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1994 SALMON FISHERIES MANAGEMENT PLAN
KOTZEBUE AREA

Charles Lean
Area Management Biologist
Tracy Lingnau
Asst. Area Biologist

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Alaska Department of Fish and Game
Commercial Fisheries Management and Development Division, AYK Region
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FISHERY BACKGROUND

The Kotzebue District includes all waters from Cape Prince of Wales to Point Hope. Chum salmon are the most abundant anadromous fish within this district. However, other salmon species (chinook, pink, coho, and sockeye) occur in lesser numbers as are char and sheefish.

Subsistence Fishery

Fishing has long been an important food gathering activity for people of Kotzebue area drainages. Remnants of fishing spears have been found within the area which date back as far as 1250 A.D. The subsistence fishery is still very important to the local people. A recent study of subsistence needs in the City of Kotzebue found that the estimated 1986 chum salmon catch by the residents of the City of Kotzebue and the immediate vicinity was 35,000. The villages of Noatak, Noorvik and Shungnak harvested a combined average of 15,000 chum salmon annually over the past five years. Reported harvest figures are considered to be minimal since not all communities or fishermen were contacted. The villages of Kiana, Ambler and Kobuk have not been surveyed recently and are not included in harvest values. The estimated annual subsistence harvest of 50,000 chum salmon by Kotzebue area residents is considered a minimum estimate.

Commercial Fishery

Commercial salmon fishing in the Kotzebue District dates back to 1914, when during a 4-year period, a canned and salt packed product was processed. The current chum salmon directed, commercial fishery was initiated in 1962 and occurs in ocean waters near Kotzebue (Figure 1). Commercial fishermen operate set gill nets primarily out of open skiffs powered by outboard motors. Buyers generally fly freshly caught, iced salmon out of the district in the round.

Commercial chum salmon harvests during the past 15 years (1979-1993) have ranged from 71,071 to 677,200 fish, the 15-year average being 290,808. Fishing effort during the same period has ranged from 114 to 199 fishermen, averaging 175 fishermen. During 1993, 71,071 chum and 55 chinook salmon were harvested by 114 fishermen. The total wholesale value of the harvest was \$231,413 and ranked as the lowest value of the last 15 years. Chum salmon brought roughly one-third the recent average price.

FISHERY OUTLOOK

Status of Stocks

Chum salmon abundance fluctuates greatly between years as noted by commercial harvests and escapements (Table 1). Although relative strength of parent-year escapements play an important role in the magnitude of chum salmon returns, other factors significantly affect the success of year classes. Such factors may include fresh water mortality of salmon eggs and fry due to temperature and water level fluctuations, and harvest of Kotzebue origin salmon by foreign and domestic interception fisheries.

Enumeration surveys of the Noatak and Kobuk River systems have shown these two systems are the major salmon producers of the Kotzebue District. Noatak River bound chum salmon pass through the commercial fishery primarily during August. Kobuk River bound chum salmon are of two components: (1) stocks bound for lower Kobuk River tributaries, which pass through the commercial fishery during July, and (2) stocks bound for the upper Kobuk River, which pass through the commercial fishery during August intermixed with Noatak bound fish.

Chum salmon returning to the Kotzebue area are primarily 3, 4, and 5 year old fish. The 14 year average brood year return for 1979-1993 is 5.6% 3-year-olds, 56.0% 4-year-olds, 36.0% 5-year-olds, and 2.4% 6-year-olds. The number of fish on lower Kobuk River tributary spawning grounds peak by about August 15 while those of upper Kobuk River and Noatak River spawning grounds peak by about September 1. Salmon deposit eggs in stream gravel where egg to salmon fry development occurs through the winter. If water levels during spawning are above normal, winter freezing of eggs and fry may occur in areas dewatered during reduced winter flows, greatly increasing freshwater mortality. High spawning ground mortality may partially explain poor runs which follow good parent year escapements. Fry emerge from stream gravel primarily during May and June and out migrate to marine waters.

1994 Wild Stock Return

The outlook for the 1994 season is based on the returning age classes of the 1993 season. During the 1994 season, the four year old age component of the run is expected to be approximately one-half the long term average. The five year old component is expected to be less than one-half the long term average. The three and six year old components of the run are expected to near normal. The commercial harvest is expected to fall within the range of 70,000 to 150,000 chum salmon.

1994 Hatchery Stock Return

The Sikusuilaq hatchery brood stock is still building and is not expected to reach full production for several years. The 1994 hatchery contribution to the commercial catch is not expected to exceed 35,000 chum salmon, assuming an exploitation rate of 50% in that fishery, and an additional 7,500 are expected to be utilized in the Noatak River subsistence fishery. Another 7,500 chum may be required for 1994 brood stock, leaving a potential surplus of 20,000 salmon returning to the Noatak River in the vicinity of the hatchery. The hatchery stock is composed of the same age classes that compose the natural return but the size of each age class may vary depending on the level of hatchery production during a given parent year. The hatchery stocks are subject to the same factors the wild stock faces once the fish are released from the environs of the hatchery.

The 1994 season is the third year that the hatchery production is not projected to be fully utilized by the harvest in the commercial fishery and brood stock needs at the hatchery. During the spring 1994 Board of Fisheries meeting, a terminal harvest was approved to facilitate the harvest of the surplus hatchery stock. The terminal area is restricted to only Sikusuilaq Creek thereby addressing the concerns Noatak Village expressed concerning the disturbance of the Noatak wild stock by an in-river fishery.

MANAGEMENT OBJECTIVES AND STRATEGIES

Primary fishery management objectives are to provide adequate chum salmon escapement through the commercial fishery: (1) to ensure sustained runs by allowing adequate natural escapement, and (2) to meet subsistence harvest needs. Fishery management will be dependent on comparing period and cumulative season catch rates to prior years. Figure 2 compares the 1979-1993 average catch by period and CPUE by period. A comparison of catch rates over the history of the fishery has shown a close relationship to escapement. The comparative data base will be limited to the 1979-1993 year data to account partially for increased fleet efficiency and to encompass the range of years when similar fishing schedules were in effect, thus providing the best available basis of comparison.

Age composition of catches will be closely monitored to determine the strength of age classes in the return. Older salmon tend to migrate into freshwater first; a fact that affects catch rate as the season progresses and affects the fishery managers evaluation of the catch statistics. Weak 3 and 4 year old age classes will tend to depress mid-season catches.

Aerial surveys will be attempted beginning in early August on the Kobuk River tributaries. Aerial surveys are not a direct count or estimate of the salmon population but are used as an index for comparison with surveys both in season and in prior years. Surveys will be attempted until mid-September. Aerial surveys are usually made too late to effect present year fisheries decisions but do provide useful information in critiquing the years management decisions and help project future salmon returns.

The Noatak sonar project will become the primary management tool the Noatak River portion of the run. Escapement based management will be put into place beginning the second week of August. The use of the sonar counts on the Noatak River as a management tool will continue to be refined over the next several years. For the sonar to be successful it is critical to cover as much of a cross sectional area of the river as possible with the sonar beam. During 1994, the goal for the estimated chum salmon migration past the sonar site will be 160,000. This is the number we believe will produce an adequate escapement, an average subsistence harvest and the Noatak's contribution toward an average commercial harvest of 300,000 chum salmon.

The test fishing project will continue on the Kobuk River, in the vicinity of Kiana, to provide an inseason index of chum salmon passage there. It is hoped that within a few years this project will be considered a reliable escapement index.

The Kotzebue District fishery generally occurs on a twice weekly schedule. July fishing periods will be 24 hours in duration to protect the lower Kobuk River run from over harvest. The lower Kobuk run peaks in July and supports a major portion of the area's subsistence harvest. During August, when the Noatak River stock is dominant, fishing time has generally increased to two 36-hour periods per week or more if returns are large. Adjustments in fishing time will continue to be based on trends in commercial catch rates over a series of periods through the first week of August. During seasons with poor returns, escapement needs will be protected by (1) reducing fishing period length to 24 hours or (2) canceling blocks of two periods to be followed by two periods for reevaluation. As August progresses the Noatak escapement will be evaluated using sonar passage estimates. The Kotzebue commercial fishing fleet appears to be very effective at capturing the majority of the fish in the district during any given period.

The first open commercial fishing period of the 1994 season will begin Monday, July 11 to allow for normal period scheduling. Initial fishing periods will be from 6:00 p.m. Monday to 6:00 p.m. Tuesday and from 6:00 p.m. Thursday to 6:00 p.m. Friday. This fishing schedule will continue at least through July 19. Based on commercial catch rates, age composition, and catch per unit effort (CPUE), a decision will be made to adjust the length of periods for the next week. Through August 10, management decisions will be based primarily on

comparisons of 1994 commercial catch rates and the age class composition of the commercial catch with historic data (1979-1993). Beginning August 11 or period 10 management decisions will be increasingly dependent on the Noatak River sonar escapement estimates. The commercial fishery will be regulated to provide a level of escapement needed for an adequate spawning population.

The Department plans to hold meetings with Kotzebue fishermen as management concerns develop. Contact with the Kobuk River subsistence fishermen will also be maintained. However, the Kobuk Test Fishing Project will not be the primary index used in making management decisions.

ESCAPEMENT OBJECTIVES

Aerial survey enumerations of salmon within rivers are utilized: (1) to evaluate initial run strength while salmon are traveling to the spawning grounds, and (2) to document peak salmon abundance on the spawning grounds as an index to total escapement. These enumeration techniques are best initiated during times of low river water levels, high water clarity, and good sunlight penetration. Unfortunately, these conditions are not always available.

One of the primary fishery management strategies is to provide for minimum escapement levels within each river system. These minimum escapement levels are based on historic averages of peak spawning counts of specific index areas within major drainage. These aerial survey escapement objectives are: (1) subject to continued review, (2) intended to evaluate escapement trends between years, and (3) are not a total count of the salmon escapement. Systems which are flown annually with associated chum salmon escapement goals are as follows: Noatak River (mouth to Kelly Bar-80,000 chum), Squirrel River (entire-11,500), Salmon River (entire-7,000), Tutuksuk River (entire-2,000), and upper Kobuk River (Kobuk Village to the lower canyon-10,000). Other systems are flown as funding is available.

TABLE 1. KOTZEBUE DISTRICT CHUM FISHERY INFORMATION 1979-1993

COMMERCIAL CATCH	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Chum (in thousands)	141.6	367.3	677.2	417.8	175.8	320.2	521.4	261.4	109.5	352.9	254.6	163.3	239.9	289.2	71.1
Number of permits	181	176	187	199	189	181	189	187	160	193	165	153	143	149	114
Average chum per permit	782	2,087	3,622	2,099	930	1,769	2,759	1,398	684	1,829	1,543	1,067	1,678	1,941	623
Est. value (in thousands)	\$990	\$1,447	\$3,247	\$1,962	\$421	\$1,149	\$2,137	\$933	\$515	\$2,605	\$614	\$438	\$429	\$527	\$231

ESCAPEMENT INDECIES (in thousands)	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Noatak	19.7	164.5	116.4	20.7 _a	78.9	67.8	44.0 _a	37.2 _a	9.3 _a	45.9 _a		20.0	80.8	34.3 _a	30.2 _c
Upper Kobuk	2.0	11.5	8.6	14.7	33.7	10.6	6.2 _a	6.0 _a	8.2	13.2 _a		8.0	24.6	10.9 _a	11.3
Squirrel	1.5 _a	13.5	9.8	7.7	6.1	5.5	6.2	5.0 _a	2.7	4.8 _a		5.0	4.6	2.8	4.5
Salmon	0.7 _a	8.5	4.7	5.4 _b	1.7	1.5	2.0	2.0 _a	3.3	6.2		6.1	5.8	1.3	13.9
Tutuksuk	0.4 _a	1.2	1.1	1.3	2.6	1.1	5.1	4.3	0.2 _a	3.1		3.0	0.7	1.2	2.0

AERIAL SURVEY ESCAPEMENT GOALS

Area	Goal
Noatak River (mouth to Kelly Bar)	80,000
Upper Kobuk (Kobuk Village to Beaver Creek)	10,000
Squirrel (entire)	11,500
Salmon (entire)	7,000
Tutuksuk (entire)	2,000

_a Low escapement indecies due to poor survey conditions during peak spawning. Index achieved either under poor survey conditions (high turbid water) or before or after peak spawning.

_b Foot surveys.

_c Aerial surveys not feasible due to unfavorable weather and water conditions.