Kotzebue District
Lower Noatak Test Fishing Project, 1989

By

Gary Knuepfer

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Introduction

A set gill net test fishing project in the lower Noatak River was initiated in 1975 and continued through 1978. Test fishing continued at a different location from 1979 through 1983 in conjunction with a Bendix sonar project, and in 1984 with a Biosonics sonar project (Figure 1). No projects were operated in 1985 or 1986. Although initial site feasibility studies for a drift test fishery in the lower Noatak River were conducted in 1984, project funding was not made available until 1987.

Current management of the Kotzebue commercial salmon fishery is dependent mainly on comparing period and cumulative season catch to prior years catches. The drift test fishing project was initiated because of its relatively low cost and the need for an inseason escapement index. If the project is continued it will assist with fisheries management by providing an index of chum salmon timing and escapement to the Noatak River, the largest salmon producing system in the Kotzebue area.

The objectives of the test fishing project were as follows:

1. Evaluate the feasibility of indexing chum salmon escapement in the Noatak River using systematic drift gillnet catches.

2. Describe the migratory timing for chum salmon escapement.

3. Estimate the age composition of the Noatak River chum salmon escapement.

4. Assess the impact of the Kotzebue District commercial salmon fishery on overall chum salmon abundance in the lower Noatak River.

Methods

Site Description

The present test fishing site was selected because of its desirable stream characteristics and proximity to the Kotzebue commercial salmon fishery (Figure 1). The site consisted of a 0.5 mile river section located approximately 9 miles upstream from the commercial salmon fishing district boundary markers near the mouth of the Noatak River. The river essentially runs through a single major channel at that location. The width of the river was approximately 1,000 feet, and was divided into three stations (Figures 2 and 3). Station A designated the western third, which included the deepest portion of the channel and had the steepest bank. The depth of the channel increased from the upper end to the lower end of the drift area (27 to 40 feet). The lower half of this station contained a considerable amount of submergent vegetation to a depth of 6 feet or more. Station B, located at the middle of the river, had a relatively even bottom profile with a depth of 19-21 feet. Station C, the eastern third, the

depth gradually dropped from a depth of 3 feet nearshore to 19 feet offshore. This station had the slowest current.

Test Fishing

Fishing was scheduled to sample salmon escapement during three different segments of the day; late morning, mid-day, and late evening. A series of three drifts (one at each station) was conducted during each time period, at approximately 1200, 1800, and 2400 hours, respectively. The 2400 hour drift was recorded as the number three drift, even though it may have actually occurred the following day. All drift time periods were shifted forward late in the season to adjust to decreasing daylight. Drifts were conducted by a two person crew, six days a week. All test fishing drifts were made from a 17 foot outboard motorboat for approximately 20 minutes with 50 fathoms of gill net. The net was composed of 5 7/8" stretched mesh multifilament webbing, 45 meshes deep, and hung at a ratio of 2:1. All fish caught were tallied by species, with most salmon sold during commercial fishing periods. Scales were collected for age composition data from all salmon caught. Sex and size data were not collected in an effort to minimize handling mortality. During commercial closures all healthy fish were released and any mortalities were given away.

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 (I) was the number of fish which would have been caught if 100 fathoms of net had been fished for 60 minutes. The index was computed as follows: $I = 6{,}000\ (C)\ (L)\ (T)$; where C is the number of chum caught, L is the length of net used (fathoms) and T is the mean fishing time (minutes). Mean fishing time was defined as the amount of time the entire net was fishing plus half the time it took to set and retrieve the net. Specific station catches were combined into an average drift time period CPUE index which was calculated by weighing the catch information from each station equally. Mean drift CPUE indices were summed to produce cumulative and total seasonal CPUE indices for the period of data collection. Cumulative proportions of seasonal total test fish CPUE indices were also calculated. Seasonal abundance by station was indexed by summing specific CPUE indices at each station across all time periods fished. Temporal and spatial distribution was described as a percent calculated by using seasonal mean CPUE rather than total CPUE indices, since the number of drifts made at each station and time period varied. No interpolations were made for missing data.

Results

Drifting began on 18 July and continued through 24 August, 1989. During that time 1,837 chum salmon were caught in a total of 254 station drifts (86 drift time periods) producing 2,987.04 chum salmon CPUE index points (Table 1 and Figure 4). Peak catches occurred on 9-10 August and 14 August. Peak catch day

was 14 August with 2 drifts producing CPUEs of approximately 162 each. A total of 36.0, 34.6, and 29.4 percent of the total seasonal CPUE indices was caught at 1200, 1800, and 2400 hours, respectively (Table 2). A total of 40.1, 21.9, and 38.0 percent of the seasonal CPUE indices was caught at stations A, B, C, respectively (Table 3). Analysis of scales from 1,677 chum salmon caught in test nets revealed an age composition of 0.5, 83.3, 15.0, and 1.2 percent age 3, 4, 5, and 6, respectively (Table 4). The age composition of the 1989 Kotzebue commercial catch is shown in Table 5 for comparison.

Of the 1,837 chum salmon caught in test nets, 1,410 (77%) were sold. The rest were either released if in good condition, or given to elderly residents of Kotzebue and charitable organizations. A total of 29 char was also caught (Table 6). The first char appeared on 22 July, but most (72%) were caught after 8 August. One pink salmon and one sheefish were also caught.

For comparative purposes, the basic fishing operation, gear, location and timing did not change from the previous 2 years. However, the old cable-lay gill net had to be replaced with a new net of different twine construction midway through the season. The 1989 project began and ended earlier than the past 2 seasons. A total of 7 days of test fishing were missed due to regular days off or illness. In addition, 7 drift periods and 4 station drifts were missed due to outboard motor difficulties, or adverse weather or water conditions. The water remained high during the entire test fishing season. Climatological data is presented in Table 7. Seasonal test fish data for 1987-1989 is presented for comparison in Figures 4-14 and Tables 8-13. Figures 4-9 show test fish CPUE by drift with corresponding commercial fishing periods and commercial catch and CPUE for each year. Figure 10 compares cumulative CPUE for each year, and Figure 11 compares cumulative proportions of CPUE indices. Figures 12, 13, and 14 represent 3 year averages of cumulative CPUE, cumulative proportions, and mean daily CPUE, respectively. Tables 8 and 9 show cumulative CPUE, mean CPUE, and percent by drift and station. Table 10 presents CPUE and cumulative CPUE by drift. Tables 11 and 12 present cumulative CPUE and cumulative proportion, respectively, by day, including 3 year averages for the years 1987-1989. Mean daily CPUE and 3 year averages are shown in Table 13.

The number of test fish CPUE indices generated (number of salmon caught) is considerably influenced 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 and water conditions. For these reasons, no interpolations were made for missing data points since accuracy of the values would be questionable. Although the total number of drifts conducted each year was fairly consistent, seasonal mean CPUE, rather than total CPUE indices, may by more accurate for comparison. The mean catch per 100 fathom hour for the 1989 season was 34.7 chum salmon. This was 39 and 24 percent higher than the 1987 and 1988 means (21.3 and 26.5), respectively (Table 8).

While an effect of the commercial fishery at Kotzebue on Noatak test net CPUE was apparent, the impact in 1989 did not appear to be as pronounced as in the previous 2 years. Although the test fish CPUE indices declined during several commercial fishing periods, they were not reduced to the extent that they were

in 1987 and 1988. This is especially evident when comparing catches in July of 1988 and 1989.

The 1989 mean test fish CPUE was 24% higher than that of 1988, while the 1989 commercial salmon harvest was 28% below that of 1988. This indicates a commercial harvest of a larger proportion of the total return in 1988 and a smaller proportion in 1989. With all the variables and unknowns involved, including the Kobuk River stock contribution to the commercial fishery, many questions remain unanswered. With a larger data base it may be possible to more precisely evaluate the extent to which the commercial harvest affects escapement.

Table 1. Noatak River drift test fishing catch and mean CPUE by drift, 1989.[a]

Date	Drift	Chum	Mean CPUE	Other
7-18	1	2	3.20	
7-18	2	1	1.63	
7-18	3	2	3.26	
7-19	1	1	1.57	
7-19	2	4	5.93	
7-19	3	4	6.37	
7-20	1	1	1.54	
7-20	2	8	12.44	
7-22	1	7	10.33	char 1
7-22	2	9	14.10	
7-22	3	1	1.67	
7-23	1	12	19.30	
7-23	2	12	17.89	
7-23	3	12	15.90	
7-24	1	6	9.51	
7-24	2	6	9.61	char 1
7-24	3	11	14.16	char 1
7-25	1	25	37.76	shee 1
7-25	2	22	27.65	
7-25	3	5	6.15	
7-26	1	14	21.93	
7-26	2	31	44.20	
7-26	3	5	8.16	
7-27	1	35	47.92	
7-27	2	19	27.48	char 1
7-27	3	10	15.26	
7-28	1	11	16.42	
7-28	2	9	14.45	
7-28	3	14	21.56	
7-29	1	12	17.41	
7-29	2	9	14.84	char 1
7-29	3	17	25.24	
7-31	1	27	39.59	
7-31	2	22	32.39	
7-31	3	20	28.31	
8-01	1	9	13.64	
8-01	2	4	6.51	
8-01	3	9	12.96	
8-02	1	17	23.09	
8-02	2	22	29.85	
8-02	3	50	66.82	
8-03	1	75	85.99	
8-03	2	40	70.17	char 2
8-03	3	5	9.71	

-continued-

Table 1. (continued)

Date	Drift	Chum	Mean CPUE	Other
8-04	1	8	14.22	
8-04	2	21	37.57	
8-04	3	7	12.52	
8-05	1	31	42.77	char 1
8-05	2	23	37.21	
8-05	3	12	20.82	
8-07	1	12	21.49	
8-07	2	12	21.79	
8-07	3	13	23.70	
8-08	1	43	63.69	
8-08	2	32	51.64	
8-09	1	72	93.01	char 1
8-09	2	70	92.37	char 1
8-09	3	87	156.29	
8-10	1	53	105.80	char 2
8-10	2	14	31.24	
8-10	3	23	49.06	
8-11	1	8	20.33	
8-11	2	12	31.48	
8-11	3	12	24.86	
8-12	1	8	19.13	
8-12	2	9	23.58	
8-12	3	26	55.83	
8-14	1	137	162.19	char 4
8-14	2	117	162.02	char 3
8-15	1	44	79.98	char 2
8-15	2	2	7.16	
8-15	3	6	27.69	
8-17	2	67	108.50	char 4
8-17	3	22	50.25	char 1
8-18	1	26	17.75	
8-18	2	19	44.97	
8-18	3	36	76.29	
8-19	1	11	25.03	
8-19	2	14	31.46	
8-19	3	15	34.92	char 2
8-21	1	13	34.44	
8-21	2	27	62.57	
8-21	3	14	35.58	
8-23	3	12	34.92	char 1
8-24	2	3	8.00	
8-24	3	7	19.05	

[a] Mean CPUE is calculated from the CPUE of 3 individual stations per drift.

Table 2. Noatak River seasonal test fishing CPUE indicies, mean CPUE, and percent by drift period (time of day), 1989.

Drift Period	Season CPUE Indices	Drift Periods	Season Mean CPUE[a]	%
1 (1200)	1049.03	28	37.46	35.98
2 (1800)	1080.70	30	36.02	34.60
3 (2400)	857.31	28	30.62	29.42
Total	2987.04	86	34.70	100.00

[a] Calculated by weighting CPUE information from each drift time period equally.

Table 3. Noatak River seasonal test fishing mean CPUE, and percent by station, 1989.

Station	No. Station Drifts	Season Mean CPUE[a]	%
A	86	42.47	40.06
B	84	23.24	21.92
C	84	40.3	38.02
Total	254	35.34	100.00

[a] Calculated by weighting CPUE information from each station equally.

Table 4. Age composition of Noatak River drift test net catches, 1989.

			Age by Week							
			0.2		0.3		0.4		0.5	
Date	Sample Size	Cum. Sample	#	%	#	%	#	%	#	%
7/18-7/23	67	67	0	0.0	48	71.6	18	26.9	1	1.5
7/24-7/29	247	314	0	0.0	174	70.5	70	28.3	3	1.2
7/31-8/05	345	659	2	0.6	264	76.5	75	21.7	4	1.2
8/07-8/12	475	1134	0	0.0	413	86.9	56	11.8	6	1.3
8/14-8/19	490	1624	5	1.0	449	91.6	30	6.1	6	1.2
8/21-8/24	53	1677	1	1.9	49	92.4	2	3.8	1	1.9

			Cumulative Age							
			0.2		0.3		0.4		0.5	
Date	Sample Size	Cum. Sample	#	%	#	%	#	%	#	%
7/18-7/23	67	67	0	0.0	48	71.6	18	26.9	1	1.5
7/24-7/29	247	314	0	0.0	222	70.7	88	28.0	4	1.3
7/31-8/05	345	659	2	0.3	486	73.8	163	24.7	8	1.2
8/07-8/12	475	1134	2	0.2	899	79.3	219	19.3	14	1.2
8/14-8/19	490	1624	7	0.4	1348	83.0	249	15.3	20	1.2
8/21-8/24	53	1677	8	0.5	1397	83.3	251	15.0	21	1.2

Table 5. Percent age composition of chum salmon taken in the Kotzebue commercial chum salmon fishery, 1989.

Sample Size	Age Class 0.2	0.3	0.4	0.5
3335	0.7	77.8	20.4	1.0
985[a]	14.5	65.8	19.1	0.7

[a] Historic mean for years 1962-1985

Table 6. Noatak River test fish char catch, 1987-1989.

Date	Drift	1987	1988	1989
7/22	1			1
7/24	2			1
7/24	3			1
7/27	2			1
7/29	2			1
8/03	2			2
8/05	1			1
8/05	3		1	
8/08	3		1	
8/09	1			1
8/09	2			1
8/10	1			2
8/11	3	1		
8/14	1			4
8/14	2			3
8/15	1			2
8/17	2			4
8/17	3			1
8/18	1		1	
8/18	2	1		
8/18	3		2	
8/19	2		2	
8/19	3	1		2
8/20	1	2		
8/21	2	1	1	
8/22	1	1		
8/22	2	3	1	
8/22	3	3		
8/23	3			1
8/24[a]	2	2	2	
8/25	2	2		
8/26	1	1		
8/26	2	5		
8/26	3	1		
8/27	1	4		
8/27	2	3		
8/27	3	2		
Total		33	11	29

[a] Last day of fishing, 1988 and 1989.

Table 7. Noatak River test fish site climatological data, 1989.

Date	Time	Water Level (in.)	Secchi (in.)	Water Temp (C)	Wind (mph)	Cloud Cover[a]	PPT[b]
7/18	1300	-	4	11	SSE 10-15	4	2
7/18	1800	-	7	11	-	4	2
7/18	2400	-	7	11	SE 5	4	2
7/19	1200	-	7	11	SE 10	4	1
7/19	1800	-	7	11	SE 5	4	2
7/19	2400	-	7	11	0	4	7
7/20	1200	-	7	10	SE 10	4	7
7/20	1800	-	7	12	SE 5	1	7
7/22	1400	-	4	11	S 15	3	7
7/22	1800	-	0	11	S 10	2	7
7/22	2400	-	4	11	S 15	3	7
7/23	1200	-	7	11	S 20	3	1
7/23	1800	-	-	11.5	S 20	3	7
7/23	2400	-	7	11	S 7	3	7
7/24	1200	-	12	11	S 20	4	1
7/24	1800	-	12	11	S 20	4	1
7/24	2400	-	12	11	S 5-10	4	7
7/25	2030	-	12	11	S 25	4	2
7/25	1800	-	12	11	W 5	4	2
7/25	2400	-	22	10	0	1	7
7/26	1200	-	24	9.5	N 7	1	7
7/26	1800	-	24	9.5	NW 10	1	7
7/26	2400	-	20	9.5	NW 10	1	7
7/27	1400	-	24	9.5	SW 5	1	7
27	1850	-	24	10	S 10	1	7
27	0215	-	24	10	0	2	7
7/28	1400	-	15	10.5	E 20	4	7
7/28	1840	-	12	10.5	E 20	4	2
7/28	0155	-	12	9.5	SE 5	4	1
7/29	1410	-	14	9.5	W 15	4	1
7/29	2000	-	18	-	0	4	7
7/29	0145	-	16	-	0	4	7
7/31	1515	-	-	-	N 10	4	7
7/31	1945	-	-	-	0	2	7
7/31	2400	-	-	-	0	2	7
8/01	1330	-	-	-	0	4	7
8/01	1830	-	24	-	SE 10	3	7
8/01	0200	-	24	-	0	4	7
8/02	1415	-	38	-	SW 8	4	7
8/02	2000	-	38	-	SE 10	4	7
8/02	0200	-	37	-	0	4	7
8/03	1445	-	28	-	SE 15-20	4	7
8/03	1930	-	30	-	SE 20	4	7
8/03	0115	-	31	13	SE 20	4	1
8/04	1245	19	36	13	S 10	4	1
8/04	1830	24	31	13.5	S 25	3	7
8/04	2400	24	35	13	S 25	4	1
8/05	1310	30	34	13	S 25	4	1
8/05	1900	24	36	15	SW 20	4	7
8/05	2400	23	40	15	SE 3	4	7
8/07	1315	26	13	13	E 20	4	1

-continued-

Table 7. (continued)

Date	Time	Water Level (in.)	Secchi (in.)	Water Temp (C)	Wind (mph)	Cloud Cover[a]	PPT[b]
8/07	1900	24	11	13	E 15	4	1
8/07	2400	23	10	13	SE 20	4	1
8/08	1330	24	12	13	E 20	4	1
8/08	1915	26	10	-	SE 10	4	1
8/09	1500	24	9	13	SE 20	4	2
8/09	1930	26	10	13	SE 20	4	7
8/09	0100	27	14	12	SE 10	3	7
8/10	1500	28	9	13	SE 12	2	7
8/10	1830	28	10	13	SE 5	4	7
8/10	2400	28	10	13	0	4	7
8/11	1230	27	14	12	SE 10	4	7
8/11	2000	27	14	12	0	4	7
8/11	0200	27	14	13	0	4	1
8/12	1145	29	12	13	SW 10	4	7
8/12	1715	31	12	13	SW 15	4	7
8/12	2400	31	10	13	0	4	1
8/14	1300	37	10	13	SE 15	4	7
8/14	1730	37	10	13	SE 15	4	7
8/15	1345	38	9	13	SE 3	4	2
8/15	1800	38	8	13	SE 5	4	2
8/15	2400	38	9	13	SE 5	4	2
8/17	2100	30	6	12	SW 15	3	7
8/17	2400	29	6	12	NW 15	3	7
8/18	1320	25	8	12	NW 10	4	1
18	1815	24	9	12	W 10	4	1
18	2330	24	9	12	0	4	7
8/19	1315	26	10	13	S 15	2	7
8/19	1800	25	10	112	S 10	4	1
8/19	2330	24	10	13	S 10	4	7
8-21	1245	24	13	12	E 8	3	7
8/21	1700	26	11	11	SE 15	4	1
8/21	2200	26	113	11	SE 5-10	4	2
8/23	2030	-	12	-	0	4	7
8/24	1600	19	14	12	S 8-10	3	7
8/24	2200	16	14	12	0	3	7

[a] Cloud cover:
0 - No observation made
1 - Clear sky; clouds less than 1/10
2 - Cloud cover not more than 1/2
3 - Cloud cover more than 1/2
4 - Completely overcast
5 - Fog or thick haze

[b] Precipitation: (PPT)
0 - No observation made
1 - Intermittent rain
2 - Continuous rain
3 - Snow
4 - Snow and rain mix
5 - Hail
6 - Thunderstorm
7 - No precipitation

Table 8. Cumulative CPUE, seasonal mean CPUE, and percent by drift period, 1987-1989.

Drift Period	Cumulative CPUE			No. Drifts			Seasonal Mean CPUE			Percent		
	1987	1988	1989	1987	1988	1989	1987	1988	1989	1987	1988	1989
1	617.40	779.53	1049.03	27	26	28	22.90	29.98	37.46	35.70	37.60	35.60
2	610.40	784.95	1080.70	31	29	30	19.70	27.07	36.02	30.70	33.90	35.20
3	626.00	638.02	857.31	29	28	28	21.60	22.79	30.62	33.60	28.50	29.20
Total	1853.80	2202.50	2987.04	87	83	86	21.30	26.54	34.73	100.00	100.00	100.00

Table 9. Seasonal mean CPUE and percent by station, 1987-1989.

	Seasonal Mean CPUE			Percent		
Station	1987	1988	1989	1987	1988	1989
A	25.70	36.10	42.47	40.04	44.83	40.06
B	17.10	13.20	23.24	26.90	16.39	21.92
C	20.80	31.23	40.30	32.70	38.78	38.02
Total	21.20	26.84	35.39	100.00	100.00	100.00

'able 10. Noatak River test fish CPUE and cumulative CPUE by drift, 1987-1989.

Date	Drift	1987	1988	1989	CUM 1987	CUM 1988	CUM 1989
7/18	1			3.20			3.33
	2			1.63			4.83
	3			3.26			8.09
7/19	1		8.69	1.57		8.69	9.66
	2		3.55	5.93		12.24	15.59
	3		5.11	6.37		17.35	21.96
7/20	1		33.36	1.54		50.71	23.50
	2		19.76	12.44		70.47	35.94
	3		6.81			77.28	35.94
7/21	1		1.74			79.02	35.94
	2		13.10			92.12	35.94
	3		1.70			93.82	35.94
7/22	1		0.00	10.33		93.82	46.27
	2		0.00	14.10		93.82	60.37
	3		0.00	1.67		93.82	62.04
7/23	1		1.78	19.30		95.60	81.34
	2	3.30	1.70	17.89	3.30	97.30	99.23
	3	11.70	32.44	15.90	15.00	129.74	115.13
7/24	1	0.00		9.51	15.00	129.74	124.64
	2	10.30		9.61	25.30	129.74	134.25
	3	0.00		14.16	25.30	129.74	148.41
,25	1	48.30	11.99	37.76	73.60	141.73	186.17
	2	6.20	5.00	27.65	79.80	146.73	213.82
	3	32.70	14.08	6.15	112.50	160.81	219.97
7/26	1		5.22	21.93	112.50	166.03	241.90
	2		3.26	44.20	112.50	169.29	286.10
	3		1.90	8.16	112.50	171.19	294.26
7/27	1	27.70	0.00	47.92	140.20	171.19	342.18
	2	35.10	1.70	27.48	175.30	172.89	369.66
	3	51.90	0.00	15.26	227.20	172.89	384.92
7/28	1	15.10	15.58	16.42	242.20	188.47	401.34
	2	11.80	12.44	14.45	254.10	200.91	415.79
	3	16.00	0.00	21.56	270.10	200.91	437.35
7/29	1	8.00		17.41	278.10	200.91	454.76
	2	27.60		14.84	305.70	200.91	469.60
	3	11.90		25.24	317.60	200.91	494.84
7/30	1	40.00			357.60	200.91	494.84
	2	32.00	6.67		389.60	207.58	494.84
	3				389.60	207.58	494.84
7/31	1	20.50		39.59	410.10	207.58	534.43
	2	0.00		32.39	410.10	207.58	566.82
	3	28.10	6.82	28.31	438.20	214.40	595.13

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ıble 10. (continued)

Date	Drift	1987	1988	1989	CUM 1987	CUM 1988	CUM 1989
8/01	1	22.00	50.47	13.64	460.20	264.87	608.77
	2	8.00	43.18	6.51	468.20	308.05	615.28
	3	5.80	34.24	12.96	474.00	342.29	628.24
8/02	1		16.00	23.09	474.00	358.29	651.33
	2		16.69	29.85	474.00	374.98	681.18
	3		29.94	66.82	474.00	404.92	748.00
8/03	1	35.50	39.07	85.99	509.50	443.99	833.99
	2	0.00	83.07	70.17	509.50	527.06	904.16
	3	1.70	58.14	9.71	511.20	585.20	913.87
8/04	1	0.00	59.61	14.22	511.20	644.81	928.09
	2	3.40	82.80	37.57	514.60	727.61	965.66
	3	19.10	85.84	12.52	533.70	813.45	978.18
8/05	1	40.00	57.90	42.77	573.70	871.35	1020.95
	2	59.20	48.29	37.21	632.90	919.64	1058.16
	3	31.70	32.38	20.82	664.60	952.02	1078.98
8/06	1	52.40			717.00	952.02	1078.98
	2	26.20			743.20	952.02	1078.98
	3	3.50			746.70	952.02	1078.98
8/07	1	10.00		21.49	756.70	952.02	1100.47
	2	6.70		21.79	763.40	952.02	1122.26
	3	1.70		23.70	765.10	952.02	1145.96
08	1	41.20	50.23	63.69	806.30	1002.25	1209.65
	2	29.20	33.04	51.64	835.50	1035.29	1261.29
	3	28.00	32.51		863.50	1067.80	1261.29
8/09	1		5.25	93.01	863.50	1073.05	1354.30
	2		0.00	92.37	863.50	1073.05	1446.67
	3		1.78	156.29	863.50	1074.83	1602.96
8/10	1	90.20	1.82	105.80	953.70	1076.65	1708.76
	2	88.00	5.18	31.24	1041.70	1081.83	1740.00
	3	89.30	14.31	49.06	1131.00	1096.14	1789.06
8/11	1		45.89	20.33	1131.00	1142.03	1809.39
	2	135.40	57.60	31.48	1266.40	1199.63	1840.87
	3	92.40	87.54	24.86	1358.80	1287.17	1865.73
8/12	1	35.40	133.87	19.13	1394.20	1421.04	1884.86
	2	33.50	73.38	23.58	1427.70	1494.42	1908.44
	3	83.30	18.55	55.83	1511.00	1512.97	1964.27
8/13	1	33.90			1544.90	1512.97	1964.27
	2	6.50			1551.40	1512.97	1964.27
	3	6.40			1557.80	1512.97	1964.27
8/14	1	5.40		162.19	1563.20	1512.97	2126.46
	2	3.50		162.02	1566.70	1512.97	2288.48
	3	20.30			1587.00	1512.97	2288.48

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ıble 10. (continued)

Date	Drift	1987	1988	1989	CUM 1987	CUM 1988	CUM 1989
8/15	1	18.80		79.98	1605.80	1512.97	2368.46
	2	3.50	21.38	7.16	1609.30	1534.35	2375.62
	3	14.80		27.69	1624.10	1534.35	2403.31
8/16	1		8.70		1624.10	1543.05	2403.31
	2		13.33		1624.10	1556.38	2403.31
	3				1624.10	1556.38	2403.31
8/17	1	5.10	25.64	108.50	1629.20	1582.02	2511.81
	2	0.00	1.70	50.25	1629.20	1583.72	2562.06
	3	0.00	24.91		1629.20	1608.63	2562.06
8/18	1	5.20	86.57	17.75	1634.40	1695.20	2579.81
	2	7.00	87.67	44.97	1641.40	1782.87	2624.78
	3	5.90	73.16	76.29	1647.30	1856.03	2701.07
8/19	1	3.30	69.18	25.03	1650.60	1925.21	2726.10
	2	8.50	75.17	31.46	1659.10	2000.38	2757.56
	3	17.10	11.89	34.92	1676.20	2012.27	2792.48
8/20	1	20.20			1696.40	2012.27	2792.48
	2	6.80			1703.20	2012.27	2792.48
	3				1703.20	2012.27	2792.48
8/21	1			34.44	1703.20	2012.27	2826.92
	2	0.00	40.22	62.57	1703.20	2052.49	2889.49
	3	0.00	33.87	35.58	1703.20	2086.36	2925.07
22	1	11.30			1714.50	2086.36	2925.07
	2	1.60	10.33		1716.10	2096.69	2925.07
	3	31.30	7.45		1747.40	2104.14	2925.07
8/23	1		19.40		1747.40	2123.54	2925.07
	2		10.71		1747.40	2134.25	2925.07
	3		11.99	34.92	1747.40	2146.24	2959.99
8/24	1	4.80	21.02		1752.20	2167.26	2959.99
	2	15.90	14.03	8.00	1768.10	2181.29	2967.99
	3	10.80	5.41	19.05	1778.90	2186.70	2987.04
8/25	1	0.00	10.55		1778.90	2197.25	
	2	10.20			1789.10	2197.25	
	3		5.25		1789.10	2202.50	
8/26	1	6.80			1795.90		
	2	13.70			1809.60		
	3	3.80			1813.40		
8/27	1	16.30			1829.70		
	2	17.30			1847.00		
	3	6.80			1853.80		

Table 11. Noatak River test fish cumulative CPUE by day and 3 year averages for the years 1987-1989.

Date	Daily Cumulative CPUE 1987	1988	1989	3 Yr. Avg.
7/18			8.09	8.09
7/19		17.35	21.96	19.66
7/20		77.28	35.94	56.61
7/21		93.82	35.94	64.88
7/22		93.82	62.04	77.93
7/23	15.00	129.74	115.13	86.62
7/24	25.30	129.74	148.41	101.15
7/25	112.50	160.81	219.97	164.43
7/26	112.50	171.19	294.26	192.65
7/27	227.20	172.89	384.92	261.67
7/28	270.10	200.91	437.35	302.79
7/29	317.60	200.91	494.84	337.78
7/30	389.60	207.58	494.84	364.01
7/31	438.20	214.40	595.13	415.91
8/01	474.00	342.29	628.24	481.51
8/02	474.00	404.92	748.00	542.31
8/03	511.20	585.20	913.87	670.09
8/04	533.70	813.45	978.18	775.11
8/05	664.60	952.02	1078.98	898.53
8/06	746.70	952.02	1078.98	925.90
8/07	765.10	952.02	1145.96	954.36
8/08	863.50	1067.80	1261.29	1064.20
8/09	863.50	1074.83	1602.96	1180.43
8/10	1131.00	1096.14	1789.06	1338.73
8/11	1358.80	1287.17	1865.73	1503.90
8/12	1511.00	1512.97	1964.27	1662.75
8/13	1557.80	1512.97	1964.27	1678.35
8/14	1587.00	1512.97	2288.48	1796.15
8/15	1624.10	1534.35	2403.31	1853.92
8/16	1624.10	1556.38	2403.31	1861.26
8/17	1629.20	1608.63	2562.06	1933.30
8/18	1647.30	1856.03	2701.07	2068.13
8/19	1676.20	2012.27	2792.48	2160.32
8/20	1703.20	2012.27	2792.48	2169.32
8/21	1703.20	2086.36	2925.07	2238.21
8/22	1747.40	2104.14	2925.07	2258.87
8/23	1747.40	2146.24	2959.99	2284.54
8/24	1778.80	2186.70	2987.04	2317.51
8/25	1789.10	2202.50		
8/26	1813.40			
8/27	1853.80			

Table 12. Noatak River test fish cumulative proportions by day, 1987-1989.

Date	Daily Cumulative CPUE 1987	1988	1989	3 Yr. Avg.
7/18			0.0027	0.0027
7/19		0.0079	0.0074	0.0076
7/20		0.0351	0.0120	0.0236
7/21		0.0426	0.0120	0.0273
7/22		0.0426	0.0208	0.0317
7/23	0.0081	0.0589	0.0385	0.0352
7/24	0.0136	0.0589	0.0497	0.0407
7/25	0.0607	0.0730	0.0736	0.0691
7/26	0.0607	0.0777	0.0985	0.0790
7/27	0.1226	0.0785	0.1289	0.1100
7/28	0.1457	0.0912	0.1464	0.1278
7/29	0.1713	0.0912	0.1657	0.1427
7/30	0.2102	0.0942	0.1657	0.1567
7/31	0.2364	0.0973	0.1992	0.1777
8/01	0.2557	0.1554	0.2103	0.2071
8/02	0.2557	0.1838	0.2504	0.2300
8/03	0.2758	0.2657	0.3059	0.2825
8/04	0.2879	0.3693	0.3275	0.3282
8/05	0.3585	0.4322	0.3612	0.3840
8/06	0.4028	0.4322	0.3612	0.3988
8/07	0.4127	0.4322	0.3836	0.4095
8/08	0.4658	0.4848	0.4223	0.4576
8/09	0.4658	0.4880	0.5366	0.4968
8/10	0.6101	0.4977	0.5989	0.5689
8/11	0.7330	0.5844	0.6246	0.6473
8/12	0.8151	0.6869	0.6576	0.7199
8/13	0.8403	0.6869	0.6576	0.7283
8/14	0.8561	0.6869	0.7661	0.7697
8/15	0.8761	0.6966	0.8046	0.7924
8/16	0.8761	0.7066	0.8046	0.7958
8/17	0.8788	0.7304	0.8577	0.8223
8/18	0.8886	0.8427	0.9043	0.8785
8/19	0.9042	0.9136	0.9349	0.9176
8/20	0.9188	0.9136	0.9349	0.9224
8/21	0.9188	0.9473	0.9793	0.9484
8/22	0.9426	0.9553	0.9793	0.9591
8/23	0.9426	0.9745	0.9909	0.9693
8/24	0.9595	0.9928	1.0000	0.9841
8/25	0.9651	1.0000	1.0000	0.9884
8/26	0.9782	1.0000	1.0000	0.9927
8/27	1.0000			1.0000

Table 13. Mean Daily CPUE and 3 year average for the years 1987-1989.

Date	1987	1988	1989	3 yr. Avg.
7/18			2.7	2.7
7/19		5.8	4.6	5.2
7/20		20.0	7.0	13.5
7/21		5.5		5.5
7/22		0.0	8.7	4.4
7/23	7.5	12.0	17.7	12.4
7/24	3.4		11.1	7.3
7/25	29.1	10.4	23.8	21.1
7/26		3.5	24.8	14.2
7/27	38.2	0.6	30.2	23.0
7/28	14.3	9.3	17.5	13.7
7/29	15.8		19.2	17.5
7/30	36.0	6.7		21.3
7/31	16.2	6.8	33.4	18.8
8/01	11.9	42.6	11.0	21.8
8/02		20.9	39.9	30.4
8/03	12.4	60.1	55.3	42.6
8/04	7.5	76.1	21.4	35.0
8/05	43.6	46.2	33.6	41.1
8/06	27.4			27.4
8/07	6.1		22.3	14.2
8/08	32.8	38.6	57.7	43.0
8/09		2.3	113.9	58.1
8/10	89.2	7.1	62.0	52.8
8/11	113.9	63.7	25.6	67.7
8/12	50.7	75.3	32.8	52.9
8/13	15.6			15.6
8/14	9.7		162.1	85.9
8/15	12.4	21.4	38.3	24.0
8/16		11.0		11.0
8/17	1.7	16.4	79.4	32.5
8/18	6.0	82.5	46.3	44.9
8/19	9.6	52.1	30.5	30.7
8/20	9.0			9.0
8/21	0.0	37.0	44.2	27.1
8/22	14.7	8.9		11.8
8/23		14.0	34.9	24.4
8/24	10.5	13.5	13.5	12.5
8/25	5.1	7.9		6.5
8/26	8.1			8.1
8/27	13.5			13.5

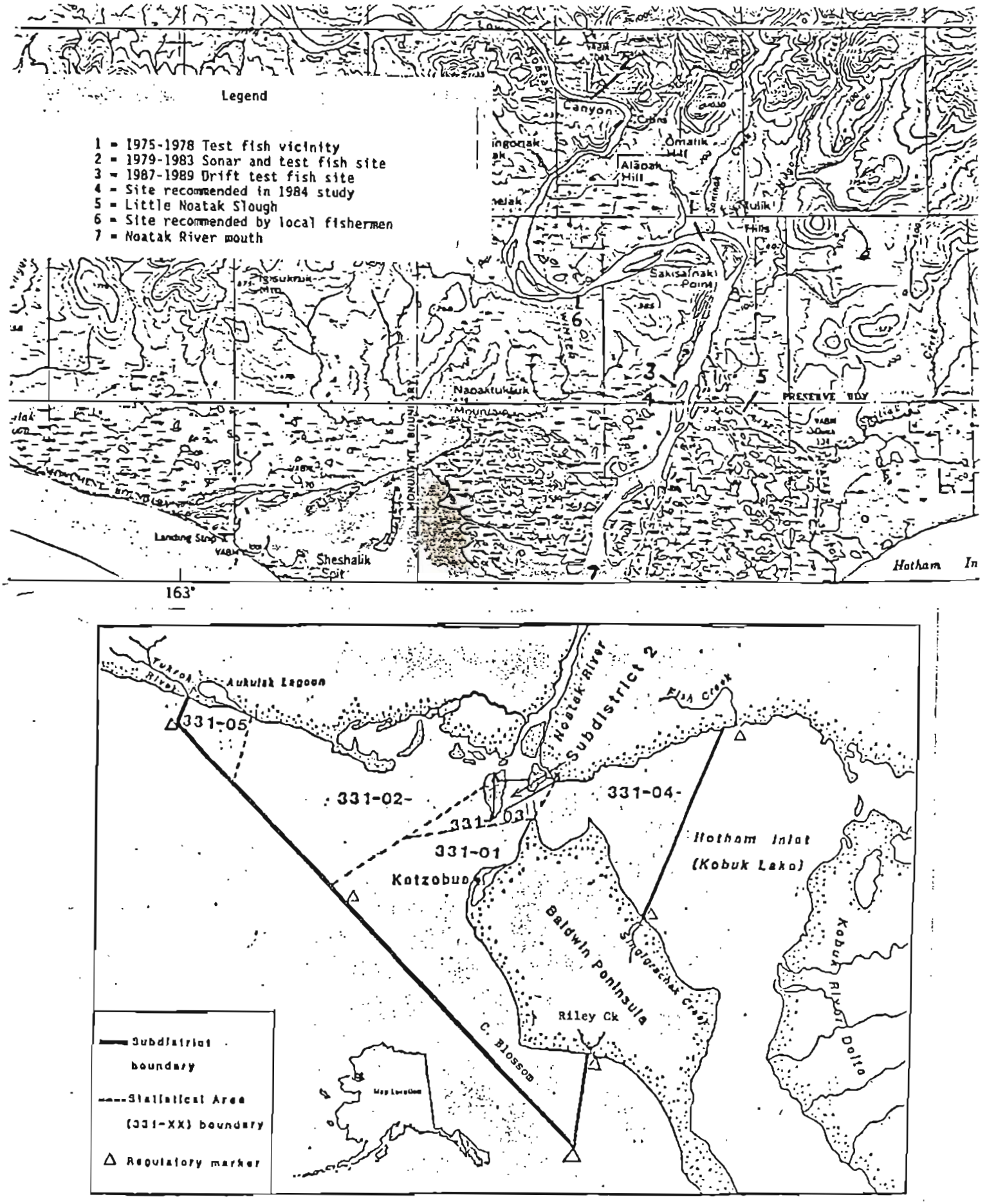

Figure 1. Noatak River test fishing sites and Kotzebue Sound commercial salmon fishing subdistricts.

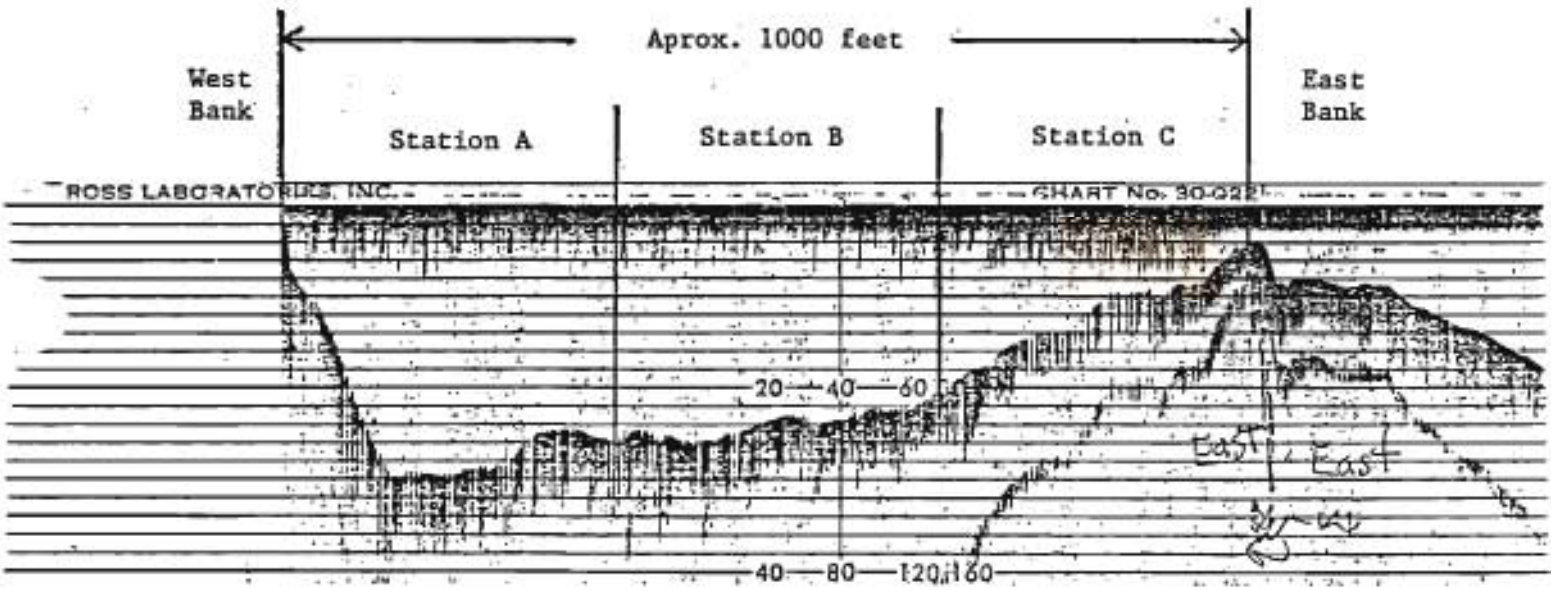

Figure 2. Bottom profile of drift test fish site, 1989.

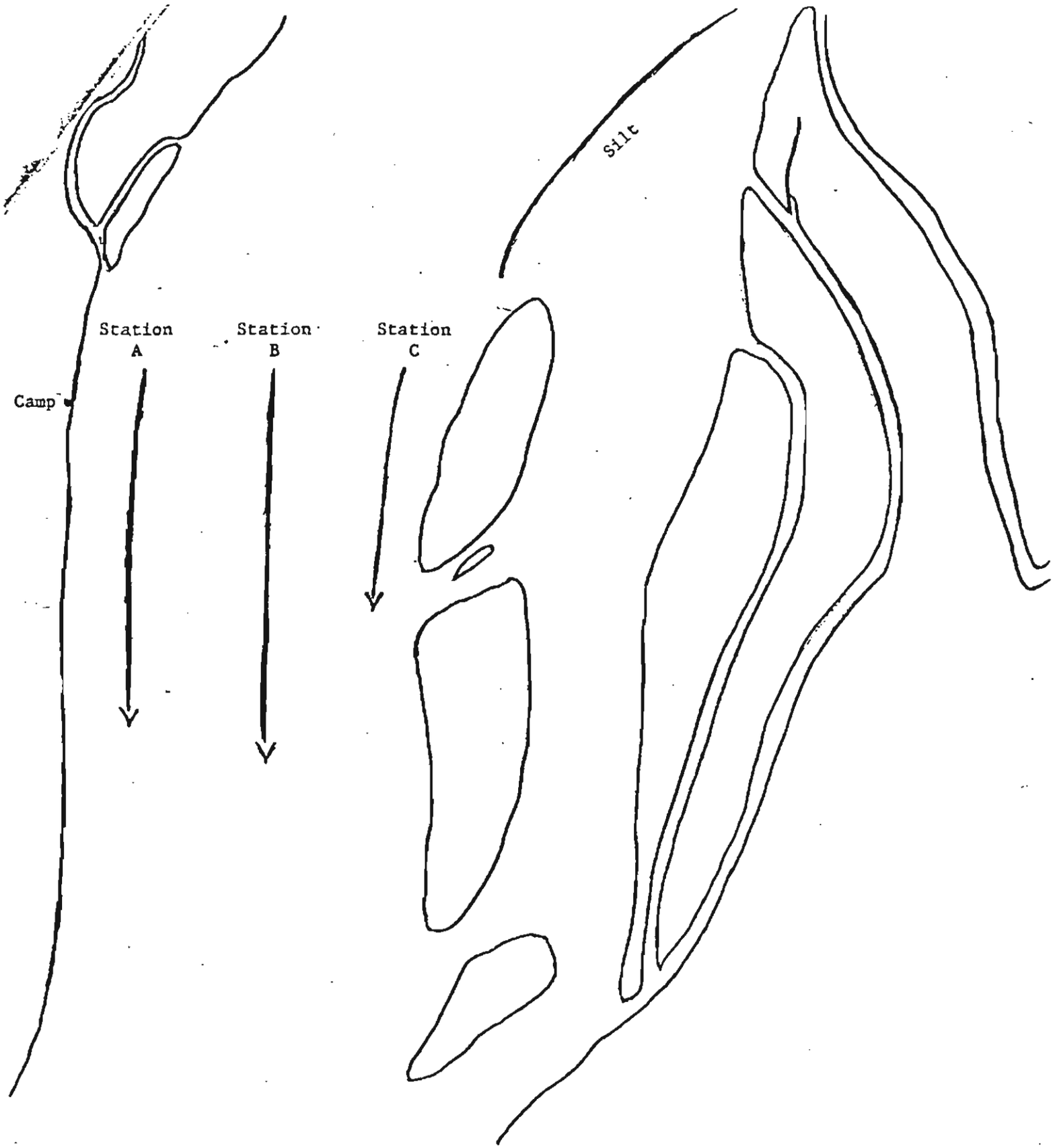

Figure 3. Drifting stations used in the Noatak River test fishery, 1987-1989.

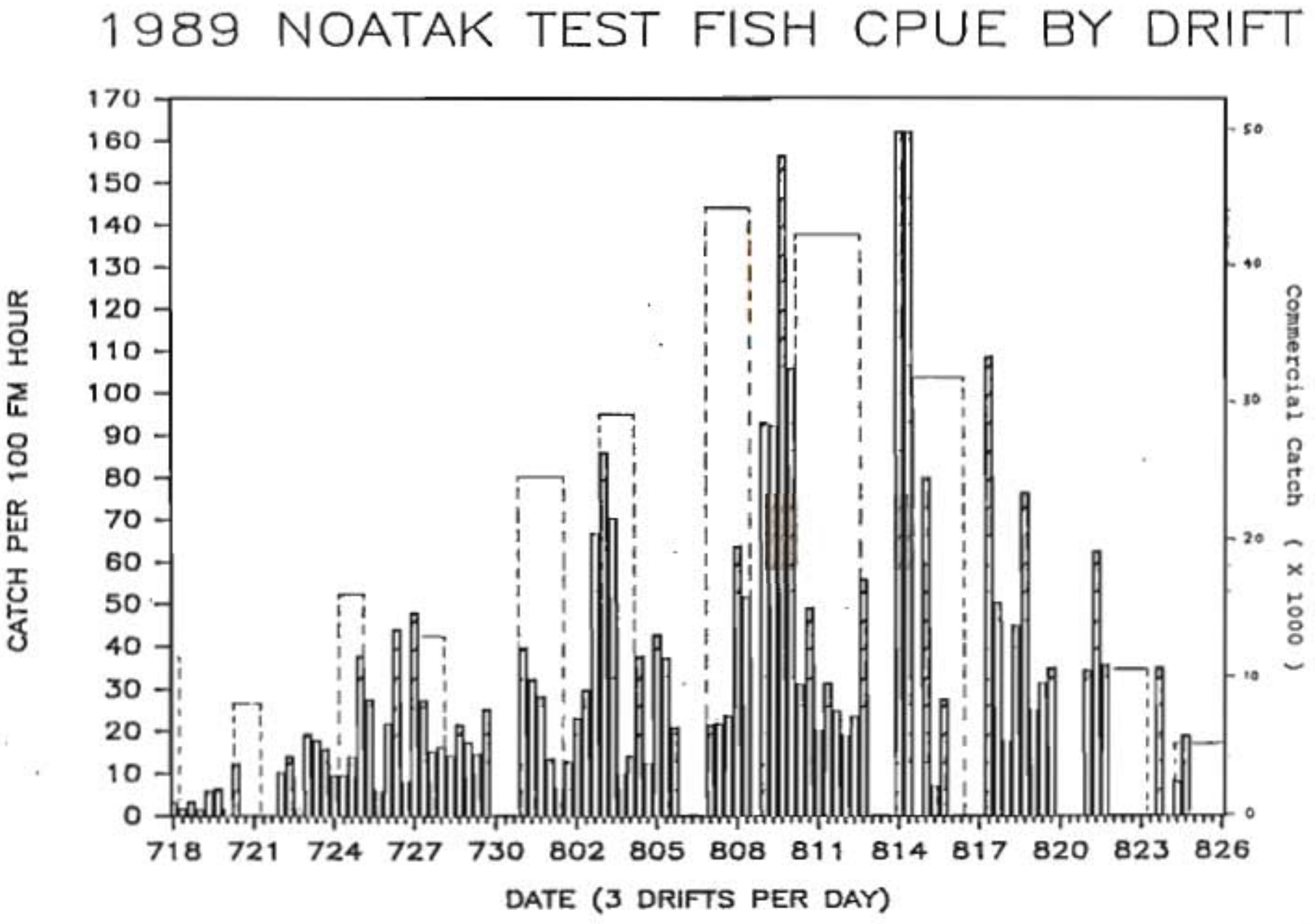

Figure 4. Noatak River test fish CPUE (histogram) and commercial catch (—), 1989.

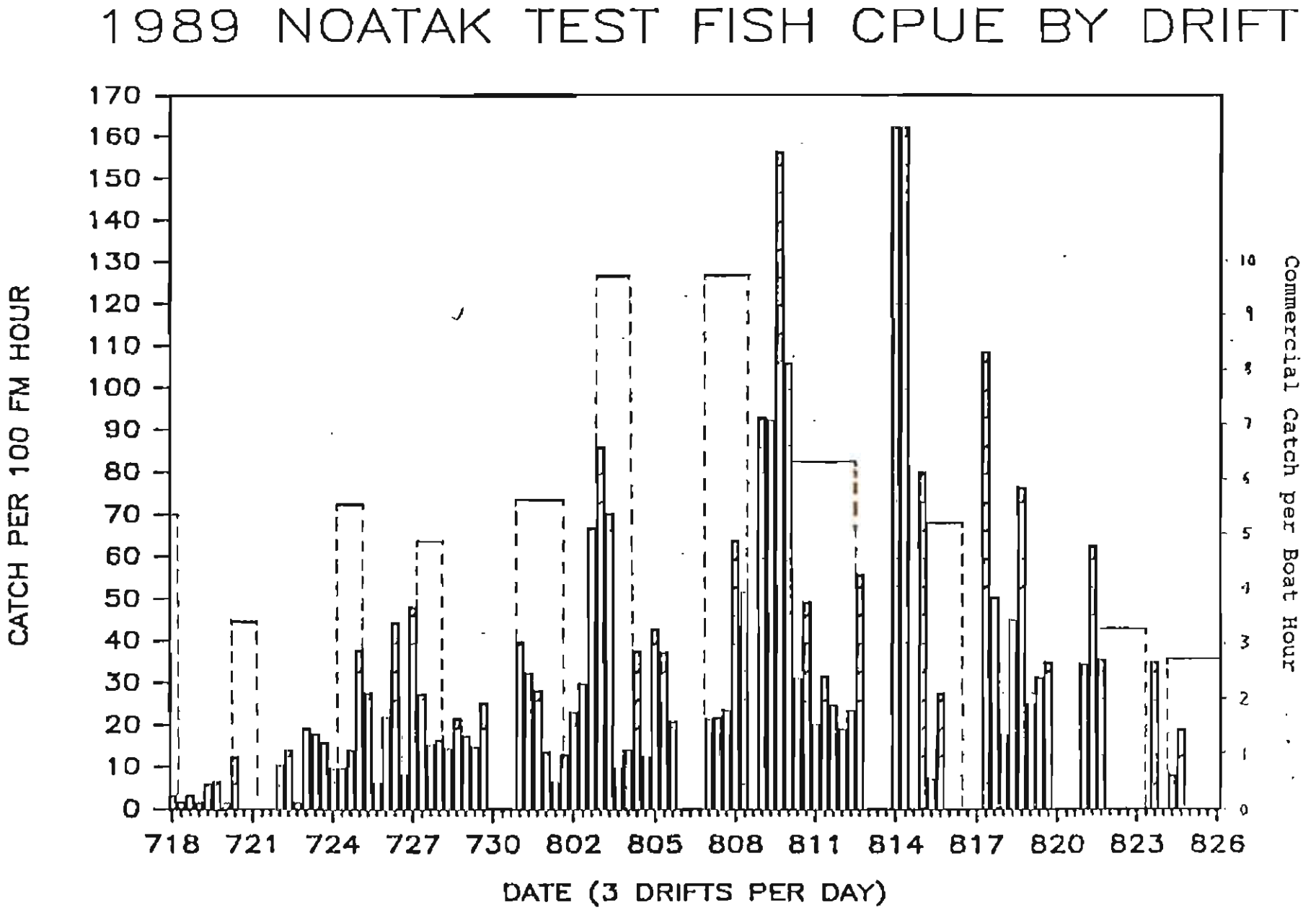

Figure 5. Noatak River test fish CPUE (histogram) and commercial CPUE (—), 1989.

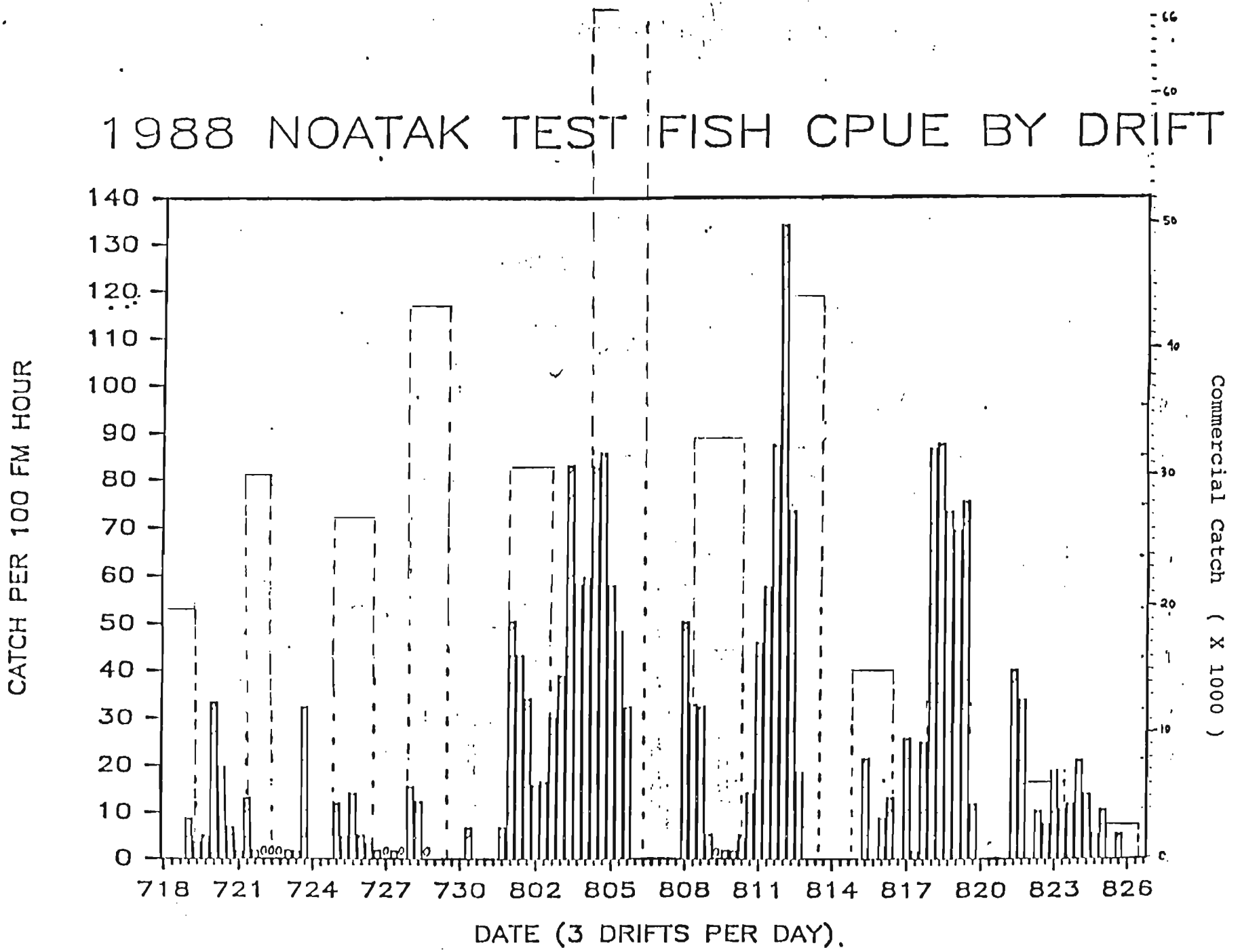

Figure 6. Noatak River test fish CPUE (histogram) and commercial catch (—) 1988

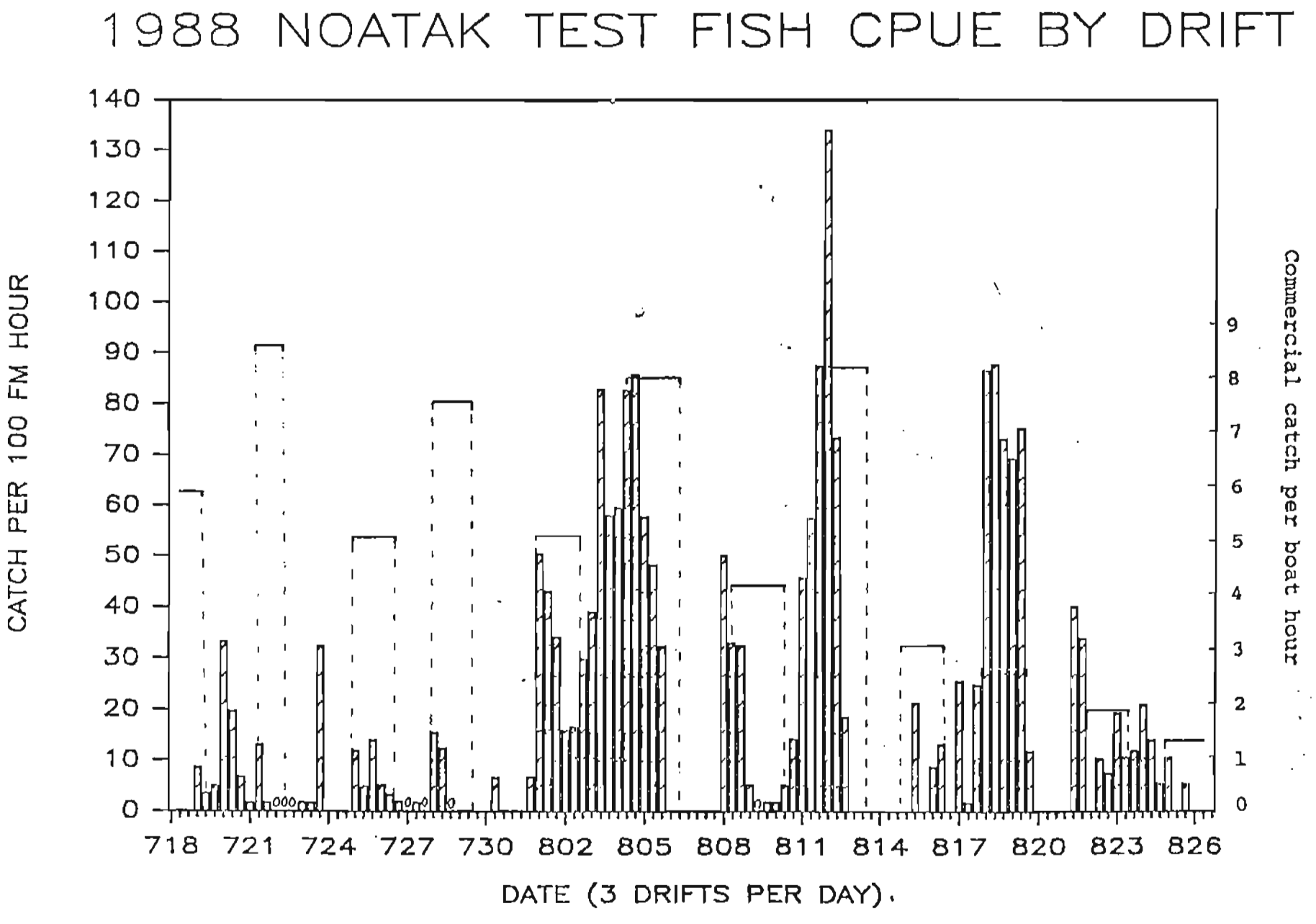

Figure 7. Noatak River test fish CPUE (histogram) and commercial CPUE (—), 1988.

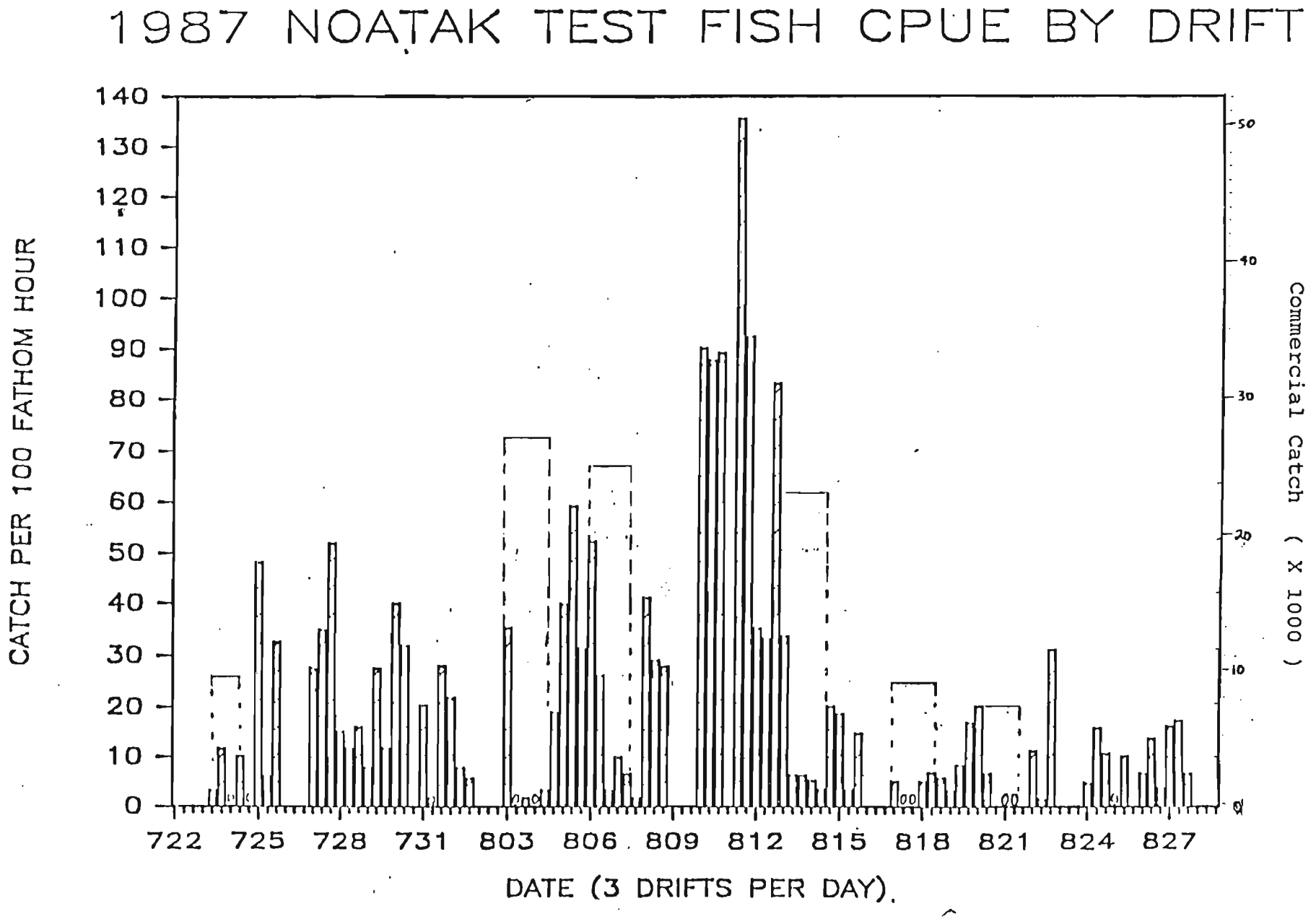

Figure 8. Noatak River test fish CPUE (histogram) and commercial catch (—), 1987.

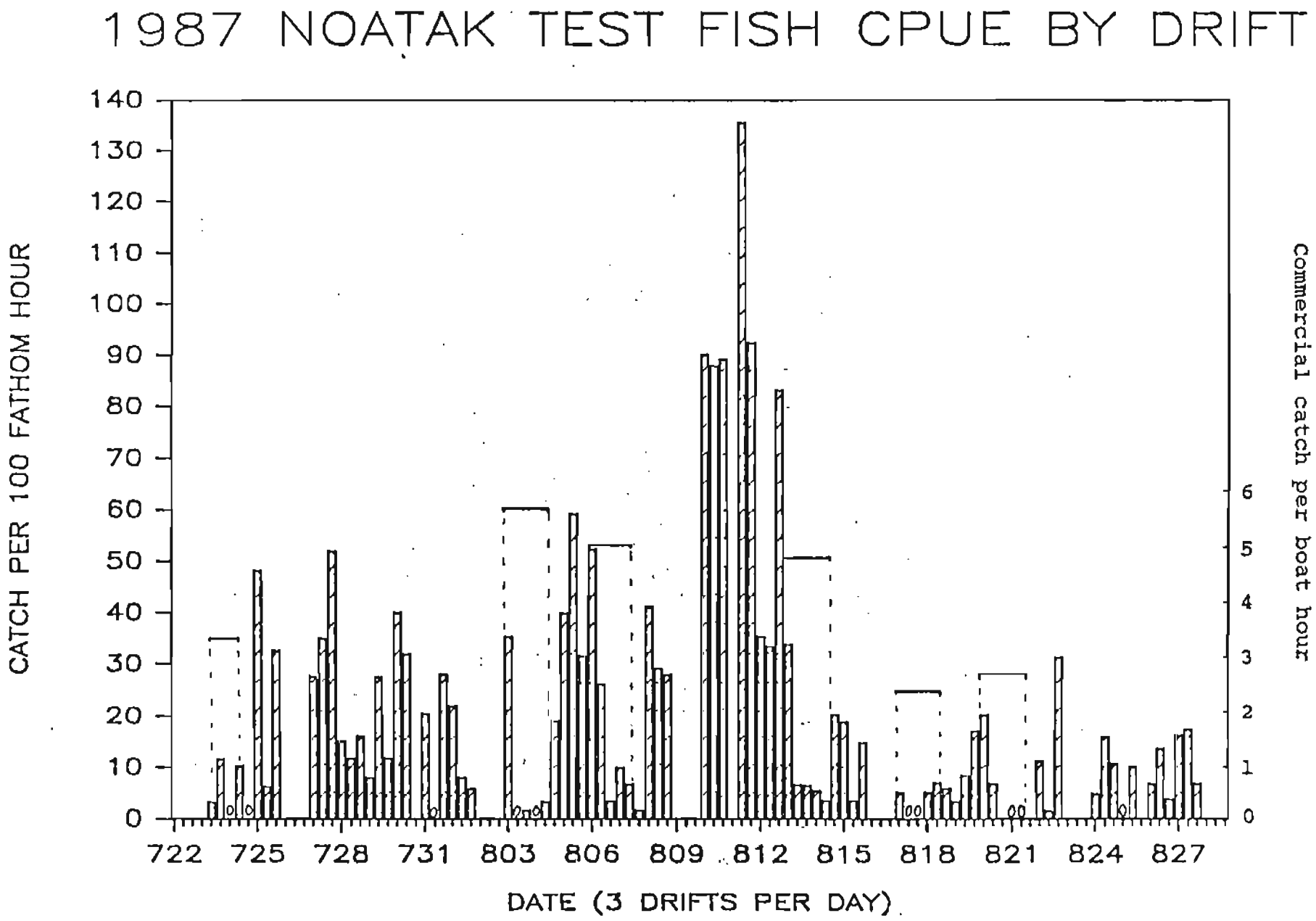

Figure 9. Noatak River test fish CPUE (histogram) and commercial CPUE (—), 1987.

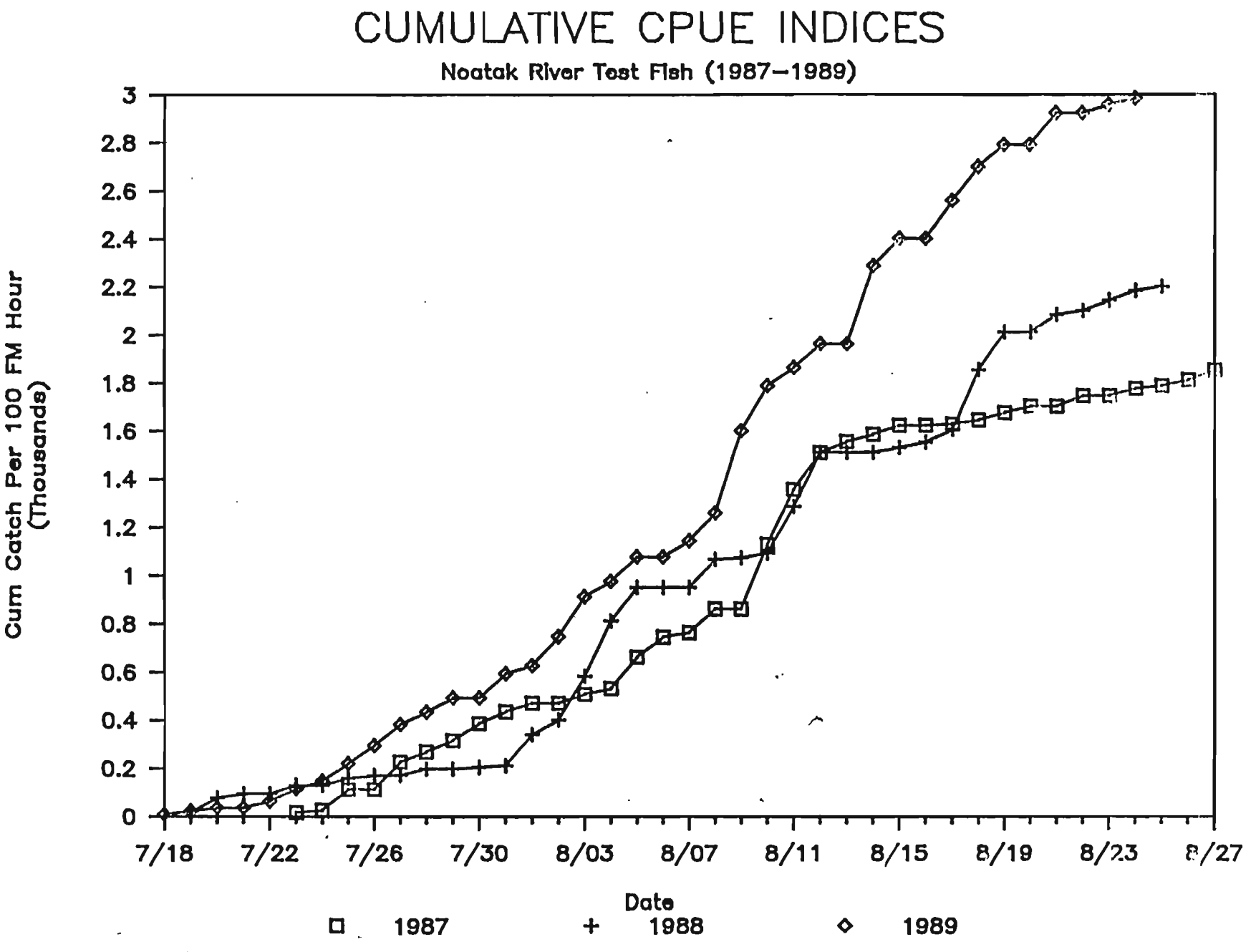

Figure 10. Cumulative mean drift CPUE indices, 1987-1989.

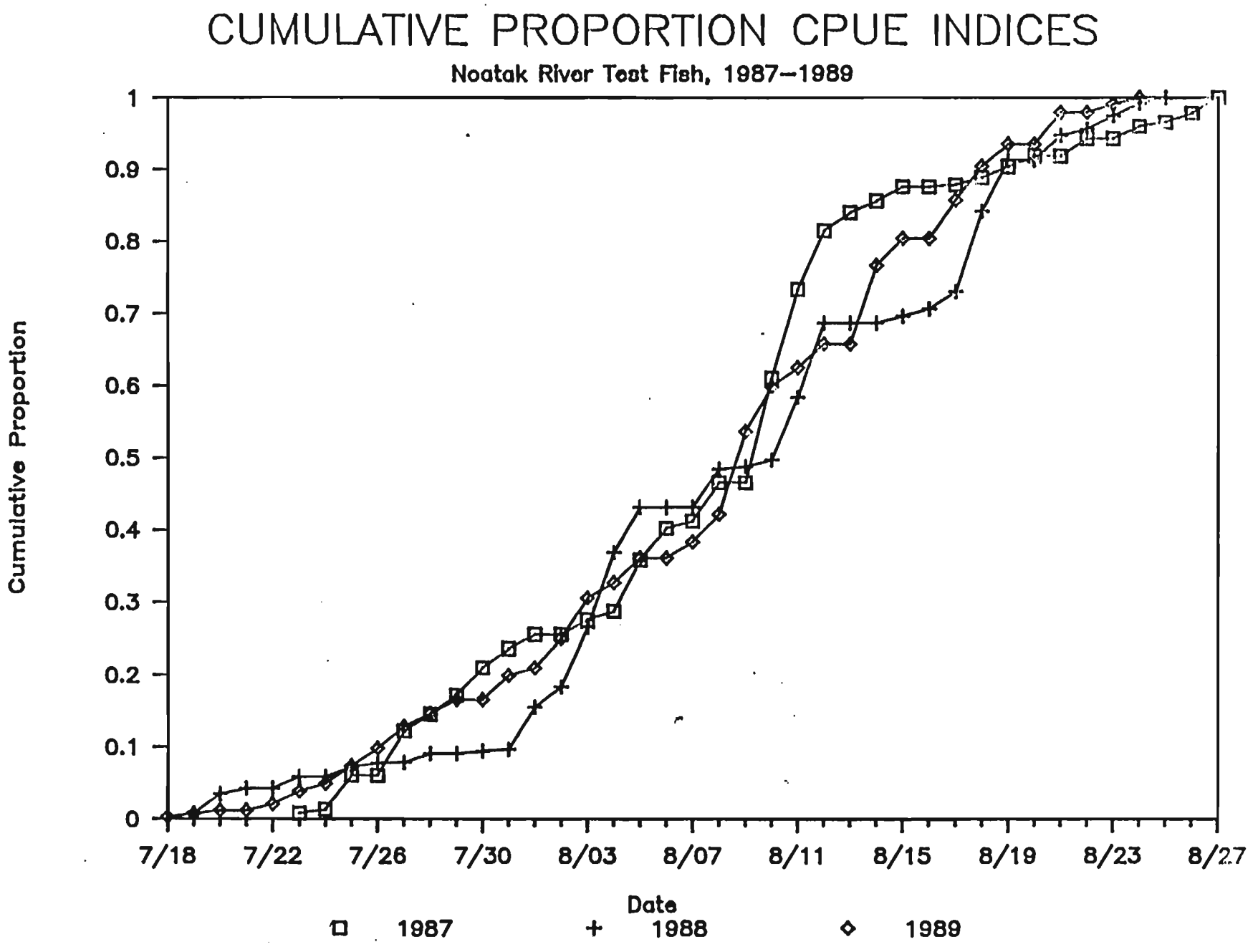

Figure 11. Cumulative proportion of seasonal total CPUE indices, 1987-1989.

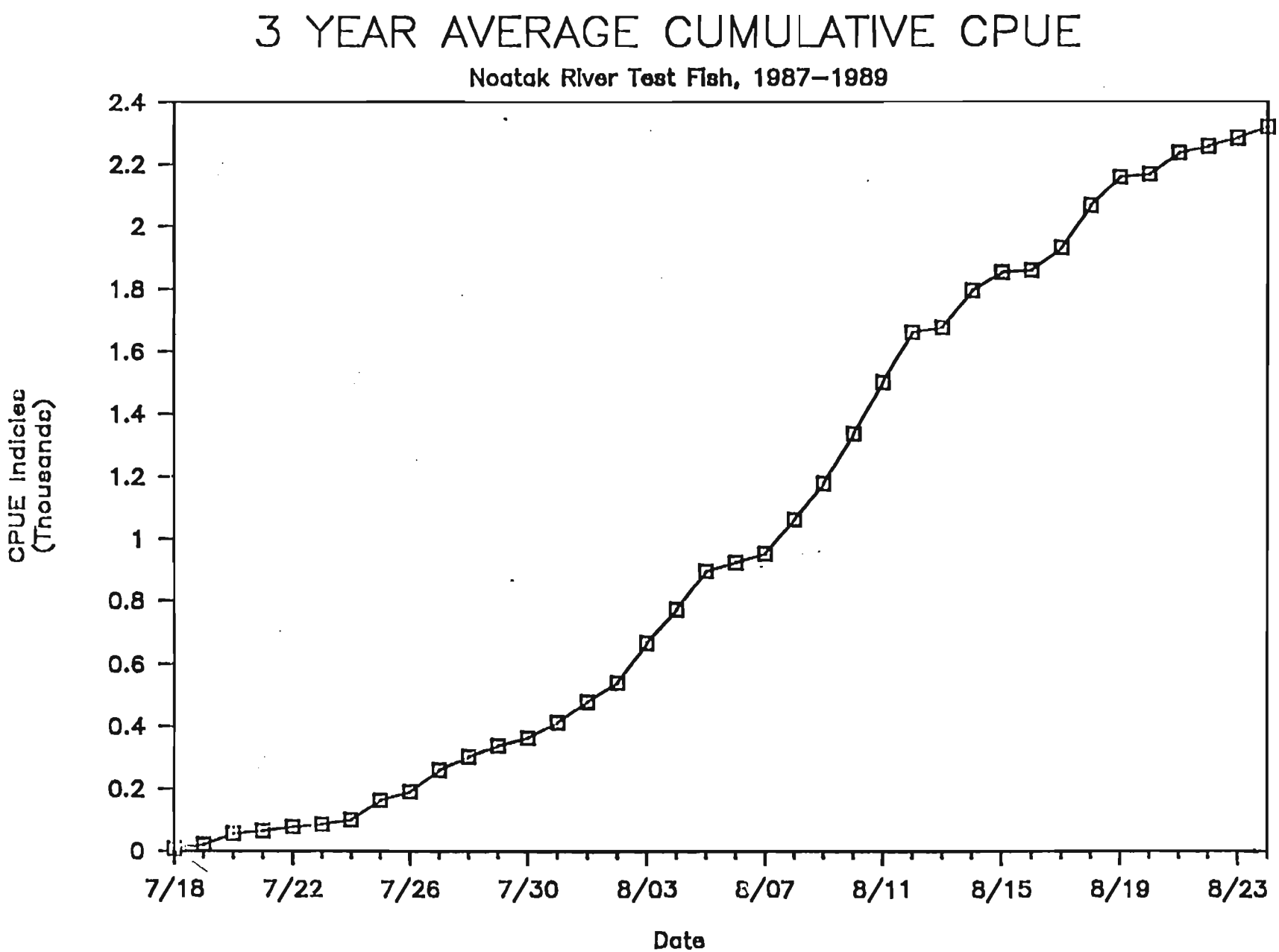

Figure 12. Three year average of cumulative CPUE for the years 1987-1989.