

UTILIZATION OF SALMON IN THE CHUKCHI SEA  
DRAINAGE REGION OF ALASKA

1967

by

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STATUS OF COMMERCIAL AND SUBSISTENCE SALMON FISHERIES  
IN THE KOTZEBUE DISTRICT OF ALASKA

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INTRODUCTION

The purpose of this report is to discuss the utilization and importance of salmon runs in the Kotzebue District. The Kotzebue District includes all waters from Cape Prince of Wales northward to Point Hope (see Figure 1). The area north of Point Hope extending to Demarcation Point is not covered in this report since salmon are not very abundant in this region nor is there much dependence on salmon fishing for a livelihood. The most important salmon spawning streams in the Kotzebue District are those streams draining into Kotzebue Sound, especially the Noatak and Kobuk Rivers. Although the occurrence of all five species of Pacific salmon in this area have been documented, chum salmon far outrank the other species in abundance.

The quality of the water and streambed conditions of the salmon spawning streams of the Kotzebue District have remained unaffected by man-made activities such as dams, pollution, mining or logging.

A total resident population of 4,235, the majority of which are Eskimos, are located in villages along the coast and the major rivers. The local residents are directly dependent on the fish and game resources for their livelihood. The fisheries in this area are of two distinct types, commercial and subsistence. The village residents are still fairly dependent on subsistence fishing to provide a source of food for themselves and their sled dogs. Commercial salmon fishing has recently provided the local residents a means of obtaining a cash income in this area of little industrialization where employment opportunities are scarce or limited to short term construction projects and firefighting.

## SUBSISTENCE FISHING

Subsistence salmon fishing has long been an important food gathering activity for the Eskimo people of the Kotzebue area. The remnants of salmon spears and nets have been found in old village sites on the Kobuk River that date back to 1250 A.D. (Giddings, 1952). At present, subsistence fishermen use set gill nets and beach seines to catch salmon in the bays and rivers. Nearly all of the catch is consumed as dried fish. All portions of salmon are utilized, e.g., the flesh is dried and the head and viscera fed to dogs. 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 substitute protein food in place of their salmon catch, this fishery would be of considerable more value than the commercial fishery. In some years the numbers of salmon taken for subsistence in the Kotzebue Sound area exceed the commercial catch.

The available subsistence chum salmon catch data, fishing effort, and catch per unit effort is summarized for the region in Table 1. The 1957 study by Raleigh gives estimates of average annual subsistence catches for recent years prior to 1957. The methods and completeness of this survey were not fully documented. The catch estimates were obtained from interviews of a certain percentage of each village population. The interview data was then expanded to include the entire village, and possibly large errors in the estimation of total catches could have occurred.

Catches during the period 1962-1967 were obtained by the Alaska Department of Fish and Game. The catches were tabulated either by direct counts of salmon, interviews, or by the return of catch forms that were

distributed to the fishermen prior to each fishing season. Most of these villages were visited several times during each season by Department biologists to insure the completeness and accuracy of data. On the basis of observations and analysis of catch records, it was estimated that the recorded catches represented about 70 percent of the actual harvest. The catch per unit effort data from 1962-1967 in Table 1 is usually indicative of the relative size of the chum salmon runs from year to year. In 1962 a large run of chums occurred in the Kotzebue District and, accordingly, total catch and catch per fishermen were high. During the last two years the chum runs have been relatively poor and the catch per fishermen was also small.

The estimated average annual catch, both commercial and subsistence, of chum salmon in the Kotzebue Sound drainage during the 1962-1967 period was slightly less than one-half of that for the 1957 study. There is not sufficient information to determine whether this apparent decline in catch is a result of less fishing effort, fewer available salmon, errors in catch estimates or a combination of all these factors.

Although there was no fishing effort or other data available, there is some indication that the dependence on subsistence fishing has declined in this region during recent years as a result of increased welfare payments and more employment opportunities. Also motorized snow vehicles are beginning to replace sled dogs and this is expected to result in less subsistence fishing effort in the future. It is expected as the dependence on subsistence fishing declines, the regulations will be liberalized to allow a greater proportion of the chum run to be commercially harvested.

## COMMERCIAL FISHING

Commercial fishing in the Kotzebue District dates back to 1914. During the 1914-1918 period, the Midnight Sun Packing Company processed 10,130 cases (48-1 lb. cans) and 330 barrels of hard-salt salmon in the vicinity of Kotzebue (Pacific Fishermen Yearbooks, 1915-1919). The species of salmon was not mentioned in these reports, but it is assumed that chum salmon were processed. It is estimated that about 104,300 chum salmon (9.5 salmon per case and 34 fish per barrel) were harvested during this period (Table 2).

The next commercial catch, the largest in the history of this fishery, was not made until 1962 when regulations promulgated by the Alaska Department of Fish and Game resulted in a catch of nearly 130,000 chum salmon. During the period 1962-1967, commercial chum salmon catches have ranged from a high of 129,948 in 1962 to 29,400 in 1967 (Table 3). The average annual catch during this period has been 60,180 chum salmon.

All the commercial fishing effort is concentrated in the waters of Kotzebue Sound near the village of Kotzebue. Fishermen can legally operate set gill nets of up to 150 fathoms. Small open skiffs, powered by outboard motors, are used to operate the fishing gear and deliver fish to buyers.

In Table 4 the annual economic values of the commercial fishery in terms of income to fishermen, tender boat operators and plant workers, wholesale value of the pack, and State revenues are presented. A majority of the commercial fishermen and plant workers are Eskimo residents who are dependent on this fishery for a major share of their cash income.

The development of the commercial fishery during recent years has been hampered by logistic problems, high transportation costs, and the lack of existing processing facilities. Also the Eskimo fishermen had to adapt to

different fishing methods. Although the present fishery is still in its infancy, many of the problems confronting both processors and fishermen are being solved and commercial fishing can be expected to increase in economic importance to the Kotzebue Sound area during the next few years.

The method of processing the commercial catch has shifted from a floating cannery operation to shore-based dressing and cold storage facilities. The change from a canned product to a fresh-frozen product has resulted in a substantial increase in the value of the commercial catch in terms of price per fish paid to the fishermen. Kotzebue chum salmon are of excellent quality, i.e., bright color, firm flesh and high oil content, and are in great demand for the fresh-frozen market, especially by Japanese firms.

#### MANAGEMENT AND RESEARCH

The Kotzebue District chum salmon commercial fishery is managed and is the object of scientific study by the Alaska Department of Fish and Game. The primary objective of management is to allow the commercial harvest of the salmon runs on a maximum sustained yield basis after insuring that optimum escapements are realized and that sufficient numbers of salmon are available for subsistence. Biologists are able to accomplish these objectives by relaxing or restricting fishing regulations during the season based on fishery observations and statistics.

The commercial fishery is regulated by restricting the amount and type of gear, area open to fishing, and fishing time. Fishing is allowed normally for four days a week. Depending on the size of the runs and fishing conditions (e.g., storms), the days per week open to commercial fishing can be changed during the course of the season. The relative

size of the runs is determined by evaluation of comparative commercial catch per unit effort data, amount of fishing gear, aerial surveys of key spawning areas and analysis of subsistence catch data. Since the present commercial fishery has existed since only 1962, effective management of the commercial fishery is hindered by the relative lack of comparative data, such as the relationship between catch and subsequent return and prior research studies. Also, in some years reliable estimates of spawning escapements cannot be obtained due to high turbid waters. Aerial survey estimates of spawning escapements are presented in Table 5.

Special research projects include test fishing, tag and recovery, and catch sampling studies of the salmon runs. Results of these studies, which are directly applicable toward management of the fishery, yield information on abundance, timing, movements, and age-sex-size composition of Kotzebue District chum salmon. Since 1962 a total of approximately \$30,000 has been expended by the State in management and research of the Kotzebue District salmon fisheries.

#### JAPANESE SALMON FISHERY IN THE CHUKCHI SEA

In 1967, for the second year, a Japanese salmon fishery operated in the Chukchi Sea. The Chukchi Sea is excluded from treaties between Japan, Canada, and the United States; and between Japan and U.S.S.R. governing high seas salmon fisheries. In 1966 a Japanese firm initiated salmon fishing operations in the Chukchi Sea with the vessel Dairin Maru No. 8 (215 gross tons). The Dairin Maru No. 10, a larger vessel (300 gross tons), was employed in 1967. Fishing gear consisted of gill nets of unknown mesh size. During both years most of the fishing effort was conducted in the following areas: 66° - 67° North latitude and 166° - 169° West longitude.

Below is summarized the reported catches for 1966 and 1967:

<u>Year</u>	<u>Chum Salmon</u>	<u>No. of Tans</u>	<u>Catch per Tan</u>
1966	24,813	23,075	1.07
1967	24,295	21,217	1.15

In both years, best catches were made during the period late July to early August. The peak catches in the Chukchi Sea are similar to peak catches made in the Kotzebue Sound commercial fishery indicating that the high seas fishery may be catching large numbers of chum salmon bound for Kotzebue area streams. The continuation and probable expansion of the Japanese high seas salmon fishery in the Chukchi Sea poses a definite threat to the Kotzebue area chum salmon runs, particularly during years of low abundance.

## REFERENCES

- Alaska Department of Fish and Game. Annual Reports of the Arctic-Yukon-Kuskokwim Area, 1962-1967. (Mimeographed). Anchorage, Alaska.
- Anonymous. Pacific Fishermen Yearbooks, 1915-1919. San Francisco, Calif.
- Giddings, J. L., Jr. 1952. The Arctic Woodland Culture of the Kobuk River. The University Museum, University of Pennsylvania, Philadelphia, Pa.
- Pennoyer, Steven, Kenneth R. Middleton and Melvan E. Morris, Jr. 1965. Arctic-Yukon-Kuskokwim Area Salmon Fishing History. Alaska Department of Fish and Game, Informational Leaflet No. 70.
- Raleigh, Robert F. 1958. Reconnaissance of salmon fisheries between Cape Newenham and Point Hope, Alaska, 1957. U. S. Fish and Wildlife Service, Bureau of Commercial Fisheries, Western Alaska Salmon Investigations, Juneau, Alaska. (Multilithed).

FIGURE 1

KOTZEBUE DISTRICT MAP

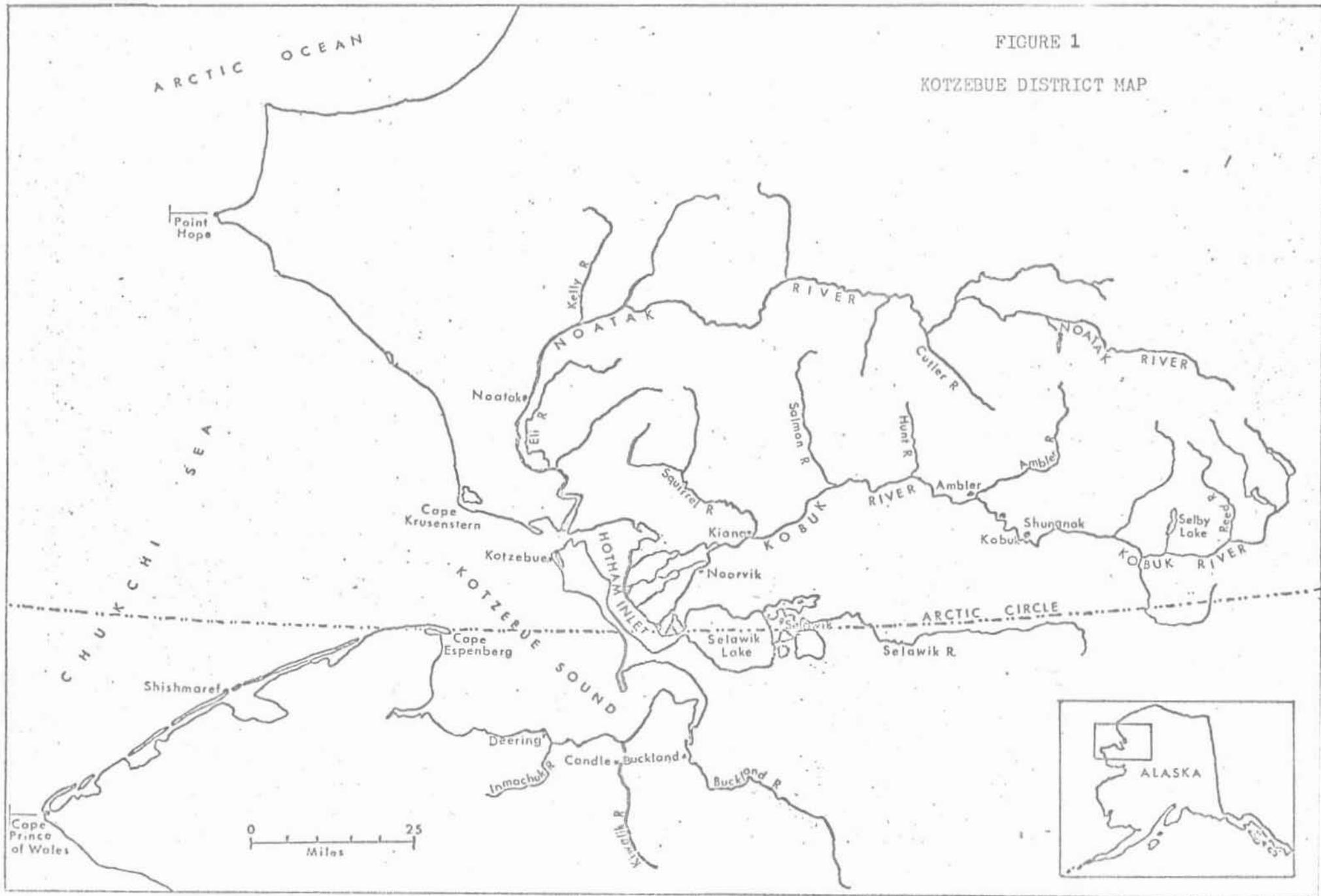


TABLE 1

COMPARATIVE KOTZEBUE DISTRICT SUBSISTENCE CHUM SALMON CATCHES,  
1962-1967

Year	Number of Fishermen Interviewed	Chum Salmon Catch	Catch Per Unit Effort
1957	<u>1/</u>	298,430 <sup>2/</sup>	<u>1/</u>
1962	81	70,283	868
1963	67	31,069	464
1964	58	29,762	513
1965	89	30,500	343
1966	121	35,588	294
1967	145	40,108	277

1/ Data not available.

2/ Estimated mean annual catches prior to 1957 (Study by Raleigh).

TABLE 2

KOTZEBUE DISTRICT COMMERCIAL  
AND SUBSISTENCE SALMON CATCHES  
1914-1967

YEAR <u>1/</u>	COMMERCIAL CATCH			SUBSISTENCE CATCH
	CHUM <u>2/</u>	OTHER <u>3/</u>	TOTAL	CHUM
1914	8,550		8,550	
1915	4,750		4,750	
1916	19,000		19,000	
1917	44,612		44,612	
1918	27,407		27,407	
-	-	-	-	-
1962	129,948	127	130,075	70,283
1963	54,445	143	54,588	31,069
1964	76,499	5	76,504	29,762
1965	40,034		40,034	30,500
1966	30,764	1	30,765	35,588
1967	29,400		29,400	40,108

1/ There was no commercial fishing during 1919-1961

2/ Catches for 1914-1918 from pack data only: numbers of chums estimated at 9.5 per case (48#) and 34 per barrel

3/ Mostly pinks but includes kings and reds

TABLE 3

COMPARATIVE KOTZEBUE DISTRICT COMMERCIAL CHUM SALMON CATCHES,  
FISHING EFFORT, AND CATCH PER UNIT EFFORT DATA, 1962-1967

Year	Number of Licensed Fishing Vessels	Chum Salmon Catch	Seasonal Catch Per Unit Effort
1962	84	129,948	1,547
1963	61	54,445	893
1964	52	76,499	1,471
1965	45	40,025	889
1966	44	30,764	699
1967	30	29,400	980

TABLE 4

DOLLAR VALUE ESTIMATES OF KOTZEBUE DISTRICT COMMERCIAL FISHERY, 1962-1967 1/

<u>YEAR</u>	<u>GROSS VALUE OF CATCH TO FISHERMEN</u>	<u>WAGES EARNED 2/</u>	<u>TOTAL INCOME TO DISTRICT</u>	<u>WHOLESALE VALUE OF PACK 3/</u>	<u>LICENSE AND TAX REVENUES TO STATE</u>
1962	\$45,500.00	\$	\$	\$304,500.00	\$11,635.00
1963	9,140.00			113,316.00	6,039.00
1964	34,660.00			158,020.00	5,279.00
1965	18,000.00			83,294.00	2,952.00
1966	25,000.00			84,630.00	2,820.00
1967	28,700	15,000.00	43,700.00	100,450.00	4,245.00

1/ Information not available for wages earned for 1962 - 1966

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

3/ Based on type of processing when fish were shipped out of the district

TABLE 5

## KOTZEBUE DISTRICT AERIAL SURVEY COUNTS OF CHUM SALMON

1962 - 1967

STREAM	1962	1963	1964	1965	1966	1967
Kobuk River	22,500	4,535	7,985	2,750	2,674	2,495
Squirrel River	16,050	2,220	8,009	7,230	1,350	3,332
Salmon River	12,936	1,535	9,353	1,500	3,957	2,116
Tutuksuk River	10,841	670	2,685		1,273	169
Hunt River	1,060	0				
Ambler River	690	0				
Shungnak River	640					95
Noatak River	168,500	1,970 <u>1/</u>	89,798	6,152 <u>1/</u>	101,640	28,620 <u>1/</u>
Kelly River	3,318	600		3,155	845	225
Eli River	<u>9,080</u>	<u>35</u>	<u>      </u>	<u>      </u>	<u>120</u>	<u>      </u>
TOTALS	245,615	11,565	117,830	20,787	111,859	37,052

1/ Survey incomplete or poor survey conditions