

Kotzebue District Salmon, 1986

A Report to the Alaska Board of Fisheries

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BACKGROUND

District Boundaries

The Kotzebue District includes all waters from Cape Prince of Wales north to Point Hope. All commercial fishing effort occurs in marine waters near the village of Kotzebue (Figures 1, 2, and 3). Commercial fishermen operate set gillnets of 150 fathoms in length primarily out of open skiffs powered by outboard motors.

Management Objectives and Strategies

The primary fishery management objectives were to provide adequate chum salmon escapement through the commercial fishery to ensure (1) sustained runs in future years, and (2) required subsistence harvest levels. Fishery management was dependent on comparing period and cumulative season catch rates to prior years. To a lesser extent management depends on inseason aerial survey counts of index area spawning grounds. This management technique resulted in a conservative management approach due to: (1) the absence of an inriver escapement index program as conducted in prior years, (2) the unknown effect on the commercial catch of the extended fishing boundary (statistical area 331-05), and (3) the increased fishing fleet efficiency in terms of new and improved equipment and greater fishing expertise. Run strength was assessed after each period by comparing catch data (total catch, catch per unit effort (CPUE), and cumulative CPUE) to average values for catches on approximately the same dates from the previous 7 years. The comparative data base was limited to the recent 7 year data to partially account for increased fleet efficiency and to encompass a range of weak and strong runs, thus providing a good comparative base.

The Kotzebue district fishery occurs on a twice weekly schedule. July fishing periods are usually held to 24 hours in duration to protect the Kobuk River run from overharvest. The Kobuk run is strongest in July. These fish support the area's greatest subsistence harvest. During August when the more abundant Noatak River stock is dominant, fishing time is generally increased to at least two 36 hour periods per week. Further adjustments in fishing time are made based on trends of commercial catch rates over a series of periods. The Kotzebue commercial fishing fleet appears to be very effective at capturing the majority of the fish in the district during any given period.

Status of Fishery and Stocks

Chum salmon is the target species for both the commercial and subsistence salmon fisheries. Although a noticeable increase of pink salmon has occurred over the last several years, over 99% of the total salmon harvest is comprised of chum salmon. Chinook, red and coho salmon occur in small numbers.

There was an early commercial salmon fishery during 1914-1918; the recent fishery has occurred each year since 1962. Chum salmon harvests averaged about 85,000 fish during 1962-1972, but the harvest increased to an average of 351,700 during 1973-1986 (Table 1). Chum salmon harvests during the last 14 years have fluctuated widely (from 111,000 to 677,000) which can be expected from a population which inhabits the northern extreme of the species range. Fishing effort increased drastically during the 1973-1975 period and has since stabilized at about 180-190 - # of permit holders fishermen (Table 2).

Subsistence harvests have been documented by the Department since 1962 and have ranged from 10,000 to 70,000 chum salmon. These harvest figures are considered minimum estimates since not all fishermen are contacted during household surveys. During the first 10 years of surveys (1962-1971) the average documented catch was 34,000 with an average catch per fisherman of 354 chum. During the next 10 years (1972-1981), the average documented subsistence catch dropped to 17,000 fish with the average catch per fisherman dropping to 183 chum even though the five largest runs on record occurred during this time. These data indicated that subsistence use of chum salmon had declined over this 10 year period (Table 1). Due to budgetary constraints only limited subsistence catch data has been obtained since 1983 and is not comparable to past years data.

Aerial surveys have been used to document escapements since 1962. When standardized methods are used and surveys are flown under fair to good weather and stream conditions, the resultant data is comparable from year to year and can be used to measure performance of the fishing management program. During the past 10 years escapements have varied from record levels (1973-1975) to very low levels (1980-1982). Since 1983 escapements have been at moderate levels.

SEASON SUMMARY

The 1986 Kotzebue commercial salmon harvest was 261,436 chum salmon and 101 chinook salmon with 187 ^{Separate individuals} fishermen reporting catches. Char were taken incidentally to the salmon harvest but only 5 were sold on the commercial market. By interviewing 427 commercial fishermen it was estimated that 2303 char were landed by the commercial fleet from August 14-26, the time during which

char catches are most common.

Fourteen fishing periods occurred twice weekly from July 10 to August 26 for a total of 372 hours. Although fishing was open, no buyers were available for the last fishing period of August 28 and 29. Catch rates were near the seven year average through the seventh period. # Although the age composition of the catch was composed of a much higher percentage of 5 year old fish than normal, the fishing periods were extended to 36 hours on the normal schedule on July 31. Beginning on the eighth period (August 4-5) the catches and catch rates began to rapidly decline. Usually the catch and cumulative catch rate peaks on the tenth period roughly 10 days later. To rule out the influence of weather on salmon migration and fishing, or some other short term lull in fish migration, the fishing periods were maintained at 36 hours in length through the ninth period. In keeping with the management plan distributed shortly before the season and the previous years management strategy, fishing time was then reduced to ^{two} 24 hour periods a week from period 10 (August 11) until the season closed on August 29. The average fishing period was 26.6 hours long in 1986 as compared to 36.3 hours for the 1973-1986 seasons' average.

Although the fishing schedule of two 24 hour periods a week was maintained from period 10 until the season closure, an earlier closure was considered. Following a far below average catch during period 10, the Department stated that if subsequent periods continued to decline, an early closure of the season could occur. When period 11 catches proved to be only slightly better, an announcement was made which stated that the season would close following period 12. However, a near average catch rate for this late season period coupled with new aerial survey information

indicating adequate escapement caused a reversal of this decision.

Although the 1986 commercial harvest was only slightly below the 10 year average, the value of the 1986 fishery was the third lowest in the last 10 years. Kotzebue fishermen averaged slightly less than \$5000 each and the total value of the catch was approximately \$932,600. During 1986, prices averaged \$0.41/lb for chum salmon and \$1.25 for chinook salmon. Average weights were 8.7 and 16.4 pounds for chum and chinook salmon, respectively. Four buyers operated in the Kotzebue area and all fish were flown out in the round for processing. Buyers gradually dropped out of the fishery towards the end of the season; two buyers operated during the twelfth period and only one bought fish during the thirteenth and fourteenth periods.

One half of the catch was taken in statistical area 331-01, adjacent to the Baldwin Peninsula (Table 3 and Figure 3). Over 90% of the fishermen participated in this area during at least one period of the fishing season. Seventy percent fished in area 331-02 (Sisualik), and less than half fished in area 331-03 (Noatak River mouth area). Only 18% and 13% of Kotzebue fishermen fished in areas 331-04 (Hotham Inlet) and 331-05 (northwest boundary), respectively. Sea conditions in area 331-05 can be such that only large boats fish this area on a regular basis.

The age composition (weighted by period catch) was 0.3% age 3, 18.2% age 4, 77.8% age 5 and 3.6% age 6 (Table 5). For the first time in the history of the fishery, the number of five year old fish in the catch surpassed the number of four year olds. Four year olds have dominated the catch every year prior to this year and have historically comprised 66% of the catch. Conversely,

the return of 5 year olds was three times the historical average percentage. Both the number and percentage of three year olds are the lowest in the history of the fishery. This is the second consecutive year that the fishery has experienced a record low return of three year old fish.

Escapement

Aerial surveys of index spawning streams were hindered by poor weather, but completed surveys indicated adequate escapements of chum salmon on both the Noatak and Kobuk River systems. Each major river system is divided into several index areas so that the whole river system does not need to be flown to make a comparison of escapement to previous years. On an ideal year all primary index areas of each river would be flown three times; early, August 21-31; peak, September 1-10; and late, September 11-20. By having different index times and areas the Department is able to make more meaningful comparisons of escapement during seasons similar to 1986. Only early surveys were completed on the Noatak River but peak surveys were made on the Kobuk tributaries (Table 3).

Ground surveys were conducted on the lower Noatak and Kobuk Rivers to collect information on the age, sex, and length of fish escaping to these areas. Trips to the upper Noatak and Kobuk Rivers to collect A-W-L samples were canceled because of high water levels. This year, the age composition of sampled escapements was similar to the commercial catch.

Outlook for 1987

In 1987, chum salmon will be returning from the 1981-1984 brood years, with returns from the 1983 year class dominating. The return of 6 year olds is expected to be well above the historical record returns as was the return of 4 year olds in 1985 and 5 year olds in 1986. During most years the 6 year old component of the commercial catch does not exceed 3,000 chum salmon. The number of 5 year olds returning in 1986 is the second highest in the history of the fishery. Conversely, an exceptionally poor return of 4 and 5 year olds is expected based on the return of 3 and 4 year old fish in 1986. The number of 4 year olds in the 1986 catch was the lowest since 1969; the number of 3 year olds was the lowest in the history of the fishery. In the Kotzebue area, a strong relationship exists between the number of 3 year old fish in one year and the subsequent number of 4 year old fish the next year. Similarly, there is a good relationship between 4 year old fish in one year and their 5 year old siblings returning the following year. Since 4 and 5 year old fish have historically comprised 85% of the catch in the Kotzebue fishery, the return of salmon to Kotzebue Sound in 1987 is expected to be well below average.

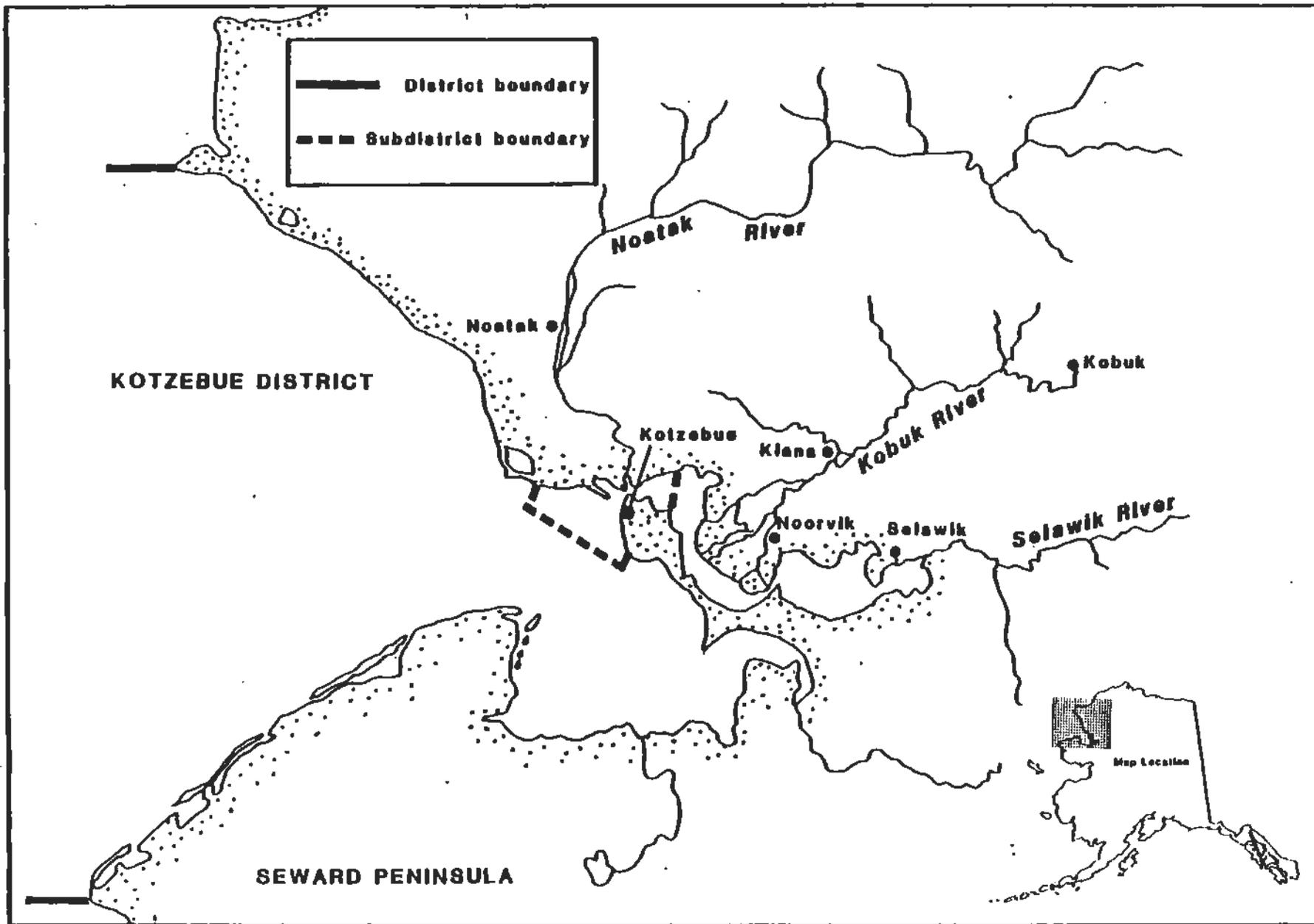
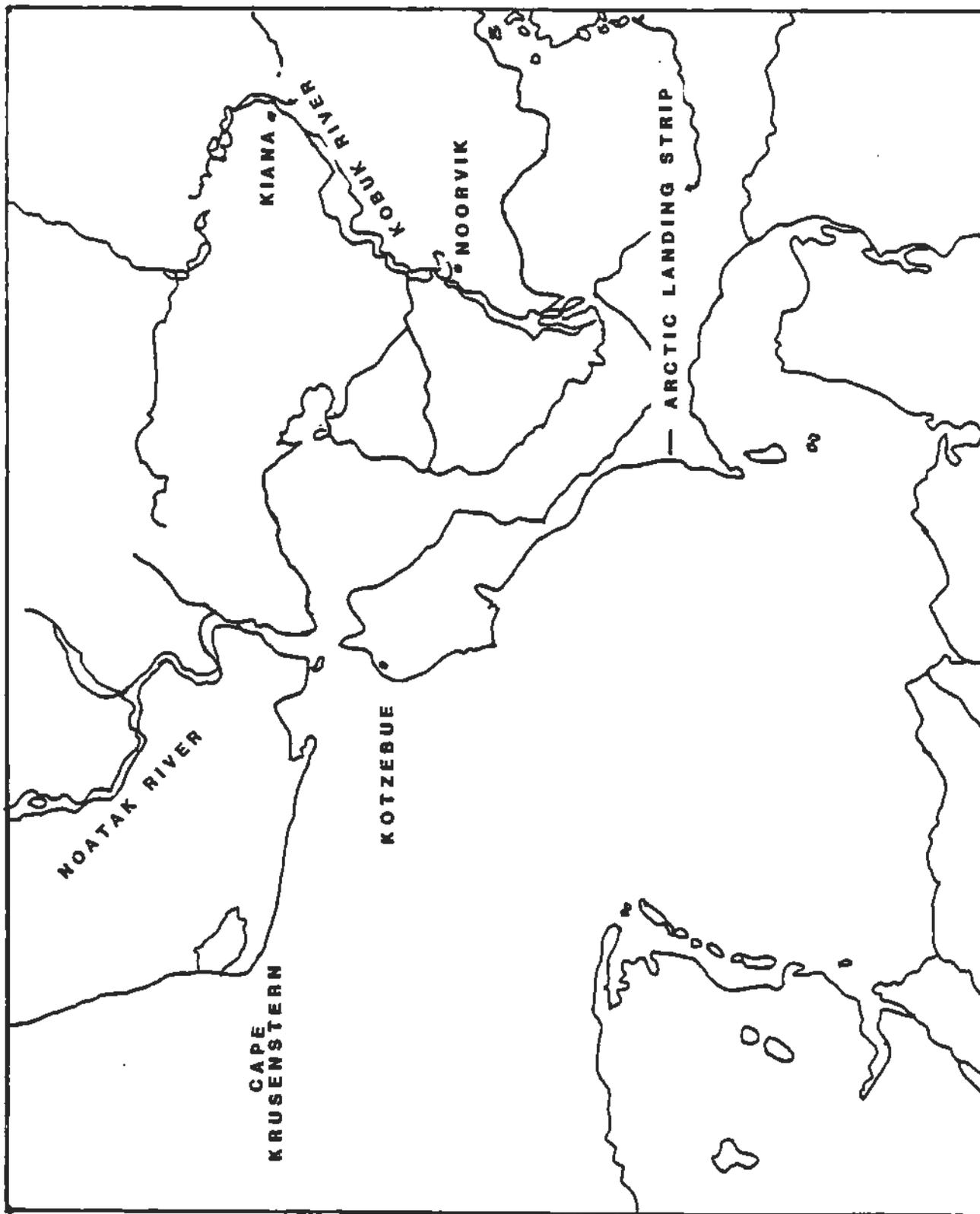


Figure 1. District boundaries and associated area, Kotzebue District.

Figure 2. Kotzebue Sound



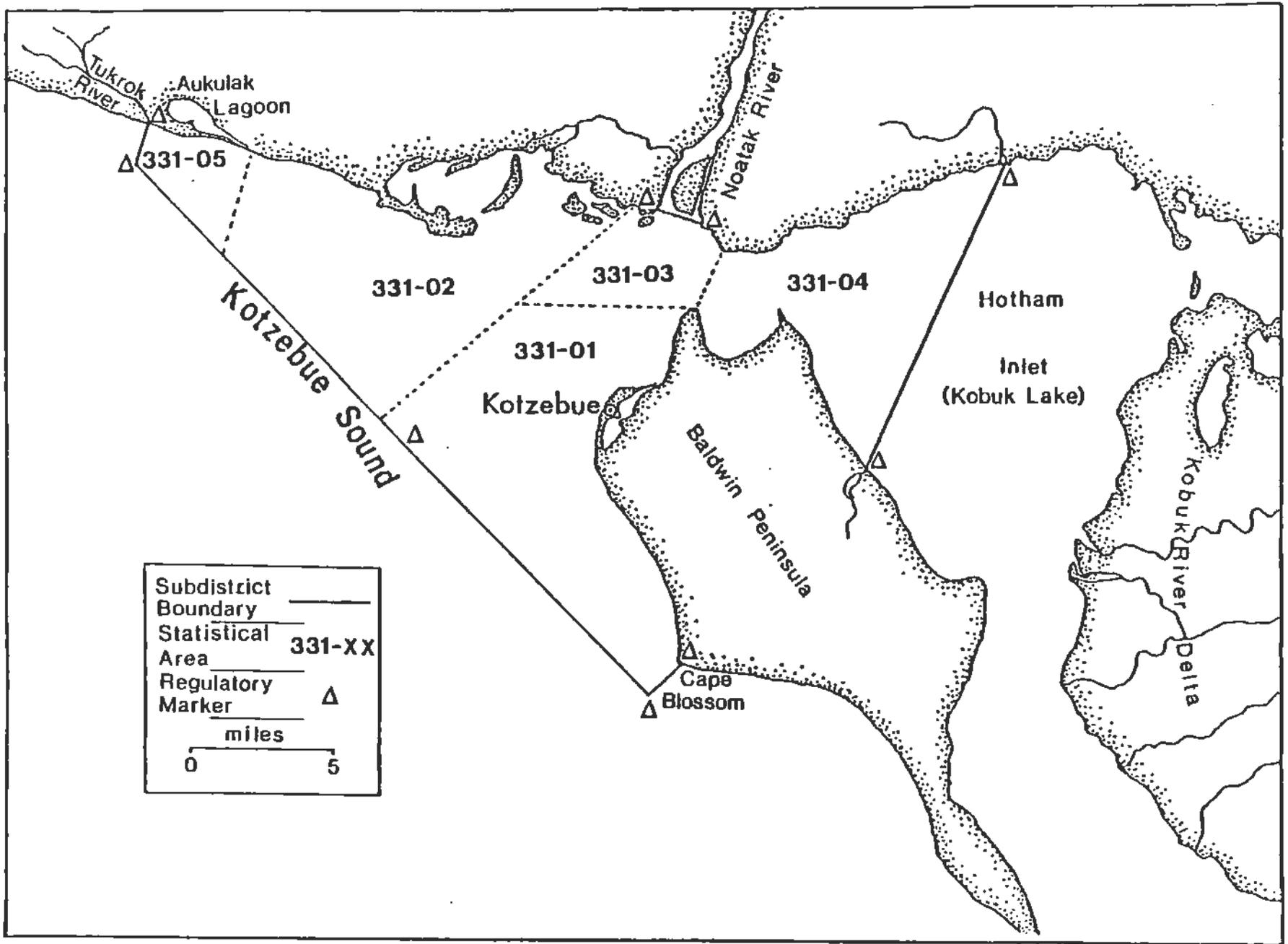


Figure 3. Kotzebue Sound commercial salmon fishing subdistricts.

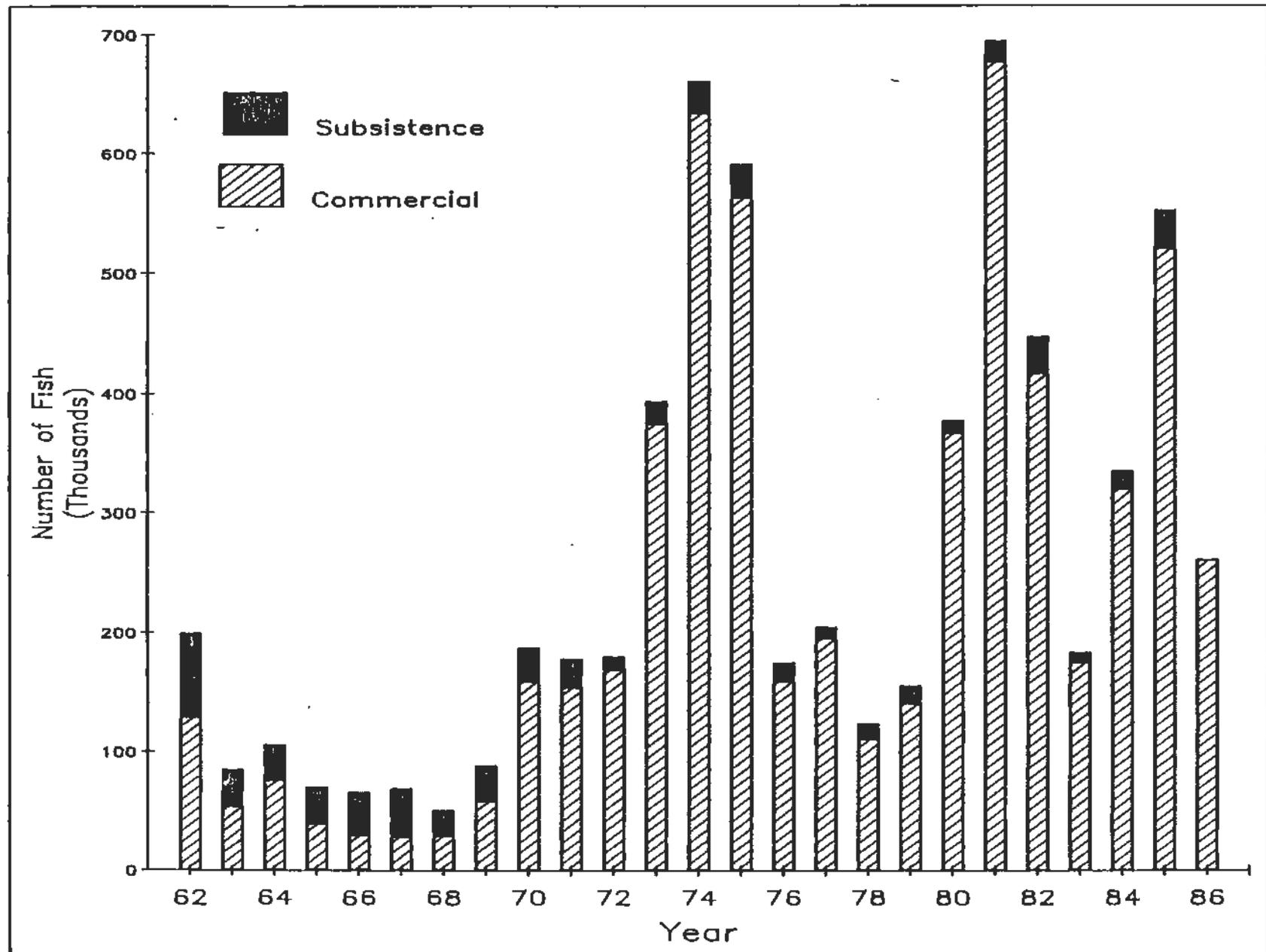


Figure 4. Kotzebue Sound commercial chum salmon harvests, 1962-1986.

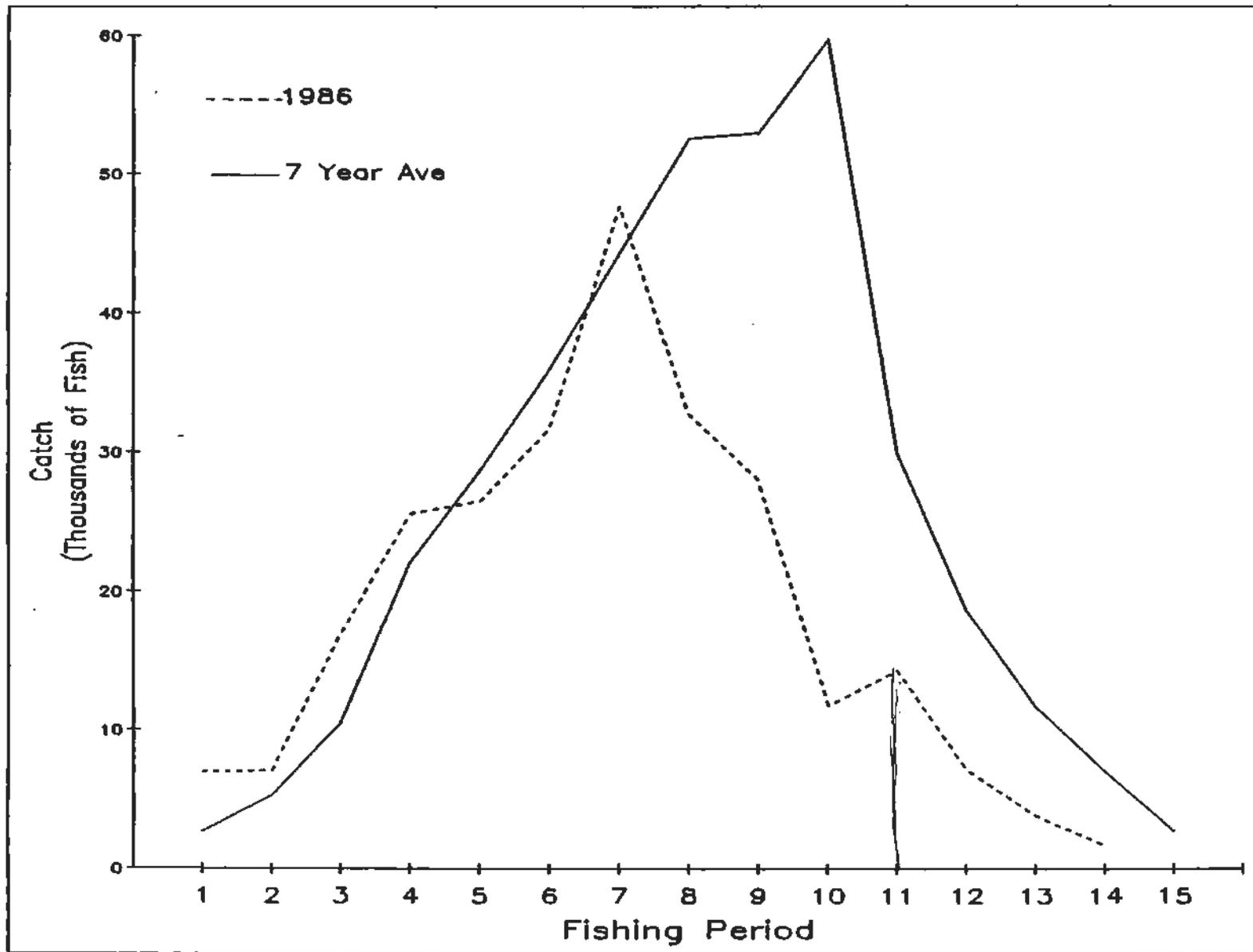


Figure 5. Comparison of the 1986 and seven year average commercial chum salmon period catches, Kotzebue district.

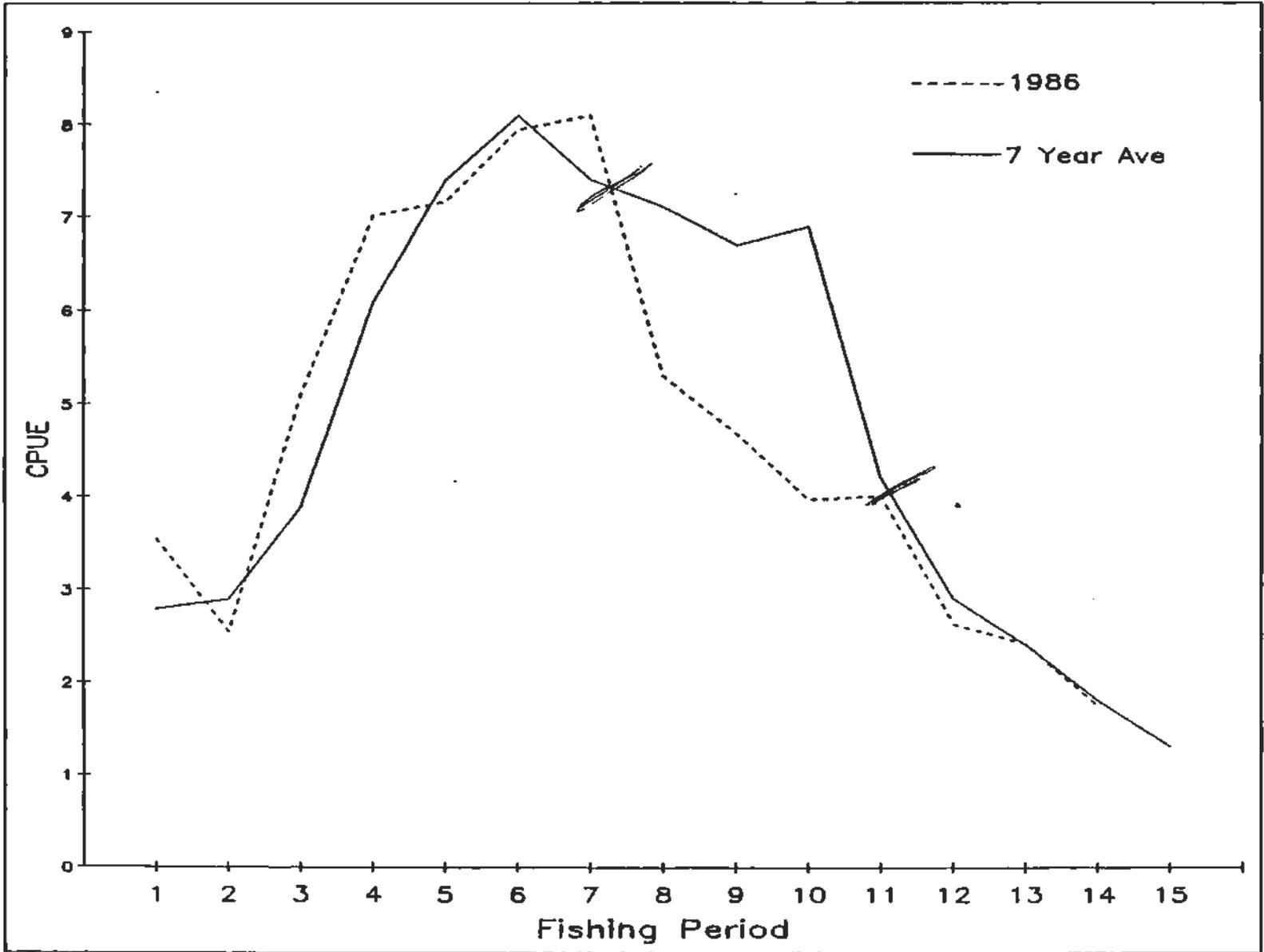


Figure 6. Comparison of the 1986 and seven year average commercial chum salmon period catch per unit effort (CPUE), Kotzebue district.

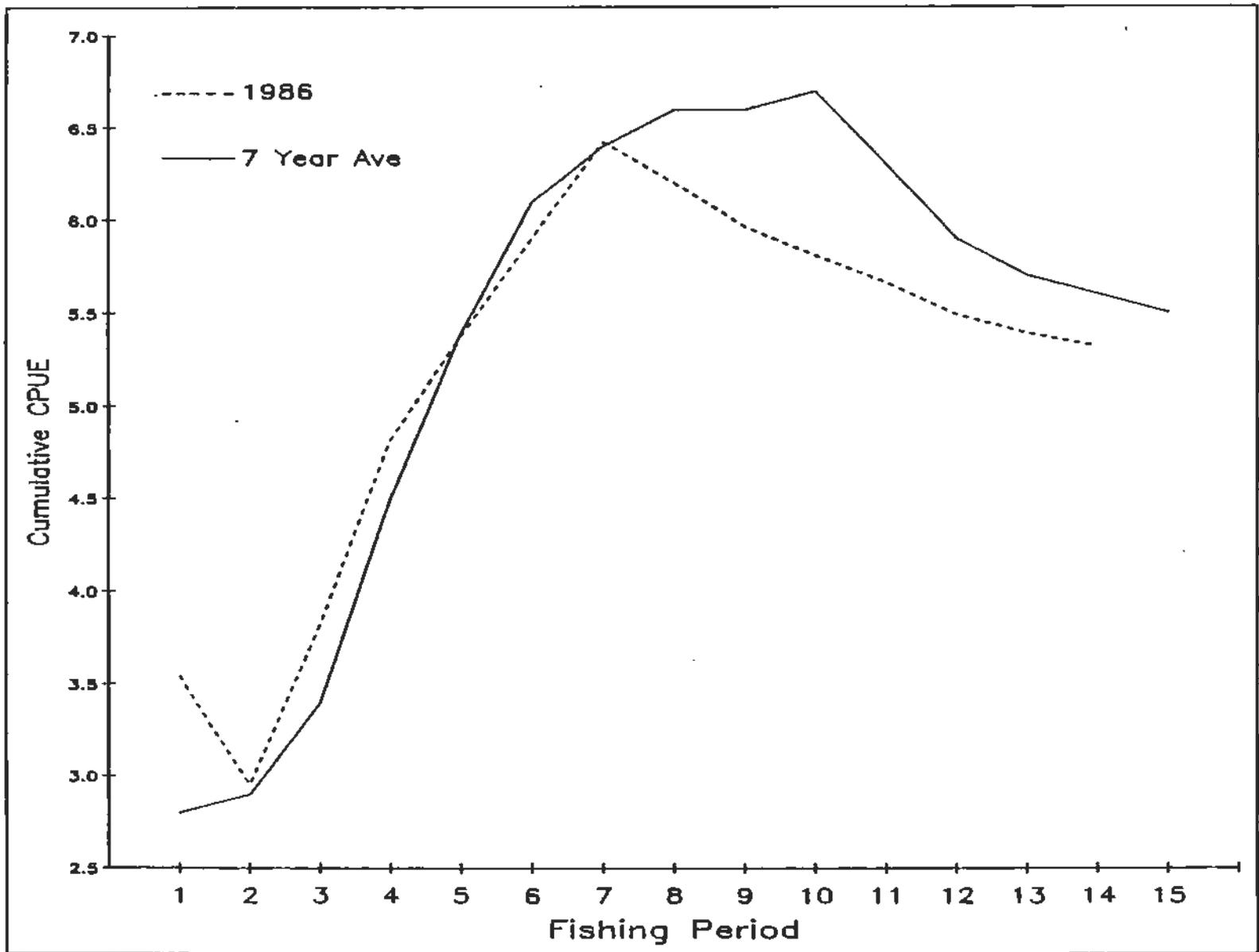


Figure 7. Comparison of the 1986 and seven year average commercial chum salmon cumulative catch per unit effort (Cum. CPUE), Kotzebue district.

Table 1. Comparative commercial chum salmon catch statistics, Kotzebue District, 1962-1986.

	1962-1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Total Catch	176,748	159,900	111,500	141,545	367,284	677,239	417,790	175,762	320,206	521,406	261,436
Total days 1/	30	21	23	21	27	27	23.5	12.5	19.5	25.5	15.5
Total boat days 2/	1,512	2,353	2,730	2,462	2,569	3,336	3,115	1,557	2,432	3,302	2,049
Average catch/boat day	102	83	41	57	143	203	134	113	132	154	128
No. of fishermen	101	224	208	181	176	187	199	189	181	189	187
Average catch per fisherman	1,034	714	536	782	2,087	3,622	2,099	930	1,769	2,759	1,398
Estimated value 3/ (\$ x 1,000)	375	1,034	575	990	1,447	3,247	1,962	421	1,149	2,137	933
Round weight (pounds)	0.8	9.6	9.1	0.8	0.6	9.1	9.3	9.4	0.2	0.7	0.7
Average price per pound \$	0.17	0.56	0.57	0.80	0.46	0.53	0.51	0.25	0.44	0.47	0.41

1/ Day = 24 hours of open fishing time.

2/ Boat days standardized in 1983 for all prior 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/ Estimates for 1979, 1980, and 1981 include only chum salmon value which represents over 99% of the total value. Estimates after 1981 represent total value.

Table 2. Commercial catches of chum and chinook salmon in the Kotzebue District by fishing period, 1986.

	Period Dates	Hours Fished	No. of Fishermen	Period Catch and Catch Per Unit Effort						Cumulative Catch and Catch Per Unit Effort					
				Chinook	CPUE	Chum	CPUE	Char	CPUE	Chinook	CPUE	Chum	CPUE	Char	CPUE
1	7/10-7/11	24	82	13	0.01	6,960	3.54	0	0.00	13	0.01	6,960	3.54	0	0.00
2	7/14-7/15	24	116	11	0.00	7,058	2.54	0	0.00	24	0.01	14,018	2.95	0	0.00
3	7/17-7/18	24	138	8	0.00	16,883	5.10	0	0.00	32	0.00	30,901	3.83	0	0.00
4	7/21-7/22	24	152	10	0.00	25,555	7.01	0	0.00	42	0.00	56,456	4.82	0	0.00
5	7/24-7/25	24	154	11	0.00	26,462	7.16	0	0.00	53	0.00	82,918	5.38	0	0.00
6	7/28-7/29	24	166	11	0.00	31,678	7.95	0	0.00	64	0.00	114,596	5.91	0	0.00
7	7/31-8/02	36	163	15	0.00	47,551	8.10	0	0.00	79	0.00	162,147	6.42	0	0.00
8	8/04-8/06	36	171	4	0.00	32,610	5.30	0	0.00	83	0.00	194,757	6.20	0	0.00
9	8/07-8/09	36	166	3	0.00	27,979	4.60	0	0.00	86	0.00	222,736	5.96	0	0.00
10	8/11-8/12	24	124	2	0.00	11,810	3.97	0	0.00	88	0.00	234,554	5.81	0	0.00
11	8/14-8/15	24	149	4	0.00	14,324	4.01	5	0.00	92	0.00	248,878	5.66	5	0.00
12	8/18-8/19	24	112	5	0.00	7,061	2.63	0	0.00	97	0.00	255,939	5.49	5	0.00
13	8/21-8/22	24	66	3	0.00	3,823	2.41	0	0.00	100	0.00	259,762	5.39	5	0.00
14	8/25-8/26	24	40	1	0.00	1,674	1.74	0	0.00	101	0.00	261,436	5.32	5	0.00
15	8/28-8/29	24	0	NO BUYER THIS PERIOD						101	0.00	261,436	5.32	5	0.00
Season Totals			187	101		261,436		5		101		261,436		5	

Table 3. Fishery information, Kotzebue District, 1986.

	1980	1981	1982	1983	1984	1985	1986
Subsistence 1/ Catch (x1000)	10.6	17.8	30.1	10.3	15.5	31.5	18.6 5/
Fishermen Interviewed	111	71	204	46	66	245	72
Commercial Catch (x1000)	367.3	677.2	417.8	175.8	320.2	521.4	261.4
Fishermen	176	187	199	189	181	189	187
Ave Catch/Fisherman	2,087	3,622	2,099	930	1,769	2,759	1,400
Value of Fishery (x1000)	1,447	3,247	1,962	421	1,149	2,137	933
Escapement (x1000) 2/ Noatak R	164.5	116.4	20.7 3/	79.8	67.8	44.0 3/	37.2 3/
Upper Kobuk R	11.5	8.6	14.7	33.7	10.6	6.2 3/	6.0 3/
Squirrel R	13.5	9.8	7.7	6.1	5.5	6.2	5.0
Salmon R	8.5	4.7	5.4 4/	1.7	1.5	2.0	2.0
Tutuksuk R	1.2	1.1	1.3	2.6	1.1	5.1	4.3

1/ Subsistence survey methods were not always consistent between years. These are considered minimum harvest estimates since it is not possible to contact each fisherman within each community each year.

2/ Escapement goals are: Noatak river (mouth to Kelly Bar) 80,000; Squirrel River (entire) 11,500; Salmon River (entire) 7,000; Tutuksuk (entire) 2,000; and upper Kobuk River (Kobuk Village to Beaver Creek) 10,000.

3/ Low escapement estimates due to poor survey conditons during peak spawning or before or peak spawning.

4/ Foot surveys.

5/ Surveys not complete for 1986.

Table 4. Commercial chum and chinook salmon catch by statistical area, Kotzebue District, 1986.

Stat Area	No. of Fishermen	CHUM SALMON					CHINOOK SALMON				
		No. of Chum	Percent	Pounds	Ave. Weight	CPUE	No. of Chinook	Percent	Pounds	Ave. Weight	CPUE
331-01	171	131,031	50.1	131,368	8.6	2.1	40	39.6	680	17.0	0.0
331-02	130	74,739	28.6	649,490	8.7	1.6	41	40.6	698	17.0	0.0
331-03	82	40,974	15.7	363,018	8.9	1.3	3	3.0	41	13.7	0.0
331-04	34	7,535	2.9	65,710	8.7	0.6	3	3.0	49	16.3	0.0
331-05	24	7,157	2.7	61,734	8.6	0.8	14	13.9	189	13.5	0.0
Totals	187	261,436	100.0	1,271,320	8.7	3.8	101	100.0		16.4	0.0

Table 5. Comparative age and sex composition of Kotzebue District salmon, 1962-1986.

Year	Sample Size	Percent Age Class					
		Males	Females	3 yr. old	4 yr. old	5 yr. old	6 yr. old
1962	69	26.1	73.9	7.3	63.3	28.0	1.4
1963	255	35.0	65.0	30.1	50.9	18.6	0.4
1964	463	43.6	56.4	53.3	45.1	1.7	0.0
1965	480	42.1	57.9	2.3	91.0	6.7	0.0
1966	430	40.2	59.8	10.1	67.1	22.8	0.0
1967	1865	37.3	62.7	8.8	72.3	18.5	0.5
1968	1989	48.2	51.8	21.2	58.0	19.8	0.9
1969	1125	53.7	46.3	36.8	58.3	4.9	0.0
1970	267	45.3	54.7	3.9	91.0	5.1	0.0
1971	1105	54.6	45.4	7.1	67.3	26.3	0.0
1972	980	50.9	49.1	15.8	59.4	24.1	0.6
1973	598	46.0	54.0	16.7	69.5	13.8	0.0
1974	350	47.1	52.9	28.5	63.5	7.8	0.2
1975	340	46.4	53.6	2.5	86.9	10.7	0.0
1976	566	47.9	52.1	11.2	51.6	37.2	0.1
1977	446	49.3	50.7	6.7	73.0	18.6	1.7
1978	579	49.9	50.1	10.5	57.5	31.8	0.2
1979	658	53.3	46.7	30.6	53.2	15.2	1.0
1980	710	56.4	43.6	15.1	78.1	6.6	0.2
1981	1167	52.4	47.6	2.4	67.1	30.6	0.0
1982	983	48.8	51.2	5.9	48.3	40.3	5.5
1983	1979	43.4	56.6	5.8	57.8	34.2	2.3
1984	2933	50.2	49.8	14.6	64.3	19.7	1.3
1985	3293	47.8	52.2	0.4	83.7	15.5	0.4
1986	3213	45.2	54.8	0.3	18.2	77.8	3.6
Mean 1/	985	46.5	53.5	14.5	65.8	19.1	0.7

1/ Historic mean for years, 1962-1985.