3A95-29

Noatak River Test Fishing Project, 1995

By

Tracy Lingnau

Regional Information Report[1] No. 3A95-29

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

November 1995

---

[1] The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports.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 or the Commercial Fisheries Management and Development Division.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The Noatak River flows approximately 680 km from it's headwaters in the Schwatka Mountains to Kotzebue Sound (Figure 1). Only one village is located on the Noatak River, the village of Noatak, and it depends on Noatak River chum salmon for subsistence use. Residents of Kotzebue also depend on Noatak River chum salmon as a subsistence resource. The Noatak River is also thought to support 50% or more of the commercial catch of chum salmon in the Kotzebue District.

The Noatak River is wide, deep with normally silty water in the lower 70 km with a braided multiple channel and sometimes silty characteristics above 70 km. These conditions preclude the use of towers and weirs to estimate fish passage. Historically, aerial surveys were used to assess escapements. These surveys are susceptible to weather, river conditions and pilot availability and variability between surveyors. The lack timeliness and other variables affecting aerial surveys prompted investigation into the use of hydroacoustic (sonar) techniques to estimate salmon escapement on the Noatak River. Feasibility studies to ascertain the applicability of sonar began in 1979 (Bird and Bigler 1982; Bigler 1983; Bigler 1984; Berning et al 1987). The current site was selected in 1988 because of it's favorable features of a single, relatively narrow channel with stable banks and smooth V-shaped bottom profile. The sonar project has been at it's current location since then. It's proximity to the commercial fishing district also allows managers to use the data inseason (Figure 2).

Due to the status of the sonar program heading into the 1995 season, it was necessary to scale back sonar project operations in the AYK (Arctic-Yukon-Kuskokwim) Region and to not undertake new sonar research and development projects. It was decided to suspend the Noatak River sonar project operations for 1995 in order to focus limited resources on the Yukon and Kuskokwim River sonar projects. Some funding was available, however, and area managers requested to conduct drift test fishing in lieu of the sonar project on the Noatak River for 1995. This would allow a feasibility study of a test fish project only and continue the species apportionment data base collection. The test fish project was approved and preparations were made for a down-sized operation. When test fishing was conducted in conjunction with the sonar project, it's purpose was to provide estimates of species composition of the sonar passage estimates, not to index run timing or abundance. This year's reduced test fish project at the current sonar site is not to be confused with the test fish project conducted on the Noatak River, approximately 15 km from the mouth, from 1987-1991.

The objectives of the test fishing project for 1995 were:

1. To evaluate the feasibility of indexing chum salmon abundance in the Noatak River using systematic drift gill net catches.

2. Describe the migratory timing for chum salmon in the lower Noatak River.

3. Sample for age, sex and size composition.

4. To continue the collection of species apportionment information for the historical data base.

METHODS

Site Description

The site is approximately 39 river kilometers from the mouth of the river. This is the furthest downstream site where the river runs through a single, narrow channel. The sonar site was selected because of it's desirable stream characteristics. The width of the river was approximately 300 meters and was divided into two sites. Site W is the west side of the river (right bank), which is the gradual side of the river with the slower current. Site E is located on the east side of the river (left bank) and has the steeper gradient with the faster current. A bottom profile at the test fish site this year revealed the previous year's V-bottom profile with the deepest point in the river being just under 15 meters. In Figure 3, both banks show a sharp drop; however, if this profile was drawn to scale, the gradient would not be near as steep.

Test Fishing

The fishing scheduled was set up identical to previous years sampling methods for special apportionment. Test fishing was conducted in two time segments of the day at each of the two sites; morning (1000) and afternoon (1600). At the beginning of the project, a third drift was conducted at mid-river but discontinued after a couple of days because of the amount of additional time it took. Nor was there any data collected from mid-river drifts in previous years to compare to this year. Drifts were conducted by a two person crew, six days per week. During the peak of the run, the first two weeks of August, drifts were attempted every day of the week.

Drift test fishing was performed from an open outboard motorboat for approximately 10 minutes. Three drifts of different mesh sizes were conducted at each site twice daily with 25 fathom gill nets. Mesh sizes of 2.75 inch (in) (70 mm) and 6 in (152 mm) were drifted twice a day at each site. The 4 in (102 mm) and 5 in (127 mm) mesh were alternated between fishing periods, every other day. If catch rates were high, fishing time was reduced in order to control mortality. All nets were hung at a ratio of 2:1. Age-sex-length data were collected from chum salmon. Mortalities were given to elders or individuals for subsistence purposes. Chum salmon were also sold to commercial buyers in Kotzebue on four different occasions during the season.

Standardized Catches

Actual catches were converted to catch per unit of effort (CPUE) by considering fishing time and the length of net used. Each CPUE index was the number of fish which would have been caught if 100 fathoms of net had been fished for 60 minutes. The index (I) was calculated as follows:

$$I = \frac{6,000(c)}{(l)(t)}$$

Where: c = number of chum salmon caught
l = length of net in fathoms
t = mean fishing time in minutes

Mean fishing time (t) was defined as the amount of time the entire net was fishing plus half the time it took to deploy and retrieve the net. Mean daily drift CPUE indices were calculated using the sum of the total time fished and total fish caught for each day. The mean daily indices were summed to produce total seasonal CPUE indices for the period of data collection. Daily and cumulative proportions of seasonal total test fish CPUE indices were also calculated.

Catch rate for each time period and site was determined by using the fishing time and number of fish caught for those specific time periods and sites. Seasonal abundance by site and time period were indexed by summing CPUE indices for each of the daily sites and time periods. Temporal distribution was depicted as a percent calculated by dividing each time period total by the total time period CPUE indices. Spacial distribution was described by dividing each sites CPUE seasonal total by the total of both sites CPUE indices. Temporal and spatial distribution was described as a percent since the number of drifts made at each site and the amount of each time fished varied.

Because the data was not intended for species apportionment this year, only chum salmon catch rates from 6 in mesh were calculated. This is one of the most commonly used mesh sizes in the district. Test fish information from the left bank was only collected in 1994. Therefore, the only historical comparisons presented in this report are from the right bank, 6 in mesh only.

RESULTS

Drifting began on July 19 and continued through August 29. CPUE indices were calculated for each drift and site (Table 1). There was a total of 1,501 chum salmon caught in all gill nets combined. One thousand eighty-two were from 6 in gill nets. A total of 140 drifts (70 drift time periods) with 6 in mesh were conducted. Peak catch occurred on August 19 with a catch of 73 salmon. That daily CPUE was 166.96 and comprised 3.98% of the seasonal CPUE index. However, the peak daily CPUE of 354.78 occurred on August 12 and was 8.46% of the seasonal CPUE index. An equal split of 50.9 and 49.1 percent of the seasonal CPUE indices was caught at 1000 and 1600 hours (Table 4). An almost equal total of 46.3 and 53.7 percent of the total seasonal CPUE indices was caught at sites W and E. Due to net avoidance problems in the clear low water conditions, results may not be indicative of relative bank orientation.

Of the 1,501 chum salmon caught from test nets, age, sex and length samples were collected

from 1,493. Of those, 1,302 were ageable scales. The age composition was 1.9% Age-0.2, 56.1% Age-0.3, 39.9% Age-0.4, 1.8% Age-0.5 and 0.2% Age-0.6 (Table 6). Enough scale samples were taken to stratify age and sex composition by week (Table 5.) The age composition of the 1995 Kotzebue commercial and Kobuk River test fish catch is shown for comparison. Length by age comparison indicates that the Kotzebue commercial samples were slightly larger than the Kobuk River drift test fish catch. Chum salmon caught in test nets at the Noatak River sonar site were smaller by age class. These differences are probably caused by the type of gear used. Most fishermen in the Kotzebue commercial fishery use 5-7/8 in or 6 in mesh gear. The test fishery on the Noatak River used a range of mesh sizes, 6 in and smaller, which caught smaller chum salmon. All but a few of the salmon were either sold, transported to elders or local residents by department personnel.

Four days of test fishing was missed due to regular days off. Five drifts were missed due to equipment failure or other logistical problems. Seasonal test fishing data for 1993-1995 is presented in Tables 2 and 3, and in Figures 4 and 5. Figure 4 shows test fishing CPUE by day for 1993-1995. Figure 5 compares cumulative CPUE and cumulative proportions of CPUE indices.

The test fishing CPUE indices generated (number of salmon caught) is influenced considerably by commercial fishing activity in Kotzebue Sound, as well as the number of drifts conducted and their timing compared to commercial periods. In addition, local salmon migration patterns can be greatly influenced by weather conditions. For these reasons, no interpolations were made for missing data points since accuracy of these estimates may not be reliable.

CONCLUSIONS

A test fishing project alone on the Noatak River is not feasible. This year's low and clear water lead to severe net avoidance by chum salmon. Even though the overall run was the best in at least 10 years, test fish data suggested it was one of the worst. This year's data supports the same conclusion from the 1991 test fish project in the lower Noatak River (km 15), (Lingnau 1992). That test fishery was located in a lower portion of the river and had the same shortcomings. In 1991, aerial survey escapement goals were met, the sonar project indicated an average run but the test fish project in the lower river indicated a below average run strength. This year's cumulative CPUE was the lowest of the three comparable years at the sonar site. The peak Noatak River aerial survey, however, was nearly double the escapement goal and one of the highest ever recorded. Commercial catch rates also indicated a very strong return.

Frequent and shorter commercial openings significantly reduced fluctuations in the test net indices. This created a smoother curve in the daily and cumulative catch rate graphs. There are no points of data this year to evaluate the time of the migration from the commercial fishery to the test fish site. Previous information from department projects and local residents indicates travel time is 2-3 days. The project's six week duration was probably a little short. With low catch rates, an additional week of test fishing would have had little effect on the projects final

results.

Logistically, test fishing by itself on the Noatak River is not an index of the passage rate. However, with the broad range of test nets, it is believed that the test fishery does provide adequate species apportionment information. In terms of abundance assessment, however, test fish data alone could easily mislead managers to a wrong conclusion. Because of river characteristics and problems with aerial surveys mentioned earlier, the only way to accurately assess the chum salmon run into the Noatak River inseason is with hydroacoustical information.

LITERATURE CITED

Berning, R.L., D.C. Mesiar and D.M. Gaudet. 1987. Sonar Enumeration of Migrating Fish in the Noatak River, 1984. Information Leaflet No. 262. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.

Bigler, B.S. 1983. Noatak River Salmon Studies, 1982. AYK Region: Norton Sound/Kotzebue, Salmon Escapement Report #33. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kotzebue.

Bigler, B.S. 1984. Noatak River Salmon Studies, 1983. AYK Region: Norton Sound/Kotzebue, Salmon Escapement Report #39. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kotzebue.

Bird, F., and B.S. Bigler. 1982. Norton Sound-Kotzebue Salmon Studies. AYK Region: Norton Sound/Kotzebue State/Federal Report #9. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.

Lingnau, T. L. 1992. Noatak River Test Fishing Project, 1991. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A92-05, Anchorage.

Table 1. Noatak River drift test fish chum salmon CPUE by day, drift, and site from 6 inch mesh gill nets, 1995. [a]

Date	CPUE by Drift [b]		CPUE by Site [c]		Daily CPUE	Cumm. CPUE
	#1	#2	W	E		
19-Jul	0.00	0.00	0.00	0.00	0.00	0.00
20-Jul	36.00	97.63	98.18	45.71	62.16	62.16
21-Jul [d]						62.16
22-Jul	91.43	58.99	0.00	207.57	74.94	137.10
23-Jul	263.66	218.18	211.76	106.67	246.26	383.36
24-Jul	226.29	194.78	224.68	135.65	210.65	594.01
25-Jul	152.20	128.00	20.87	276.00	139.53	733.54
26-Jul	93.91	132.77	93.91	132.77	113.55	847.09
27-Jul	112.34	80.00	40.85	150.00	96.00	943.09
28-Jul	0.00	[e]	0.00	0.00	0.00	943.09
29-Jul [d]						943.09
30-Jul	24.83	137.14	17.14	140.00	86.25	1,029.34
31-Jul	36.92	21.82	81.70	4.95	30.00	1,059.34
01-Aug	65.45	81.70	105.88	35.82	71.11	1,130.45
02-Aug	40.93	92.53	50.15	49.87	61.13	1,191.58
03-Aug [d]						1,191.58
04-Aug	28.66	70.00	49.41	40.85	45.91	1,237.49
05-Aug	80.00	54.08	30.64	107.76	69.36	1,306.85
06-Aug	233.33	68.57	142.98	220.00	152.11	1,458.96
07-Aug	69.57	55.65	83.48	104.35	62.61	1,521.57
08-Aug	112.34	30.00	120.00	20.43	70.74	1,592.31
09-Aug	20.57	184.11	170.00	40.85	104.06	1,696.37
10-Aug [d]						1,696.37
11-Aug	20.57	184.11	170.00	40.85	68.09	1,764.46
12-Aug	317.75	[e]	354.78	441.60	317.75	2,082.21
13-Aug	[e]	[e]	[e]	[e]	[e]	2,082.21
14-Aug	[e]	[e]	[e]	[e]	[e]	2,082.21
15-Aug	173.91	296.17	234.89	375.65	223.45	2,305.66
16-Aug	212.57	137.14	104.35	177.39	174.86	2,480.52
17-Aug	166.96	280.00	194.04	360.00	224.68	2,705.20
18-Aug	270.42	205.71	255.32	410.00	238.30	2,943.50
19-Aug	290.70	205.71	166.96	440.82	248.51	3,192.01
20-Aug	60.85	90.43	114.78	30.00	75.43	3,267.44
21-Aug	160.00	27.83	125.22	125.22	93.91	3,361.35
22-Aug	83.48	91.76	160.00	31.30	87.59	3,448.94
23-Aug	76.52	42.35	106.67	62.61	59.56	3,508.50
24-Aug	141.97	83.48	71.49	255.32	113.14	3,621.64
25-Aug	102.86	109.71	81.70	93.91	106.29	3,727.93
26-Aug	76.52	118.26	219.13	20.87	97.39	3,825.32
27-Aug	61.71	83.48	83.48	30.64	70.34	3,895.66
28-Aug	48.70	118.26	93.91	52.17	83.48	3,979.14
29-Aug	86.67	114.93	117.55	90.00	100.70	4,079.84
30-Aug						
31-Aug						

[a] Catch per unit effort is calculated in catch/100fm/hour
[b] Drift 1 begins at 1000 and Drift 2 at 1600.
[c] Site W is the West Bank (right bank), Site E is the East (left bank).
[d] Regular Day Off
[e] No fishing due to mechanical, weather or other problems.

Table 2. Noatak River drift test fish chum salmon mean daily and cumulative CPUE from the right bank only, 6 inch mesh only, 1993–1995. [a]

	1993		1994		1995	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.
18–Jul	21.51	21.51				
19–Jul	149.06	170.57			0.00	0.00
20–Jul	0.00	170.57			98.18	98.18
21–Jul	10.70	181.26			[b]	98.18
22–Jul	0.00	181.26	10.90	10.90	0.00	98.18
23–Jul	0.00	181.26	129.49	140.38	211.76	309.94
24–Jul	30.14	211.40	146.85	287.23	224.68	534.62
25–Jul	0.00	211.40	13.95	301.18	20.87	555.49
26–Jul	0.00	211.40	69.97	371.15	93.91	649.40
27–Jul	34.95	246.35	21.47	392.62	40.85	690.25
28–Jul	115.71	362.06	197.71	590.34	[b]	690.25
29–Jul	0.00	362.06	530.30	1,120.63	[b]	690.25
30–Jul	21.45	383.51	136.45	1,257.09	17.14	707.39
31–Jul	173.82	557.33	319.26	1,576.35	81.70	789.09 *
01–Aug	63.86	621.19	420.33	1,996.68	105.88	894.97
02–Aug	141.39	762.58	155.86	2,152.55	50.15	945.12
03–Aug	157.72	920.30	221.54	2,374.08	[b]	945.12
04–Aug	213.41	1,133.71	115.53	2,489.61	49.41	994.53
05–Aug	72.65	1,206.36	460.01	2,949.63	30.64	1,025.17
06–Aug	293.10	1,499.46	693.97	3,643.60	142.98	1,168.15
07–Aug	175.17	1,674.63	342.28	3,985.87	83.48	1,251.63
08–Aug	98.43	1,773.06	992.13	4,978.01	120.00	1,371.63
09–Aug	239.43	2,012.49	843.96	5,821.96	170.00	1,541.63
10–Aug	373.33	2,385.82 *	105.55	5,927.51	[b]	1,541.63
11–Aug	317.81	2,703.63	387.18	6,314.69	170.00	1,711.63
12–Aug	479.00	3,182.63	465.02	6,779.71 *	354.78	2,066.41
13–Aug	261.64	3,444.27	236.55	7,016.26	[b]	2,066.41 +
14–Aug	318.77	3,763.04	533.61	7,549.87	[b]	2,066.41
15–Aug	102.61	3,865.65	1,491.01	9,040.87	234.89	2,301.30
16–Aug	90.42	3,956.07	3,215.87	12,256.75	104.35	2,405.65
17–Aug	351.96	4,308.03	1,478.92	13,735.66 +	194.04	2,599.69
18–Aug	135.64	4,443.67	727.80	14,463.46	255.32	2,855.01
19–Aug	238.84	4,682.51	392.22	14,855.68	166.96	3,021.97
20–Aug	312.88	4,995.39	678.26	15,533.94	114.78	3,136.75 *
21–Aug	481.28	5,476.67 +	182.66	15,716.60	125.22	3,261.97
22–Aug	616.15	6,092.82	369.23	16,085.84	160.00	3,421.97
23–Aug	383.23	6,476.06	5,533.33	21,619.17 *	106.67	3,528.64
24–Aug	402.93	6,878.99	1,650.43	23,269.60	71.49	3,600.13
25–Aug	257.65	7,136.64	1,038.96	24,308.56	81.70	3,681.83
26–Aug	668.29	7,804.93	277.90	24,586.46	219.13	3,900.96
27–Aug	170.64	7,975.57	231.07	24,817.53	83.48	3,984.44
28–Aug	557.09	8,532.66	126.13	24,943.66	93.91	4,078.35
29–Aug	578.31	9,110.97 *	194.33	25,137.99	117.55	4,195.90
30–Aug	122.01	9,232.98	241.28	25,379.27		
31–Aug	209.75	9,442.73	122.26	25,501.53		
01–Sep	696.37	10,139.10	201.40	25,702.92		
02–Sep	514.29	10,653.39	63.58	25,766.50		
03–Sep	288.91	10,942.30	138.02	25,904.52		
04–Sep	220.07	11,162.37	59.97	25,964.49		
05–Sep	165.86	11,328.24	39.85	26,004.34		
06–Sep	0.00	11,328.24	0.00	26,004.34		
07–Sep	86.80	11,415.04	342.86	26,347.19		
08–Sep	171.43	11,586.46	0.00	26,347.19		
09–Sep	246.50	11,832.96	57.55	26,404.75		
10–Sep	79.21	11,912.17				
11–Sep	62.58	11,974.75				
12–Sep	186.05	12,160.80				
13–Sep	258.06	12,418.86				

[a] Quartiles are indicated by the "+" and the mid–points are indicated by a "*".
[b] No fishing due to day off, weather, mechanical or other problems.

Table 3. Noatak River drift test fish chum salmon daily and cumulative proportions from the right bank only, 6 inch mesh only, 1993–1995. [a]

	1993		1994		1995	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.
18–Jul	0.0017	0.0017				
19–Jul	0.0120	0.0137			0.0000	0.0000
20–Jul	0.0000	0.0137			0.0234	0.0234
21–Jul	0.0009	0.0146			0.0000	0.0234
22–Jul	0.0000	0.0146	0.0000	0.0000	0.0000	0.0234
23–Jul	0.0000	0.0146	0.0000	0.0000	0.0505	0.0739
24–Jul	0.0024	0.0170	0.0004	0.0004	0.0535	0.1274
25–Jul	0.0000	0.0170	0.0049	0.0053	0.0050	0.1324
26–Jul	0.0000	0.0170	0.0056	0.0109	0.0224	0.1548
27–Jul	0.0028	0.0198	0.0005	0.0114	0.0097	0.1645
28–Jul	0.0093	0.0292	0.0027	0.0141	0.0000	0.1645
29–Jul	0.0000	0.0292	0.0008	0.0149	0.0000	0.1645
30–Jul	0.0017	0.0309	0.0075	0.0224	0.0041	0.1686
31–Jul	0.0140	0.0449	0.0201	0.0425	0.0195	0.1881
01–Aug	0.0051	0.0500	0.0052	0.0477	0.0252	0.2133
02–Aug	0.0114	0.0614	0.0121	0.0598	0.0120	0.2252
03–Aug	0.0127	0.0741	0.0160	0.0758	0.0000	0.2252
04–Aug	0.0172	0.0913	0.0059	0.0817	0.0118	0.2370
05–Aug	0.0058	0.0971	0.0084	0.0901	0.0073	0.2443
06–Aug	0.0236	0.1207	0.0044	0.0945	0.0341	0.2784 *
07–Aug	0.0141	0.1348	0.0175	0.1120	0.0199	0.2983
08–Aug	0.0079	0.1428	0.0263	0.1383	0.0286	0.3269
09–Aug	0.0193	0.1621	0.0130	0.1513	0.0405	0.3674
10–Aug	0.0301	0.1921 *	0.0377	0.1889 *	0.0000	0.3674
11–Aug	0.0256	0.2177	0.0320	0.2210	0.0405	0.4079
12–Aug	0.0386	0.2563	0.0040	0.2250	0.0846	0.4925
13–Aug	0.0211	0.2773	0.0147	0.2397	0.0000	0.4925
14–Aug	0.0257	0.3030	0.0176	0.2573	0.0000	0.4925
15–Aug	0.0083	0.3113	0.0090	0.2663 *	0.0560	0.5485 *
16–Aug	0.0073	0.3186	0.0203	0.2866	0.0249	0.5733
17–Aug	0.0283	0.3469	0.0566	0.3431	0.0462	0.6196
18–Aug	0.0109	0.3578	0.1221	0.4652	0.0608	0.6804
19–Aug	0.0192	0.3770	0.0561	0.5213	0.0398	0.7202
20–Aug	0.0252	0.4022	0.0276	0.5490	0.0274	0.7476 *
21–Aug	0.0388	0.4410 *	0.0149	0.5638 *	0.0298	0.7774
22–Aug	0.0496	0.4906	0.0257	0.5896	0.0381	0.8156
23–Aug	0.0309	0.5215	0.0069	0.5965	0.0254	0.8410
24–Aug	0.0324	0.5539	0.0140	0.6105	0.0170	0.8580
25–Aug	0.0207	0.5747	0.2100	0.8205	0.0195	0.8775
26–Aug	0.0538	0.6285	0.0626	0.8832	0.0522	0.9297
27–Aug	0.0137	0.6422	0.0394	0.9226	0.0199	0.9496
28–Aug	0.0449	0.6871	0.0105	0.9332	0.0224	0.9720
29–Aug	0.0466	0.7336 *	0.0088	0.9419	0.0280	1.0000
30–Aug	0.0098	0.7435	0.0048	0.9467		
31–Aug	0.0169	0.7604	0.0074	0.9541		
01–Sep	0.0561	0.8164	0.0092	0.9633		
02–Sep	0.0414	0.8578	0.0046	0.9679		
03–Sep	0.0233	0.8811	0.0076	0.9755		
04–Sep	0.0177	0.8988	0.0024	0.9780		
05–Sep	0.0134	0.9122	0.0052	0.9832		
06–Sep	0.0000	0.9122	0.0023	0.9855		
07–Sep	0.0070	0.9192	0.0015	0.9870		
08–Sep	0.0138	0.9330	0.0000	0.9870		
09–Sep	0.0198	0.9528	0.0130	1.0000		
10–Sep	0.0064	0.9592				
11–Sep	0.0050	0.9642				
12–Sep	0.0150	0.9792				
13–Sep	0.0208	1.0000				

[a] Quartiles are indicated by the "+" and the mid–points are indicated by a "*".

Table 4. Noatak River drift test fish chum salmon CPUE indices, mean CPUE and percent by drift (time of day) and site (location) from 6 inch mesh gill net, 1995.

Drift Period	Season CPUE Indicies	No. of Period Drifts	Season Mean CPUE	Percent	Station	Season CPUE Indicies	No. of Site Drifts	Season Mean CPUE	Percent
1 1000	4040.29	36	112.2	50.9	W West Bank	4,195.9	36	116.6	46.3
2 1600	3,895.3	34	114.6	49.1	E East Bank	4,857.6	36	134.9	53.7
Total	7,935.6	70	113.4	100.0		9,053.5	72	125.7	100.0

Table 5. Noatak River drift test fish chum salmon age and sex composition by week, 1995.

		Brood Year and Age Group					
		1992 (0.2)	1991 (0.3)	1990 (0.4)	1989 (0.5)	1988 (0.6)	Total
Stratum Dates:	7/20–7/28						
Sampling Dates:	7/20–7/28						
Female	Sample Size	1	50	68	6	0	125
	Percent of Sample	0.4	18.9	25.7	2.3	0.0	47.2
Male	Sample Size	0	79	54	4	1	138
	Percent of Sample	0.0	29.8	20.4	1.5	0.4	52.1
Total	Sample Size	1	131	122	10	1	265
	Percent of Sample	0.4	49.4	46.0	3.8	0.4	100.0
	Standard Error	0.4	3.1	3.1	1.2	0.4	
Stratum Dates:	7/29–8/05						
Sampling Dates:	7/29–8/05						
Female	Sample Size	0	28	17	3	0	48
	Percent of Sample	0.0	21.1	12.8	2.3	0.0	36.1
Male	Sample Size	0	52	30	1	0	83
	Percent of Sample	0.0	39.1	22.6	0.8	0.0	62.4
Total	Sample Size	0	81	48	4	0	133
	Percent of Sample	0.0	60.9	36.1	3.0	0.0	100.0
	Standard Error	0.0	4.2	4.2	1.5	0.0	
Stratum Dates:	8/06–8/12						
Sampling Dates:	8/06–8/12						
Female	Sample Size	2	49	47	2	0	100
	Percent of Sample	0.9	22.6	21.7	0.9	0.0	46.1
Male	Sample Size	2	60	53	2	0	117
	Percent of Sample	0.9	27.6	24.4	0.9	0.0	53.9
Total	Sample Size	4	109	100	4	0	217
	Percent of Sample	1.8	50.2	46.1	1.8	0.0	100.0
	Standard Error	0.9	3.4	3.4	0.9	0.0	
Stratum Dates:	8/13–8/19						
Sampling Dates:	8/13–8/19						
Female	Sample Size	1	119	64	2	1	187
	Percent of Sample	0.3	34.0	18.3	0.6	0.3	53.4
Male	Sample Size	3	94	64	2	0	163
	Percent of Sample	0.9	26.9	18.3	0.6	0.0	46.6
Total	Sample Size	4	213	128	4	1	350
	Percent of Sample	1.1	60.9	36.6	1.1	0.3	100.0
	Standard Error	0.6	2.6	2.6	0.6	0.3	

(continued)

Table 5. (Page 2 of 2)

		Brood Year and Age Group					
		1992 (0.2)	1991 (0.3)	1990 (0.4)	1989 (0.5)	1988 (0.6)	Total
Stratum Dates:	8/20–8/25						
Sampling Dates:	8/20–8/25						
Female	Sample Size	3	66	45	0	0	114
	Percent of Sample	1.5	33.2	22.6	0.0	0.0	57.3
Male	Sample Size	3	53	29	0	0	85
	Percent of Sample	1.5	26.6	14.6	0.0	0.0	42.7
Total	Sample Size	6	119	74	0	0	199
	Percent of Sample	3.0	59.8	37.2	0.0	0.0	100.0
	Standard Error	1.2	3.5	3.4	0.0	0.0	
Stratum Dates:	8/26–8/29						
Sampling Dates:	8/26–8/29						
Female	Sample Size	8	50	22	2	0	82
	Percent of Sample	5.6	35.2	15.5	1.4	0.0	57.7
Male	Sample Size	2	31	27	0	0	60
	Percent of Sample	1.4	21.8	19.0	0.0	0.0	42.3
Total	Sample Size	10	81	49	2	0	142
	Percent of Sample	7.0	57.0	34.5	1.4	0.0	100.0
	Standard Error	2.2	4.2	4.0	1.0	0.0	
Stratum Dates:	7/26–8/29	Season Total					
Sampling Dates:	7/26–8/29						
Female	Sample Size	15	362	263	15	1	656
	Percent of Sample	1.2	27.8	20.2	1.2	0.1	50.4
Male	Sample Size	10	369	257	9	1	646
	Percent of Sample	0.8	28.3	19.7	0.7	0.1	49.6
Total	Sample Size	25	731	520	24	2	1,302
	Percent of Sample	1.9	56.1	39.9	1.8	0.2	100.0
	Standard Error	0.4	1.4	1.4	0.4	0.1	

Table 6. Comparison of chum salmon age and sex composition and mean length from the Kobuk and Noatak River drift test fish catch and the Kotzebue District commercial catch, 1995. [a]

		Brood Year and Age Group					
		1992 (0.2)	1991 (0.3)	1990 (0.4)	1989 (0.5)	1988 (0.6)	Total
Stratum Dates:	7/13–8/16		Kobuk River				
Sampling Dates:	7/13–8/16						
Female	Sample Size	6	232	130	8	0.0	376
	Percent of Sample	0.6	22.6	12.7	0.8	0	36.7
	Mean Length	552.5	587.7	595.0	598.8		
Male	Sample Size	17	398	219	15	0.0	649
	Percent of Sample	1.7	38.8	21.4	1.5	0	63.3
	Mean Length	577.1	603.8	618.1	626.7		
Total	Sample Size	23	630	349	23	0.0	1,025
	Percent of Sample	2.2	61.5	34.0	2.2	0	100.0
	Standard Error	0.5	1.5	1.5	0.5		
Stratum Dates:	7/20–8/29		Noatak River				
Sampling Dates:	7/20–8/29						
Sample Size:	1,302						
Female	Percent of Sample	1.2	27.8	20.2	1.2	0.1	50.4
	Number in Catch	1,884	45,460	33,027	1,884	126	82,380
	Mean Length	546.7	569.0	576.0	589.3	600.0	
Male							
	Sample Size	0.8	28.3	19.7	0.7	0.1	49.6
	Percent of Sample	1,256	46,339	32,274	1,130	126	81,124
Total	Mean Length	575.5	597.2	609.3	621.7	620.0	
	Percent of Sample	1.9	56.1	39.9	1.8	0.2	100.0
	Number in Catch	3,139	91,798	65,301	3,014	251	163,504
	Standard Error	622	2,249	2,220	610	178	
Stratum Dates:	7/10–8/28		Kotzebue Commercial				
Sampling Dates:	7/11–8/28						
Sample Size:	4,735						
Female	Percent of Sample	1.0	27.5	19.1	1.2	0.0	48.8
	Number in Catch	2,842	79,880	55,663	3,583	0	141,967
	Mean Length	574.0	591.7	602.1	614.4		
Male	Percent of Sample	1.3	29.4	19.3	1.1	0.0	51.2
	Number in Catch	3,892	85,440	56,157	3,212	62	148,763
	Mean Length	577.4	613.5	625.4	637.7	637.0	
Total	Percent of Sample	2.3	56.9	38.5	2.3	0.0	100.0
	Number in Catch	6,734	165,319	111,819	6,796	62	290,730
	Standard Error	636	2,093	2,056	638	62	

[a] Lengths are in millimeters and measured from mid–eye to fork–of–tail.

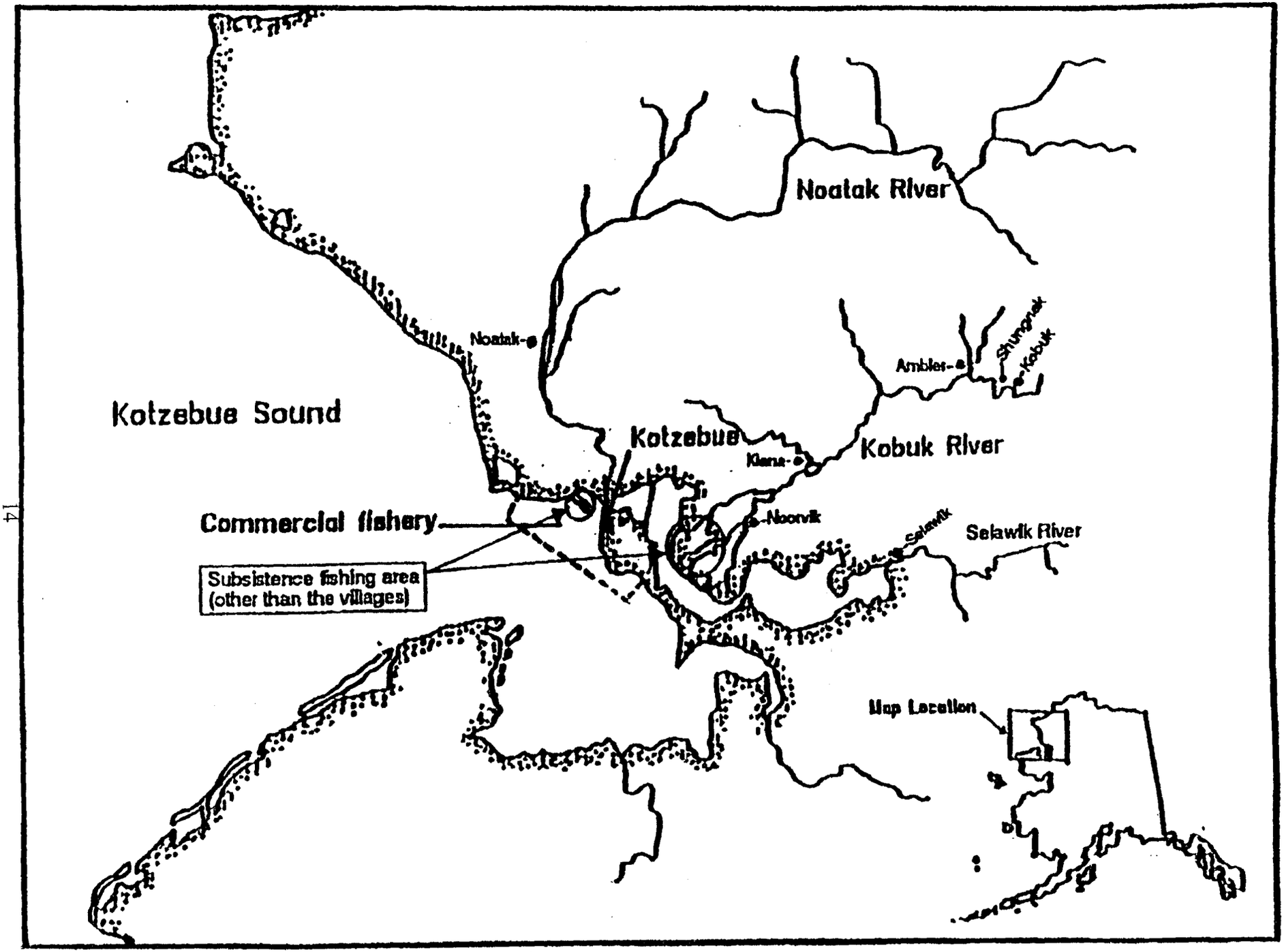

Figure 1. Kotzebue Sound commercial fishing district, villages and subsistence fishing areas

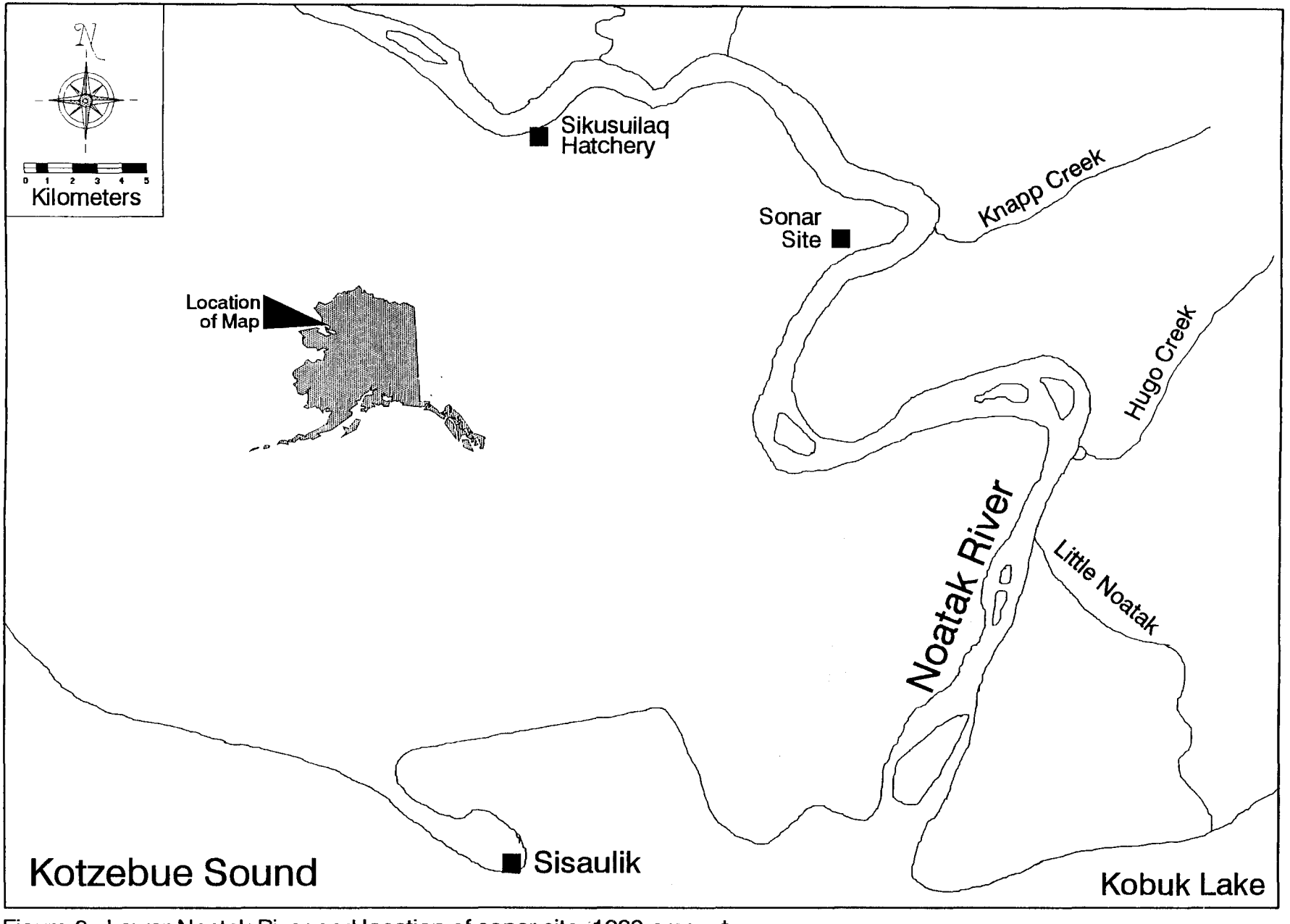

Figure 2. Lower Noatak River and location of sonar site, 1989-present.

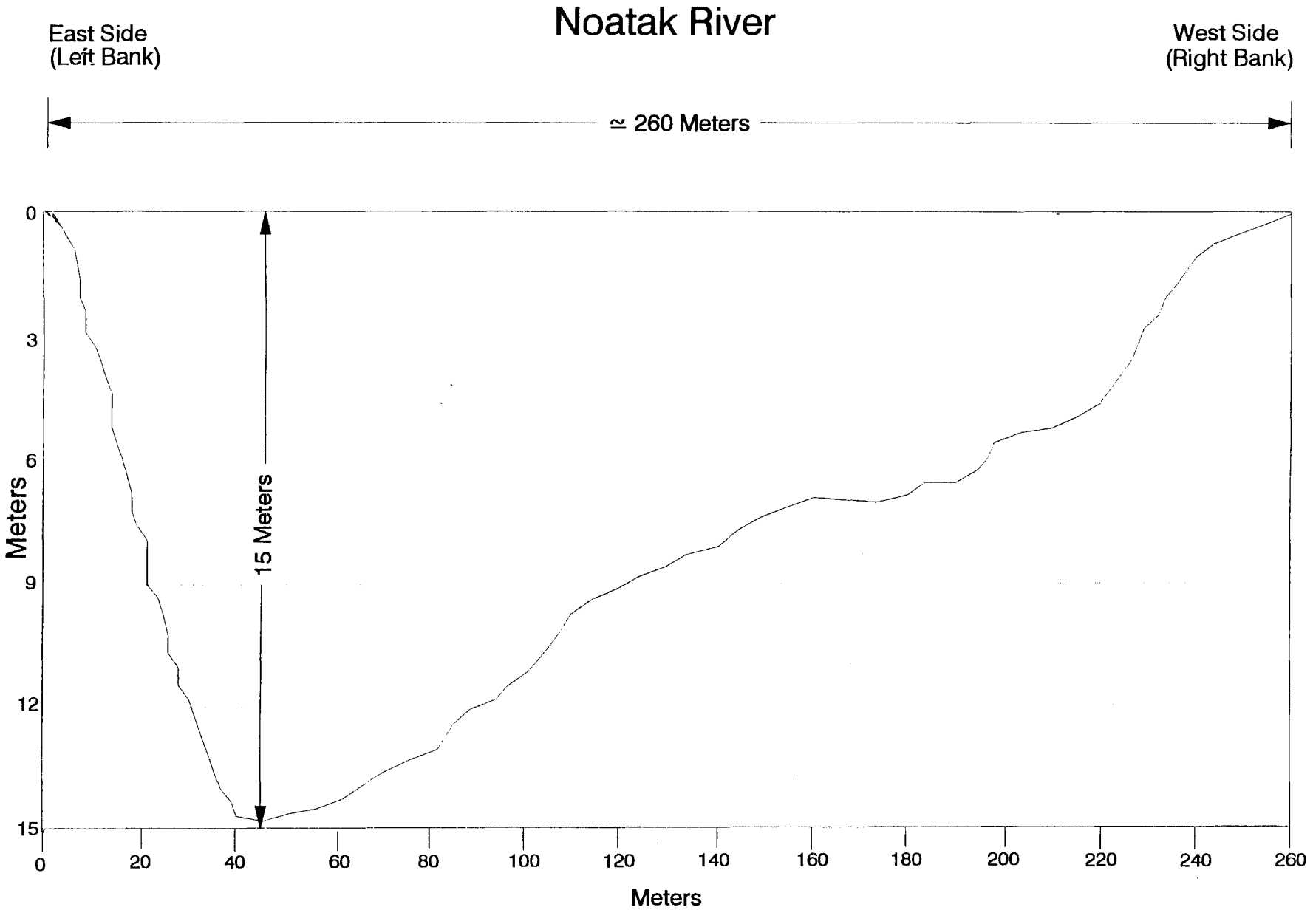

Figure 3. Noatak River bottom profile at the test fish site, 1995.

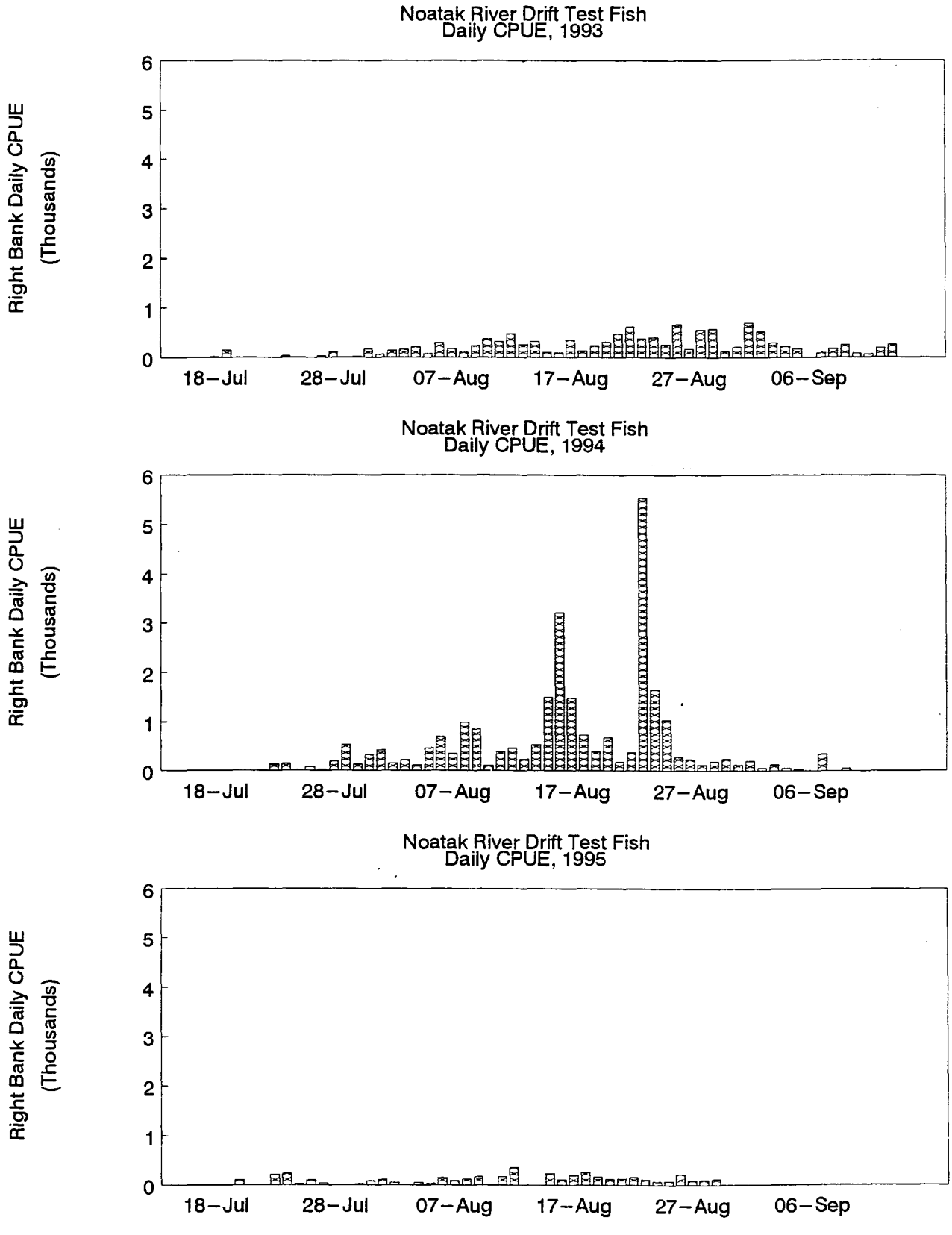

Figure 4. Noatak River chum salmon drift test fish daily CPUE from 6 inch. mesh, right bank only, 1993–1995.

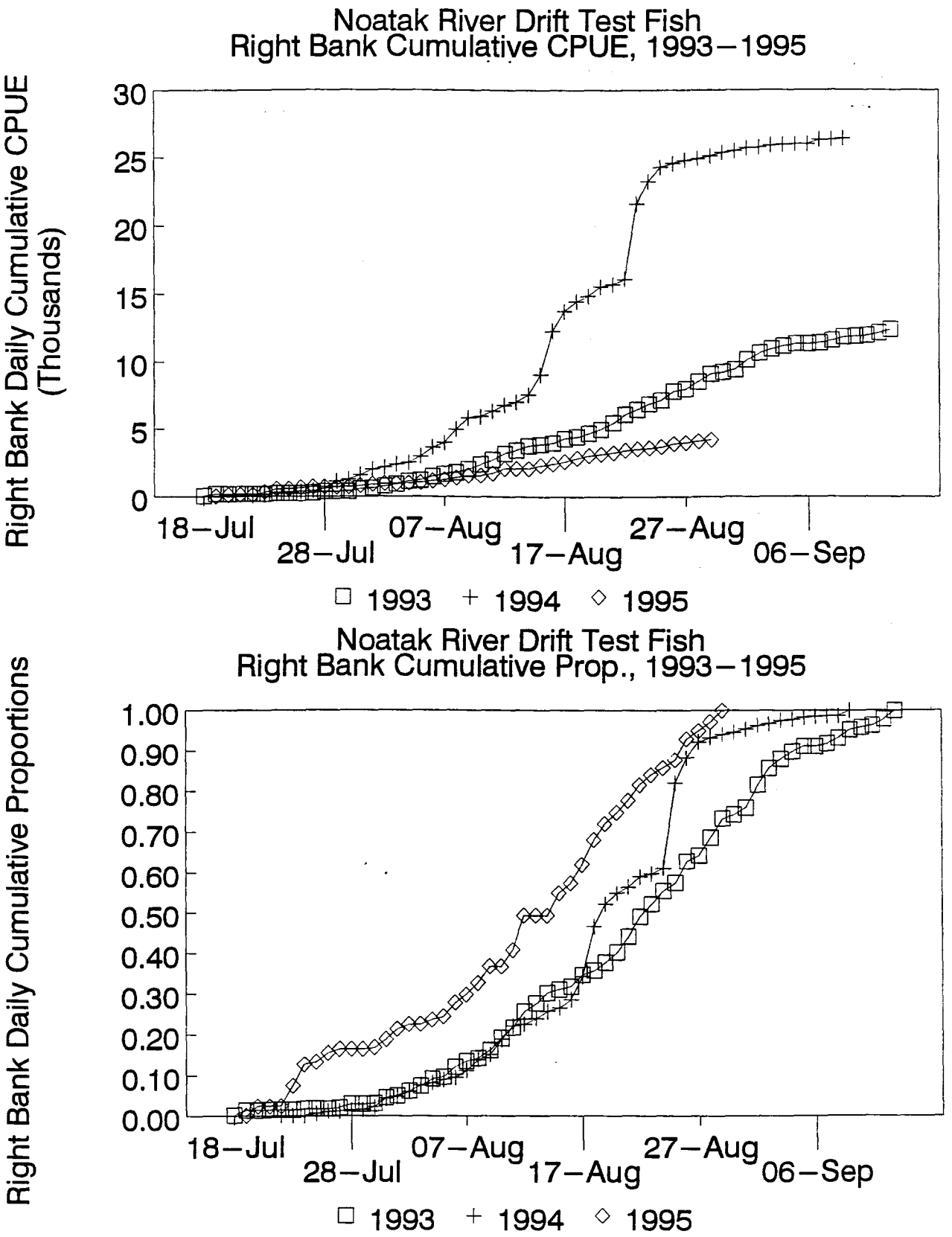

Figure 5. Noatak River drift test fish chum salmon cumulative CPUE and CPUE proportions from 6 inch mesh, right bank only, 1993–1995