ARCTIC YUKON KUSKOKWIM REGION

NORTON SOUND/KOTZEBUE SALMON

ESCAPEMENT REPORT # 30

1982, UNALAKLEET RIVER ESCAPEMENT PROJECT

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INTRODUCTION

The Unalakleet River empties into Norton Sound approximately 130 miles southeast of Nome, is approximately 130 miles in length, and drains an area of 1,087 square miles. The Unalakleet River flows from the Nulato hills westward to the town of Unalakleet on the Bering Sea coast. Five major tributaries comprise the river, all of which support spawning salmon.

The town of Unalakleet is situated at the mouth of the Unalakleet River, the most important salmon producing river in Norton Sound. Historically, the people of the area have depended on the salmon runs for their livelihood; first, as food for themselves and their dogs and more recently as the basis of their cash economy.

Salmon escapement to the system has been assessed annually by aerial stream surveys, counting towers on the North River in 1973 and 1974 and on the Chirosky River during 1975 and 1976. Weather and water clarity have often limited these enumeration efforts but escapement estimates have ranged as high as 1,477 king (1977); 28,600 chum (1978); 491,706 pink (1978) and 1,184 coho salmon (1980), not including major tributaries.

A salmon subsistence survey is conducted by the Commercial Fisheries Division each year in Unalakleet. Results have indicated that subsistence catch averages have been increasing in recent years. The recent five-year average, 1977 to 1981, subsistence salmon catches were: 884 king; 3,598 coho; 10,784 pink and 4,118 chum salmon. Coho and pink salmon catches have shown the greatest increases due largely to increased returns of these species.

Commercial catches in the Unalakleet subdistrict have also increased due to increased effort, better technology and the increased returns of coho and pink salmon. The recent five-year average, (1977-1981), commercial catch for the Unalakleet subdistrict is 5,413 king; 16,714 coho; 106,645 pink and 40,769 chum salmon. In 1982 the average commercial fisherman received approximately $6,000 from the sale of salmon.

Because of the importance of the commercial and subsistence fisheries and the problems of estimating escapement in this subdistrict, side scanning sonar was installed in 1982 in the Unalakleet River in hopes of gaining a more accurate estimate of escapement and at the very least, a more consistent index of salmon migration.

During 1981, a test fishing program was put in operation at four

sites in the lower four miles in the Unalakleet River. Indices from the area biologist set some commercial fishing openings and closures. In 1982 the sonar project was initiated. The growing importance of the fisheries on the Unalakleet salmon stocks has made accurate in-season escapement counts more necessary than the post-season estimates of the past. By August the sonar counts were providing a useful index of the coho salmon escapement helping the area biologist to decide to extend the coho fishery based on the large escapement indicated by sonar.

This report presents the results of the Unalakleet sonar project's first year of operation.

METHODS

Project Deployment:

Supplies and equipment were moved to the sonar site approximately 3 1/2 miles upstream on the Unalakleet River on May 26 and 27. Camp construction and sonar assembly for both banks was completed on June 21. The south bank counter was in operation June 15 and the north bank counter was in operation June 22. Sonar counter operation ceased on September 7, 85 days after counting was initiated. By September 10 the sonar camp had been dismantled and the equipment stored for the winter.

Test fishing began on May 25 and ended on September 24.

Sonar

The Electrodynamics Division of the Bendix Corporation developed a side scanning hydroacoustic counter during the 1970's capable of detecting and counting salmon migrating along the banks of tributary streams. The side scan sonar counter is designed to transmit a sonic beam along a 60-foot aluminum tube or substrate.

Echoes from fish passing through the beam are reflected to the transducer. The system's electronics interpret the strength and number of the echoes, and tally fish counts.

Two Bendix side-scan counters, 1981 models, were used on the Unalakleet River. The respective 60-foot long tubular aluminum substrates were deployed from opposite banks of the Unalakleet River. Both substrates were positioned so that there was at least two feet of water over the sonar projected immediately above the substrate: that is, two feet over the transducer housing and seven feet over the target and of the substrate. It was found that two feet of water was needed as a buffer to

eliminate "debris" counts due to wind ripples, flotsam and sudden water level changes. A small weir was placed to prevent fish passage inshore from the transducer on both sides of the river.

The substrates were not located directly opposite each other. The north bank substrate was located 400 feet upstream from the south bank substrate which was placed in a nearly ideal river bottom profile. Unfortunately, mud shallows were opposite the south bank.

The river width at the sonar site is approximately 200 feet. The deepest channel is located about 80 feet from shore at the north bank substrate and about 100 feet from shore at the north bank substrate. Although one-third of the river is insonified by the sonar beams, if fish follow a depth contour then more than two-thirds of the possible fish paths would be covered by the sonar counters.

The substrates were moved several times during the summer because of water level changes and for cleaning. The substrates were guyed to two dead men, each in the form of buried logs, held in place with fence posts. Stainless steel aircraft cable was attached to each end of the substrate and to respective dead men on shore.

The cables were roughly parallel and adjusted to hold the substrate perpendicular to shore. The inshore cable was long enough to allow the substrate to remain perpendicular to shore even though it might be moved 15 feet from shore. The easiest method of movement of the substrate was to use the hydrodynamic shape of the substrate to raise the tube with the aid of the current while pulling the off-shore buoy with a small skiff. The in-shore footing could then be relocated with a minimum of effort.

Although the current at the sonar site was insufficient to raise the tube to the surface, it did help in pulling it up to a point where it could be cleaned.

Calibration (a comparison of oscilloscope fish counts and sonar counter fish counts) was scheduled four times daily on both banks. Untrained personnel and the magnitude of the pink salmon run compounded by slow fish passage made this schedule impractical much of the summer. Calibration was attempted when usable results seemed possible. It was not attempted at extreme rates of fish passage. Calibration was done by comparing echoes on a Tektronix 221 oscilloscope with counts of the sonar counter. Salmon passing through the sonar beam produce a distinctive

oscilloscope trace. A count of 100 fish within 30 minutes, the maximum calibration period, was required before resetting the sonar fish velocity controls.

$$\% \text{ agreement} = \frac{\text{Sonar count}}{\text{Oscilloscope count}}$$

The % agreement was then used to adjust the daily counts. Agreement of <1 indicates the sonar was undercounting and >1 indicates overcounting.

When the count agreement varied more than 15% the following equation was used to derive a new fish velocity:

% agreement x existing velocity = new velocity

Fish velocity was set at .571 sec/ft at the start of counting and adjusted during the season as indicated by calibration.

Salmon milling over the substrate (termed "oscars") became a problem July 14 when spawned out and spawning pink salmon started "riding" the substrate turbulence wave. These fish were counted many times although there were only a few fish. It was assumed that this problem only existed on the inshore one-half of each substrate since pinks would be swept away in the faster deep water.

Records of fish velocity changes, % agreement fish passage and other problems affecting the salmon counts were kept on a daily basis. From these records, individual hours and sectors could be adjusted to more accurately show salmon migration. If an hour or sector count was suspected it was disregarded and an average of the two most adjacent counts was substituted. If a large block of counts were missing then adjacent daily percentages were calculated to determine the missing values. The decision concerning the validity of a count was often highly subjective. Weather conditions, observations from earlier in the day and intuition were all used.

The large fish counting feature of the 1981 model sonar counter did not work well on the Unalakleet. The large fish counts were proportional to total number counted and higher than expected. The large fish count was ignored if less than 100/day and anything in excess of 100 was added to the total daily count and apportioned using test fishing catch data.

Test Fishing

The test fishing site used in 1982 (Figure 1) was chosen because of its success during 1981. Drift gillnets in the Unalakleet River would not sample the same section of river a sonar counter would monitor and a set net can be fished more consistently than a drift net. The test net site had less milling than sites down stream. Up-river sites are affected by the North River salmon stocks and subsistence fishermen.

A variable mesh gillnet was set near the test net site on May 25 to capture char, whitefish or other species that might prey on salmon fry or smolt. Twenty foot panels of 4", 3" and 2 1/2" mesh made up the gillnet. Prior to sonar operations an 8 1/4" gillnet was fished as an index of king salmon migration. A 10 fathom net was used on June 4 and June 5 but was removed because of debris. Starting on June 7 until June 20 only a 20 fathom 8 1/4" mesh gillnet was fished at the test site. From June 21 until September 7, the period of sonar counter operation, a rotating schedule of 12-hour time blocks over a period of 3 days was used. The nets used included: (1) 20 fm 8 1/4" mesh (2) 20 fm 5 7/8" mesh (3) 25 fm 4" mesh and (4) 10 fm variable mesh. The 8 1/4" and variable mesh nets were fished simultaneously with the variable mesh 20 feet upstream of the 8 1/4" mesh. The 3-day rotation schedule allowed each net to be fished during one 12-hour high tide/daylight period and one 12-hour low tide/night period. Nets were rotated at 0900 and 2100 daily. The 8 1/4" mesh net was removed from the rotation on July 23 because it was no longer capturing fish since the king salmon run was over.

To calculate the species composition of the sonar total CPUE's (catch/100 fm-hr) were calculated for four salmon species. Pink salmon CPUE, chum salmon CPUE and non-salmon CPUE were calculated throughout the season. King salmon CPUE was calculated through June 23; coho salmon CPUE was calculated thereafter. During each three-day rotation, the different net sizes were fished twice. Thus, for each of the four fish types sampled, two CPUE's were calculated. These two CPUE's were totaled. Dividing the total CPUE for each fish type by the total CPUE's for all fish types during a single rotation resulted in the percentage of each fish type caught by the test nets. These same percentages were then applied to the sonar count for the same three day period, giving the total apportioned to each species.

Test fishing was not done on Sundays but the sonar continued counting. In order to apportion the sonar counts on Sunday, the first 12 hours of that day were apportioned using the previous

three-day test fishing rotation and the second 12 hours were apportioned using the following three-day rotation.

From September 8 to September 24 the 5 7/8" net was fished exclusively as an index of the coho salmon run.

Weights, lengths and scale samples were taken from all king, coho and chum salmon captured. Pink salmon were not sampled. King tissue samples were taken from net killed salmon for electrophoretic studies coordinated by the Stock Separation Section of the Commercial Fisheries Division.

Counting Towers

Counting towers were erected immediately adjacent to the onshore end of the substrates (Figure 2). The use of visual tower counts for comparison with sonar counts proved unfeasible. However, visual counts were useful determining ratios of moribund fish, debris passage, etc.

Drift Sets/Beach Seine

Drift netting and beach seining were done for comparison with test net species apportionment and to determine fish passage beyond the sonar counting range. Drift sets were accomplished by drifting 20 fm 5 7/8" gillnet perpendicular to the shore. Each drift was 5 minutes in duration and was begun approximately 200 yards upstream from each substrate and ended approximately 150 yards downstream (Figure 2). Drifts were made on August 9 (north and south bank); August 11 (north and south bank); August 18 (north bank) and August 26 (north and south bank). Beach seining was accomplished by using a 25 fm 4" gillnet immediately downstream of the south bank substrate. Shoreline conditions prevented seining on the north bank. Beach seines were done on August 21 and 27 during low tide.

Fry/Smolt Trapping

Wire minnow traps were set at likely locations on the Unalakleet, North and South Rivers. The number of traps set ranged from two to eight, depending on river conditions and personnel available. Trapping began May 24 and continued intermittently until mid-August. Because of project priorities this portion of the project was conducted sporadically and, therefore, produced little usable data on fry/smolt age, sex ratios, etc.

River Surveys

Two-person boat crews were used to survey the North and South Rivers and the main Unalakleet River. Surveys were accomplished on July 11 (North River); August 4 (South River); August 12 (North River) and August 20 (Unalakleet River).

The primary goal of each survey was as follows:

July 11 -- Determine relative stages of the pink run as shown by the distance which pinks had traveled upstream and the presence of pink carcasses.

August 4 -- Determine the distribution of spawning salmon.

August 12 -- Determine the distribution of coho salmon and enumerate salmon carcasses on selected bars.

August 20 -- Enumerate salmon carcasses on selected bars for comparison with aerial counts.

RESULTS

Subsistence Survey

The mean king salmon catch per fisherman peaked on June 17 for the ocean and July 3 for the subsistence catch within the river. This is somewhat later than 1981 when kings peaked on June 19-22 in the river. It should be noted that only one ocean fisherman was surveyed during 1982.

River and ocean king salmon subsistence surveys are presented in Table 1 and Figure 3. Because the nets, fishing times and net locations vary among fishermen, it was easier to calculate mean catch per fisherman than catch per unit effort.

Sonar

During the period from June 15 to September 7 the final sonar count was 6,814,351 fish. 943,924 (13.9%) were counted on the south bank and 5,870,427 (86.1%) were counted on north bank (Table 2).

The daily sonar counts (Table 2) were adjusted by the test net proportions (Table 8) to give the following escapement totals for the period June 20 to September 7:

Species	Total Count	% of Total
Chinook	7,586	0.1
Coho	91,814	1.3
Pink	6,119,155	89.8
Chum	223,913	3.3
Other	371,883	5.5

Table 3 presents this data by 3-day sample period. Fish other than salmon that were considered countable by the sonar counter included artic char, broad, humpback and Alaska whitefish, grayling, burbot and sheefish.

Peak adjusted sonar counts were on July 13 for king; August 6 for coho; July 9 for pink and July 9 for chum salmon (Table 3, Figures 7-10).

Representative passage rates by sector and by hour for 2 and 3-day periods are presented in Figures 5 and 6 respectively.

Test Fishing

A total of 39 (90% male - 10% female) king salmon; 310 (55% male - 45% female) coho salmon; 5,114 pink salmon and 375 (56% male - 44% female) chum salmon were captured from June 7 to September 24. The fish were sampled and donated to a local subsistence fisherman.

Based on the 1982 test net CPUE, the king migration peaked from June 18-25, coho from July 31 to August 15, pink from July 8-11 and chum salmon from July 8-11.

Fewer king salmon were caught in 1982 than in 1981 with a higher proportion of younger age classes. Coho returns were greater and pinks were far more abundant than in 1981. A longer migration of chums occurred in 1981 from June 17 to August 20, but in 1982 chum migration lasted only from June 20 to August 10.

Twenty-five female pink salmon captured in the 4" mesh net were sampled for percent roe content on July 16 and again on July 29 (Table 6). On July 16 the average body weight was 905.3 grams and the average roe weight was 151.1 grams giving an average of 16.7% roe by weight. On July 29, the average body weight was 917.6 grams and the average roe weight was 172.6 grams giving an average of 18.8% roe by weight. Random totes from a local processor were sampled for pink salmon sex ratios. In seven separate samples of 25 each, 202 males (73%) and 73 females (27%) were found. The Fish and Game 4" test nets during the same

period caught roughly 70% males and 30% females. Roe recovery at the plant was reported by the processor to be less than 1% by weight of the total pink catch. It is not known what percentage of the commercial catch was caught in 4 1/2" or 5 7/8" gear.

Age, Sex and Size Composition of Unalakleet Salmon Catches

An age analysis of scales collected during the project indicated the following age compositions: king salmon commercial catch (4-2, 12%; 5-2. 52%; 6-2, 33%; 7-2, 4%); coho salmon - 5 7/8" test net (3-2, 1%; 4-3, 99%); chum salmon - 5 7/8" test net (3-1, 2%; 4-1, 67%; 5-1, 29%; 6-1, 2% - Table 7). Tables 10 a, b, c, d and e show the age composition of the various species by date and the mesh sizes used during project.

Counting Towers

At no time during the 1982 season was either substrate totally visible from the counting tower; so, visual counts could not be compared to side scan sonar counts. However, the towers proved valuable in determining the rate of debris passage, ratios of moribund fish and carcasses (especially pink salmon to migrating fish and sighting individuals or schools of salmon remaining in the counting range above the substrate).

Based on tower observations (debris, moribund fish, carcasses, etc) sonar counts on both banks were reduced by a factor of .25 from July 17 to August 5 and by a factor of .125 from August 6 to August 10.

Drift Sets/Beach Seines

In general both drift netting and beach seines showed poor correlation with either set netting or the sonar counts. The advantage of set net sampling is that river levels and debris are much less of a problem; so that a set net program provides a much more consistent index. Drift netting did indicate that chum and coho salmon migrate close to the river banks not in mid-stream. Table 8 lists the results of the drift sets and beach seines.

River Surveys/Aerial Surveys

Four boat surveys were conducted on the Unalakleet River system. These surveys were used to verify the late aerial surveys of chum and pink salmon. The aerial surveys proved to be of poor quality as judged by the spot checks of carcass counts made on the North River and main Unalakleet River. Boat counts of salmon are shown in detail in Appendix I. Since the aerial survey of the

Unalakleet system was so poor, due to rain and turbidity, this year no comparison to the sonar counts will be made and no tables of aerial counts are included in this report.

DISCUSSION

Based on test fishing, commercial catch data, aerial and boat surveys, and observations made throughout the project, only the pink and coho salmon sonar counts are considered realistic. King and chum salmon estimates are unrealistically high as a result of the large number of pink salmon present.

The "large fish" register on the 1981 Bendix sonar is not considered accurate since the large fish count was proportional to the total sector count throughout the season. The counter tallied king salmon until September 7, although none were observed in the vicinity after July 15. In adjusting raw sonar counts, the large fish count over 100 was added to the daily total. On further consideration a better adjustment would be to add half the large fish count to the daily total since it seems to be an index of the simultaneous fish passage to be counted as one fish.

Due to the large pink run occurring at the same time as the king and chum salmon runs, it is probable that both the king and chum counts are inflated by the salmon counter since a small error in percentage species apportionment could cause a difference of several thousand fish being attributed to the wrong species catagory. One indication of this species allocation problem is the small difference in dates of the peak CPUE's in the test net data (king, June 24 and July 11; chum, July 11; pink, July 12).

A more dramatic indication that the chum count is high is a comparison of the Unalakleet subdistrict and Moses Point subdistrict salmon runs. During 1982, the Kwiniuk River chum escapement was 44,099. Aerial surveys and tower counts during 1980 indicate that the Tubutulik River has an equal escapement giving a rough estimate for the total escapement of the Moses Point subdistrict of 80,000 chum salmon during 1982. The commercial catch was 39,915 with 11,700 boat hours for the period of June 17 to July 31. For the same period the Unalakleet commercial catch was 37,409 with 28,560 boat hours. Thus, chum/boat hour in Moses Point was over 2.5 times the chum/boat hour in Unalakleet. It would seem there would be significantly less escapement in the Unalakleet River, yet the apportioned sonar count indicates 2.8 times the Moses Point escapement.

Fish velocities used were .571 sec/ft from June 15 to June 25;

.683 sec/ft from June 25 to July 21; .471 sec/ft from July 2 to August 18 and a .584 sec/ft from August 18 to September 7. An incomplete understanding of the counter and the inability to calibrate during much of the pink salmon run makes any speculation about the relation between fish velocity settings to other parameters inconclusive. However, large changes of river level seemed to coincide with changes in the fish swimming speed.

Recommendations

The Tektronix 221 oscilloscope had too small of a screen. At times it was difficult to separate spikes. An oscilloscope with a larger and brighter screen would prove helpful and reduce eye fatigue.

During periods of high water, the north bank substrate was difficult to reach for cleaning and maintenance. The possibility of extending the counting range should be investigated in 1983 so that the transducer would remain more accessible.

A much more stable water depth indicator is needed. Debris and boats being secured to the indicator caused problems all season. A tripod of heavy pipe might prove more stable.

Test fishing utilizing a rotation of mesh sizes appears to be the most reliable method of those used for species apportionment. All nets should be of equal length (20 fm) and close attention paid to maintain the same angle to the shore on each net. The nets need to be cleaned regularly to keep net avoidance to a minimum and "catchability" consistent.

The same test net site should be retained in 1983. Although this site experiences some schooling activity, primarily by pink and chum salmon, it is the most desirable between the Unalakleet River mouth and its confluence with the first major spawning tributary, the North River.

At least one tower should be retained, even though visual count was not possible, observations on debris, moribund fish and schooling activity was possible. This information proved useful for the adjustment of raw sonar counts.

CONCLUSION

By the end of the first season's operation limited use of the sonar counts was already being used in the management of the fishery. The coho salmon run was sufficiently separate from other salmon runs that the counts could be used as an in-season

index of the coho escapement. The count of 91,814 coho seems within reason.

The estimates of king (7,586) and chum salmon (223,913) escapement seem suspect, as already discussed, due mostly to the large pink salmon return.

The overwhelming pink salmon return was so much larger than the coincidental king and chum salmon returns that the estimated escapement of 6,119,155 pinks seemed reasonable or unaffected by the other returns.

The second year's operation of a test net did cover the inadequacies of the sonar count to a certain extent by providing a basis of comparison of catch per unit effort for the years of 1981 and 1982. This information was useful especially in light of the poor aerial survey conditions experienced during the 1982 season.

By building a data base over the years, a useful tool can evolve for coho and pink salmon management. It is possible that with improved speciation techniques a usable chum count might be made. The small run size combined with the large fishery value and the tendency of king salmon to migrate up a portion of the river uncountable by present technology makes a usable estimate of king escapement a high priority for management.

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Figure 1.

ADF&G TEST NET SITES

Figure 2. Sonar site schematic

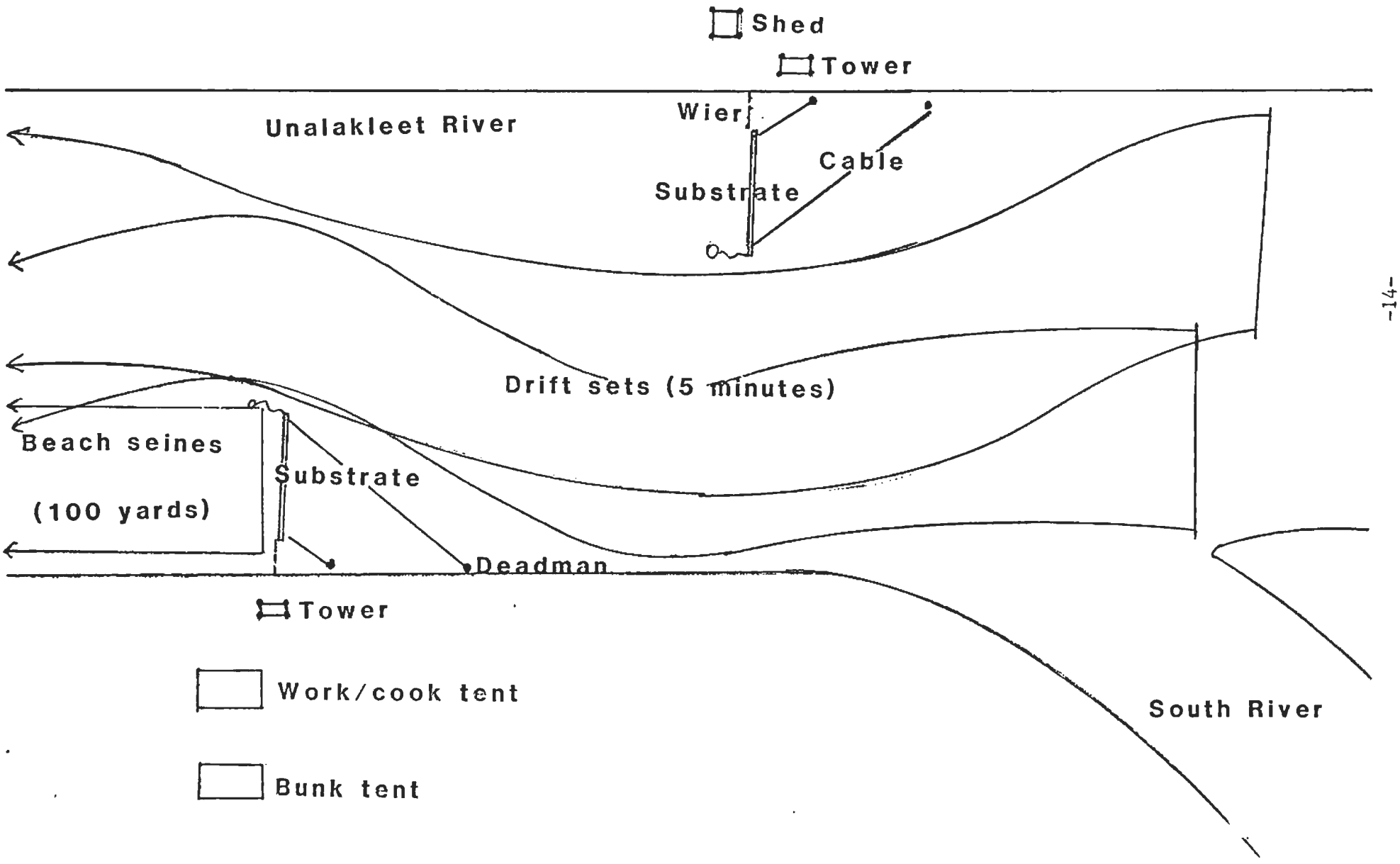
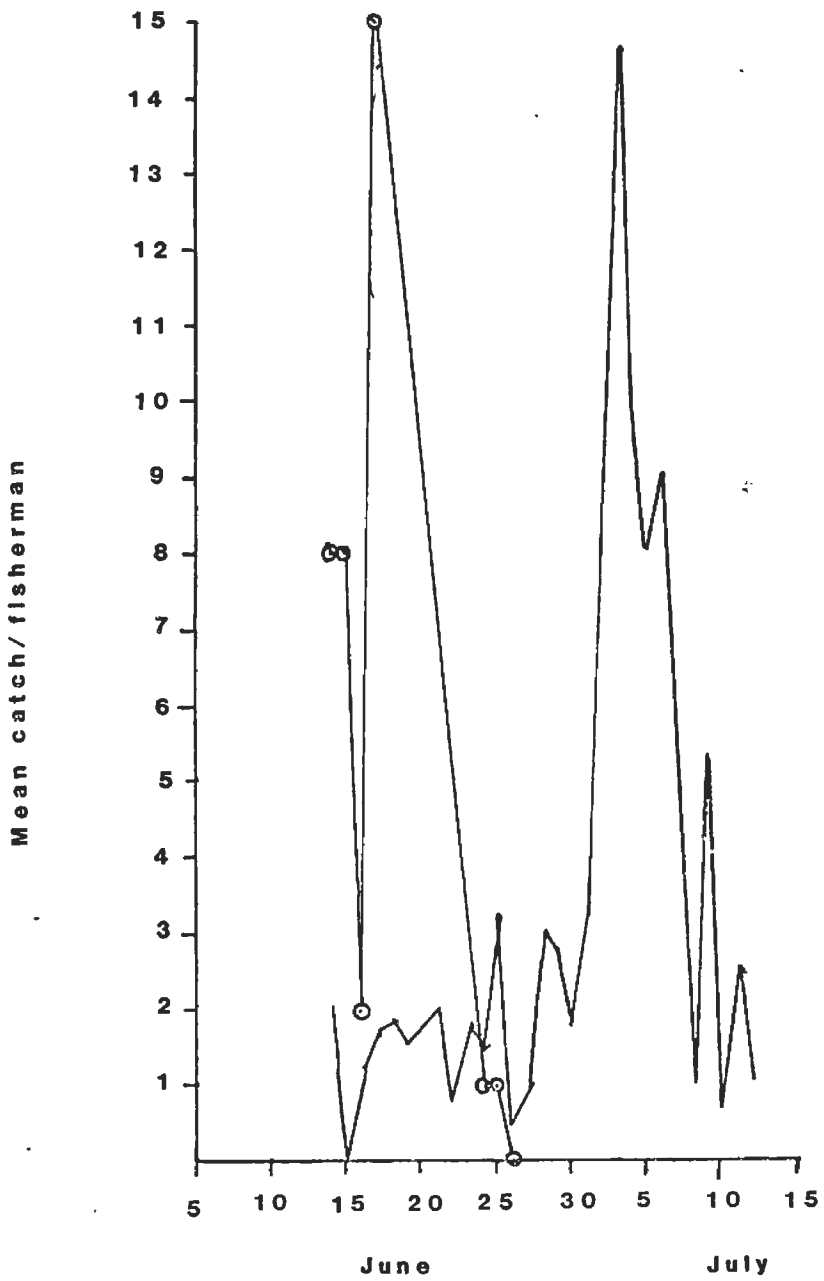


Figure 3.



Unalakleet Subsistence Survey, 1982

King Salmon

River

Ocean

Figure 4A.

Specie apportionment

King salmon

Unalakleet sonar, 1982

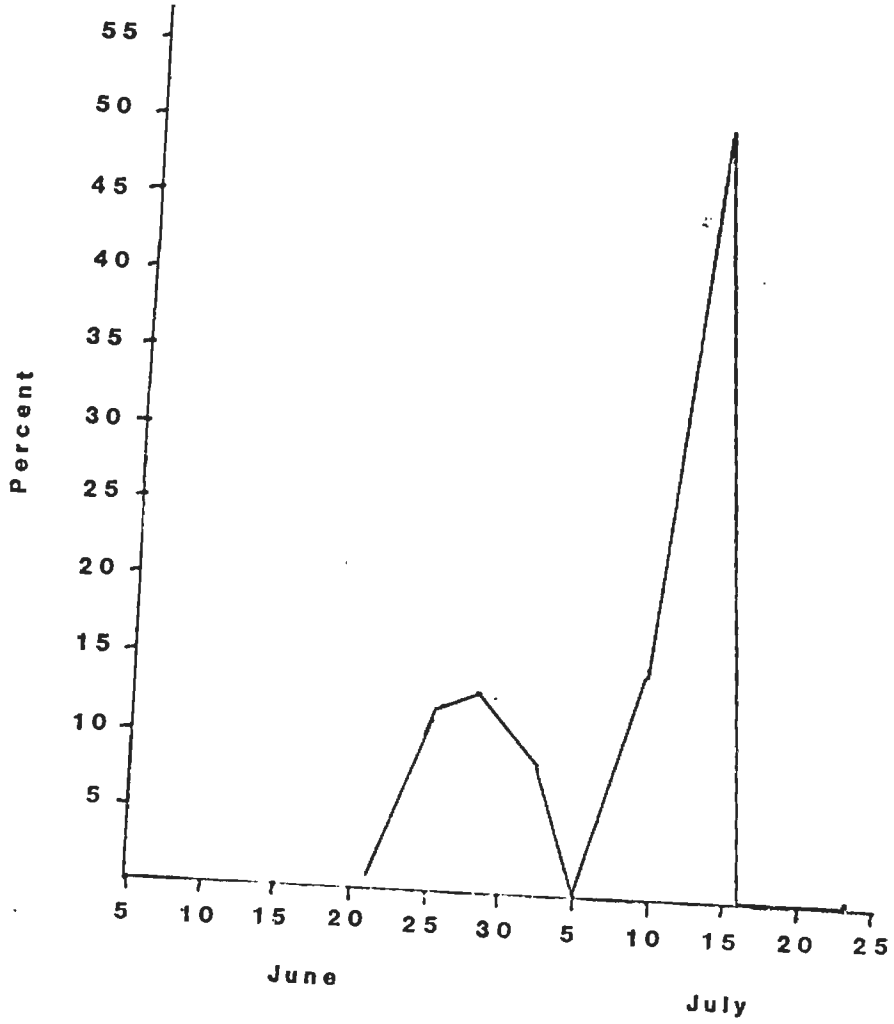


Figure 4B.

Specie apportionment

Coho salmon

Unalakleet sonar, 1982

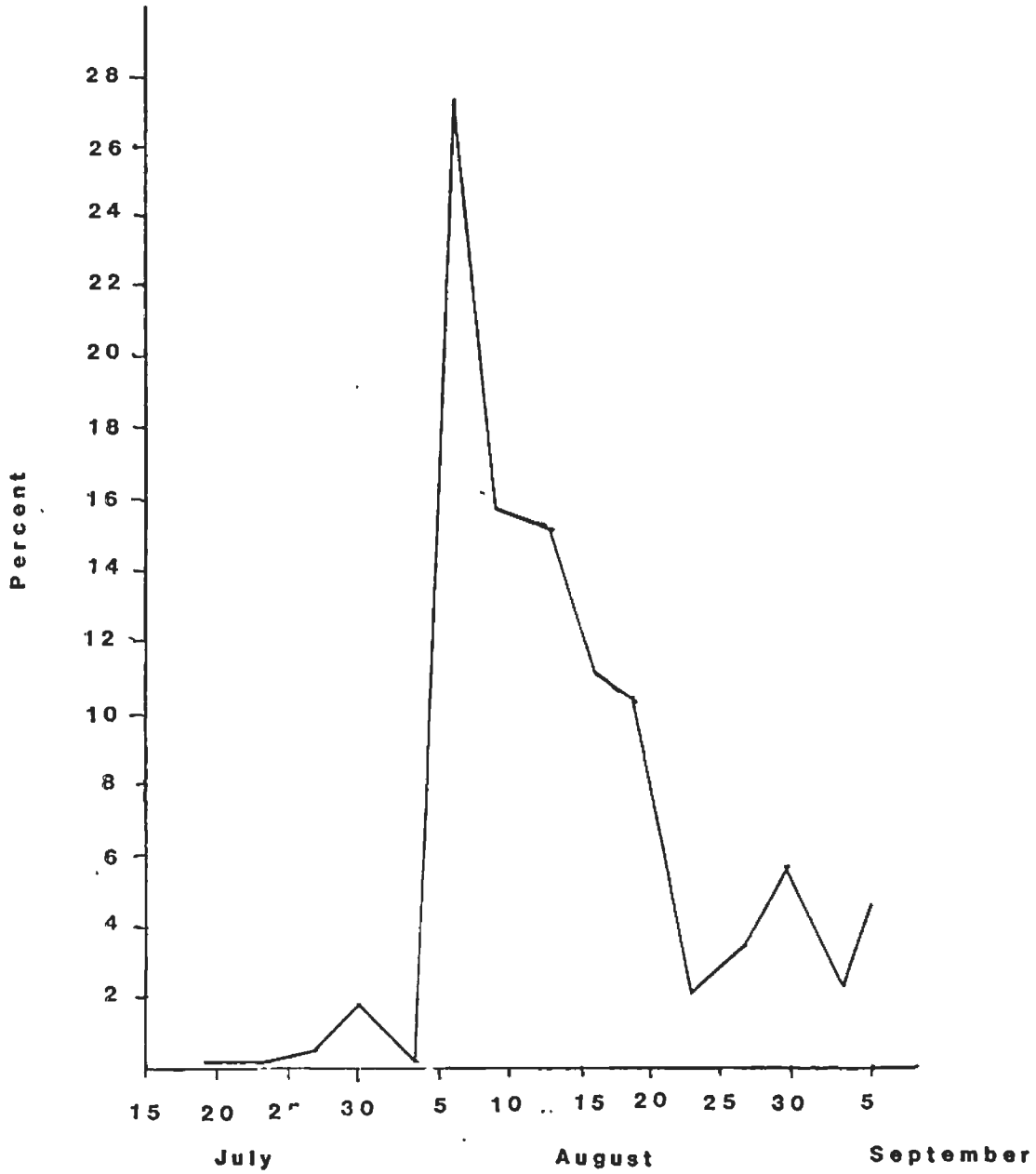


Figure 4C.

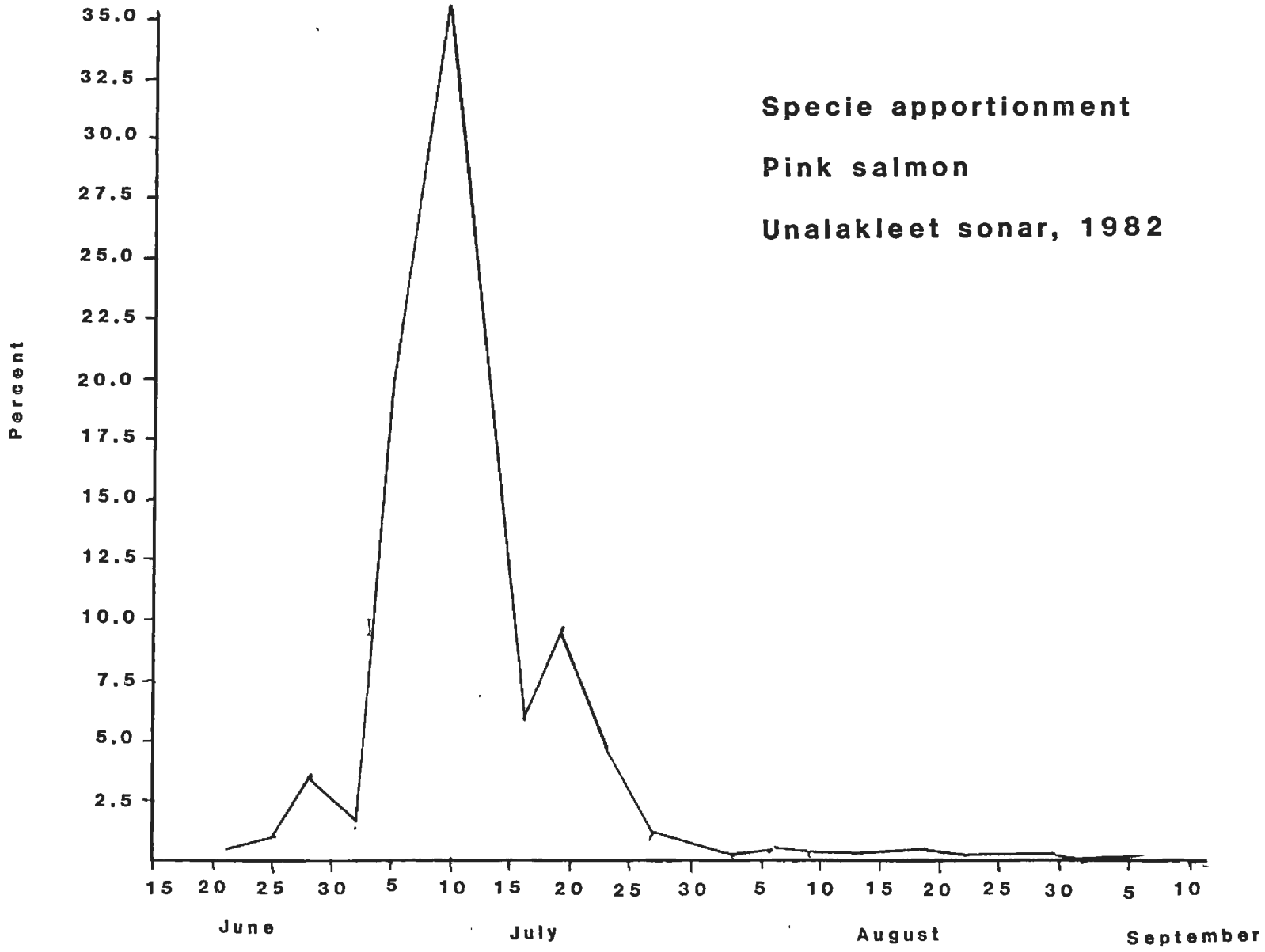

Specie apportionment
Pink salmon
Unalakleet sonar, 1982
Percent
35.0
32.5
30.0
27.5
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
15 20 25 30 5 10 15 20 25 30 5 10 15 20 25 30 5 10
June
July
August
September

Figure 4D

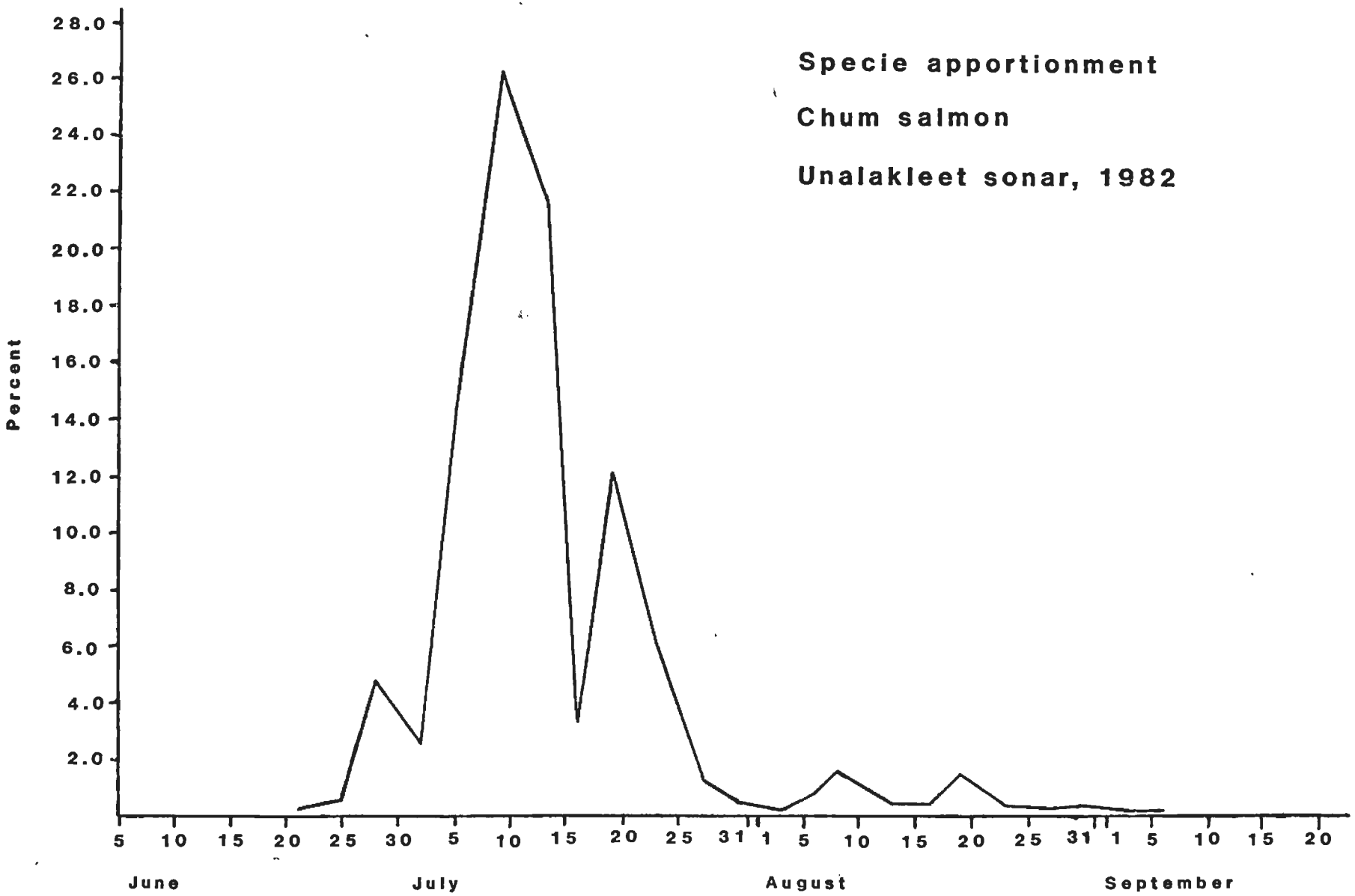

Specie apportionment
Chum salmon
Unalakleet sonar, 1982
Percent
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
5 10 15 20 25 30 5 10 15 20 25 31 1 5 10 15 20 25 31 1 5 10 15 20
June
July
August
September

Figure 5

Sector Distribution of Counts
Unalakleet Side Scan Sonar, 1982

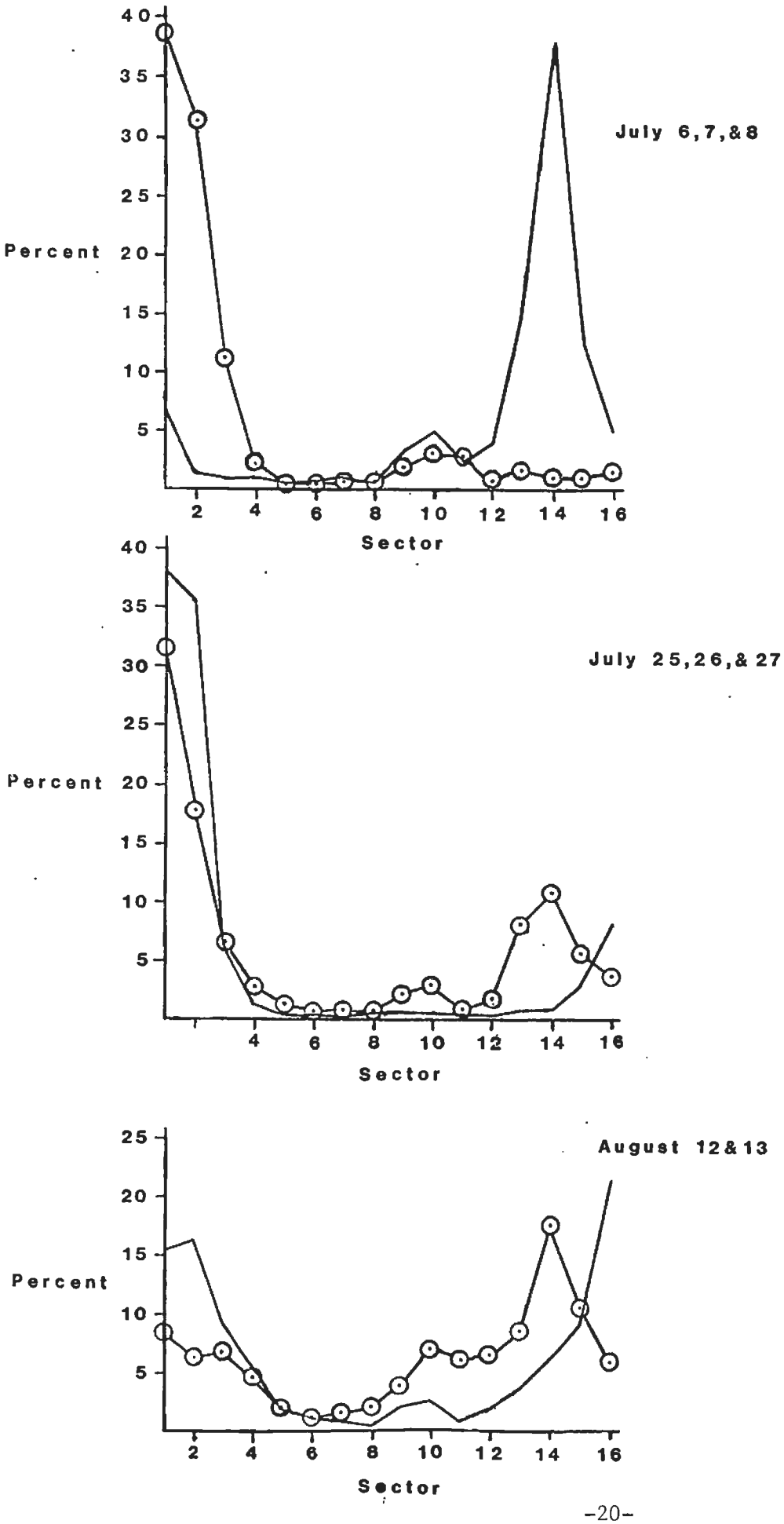


Figure 6

Hourly Distribution of Counts

Unalakleet Side Scan Sonar, 1982

South Bank

North Bank

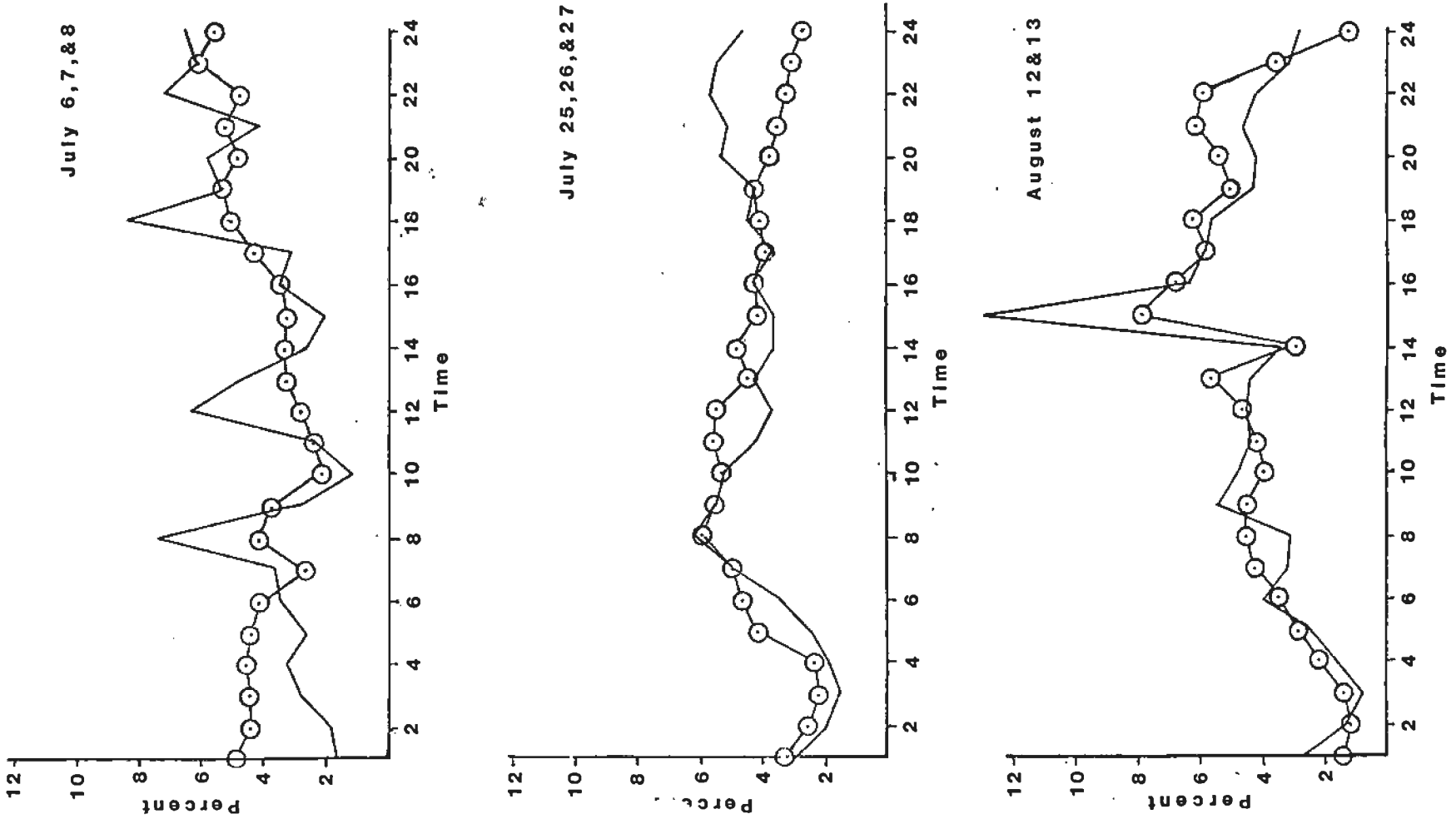


Figure 7A.

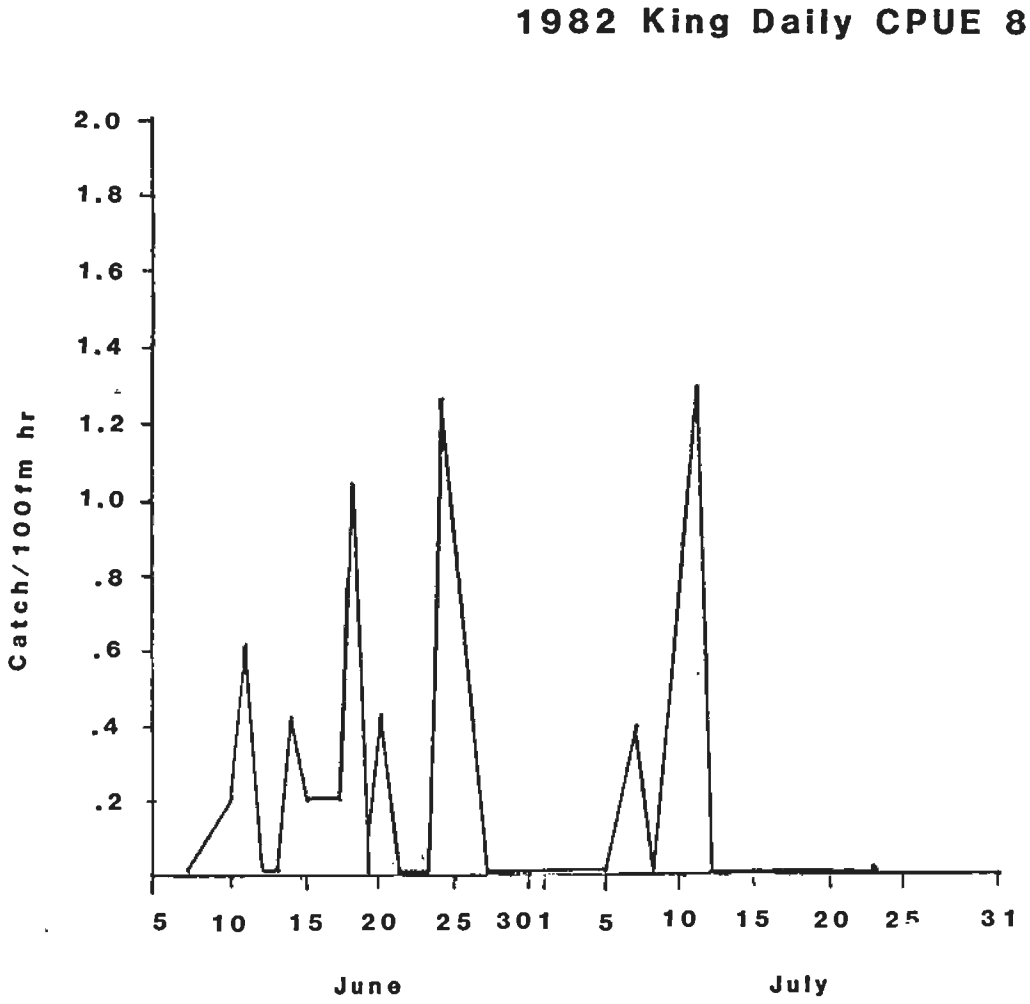

1982 King Daily CPUE 8 1/4" Mesh
Catch/100fm hr
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
5
10
15
20
25
30
1
5
10
15
20
25
31
June
July

Figure 7B.

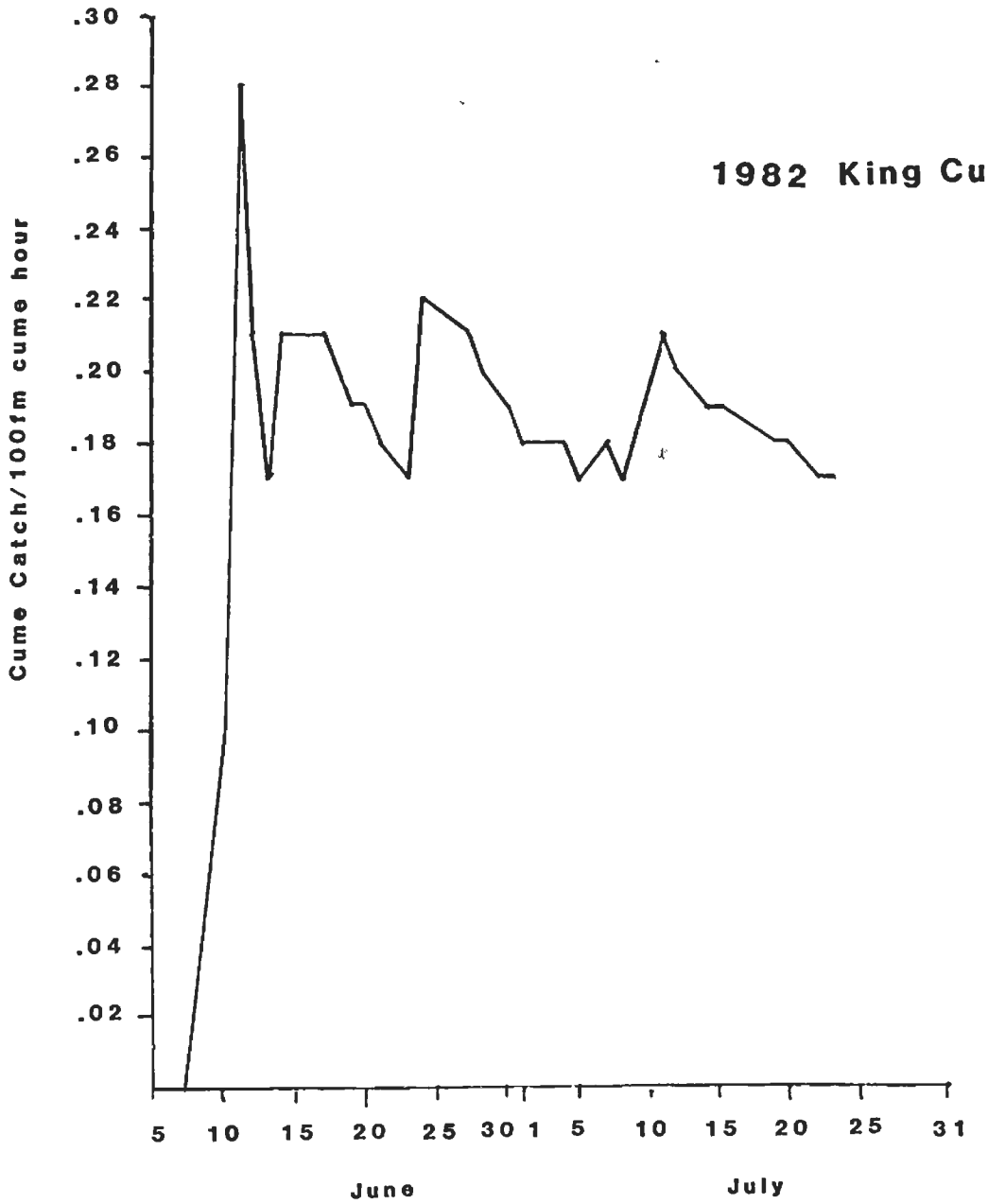

1982 King Cumulative CPUE 8 1/4"
Cume Catch/100fm cume hour
.30
.28
.26
.24
.22
.20
.18
.16
.14
.12
.10
.08
.06
.04
.02
5 10 15 20 25 30 1 5 10 15 20 25 31
June
July

Figure 8A. Coho cumulative CPUE 5 7/8" mesh

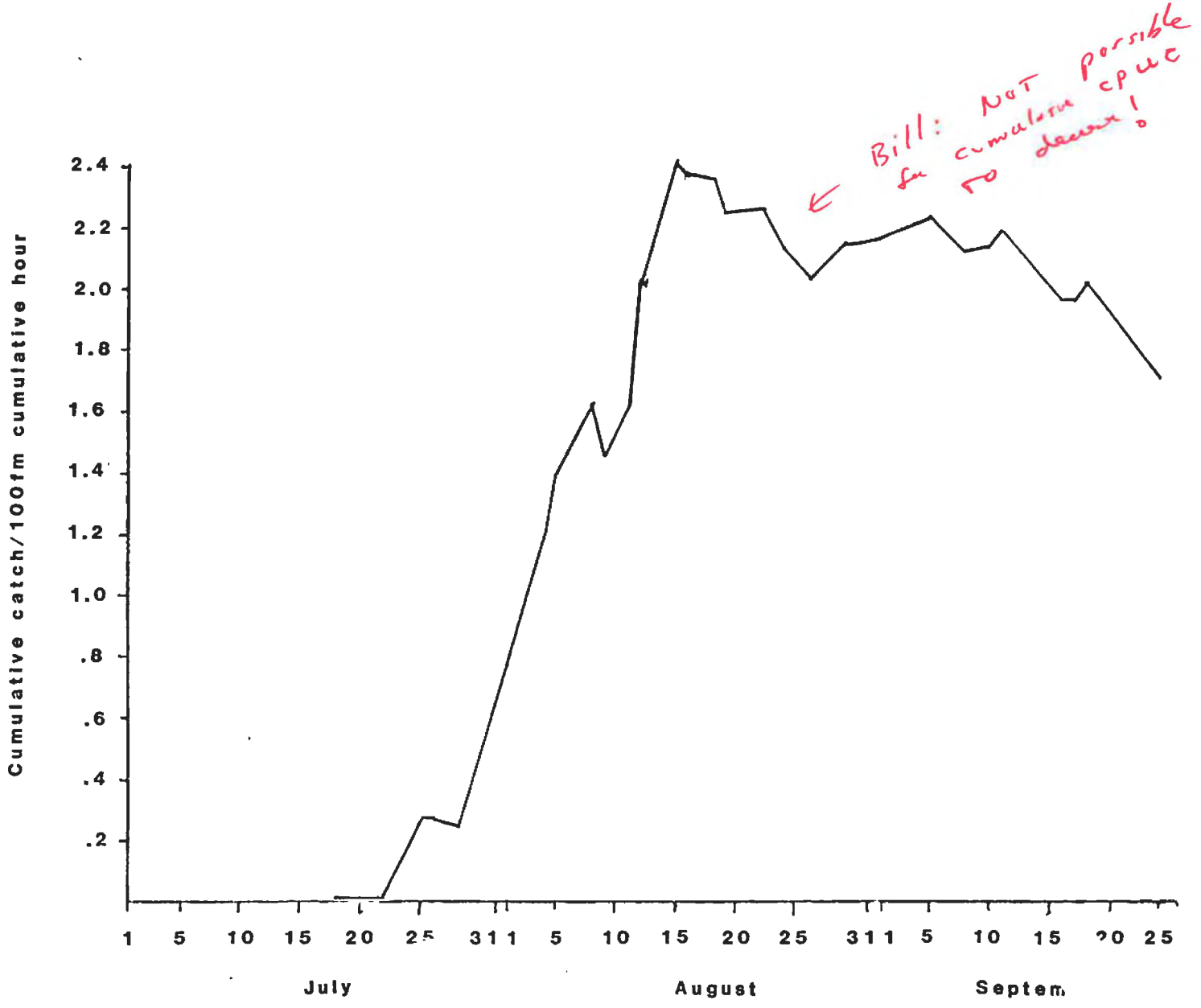


Figure 8B. 1982 Coho Daily CPUE 5 7/8" mesh

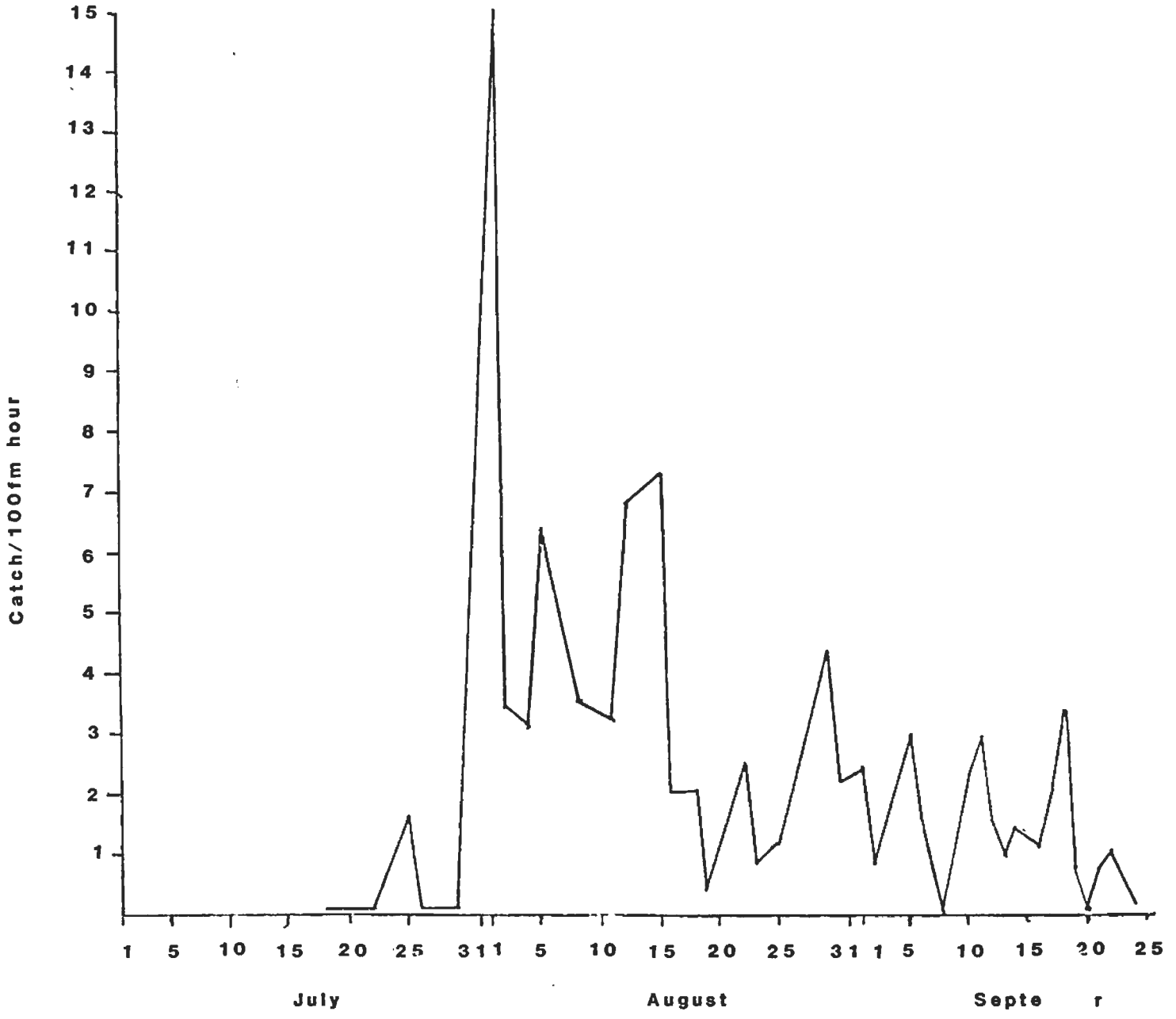


Figure 9A

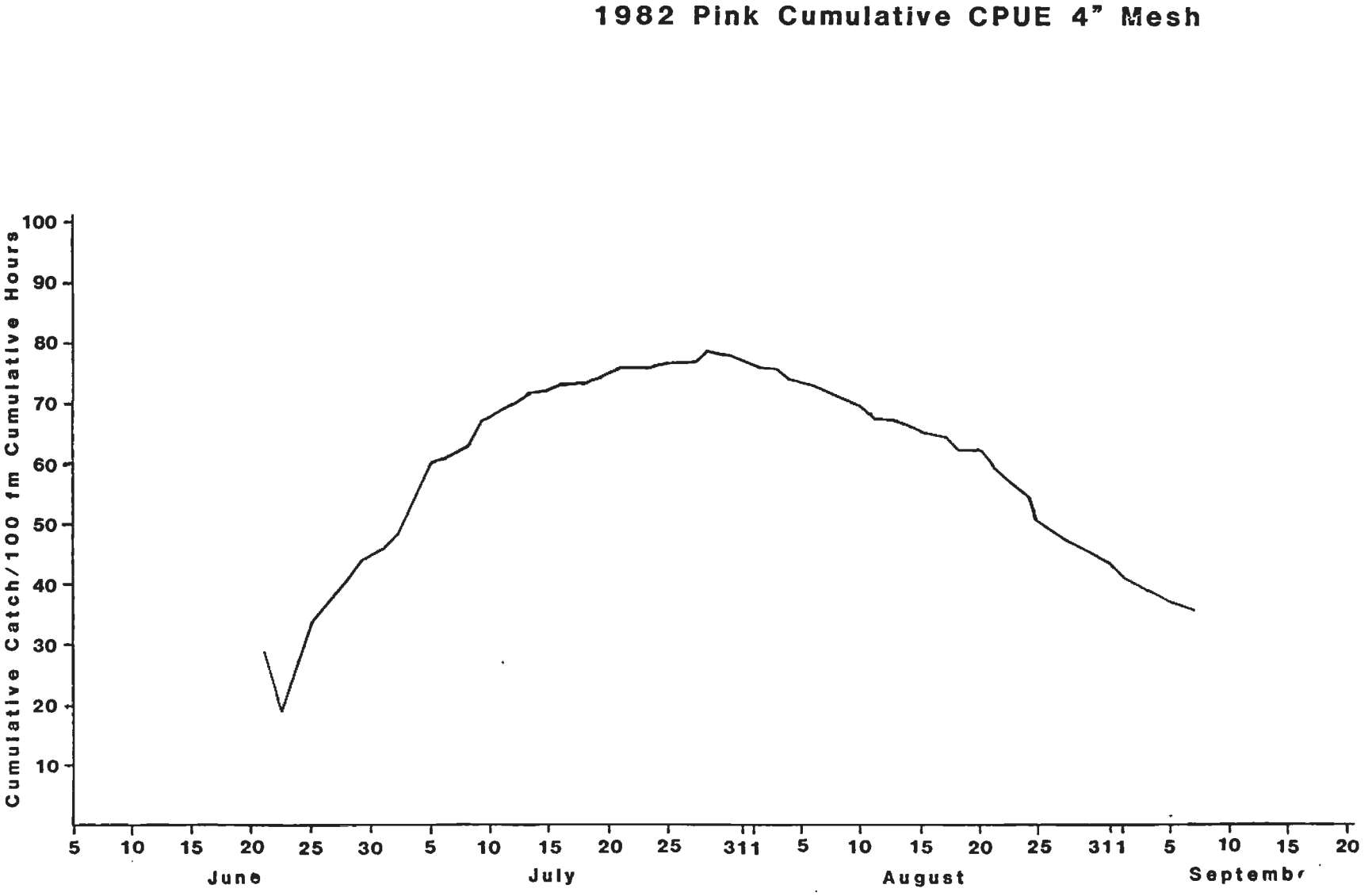

1982 Pink Cumulative CPUE 4" Mesh
Cumulative Catch/100 fm Cumulative Hours
100
90
80
70
60
50
40
30
20
10
5 10 15 20 25 30 5 10 15 20 25 311 5 10 15 20 25 311 5 10 15 20
June
July
August
Septembe

Figure 9B

1982 Pink Daily CPUE 4" Mesh

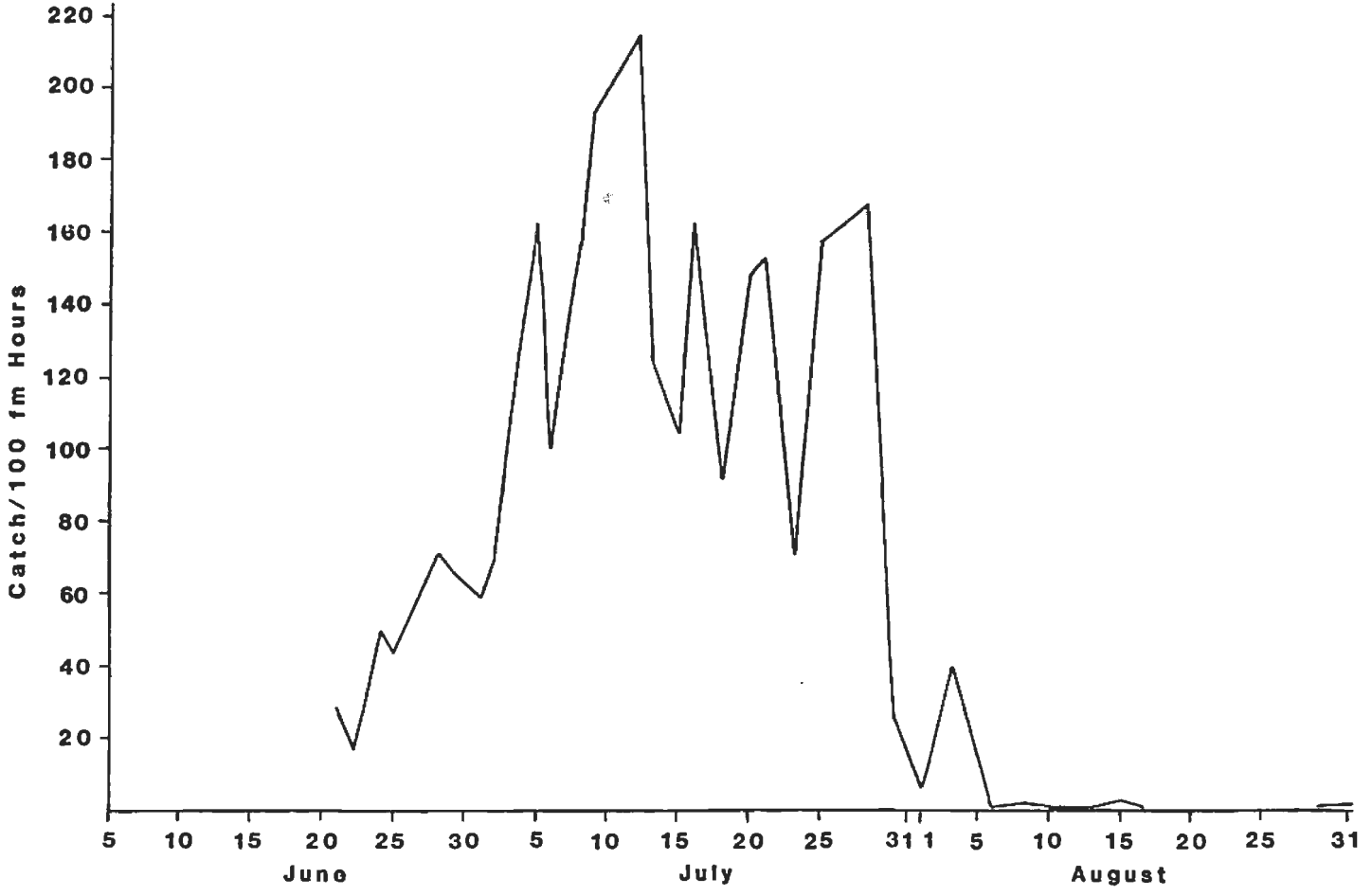


Figure 10A. 1982 Chum Daily CPUE 5 7/8" Mesh

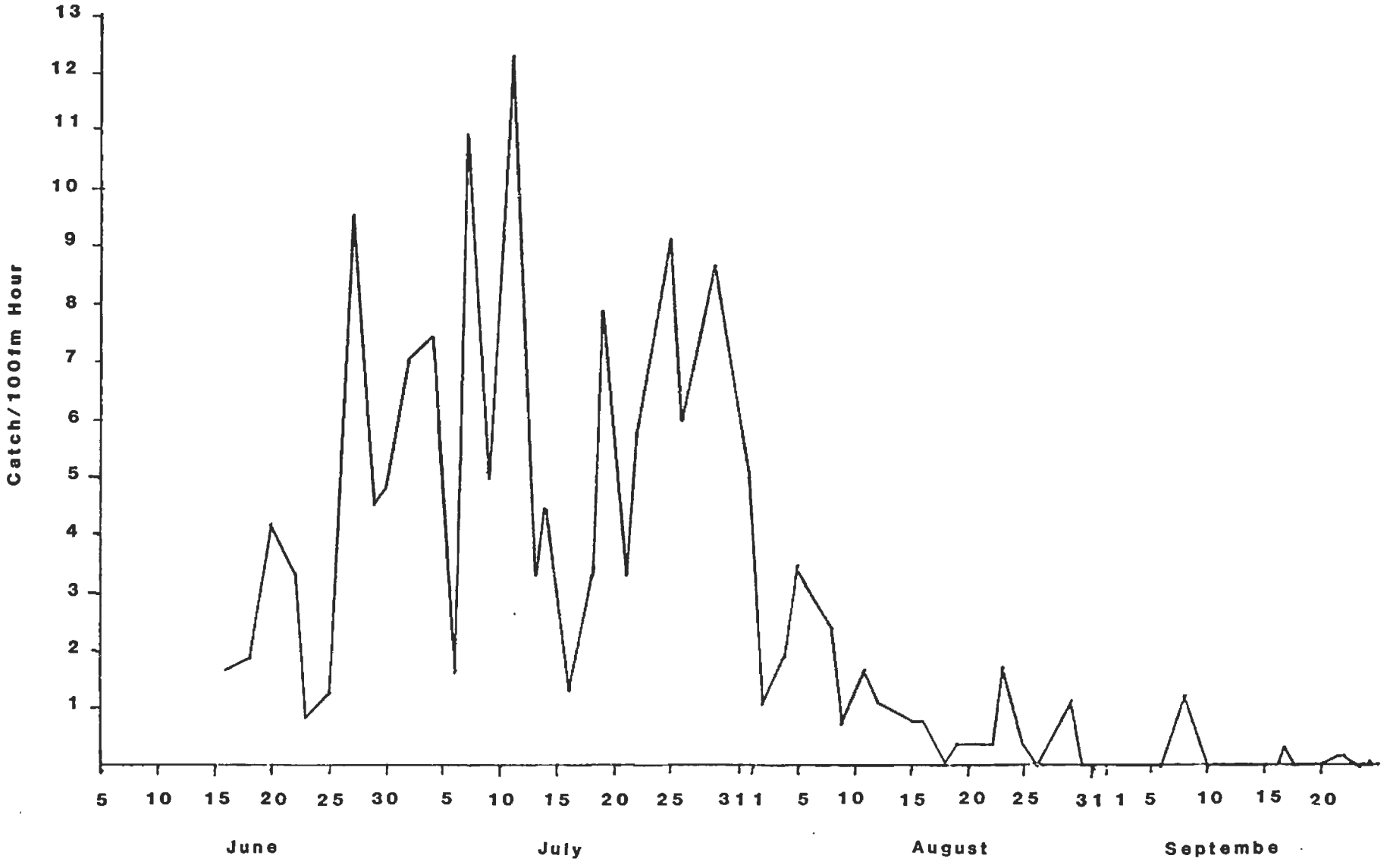


Figure 10B. 1982 Chum Cumulative CPUE 5 7/8" Mesh

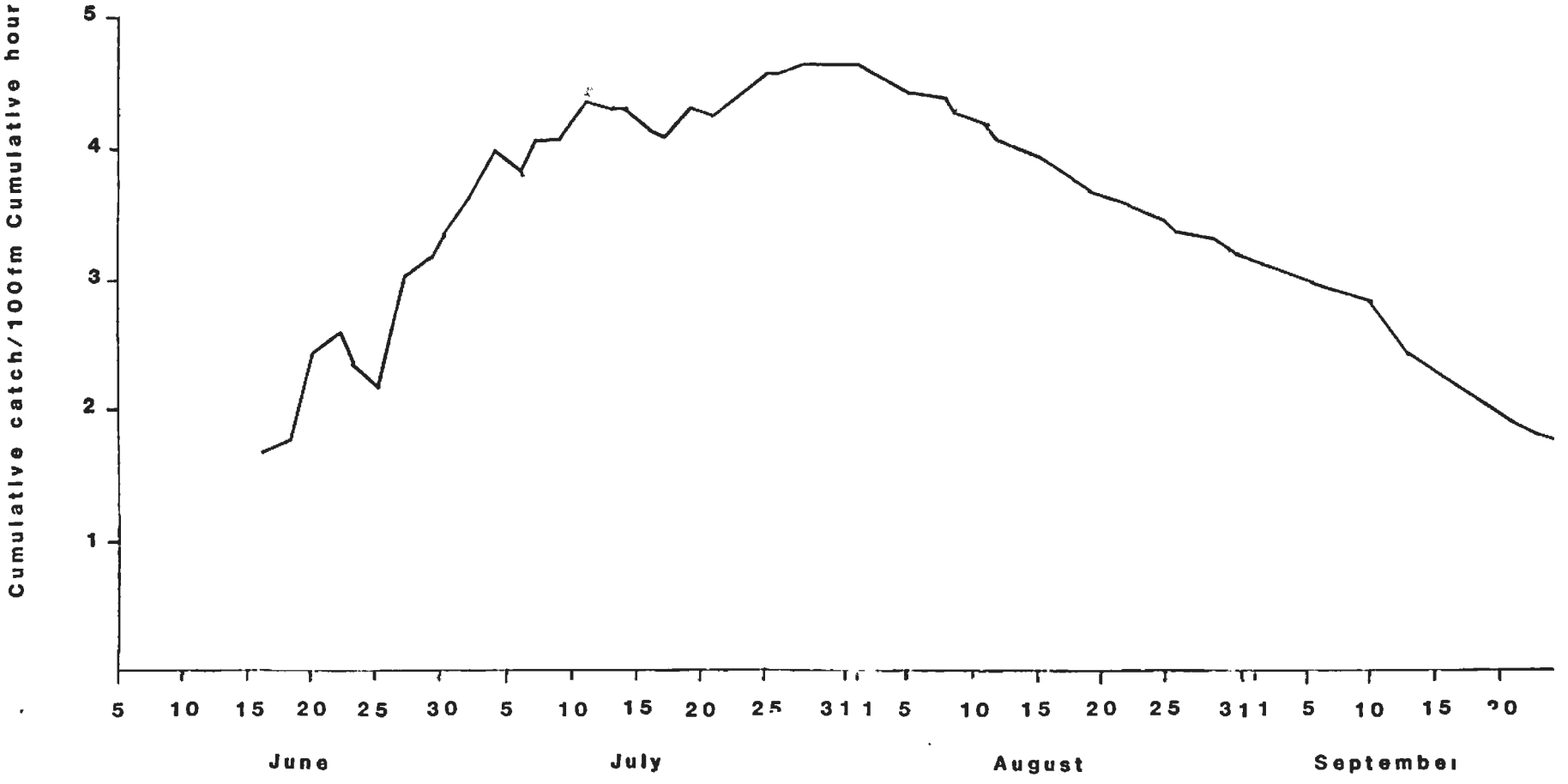
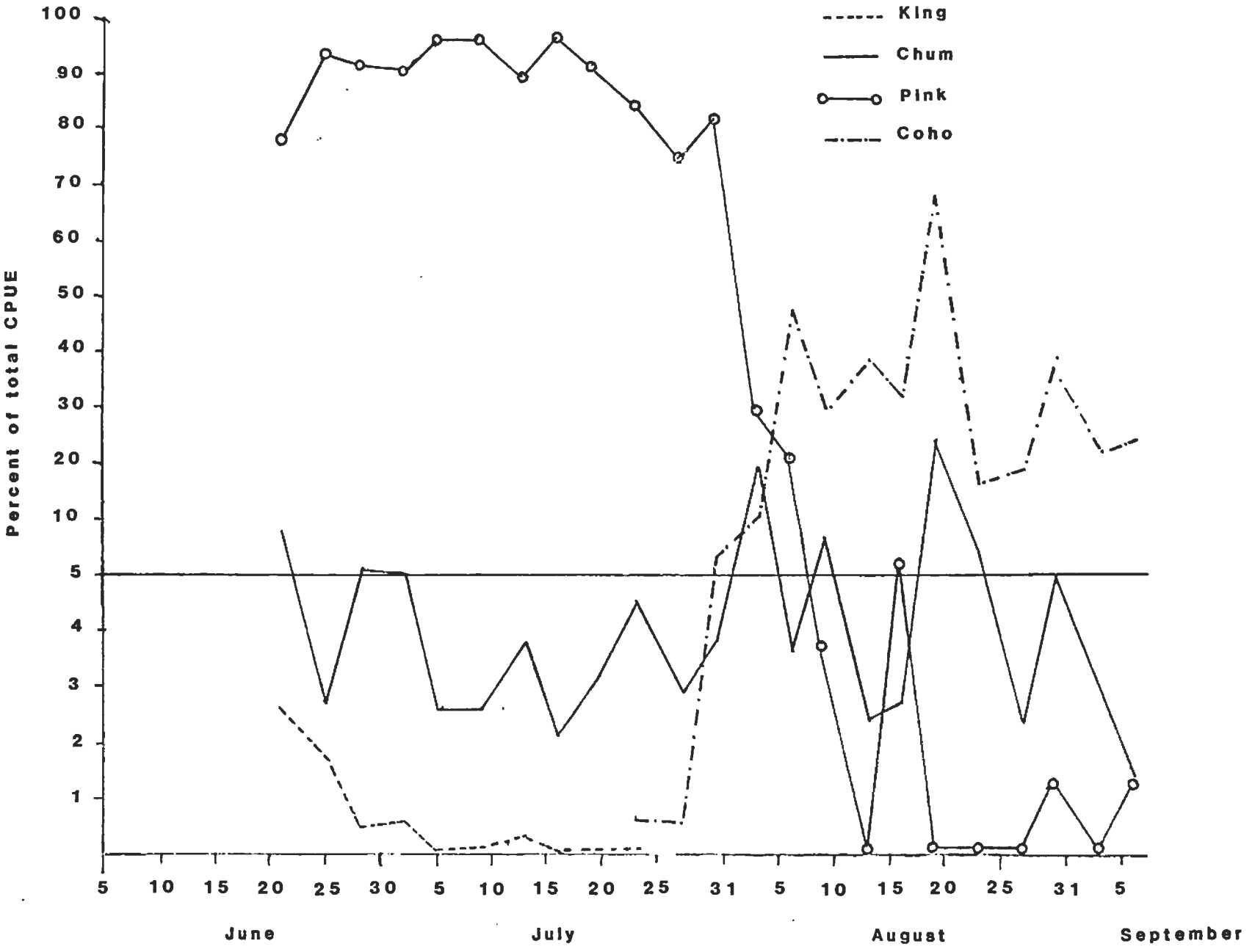


Figure 11. Test Net Proportions



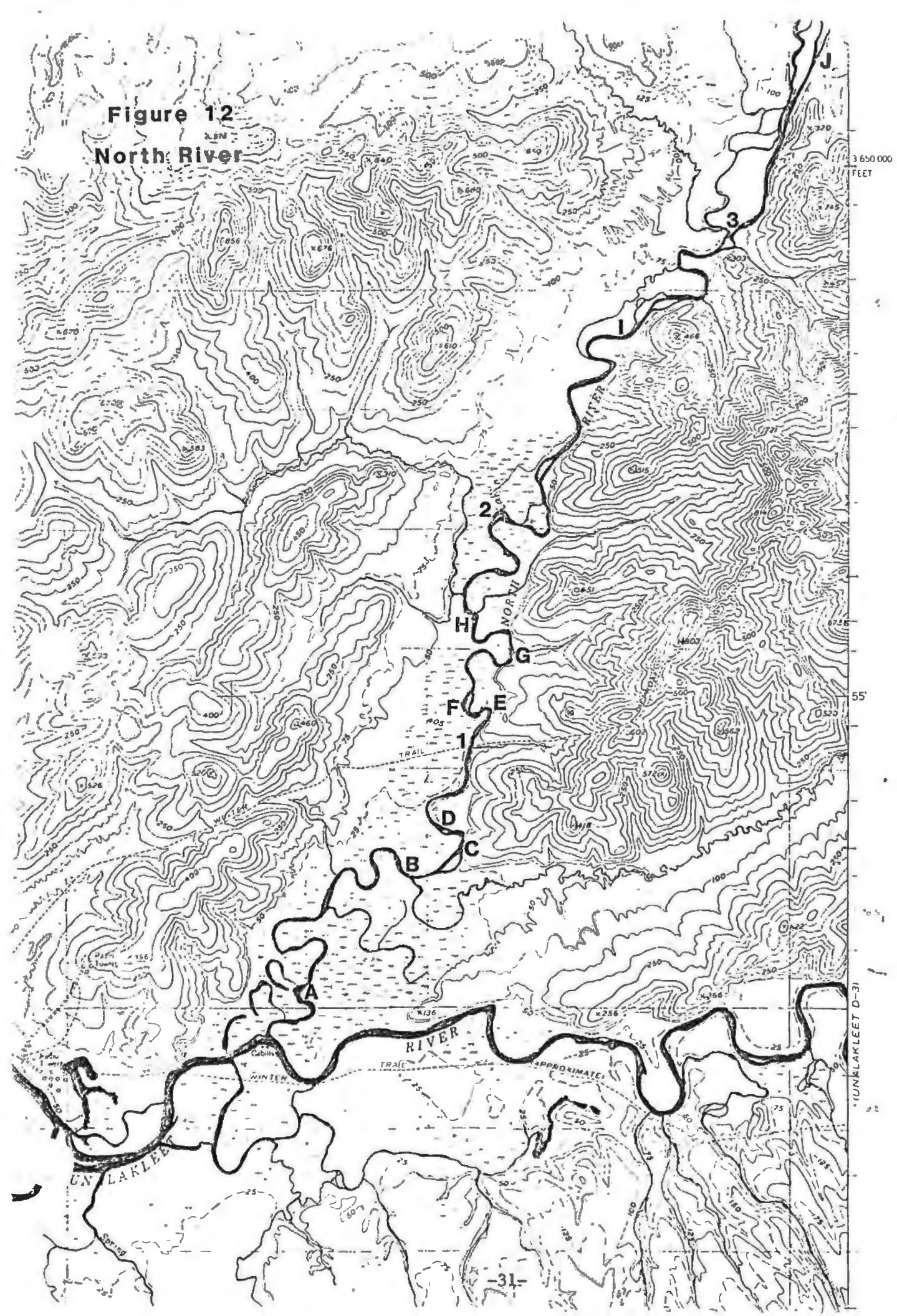


Figure 12
North River
J
3
I
2
H
G
F
E
1
D
C
B
A
NORTH RIVER
TRAIL
RIVER
TRAIL
APPROXIMATE
Cabins
WINTER
UNNAMED LAKE
UNNAMED LAKE
Spring
3 650 000
FEET
55'
UNNAMED LAKE 1-31

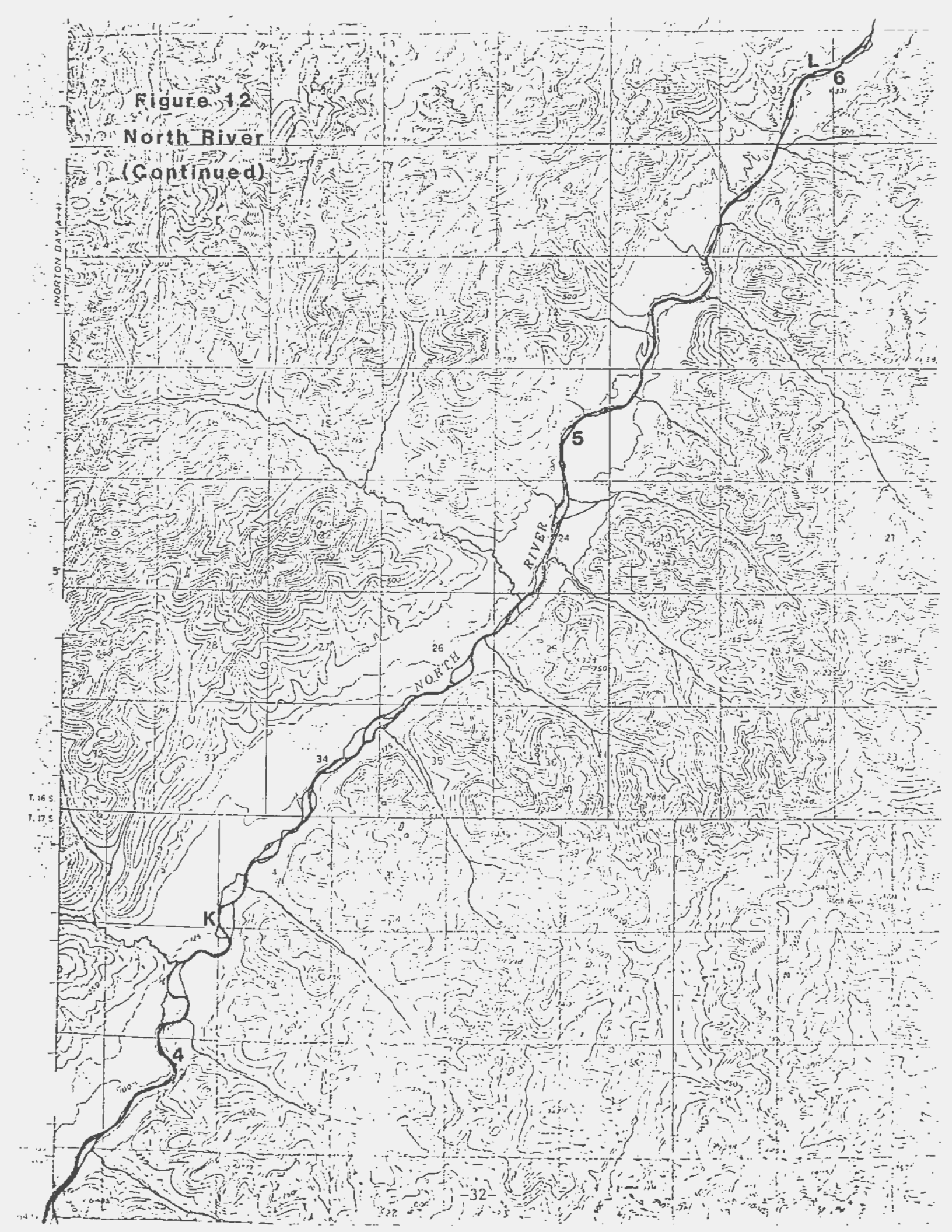


Figure 12
North River
(Continued)
L
6
5
RIVER
NORTH
K
4
T. 16 S.
T. 17 S.

Figure 13. 1982 Temperatures.

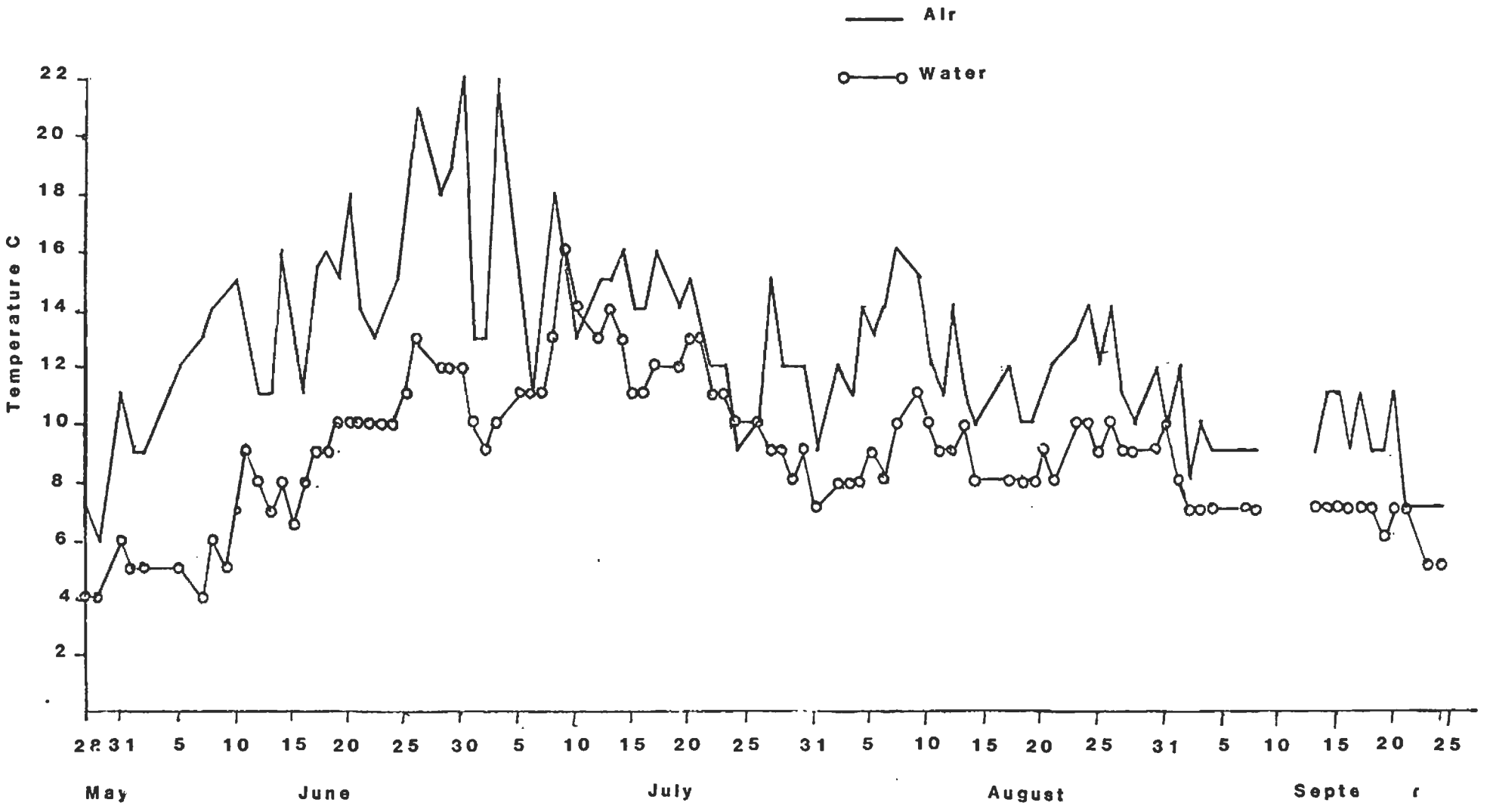


Figure 14. Water Turbidity

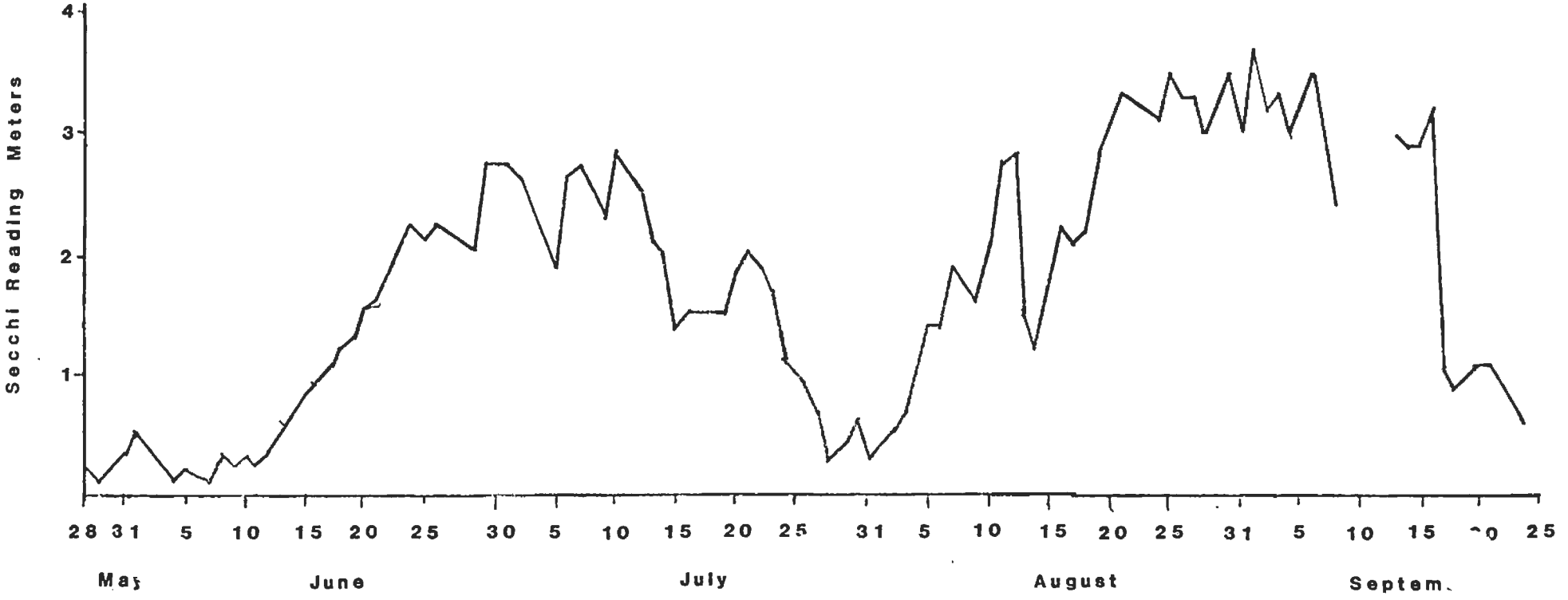
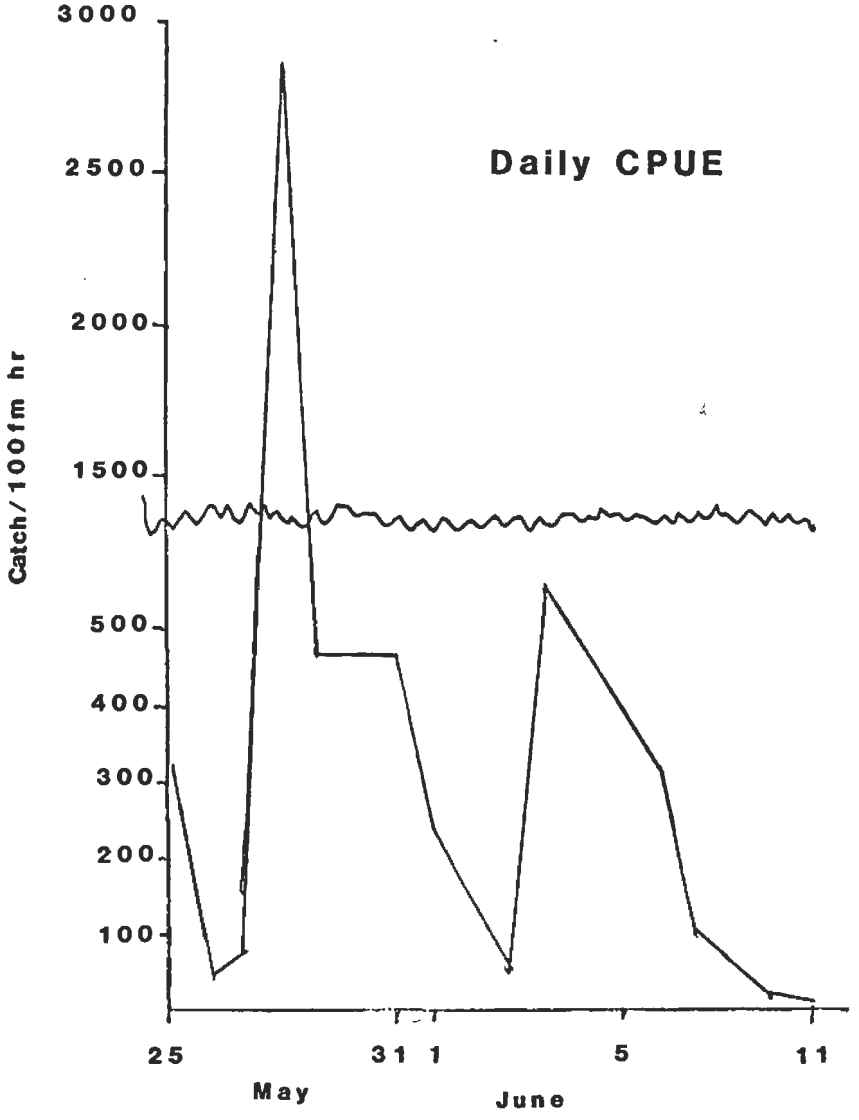
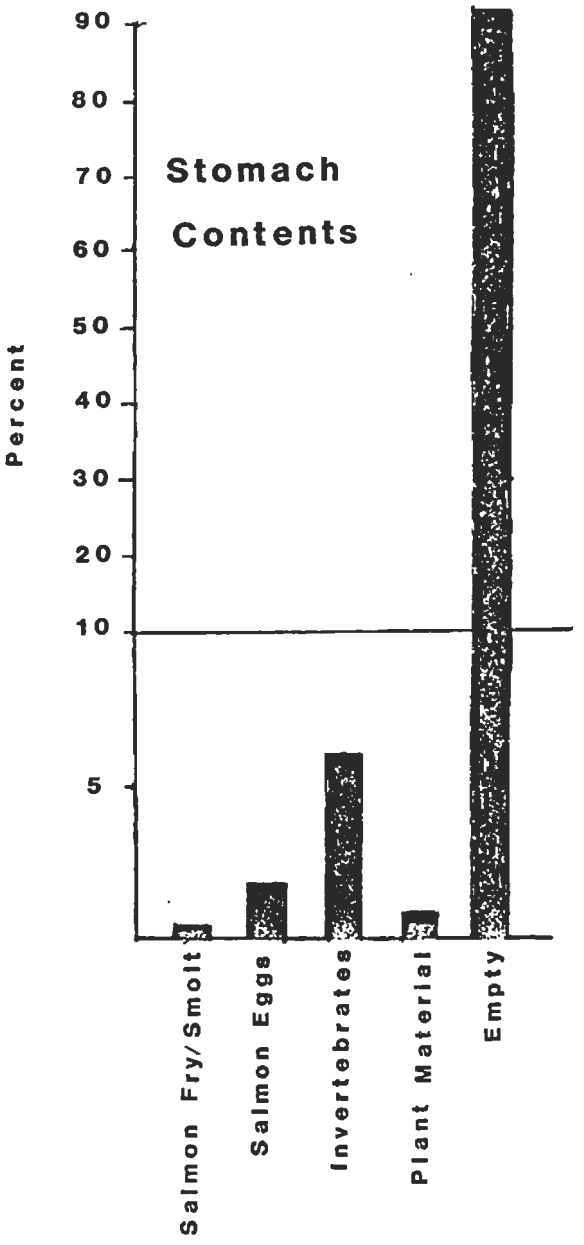


Figure 15 Arctic Char Test Fish





ABLE 1. Unalakleet King Salmon Subsistence Fisherman Survey

RIVER SUBSISTENCE

Date	# of Fishermen	# Kings	Average
6-14	2	4	2.0
6-15	3	0	0.0
6-16	4	5	1.2
6-17	3	5	1.7
6-18	5	9	1.8
6-19	6	9	1.5
6-20	6	10	1.7
6-21	5	10	2.0
6-22	4	3	.8
6-23	4	7	1.8
6-24	4	6	1.5
6-25	4	13	3.2
6-26	4	2	.5
6-27	3	3	1.0
6-28	3	9	3.0
6-29	3	8	2.7
6-30	4	7	1.8
7-1	5	16	3.2
7-2	6	41	6.8
7-3	5	73	14.6
7-4	4	40	10.0
7-5	3	24	8.0
7-6	3	27	9.0
7-7	4	21	5.2
7-8	3	3	1.0
7-9	3	16	5.3
7-10	3	2	.7
7-11	4	10	2.5
7-12	2	2	1.0
7-13	2	0	.0
Subtotals	8	385	

OCEAN SUBSISTENCE

6-14	1	8	8.0
6-15	1	8	8.0
6-16	1	2	2.0
6-17	1	15	15.0
6-24	1	1	1.0
6-25	1	1	1.0
6-26	1	0	.0
Subtotals	1	35	
TOTALS	9	420	

TABLE 2A. Side Scan Sonar Data, Unalakleet River, 1982.

Date	South Bank	North Bank	Daily Total	Proportion of Season Total	Cum. Total	Cum. Proo. of Season Total
6/15	306	-	306	.0000	306	.0000
6/16	457	-	457	.0001	763	.0001
6/17	466	-	466	.0001	1229	.0002
6/18	527	-	527	.0001	1756	.0003
6/19	658	-	658	.0001	2414	.0004
6/20	498	-	498	.0001	2912	.0005
6/21	848	-	848	.0001	3760	.0006
6/22	457	881	1338	.0002	5098	.0008
6/23	213	927	1140	.0002	6238	.0010
6/24	391	4754	5145	.0008	11383	.0018
6/25	1036	26451	27487	.0040	38870	.0058
6/26	869	37904	38773	.0057	77643	.0115
6/27	1883	69331	71214	.0105	148857	.0220
6/28	3573	52290	55863	.0082	204720	.0320
6/29	8047	44162	52209	.0077	256929	.0379
6/30	4303	23653	27954	.0041	284883	.0420
7/01	3145	17093	20238	.0030	305121	.0450
7/02	7223	19776	26999	.0040	332120	.0490
7/03	7894	65625	73519	.0108	405639	.0598
7/04	23055	188142	211197	.0310	616836	.0908
7/05	23724	362423	386147	.0566	1002983	.1474
7/06	49813	564356	614169	.0901	1617152	.2375
7/07	35557	467628	503185	.0738	2120337	.3113
7/08	100192	671804	771996	.1133	2892333	.4246
7/09	136119	647284	783403	.1150	3675736	.5396
7/10	79865	327510	407375	.0599	4083111	.5995
7/11	30186	174136	204322	.0300	4287433	.6295
7/12	29441	370203	399644	.0586	4687077	.6881
7/13	71331	392145	463476	.0680	5150533	.7561
7/14	32683	154838	187521	.0275	5338074	.7836
7/15	9146	47894	57040	.0084	5395114	.7920
7/16	6952	59274	66226	.0097	5461340	.8017
7/17	10594	114557	125151	.0184	5586491	.8201
7/18	35591	134002	169593	.0249	5756084	.8450
7/19	20898	154722	175620	.0258	5931704	.8708
7/20	13692	183732	197424	.0290	6129128	.8998
7/21	20982	154963	175945	.0258	6305073	.9256
7/22	6808	66739	73547	.0108	6378620	.9368
7/23	5422	27442	32864	.0048	6411484	.9412
7/24	10532	21721	32253	.0047	6443737	.9459
7/25	9524	23650	33174	.0047	6476911	.9506
7/26	10978	23706	34684	.0051	6511595	.9557
7/27	7377	8704	16081	.0024	6527676	.9581
7/28	7346	1649	8995	.0013	6536671	.9594
7/29	12717	1772	14489	.0021	6551160	.9615
7/30	3790	1498	5228	.0008	6556448	.9623
7/31	962	2341	3303	.0005	6559751	.9628

ABLE 2A. Side Scan Sonar Data, Unalakleet River, 1982. (Continued)

Date	South Bank	North Bank	Daily Total	Proportion of Season Total	Cum. Total	Cum. Prop. of Season Total
8/1	----	----	----	----	----	----
8/2	----	----	----	----	----	----
8/3	----	----	----	----	----	----
8/4	7483	----	7483	.0011	6567234	.9639
8/5	5612	11234	16846	.0025	6584080	.9664
8/6	5550	13702	19252	.0028	6603332	.9692
8/7	3208	14632	17840	.0026	6621172	.9718
8/8	2373	15670	18043	.0026	6639215	.9744
8/9	3210	10139	13349	.0020	6652564	.9764
8/10	3202	4700	7902	.0012	6660466	.9776
8/11	4390	5054	9944	.0015	6670410	.9791
8/12	5656	7572	13228	.0019	6683638	.9810
8/13	1608	5044	6652	.0010	6690290	.9820
8/14	2797	10162	12959	.0019	6703249	.9839
8/15	5678	6738	12416	.0018	6715665	.9857
8/16	4417	4068	8485	.0012	6724150	.9869
8/17	2105	2595	4700	.0007	6728850	.9876
8/18	1795	2349	4144	.0006	6732994	.9882
8/19	3097	3020	6117	.0009	6739111	.9891
8/20	1885	1066	2951	.0004	6742062	.9895
8/21	1292	1121	2413	.0004	6744475	.9899
8/22	1420	1285	2705	.0004	6747180	.9903
8/23	1364	3282	4646	.0007	6751826	.9910
8/24	2170	1315	3485	.0005	6755311	.9915
8/25	1600	1366	2966	.0004	6758277	.9919
8/26	4685	2326	7011	.0010	6765288	.9929
8/27	2471	1275	3746	.0005	6769034	.9934
8/28	4920	2010	6930	.0010	6775964	.9944
8/29	1283	3224	4507	.0007	6780471	.9951
8/30	1723	1542	3265	.0005	6783736	.9956
8/31	1700	1396	3096	.0004	6786832	.9960
9/1	1390	1114	2504	.0004	6789336	.9964
9/2	1576	1346	2922	.0004	6792258	.9968
9/3	1541	1289	2830	.0004	6795088	.9972
9/4	787	2392	3179	.0005	6798267	.9977
9/5	830	1789	2619	.0004	6800886	.9981
9/6	349	2016	2365	.0003	6803251	.9984
9/7	186	10914	11100	.0016	6814351	1.0000
Total	943924	5870427	6814351	1.0000		

TABLE 3A. SPECIES APPORTIONMENT BY TEST PERIOD, UNALAKLEET SIDE SCAN SONAR, 1982

	KING SALMON			
Dates	3-Day Apportionment Count	Proportion of Season Total	Cum. King Count	Cum. Prop. of Season Total
6/20 - 6/22	70	.0092	70	.0092
6/23 - 6/26N	907	.1196	977	.1288
6/26N - 6/29	993	.1309	1970	.2597
6/30 - 7/3N	672	.0886	2642	.3483
7/3N - 7/6	0	.0000	2642	.3483
7/7 - 7/10N	1131	.1491	3773	.4974
7/10N - 7/13	3813	.5026	7586	1.0000
7/14 - 7/17N	0	.0000	7586	1.0000
7/17N - 7/20	0	.0000	7586	1.0000
[illegible] - 7/26N	0	.0000	7586	1.0000
Total	7586	1.0000		

Species Apportionment		Side Scan Sonar Totals	
King	7586	South Bank	943924
Chum	223913	North Bank	5870427
Pink	6119155		
Silver	91814		
TOTAL	6442468 (94.5%)		6814351

T E 3B. Species Apportionment by Test Period, Unalakleet Side Scan Sonar, 1982

Dates	CHUM SALMON 3-Day Apportionment Count	Proportion of Season Total	Cum. Count	Cum. Prop. of Season Total
6/20 - 6/22	231	.0010	231	.0010
6/23 - 6/26N	1435	.0064	1666	.0074
6/26N - 6/29	10728	.0479	12394	.0553
6/30 - 7/3N	5821	.0260	18215	.0813
7/3N - 7/6	32455	.1449	50670	.2262
7/7 - 7/10N	58819	.2627	109489	.4889
7/10N - 7/13	48303	.2157	157792	.7046
7/14 - 7/17N	7481	.0334	165273	.7380
7/17N - 7/20	27235	.1216	192508	.8596
7/21 - 7/24N	13432	.0600	206142	.9196
7/24N - 7/27	2902	.0130	208842	.9326
7/28 - 7/31N	1156	.0052	209998	.9378
7/31N - 8/3	318	.0014	210316	.9392
[illegible] - 8/7N	1890	.0084	212206	.9476
- 8/10	4050	.0181	216256	.9657
[illegible] - 8/14N	871	.0039	217127	.9696
8/14N - 8/17	866	.0039	217993	.9735
8/18 - 8/21N	3505	.0157	221492	.9892
8/21N - 8/24	795	.0036	222293	.9928
8/25 - 8/28N	395	.0018	222687	.9946
8/28N - 8/31	702	.0031	223390	.9977
9/1 - 9/4N	276	.0012	223665	.9989
9/4N - 9/7	247	.0011	223913	1.0000
TOTAL	223913	1.0000		

TABLE 3C. Species Apportionment by Test Period, Unalakleet Side Scan Sonar, 1982

Dates	PINK SALMON 3-Day Apportionment Count	Proportion of Season Total	Cum. Count	Cum. Prop. of Season Total
6/20 - 6/22	2088	.0003	2088	.0003
6/23 - 6/26N	49703	.0081	51791	.0084
6/26N - 6/29	181190	.0296	232981	.0380
6/30 - 7/3N	101428	.0166	334409	.0546
7/3N - 7/6	1198341	.1958	1532750	.2504
7/7 - 7/10N	2171781	.3549	3704531	.6053
7/10N - 7/13	1138932	.1861	4843463	.7914
7/14 - 7/17N	359549	.0588	5203012	.8502
7/17N - 7/20	550743	.0900	5753755	.9402
7/21 - 7/24N	251620	.0411	6005375	.9813
7/24N - 7/27	74049	.0121	6079424	.9934
7/28 - 7/31N	24735	.0040	6104159	.9974
7/31N - 8/3	479	.0001	6104638	.9975
8/4 - 8/7N	10553	.0017	6115191	.9992
8/7N - 8/10	1784	.0003	6116975	.9995
8/11 - 8/14N	0	.0000	6116975	.9995
'14N - 8/17	1796	.0003	6118771	.9998
18 - 8/21N	0	.0000	6118771	.9998
8/21N - 8/24	0	.0000	6118771	.9998
8/25 - 8/28N	0	.0000	6118771	.9998
8/28N - 8/31	172	.0001	6118943	.9999
9/1 - 9/4N	0	.0000	6118943	.9999
9/4N - 9/7	212	.0001	6119155	1.0000
TOTAL	6119155	1.0000		

BLE 3D. Species Apportionment by Test Period, Unalakleet Side Scan Sonar, 1982

Dates	SILVER (COHO) SALMON			
	3-Day Apportionment Count	Proportion of Season Total	Cum. Count	Cum. Prop. of Season Total
7/17N - 7/20	0	.0000	0	.0000
7/21 - 7/24N	0	.0000	0	.0000
7/24N - 7/27	500	.0054	500	.0054
7/28 - 7/31N	1795	.0196	2295	.0250
7/31N - 8/3	188	.0020	2483	.0270
8/4 - 8/7N	24990	.2722	27473	.2992
8/7N - 8/10	13934	.1518	41407	.4510
8/11 - 8/14N	13868	.1510	55275	.6020
8/14N - 8/17	10233	.1115	65508	.7135
8/18 - 8/21N	9631	.1049	75139	.8184
8/21N - 8/24	1927	.0210	77066	.8394
9/25 - 8/28N	3214	.0350	80280	.8744
'28N - 8/31	5217	.0568	85497	.9312
/1 - 9/4N	2146	.0234	87643	.9546
9/4N - 9/7	4171	.0454	91814	1.0000
TOTAL	91814	1.0000		

TABLE 4A. 1982 King Salmon Test Net Data - 8 1/4" Mesh

Date	Hours	Catch	Coue*	Cum. Hours	Cum. Catch	Cum. Coue**
6/7	24	0	.00	24	0	.00
6/10	24	1	.21	48	1	.10
6/11	24	3	.62	72	4	.28
6/12	24	0	.00	96	4	.21
6/13	24	0	.00	120	4	.17
6/14	24	2	.42	144	6	.21
6/15	24	1	.21	168	7	.21
6/17	24	1	.21	192	8	.21
6/19	24	0	.00	216	8	.19
6/20	24	1	.21	240	9	.19
6/21	12	0	.00	252	9	.18
6/23	12	0	.00	264	9	.17
6/24	11.9	3	1.26	275.9	12	.22
6/27	12.6	0	.00	287.9	12	.21
6/28	11.5	0	.00	299.4	12	.20
6/30	12.0	0	.00	311.4	12	.19
7/1	13.5	0	.00	324.9	12	.18
7/4	11.0	0	.00	335.9	12	.18
7/5	12.0	0	.00	347.9	12	.17
7/7	13.0	1	.39	360.9	13	.18
7/8	14.0	0	.00	374.9	13	.17
7/11	12.0	3	1.25	386.9	16	.21
7/12	11.8	0	.00	398.7	16	.20
7/14	12.2	0	.00	410.9	16	.19
7/15	12.2	0	.00	423.1	16	.19
7/19	11.9	0	.00	435.0	16	.18
7/20	12.0	0	.00	447.0	16	.18
7/22	11.5	0	.00	458.5	16	.17
7/23	5.2	0	.00	463.7	16	.17

* Catch/100 fm / Hr

** Total Catch/100 fm / Total hrs

TABLE 4B. 1982 Coho Salmon Test Net Data - 5 7/8" Mesh

Date	Hours	Catch	Coue*	Cum. Hours	Cum. Catch	Cum. Coue**
7/18	12.0	0	.00	12.0	0	.00
7/19	12.0	0	.00	24.0	0	.00
7/21	11.8	0	.00	35.8	0	.00
7/22	24.5	0	.00	60.3	0	.00
7/25	12.6	4	1.58	72.9	4	.27
7/26	2.5	0	.00	75.4	4	.27
7/29	4.6	0	.00	80.0	4	.25
8/1	3.0	9	15.00	83.0	13	.78
8/2	4.4	3	3.41	87.4	16	.92
8/4	13.2	8	3.04	100.6	24	1.19
8/5	7.3	6	6.49	107.9	30	1.39
8/8	12.6	9	3.57	120.5	39	1.62
8/9	12.9	0	.00	133.4	39	1.46
8/11	12.2	8	3.28	145.6	47	1.61
8/12	12.5	17	6.80	158.1	64	2.02
8/15	12.3	18	7.32	170.4	82	2.41
8/16	12.2	5	2.05	182.6	87	2.38
8/18	12.0	5	2.08	194.6	92	2.36
8/19	12.2	1	.41	206.8	93	2.25
8/22	12.2	6	2.46	219.0	99	2.26
8/23	11.8	2	.84	230.8	101	2.19
8/25	12.1	3	1.24	242.9	104	2.14
8/26	12.0	0	.00	254.9	104	2.04
8/29	12.5	11	4.40	267.4	115	2.15
8/30	11.3	5	2.21	278.7	120	2.15
9/1	12.2	6	2.46	290.9	126	2.17
9/2	11.5	2	.87	292.4	128	2.19
9/5	11.6	8	3.01	304.0	136	2.24
9/6	9.8	3	1.53	313.8	139	2.21
9/8	11.8	0	.00	325.6	139	2.13
9/10	28.5	13	2.28	354.1	152	2.15
9/11	23.5	14	2.98	377.6	166	2.20
9/12	25.6	8	1.56	403.2	174	2.16
9/13	25.6	5	.98	428.8	179	2.09
9/14	21.3	6	1.41	450.1	185	2.06
9/15	26.7	7	1.31	476.8	192	2.01
9/16	22.2	5	1.13	499.0	197	1.97
9/17	24.8	10	2.02	523.0	207	1.98
9/18	22.1	15	3.39	545.9	222	2.03
9/19	30.2	4	.67	576.1	226	1.96
9/20	19.1	0	.00	595.2	226	1.90
9/21	26.2	4	.76	621.4	230	1.85
9/22	27.6	6	1.09	649.0	236	1.82
9/23	20.2	2	.50	669.2	238	1.78
9/24	23.8	1	.21	693.0	239	1.72

* Catch/100 fm

Hr

** Total Catch/100 fm

Total Hours

Table 4C. 1982 pink salmon test net data - 4" mesh.

Date	Hours	Catch	Cpue*	Cum. Hours	Cum. Catch	Cum. Cpue**
6/21	12	87	29.00	12	87	29.00
6/22	12	40	16.67	24	127	21.17
6/24	12	147	49.00	36	274	30.44
6/25	11.5	126	43.82	47.5	400	33.68
6/28	12.5	222	71.04	60.0	622	41.47
6/29	7.0	116	66.28	67.0	738	44.06
7/1	9.0	134	59.56	76.0	872	45.89
7/2	10.5	184	70.10	86.5	1056	48.83
7/5	9.5	387	162.94	96.0	1443	60.12
7/6	3.0	75	100.00	99.0	1518	61.33
7/8	2.2	86	156.36	101.2	1604	63.40
7/9	3.0	144	192.00	104.2	1748	67.10
7/12	2.1	112	213.33	106.3	1860	70.00
7/13	3.5	110	125.71	109.8	1970	71.77
7/15	2.0	52	104.00	111.8	2022	72.34
7/16	1.5	61	162.67	113.3	2083	73.54
7/18	1.5	35	93.33	114.8	2118	73.80
7/20	1.6	59	147.50	116.4	2177	74.81
7/21	1.6	61	152.50	118.0	2238	75.86
7/23	2.4	43	71.67	120.4	2281	75.78
7/25	1.1	43	156.36	121.5	2324	76.51
7/27	.6	21	350.00	122.1	2345	76.82
7/28	2.4	100	166.67	124.5	2445	78.55
7/30	1.4	9	25.71	125.9	2454	77.97
8/1	3.5	6	6.86	129.4	2460	76.04
8/3	1.8	18	40.00	131.2	2478	75.55
8/4	4.7	34	28.94	135.9	2512	73.94
8/6	1.2	0	.00	137.1	2512	73.29
8/8	4.5	2	1.78	141.6	2514	71.02
8/10	2.8	0	.00	144.4	2514	69.64
8/11	3.7	0	.00	148.1	2514	67.90
8/13	1.6	0	.00	149.7	2514	67.17
8/15	3.9	3	3.08	153.61	2517	65.55
8/17	1.6	0	.00	155.2	2517	64.87
8/18	5.5	0	.00	160.7	2517	62.65
8/20	1.3	0	.00	162.0	2517	62.15
8/22	12.2	0	.00	174.2	2517	57.80
8/24	12.0	0	.00	186.2	2517	54.07
8/25	11.9	0	.00	198.1	2517	50.82
8/27	12.6	0	.00	210.7	2517	47.78
8/29	11.6	0	.00	222.3	2517	45.29
8/31	10.6	1	.38	232.9	2518	43.25
9/1	12.2	0	.00	245.1	2518	41.09
9/3	12.1	0	.00	257.2	2518	39.16
9/5	12.2	0	.00	269.4	2518	37.39
9/7	12.6	1	.32	282.0	2519	35.73

* Catch/100 fm / Hr

** Total Catch/100 fm / Total Hrs

Table 4D. 1982 chum salmon test net data - 5 7/8" mesh.

Date	Hours	Catch	Cpue*	Cum. Hours	Cum. Catch	Cum. Cpue**
6/16	24	8	1.67	24	8	1.67
6/18	24	9	1.88	48	17	1.77
6/20	12	12	4.16	60	29	2.42
6/22	12	8	3.34	72	37	2.57
6/23	12	2	.84	84	39	2.32
6/25	11.9	3	1.23	95.9	42	2.19
6/27	12.1	23	9.51	108.0	65	3.01
6/29	12.2	11	4.51	120.2	76	3.16
6/30	13.5	13	4.81	133.7	89	3.33
7/2	12.0	17	7.09	145.7	106	3.64
7/4	13.5	20	7.41	159.2	126	3.96
7/6	12.0	4	1.67	171.2	130	3.80
7/7	5.5	12	10.91	176.7	142	4.02
7/9	9.0	9	5.00	185.7	151	4.07
7/11	6.5	16	12.31	192.2	167	4.34
7/13	12.2	8	3.30	204.4	175	4.28
7/14	9.0	8	4.44	213.4	183	4.29
7/16	11.8	3	1.27	225.2	186	4.13
7/18	12.0	8	3.33	237.2	194	4.09
7/19	12.0	19	7.91	249.2	213	4.27
7/21	11.8	8	3.39	261.0	221	4.23
7/22	24.5	28	5.71	285.5	249	4.36
7/25	12.6	23	9.10	298.1	272	4.56
7/26	2.5	3	6.00	300.6	275	4.57
7/29	4.6	8	8.70	305.2	283	4.64
8/1	3.0	3	5.00	308.2	286	4.64
8/2	4.4	1	1.14	312.6	287	4.59
8/4	13.2	5	1.90	325.8	292	4.48
8/5	7.3	5	3.42	333.1	297	4.46
8/8	12.6	6	2.38	345.7	303	4.38
8/9	12.9	2	.78	358.6	305	4.25
8/11	12.2	4	1.64	370.8	309	4.17
8/12	12.5	3	1.20	383.3	312	4.07
8/15	12.3	2	.82	395.6	314	3.97
8/16	12.2	2	.82	407.8	316	3.87
8/18	12.0	0	.00	419.8	316	3.76
8/19	12.2	1	.41	432.0	317	3.67

*Catch/100 fm

Hrs

**Cumulative Catch/100 fm

Cumulative Hours

Table 4D. 1982 chum salmon test net data - 5 7/8" mesh (Cont.)

Date	Hours	Catch	Cpue	Cum. Hours	Cum. Catch	Cum. Cpue
8/22	12.2	1	.41	444.2	318	3.58
8/23	11.8	4	1.70	456.0	322	3.53
8/25	12.1	1	.41	468.1	323	3.45
8/26	12.2	0	.00	480.3	323	3.36
8/29	12.5	3	1.20	492.8	326	3.31
8/30	11.3	0	.00	504.1	326	3.23
9/1	12.2	0	.00	516.3	326	3.16
9/2	11.5	0	.00	527.8	326	3.09
9/5	11.6	0	.00	539.4	326	3.02
9/6	9.8	0	.00	549.2	326	2.97
9/8	11.8	3	1.27	561.0	329	2.93
9/10	28.5	0	.00	589.5	329	2.79
9/11	23.5	0	.00	613.0	329	2.68
9/12	25.6	0	.00	638.6	329	2.58
9/13	25.6	0	.00	664.2	329	2.48
9/14	21.3	0	.00	685.5	329	2.40
9/15	26.7	0	.00	712.2	329	2.31
9/16	22.2	0	.00	734.4	329	2.24
9/17	24.8	2	.40	759.2	331	2.18
9/18	22.1	0	.00	781.3	331	2.12
9/19	30.2	0	.00	811.5	331	2.04
9/20	19.1	0	.00	830.6	331	1.99
9/21	26.2	1	.19	856.8	332	1.94
9/22	27.6	1	.18	884.4	333	1.88
9/23	20.2	0	.00	904.6	333	1.84
9/24	23.8	0	.00	928.4	333	1.79

Table 4D. 1982 chum salmon test net data - 5 7/8" mesh (Cont.)

Date	Hours	Catch	Cpue	Cum. Hours	Cum. Catch	Cum. Cpue
8/22	12.2	1	.41	444.2	318	3.58
8/23	11.8	4	1.70	456.0	322	3.53
8/25	12.1	1	.41	468.1	323	3.45
8/26	12.2	0	.00	480.3	323	3.36
8/29	12.5	3	1.20	492.8	326	3.31
8/30	11.3	0	.00	504.1	326	3.23
9/1	12.2	0	.00	516.3	326	3.16
9/2	11.5	0	.00	527.8	326	3.09
9/5	11.6	0	.00	539.4	326	3.02
9/6	9.8	0	.00	549.2	326	2.97
9/8	11.8	3	1.27	561.0	329	2.93
9/10	28.5	0	.00	589.5	329	2.79
9/11	23.5	0	.00	613.0	329	2.68
9/12	25.6	0	.00	638.6	329	2.58
9/13	25.6	0	.00	664.2	329	2.48
9/14	21.3	0	.00	685.5	329	2.40
9/15	26.7	0	.00	712.2	329	2.31
9/16	22.2	0	.00	734.4	329	2.24
9/17	24.8	2	.40	759.2	331	2.18
9/18	22.1	0	.00	781.3	331	2.12
9/19	30.2	0	.00	811.5	331	2.04
9/20	19.1	0	.00	830.6	331	1.99
9/21	26.2	1	.19	856.8	332	1.94
9/22	27.6	1	.18	884.4	333	1.88
9/23	20.2	0	.00	904.6	333	1.84
9/24	23.8	0	.00	928.4	333	1.79

Table 5. 1982 test net proportions (% Total CPUE).

Dates	King	Chum	Pink	Silver	Misc.
6/20 - 6/22	2.6%	8.6%	77.8%	0%	11.0%
6/23 - 6/26N	1.7	2.7	93.5	-	2.1
6/26N - 6/29	0.5	5.4	91.2	-	2.9
6/30 - 7/3N	0.6	5.2	90.6	-	3.6
7/3N - 7/6	0.0	2.6	96.0	-	1.4
7/7 - 7/10N	0.05	2.6	96.0	-	1.3
7/10N - 7/13	0.3	3.8	89.6	-	6.3
7/14 - 7/17N	0.0	2.1	96.3	-	1.6
7/17N - 7/20	0.0	3.0	91.0	-	6.0
7/21 - 7/24N	0.0	4.5	84.3	0.6	10.6
7/24N - 7/27	-	2.9	74.0	0.5	22.6
7/28 - 7/31N	-	3.8	81.3	5.9	9.0
7/31N - 8/3	-	19.3	29.0	11.4	40.3
8/4 - 8/7N	-	3.6	20.1	47.6	28.7
8/7N - 8/10	-	8.4	3.7	28.9	59.0
8/11 - 8/14N	-	2.4	0.0	38.2	59.4
8/14N - 8/17	-	2.7	5.6	31.9	59.8
8/18 - 8/21N	-	24.3	0.0	66.8	8.9
8/21N - 8/24	-	6.6	0.0	16.0	77.4
8/25 - 8/28N	-	2.3	0.0	18.7	79.0
8/28N - 8/31	-	4.9	1.2	36.4	57.5
9/1 - 9/4N	-	2.8	0.0	21.8	75.4
9/4N - 9/7	-	1.4	1.2	23.6	73.8

Table 6. Pink salmon roe percentage, 1982.

July 16			July 29		
Body Weight	Roe Weight	%	Body Weight	Roe Weight	%
731.1 g	101.2 g	13.8	993.1 g	194.9 g	19.6
843.3	74.9	8.9	791.1	146.9	18.6
812.8	160.6	19.8	751.4	133.4	17.8
873.2	142.6	16.3	890.9	155.5	17.5
945.2	146.3	15.5	950.2	203.1	21.4
852.3	204.2	24.0	961.2	171.2	17.8
938.9	129.7	13.8	966.4	198.1	20.5
1120.6	154.2	13.8	846.5	158.6	18.7
1085.4	210.1	19.4	950.2	167.3	17.6
871.7	161.4	18.5	936.7	191.7	20.5
869.1	190.7	21.9	1046.6	239.9	22.9
936.6	156.7	16.7	810.1	169.9	21.0
952.8	156.8	16.5	893.4	194.1	21.7
878.3	158.5	18.0	1027.5	159.2	15.5
975.9	141.8	14.5	1074.4	180.9	16.8
914.7	158.8	17.4	792.5	148.8	18.8
903.4	183.1	20.3	942.4	185.9	19.7
1054.4	170.8	16.2	716.4	131.4	18.3
986.8	171.9	17.4	1092.9	179.8	16.5
912.9	152.7	16.7	955.9	184.4	19.3
947.4	158.8	16.8	870.0	194.3	22.3
986.3	182.0	18.5	858.9	151.9	17.7
1201.4	162.6	13.5	883.7	150.0	17.0
1038.1	146.8	14.1	1099.7	199.7	18.2
902.4	147.0	16.3	838.8	124.3	14.8
AV 905.3 g	151.1 g	16.7%	917.6 g	172.6 g	18.8%

July 13

7 Totes Sampled @ 25/Tote = 175

202 - 73%
73 - 27%

Table 7a. Age, sex and size composition of Norton Sound king salmon, unalakleet test net catch sample, 8 1/4" and 5 7/8" mesh, 1982.

Date/		Combined			4-2			5-2			6-2			7-2		
Mesh Size	Sex	No.	%	Length	No.	%	Length	No.	%	Length	No.	%	Length	No.	%	Length
6/10-7/11	Male	14	87.5	753.5	3	18.8	552.7	9	56.3	785.2	2	12.5	912.0	0	0	-
8 1/4"	Female	2	12.5	941.5	0	0	-	1	6.3	1000.0	1	6.3	883.0	0	0	-
	Total	16	100.0	777.0	3	18.8	552.7	10	62.5	806.7	3	18.8	902.3	0	0	-
6/16-7/13	Male	21	91.3	651.1	16	69.6	588.5	4	17.4	814.3	0	0	-	1	4.3	1000.(
5 7/8"	Female	2	8.7	814.0	0	0	-	0	0	-	2	8.7	814.0	0	0	-
	Total	23	100.0	665.3	16	69.6	558.5	4	17.4	814.3	2	8.7	814.0	1	4.3	1000.(

Age, sex and size composition of Norton Sound king salmon, unalakleet (subdistrict 6) commercial catch, 8 1/4" mesh, 1982.

Date/		Combined			4-2			5-2			6-2			7-2		
Mesh Size	Sex	No.	%	Length	No.	%	Length	No.	%	Length	No.	%	Length	No.	%	Length
6/22	Male	64	64.0	752.4	12	12.0	560.3	40	40.0	770.4	11	11.0	881.0	1	1.0	920.(
6/25	Female	36	36.0	825.0	0	0	-	12	12.0	755.6	21	21.0	859.4	3	3.0	866.(
	Total	100	100.0	778.6	12	12.0	560.3	52	52.0	767.0	32	32.0	866.8	4	4.0	879.5

TABLE 7B. Age, Sex and Size Composition of Norton Sound Coho Salmon, Unalakleet River Test Net Catch Sample, 5 7/8" Mesh, 1982.

		Combined			3-2			4-3			5-4		
Date	Sex	No.	%	Length	No.	%	Length	No.	%	Length	No.	%	Length
7/24	Male	1	33.3	546.0	0	0	-	1	33.3	546.0	0	0	-
7/30	Female	2	66.7	573.0	0	0	-	2	66.7	596.5	0	0	-
	Total	3	100.0	573.0	0	0	-	3	100.0	573.0	0	0	-
7/31	Male	15	62.5	566.3	0	0	-	15	62.5	566.3	0	0	-
8/06	Female	9	37.5	570.8	0	0	-	9	37.5	570.8	0	0	-
	Total	24	100.0	568.0	0	0	-	24	100.0	568.0	0	0	-
8/01	Male	24	61.5	577.1	0	0	-	24	61.5	577.1	0	0	-
8/13	Female	15	38.5	564.8	0	0	-	15	38.5	564.8	0	0	-
	Total	39	100.0	572.4	0	0	-	39	100.0	572.4	0	0	-
8/14	Male	15	50.0	574.4	0	0	-	15	50.0	574.4	0	0	-
8/20	Female	15	50.0	570.3	0	0	-	15	50.0	574.3	0	0	-
	Total	30	100.0	572.3	0	0	-	30	100.0	572.3	0	0	-
?1	Male	6	50.0	540.3	0	0	-	6	50.0	540.3	0	0	-
.7	Female	6	50.0	551.7	0	0	-	6	50.0	551.7	0	0	-
	Total	12	100.0	546.0	0	0	-	12	100.0	546.0	0	0	-
8/28	Male	10	41.7	591.3	0	0	-	10	41.7	591.3	0	0	-
9/03	Female	14	58.3	575.1	0	0	-	14	58.3	575.1	0	0	-
	Total	24	100.0	581.8	0	0	-	24	100.0	581.8	0	0	-
9/04	Male	8	42.1	603.5	0	0	-	8	42.1	603.5	0	0	-
9/10	Female	11	57.9	585.2	0	0	-	11	57.9	585.2	0	0	-
	Total	19	100.0	592.9	0	0	-	19	100.0	592.9	0	0	-
9/11	Male	18	37.5	598.5	1	2.1	631.0	17	35.4	596.6	0	0	-
9/12	Female	30	62.5	604.5	1	2.1	601.0	28	58.3	606.8	1	2.1	545.0
	Total	48	100.0	602.3	2	4.2	616.0	45	93.8	603.0	1	2.1	545.0
9/18	Male	16	55.2	601.8	0	0	-	16	55.2	601.8	0	0	-
9/24	Female	13	44.8	589.6	0	0	-	13	44.8	589.6	0	0	-
	Total	29	100.0	596.3	0	0	-	29	100.0	596.3	0	0	-
Total	Male	113	49.6	583.1	1	0.4	631.0	112	49.1	582.7	0	0	-
	Female	115	50.4	582.0	1	0.4	601.0	113	49.6	582.2	1	0.4	545.0
	Total	228	100.0	582.6	2	0.9	616.0	225	100.0	582.5	1	0.4	545.0

TABLE 7C. Age, Sex and Size Composition of Norton Sound Coho Salmon. Unalakleet River Test Catch Sample, 4", 3" and 2 1/4" Mesh Net, 4" Seine, and Hook and Line (90% 4" Gillnet Catch). 1982.

		Combined			3-2			4-3			5-4		
Date	Sex	No.	%	Length	No.	%	Length	No.	%	Length	No.	%	Length
7/24	Male	2	50.0	586.0	0	0	-	2	50.0	586.0	0	0	-
7/30	Female	2	50.0	561.5	0	0	-	2	50.0	561.5	0	0	-
	Total	4	100.0	573.0	0	0	-	4	100.0	573.0	0	0	-
7/31	Male	5	71.4	538.2	0	0	-	5	71.4	538.2	0	0	-
8/06	Female	2	28.6	550.5	0	0	-	2	28.6	550.5	0	0	-
	Total	7	100.0	541.7	0	0	-	7	100.0	541.7	0	0	-
8/07	Male	14	63.6	559.1	1	4.5	621.0	13	59.1	554.3	0	0	-
8/13	Female	8	36.4	553.1	0	0	-	8	36.4	553.1	0	0	-
	Total	22	100.0	557.0	1	4.5	621.0	21	95.5	553.9	0	0	-
8/14	Male	18	64.3	575.5	1	3.6	599.0	17	60.7	547.1	0	0	-
8/20	Female	10	35.7	570.7	0	0	-	10	35.7	570.7	0	0	-
	Total	28	100.0	557.3	1	3.6	599.0	27	96.4	555.8	0	0	-
8/21	Male	9	90.0	543.2	1	10.0	623.0	8	80.0	533.2	0	0	-
7	Female	1	10.0	566.0	0	0	-	1	50.0	566.0	0	0	-
	Total	10	100.0	545.4	1	10.0	623.0	9	90.0	536.8	0	0	-
8/28	Male	10	62.5	576.6	0	0	-	10	62.5	576.6	0	0	-
9/03	Female	6	37.5	597.0	0	0	-	6	37.5	597.0	0	0	-
	Total	16	100.0	584.2	0	0	-	16	100.0	584.2	0	0	-
9/04	Male	4	80.0	501.8	0	0	-	4	80.0	501.8	0	0	-
9/10	Female	1	20.0	555.0	0	0	-	1	20.0	555.0	0	0	-
	Total	5	100.0	512.4	0	0	-	5	100.0	512.4	0	0	-
Total	Male	62	67.4	532.6	3	3.3	614.3	59	64.1	549.3	0	0	-
	Female	30	32.6	568.6	0	0	-	30	32.6	568.6	0	0	-
	Total	92	100.0	557.7	3	3.3	614.3	89	96.7	555.8	0	0	-

TABLE 7D. Age, Sex and Size Composition of Norton Sound Chum Salmon, Unalakleet Test Net Catch Sample, 8 1/4" and 5 7/8" Mesh, 1982.

Date/ Mesh Size	Sex	Combined No.	Combined %	Combined Length	3-1 No.	3-1 %	3-1 Length	4-1 No.	4-1 %	4-1 Length	5-1 No.	5-1 %	5-1 Length	6-1 No.	6-1 %	6-1 Length
6/10-6/16	Male	5	62.5	605.2	0	0	-	2	25.0	583.5	3	37.5	621.3	0	0	-
5 7/8"	Female	3	37.5	586.3	0	0	-	0	0	586.3	3	37.5	-	0	0	-
	Total	8	100.0	523.3	0	0	-	2	25.0	583.5	6	75.0	603.8	0	0	-
6/17-7/23	Male	17	63.0	610.2	0	0	-	10	37.0	594.8	6	22.2	635.7	1	3.7	608.0
5 7/8"	Female	10	37.0	596.2	0	0	-	5	18.5	582.8	5	18.5	613.2	0	0	-
	Total	27	100.0	604.9	0	0	-	15	55.6	590.8	11	40.7	625.5	1	3.7	608.0
6/24-6/30	Male	33	66.0	607.8	0	0	-	25	50.0	598.9	7	14.0	637.0	1	2.0	605.0
5 7/8"	Female	17	34.0	594.7	0	0	-	5	10.0	594.2	10	20.0	590.9	2	4.0	615.0
	Total	50	100.0	602.9	0	0	-	30	60.0	598.1	17	34.0	609.9	3	6.0	611.7
7/01-7/07	Male	30	57.7	593.8	0	0	-	29	55.8	592.0	1	1.9	645.0	0	0	-
5 7/8"	Female	22	42.3	594.6	0	0	-	12	23.1	582.2	10	19.2	609.4	0	0	-
	Total	52	100.0	594.1	0	0	-	41	78.8	589.1	11	21.2	612.6	0	0	-
7/08-7/14	Male	25	59.5	606.1	1	2.4	570.0	18	42.9	601.3	6	14.3	616.5	0	0	-
5 7/8"	Female	17	40.5	600.1	0	0	-	8	19.0	604.4	9	21.4	596.3	0	0	-
	Total	42	100.0	603.6	1	2.4	570.0	26	61.9	602.2	15	35.7	608.4	0	0	-
7/15-7/21	Male	16	57.1	597.8	0	0	-	13	46.4	594.0	2	7.1	608.5	1	3.6	625.0
5 7/8"	Female	12	42.9	599.5	0	0	-	9	32.1	600.6	2	7.1	585.0	1	3.6	619.0
	Total	28	100.0	598.5	0	0	-	22	78.6	596.7	4	14.3	596.8	2	7.1	622.0
7/22-7/28	Male	27	42.9	602.5	1	1.6	541.0	17	27.0	596.8	8	12.7	614.8	1	1.6	663.0
5 7/8"	Female	36	57.1	573.9	0	0	-	26	41.3	568.7	10	15.9	587.5	0	0	-
	Total	63	100.0	586.2	1	1.6	541.0	43	68.3	579.8	18	28.6	599.6	1	1.6	663.0
7/29-8/04	Male	5	27.8	605.8	0	0	-	3	16.7	597.3	1	5.6	574.0	1	5.6	663.0
5 7/8"	Female	13	72.2	573.1	0	0	-	12	66.7	570.5	1	5.6	604.0	0	0	-
	Total	18	100.0	582.2	0	0	-	15	83.3	575.9	2	11.1	589.0	1	5.6	663.0
8/05-8/11	Male	7	36.8	591.3	1	5.3	512.0	5	26.3	603.0	1	5.3	612.0	0	0	-
5 7/8"	Female	12	63.2	572.9	0	0	-	9	47.4	572.9	3	15.8	571.7	0	0	-
	Total	19	100.0	579.5	1	5.3	512.0	14	73.7	583.6	4	21.1	581.8	0	0	-

TABLE 7D. Age, Sex and Size Composition of Norton Sound Chum Salmon, Unalakleet Test Net Sample, 8 1/4" and 5 7/8" Mesh, 1982. (Continued)

Date/ Mesh Size	Sex	Combined No.	Combined %	Combined Length	3-1 No.	3-1 %	3-1 Length	4-1 No.	4-1 %	4-1 Length	5-1 No.	5-1 %	5-1 Length	6-1 No.	6-1 %	6-1 Length
8/12-8/18	Male	3	42.9	576.3	1	14.3	527.0	1	14.3	616.0	1	14.3	586.0	0	0	-
5 7/8"	Female	4	57.1	583.8	0	0	-	4	57.1	583.8	0	0	-	0	0	-
	Total	7	100.0	580.6	1	14.3	527.0	5	71.4	590.2	1	14.3	586.0	0	0	-
8/19-8/25	Male	3	50.0	600.7	0	0	-	1	16.7	629.0	2	33.3	586.5	0	0	-
5 7/8"	Female	3	50.0	592.7	0	0	-	3	50.0	592.7	0	0	-	0	0	-
	Total	6	100.0	596.7	0	0	-	4	66.7	601.8	2	33.3	586.5	0	0	-
8/26-9/01	Male	2	33.3	621.5	0	0	-	1	16.7	629.0	1	16.7	614.0	0	0	-
5 7/8"	Female	4	66.7	570.8	0	0	-	4	66.7	570.8	0	0	-	0	0	-
	Total	6	100.0	587.7	0	0	-	5	83.3	582.4	1	16.7	614.0	0	0	-
9/01-9/08	Male	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-
5 7/8"	Female	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-
	Total	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-
9/09-9/15	Male	2	66.7	570.0	1	33.3	515.0	0	0	-	1	33.3	625.0	0	0	-
5 7/8"	Female	1	33.3	600.0	0	0	-	0	0	-	1	33.3	600.0	0	0	-
	Total	3	100.0	580.0	1	33.3	515.0	0	0	-	2	66.7	612.7	0	0	-
9/16-9/22	Male	1	25.0	598.0	0	0	-	0	0	-	1	25.0	598.0	0	0	-
5 7/8"	Female	3	75.0	598.0	0	0	-	2	50.0	591.5	1	25.0	611.0	0	0	-
	Total	4	100.0	598.0	0	0	-	2	50.0	591.5	2	50.0	604.5	0	0	-
Total	Male	176	52.9	599.0	5	1.5	533.0	125	37.5	597.0	41	12.3	620.9	5	1.5	632.8
5 7/8"	Female	157	47.1	586.5	0	0	-	99	29.7	580.6	55	16.5	595.8	3	0.9	616.3
	Total	333	100.0	592.8	5	1.5	533.0	224	67.3	591.4	96	28.8	606.5	8	2.4	626.7
Total	Male	15	57.7	622.6	1	3.8	601.0	8	30.8	627.1	6	23.1	627.1	0	0	-
2 1/2"	Female	11	42.3	568.8	2	7.7	490.5	4	15.4	555.2	4	15.4	606.2	1	3.8	630.0
3", 4"	Total	26	100.0	599.9	3	11.3	527.3	12	46.2	603.2	10	38.5	614.6	1	3.8	630.0
6/10-9/22																
Total	Male	15	75.0	625.5	0	0	-	9	45.0	604.4	4	20.0	656.8	2	10.0	658.0
8 1/4"	Female	5	25.0	615.0	0	0	-	2	10.0	582.0	3	15.0	637.0	0	0	-
6/10-7/24	Total	20	100.0	622.9	0	0	-	11	55.0	600.0	7	35.0	648.3	2	10.0	658.0

Table 8. Test fishing at sonar site.

DRIFT SETS 20 fathoms - 5 7/8" Mesh

Date	Bank	Time	Catch
8/9	North	950-955	3 chum 6 pink carcasses
8/9	South	1047-1050	4 silver
8/11	North	2005-2010	2 chum 6 pink carcasses
8/11	South	2014-2019	1 chum 2 silver 1 Dolly Varden 1 pink carcass
8/18	North	1110-1115	0
8/26	North	1221-1226	1 chum 1 pink carcass
8/26	South	1202-1207	1 silver

BEACH SEINE 25 fathoms - 4" Mesh, 100 yards

8/21	South	2045	2 chum 1 silver 3 Burbot 1 Dolly Varden
8/27	South	1945	1 chum 1 Burbot

Table 9. Arctic char/dolly varden test fish, 1982 (60' Variable Mesh).

Date	Hours	Catch	CPUE
5/25	.5	16	320.0
5/25	8.3	53	63.9
5/26	.5	21	42.0
5/27	.6	5	83.3
5/28	.3	81	2700.0
5/29	.3	14	466.7
5/31	.3	14	466.7
6/1	.3	7	233.3
6/3	.6	3	50.0
6/4	.4	30	750.0
6/5	.5	23	460.0
6/7	.9	28	311.1
6/8	1.0	10	100.0
6/9	.7	4	57.1
6/10	1.5	3	20.0
6/11	3.4	5	14.7
TOTAL	20.1	317	

	Percent by Incidence or Weight	
Stomach Contents	Number	Percent
Salmon Fry/Smolt	1	.3
Salmon Eggs	6	1.9
Invertebrates	20	6.3
Plant Material	2	.6
Empty	288	90.9
Total	37	100.0