

1993
KOTZEBUE DISTRICT
FISHERIES REPORT
to the
Alaska Board of Fisheries

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1993 KOTZEBUE DISTRICT FISHERIES, A REPORT TO THE BOARD

General Information

Commercial harvest in the Kotzebue district (Figure 1) for 1993 were 71,071 chum salmon, 55 chinook salmon, and 76 Dolly Varden (Table 1). This was the lowest commercial catch since 1969 and was half the projected low range of 150,000. This catch was 23% of the 14 year (1979-1992) average of 306,000. There were 114 permits that fished this year. This is the lowest amount of participants since 1972 (104). The low fishing effort is attributed largely to construction opportunities available in the region as salmon prices were higher than in recent years.

Gear is limited to set nets with a aggregate of no more than 150 fathoms per fisherman. Fishermen generally operate with one end on or near shore and with all three shackles (50 fathoms per shackle) connected. Fishermen also set in deeper channels in the mud flats further out from shore. Most gear used in the district is 5-7/8 in (14.9 cm) stretch multifilament gill net.

Seven out of the normal 15 openings were fished for a total of 168 hours in 1993. This was the lowest number of hours fished since the fisheries inception in 1962 and was 31% of the recent 14 year (1979-1992) average (529). All commercial fishing periods were 24 hours in length during the 1993 season.

Inseason Management

Primary fishery management objectives were 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 depended on comparing period and cumulative season catch rates to prior years during the early part of the season and the Noatak River sonar counts during the last 4 periods. A comparison of catch rates over the history of the fishery has shown a close relationship to escapement.

Age composition of catches were also 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. A weak 4 year old age class will tend to depress mid-season catches.

Meetings were held with fishermen throughout the season to distribute information, gain input from local fishermen, and to announce future management strategies. Contact with the Kobuk River subsistence fishermen was maintained. A test fishery began this year on the Kobuk River however test fish indices were not used for management purposes because of the lack of historical data. Information from the Kobuk River test fishery will be available in report form on a later date.

Commercial Season Summary

The Kotzebue Sound commercial salmon season was opened July 8 by emergency order as established by regulation. Commercial catch for the first 3 periods were just below the recent 14 year average (Table 3, Figure 2) however catch per unit effort (CPUE) was above average. With catch rates just above average for the first 3 periods, periods 4 and 5 were also 24 hours in length.

Catch rates for periods 4 and 5 dropped to 80% and 60% of normal. Even more alarming was the significant low number of age-4 fish compared to the average (Table 5, Figure 3). Normally at this time half the fish are 4 year olds. Age composition for periods 4 and 5 were 25% and 30% of average. Age-4 fish make up roughly 65% of the total commercial harvest. Because of the low catch rate and lack of 4 year olds, period closures were thought necessary to attain escapement goals.

An E.O. was issued to close period 6 in order to allow salmon to migrate into the Kobuk River. Period 7 was fished to re-evaluate the age composition of the run. The catch rate was right at average. However, because of the still alarming low number of 4 year old fish, period 8 was also pulled. Period 9 was fished to again re-evaluate age composition and catch rates. The four year old age composition for period 9 was still far below normal (22%). Normally at this point of the fishery roughly 65% of the fish are 4 year olds. Catch rates were nearly twice the average. Because most of the fish were caught from inside statistical areas (1 and 4), it was thought that most fish caught were milling and that there were relatively few fish moving into the district.

Noatak River sonar daily counts through the first week of August were above 1990 levels when only about half of the escapement goal was met (Table 7, Figure 4) but still under 1991 and 1992 when escapements were just met. With the lack of four year old fish and low sonar counts, the district was closed to commercial fishing.

Sikusuilaq Hatchery was expecting a total return of approximately 60,000 fish with a hatchery escapement estimate of 15,000. With the commercial closure, the escapement estimate rose significantly, even though the projected total return was revised to 30,000 to 40,000 chum. Normally hatchery fish are caught in the latter part of the season and roughly 40,000 fish were expected to be caught in the commercial catch. Because of the commercial fishing closure, an estimate of only 3,000 fish were caught. Inseason analysis estimated there would be 20,000 to 25,000 hatchery bound salmon counted by the sonar. The department realized that we would not have age information from commercial harvest. Commercial fishermen were contracted to catch salmon during closed periods to sample for age composition. Continued commercial test fishing indicated that four year olds remained weak throughout the season. Fish from the commercial test fishery were given away with the invaluable assistance from the Maniilaq Traditional Foods Program. Those not used by Maniilaq were given away to other public entities.

The older age class (age-5) of fish tend to dominate the earlier commercial openings with the younger age classes moving through during the latter part of the fishery. Age-5 fish were dominant throughout the commercial season and commercial test fishing during closed periods. Four year old fish failed to show

in significant numbers. Normally four year olds dominate most of the fishing season. During 1993, age-4 fish were 20% to 60% of normal for the duration of the season.

Four buyers purchased a total of 602,808 pounds of chum salmon (average weight 8.5) at \$.38 per pound, 967 pounds of chinook salmon (average weight 17.6) at an average of \$2.37 per pound, and 540 pounds of Dolly Varden (average weight 7.1) at an average of \$.10 per pound. The total ex-vessel value was \$231,413 to Kotzebue area fishermen with an average of \$2,030 for each participating permit holder (Table 2). All buyers ice packed their fish and flew them out in the round for processing. Three buyers flew fish to Anchorage, one buyer flew fish to Bethel or to Anchorage then took salmon by truck to Kenai for processing.

Sikusuilaq Hatchery Stock Fishery

The 1993 projected adult return to the Sikusuilaq Hatchery and Kotzebue District was 60,000 chum salmon. By mid-August the return was known to be roughly half the earlier projection. The harvest of hatchery stock in the commercial fishery was estimated to be less than 4,000 chum. With the early closure of the commercial fishery, the hatchery stock migrating into the river was several times the brood stock requirements for the hatchery, despite the poor rate of return. At fishermen meetings, the department staff estimated that an excess of 20-30,000 hatchery stock would return to the hatchery.

Two buyers expressed their interest to buy the hatchery surplus. This large surplus was not anticipated prior to the season, so no work had been done to administer such a fishery. The Northwest Arctic Borough poled the potential user groups as to their feelings toward such a fishery. The response they found was generally favorable and the commercial fishermen were the user group most severely impacted by the conservation actions during 1993. The Borough acting on behalf of the public, there is no aquaculture association in the region, solicited bids with the proceeds to be distributed evenly between all active commercial fishermen in the 1993 commercial fishery.

The department wrote an emergency regulation to open the lower Noatak River and an emergency order to allow management of the fishery by field order. Department staff were aware of the locations where hatchery stock had been caught during previous years. The NWAB Assembly accepted the only bid, which was well above their minimum, on September 8. On September 9, the inriver fishery began. High water and the associated debris load hampered the fishery. Although the catch rates were low, the tagged to untagged fish ratio in the harvest was similar to that at the hatchery race way, 1 to 210 as opposed to 1 to 170. This indicates roughly 20% of the harvest was wild stock. After the initial two days, the buyer chose to send most of the crew home with the intent to call them back when the water dropped.

Roe quality in commercial terms was poor. Roughly one third of the fish were overly ripe, and as a consequence had to be sent to a less lucrative market. The buyer decided to seek a different wholesaler. There was little fishing activity from September 16 until September 25. The final harvests were reported October 10. Over 1,700 chum salmon were sold. The fish that were sold were

predominantly female. Male salmon and egg take carcasses from the hatchery were transported to Kotzebue for distribution to subsistence users in the middle Yukon villages. Roughly 4,300 salmon from the Noatak River were airlifted to the Yukon villages.

Although this fishery did little to alleviate the financial hardship for the Kotzebue commercial fishermen, it did serve as a feasibility study for a terminal fishery on this hatchery stock. Locations where predominantly hatchery stock mill were located. The quality and market for these fish was documented. And some pitfalls regarding this potential fishery were found: high water drastically affected the success of the fishery and the Village of Noatak has expressed reservations over the proximity and potential impact of the fishery to their subsistence activities.

Escapement

The lower Kobuk River tributaries (Squirrel, Salmon, and Tutuksuk) were flown on August 11 and August 26. Weather and water conditions were fair to good for the surveys. Escapements were at different levels for all three tributaries. Peak surveys indicate the Squirrel R. was less than half of aerial escapement goal, Tutuksuk R. indices were just met, and the Salmon R. indices was nearly double the goal (Table 2).

Only one survey was conducted on the Upper Kobuk. That survey was completed under good conditions and indicated aerial escapement goals were met. The survey, conducted on August 26, was the first of three scheduled surveys and in all probability occurred before peak spawning.

In the Noatak drainage, both aerial survey and sonar indices have been used to evaluate escapement. Aerial survey data have been available since the early 1960s, and for 15 years the aerial survey escapement goal has been 80,000 chum. Sonar data have been available since 1989, but a sonar escapement goal had not been established because sonar technology continued to improve. In 1991, when wildstock escapement was judged adequate, both aerial and sonar methods counted 80,000 chum. In 1993, the sonar range was extended by 50 percent, and sonar counts were estimated to increase by 17 percent. Aerial survey methods did not change. Therefore it was assumed that sonar counts would need to be expanded to track with aerial survey counts. In 1993, the sonar wildstock escapement goal was 95,000, or 17 percent more than the aerial wildstock escapement goal of 80,000.

At the same time that sonar technologies were improving, hatchery returns to the Noatak River also were increasing. In 1993, hatchery returns were estimated to be approximately 25,000, compared with approximately 6,000 in 1991. In 1993, it was estimated that approximately 15,000 hatchery fish would have been counted at the sonar by August 30. Therefore, at the sonar the combined hatchery and wildstock escapement goal was approximately 110,000 to 115,000 salmon on August 30, 1993. This was the target that the management staff attempted to meet during the commercial fishing season.

In 1993 poor weather hampered aerial surveys on the Noatak River. Under poor conditions, one survey was completed on August 10, and 30,000 chum salmon were

observed (38 percent of the 80,000-salmon goal). On that date, sonar escapement was 39,000, or 9,000 more than were observed on the survey. Due to poor conditions, no additional aerial surveys were conducted in 1993. On August 30, the sonar escapement was estimated to be 106,000, approaching the combined hatchery and wildstock escapement goal. But in November, when final assessments of sonar data were complete, the August 30 sonar count was revised downward to 99,000, or 11,000 to 16,000 below the combined hatchery and wildstock escapement goal.

Closing the Kotzebue District allowed salmon into spawning tributaries. Overall, the Kobuk River escapement indices showed that escapement goals were met. The Noatak River wild stock escapement seems to have fallen short of the goals set for that river system. The short fall on the Noatak River is essentially the same as the unexpected hatchery stock escapement, roughly 15 to 20,000 chum. The final sonar count of 118,000 on September 13 is an index of both wildstock and hatchery components of the Noatak River chum salmon run. This is the time period when 90% of the run passes the site. The project was extended 2 weeks during 1993 to begin building a better data base for the future.

Dolly Varden

Incidental catch of Dolly Varden (locally called trout) was virtually non-existent with a catch of only 76. Spawners and wintering Dolly Varden normally migrate through the district during the third week of August. With the district closed to commercial fishing, there was no opportunity for incidental commercial catch of trout during their peak migration. Those trout that were caught were sold and sent out iced in the round with salmon.

Freshwater Fisheries

Limited commercial harvest of miscellaneous finfish has been allowed since statehood, normally under the auspices of a permit which delineates harvest levels, open areas, legal gear, etc. There was no reported commercial harvest of whitefish, pike, or burbot during the 1993 commercial salmon season. Sheefish are caught and sold predominantly between late October and late March.

There were 10 freshwater permit holders in 1993. Of these 10, two were registered and one reported a commercial catch of 1,700 pounds of sheefish (Table 8).

1994 Outlook

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 age 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 be near normal. The commercial harvest is expected to fall within the range of 70,000 to 150,000 chum salmon.

Table 1. Commercial catches of chum salmon, chinook salmon, and Dolly Varden by period in the Kotzebue District, 1993.

Period	Dates	Hours	Number of Fishermen	Chum			Chinook			Dolly Varden		
				Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.
1	7/08-7/09	24	24	2,027	17,308	8.5	1	17	17.0			
2	7/12-7/13	24	44	4,285	37,273	8.7	8	148	18.5			
3	7/15-7/16	24	55	8,205	71,345	8.7	15	246	16.4			
4	7/19-7/20	24	62	7,572	64,962	8.6	4	73	18.3			
5	7/22-7/23	24	79	7,659	67,533	8.8	10	193	19.3			
6	Closed Period											
7	7/29-7/30	24	79	14,309	121,565	8.5	6	120	20.0			
8	Closed Period											
9	8/05-8/06	24	88	27,014	222,822	8.2	11	170	15.5	76	540	7.1
10	Closed Period											
11	Closed Period											
12	Closed Period											
13	Closed Period											
14	Closed Period											
15	Closed Period											
Totals		168	114	71,071	602,808	8.5	55	967	17.6	76	540	7.1

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Table 2. Kotzebue District chum salmon fishery information, 1981 - 1993.

Commercial Catch	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Chum (in thousands)	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	187	199	189	181	189	187	160	193	165	153	143	149	114
Average catch per permit	3,621	2,099	930	1,769	2,759	1,398	684	1,828	1,543	1,067	1,678	1,941	623
Est. value (x 1,000)	\$3,247	\$1,962	\$421	\$1,149	\$2,137	\$933	\$515	\$2,605	\$614	\$438	\$429	\$527	\$231
Est. value per fisherman (x 1,000)	\$17.4	\$9.9	\$2.2	\$6.3	\$11.3	\$5.0	\$3.2	\$13.5	\$3.7	\$2.9	\$3.0	\$3.5	\$2.0

ESCAPEMENT ^a

Noatak	106,513	20,682 ^c	78,900	67,800	43,526 ^c	37,277 ^c	5,565 ^c	45,930 ^c	^b	23,345 ^c	80,750	34,335 ^c	30,210 ^c
Upper Kobuk	8,648	14,674	33,746	10,621	6,200 ^c	6,015 ^c	8,210	11,895		14,935 ^c	24,645	10,935 ^c	11,334
Squirrel	9,854	7,690	6,075	5,473	6,145	4,982 ^c	2,708	4,848 ^c		5,500 ^c	4,606	2,765	4,463
Salmon	4,709	1,871 ^d	1,677	1,471	2,816	1,971 ^c	3,333	6,208		6,335 ^c	5,845	1,345	13,880
Tutuksuk	1,114	1,322	2,637	1,132	5,100	4,257	208 ^c	3,122		2,275 ^c	744	1,162	1,996
Total	130,838	46,239	123,035	86,497	63,787	54,502	20,022	72,003		52,390	116,590	50,542	61,863

ESCAPEMENT GOALS

Noatak River (mouth to Kelly Bar)	80,000
Upper Kobuk (Kobuk Village to Beaver Creek)	10,000
Squirrel River	11,500
Salmon River	7,000
Tutuksuk River	2,000
Total	110,500

^a Peak aerial survey

^b Aerial surveys not feasible in 1989 due to unfavorable weather and water conditions.

^c Poor aerial survey conditions.

^d Foot surveys.

Table 3. Kotzebue District 1993 commercial and 14 year average catch statistics (1979–1992).

Period	Hours	Number Permits	Catch (x 1,000)	CPUE	Cumulative		
					Catch (x 1,000)	CPUE	Prop. Catch
1	24	44	3.4	3.1	3.1	3.1	0.010
2	24	72	5.4	3.0	8.5	3.0	0.028
3	24	99	10.0	4.0	18.5	3.5	0.062
4	25	120	19.4	6.2	37.9	4.5	0.123
5	28	133	24.6	6.5	62.5	5.1	0.205
6	30	138	30.8	7.4	91.1	5.6	0.300
7	38	145	40.6	7.5	128.8	6.0	0.430
8	40	147	42.5	7.0	171.2	6.2	0.570
9	43	142	41.8	6.6	213.1	6.3	0.710
10	41	144	46.8	7.5	256.5	6.4	0.833
11	44	134	26.4	4.7	279.1	6.2	0.912
12	45	117	15.7	2.9	292.5	5.9	0.956
13	42	89	10.0	2.9	301.1	5.8	0.983
14	39	64	6.0	2.4	305.0	5.7	0.995
15	41	39	2.8	1.8	306.6	5.6	1.000

Year: 1993		Cumulative					
Period	Hours	Number Permits	Catch (x 1,000)	CPUE	Catch (x 1,000)	CPUE	Prop. Catch
1	24	24	2.0	3.5	2.0	3.5	0.028
2	24	44	4.3	4.1	6.3	3.9	0.060
3	24	55	8.2	6.2	14.5	4.9	0.204
4	24	62	7.6	5.1	22.1	5.0	0.311
5	24	79	7.7	4.1	29.8	4.7	0.419
6	Closed Period				29.8		0.419
7	24	79	14.3	7.5	44.1	5.4	0.620
8	Closed Period				44.1		0.620
9	24	88	27.0	12.8	71.1	6.9	1.000
10	Closed Period						
11	Closed Period						
12	Closed Period						
13	Closed Period						
14	Closed Period						
15	Closed Period						

Table 4. Kotzebue District commercial chum salmon, chinook salmon, and Dolly Varden catch by statistical area, 1993.

Statistical Area	Number of Fishermen	Chum			Chinook			Dolly Varden		
		Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.
331-01	94	35,285	294,939	8.36	21	398	18.95			
331-02	34	6,761	58,306	8.62	8	137	17.13	23	177	7.70
331-03	17	4,080	36,203	8.87	2	45	22.50			
331-04	30	14,125	121,379	8.59	7	101	14.43			
331-05	14	3,444	29,651	8.61	8	106	13.25	53	363	6.85
331-06	32	7,376	62,330	8.45	9	180	20.00			
Totals	114	71,071	602,808	8.48	55	967	17.58	76	540	7.11

Table 5. Historical average age composition by period for the recent 14 years (1979–1992) and 1993.

14 Year Avg.		Percent				Catch by Age			
Period	Catch	3	4	5	6	3	4	5	6
1	3,351	0.4	37.3	58.8	3.5	13	1,250	1,970	117
2	5,361	1.2	45.3	51.0	2.6	64	2,427	2,734	139
3	10,048	1.7	42.5	50.1	5.7	171	4,270	5,034	573
4	19,394	1.5	53.8	41.9	2.9	291	10,428	8,126	562
5	24,580	1.5	50.5	43.1	4.9	369	12,413	10,594	1,204
6	30,797	1.8	58.9	37.0	2.3	554	18,139	11,395	708
7	40,569	2.9	60.6	34.9	1.6	1,177	24,585	14,159	649
8	42,478	5.2	66.5	26.5	1.8	2,209	28,248	11,257	765
9	41,814	7.5	62.0	28.0	2.6	3,136	25,925	11,708	1,087
10	46,772	6.3	67.3	25.3	1.0	2,947	31,478	11,833	468
11	26,396	14.0	65.4	19.7	1.0	3,695	17,263	5,200	264
12	15,670	15.2	61.4	21.2	2.2	2,382	9,621	3,322	345
13	10,019	14.8	65.9	17.8	1.5	1,483	6,603	1,783	150
14	5,994	12.9	67.6	18.7	0.9	773	4,052	1,121	54
15	2,781	5.5	72.8	20.4	1.3	153	2,025	567	36

Kotzebue Sound commercial catch and age composition, 1993. ^a

1993		Percent				Catch by Age			
Period	Catch	3	4	5	6	3	4	5	6
1	2,027	0.0	12.9	78.8	8.2	0	262	1,598	167
2	4,285	0.4	20.1	67.5	11.3	16	860	2,893	485
3	8,205	0.0	18.6	74.0	6.7	0	1,525	6,070	549
4	7,572	1.1	11.4	81.2	5.9	84	866	6,147	447
5	7,659	0.4	17.2	78.4	4.0	28	1,319	6,004	309
6	Closed	1.8	18.4	75.0	4.8	<i>Closed period, age comp. based on comm. test nets.</i>			
7	14,309	2.9	25.5	66.9	0.4	416	3,642	9,574	52
8	Closed	2.7	27.5	68.1	2.2	<i>Closed period, age comp. based on comm. test nets.</i>			
9	27,014	1.5	22.4	73.4	2.7	417	6,050	19,817	730
10	Closed	5.9	39.1	52.0	2.6	<i>Closed period, age comp. based on comm. test nets.</i>			
11	Closed	1.9	42.7	54.1	1.3	<i>Closed period, age comp. based on comm. test nets.</i>			
12	Closed	5.2	36.7	56.0	2.2	<i>Closed period, age comp. based on comm. test nets.</i>			
13	Closed	12.0	40.0	46.7	1.3	<i>Closed period, age comp. based on comm. test nets.</i>			
14	Closed	4.5	39.4	55.8	0.4	<i>Closed period, age comp. based on comm. test nets.</i>			
15	Closed	8.6	41.7	49.2	0.4	<i>Closed period, age comp. based on comm. test nets.</i>			

^a Second period had 0.73; 3rd period had 0.74; 4th period had 0.37; 7th period had .36 percent 7 year old fish.

Table 6. Kotzebue District commercial age and sex composition of chum salmon, 1962–1992.^a

Year	Sample Size	Percent		Percent Age Class			
		Males	Females	Age-3	Age-4	Age-5	Age-6
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	52.9	45.0	1.7	0.4
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	1,865	37.3	62.7	8.8	72.2	18.5	0.5
1968	1,989	48.2	51.8	21.2	58.1	19.8	0.9
1969	1,125	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	1,105	54.6	45.4	7.1	66.8	26.1	0.0
1972	980	50.9	49.1	15.8	59.5	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	86.8	10.7	0.0
1976	566	47.9	52.1	11.2	51.5	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 ^b	658	53.3	46.7	30.6	53.2	15.2	1.0
1980 ^c	710	56.4	43.6	15.1	78.1	6.6	0.2
1981 ^d	1,167	52.4	47.6	2.4	67.1	30.5	0.0
1982	983	48.8	51.2	5.9	48.3	40.3	5.5
1983 ^e	1,979	43.4	56.6	5.8	57.7	34.2	2.3
1984 ^f	2,933	50.2	49.8	14.6	64.4	19.7	1.3
1985 ^g	3,293	47.8	52.2	0.4	83.7	15.5	0.4
1986 ^h	3,095	46.0	54.0	0.3	18.6	78.9	2.2
1987 ⁱ	1,987	52.0	48.0	15.0	43.0	31.0	11.0
1988 ^j	3,324	48.0	52.0	6.5	74.9	16.9	1.7
1989	3,336	49.3	50.7	0.7	77.9	20.4	1.0
1990 ^k	2,497	49.4	50.6	2.3	45.6	50.7	1.4
1991	3,292	46.4	53.6	2.9	60.4	35.8	0.9
1992 ^l	3,706	39.9	60.1	0.9	58.5	37.5	3.1
14 Year Average (1979–1992)		47.5	52.5	5.1	60.0	32.8	2.2
1993 ^m	3,707	50.9	49.1	2.9	26.4	66.5	4.2

^a Commercial periods not sampled for years 1962 to 1978 are unknown.

^b Commercial openings 1 and 10 not sampled due to period closure.

^c Commercial openings 8, 13, and 15 not sampled due to period closure.

^d Commercial openings 8, 10, 12, and 14 not sampled due to period closure.

^e Commercial openings 11, 13, 14, and 15 not sampled due to period closure.

^f Commercial openings 14 and 15 not sampled due to period closure.

^g Commercial openings 1, 3, 5, 7, 9, 11, and 13 not sampled due to period closure.

^h Commercial opening 15 not sampled due to period closure.

ⁱ Commercial openings 1, 2, 4, 6, 7, 8, 10, 11, 14, and 15 not sampled due to period closure.

^j Includes 0.1 percent age-7 fish.

^k Commercial openings 11 to 15 not sampled due to period closure.

^l Commercial opening 12 not sampled due to period closure.

^m Commercial openings 6, 8, 10, 11, 12, 13, 14, and 15 were closed periods. Closed periods were sampled for age and sex composition from commercial test nets and are included in the 1993 data.

Table 7.A. Noatak River Sonar daily and cumulative chum salmon counts, 1990-1993.

Date	1990		1991		1992		1993	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
10-Jul			412	412				
11-Jul			275	687				
12-Jul			264	951				
13-Jul			289	1,239				
14-Jul			490	1,729				
15-Jul			785	2,514				
16-Jul			683	3,198				
17-Jul			133	3,330				
18-Jul			118	3,448			290	290
19-Jul			82	3,531			372	662
20-Jul	439	439	176	3,707			214	876
21-Jul	861	1,301	170	3,876			29	905
22-Jul	587	1,887	231	4,107			32	937
23-Jul	509	2,396	292	4,399			26	963
24-Jul	980	3,376	246	4,645			96	1,059
25-Jul	615	3,991	543	5,188			159	1,218
26-Jul	602	4,593	570	5,758			386	1,604
27-Jul	587	5,180	850	6,608	1,795	1,795	356	1,959
28-Jul	2,469	7,649	707	7,314	860	2,655	977	2,937
29-Jul	1,432	9,081	1,038	8,353	253	2,908	548	3,485
30-Jul	756	9,837	1,419	9,772	355	3,263	722	4,207
31-Jul	1,174	11,011	678	10,450	351	3,614	582	4,789
01-Aug	626	11,637	1,292	11,742	710	4,324	506	5,296
02-Aug	390	12,027	1,464	13,205	1,482	5,806	1034	6,330
03-Aug	647	12,674	1,917	15,123	485	6,291	1283	7,613
04-Aug	445	13,119	5,009	20,132	282	6,573	2420	10,033
05-Aug	941	14,060	2,746	22,878	1,499	8,072	3587	13,620
06-Aug	1,076	15,135	2,087	24,966	1,835	9,907	6115	19,734
07-Aug	1,903	17,039	2,002	26,968	1,161	11,068	2997	22,732
08-Aug	1,366	18,404	1,563	28,531	3,837	14,905	4353	27,085
09-Aug	1,594	19,998	890	29,420	1,305	16,210	5106	32,190
10-Aug	2,086	22,084	744	30,164	1,205	17,415	6585	38,775
11-Aug	1,983	24,067	1,839	32,003	3,142	20,557	5569	44,344
12-Aug	2,067	26,134	2,346	34,350	1,474	22,031	3994	48,338
13-Aug	2,343	28,477	2,837	37,187	1,763	23,794	4302	52,640
14-Aug	1,982	30,460	6,264	43,451	548	24,342	2713	55,353
15-Aug	757	31,217	7,087	50,537	1,475	25,817	1827	57,179
16-Aug	810	32,026	5,963	56,500	4,667	30,484	1686	58,865
17-Aug	1,626	33,653	2,852	59,352	4,986	35,470	1545	60,410
18-Aug	1,770	35,422	2,237	61,589	2,804	38,274	1702	62,112
19-Aug	1,270	36,692	2,291	63,879	3,652	41,926	1520	63,632
20-Aug	886	37,578	3,068	66,948	4,873	46,799	4708	68,340
21-Aug	468	38,046	1,928	68,876	4,444	51,243	7980	76,320
22-Aug	635	38,681	2,215	71,091	1,429	52,672	3417	79,738
23-Aug	644	39,325	1,933	73,025	1,080	53,752	2970	82,708
24-Aug	535	39,860	1,410	74,435	2,561	56,313	2526	85,234
25-Aug	993	40,853	1,320	75,755	2,204	58,517	2613	87,847
26-Aug	1,078	41,931	1,464	77,219	3,724	62,241	2467	90,314
27-Aug			1,747	78,966	5,077	67,318	2232	92,546
28-Aug			1,385	80,351	1,428	68,746	2646	95,192
29-Aug			1,147	81,498	1,319	70,065	1988	97,180
30-Aug			1,241	82,739			1778	98,958
31-Aug							2492	101,449
01-Sep							1922	103,371
02-Sep							1624	104,995
03-Sep							1531	106,526
04-Sep							955	107,481
05-Sep							1338	108,818
06-Sep							891	109,709
07-Sep							2965	112,674
08-Sep							2455	115,129
09-Sep							1667	116,796
10-Sep							232	117,029
11-Sep							125	117,153
12-Sep							251	117,405
13-Sep							582	117,986

Table 8. Kotzebue District winter commercial Sheefish harvest statistics, 1967–1993. ^a

Year ^b	No. of Fishermen	No. of Fish	Pounds		Price/Pound	Estimated Value
			Total	Average		
1967 ^c		4,000	26,000	6.5	\$0.20	\$5,200
1968	10	792	4,752	6.0	\$0.22	\$1,045
1969	17	2,340	15,209	6.5	\$0.25	\$3,802
1970 ^c		2,206			\$0.14	
1971	4	73	720	9.9	\$0.13	\$95
1972	5	456	4,071	8.9	\$0.16	\$651
1973	11	2,322	15,604	6.7	\$0.20	\$3,121
1974	6	1,080 ^d	6,265	5.8	\$0.30	\$1,880
1975	^c	2,543 ^d	24,161	9.5	\$0.30	\$7,248
1976	14	2,633	19,484	7.4	\$0.30	\$5,845
1977	2	566	5,004	8.8	\$0.30	\$1,501
1978	11	2,879	26,200	9.1	\$0.40	\$10,480
1979 ^e						
1980	4	1,175	8,225	7.0	\$0.50	\$4,113
1981	1	278	1,836	6.6	\$0.75	\$1,377
1982	11	2,629 ^f	17,376	6.6	\$0.75	\$13,032
1983	8	1,424	13,395	9.4	\$0.50	\$6,698
1984	5	927 ^d	10,403	11.2	\$0.55	\$5,722
1985	4	342 ^d	3,902	11.4	\$0.51	\$1,990
1986	2	26	312	12.0	\$0.75	\$234
1987	3	670	5,414	8.1	\$0.49	\$2,653
1988	3	943	7,373	7.8	\$0.45	\$3,318
1989	8	2,335	16,749	7.2	\$0.51	\$8,542
1990 ^c	6	687	5,617	8.2		
1991	5	852	8,224	9.7	\$0.50	\$4,112
1992	3	289	2,850	9.9	\$0.65	\$1,853
1993	1	210 ^d	1,700	8.1	\$0.50	\$850

^a Data is not exact, in some instances total catch poundage was determined from average weight and catch data. Similarly, various price/pound figures were determined from price/fish and average weight data.

^b Season was from October 1 to September 30. Year indicated would be the year the commercial season ended. For example, the year 1980 would represent October 1, 1979 to September 30, 1980.

^c Data unavailable or incomplete.

^d Number of fish not always reported. Estimates were based on average weight from reported sales which documented the number of fish.

^e No reported commercial catches.

^f Estimate based on historical average weight.

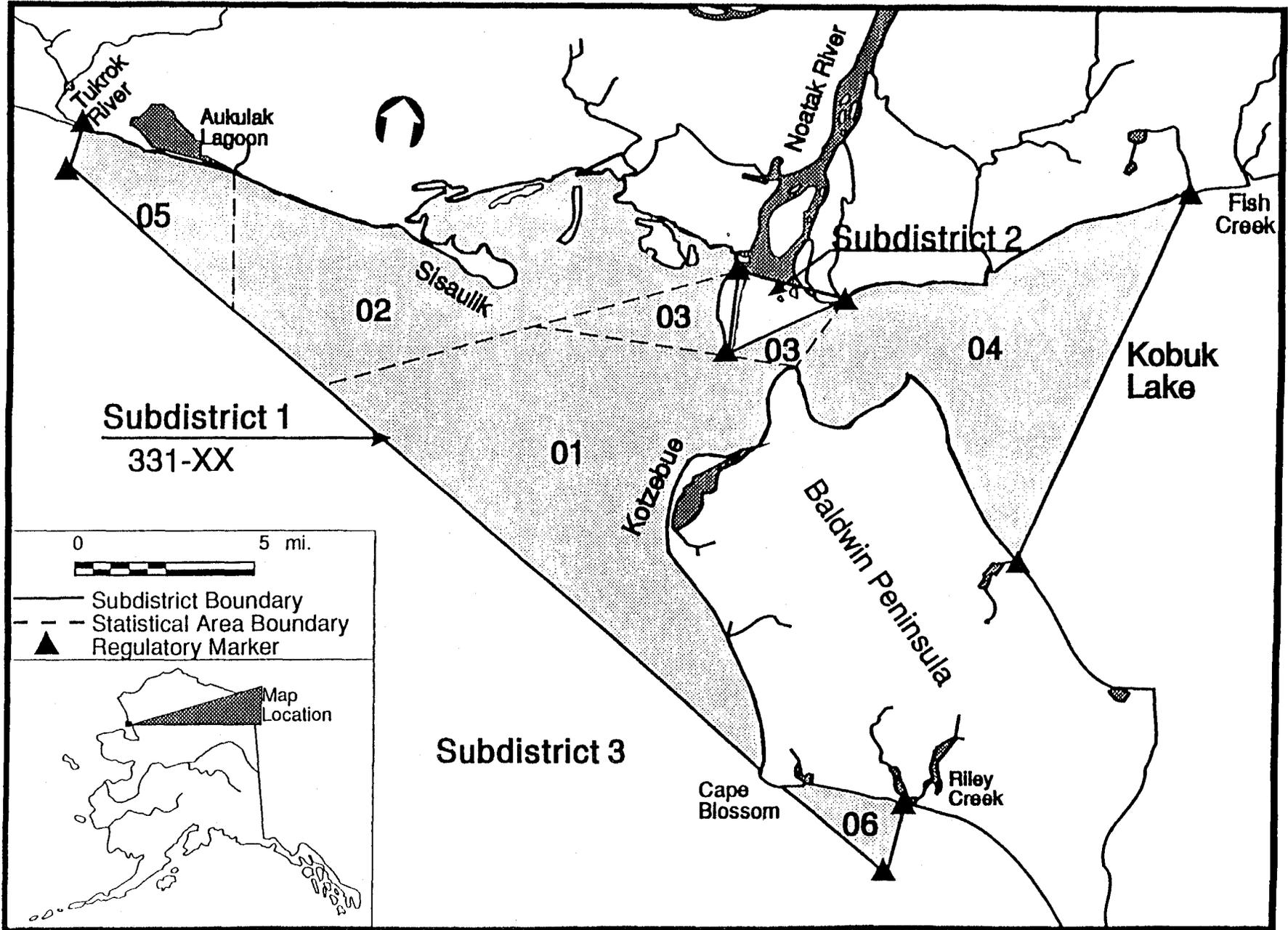
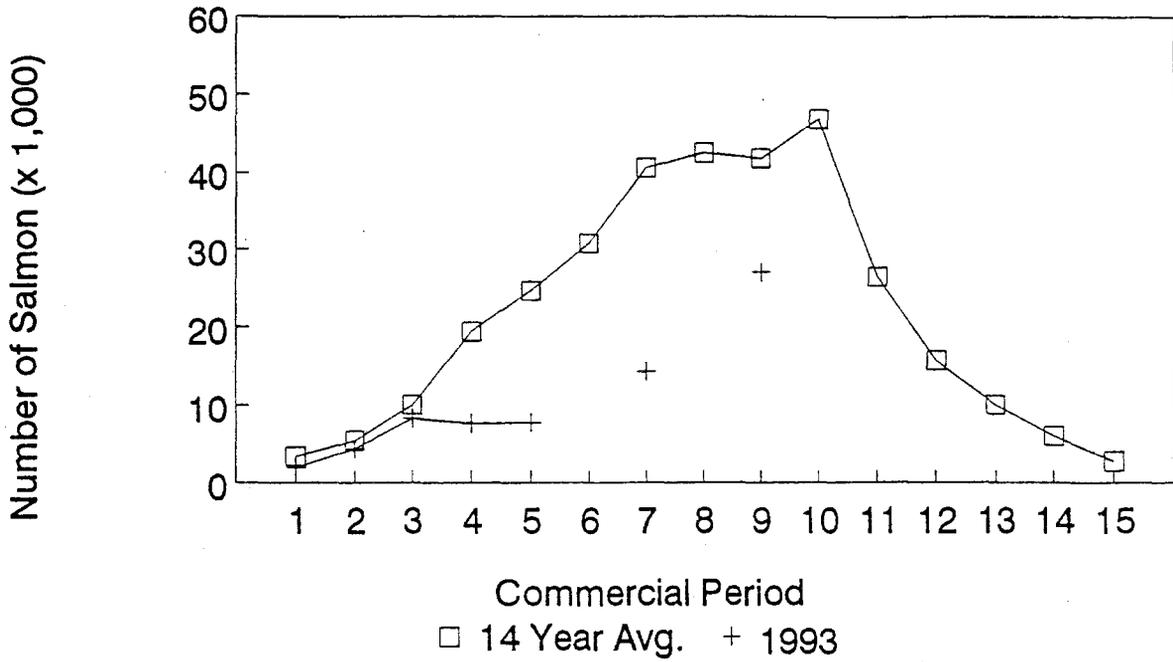


Figure 1. Kotzebue Sound commercial fishing subdistricts and statistical areas.

Kotzebue Sound Chum Salmon
Catch: 1993 vs 14 Year Average



Kotzebue Sound Chum Salmon
CPUE: 1993 vs 14 Year Average

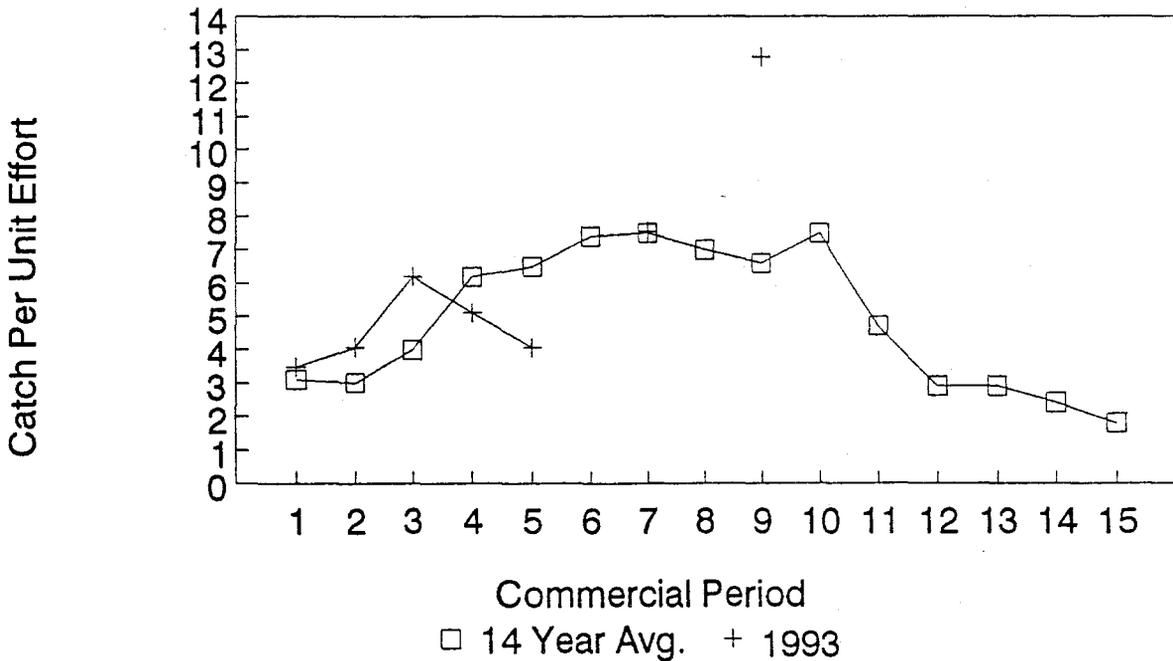
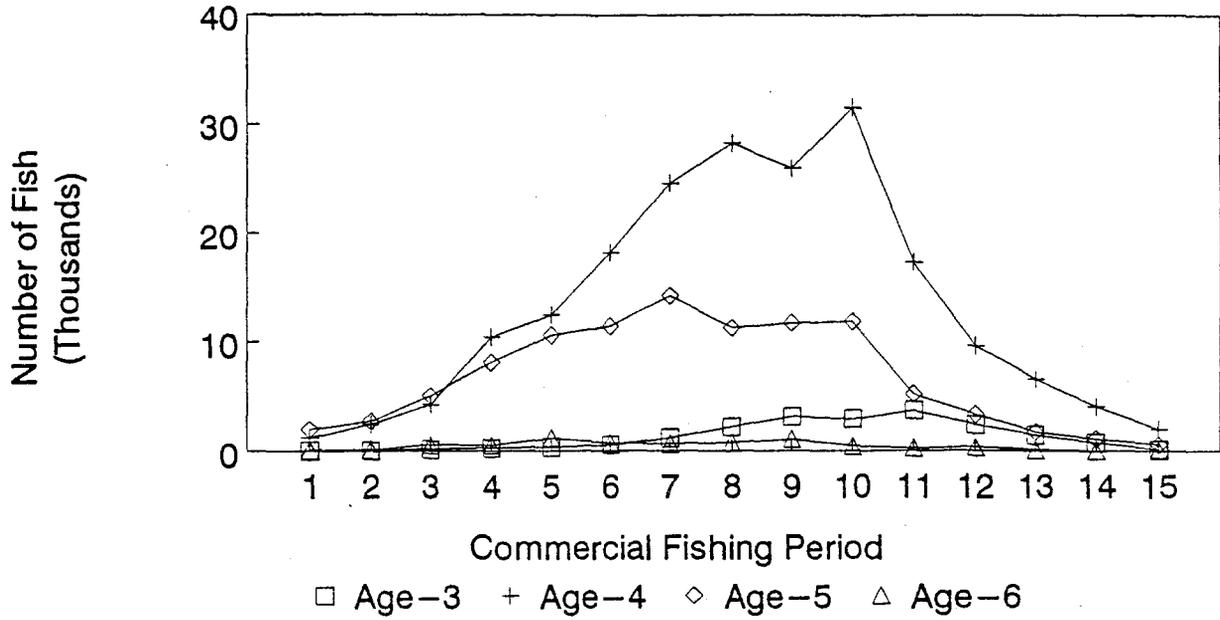


Figure 2. Kotzebue District commercial previous 14 year average (1979–1992) and 1993 catch and catch per unit effort comparisons.

Kotzebue Sound Commercial Salmon
14 Year Average



Kotzebue Sound Commercial Salmon
1993

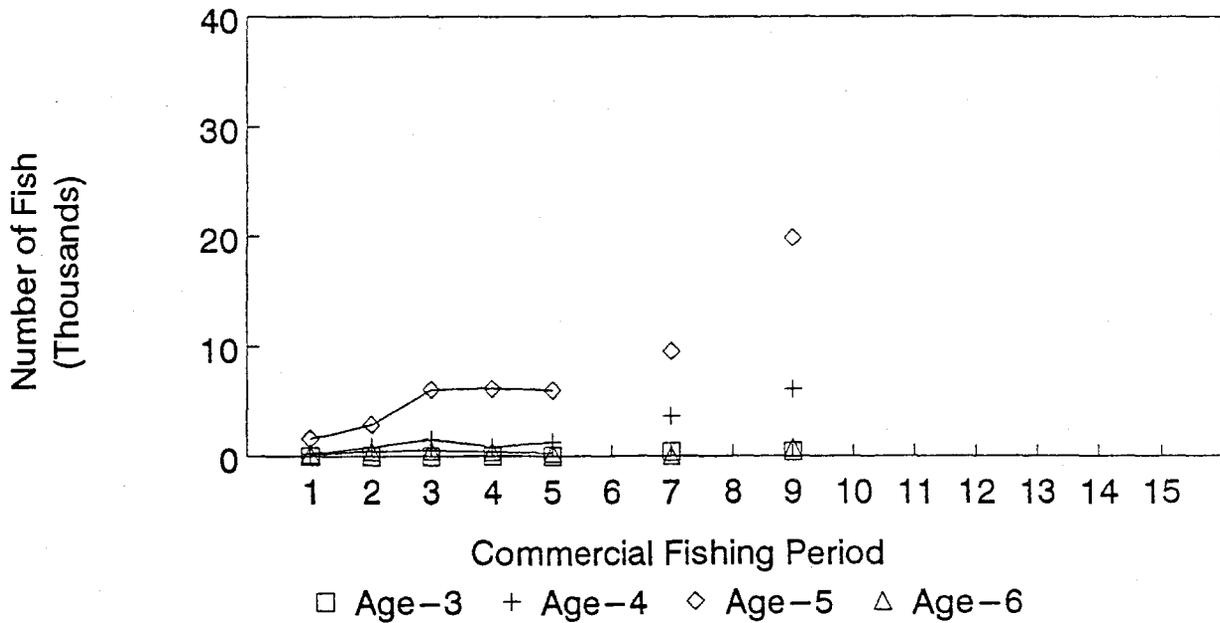


Figure 3. Age in numbers of chum salmon by period comparing recent 14 year average (1979–1992) to 1993.

Noatak River Sonar Cumulative Chum Salmon Counts

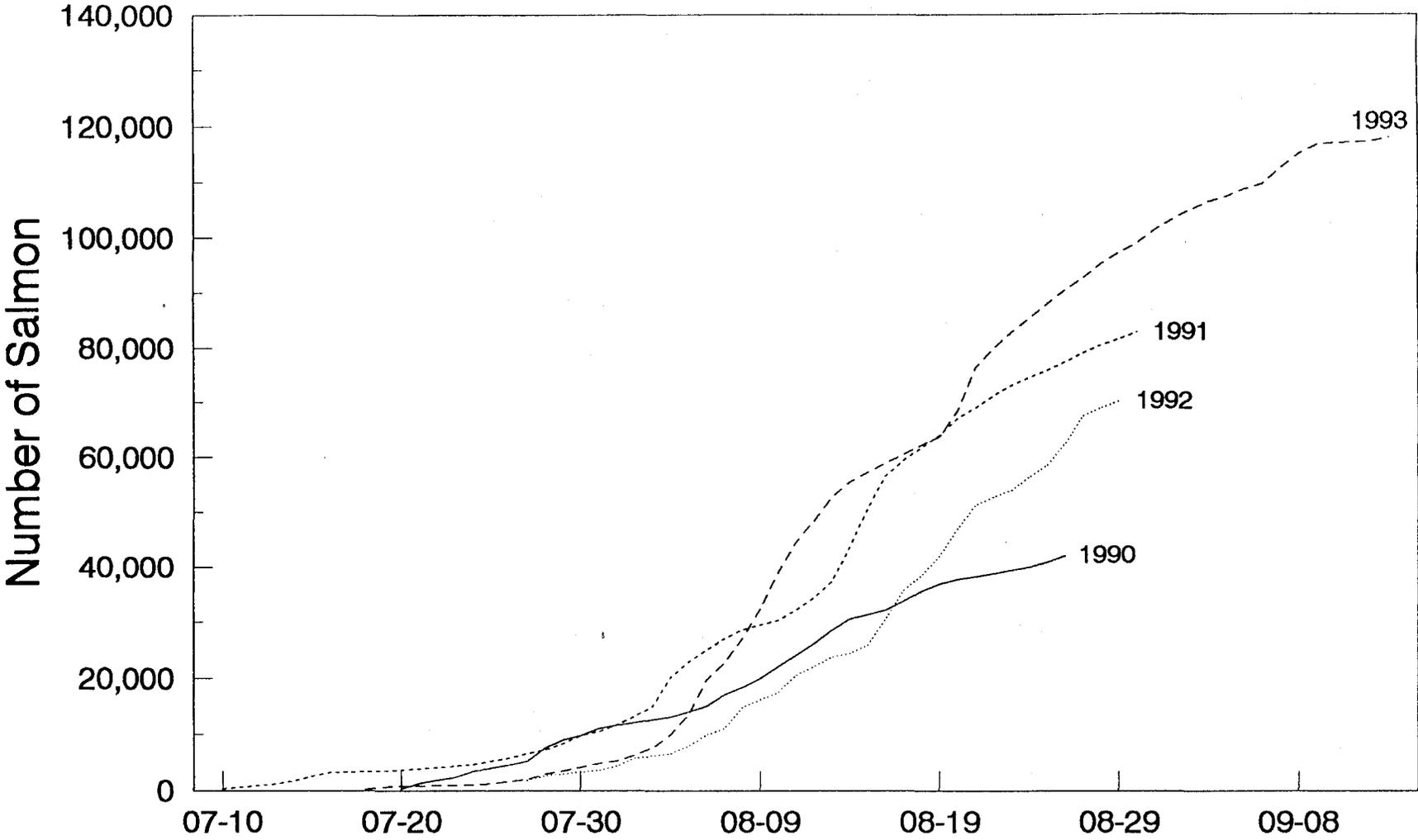


Figure 4. Noatak River sonar cumulative chum salmon counts, 1990-1993.