king crab population, Norton Sound as determined by ADF&G pot survey, 1980-1982. Dotted line represents minimum legal size. Shaded area represents next year recruitment.

NO. OF MALE KING CRAB CAPTURED PER 100 POTS



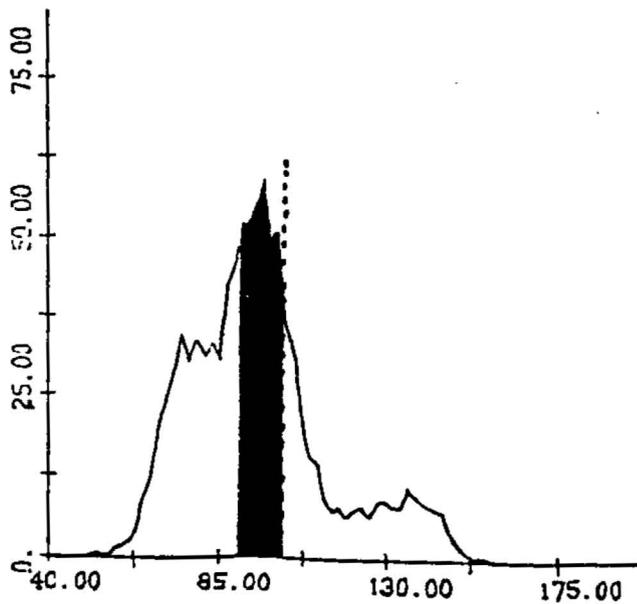
1980

NUMBER OF CRAB = 4669
NUMBER OF POTS = 397



1981

NUMBER OF CRAB = 7512
NUMBER OF POTS = 718



1982

NUMBER OF CRAB = 7016
NUMBER OF POTS = 689

CARAPACE LENGTH (MM) -117-

Section 4 - MISCELLANEOUS SPECIES

Introduction

Several species other than salmon, crab and herring are utilized for commercial and subsistence purposes in the Norton Sound, Port Clarence and Kotzebue Districts. Primary species include inconnu or "sheefish" (Stenodus leucichthys), whitefish (Coregonus sp., Prosopium sp.), Arctic char (Salvelinus alpinus) and saffron cod (Eleginus gracilis).

The fish are taken by set gillnets, beach seines, "jigging" through the ice and rod and reel. Subsistence catches taken during the summer months are normally sun-dried, while winter catches are stored frozen. Fish are utilized both for human consumption and for dog feed. Fish taken for commercial purposes are mainly sold locally, although some are shipped from the area.

Subsistence harvest of most species is not limited by regulation. Commercial harvest may be prohibited in some freshwater areas, but limited commercial endeavors are allowed in many areas under terms of a permit.

Inconnu (Sheefish)

The distribution of Inconnu includes the Kobuk-Selawik River drainages, and Hotham Inlet of Kotzebue Sound and some Norton Sound drainages, but the largest populations and harvests occur within the former area (Figure 14). In the Kotzebue Sound area, adult fish migrate to upriver spawning areas after ice break-up and to wintering areas within the Hotham Inlet-Selawik Lake area during October-November. Although inconnu are capable of consecutive spawning, most fish spawn every two to three years. Inconnu mature slowly with males reaching maturity at 5-7 years of age and females at 7-11 years.

The inconnu's spawning and overwintering migration behavior makes them available for harvest by the various fisheries throughout their life cycle, and increases their vulnerability to overharvest. In addition, the inconnu's slow maturation rate increases the time required to restore depleted populations.

During the 1960's, age, sex and length data indicated stocks were being overharvested by the commercial and subsistence

household interviews in other villages along the Kobuk and Selawik Rivers were not possible. However, mail-in survey calendars were distributed to most known active subsistence fishermen in the Kotzebue district. Only three calendars were returned so harvest information is incomplete. Reported 1984 summer harvest figures of inconnu, by village, are presented in Table 19. Residents of Shungnak and Ambler both reported a high abundance of inconnu in the upper Kobuk River this summer, but wet weather and high water hampered efforts to harvest the fish and resultant catches were about average (Appendix Table 35). The total reported summer catch, in the Kotzebue district, of 2,803 inconnu should be regarded as a minimum harvest only.

Escapement

In recent years aerial surveys have been conducted on key inconnu spawning areas incidental to the effort of enumerating salmon. These surveys have primarily been conducted along the upper Kobuk River in September. Survey conditions historically result in either very few or no inconnu being observed. During these surveys, species identification has been a problem in some years. A total of 250 inconnu were counted in September of 1981 in the Kobuk River. None were seen at all in 1982, primarily because of marginal survey conditions. During September of 1983, a total of 1,009 inconnu were counted. In surveys conducted in September of 1984, viewing conditions were unusually excellent and salmon and inconnu were easily distinguished. A total of 2,604 inconnu were counted in the upper Kobuk River. Escapement counts throughout the period 1980 through 1983 were probably low because of poor survey conditions, inexperienced observers, and a survey date that targets for spawning chum salmon instead of inconnu. Historical escapement data is presented in Appendix Table 36. Incomplete escapement and catch data provide little basis for assessing the current population status of inconnu in the Kotzebue district.

Table 19. Village subsistence inconnu catches,
Kotzebue District, 1983-84.

Village	May 1983 through April 1984 1/		May 1984 through September 1984 2/	
	# Fishermen Interviewed	Reported Inconnu Harvest	# Fishermen Interviewed	Reported Inconnu Harvest
Kobuk	1	23	0	--
Shungnak	14	449	14	1,389
Ambler	2	112	14	1,395
Kiana	1	15	0	--
Noorvik	2	24	0	--
Selawik	0	--	0	--
Kotzebue	7	141	2	19
District Totals	27	764	30	2,803

1/ Due to budgetary constraints, winter inconnu catches were not documented. These figures represent only fish reported caught during the summer of 1983.

2/ Fishery still in progress. Figures reflect reported catches made during open water months only. Reported winter catches will be documented in the 1985 Annual Management Report.

Appendix Table 34. Winter commercial inconnu harvest statistics, Kotzebue, 1966-1984. 1/

Year	Number of Fishermen	Number of Fish	Pounds Total	Avg.	Price (Per Pound)
1966-67	2/	4,000	26,000	6.5	1.30 3/
1967-68	10	792	4,752	6.0	.22
1968-69	17	2,340	15,209	6.5	.25
1969-70	2/	2,206	1/	1/	.14
1970-71	4	73	720	9.7	1.30 3/
1971-72	5	455	23,201	6.4	.16
1972-73	11	2,322	15,604	7.3	.20
1973-74	6	2/	6,265	5.8	.30
1974-75	2/	2/	24,161	9.5	.30
1975-76	14	2,633	19,484	7.4	.30
1976-77	2	566	5,004	9.0	.30
1977-78	11	2,879	26,200	9.8	.40
1978-79 4/					
1979-80	4	1,175	8,225	7.0	.50
1980-81	1	278	1,836	6.6	.75
1981-82	11	2,629 5/	17,376	2/	.75
1982-83	8	1,424	13,395	9.4	.50
1983-84	5	927 6/	10,403	11.2	.55

1/ Data is not exact: e.g. in some instances total catch poundages were determined from average weight and catch data. Similarly, various price/pound figures were determined from price/fish and average weight data.

2/ Data unavailable.

3/ Price/fish.

4/ No reported commercial catches.

5/ Estimate based on historical average weight.

6/ Number of fish not always reported. Estimates were made based on average weight from reported sale which documented the number of fish.

Appendix Table 36. Annual aerial survey counts of inconnu in the Kobuk and Selawik Rivers, 1966-1984.

Date	Kobuk River	Selawik River	Total
9/5/66	1,200		1,200
9/22/67	1,025		4,359
9/14/68	4,973	1,234	6,207
9/10/69	3,654		3,654
9/5/70	3,220		3,220
8/30/71	8,166	1,196	8,166
8/22/72	1/	3/	
1973	2/		
8/21/74	1/		
8/24/75	1/		
9/2/76	73		73
1978	2/		
9/12/79	2,824		2,824
9/11/80	1,772		1,772
9/15/81	250 4/		250
1982	1/		1/
9/19/83	1,009 4/		1,009
9/05/84	2,604		2,604

1/ No fish reported.

2/ Not surveyed.

3/ Not surveyed since 1971.

4/ Probably more inconnu than listed; species identification problems.

Since the price paid for char has always been relatively low, (Appendix Table 37) and it is highly prized as a food fish, many commercial fishermen do not sell the char they catch. Consequently, commercial harvest figures presented (Appendix Table 37) do not reflect the actual catch prior to 1983. In 1983 and again in 1984, Department personnel conducted dockside interviews with salmon fishermen delivering fish during all salmon fishing periods occurring after August 15. In 1984, a total of 20 fishermen were interviewed during the last 2 salmon openings of the 1984 season, on August 16 through 18 and again on August 20 through 22. The average number of char that were kept for personal use was computed for each delivery based on fishermen interviews. An estimate of the number of char kept for the entire fishing period was computed by multiplying the average char kept/delivery by the number of deliveries in the district during that period. The total estimated incidental catch during the 1984 Kotzebue commercial salmon fishery (including those sold) was 1,090 char (Table 20). The estimate of total char caught in 1984 is somewhat higher than in 1983 (Appendix Table 37) but still lower than normal when compared with historic sales, which do not account for char not sold.

Subsistence Fishery

Arctic char are taken for subsistence purposes by beach seine, gillnet or "jigging". They are normally caught in the early spring and late fall during migration to and from ocean waters. They are dried or frozen and used for human consumption, dog food or trapping bait.

Most villagers in the Norton Sound district report incidental catches of char in their subsistence salmon nets. However, the bulk of the catch is taken by seining in the late fall, after Department subsistence surveys have been completed, making it difficult to estimate the total subsistence catch in the Norton Sound district.

In the Kotzebue District, the largest catches of arctic char are the result of beach seining efforts by residents of Noatak and Kivalina in the late fall. Overwintering char are harvested throughout the winter by hook and line through the ice and by seine in open water areas of the Wulik, Kivalina and Noatak Rivers.

Although winter catches have not been documented, the summer

Table 20. Period incidental Arctic Char catches in the Kotzebue District commercial salmon fishery, 1984.

Dates	# Char Delivered	2/	Estimated Unsold Catch 1/	Total Catch
7/9-8/15	0		0	0
8/16-18	0		270	270
8/20-22	347		473	820
Season Totals	347		743	1090

1/ Estimate based on interviews with fishermen.

2/ Limited market.

Appendix Table 37. Arctic Char harvested incidentally during the commercial salmon fishery, Kotzebue District, 1966-1984.

Year	# of Fish Sold	Estimated Total Catch 8/	Pounds Sold 5/	Average Weight lbs.	Average Price/lb.
1966	3,325			7-10	.55 7/
1967	367		2,606	7.1	.11
1968	3,181		21,949	6.9	.14
1969	1,089 1/		4/	4/	2.84 7/
1970	2,095		4/	4/	4/
1971	3,828 2/		23,353	6.4	.16
1972	7,746		56,545	7.3	.17
1973	640		4,608	7.2	.16
1974	2,605 3/		20,580	7.9	.16
	4/		4/	4/	4/
1976	4/		4/	4/	4/
1977	4/		4/	4/	4/
1978	1,229		9,094	7.4	.15
1979	2,523		12,523	5.0	.25
1980	3,049		17,015	5.6	.20
1981	3 6/		16	5.6	.17
1982	3,447		23,648	6.9	.20
1983	190 6/	845	1,108	5.8	.20
1984	347 6/	1,090	2,104	6.1	.25

1/ Includes 269 taken by permit.

2/ Includes 179 taken by permit

3/ Includes 234 taken during commercial inconnu fishery.

4/ No catch and/or poundage reported.

Some data extrapolated from average reported weight.

6, Limited char market; many fish used at home or dumped.

7/ Price per fish.

8/ Estimate includes fish caught but not sold based on interview of fishermen.

Appendix Table 39. Arctic Char aerial survey counts,
Kotzebue District, 1968-84.

Year	Noatak River Drainage Index Streams ^{1/}	Wulik River ^{2/}	Kivalina River ^{2/}
1968		90,236	27,640
1969 ^{2/}	21,000 ^{3/}	297,257	
1976		68,300	12,600
1977 ^{4/}			
1978 ^{4/}			
1979 ^{5/}		55,030	15,744
1980	45,185 ^{3/}	113,553 ^{5/}	36,692 ^{5/}
1981 ^{5/}	5,873	101,800	45,000
1982 ^{5/}	6,088	65,581	10,932
1983 ^{5/}	4,144 ^{3/}		
		4/	4/
1984	7,444	30,924	5,474

1/ Includes summer spawner count on the Kelly and Kugururok Rivers, tributaries of the Noatak, conducted in July.

2/ Overwintering char counts conducted in September.

3/ Incomplete survey.

4/ Poor weather hampered/prevented survey.

5/ Sport Fish Division survey.

a maximum of 2,500 pounds of whitefish from the Kuzitrin River. One delivery of 52 fish for 210 pounds (\$.65/lb.) was reported on this permit.

In the Kotzebue district, a permit to harvest up to 5,000 pounds of whitefish was issued to the city of Selawik cooperative whitefish project in 1984. Two thousand four hundred ninety six pounds have been reported sold, mostly as a dried product, during the Kotzebue Trade Fair in July. A permit was issued in the fall of 1984 to a resident of Noorvik allowing a harvest of up to 5,000 pounds of whitefish in the lower Kobuk River during the summer of 1985. The cities of Selawik and Kiana both have been awarded grants to conduct market or commercial harvest feasibility studies of whitefish in their respective localities. These studies and their conclusions could result in an increased number of proposals to commercially harvest whitefish.

Subsistence Fishery

Whitefish have been taken mainly by beach seine or set gillnets. Catches are usually dried and used for human consumption or dog food. In some areas fish are "gutted" and dried early in the summer, while later in the summer the fish are filleted and dried with the eggs and viscera intact.

Subsistence catch enumeration is difficult since fishermen do not count fish individually, but by "tubs", "bags", "strings" or any other estimators of gross abundance. Additionally, many fish have been dried and consumed or stored in caches prior to the survey period. Reported subsistence harvests are the result of a limited and sporadic survey effort and should be regarded as minimum figures and not comparable from year to year. Recent and historical subsistence harvest figures for the Kotzebue district are presented in Table 22 by village and Appendix Table 40 by year.

Escapement

Whitefish escapements have not been monitored in the past, but there have been no indications from limited Department observations or fishermen interviews of declining populations.

Appendix Table 40. Subsistence whitefish catch and effort data, Kotzebue District, 1970-1984. 1/

Year	Fishermen Interviewed	Number of Fish
1970		58,165
1971		36,012
1974-1976	2/	2/
1977		30,810
1978		77,474
1979	123	43,653
1980	67	49,106
1981	71	37,746
1982	2/	2/
1983	47	16,389
1984	79	28,614

- 1/ Data unavailable prior to 1970. Systematic whitefish catch surveys have never been conducted in the area. This information was collected incidentally with late summer salmon surveys and probably represents only a small fraction of the catch made on a year round basis.
- 2/ Data unavailable.

Miscellaneous Finfish Species

Other finfish species taken for subsistence in the Norton Sound-Port Clarence-Kotzebue area include: rainbow smelt (boreal smelt), capelin, northern pike, starry flounders, yellow fin sole, arctic flounder, Alaska plaice, grayling, and burbot.

Subsistence utilization of these species has been documented although effort and catch vary widely in scale and importance with locality. Some of these species are important to the subsistence community in certain localities during specific seasons of the year.

Until 1984, sale of any of these species had never been documented in this area, although unreported sales have occurred. The City of Selawik Cooperative Whitefish Project was issued a permit allowing a harvest and sale of up to 1,000 pounds each of burbot and pike as an incidental part of their commercial harvest of whitefish. A total of 1,232 pounds of pike were reported sold locally as dried fish. An amendment to the existing permit was granted allowing up to 1,332 pounds of pike to be harvested so a shipment of an additional 100 pounds could be allowed for a frozen fish market test. No sales of burbot from the Selawik area have been reported. A permit was issued in the fall of 1984 to an individual allowing the harvest of up to 3,000 pounds of burbot, in the lower Noatak River, for the winter of 1984-85. The proposed harvest season is still in progress. No sales of burbot from this area have been reported as yet.

There is little information available on the population status and dynamics of many of these species, but there have been no evidence based on limited Department observations and interviews with fishermen, that any of these species are declining in numbers.

Addendum 2. Studies conducted within the Norton Sound-Port
Clarence-Kotzebue Districts, 1984.

1. Kwiniuk River Salmon Counting Tower

- a) Location:
About five miles upstream from the mouth of the Kwiniuk River in Norton Sound.
- b) Objectives:
Determine daily and seasonal timing and magnitude of chum and pink salmon runs. Determine age, sex and size of chinook and chum salmon of the commercial harvest at buying facilities at Moses Point.
- c) Results:
An unexpanded total of 736 chinook, and an expanded total of 736,544 pink and 54,043 chum salmon was counted past the tower. Both chinook and pink escapements were the largest and the chum escapement was the third largest recorded.

2. Unalakleet Salmon Studies

- a) Location:
Unalakleet River and North River
- b) Objectives:
 - 1) To maintain an index of salmon migration up the Unalakleet River through the use of gillnets.
 - 2) To re-establish a counting tower on the North River.
 - 3) Test the feasibility of a sonar counter in a location eleven miles upstream.
- c) Results:
 - 1) The chinook salmon run peaked on July 7 and 8, coho salmon on August 3, pink salmon on July 13 and chum salmon on July 6. The predominant age class in the commercial catch by the Gilbert-Rich aging method, for each species was: king salmon 6-2, chum salmon 4-1, and coho salmon 4-3.
 - 2) An expanded total of 2,844 chinook, 316,073 pink and 2,903 chum salmon were counted past the tower. Both the chinook and pink salmon counts are considerably larger than the counts recorded from 1972-74.

6. **Nearshore Winter King Crab Tagging Study**
 - a) **Location:**
Ocean waters of Norton Sound 1 to 2.5 miles south of Nome.
 - b) **Objectives:**
To observe the abundance and distribution of King crab in nearshore Nome waters. To study migration and estimate the number of crabs captured more than once. Also to evaluate the effectiveness of the "15 mile summer commercial crab closure" in protecting inshore crab; to obtain basic life history data.
 - c) **Results:**
A total of 70 pots were pulled, capturing 1,677 male and 78 female king crab. Of the 1,677 male crab, 447 were tagged and released.

7. **Herring Test Fishing**
 - a) **Location:**
Norton Sound ocean waters; camps located at Klikitarik, Cape Denbigh and Unalakleet.
 - b) **Objectives:**
To determine age class composition of the Norton Sound herring run through test fishing with variable mesh gillnets. Also, spawning areas were mapped along with the monitoring of the spawn-on-kelp fishery.
 - c) **Results:**
Gillnets were operated from June 6 through July 1. Scale analysis has been completed and the results are listed in Figure 8.

8. **Squirrel River Salmon Counting Tower**
 - a) **Location:**
On the lower Squirrel River, a tributary of the Kobuk River, about 30 miles east of Kotzebue.
 - b) **Objectives:**
Determine daily and seasonal timing and magnitude of chum and pink salmon runs in this stream.
 - c) **Results:**
An unexpanded total of 2 chinook, and an expanded total of 954 pink and 1,038 chum salmon was counted past the tower. Unusually rainy weather, causing high and turbid water conditions, forced an early termination of the project.

Addendum 3. Emergency orders during 1984.

Emergency Order Number Norton Sound	Effective Date	Action Taken	Comments
3-Z-05-84	June 25 6:00 P.M. A.D.T.	Opened salmon subdistricts 2,3, and 4 to two 48 hour periods per week. Opened subdistricts 5 and 6 for a 24 hour commercial test opening. Rescinded E.O. 3-Z-03-84.	Information from the Department counting tower on Kwiniuk River in the Moses Point subdistrict indicated that the salmon run was underway in the Northern Norton Sound. Therefore, the Golovin, Moses Point and Norton Bay subdistricts were put on the normal commercial fishing schedule of two 48 hour periods per week. The king salmon run was late in Shaktoolik and Unalakleet due to the presence of ice. Department test nets in the Unalakleet River had begun catching king salmon, indicating the run was beginning. These two subdistricts were opened for a 24 hour period to test run timing and abundance.
3-Z-06-84	June 28 6:00 P.M. A.D.T.	Established two 24 hour commercial salmon fishing periods in the Shaktoolik (s.d. 5) and Unalakleet (s.d. 6) subdistricts. Rescinded E.O. 3-Z-05-84.	Although the initial test opening indicated salmon were present in sufficient numbers to allow further commercial harvest, Department test nets and subsistence fishermen reports indicated that the run was not completely underway. To further assess run strength, timing and fishing effort without overharvesting the salmon stocks, the Shaktoolik and Unalakleet subdistricts were put on a 2 day a week fishing schedule until further notice.
3-Z-07-84	July 2 6:00 P.M. A.D.T.	Closed Nome subdistrict waters west of Cape Nome to commercial salmon fishing.	During the past two seasons Nome subdistrict streams had experienced poor chum salmon escapements. The Nome and Snake Rivers receive very large subsistence fishing effort. To lessen the impact on chum escapement and protect the subsistence priority use of the resource, commercial salmon fishing was limited to waters from Cape Nome to Topkok Head.
3-Z-08-84	July 2 6:00 P.M. A.D.T.	Opened the Nome subdistrict to commercial salmon fishing for two 24 hour periods per week. Rescinded E.O. 3-Z-06-84.	Several restrictions were made on the Nome commercial salmon fishery for 1984 as directed by the Alaska Board of Fisheries. These directives were to insure that spawning and subsistence requirements were met. Delaying the season opening date until July 2 was an attempt to allow escapement to get underway before allowing a commercial harvest to begin.

Addendum 3. Emergency orders during 1984.

Emergency Order Number Norton Sound	Effective Date	Action Taken	Comments
3-Z-14-84	July 13 6:00 P.M. A.D.T.	Increased commercial salmon fishing time in the Nome subdistrict to two 48 hour periods per week. Rescinded E.O. 3-Z-12-84.	Department helicopter, boat and foot surveys of Nome subdistrict streams had documented average chum salmon escapement in the Nome, Eldorado and Flambeau Rivers. The current fishing effort was very low (3 fishermen), with a harvest of 2,000 chum salmon to date.
3-Z-15-84	August 1 6:00 P.M. A.D.T.	Returned all Norton Sound commercial salmon subdistricts to the normal fishing schedule of 2 days per week in the Nome subdistrict and 4 days per week in the Golovin, Moses Point, Norton Bay, Shaktoolik and Unalakleet subdistricts. Rescinded E.O. 3-Z-14-84.	The Shaktoolik and Unalakleet subdistricts were allowed an additional 36 hours per week during the strong pink run. The Nome, Golovin, Moses Point, and Norton Bay subdistricts were allowed increased fishing time during the chum run due to low effort. Since the pink and chum runs were largely over, as indicated by tower counts, aerial surveys and comparative catch statistics, all subdistricts were returned to the normal fishing schedule in August to prevent overharvest of silver salmon stocks.
3-Z-16-84	August 1 12:00 Noon A.D.T.	Delayed the opening of the commercial red and blue king crab fishery in the Norton Sound Section until further notice.	High winds and rough sea conditions prevented Department personnel from boarding vessels and conducting tank inspections, registrations and issuance of catch reporting requirements. In order to prevent overharvest of the king crab stocks it was critical that the fishery be monitored in an orderly and timely manner. Therefore the season was delayed until tank inspections could be conducted.
3-Z-17-84	August 1 6:00 P.M. A.D.T.	Opened the Norton Sound section red and blue king crab fishery. Rescinded E.O. 3-Z-16-84.	The opening of the king crab season in the Norton Sound section was delayed because poor weather made administering tank inspections, registration and catch reporting instructions impossible. A break in the weather made it possible to begin vessel registration at 9:00 A.M. August 1. Thus, the Norton Sound Section was opened 6:00 P.M., A.D.T., August 1.

Addendum 3. Emergency orders during 1984.

Emergency Order Number Norton Sound	Effective Date	Action Taken	Comments
3-Z-22-84	August 16 6:00 P.M. A.D.T.	Increased commercial salmon fishing time in the Nome, Moses Point, Norton Bay, Shaktoolik and Unalakleet subdistricts for the period beginning August 16. Rescinded E.O. 3-Z-20-84	Due to poor weather conditions in Norton Sound subdistricts 1,3,4,5, and 6, commercial fishermen missed portions of two periods in early to mid August. In order to compensate fishermen for lost fishing time and because the silver salmon run was at least average in strength, each subdistrict was allowed an additional 24 hours of fishing time during the period beginning August 16.
3-Z-23-84	August 23 6:00 P.M. A.D.T.	Increased commercial salmon fishing time in the Nome subdistrict. Rescinded E.O. 3-Z-22-84.	Due to poor weather conditions in the Nome subdistrict, commercial fishermen had missed 3 entire open fishing periods in August. To compensate for lost fishing time and because the silver salmon run was at least average in strength, the Nome subdistrict periods were increased from 2 days to 4 days per week until the end of the season.
3-Z-24-84	August 30 6:00 P.M. A.D.T.	Announced the Norton Sound commercial salmon season closure dates.	The Norton Sound commercial salmon fishery ends August 31 by regulation. However, to allow for the normal 48 hour period in the Nome, Golovin, Moses Point and Norton Bay subdistricts, the season was closed 6:00 P.M., September 1. Because the silver salmon run was above average in strength and had not dropped off significantly, the Shaktoolik and Unalakleet subdistricts commercial season was extended to 6:00 P.M., September 8.

Addendum 4. Norton Sound - Kotzebue Sound processors and associated data, 1984.

Commercial Operator	Product	District
Alaska Fish Producer, Inc. Box 104163 Anchorage, AK 99501 p/v Nicole N m/v Donald E m/v Lowboy m/v Pintail	Herring	Norton Sound
Alaska Herring Corporation 700 H Street, Suite 9 Anchorage, AK 99501 p/v Anyo Maru #22 p/v Hatsue Maru #38	Frozen Salmon Chum Pink	Norton Sound
All Alaskan Sfds., Inc. 2009 Minor Ave. East Seattle, WA 98102	King Crab	Norton Sound
Commercial Fishermen Box 199 Kotzebue, AK 99752	Fresh Salmon Chinook Chum Fresh Char	Kotzebue
Delta Trading & Fishing S.R. Box 5428 Wasilla, AK 99687	Fresh Salmon Chinook Chum Coho	Norton Sound
Icicle Seafoods 4019 21st. Ave. W. Seattle, WA 98199 p/v Arctic Star m/v Adventure m/v Invader m/v Judy B m/v Ocean Dawn m/v Tanie Rae m/v Trailblazer m/v Viking Queen m/v Viva Yo	Herring	Norton Sound

Addendum 4. Norton Sound - Kotzebue Sound processors and associated data, 1984. (continued)

Commercial Operator	Product	District
Seward Marine Services Box 335 Seward, AK 99664 m/v Adventure	Herring	Norton Sound
Starbright Fish, Inc. P.O. Box 2733 Kodiak, AK 99615 P/v Teddy	Herring	Norton Sound
Tenth & M Seafoods 1020 M. Street Anchorage, AK 99501	Fresh Salmon Chum Coho	Norton Sound
Trident Seafoods 653 Northwest 41st St. Seattle, Wa 98107 /v Billikin p/v Bountiful p/v Tempest m/v Amatuli m/v Columbia m/v Pacific Viking m/v San Michelle m/v Westling	Herring	
W/D Ltd. 2335 Eastlake E. Seattle, WA p/v Western Pioneer m/v Donna Marie	Herring	Norton Sound
Whitney-Fidalgo Seafoods 2360 W. Commodore Way Box 99008 Seattle, WA 98199 Munson Brothers-Kotzebue C.J. Phillips-Nome Frank Johnson-Unalakleet	Fresh Salmon Chinook Chum Coho Fresh Char Herring Spawn-on-Kelp	Norton Sound Kotzebue