

Kotzebue District Fisheries Report, 1994
to the
Alaska Board of Fisheries

By
Tracy Lingnau
and
Charles Lean



Regional Information Report¹ No. 3A94-33

Alaska Department of Fish and Game
Division of Commercial Fisheries, AYK Region
333 Raspberry Road
Anchorage, Alaska 99518-1599

October 1994

¹ The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate needs for up-to-date information, reports in this series may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author of the Division of Commercial Fisheries.

TABLE OF CONTENTS

	Page
LIST OF TABLES	iii
LIST OF FIGURES	iii
KOTZEBUE SOUND SEASON SUMMARY, 1994	1
General Information	1
Inseason Management	1
Commercial Season Summary	2
Sikusuilag Hatchery	4
Escapement	4
Weather	5
Dolly Varden	5
Freshwater Fisheries	5
1995 Outlook	5

LIST OF TABLES

Table	Page
1. Commercial catches of chum salmon, chinook salmon and Dolly Varden by period in the Kotzebue District, 1994.	6
2. Kotzebue District chum salmon fishery information, 1981-1994.	7
3. Kotzebue Sound chum salmon 1994 commercial and 15 year average catch statistics (1979-1993).	8
4. Kotzebue District commercial chum salmon, chinook salmon and Dolly Varden catch by statistical area, 1994.	9
5. Historical average age composition by period for the recent 15 years (1979-1993) and 1994.	10
6. Kotzebue District commercial age and sex composition of chum salmon, 1962-1994.	11
7. Kobuk River drift test fish historical mean daily and cumulative CPUE and CPUE proportions, 1993-1994.	12
8. Noatak River Sonar daily and cumulative chum salmon counts, 1990-1994.	13
9. Kotzebue District winter commercial Sheefish harvest statistics, 1967-1994.	14

LIST OF FIGURES

Figure	Page
1. Kotzebue Sound commercial fishing district, villages and subsistence fishing areas, and major chum salmon spawning tributaries.	15
2. Kotzebue Sound commercial fishing subdistricts and statistical areas. . .	16
3. Kotzebue District previous 15 year average (1979-1993) and 1994 catch per unit effort comparisons.	17
4. Age in numbers of chum salmon by period comparing recent 15 year average (1979-1993) to 1994.	18
5. Kobuk River chum salmon drift test fish cumulative CPUE for 1993 and 1994.	19
6. Noatak River chum salmon cumulative sonar counts from 1990-1994.	20

KOTZEBUE SOUND SALMON SEASON SUMMARY, 1994

General Information

The Commercial harvest in the Kotzebue district (Figure 1, Figure 2) during 1994 consisted of 149,452 chum salmon, 4 chinook salmon, and 149 Dolly Varden (Table 1). This commercial chum harvest was near the upper projected range of 75,000-150,000 salmon. This catch was roughly half of the 15 year (1979-1993) average of 291,000. There were 109 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 and the lowest salmon prices since 1972 (\$0.20).

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 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) or 6 in (15.2 cm) stretch multifilament gill net.

From July 11 to July 29 the season began normally with bi-weekly fishing periods. After period 6 when buyers could not purchase what was caught buyers met with the department managers. Buyers explained that because of the salmon glut on the market they were held to purchasing a limited poundage for each commercial period. For the remainder of the season, openings were coordinated with buyers so that fish in excess of their limitations would not be taken and could be shipped out for processing in a timely manner. A total of twenty-one openings were fished in 1994 for a total of 236 hours. Since the fishery's inception in 1962, only 1993 (168) had fewer hours fished. This was about half of the recent 15 year (1979-1993) average (456). Commercial fishing period lengths varied from 3 hours to 36 hours in length during the 1994 season.

During 1994, four buyers purchased a total of 1,166,494 pounds of chum salmon (average weight 7.8) at \$.20 per pound, 73 pounds of chinook salmon (average weight 18.3) at an average of \$1.14 per pound, and 767 pounds of Dolly Varden (average weight 5.1) at an average of \$.17 per pound. The total ex-vessel value was \$233,512 to Kotzebue area fishermen with an average of \$2,319 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. In addition, 4,000 chum salmon at an estimated 31,500 pounds was unloaded from fishermen but not sold.

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 that of previous years during the early part of the season and the Noatak River sonar counts during the last 6 periods. A comparison of catch rates over the history of the fishery has shown a close relationship to the total run strength.

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. Weak 3 and 4 year old age classes 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 occurred for the second 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 11 by emergency order as established by regulation. Commercial catch for the first 3 periods nearly mirrored the recent 15 year average with catch per unit effort (CPUE) was above average (Table 3, Figure 3). Catch and catch rates for the first 3 periods indicated the chum salmon run to be at least average. With this information, average fishing time was warranted therefore Periods 4 and 5 were 24 hours in length.

Just before the commercial opening for Period 5, Monday, July 25, the City of Kotzebue delivered letters ordering three of the four buyers to cease operations because they did not have tide land use permits required by the city. The sole buyer had reached his poundage limit Tuesday afternoon, several hours before the period closure. The City Manager was due in from Anchorage at 5:30 that afternoon at which time an emergency meeting of the city council was held. Permits for the three buyers were hastily processed and approved. The orders to cease operations affected all three buyers in different manners. One buyer felt it would not be feasible to begin purchasing fish at the period closure. A second buyer, because he could not deliver fish as expected lost his original market and was unable to purchase fish. The third, opened for business literally at the time of the closure and was able to purchase the remaining fish.

Catch rates for periods 4 and 5 were above average and catches were near average. Age composition indicated an expected weaker than normal age-5 fish but a stronger than expected age-4 fish, (Table 5, Figure 4). Normally at this time half the fish are 4-year-olds. Age composition for age-4 was 68% for periods 4 and 5. With a continued average salmon run, fishing time for Periods 6 and 7 was extended to 36 hours in length.

Period 6 changed the management strategy for the rest of the season. The period began at 6:00 a.m. Thursday morning with three of the four buyers purchasing fish. At 5:00 a.m. one buyer called the area manager and stated that he and another buyer selling to the same processor were very near their purchase limits and questioned if the remaining buyer could handle the remaining fish. Throughout Friday morning and afternoon, the remaining buyer stated to several department personnel that they could and would purchase all of the fish during the remainder of the period. However, on Saturday morning an estimated 65,000 pounds of chum salmon were sitting in totes on the beach. Of those, it is estimated that 31,500 pounds were unloaded

from fishermen but not purchased. The rest were purchased but not shipped. No fish were wasted as fish on ice were absorbed by the community for human consumption and those not on ice were distributed to dog mushers for dog food.

A meeting between buyers and department personnel was scheduled that afternoon. Three of the four buyers attended. Those buyers stated again that they were restricted to purchasing a limited poundage. It was agreed that the buyers would contact local managers in the morning on a daily basis and let us know what poundage they could purchase on that certain day. Fishing time was adjusted so that the quantity of fish harvested remained below the processor's quota. The remainder of the season was managed in this manner, with Noatak River sonar counts remaining at a level of which the escapement goal should be made. The staff felt that the escapement would not be a factor and that commercial fishing should continue. Buyers also held a meeting with fishermen explaining that because of the market and the cost of flying fish out, the best price that they could offer was \$.15/lb. Buyers asked fishermen if they would fish for that amount and those who attended said they would. However, with the reduced hours requested by the buyers, a large number of fishermen felt it was not worth their time and quit fishing.

One of the three buyers ceased operations on August 3 leaving an even more limited market. The second buyer's last day of purchasing fish was August 17. The remaining buyer purchased fish through August 24 before closing. Under a normal fishing schedule, two more commercial periods would have occurred. Because of a lack of commercial samples during periods without a buyer, the department contracted local fishermen to test fish for age composition.

During the latter portion of the fishery, an interesting discovery occurred concerning the migration pattern of hatchery and wildstock chum salmon passing through the fishery. During Periods 17, 19, 20 and 21 the commercial harvest of salmon was nearly all hatchery fish. Period 18 however was entirely wildstock. Period 18 occurred under unfavorable weather conditions and all but one of the ten fishermen fished on the south side of the fishing district. Quite the opposite was true for Periods 17, 19, 20 and 21 when virtually the entire harvest was from the north side of the fishing district. This indicates that there could be separation between hatchery and wildstock salmon as they pass through the district (Table 4).

Age-5 salmon tend to dominate the earlier commercial openings with the younger age classes moving through during the latter part of the fishery. This was also true for 1994. A higher than average number of age-4 fish were found compared to historical averages. This probably reflects a weak 5-year-old age class coming off of a weak 1993 4-year-old age class. Age-3 salmon were normal during the first half of the season but declined to roughly half of average in the latter portion of the season (Table 6).

Sikusuilag Hatchery

An expected excess of hatchery stock prompted local buyers to again explore the possibilities of a salmon roe harvest. The Northwest Arctic Borough developed and sent out bids to prospective buyers. All buyers declined to bid for the excess salmon. The only most promising buyer said that his primary market did not want the eggs because of the excess chum salmon on the market and the other possible market would have had only produced marginal profits. Therefore, no commercial

harvest of excess salmon at the hatchery occurred.

Escapement

Because of poor weather conditions and flooding conditions, no aerial surveys were flown during the entire season. A sonar project located on the Noatak River monitored escapements into that drainage. A test fish project in it's second year, located in Kiana, monitored salmon run strength and timing into the Kobuk River. The test fish crews in Kiana also visited with subsistence fishermen to monitor subsistence catches.

The test fish indices from the Kobuk River are not used to manage the fishery yet but when used with other indices, the chum salmon run into Kobuk River was quite strong (Table 7, Figure 5). The test fish indices were more than twice that of 1993 when based on aerial surveys, escapements were just met. Another indication that the Kobuk stock was strong is that the catch rates for Periods 3-6 were 1.5 to 2 times the average. One of the reasons for the high CPUE rates was there were fewer fishermen. Age-4 fish were also strong early in the season. Tributary Age/Sex/Length sampling also found larger quantities of carcasses than in the past. The chum salmon run into the Kobuk River was at minimum adequate.

This was the first year the entire Noatak River was enumerated by sonar. In past years only the "right" bank, when facing down river, was counted. Counts on the left bank were roughly 8-12 percent throughout the season so managers could deduct this from the entire count for comparison to past years. For the first time a specific goal of 160,000 chum salmon for the wildstock total passage was established. This goal was calculated using three previous tagging studies to separate Noatak and Kobuk River chum salmon stocks in Kotzebue Sound.

The Noatak River sonar began counting on July 22. Within one week, comparable counts on the right bank were three times that of 1993 (Table 8, Figure 6). The sonar passage remained twice that of 1993 until mid-August. When expanded out, this passage rate would have indicated a total passage of 180,000 to 200,000 chum salmon. However, towards the end of August these counts slowed. The Noatak River sonar counted a strong pulse of fish at the end of the season during 1993. That was expected that to occur in 1994. In previous years, subsistence catches also have indicated this pulse has occurred. During 1994 this pulse never occurred and counts remained relatively flat from the end of August until the sonar project ended on September 10. When looking back, the chum salmon run into the Noatak River was an early run. A total count past the sonar was 161,500 chum salmon. The Sikusuilaq Hatchery estimated return was 45,000-50,000 during sonar operations. This would put the wildstock escapement into the Noatak River at about 111,500-116,500 chum salmon.

Weather

In Northwest Alaska the general weather pattern for July and August was rain. In Kotzebue, the average rainfall for July and August is 1.46" and 2.03". This year the rainfall for July was 3.07", twice normal and for August 4.70, more than twice the average. The rainfall for August in 1994 was only 0.48" short of the all time record of 5.18. The Sikusuilaq Hatchery received half it's annual precipitation in a single weekend. The village of Kobuk reported the worst flood since 1937. This was corroborated with the Elders interviewed by the IRA in Kiana. Most

remembered a flood of this level when they were children. Some of them did not remember a flood this bad but did remember stories of a comparable flood from their parents. Watersheds in Northwest Alaska are quite large with a relatively low gradient. This results in river systems that take a substantial amount of time to drain. During carcass surveys, a tributary of the Kobuk River and the main stem of the Upper Kobuk showed that rivers were easily 5-7 feet above normal. Noatak River levels at the Sikusuilaq Hatchery were 8-10 above normal. These levels were above some spring breakup floods. In general, it was mid-September by the time rivers were near normal levels.

Most salmon in the Kotzebue district tend to be more of a later spawning salmon. Because of this, managers feel that egg mortality did occur but survival of brood year stock should be good as most salmon return to the deep side channels that have flowing water throughout the winter. Egg survival would have been quite poor if the flood had occurred in September.

Dolly Varden

In the previous couple of years, incidental catch of Dolly Varden (locally called trout) was virtually non-existent because of closed periods. This year, commercial fishing occurred during what is normally the time period when the Dolly Varden migrate through the district. However, the incidental harvest this year was only 149. Spawners and wintering Dolly Varden normally migrate through the district during the third week of August. There were indications that a pulse of Dolly Varden moved through the district but the fish were quite small and probably went through the commercial gear. What happened to the larger spawners is being investigated by Sport Fish Biologists.

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 1994 commercial salmon season. Sheefish are caught and sold predominantly between late October and late March.

There were 5 freshwater permit holders in 1993 and 3 permit holders in 1994. Of these 8, one was registered to sell fish but did not (Table 9).

1995 Outlook

The outlook for the 1995 season is based on the returning age classes of the 1994 season. During the 1995 season, the four year old age component of the run is expected to be near average as is the five year old component. The three year old component is generally small, and it too is likely to be near average. The commercial harvest is expected to fall within the range from 250,000 to 350,000 chum salmon, assuming an adequate market.

Table 1. Commercial catches of chum salmon, chinook salmon and Dolly Varden by period in the Kotzebue District, 1994.

Period	Date	Hours Fished	Number of Fishermen	Chum			Chinook			Dolly Varden		
				Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.
1	July 11–12	24	18	1,529	12,009	7.9						
2	July 14–15	24	33	3,677	28,730	7.8						
3	July 18–19	24	40	12,887	98,368	7.6	1	14	14.0			
4	July 21–22	24	66	17,111	137,438	8.0	1	18	18.0			
5	July 25–26	24	69	14,530	116,404	8.0	1	21	21.0			
6	^a July 27–28	36	82	41,327	330,095	8.0	1	20	20.0			
7	August 1	6	38	2,957	23,231	7.9						
8	August 2	6	57	17,435	133,823	7.7						
9	August 4	3	51	7,110	55,828	7.9						
10	August 5	4	60	13,756	107,830	7.8						
11	August 9	3	25	1,644	12,153	7.4						
12	August 10	5	22	1,720	12,649	7.4						
13	August 12	3	35	5,303	40,095	7.6						
14	August 15	4	23	2,133	15,963	7.5						
15	August 16	4	21	2,826	20,580	7.3						
16	August 17	3	22	3,236	22,790	7.0						
17	August 18	4	18	1,758	12,209	6.9						
18	August 19	5	10	817	5,769	7.1						
19	August 22	9	10	682	4,828	7.1				79	416	5.3
20	August 23	9	5	473	3,310	7.0				8	56	7.0
21	August 24	12	7	541	3,892	7.2				62	295	4.8
Totals		236	109	153,452	1,197,994	7.8	4	73	18.3	149	767	5.1

^a 4,000 fish and 31,500 lbs were added. These fish were commercially caught but not reported on fish tickets.

Table 2. Kotzebue District chum salmon fishery information, 1981 - 1994.

Commercial Catch	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
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	149.5
Number of permits	187	199	189	181	189	187	160	193	165	153	143	149	114	109
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	1,371
Est. value (x 1,000)	\$3,247	\$1,962	\$421	\$1,149	\$2,137	\$933	\$515	\$2,605	\$614	\$438	\$429	\$527	\$231	\$234
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	\$2.1

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	^b
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	206 ^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	61,883	

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 due to unfavorable weather and water conditions.

^c Poor aerial survey conditions.

^d Foot surveys.

Table 3. Kotzebue Sound chum salmon 1994 commercial and 15 year average catch statistics (1979–1993).

Period	Hours	Number Permits	Catch (x 1,000)	CPUE	Cumulative		Prop. Catch
					Catch (x 1,000)	CPUE	
1	24	42	3.3	3.1	3.0	3.1	0.010
2	24	70	5.3	3.0	8.3	3.0	0.029
3	24	96	9.9	4.1	18.2	3.6	0.063
4	25	116	18.6	6.1	36.8	4.5	0.127
5	28	129	23.5	6.4	60.3	5.1	0.207
6	30	138	30.8	7.4	87.0	5.5	0.299
7	37	140	38.7	7.5	123.1	5.9	0.423
8	40	147	42.5	7.0	162.8	6.2	0.560
9	42	139	40.8	7.0	203.6	6.4	0.700
10	41	144	46.8	7.5	244.1	6.5	0.839
11	44	134	26.4	4.7	265.2	6.3	0.912
12	45	117	15.7	2.9	277.8	6.0	0.955
13	42	89	10.0	2.9	285.8	5.8	0.983
14	39	64	6.0	2.4	289.4	5.7	0.995
15	41	39	2.8	1.8	290.9	5.7	1.000

1994		Cumulative							
Period	Date ^a	Hours	Number Permits	Catch (x 1,000)	CPUE	Catch (x 1,000)	CPUE	Prop. Catch	
1	July 11–12	24	18	1.5	3.5	1.5	3.5	0.010	
2	July 14–15	24	33	3.7	4.6	5.2	4.3	0.034	
3	July 18–19	24	40	12.9	13.4	18.1	8.3	0.118	
4	July 21–22	24	66	17.1	10.8	35.2	9.3	0.229	
5	July 25–26	24	69	14.5	8.8	49.7	9.2	0.324	
6	^a July 27–28	36	82	41.3	14.0	91.1	10.9	0.593	
7	August 1–2	12	65	20.4	26.1	111.5	12.2	0.726	
8	August 4–5	7	73	20.9	40.8	132.3	14.9	0.862	
9	August 9–10	8	38	3.4	11.1	135.7	13.6	0.884	
10	August 12	3	35	5.3	50.5	141.0	14.0	0.919	
11	August 15–17	11	38	8.2	19.6	149.2	14.2	0.972	
12	August 18–19	9	20	2.6	14.3	151.8	14.2	0.989	
13	August 22–24	30	12	1.7	4.7	153.5	13.9	1.000	
14	August 25	No commercial fishing due to lack of buyer.							
15	August 30	No commercial fishing due to lack of buyer.							

^a Commercial periods were combined so that comparisons from 1994 could be made to the historical average.

Table 4. Kotzebue District commercial chum salmon, chinook salmon and Dolly Varden catch by statistical area, 1994. ^a

Statistical Area	No. of Fishermen	Chum			Chinook			Dolly Varden		
		Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.
331-01	96	82,810	642,007	7.8	3	53	17.7	2	10	5.0
331-02	49	34,604	268,770	7.8	1	20	20.0	147	757	5.1
331-03	9	2,287	17,377	7.6						
331-04	9	1,848	14,539	7.9						
331-05	21	14,467	116,471	8.1						
331-06	16	13,436	107,320	8.0						
Totals	109	149,452	1,166,484	7.8	4	73	18.3	149	767	5.1

^a Does not include 4,000 salmon at 31,500 pounds taken commercially on July 29 but not reported on fish tickets.

Table 5. Historical average age composition by period for the recent 15 years (1979–1993) and 1994.

15 Year Avg.		Percent				Catch by Age			
Period	Catch	3	4	5	6	3	4	5	6
1	3,260	0.4	33.5	61.9	4.3	13	1,091	2,017	140
2	5,288	1.0	41.5	53.5	3.9	53	2,195	2,829	206
3	9,914	1.4	39.2	53.5	5.8	139	3,888	5,306	576
4	18,603	1.4	47.7	47.5	3.4	260	8,874	8,836	633
5	23,464	1.4	45.8	48.0	4.8	328	10,747	11,263	1,126
6	30,790	1.8	53.0	42.6	2.6	554	16,319	13,117	801
7	38,697	2.9	55.0	40.0	2.0	1,122	21,283	15,479	774
8	42,480	4.7	59.9	33.5	1.9	1,997	25,446	14,231	807
9	40,828	6.7	56.7	34.0	2.6	2,735	23,149	13,882	1,062
10	46,756	6.3	62.7	29.8	1.3	2,946	29,316	13,933	608
11	26,415	12.6	62.9	23.4	1.0	3,328	16,615	6,181	264
12	15,668	13.5	57.2	27.1	2.2	2,115	8,962	4,246	345
13	10,028	14.7	64.6	19.3	1.5	1,474	6,478	1,935	150
14	5,991	11.4	62.3	25.4	0.8	683	3,732	1,522	48
15	2,783	4.8	67.5	26.6	1.1	134	1,879	740	31

Kotzebue Sound commercial catch and age composition, 1994.

1994		Percent				Catch by Age				
Period	Date ^a	Catch	3	4	5	6	3	4	5	6
1	July 11–12	1,529	0.7	41.8	54.5	3.0	11	639	833	46
2	July 14–15	3,677	0.0	41.9	50.2	7.9	0	1,541	1,846	290
3	July 18–19	12,887	0.7	51.5	40.3	7.5	90	6,637	5,193	967
4	July 21–22	17,111	1.1	58.9	34.9	5.1	188	10,078	5,972	873
5	July 25–26	14,530	1.6	57.4	36.7	4.3	232	8,340	5,333	625
6	^a July 27–28	41,327	2.4	62.5	32.4	2.8	992	25,829	13,390	1,157
7	August 1–2	20,392	3.3	70.4	23.0	3.3	673	14,356	4,690	673
8	August 4–5	20,866	2.7	72.7	23.7	0.9	563	15,170	4,945	188
9	August 9–10	3,364	3.4	76.5	20.4	1.6	114	2,573	686	54
10	August 12	5,303	3.8	72.2	21.5	2.5	202	3,829	1,140	133
11	August 15–17	8,195	6.5	74.1	18.7	0.7	533	6,072	1,532	57
12	August 18–19	2,575	6.1	77.0	16.3	0.5	158	1,984	419	14
13	August 22–24	1,696	6.3	60.1	32.1	1.5	107	1,020	545	25
14	August 25		7.4	74.1	18.5	0.0	Age composition from commercial test samples.			
15	August 30		4.6	71.3	24.1	0.0	Age composition from commercial test samples.			

^a Commercial periods were combined so that comparisons from 1994 could be made to the historical average.

Table 6. Kotzebue District commercial age and sex composition of chum salmon, 1962–1994.^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
1993 ^m	3,707	50.9	49.1	2.9	26.4	66.5	4.2
15 Year Average (1979–1993)		47.8	52.2	4.9	56.6	36.2	2.4
1994 ⁿ	3,744	44.8	55.2	3.3	63.0	30.8	2.9

- ^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.
- ⁿ Commercial openings 14 and 15 were closed periods. Closed periods were sampled for age and sex composition from commercial test nets and are included in the 1994 data.

Table 7. Kobuk River drift test fish historical mean daily and cumulative CPUE and CPUE proportions, 1993–1994

Date	Proportions							
	1993		1994		1993		1994	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
10-Jul								
11-Jul								
12-Jul	11.18	11.18			0.023	0.023		
13-Jul	14.22	25.40	0.00	0.00	0.029	0.051	0.000	0.000
14-Jul	20.57	45.97	2.68	2.68	0.042	0.093	0.002	0.002
15-Jul	35.08	81.05	2.58	5.26	0.071	0.164	0.002	0.004
16-Jul	13.19	94.24	11.35	16.61	0.027	0.191	0.009	0.014
17-Jul	17.27	111.51		16.61	0.035	0.226	^a	0.014
18-Jul	^a	111.51	7.16	23.77	^a	0.226	0.006	0.020
19-Jul	10.71	122.22	12.40	36.17	0.022	0.247	0.010	0.030
20-Jul	2.76	124.98	3.65	39.82	0.006	0.253	0.003	0.033
21-Jul	3.20	128.18	7.30	47.12	0.006	0.259	0.006	0.039
22-Jul	5.52	133.70	3.56	50.68	0.011	0.271	0.003	0.042
23-Jul	27.15	160.85	16.49	67.17	0.055	0.325	0.014	0.055
24-Jul	9.06	169.91	^a	67.17	0.018	0.344	^a	0.055
25-Jul	^a	169.91	14.38	81.55	^a	0.344	0.012	0.067
26-Jul	15.22	185.13	47.65	129.20	0.031	0.375	0.039	0.106
27-Jul	8.06	193.19	40.66	169.86	0.016	0.391	0.033	0.139
28-Jul	16.36	209.55	57.83	227.69	0.033	0.424	0.047	0.187
29-Jul	0.93	210.48	33.62	261.31	0.002	0.426	0.028	0.214
30-Jul	0.92	211.40	69.21	330.52	0.002	0.428	0.057	0.271
31-Jul	12.58	223.98	^a	330.52	0.025	0.453	^a	0.271
01-Aug	^a	223.98	82.16	412.68	^a	0.453	0.067	0.339
02-Aug	6.74	230.72	65.12	477.80	0.014	0.467	0.053	0.392
03-Aug	54.49	285.21	71.79	549.59	0.110	0.577	0.059	0.451
04-Aug	44.23	329.44	108.98	658.57	0.090	0.667	0.089	0.540
05-Aug	89.30	418.74	59.74	718.31	0.181	0.847	0.049	0.589
06-Aug	18.60	437.34	102.56	820.87	0.038	0.885	0.084	0.673
07-Aug	20.52	457.86	^a	820.87	0.042	0.927	^a	0.673
08-Aug	^a	457.86	62.75	883.62	^a	0.927	0.051	0.725
09-Aug	1.84	459.70	96.86	980.48	0.004	0.930	0.079	0.804
10-Aug	12.63	472.33	45.83	1,026.31	0.026	0.956	0.038	0.842
11-Aug	18.11	490.44	57.02	1,083.33	0.037	0.992	0.047	0.889
12-Aug	3.74	494.18	90.54	1,173.87	0.008	1.000	0.074	0.963
13-Aug			11.36	1,185.23			0.009	0.972
14-Aug			^a	1,185.23			^a	0.972
15-Aug			5.13	1,190.36			0.004	0.977
16-Aug			16.23	1,206.59			0.013	0.990
17-Aug			0.00	1,206.59			0.000	0.990
18-Aug			0.00	1,206.59			0.000	0.990
19-Aug			3.12	1,209.71			0.003	0.992
20-Aug			0.00	1,209.71			0.000	0.992
21-Aug			^a	1,209.71			^a	0.992
22-Aug			0.00	1,209.71			0.000	0.992
23-Aug			0.00	1,209.71			0.000	0.992
24-Aug			0.00	1,209.71			0.000	0.992
25-Aug			0.91	1,210.62			0.001	0.993
26-Aug			5.56	1,216.18			0.005	0.998
27-Aug			1.86	1,218.04			0.002	0.999
28-Aug			0.93	1,218.97			0.001	1.000
29-Aug			0.00	1,218.97			0.000	1.000
30-Aug			0.00	1,218.97			0.000	1.000

Table 8. Noatak River Sonar daily and cumulative chum salmon counts, 1990 – 1994.

Date	1990 ^a		1991 ^a		1992 ^a		1993 ^b		1994 ^c	
	Daily	Cum.	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	133	133
23-Jul	509	2,396	292	4,399			26	963	463	596
24-Jul	980	3,376	246	4,645			96	1,059	1,345	1,941
25-Jul	615	3,991	543	5,188			159	1,218	945	2,886
26-Jul	602	4,593	570	5,758			386	1,604	1,552	4,438
27-Jul	587	5,180	850	6,608	1,795	1,795	356	1,959	2,208	6,646
28-Jul	2,469	7,649	707	7,314	860	2,655	977	2,937	5,755	12,401
29-Jul	1,432	9,081	1,038	8,353	253	2,908	548	3,485	5,862	18,263
30-Jul	756	9,837	1,419	9,772	355	3,263	722	4,207	3,846	22,109
31-Jul	1,174	11,011	678	10,450	351	3,614	582	4,789	4,343	26,452
01-Aug	626	11,637	1,292	11,742	710	4,324	506	5,296	3,010	29,462
02-Aug	390	12,027	1,464	13,205	1,482	5,806	1034	6,330	3,211	32,673
03-Aug	647	12,674	1,917	15,123	485	6,291	1283	7,613	2,002	34,675
04-Aug	445	13,119	5,009	20,132	282	6,573	2420	10,033	5,238	39,913
05-Aug	941	14,060	2,746	22,878	1,499	8,072	3587	13,620	7,994	47,907
06-Aug	1,076	15,135	2,087	24,966	1,835	9,907	6115	19,734	6,905	54,812
07-Aug	1,903	17,039	2,002	26,968	1,161	11,068	2997	22,732	7,785	62,597
08-Aug	1,366	18,404	1,563	28,531	3,837	14,905	4353	27,085	9,049	71,646
09-Aug	1,594	19,998	890	29,420	1,305	16,210	5106	32,190	7,557	79,203
10-Aug	2,086	22,084	744	30,164	1,205	17,415	6585	38,775	4,870	84,073
11-Aug	1,983	24,067	1,839	32,003	3,142	20,557	5569	44,344	3,838	87,911
12-Aug	2,067	26,134	2,346	34,350	1,474	22,031	3994	48,338	811	88,722
13-Aug	2,343	28,477	2,837	37,187	1,763	23,794	4302	52,640	774	89,496
14-Aug	1,982	30,460	6,264	43,451	548	24,342	2713	55,353	5,536	95,032
15-Aug	757	31,217	7,087	50,537	1,475	25,817	1827	57,179	5,885	100,917
16-Aug	810	32,026	5,963	56,500	4,667	30,484	1686	58,865	5,970	106,887
17-Aug	1,626	33,653	2,852	59,352	4,986	35,470	1545	60,410	3,568	110,455
18-Aug	1,770	35,422	2,237	61,589	2,804	38,274	1702	62,112	2,984	113,439
19-Aug	1,270	36,692	2,291	63,879	3,652	41,926	1520	63,632	2,984	116,423
20-Aug	886	37,578	3,068	66,948	4,873	46,799	4708	68,340	2,984	119,407
21-Aug	468	38,046	1,928	68,876	4,444	51,243	7980	76,320	2,984	122,391
22-Aug	635	38,681	2,215	71,091	1,429	52,672	3417	79,738	2,984	125,375
23-Aug	644	39,325	1,933	73,025	1,080	53,752	2970	82,708	2,399	127,774
24-Aug	535	39,860	1,410	74,435	2,561	56,313	2526	85,234	5,357	133,131
25-Aug	993	40,853	1,320	75,755	2,204	58,517	2613	87,847	7,642	140,773
26-Aug	1,078	41,931	1,464	77,219	3,724	62,241	2467	90,314	5,007	145,780
27-Aug			1,747	78,966	5,077	67,318	2232	92,546	2,867	148,647
28-Aug			1,385	80,351	1,428	68,746	2646	95,192	1,430	150,077
29-Aug			1,147	81,498	1,319	70,065	1988	97,180	616	150,693
30-Aug			1,241	82,739			1778	98,958	606	151,299
31-Aug							2492	101,449	1,005	152,304
01-Sep							1922	103,371	991	153,295
02-Sep							1624	104,995	1,312	154,607
03-Sep							1531	106,526	1,349	155,956
04-Sep							955	107,481	1,124	157,080
05-Sep							1338	108,818	1,167	158,247
06-Sep							891	109,709	1,245	159,492
07-Sep							2965	112,674	538	160,030
08-Sep							2455	115,129	532	160,562
09-Sep							1667	116,796	464	161,026
10-Sep							232	117,029	462	161,488
11-Sep							125	117,153		
12-Sep							251	117,405		
13-Sep							582	117,986		

^a Transducer used in counting was 420 kHz on right bank only.

^b Transducer used in counting was 120 kHz on right bank only.

^c Transducers used in counting were 120 kHz on left and right bank for a total passage count.

Table 9. Kotzebue District winter commercial Sheefish harvest statistics, 1967 – 1994. ^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
1994 ^e						

^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.

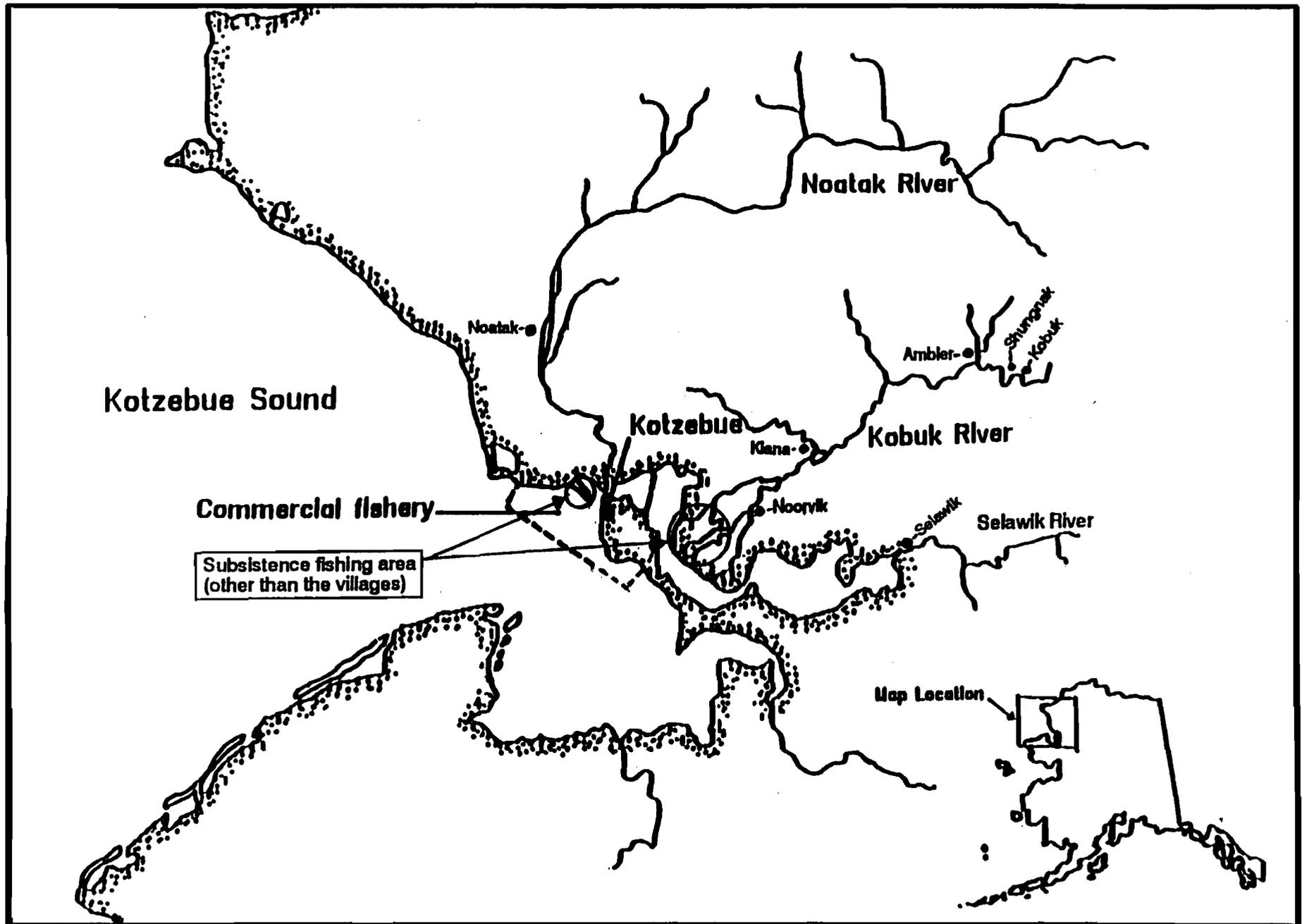


Figure 1. Kotzebue Sound commercial fishing district, villages and subsistence fishing areas, and major chum salmon spawning tributaries.

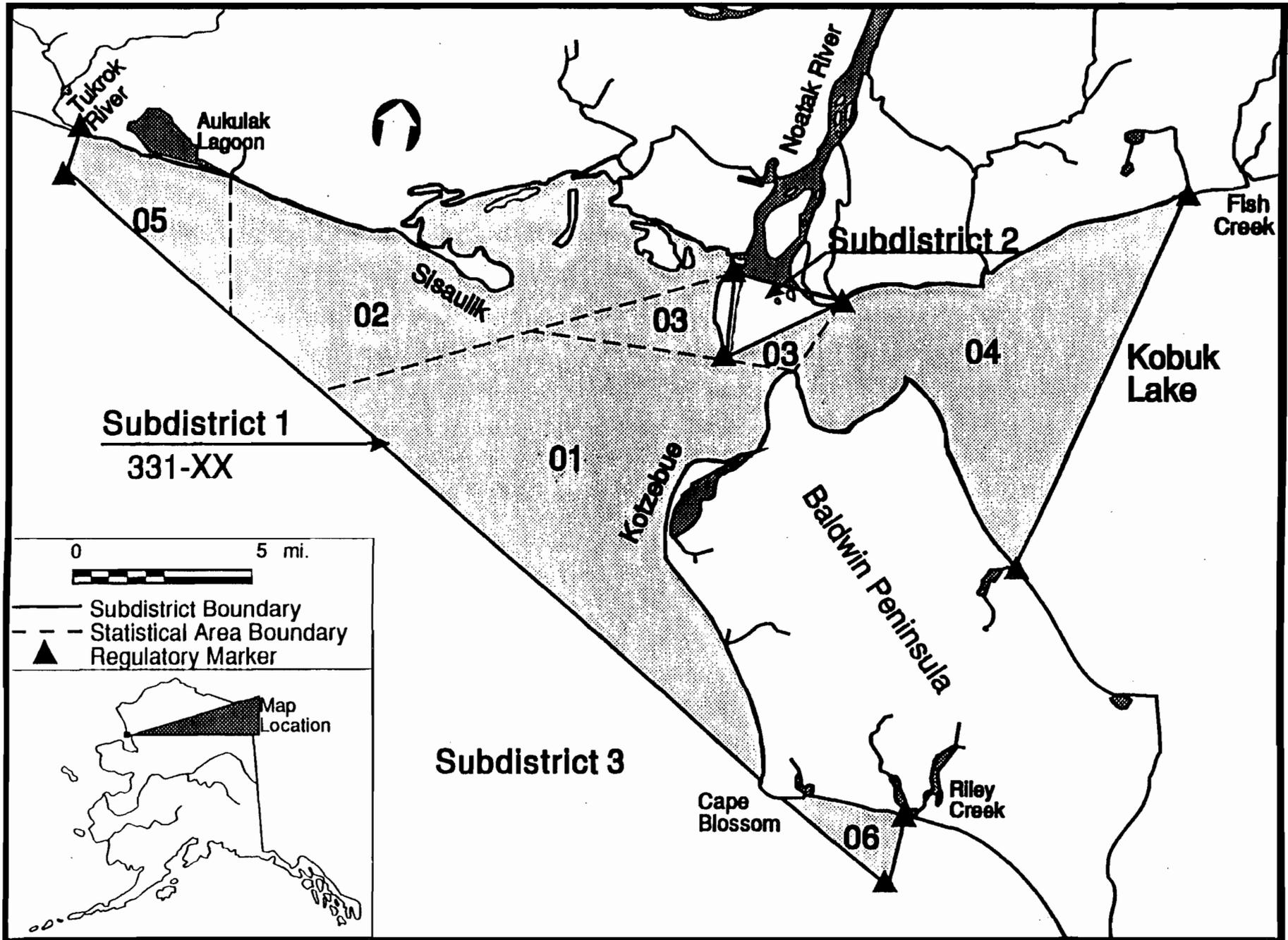
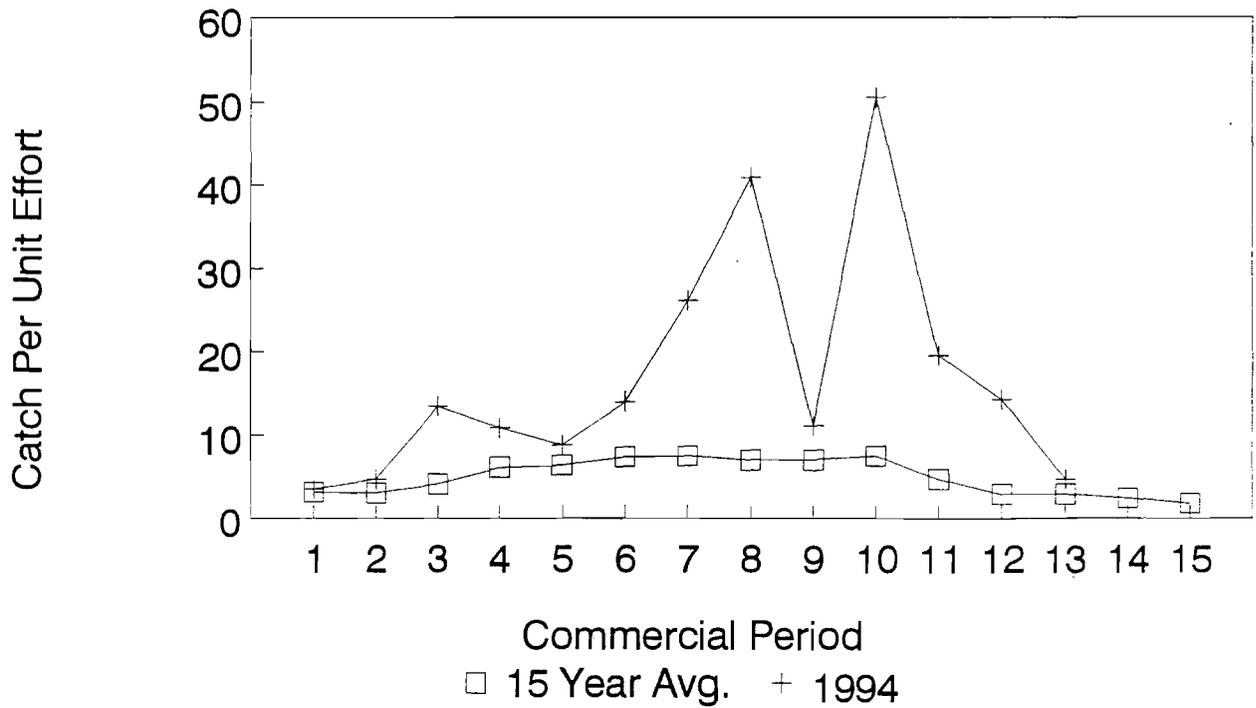


Figure 2. Kotzebue Sound commercial fishing subdistricts and statistical areas.

Kotzebue Sound Chum Salmon
CPUE: 1994 vs 15 Year Average



Kotzebue Sound Chum Salmon
Catch: 1994 vs 15 Year Average

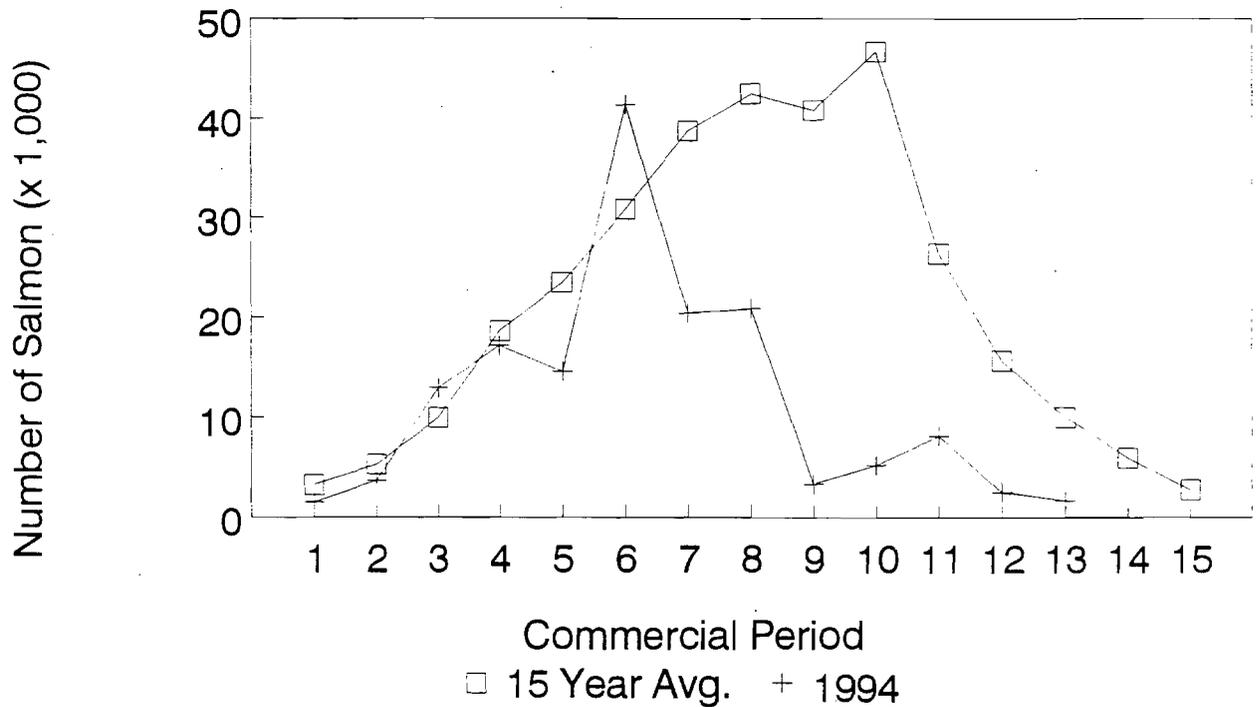
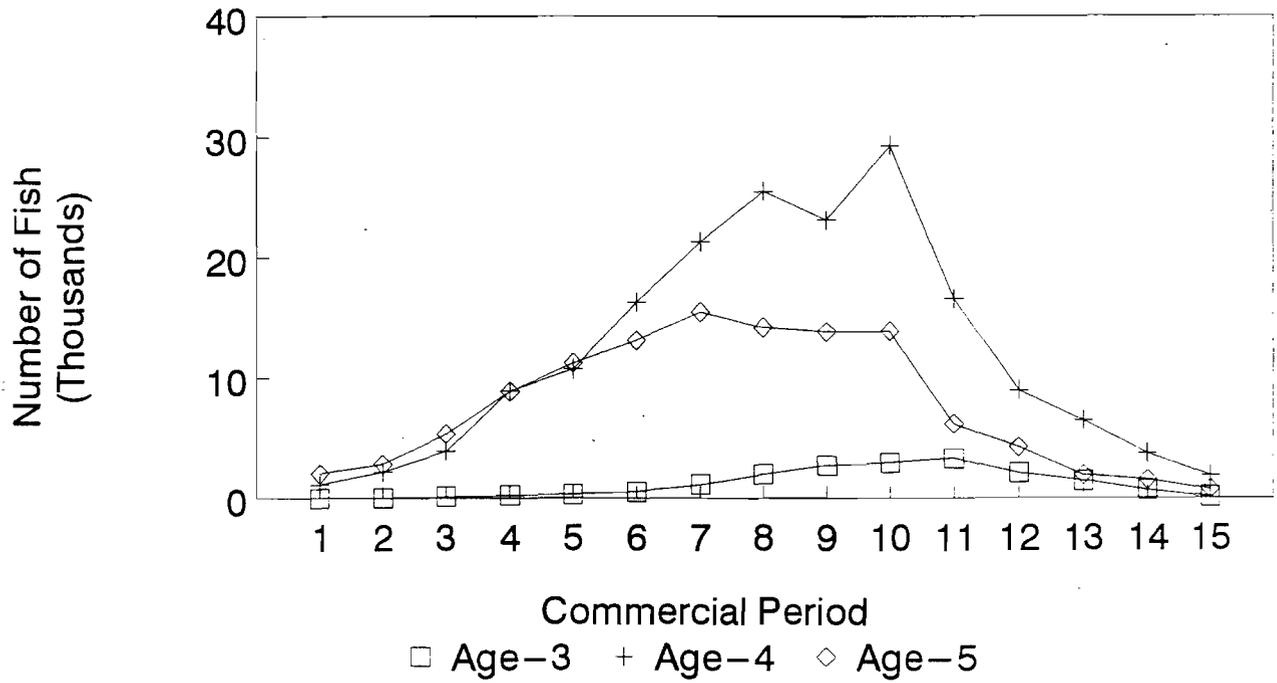


Figure 3. Kotzebue District previous 15 year average (1979–1993) and 1994 catch and catch per unit effort comparisons.

Kotzebue Sound Commercial Salmon 15 Year Average



Kotzebue Sound Commercial Salmon 1994

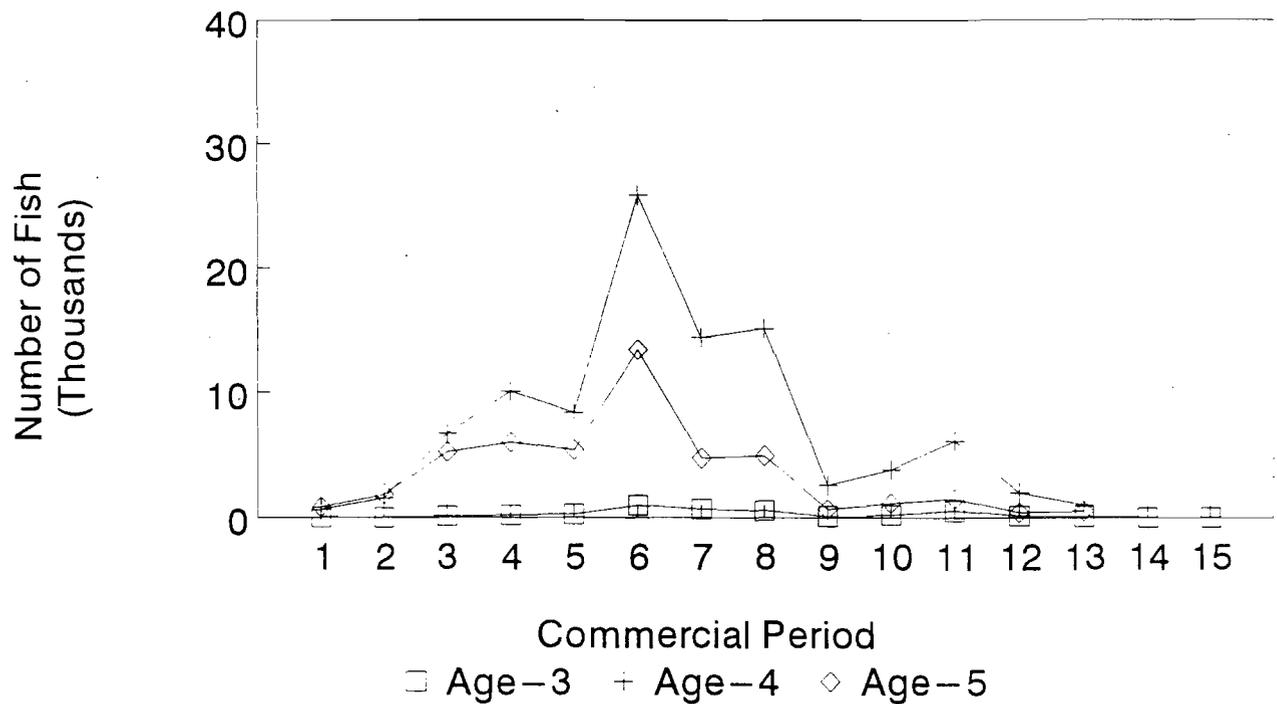


Figure 4. Age in numbers of chum salmon by period comparing recent 15 year average (1979–1993) to 1994.

Kobuk River Drift Test Fish Cumulative CPUE

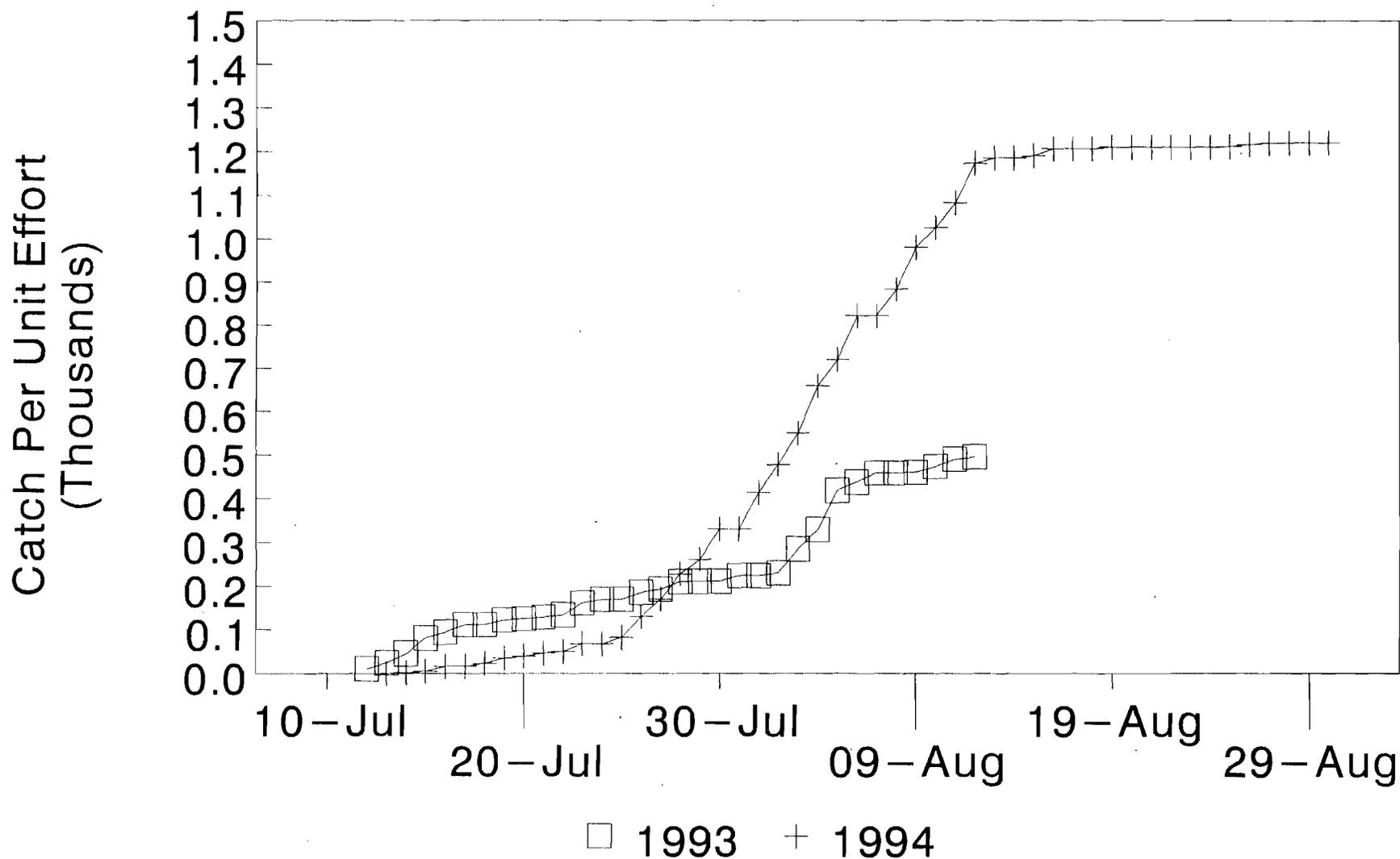


Figure 5. Kobuk River chum salmon drift test fish cumulative CPUE for 1993 and 1994.

Noatak River Sonar Cumulative Chum Salmon Counts

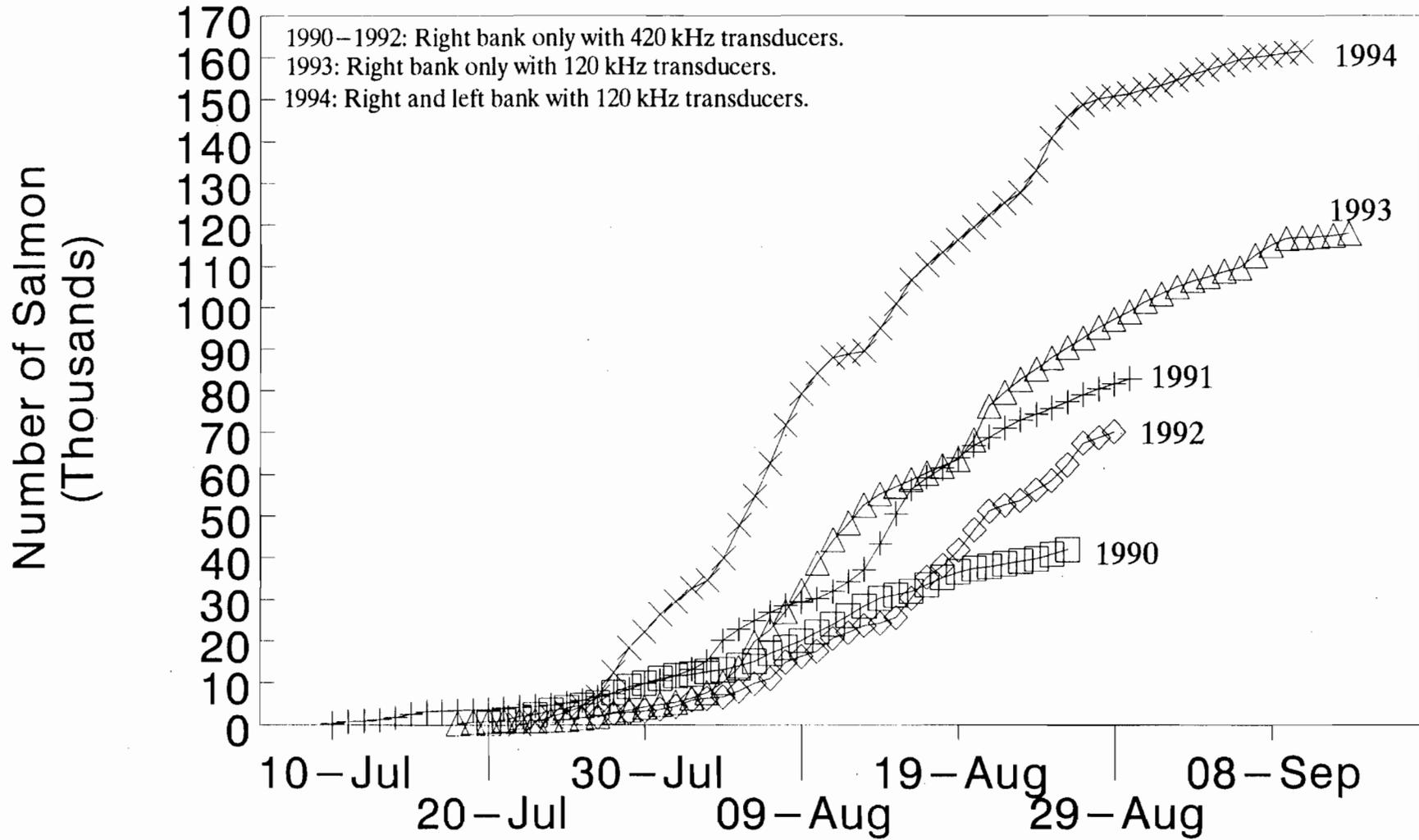


Figure 6. Noatak River chum salmon cumulative sonar counts from 1990–1994.