

A BOTTOM TRAWL SURVEY FOR CRABS IN THE SOUTHERN,
KAMISHAK AND BARREN ISLANDS DISTRICTS OF THE COOK INLET
MANAGEMENT AREA, JUNE 20 - 25 AND JULY 14 - 24, 1992

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INTRODUCTION

The Department has been conducting trawl surveys for red king (Paralithodes camtschaticus) and Tanner (Chionoecetes bairdi) crabs in the Cook Inlet Management Area since 1990. The data from these surveys are used in part to generate crab population estimates. The population estimates, in turn, are utilized to set the quotas for the commercial seasons.

The trawl survey replaced the pot index that was employed by the department prior to 1990 to assess the crab stocks. The pot survey data were used to establish an index of abundance which was subsequently related to commercial catch information. The shortcomings of the pot survey, such as soak variation and the relative nature of the indices themselves, induced the Department to employ a trawl survey which would provide for direct stock enumeration independent of commercial fishery data.

Historically trawl surveys have been operated by both the National Marine Fisheries Service (NMFS) in the Bering Sea and the Department of Fish and Game (ADF&G) in the Westward Region. Data from these surveys have proved satisfactory in determining stock conditions and resultant fisheries management strategies for king and Tanner crabs.

OBJECTIVES

The 1992 survey goals were:

1. Determine abundance of Tanner and red king crab stocks in the Southern, Kamishak and Barren Islands Districts of the Cook Inlet Management Area (Figure 1).

2. Document the size and shell age of all Tanner, king and Dungeness (Cancer magister) crabs captured. Determine egg condition of all female crabs caught.
3. Record species composition and length frequency of Pacific cod (Gadus macrocephalus) and selected rockfish (Sebastes spp.).

METHODS

Trawl and Area Description

The state research vessel Pandalus, overall length 66 feet, was utilized to conduct the survey. A 400 mesh eastern trawl was fished with 800 pound, 5'x 7', Nor'Eastern Astoria V trawl doors. Headrope and footrope lengths were 70 and 95 feet, respectively. The estimated fishing height and width were 9 and 40 feet, respectively. The trawl had 4.0 inch mesh in the wings and body, 3.5 inch in the intermediate and cod end and a 1.25 inch cod end liner.

The trawl used in the 1991 and 1992 surveys differed from the one employed in the 1990 trawl survey. Although both nets were 400 mesh eastern trawls, the net used in 1990 tended to dig into the substrate and occasionally collapse. Investigation by the Kodiak ADF&G staff and a local net loft led to rehangng the nets including alteration of the drop chain. Both of these changes resulted in significantly improved trawl performance.

Selection of the general survey areas was based on historical pot index and commercial catch information. Geographic areas that had very limited probability of crab catch were not selected. The two general locations chosen were: 1) that portion of the Southern District from upper Kachemak Bay extending west to 152 degrees W.

longitude, and 2) the Kamishak and Barren Islands Districts (referred to as Kamishak District) as far east as 152 degrees 40 minutes W. longitude (Figure 2).

Sampling Methods

Actual station sizes were initially based on those dimensions utilized in the Westward Region. Bay stations (Southern District) were 2.5 nautical miles square (6.25 sq. m.) (Figure 3) and ocean stations (Kamishak and Barren Islands) were 5.0 nautical miles square (25.0 sq. m.) (Figure 4). Station size and shape varied somewhat based on irregular coastline and depth. Depths shallower than 10 fathoms were always precluded from station selection. Bay stations were further stratified by depth to isolate the deep water (between 50 and 90 fathoms) which essentially runs from Gull Island to Barabara Point.

Initial goals for tow length and time were 1.0 nautical miles and 30 minutes, respectively. If irregular bottom or hangups caused reduction in trawl duration, data from tow lengths of 0.5 nautical miles or greater were used. The data from shorter tows were discarded and the tows repeated. The trawl path was randomly selected within the station grid by the vessel skipper wherever it appeared that a good tow could be made. All tows were made during daylight hours.

Successful tows were brought aboard and weighed. All king, Tanner and Dungeness crabs were weighed and measured. Width measurements were used for Tanner and Dungeness crabs while length was utilized for king crabs. Shell age and egg condition information was recorded.

Pacific cod and rockfish catches were sampled. As many Pacific cod were measured as time allowed: subsampling was noted and data were expanded subsequent to the survey. Rockfish were returned to

groundfish biologist for further data collection. All Pacific cod and rockfish were weighed. All other fish and invertebrate species were discarded with qualitative notation made on sample forms.

Data Analysis

Abundance estimates for king and Tanner crabs in each district were generated using the following area swept equation:

$T = 151.9 (A) (C)$ where 151.9 is a factor to convert catch per nautical mile towed to catch per square nautical mile.

T = the estimated total number for each species.

A = the area of the station in square nautical miles.

C = the catch per tow in number of crabs.

These data were calculated for each station which in turn were summed to yield an estimate for the district.

RESULTS

General

The reconstructed nets used for the 1991 and 1992 surveys resulted in significantly fewer hangups, much less mud in the cod end and fewer tears. Vessel and personnel efficiency were vastly improved over 1990. There remains however uncertainty among the staff regarding the net's catching efficiency for small Tanner crabs, generally less than 75 mm, which may be passing under the net. Successive annual survey data will determine whether or not this is occurring.

A total of 46 good tows were made from June 20 through July 24, 1992. The numbers of stations fished in the Southern and

Kamishak/Barren Islands Districts were 18 and 28, respectively. Total catches of all species and debris were 38,775 and 28,292 pounds for the Southern and Kamishak/Barren Islands Districts, respectively.

Two Southern District tows were shortened to 0.90 and 0.95 nautical miles in response to abrupt depth change. Two tows in the Kamishak/Barren Islands District were shortened to distances between 0.44 and 0.60 miles due to net hangups (Appendices A and B).

Bottom temperatures taken from a recording device attached to the headrope of the trawl are reported for both districts on Appendix C.

Southern District

Crab catches in the Southern District were 5,947, 862 and 928 pounds of Tanner, king, and Dungeness crabs, respectively. Pacific cod poundage was 1,024. Rockfish catch totalled 166 pounds. The total catch of all other species and debris was 29,848 pounds (Table 1).

The total of 3,384 male Tanner crabs were caught. The majority (62%) were sublegals (<140 mm). True prerecruit ones and twos comprised 15 and 25 percent, respectively, of all the males caught. True prerecruits and recruits are new shells in the respective size classes. The legal male catch was 38 percent (1,291) of all age classes combined. True recruits constituted 80 percent of the legal male catch and 30 percent of the total male catch (Table 2 and Figure 5).

A total of 1,178 female Tanner crabs were caught. Of these, 347 were juveniles and the remaining 831 were adults. Of the adult females, 795 (95%) had full clutches. Two hundred thirty four

(28%) of the adult females were newly mature (Table 3 and Figure 6). All eggs were uneyed.

Forty eight male king crabs were caught. King crabs were caught in 5 of the 18 stations towed. Legal animals accounted for 44 of the 48 males. The legal segment of the catch was comprised of one recruit and 43 post-recruits (98 %). No juveniles were captured (Table 4).

Eighty one female king crabs were caught in three stations. Eighty were adults and one was a juvenile. All were new shelled. Two of the adult females were barren. Nineteen (24 %) had full clutches (Table 5). Average fecundity was 71 percent and all eggs were uneyed.

Two hundred eleven male Dungeness crabs were captured. Sixty six (31 %) of these were legals. Of the 66 legals, 54 were recruits. Ninety three (64 %) of the sublegals were new shell prerecruit ones (Table 6). Fifty one (24 %) of all males were in a soft shell condition. Twenty seven (41 %) of the legals were soft; all were recruits. Twenty four (17 %) of the sublegals were soft; all were prerecruit ones. The majority of the males captured represent two size and age classes (Figure 7).

The female Dungeness catch numbered 476 animals. Three hundred ninety seven (83 %) were new shells. Only one female was bearing eggs. This female was an old shell and the eggs were uneyed (Table 7). Juveniles were not identified separately from adults, although the smallest female was 116 mm (Figure 8).

Two hundred thirty nine Pacific cod were caught. The majority of the cod were small, in the 300 to 500 mm size groups. The range of sizes was 320 to 950 mm with a mean of 518 mm (Figure 9).

Kamishak and Barren Islands Districts

Crab catches in the Kamishak and Barren Islands Districts were 781 and 228 pounds for Tanner and king crabs, respectively. One Dungeness crab was caught. Pacific cod catch was 2,006 pounds. Rockfish catch totalled 24 pounds. The total catch of all other species and debris was 25,252 pounds (Table 8).

A total of 756 male Tanner crabs were caught. Sublegals in the prerecruit one size class dominated the catch with 46 percent (351) of the males captured. The majority (88%) of these prerecruit ones were skip molts. Skip molts are old and very old shelled crabs. Legal male crabs comprised seven percent of the catch. Skip molts made up the major portion (90%) of the legals (Table 9 and Figure 10). Thirty three percent (251) of the males were caught at a single station. Black mat was found on only three Tanner crabs. They were all very old shell males.

A total of 170 female Tanner crabs were caught. Of these, 115 were juveniles and 55 were adults. Forty one (75%) of the adult females were newly mature (Table 10). Size frequency of the juveniles was fairly evenly distributed (Figure 11).

Twenty six adult male king crabs were captured from six different stations. Four of the 26 males were in the prerecruit size classes. Of the 22 legal animals, two were true recruits and the remaining 20 (91 %) were post recruits (Table 11). Only four female king crabs were caught: one was a juvenile and three adults (Table 12).

The average length of the 617 Pacific cod was 470 mm. The majority of the fish were in the 300 to 700 mm size group (Figure 12). Rockfish catch data will be documented via a separate Cook Inlet data report.

Tanner Crab Population Estimates

Tanner crab population estimates of catchable males and females were 2,756,953 and 884,530 crabs, respectively, for the Southern District. Estimates for the Kamishak and Barren Islands District were 3,018,771 males and 671,144 females. The estimate of legal male Tanner crab numbers were 953,939 and 217,173 for the Southern and Kamishak/Barren Islands Districts, respectively (Table 12). True recruits composed 78 percent of the legal male stock in the Southern District, and nine percent in the Kamishak and Barren Islands Districts.

King Crab Population Estimates

The population estimate of catchable male king crabs in the Southern District was 45,531 crabs. Ninety percent (41,153) were legal males. Eighty percent (36,515) of the estimate came from two stations.

The estimate of catchable female king crabs in the Southern District was 103,633 animals. Ninety one percent (94,330) of the estimate was from a single station.

The Kamishak/Barren Islands Districts' catch yielded a population estimate of 102,537 males. The estimate of legals was 86,666 animals. Seventy four percent came from two stations.

The population estimate of females in the Kamishak/Barren Islands Districts was 15,871 animals. This estimate was generated from a catch of four females from two stations.

DISCUSSION

King crab

Compared to historical catch figures, which only reflect the numbers of legal males, the overall population level of king crabs remains severely depressed in both the Southern and Kamishak/Barren Islands Districts. For example, the mean commercial catch per year prior to the final 1984 closure was 3.44 million pounds per year. Assuming an average weight of 6.5 pounds per crab, the 3.44 million pounds equals approximately 530,000 legal males. This compares to a total 1992 legal male population estimate of 130,000 animals, or 25 percent of the historical mean commercial catch.

The population estimate of catchable sublegal males and females for both the Southern and Kamishak/Barren Islands Districts totalled 20,000 and 120,000, respectively. These figures stress the depressed condition of the stock.

Further emphasis must be placed on the very depressed condition of the sublegal segment of the stock. Although there is current debate within the department regarding the distribution and subsequent catchability of juvenile king crabs, the adult sublegals share common grounds with the adult females and legal males; they are therefore susceptible to assessment via a trawl survey. The resultant 20,000 crab estimate of sublegal males accents both the continued poor and potential recruitment into the stock. Although the stock of king crabs does indicate a buildup of older, legal adults, their survival is due to the natural longevity of the species coupled with low fishing mortality, which is the result of bycatch from other fisheries and illegal harvest.

Tanner crab

Southern District

The commercial fishery for Tanner crabs in the Southern District was closed during 1989 and 1990 due to low adult and legal stock abundance (Table 13). The fishery opened again in 1991 in order to harvest a portion of the buildup of post-recruit crabs from the preceding closed years. This buildup was identified by the 1990 trawl survey. The 1991 survey indicated improved recruitment into the adult and legal segments of the stock. The 1992 season was therefore characterized by an increased harvest quota and a higher proportion of new shell crabs in the catch.

The 1992 survey in the Southern District showed expected growth and recruitment into both the prerecruit one and recruit size classes. The estimated abundance of the true prerecruit ones and true recruits is 683,607 and 740,136 crabs, respectively (Table 13). Previous trawl surveys in 1989, 1990 and 1991 identified the presence and growth of these two dominant year classes (Figure 13).

A final observation regarding the Southern District Tanner trawl data is the indication of a significant decline in prerecruit two and smaller crabs (Figure 13). Based on the relatively accurate survey assessment of the advancement of the larger sized year classes from the 1989 through 1991, it seems likely that an estimation of a sharp reduction in 1994 recruitment (current prerecruit twos) would be correct.

The precision of the trawl survey's estimate of the smaller year classes (prerecruit threes and smaller) remains unverified. For example, the foot rope of the trawl may be passing over many of these small crabs. Since the survey is only four years old, the department cannot at this point confirm the accuracy of the trawl survey as a forecasting tool for small Tanner crabs. The

reliability question will be answered after a few more years of comparative trawl catches.

Possible trawl inefficiency for capturing smaller crabs may also explain the disparity between the numbers of males and females over the entire survey. Although the extreme aggregating nature of adult female Tanner crabs, particularly multiparous (skipmolts) spawners, may also add to the reduced female catches.

Kamishak and Barren Islands Districts

The stock in the Kamishak and Barren Islands Districts continues to be depressed. This condition is evidenced by both the data from the Cook Inlet and the Kodiak trawl surveys: Kodiak ADF&G tows south of the latitude of Cape Douglas and Cook Inlet ADF&G trawls north of Cape Douglas. Not only are these districts suffering from successive weak year classes, but also continued characteristic heavy skipmolting in the prerecruit one size class. For example, the 1992 population estimate of the prerecruit one size class was 1,402,000 crabs. Only 166,000 (12 %) of these crabs were new shells. The remaining 88 percent (1,236,000) were skipmolts (Table 13). The high level of skipmolting at a small size, relative to the males in the Southern District for example, is further illustrated in the complete absence of the post recruit size class (Figure 10) and the significantly smaller average weight and size of the legal crabs taken in the commercial fishery.

Based on comparison to past trawl survey data and historical commercial catch, the 217,000 legal animals estimated by the 1992 trawl survey is a record low for this stock of crabs. Furthermore, examination of the historical distribution of adult and legal Tanners in the Kamishak and Barren Islands Districts indicates these animals were widely disbursed particularly in comparison to the distribution of the Southern District stock. The 217,000 estimate of legal crabs therefore further shrinks in relative size

when compared to both historical stock size and dimensions of the habitable grounds.

Dungeness crab

Interestingly, the Southern District trawl surveys appear to have recognized a group of Dungeness as they move through the successive years (Figure 14). Although the survey was not designed to assess the Dungeness crab stock(s), the data seem to agree with the results of a Southern District Dungeness pot survey (unpublished data). The utility of these Dungeness trawl data will be proven through succeeding surveys and comparison with both pot survey and commercial fishery catch information.

ble 1. Target species catch in pounds by station in the Southern District, Cook Inlet trawl survey, 1992.

Station no.	Tanner	Dung.	King	Pac. cod	Rock-fish sp.	Misc. invert., fish&debris	Total catch
1	436	10	18	46	0	836	1346
2	264	99	24	30	0	1005	1422
3	210	22	0	12	0	766	1010
4	172	134	0	18	0	1176	1500
5	80	105	0	20	0	1329	1534
6	304	156	450	16	1	1611	2538
7	213	228	100	10	0	2431	2982
8	1584	2	38	206	4	1626	3460
9	1114	0	232	110	10	874	2340
10	157	0	0	12	12	1665	1846
11	286	1	0	86	70	1669	2112
12	63	0	0	18	0	1005	1086
13	194	0	0	108	20	1774	2096
14	252	52	0	244	0	3624	4172
15	604	50	0	0	0	1587	2241
17	0	10	0	4	27	3141	3182
18	14	30	0	10	22	1520	1596
20	0	29	0	74	0	2209	2312
----- Southern District totals -----							
18	5947	928	862	1024	166	29848	38775

Table 2. Numbers of male Tanner crabs per mile towed by station in the Southern District, Cook Inlet trawl survey, 1992.

Station	Sublegal males						Legal males				Total legal	Total males
	<70	70-91	92-114		115-139		140-165		>165			
			(new)	(old)	(new)	(old)	(new)	(old)	(new)	(old)		
1	10	16	85	2	141	4	60	0	3	0	63	321
2	2	18	99	2	70	5	31	2	1	0	34	230
3	28	27	60	3	71	0	31	0	3	0	34	223
4	3	2	15	1	60	3	29	1	0	0	30	114
5	1	0	0	1	6	2	24	1	2	0	27	37
6	58	23	81	1	97	10	20	4	5	0	29	299
7	63	25	42	1	66	3	10	4	4	0	18	218
8	0	7	51	2	193	31	321	20	21	1	363	647
9	3	3	16	2	83	11	268	31	11	10	320	438
10	90	6	9	2	9	5	39	0	1	0	40	161
11	15	14	41	0	22	0	71	0	7	0	78	170
12	6	0	3	0	8	0	17	0	0	0	17	34
13	0	4	5	0	5	0	59	1	4	0	64	78
14	5	7	3	9	11	54	30	6	3	1	40	129
15	0	0	2	16	10	119	19	93	1	19	132	279
18	0	0	0	0	0	4	0	2	0	0	2	6
District total	284	152	512	42	852	251	1029	165	66	31	1291	3384

-note- stations not listed had no male Tanner crab catch

Table 3. Numbers of female Tanner crabs per mile towed by station in the Southern District, Cook Inlet trawl survey, 1992.

Station	Juveniles	----- Mature -----									Total mature			Total females
		Full clutches			Partial clutches			Barren			New	Old	VO	
		New	Old	VO	New	Old	VO	New	Old	VO				
1	16	2	0	0	0	0	0	0	0	0	2	0	0	18
2	14	2	0	0	1	0	0	0	0	0	3	0	0	17
3	32	1	0	0	0	0	0	0	0	0	1	0	0	33
4	3	0	0	0	0	0	0	0	0	0	0	0	0	3
5	3	0	0	0	0	0	0	0	0	0	0	0	0	3
6	67	1	2	1	0	0	2	0	0	0	1	2	3	73
7	62	0	1	15	0	0	0	0	0	2	0	1	17	80
8	24	127	100	177	6	0	2	0	0	0	133	100	179	436
9	6	59	75	124	1	3	8	0	0	3	60	78	135	279
10	89	13	3	3	0	0	0	0	0	0	13	3	3	108
11	13	11	0	0	1	0	0	0	0	0	12	0	0	25
12	5	1	0	0	0	0	0	0	0	0	1	0	0	6
13	7	6	5	0	0	0	0	0	0	0	6	5	0	18
14	6	0	7	30	0	0	5	0	0	2	0	7	37	50
15	0	2	26	1	0	0	0	0	0	0	2	26	1	29
District total	347	225	219	351	9	3	17	0	0	7	234	222	375	1178

-note- stations not listed had no female Tanner crab catch

Table 4. Numbers of male king crabs per mile towed by station in the Southern District, Cook Inlet trawl survey, 1992

Station	91-108		109-126		127-144		145-163		>163		Total legal males	Total males
	<91	91-108	(new)	(old)	(new)	(old)	(new)	(old)	(new)	(old)		
1	0	0	0	0	0	0	0	0	1	1	2	2
2	0	0	0	0	0	0	0	0	0	2	2	2
6	0	1	1	0	0	0	1	1	2	10	14	16
7	0	1	1	0	0	0	0	0	1	4	5	7
9	0	0	0	0	0	0	0	0	7	14	21	21
District total	0	2	2	0	0	0	1	1	11	31	44	48

-note- stations not list had no male king crab catch

Table 5. Numbers of female king crabs per mile towed by station in the Southern District, Cook Inlet trawl survey, 1992.

Station	Juveniles	----- Mature -----									Total mature			Total females
		Full clutches			Partial clutches			Barren			New	Old	VO	
		New	Old	VO	New	Old	VO	New	Old	VO				
6	1	16	0	0	50	0	0	2	0	0	68	0	0	69
7	0	2	0	0	8	0	0	0	0	0	10	0	0	10
8	0	1	0	0	1	0	0	0	0	0	2	0	0	2
District total	1	19	0	0	59	0	0	2	0	0	80	0	0	81

-note- stations not listed had no female king crab catch

Table 6. Numbers of male Dungeness crabs per mile towed by station in the Southern District, Cook Inlet trawl survey, 1992

Station	90-114		Sublegal males 115-139		140-164		Legal males			Total legal males	Total males
	<89	(new)	(old)	(new)	(old)	(new)	(old)	(new)	(old)		
1	0	0	0	1	0	0	0	0	0	0	1
2	0	0	1	16	7	17	3	0	0	20	47
3	0	0	0	2	2	0	2	0	0	2	6
4	0	0	1	27	6	13	1	0	0	14	50
5	0	0	0	30	5	15	0	1	0	16	59
6	0	0	0	8	5	4	1	0	0	5	22
7	0	0	0	7	2	4	3	0	0	7	18
14	0	0	0	0	2	0	0	0	0	0	2
15	0	0	0	1	0	0	0	0	0	0	1
17	0	0	0	1	0	1	0	0	1	2	3
20	0	0	0	0	2	0	0	0	0	0	2
District total	0	0	2	93	31	54	10	1	1	66	211

-note- stations not listed had no male Dungeness crab catch

Table 7. Numbers of female Dungeness crabs per mile towed by station in the Southern District, Cook Inlet trawl survey, 1992.

Station	Juveniles	----- Mature -----									Total females			
		Full clutches			Partial clutches			Barren				Total mature		
		New	Old	VO	New	Old	VO	New	Old	VO	New	Old	VO	
1	0	0	0	0	0	0	0	9	1	0	9	1	0	10
2	0	0	0	0	0	0	0	32	1	0	32	1	0	33
3	0	0	0	0	0	0	0	6	3	0	6	3	0	9
4	0	0	0	0	0	0	0	48	4	0	48	4	0	52
5	0	0	0	0	0	0	0	22	0	0	22	0	0	22
6	0	0	1	0	0	0	0	107	18	0	107	19	0	126
7	0	0	0	0	0	0	0	77	15	0	77	15	0	92
8	0	0	0	0	0	0	0	2	0	0	2	0	0	2
11	0	0	0	0	0	0	0	1	0	0	1	0	0	1
14	0	0	0	0	0	0	0	20	19	0	20	19	0	39
15	0	0	0	0	0	0	0	33	7	0	33	7	0	40
17	0	0	0	0	0	0	0	1	2	0	1	2	0	3
18	0	0	0	0	0	0	0	23	4	0	23	4	0	27
20	0	0	0	0	0	0	0	16	4	0	16	4	0	20
District total	0	0	1	0	0	0	0	397	78	0	397	79	0	476

-note- stations not listed had no female Dungeness crab catch

Table 8. Target species catch in pounds by station in the Kamishak District, Cook Inlet trawl survey, 1992.

Station no.	Tanner	Dung.	King	Pac. cod	Rock-fish sp.	Misc. invert., fish&debris	Total catch
27	10	0	0	52	0	634	696
28	12	0	10	138	0	812	972
29	0	0	0	100	0	278	378
31	12	1	0	22	0	369	404
32	112	0	0	82	0	358	552
33	96	0	0	88	0	390	574
34	0	0	0	118	0	378	496
36	2	0	0	52	0	302	356
37	302	0	78	20	0	922	1322
38	1	0	0	16	0	415	432
44	0	0	0	0	0	378	378
45	0	0	10	0	0	980	990
47	11	0	0	22	0	727	760
48	6	0	0	72	0	432	510
49	0	0	0	16	0	324	340
50	1	0	0	0	0	331	332
51	0	0	90	0	0	3740	3830
52	4	0	0	8	0	1084	1096
53	59	0	0	120	0	701	880
54	0	0	0	40	0	544	584
55	1	0	0	108	21	1392	1522
56	11	0	0	76	0	3227	3314
58	54	0	34	70	0	568	726
59	0	0	0	0	0	300	300
60	36	0	0	512	0	1256	1804
61	25	0	6	128	0	2675	2834
64	6	0	0	112	2	586	706
67	20	0	0	34	1	1149	1204
----- Kamishak District totals -----							
28	781	1	228	2006	24	25252	28292

Table 9. Numbers of male Tanner crabs per mile towed by station in the Kamishak District, Cook Inlet trawl survey, 1992.

Station	70-91		Sublegal males 92-114		115-139		Legal males			Total legal males	Total males
	<70	70-91	(new)	(old)	(new)	(old)	140-165 (new)	(old)	>165 (new)		
27	0	0	2	1	0	7	0	0	0	0	10
28	1	0	1	3	0	11	0	0	0	0	16
31	1	0	0	3	0	6	0	0	0	0	10
32	9	4	3	15	1	63	0	4	0	4	99
33	0	0	4	5	0	57	0	5	0	5	71
36	0	1	0	0	0	2	0	0	0	0	3
37	3	58	27	25	6	105	0	26	0	1	251
47	0	0	0	2	1	7	0	0	0	0	10
48	1	0	0	0	1	3	0	0	0	0	5
49	0	0	0	0	0	0	1	0	0	0	1
50	0	0	0	0	1	0	0	0	0	0	1
52	0	0	0	0	0	0	0	3	0	3	3
53	4	9	36	0	17	4	3	0	0	3	73
55	2	1	0	0	0	0	0	0	0	0	3
56	1	0	0	1	1	5	0	0	0	0	8
58	10	14	1	2	1	24	1	4	0	5	57
60	17	47	8	2	0	0	0	0	0	0	74
61	0	0	8	0	12	1	0	0	0	0	21
64	5	5	1	0	0	1	0	1	0	1	13
67	10	1	0	0	1	13	0	2	0	2	27
District total	64	140	91	59	42	309	5	45	0	1	756

--note- stations not listed had no male Tanner crab catch

Table 10. Numbers of female Tanner crabs per mile towed by station in the Kamishak District, Cook Inlet trawl survey, 1992.

Station	Juveniles		Full clutches		Partial clutches		Barren		Total mature		Total females
	New	Old	VO	New	Old	VO	New	Old	New	Old	
27	2	0	0	0	0	0	0	0	0	0	2
32	3	0	0	0	0	0	0	0	2	0	5
33	1	0	0	0	0	0	0	0	0	0	1
37	32	8	1	0	1	0	0	0	23	9	65
38	1	0	0	0	0	0	0	0	0	0	1
47	2	0	0	0	0	0	0	0	1	0	3
50	0	0	0	0	0	1	0	0	0	0	1
53	5	0	0	0	0	0	0	0	2	0	7
56	4	0	0	0	0	0	0	0	1	0	5
58	14	0	0	0	0	0	0	0	2	0	16
60	31	3	0	0	0	0	0	0	7	3	41
61	0	0	0	0	0	0	0	0	2	0	2
64	3	0	0	0	0	0	0	0	0	0	3
67	17	0	0	0	0	0	0	0	1	0	18
District total	115	41	11	1	1	1	0	0	41	12	170

note- stations not listed had no female Tanner crab catch

Table 11. Numbers of male king crabs per mile towed by station in the Kamishak District, Cook Inlet trawl survey, 1992

Station	91-108		Sublegal males 109-126		127-144		Legal males			Total legal males	
	<91	91-108	(new)	(old)	(new)	(old)	145-163 (new)	>163 (new)	(old)		
28	0	1	0	0	0	0	0	0	0	1	
37	0	1	0	0	1	0	1	0	3	7	
45	0	0	0	0	0	0	0	0	1	1	
51	0	0	1	0	0	0	0	2	4	9	
58	0	0	0	0	0	0	0	0	2	3	
61	0	0	0	0	0	0	1	0	0	1	
District total	0	2	1	0	1	0	2	2	10	22	
											26

-note- stations not list had no male king crab catch

Table 12. Numbers of female king crabs per mile towed by station in the Kamishak District, Cook Inlet trawl survey, 1992.

Station	Mature											
	Juveniles		Full clutches		Partial clutches		Barren		Total mature		Total females	
	New	Old	VO	New	Old	VO	New	Old	VO	New	Old	VO
31	0	0	0	0	0	0	1	0	0	1	0	0
37	1	0	0	2	0	0	0	0	0	2	0	0
District Total	1	0	0	2	0	0	1	0	0	3	0	0

Note- stations not listed had no female king crab catch

Table 13. Tanner crab population estimates in number by sex, size and age classes, 1992 Cook Inlet trawl survey.

Males	Southern District	Kamishak and Barren Is. Districts
<u>Sublegal</u>		
<70 mm	306,159	251,834
70 - 91 mm	134,137	552,348
91 -114 mm		
new	438,453	360,846
o & vo	34,688	233,671
115-139 mm		
new	683,607	166,434
o & vo	205,970	1,236,465
<u>Legal</u>		
140-165 mm		
new	740,136	19,629
o & vo	138,101	193,576
>166 mm		
new	49,547	0
o & vo	26,155	3,968
Total Legals	953,939	217,173
Total Males	2,756,953	3,018,771
Females		
Juvenile	350,782	453,343
Adult	<u>533,748</u>	<u>217,801</u>
Total	884,530	671,144

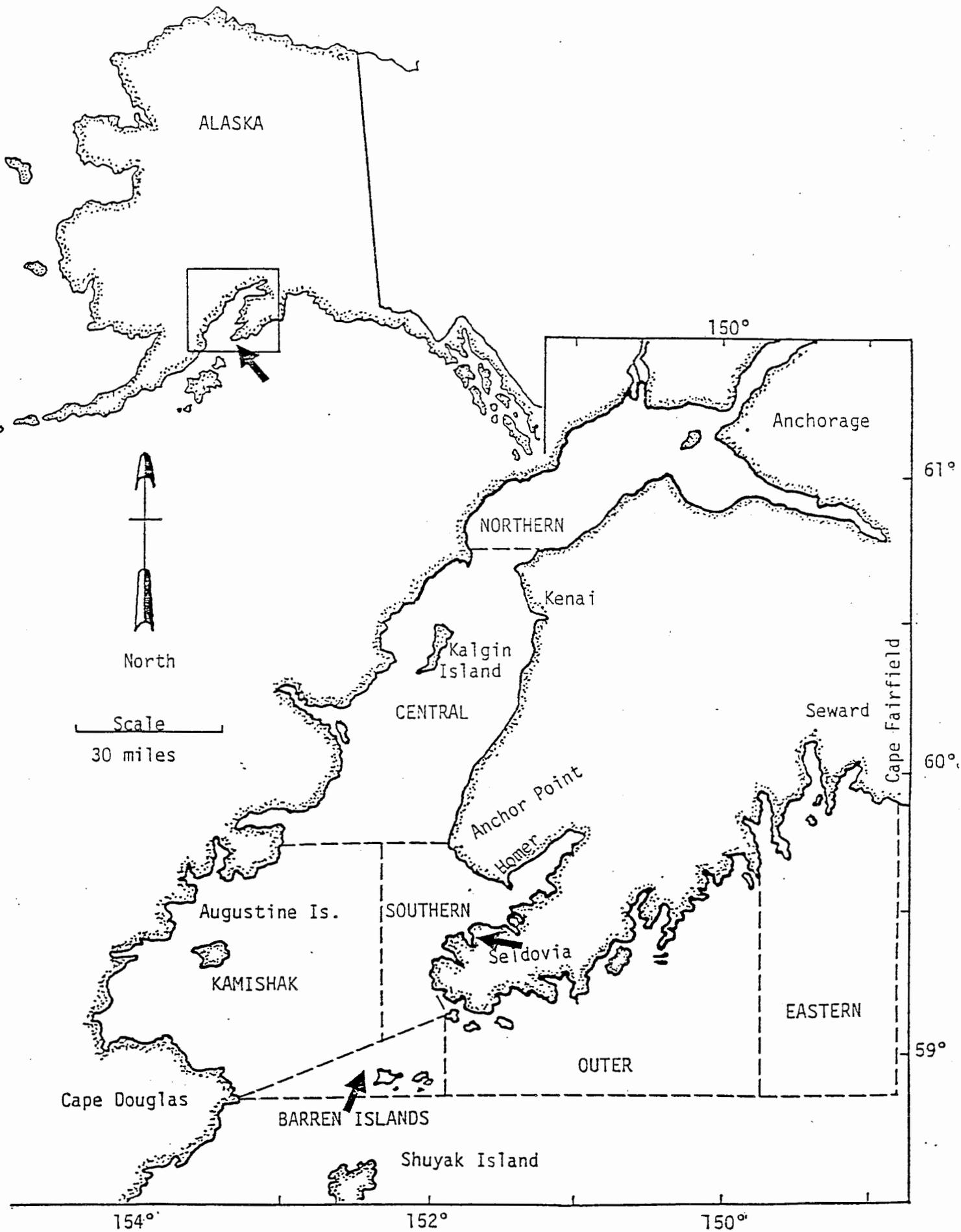


Figure 1

Cook Inlet area district location chart.

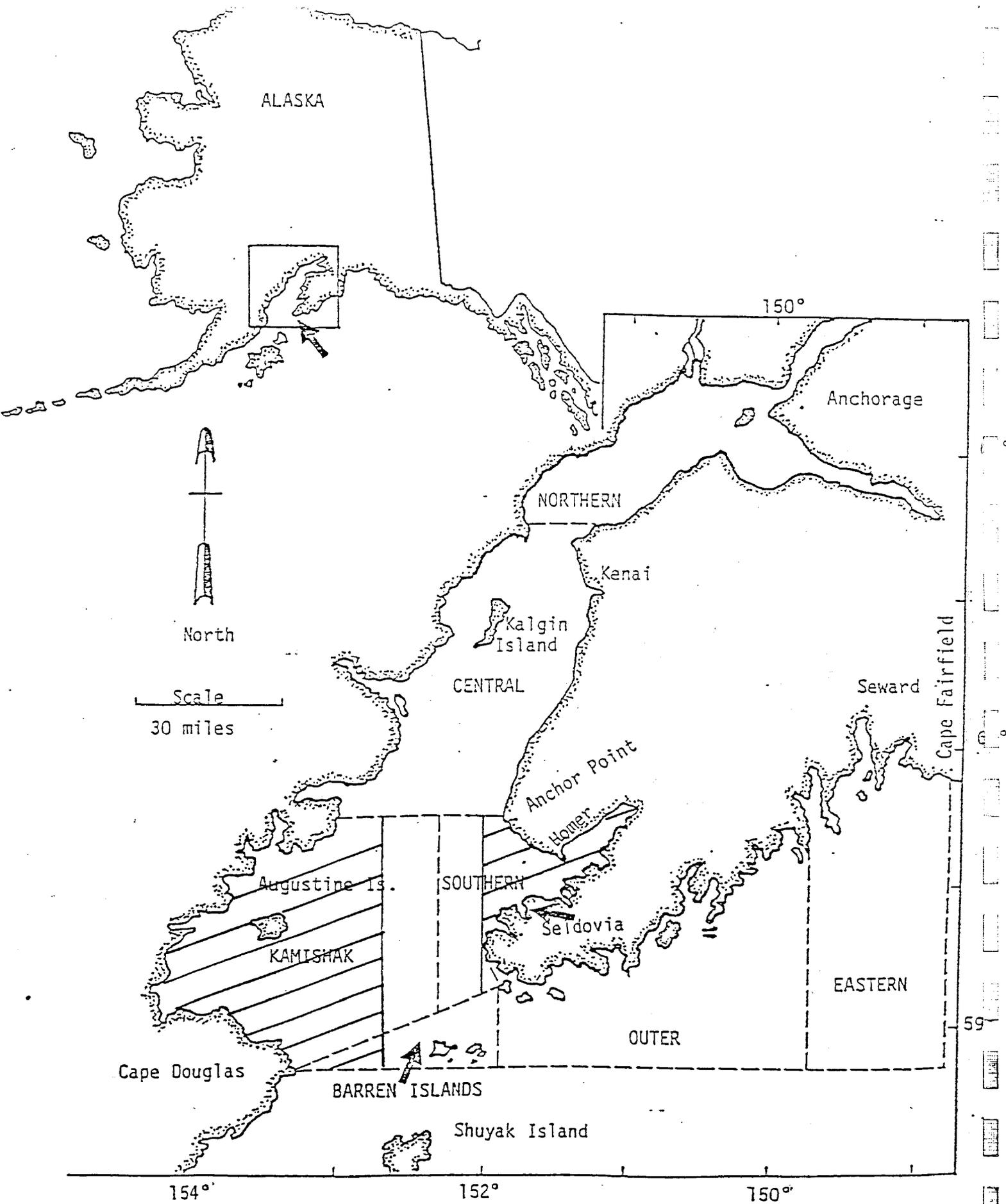


Figure 2. Cook Inlet crab trawl survey locations.

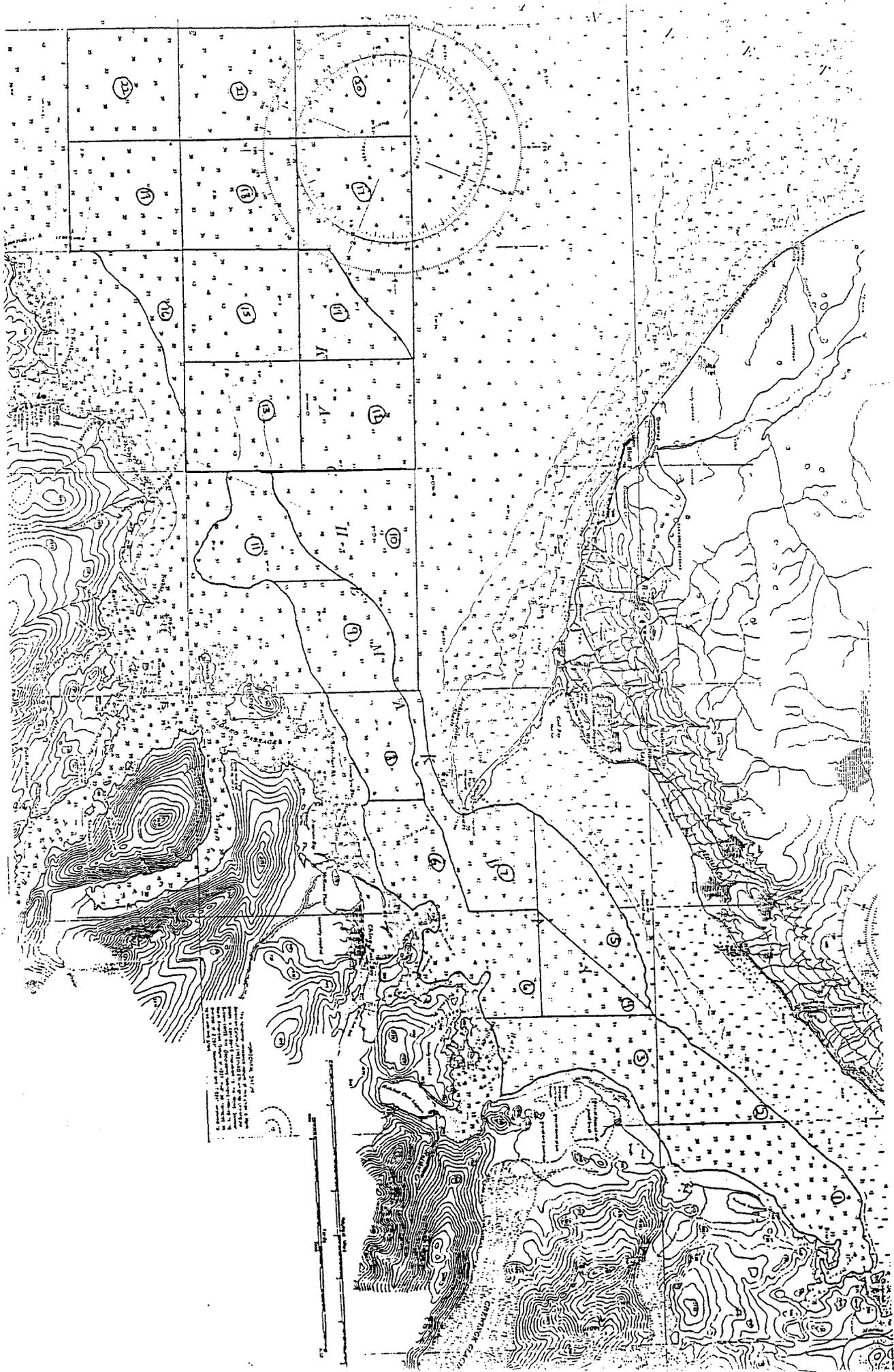


Figure 3. Southern District crab trawl survey stations.

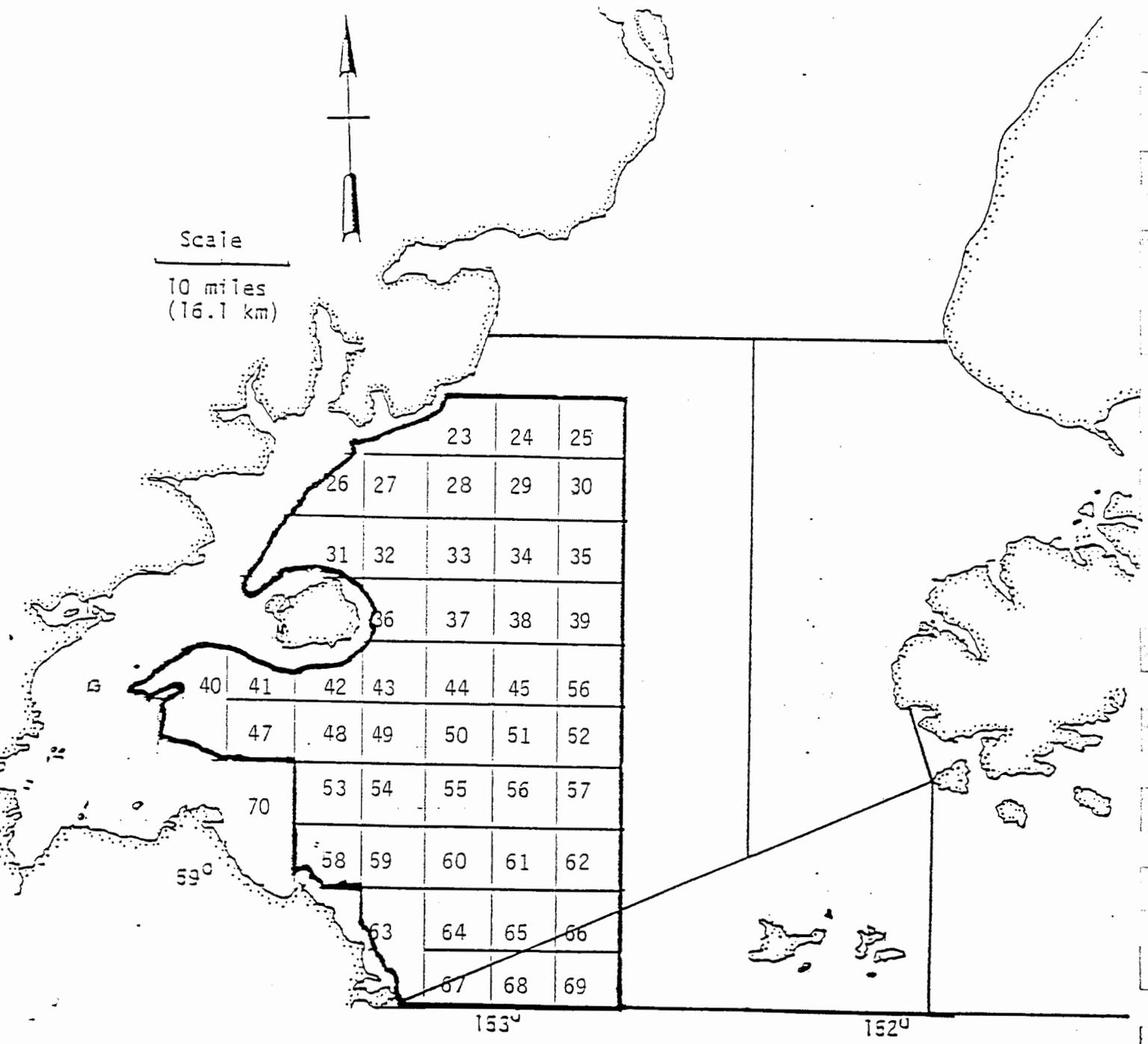


Figure 4. Kamishak and Barren Islands Districts, crab trawl survey stations.

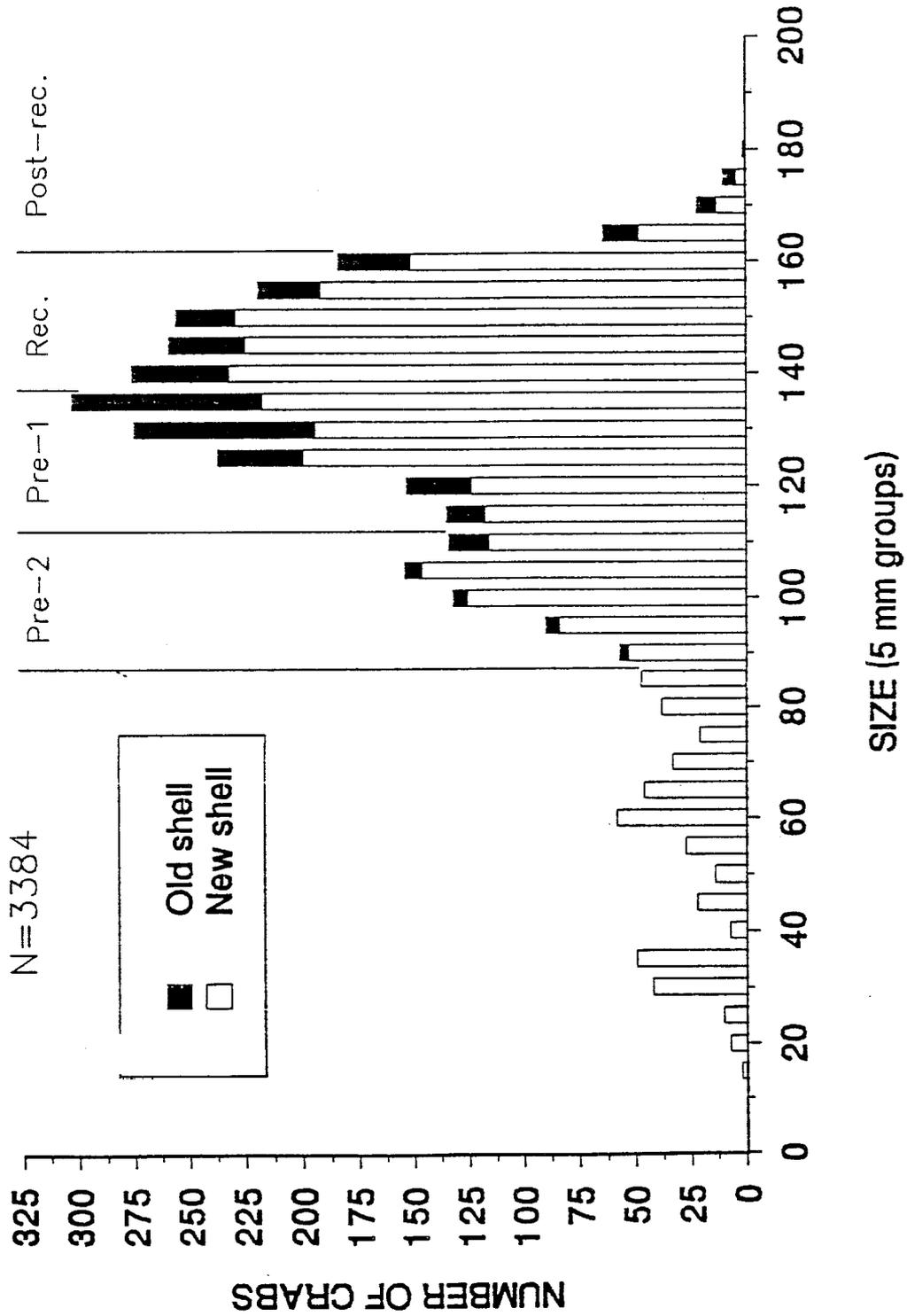


Figure 5. Male Tanner crab catch, Southern Distr., 1992 Cook Inlet trawl survey.

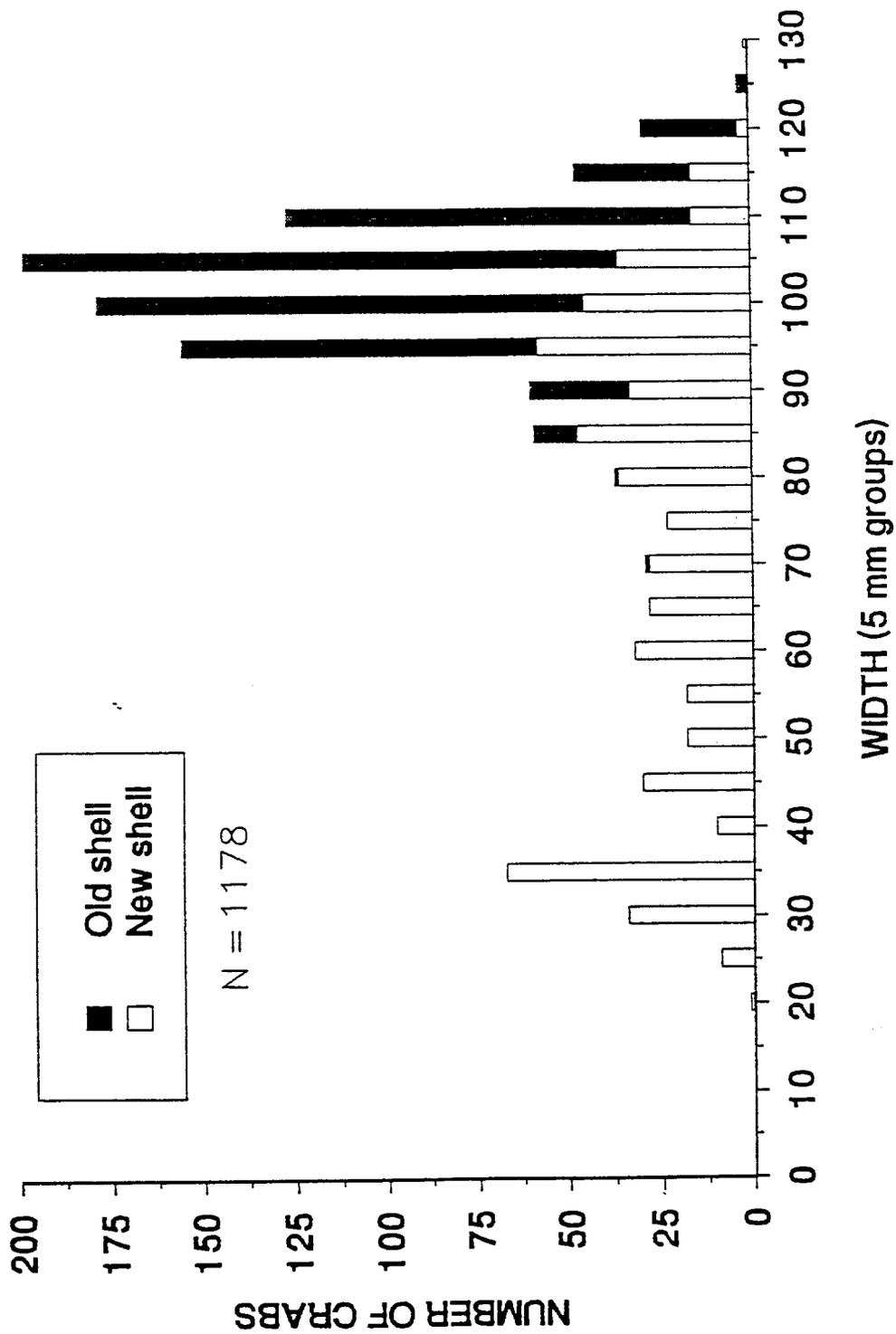


Figure 6. Female Tanner crab catch, Southern Distr., 1992 Cook Inlet trawl survey.

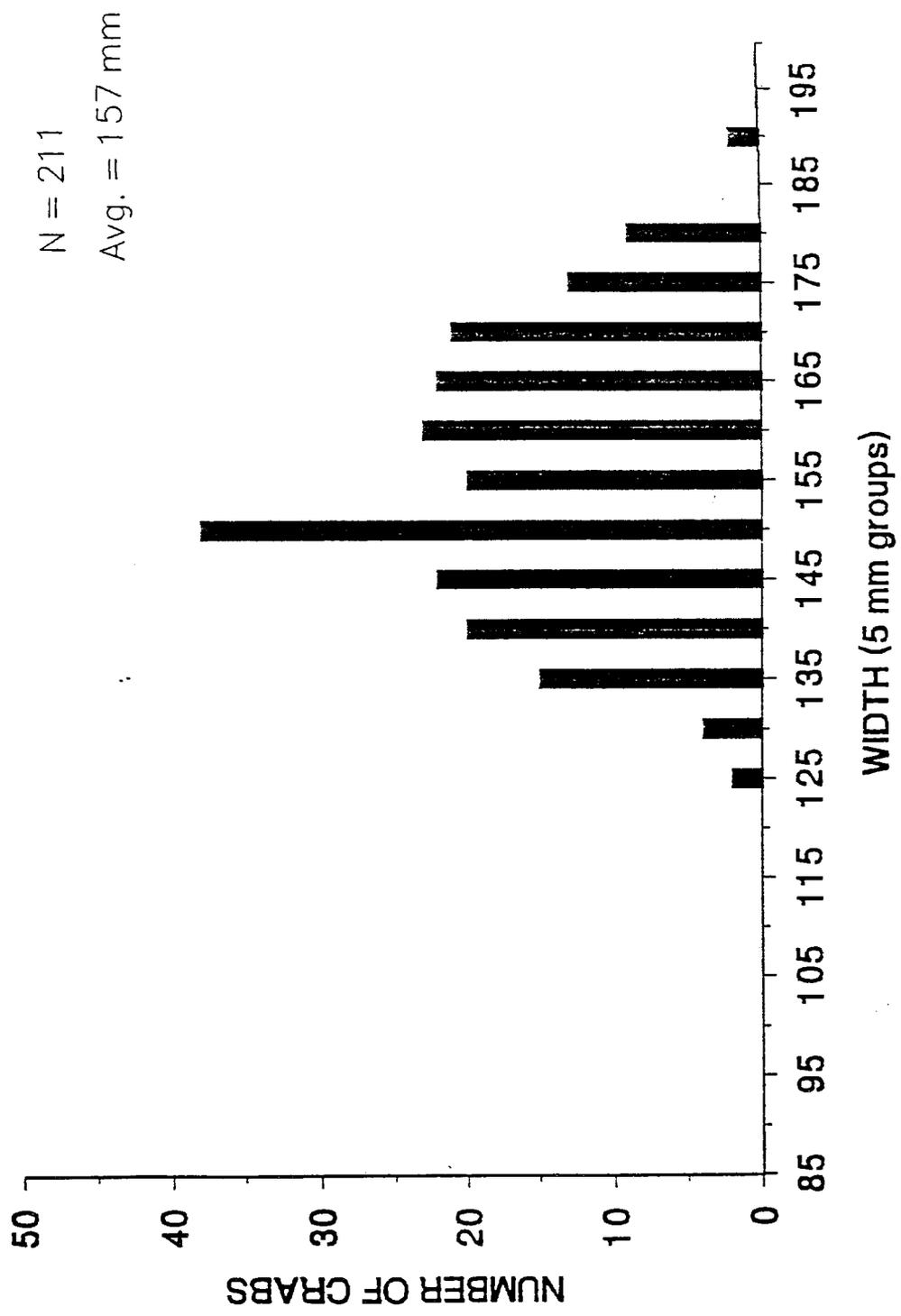


Figure 7. Male Dungeness catch, July, 1992 Southern Distr. crab trawl survey

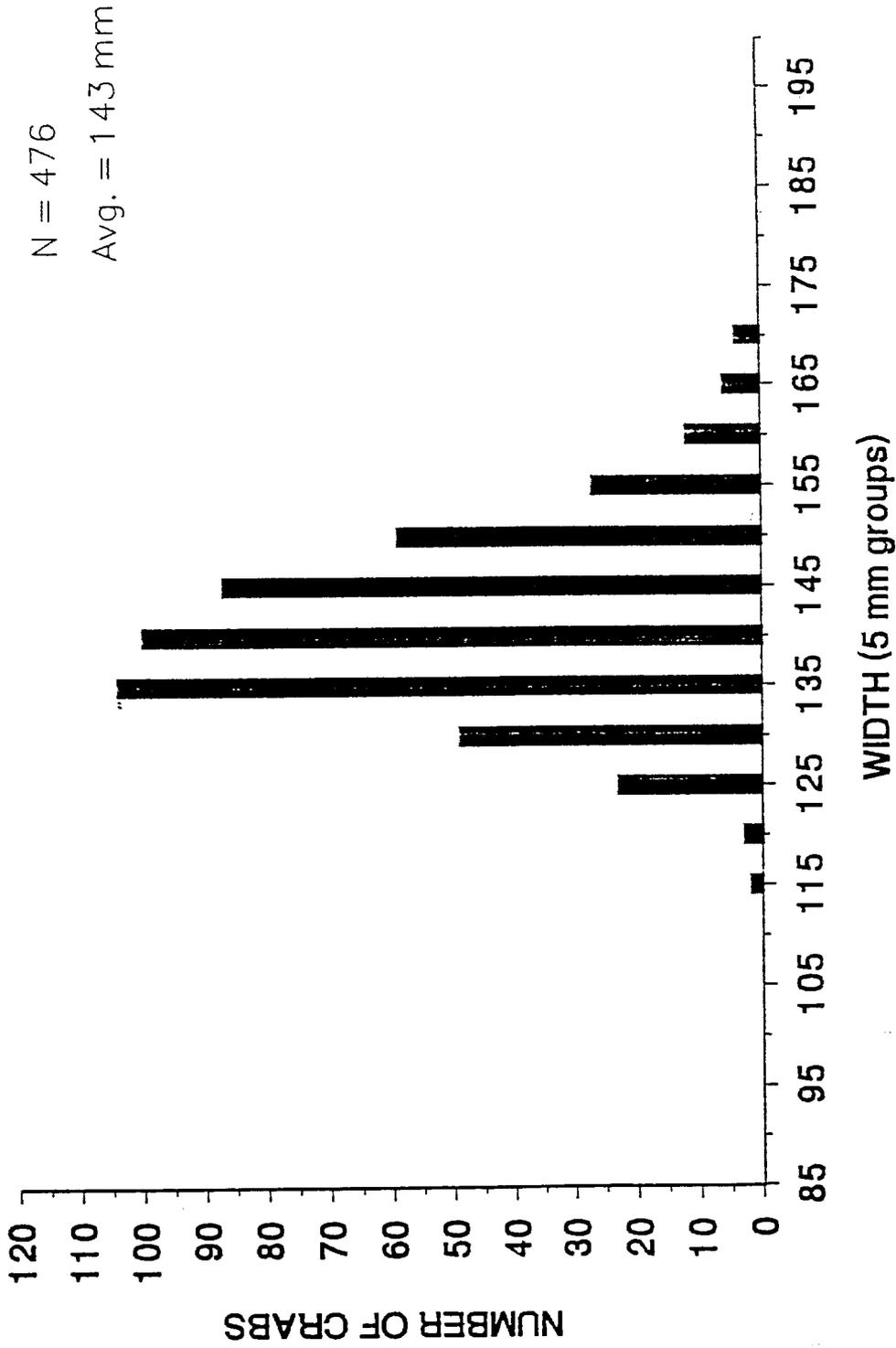


Figure 8. Female Dungeness catch, July, 1992 Southern Distr. crab trawl survey.

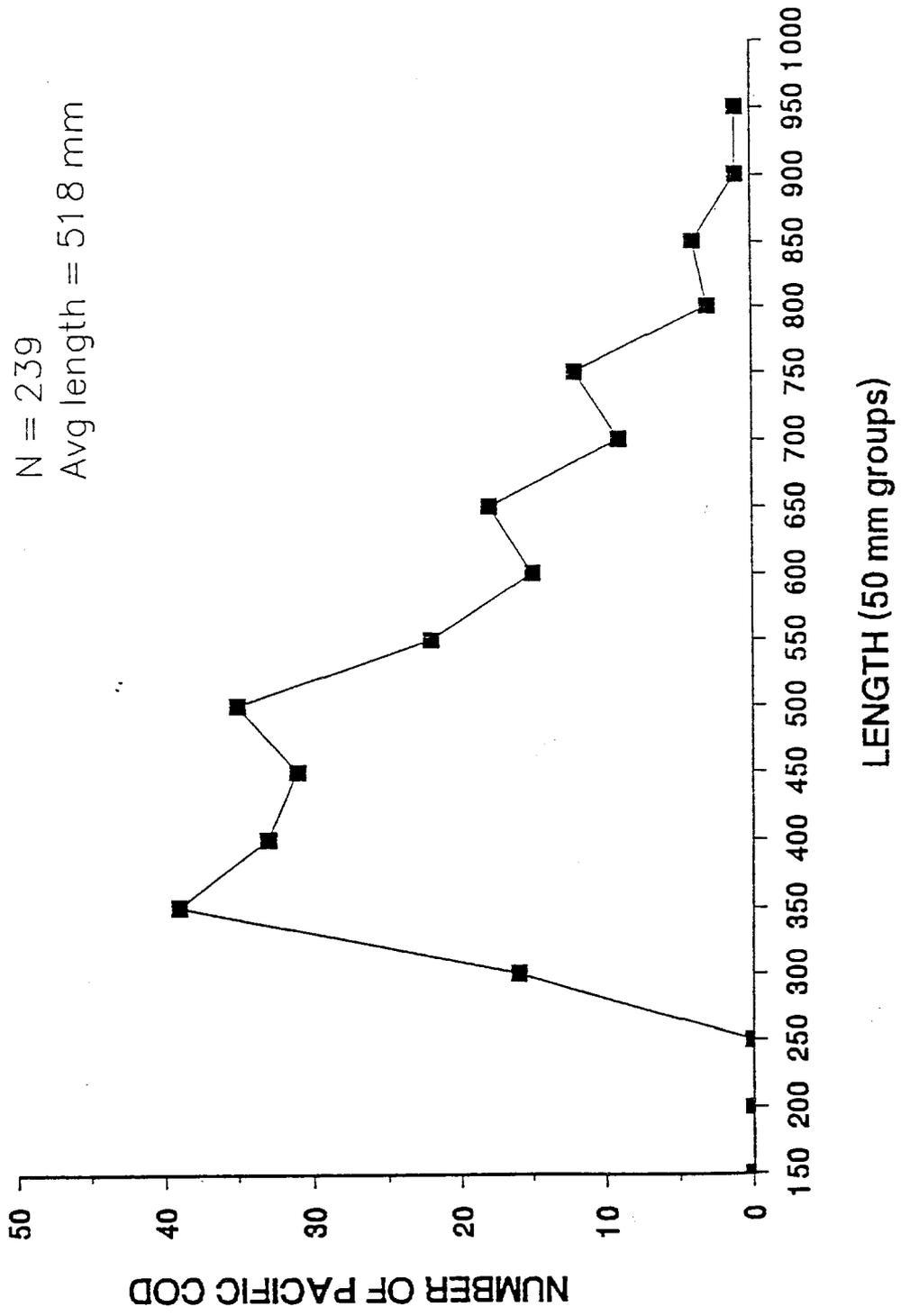


Figure 9. Pacific cod catch, Southern District, 1992 Cook Inlet trawl survey.

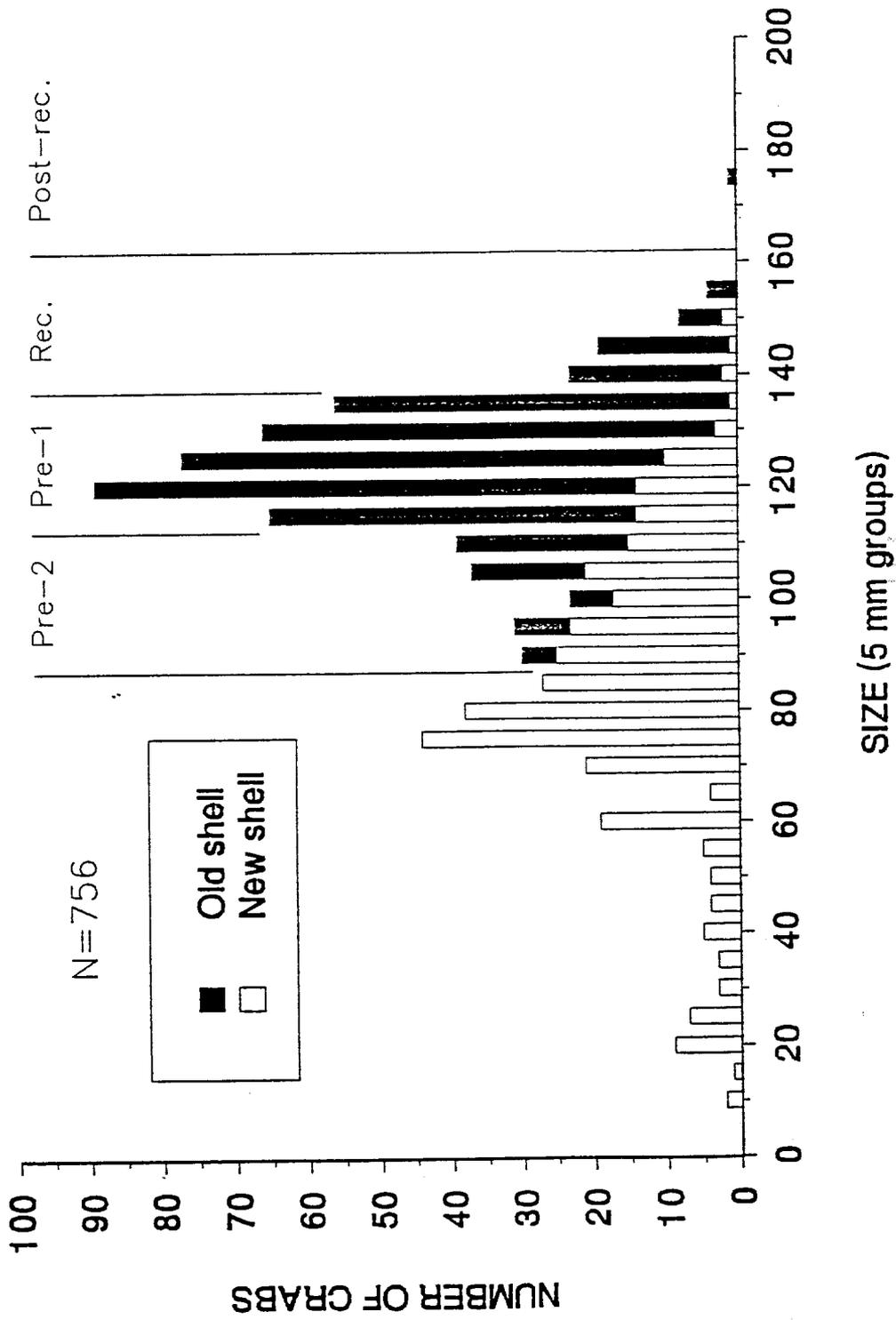


Figure 10. Male Tanner crab catch, Kamlishak District, 1992 Cook Inlet trawl survey.

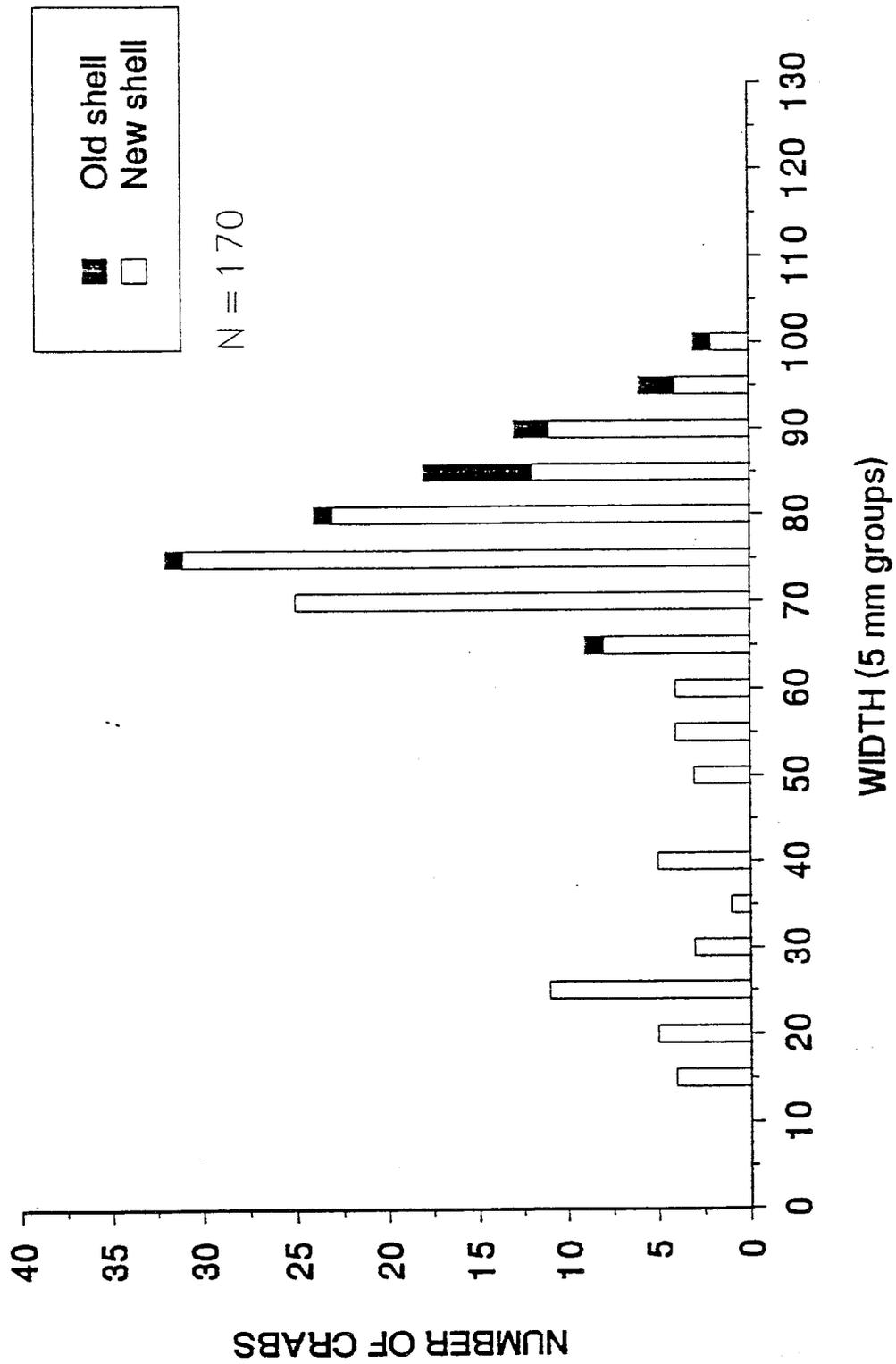


Figure 11. Female Tanner crab catch, Kamlishak Distr., 1992 Cook Inlet trawl survey.

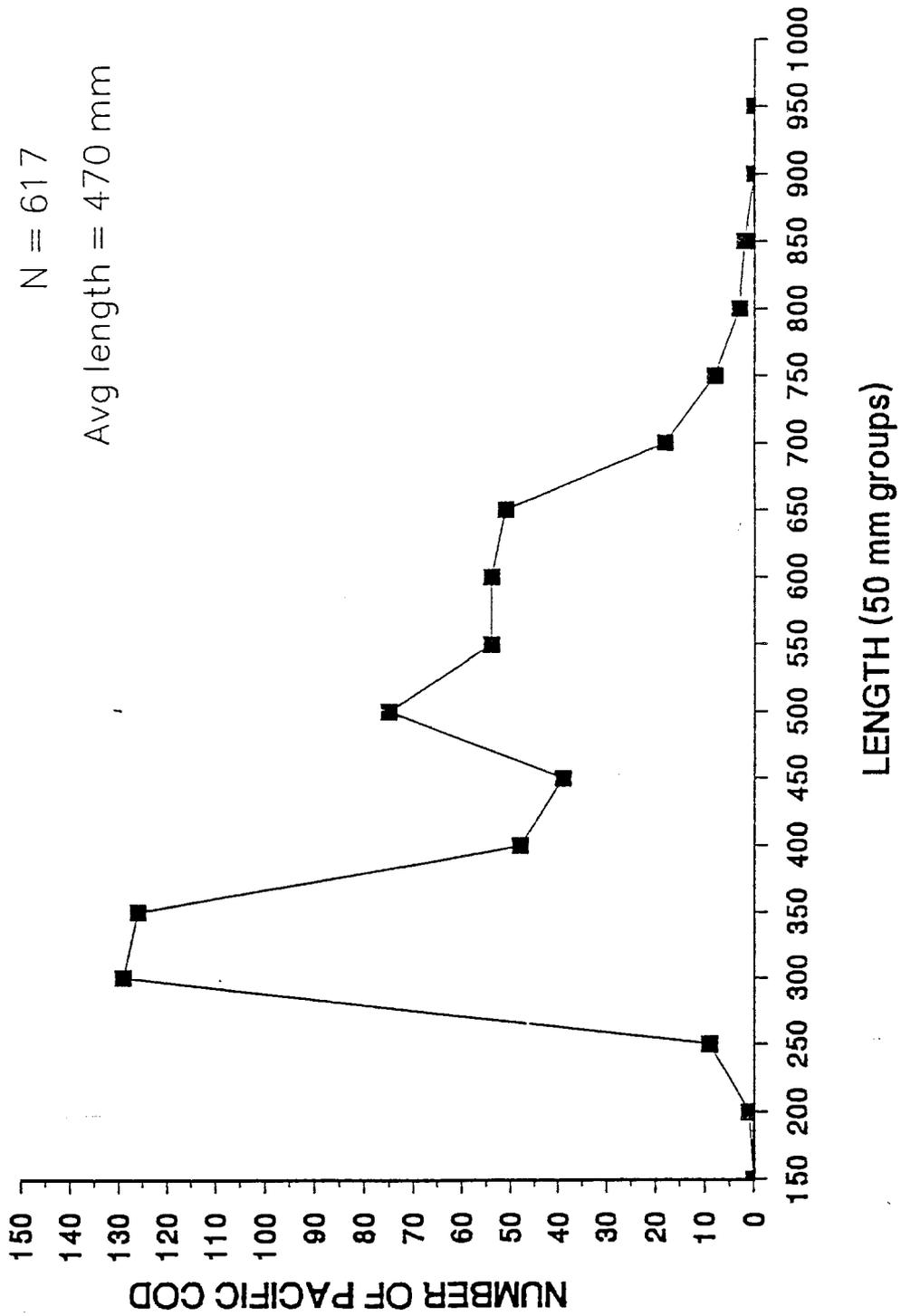


Figure 12. Pacific cod catch, Kamishak Distr., 1992 Cook Inlet trawl survey.

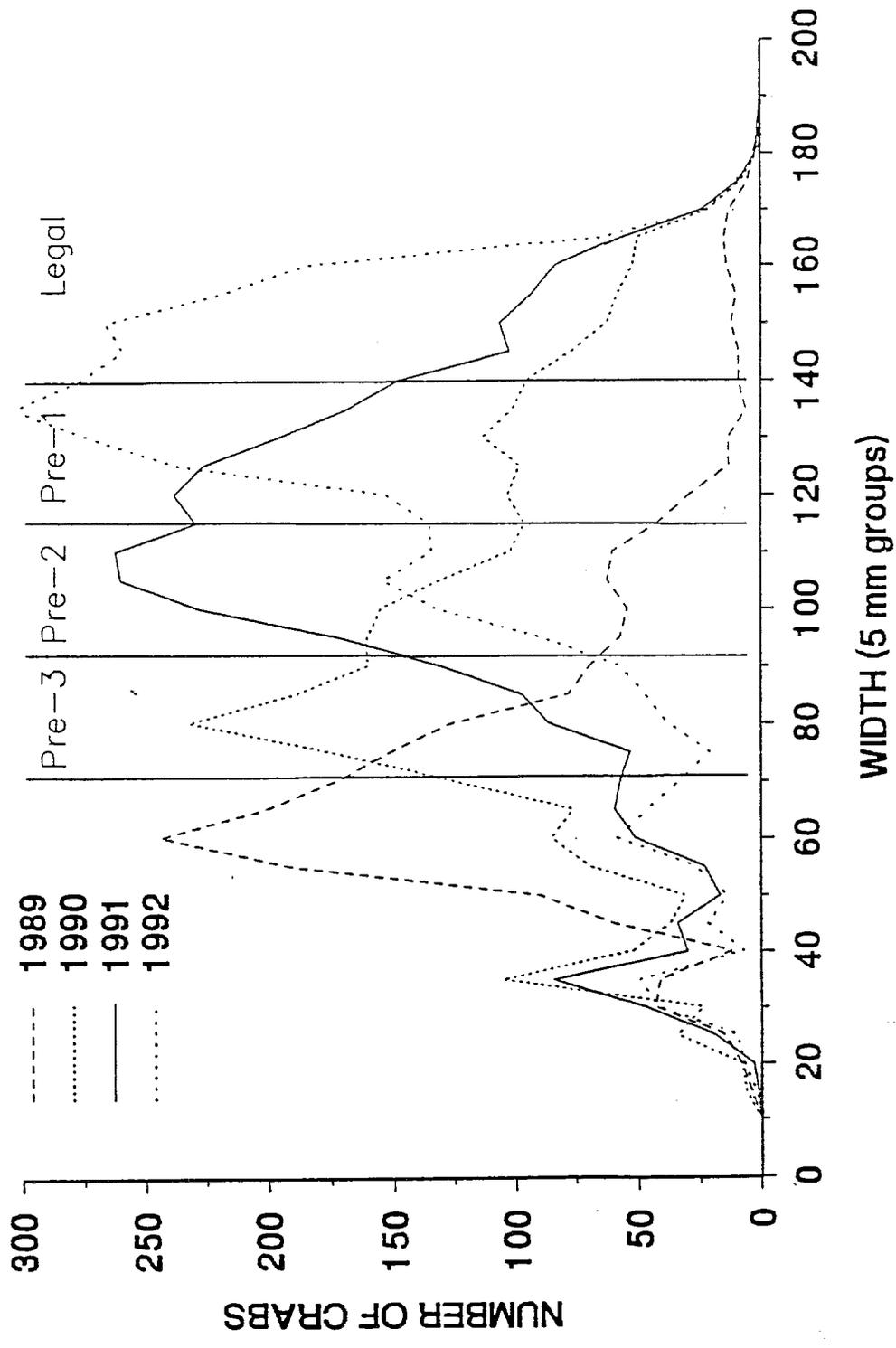


Figure 13. Male Tanner catch, 1989 - 1992, Southern Distr. trawl surveys.

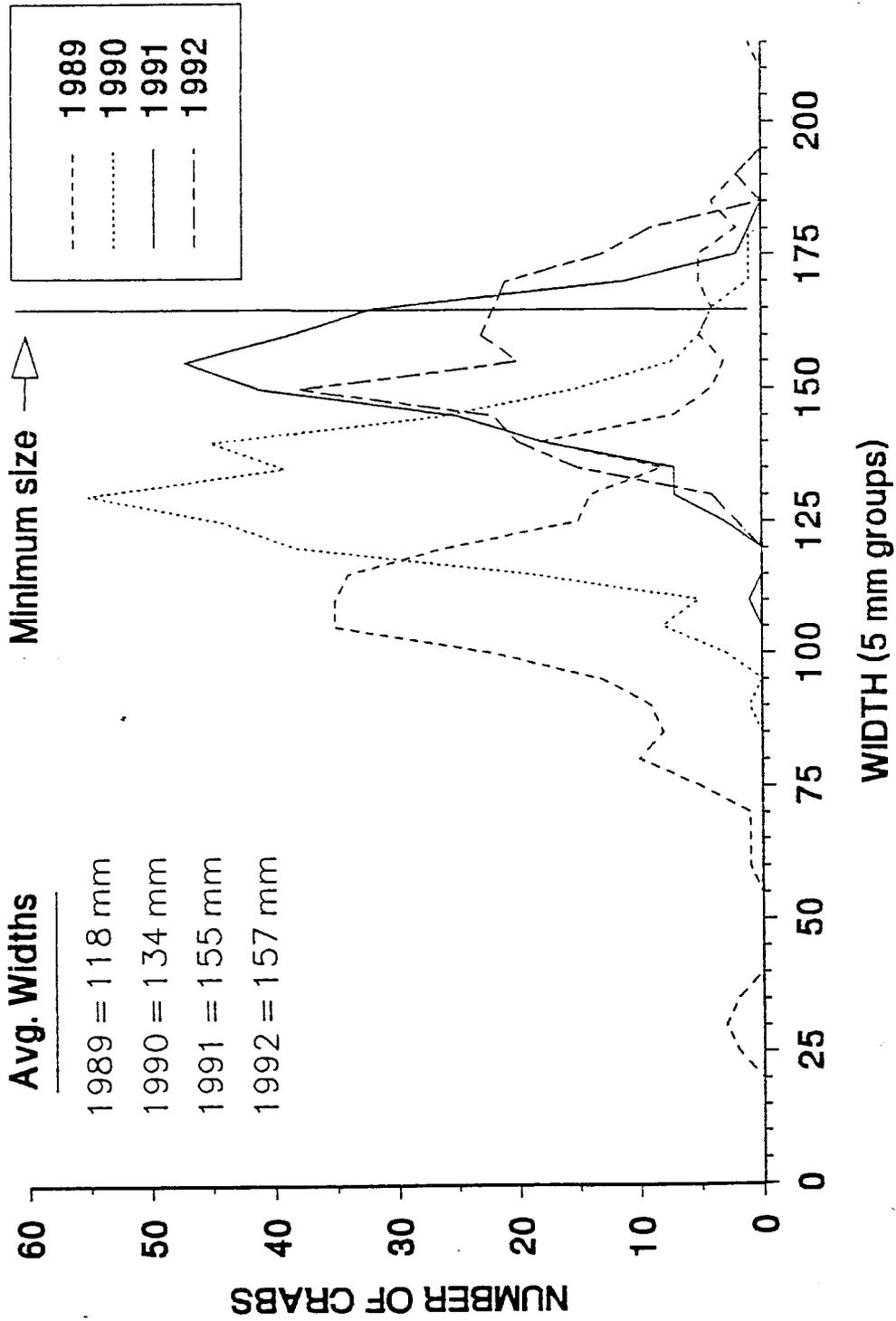


Figure 14. Male Dungeness catch, 1989 - 92, Southern Distr. trawl survey.

Appendix A. Fishing log and catch (lbs.) by station in the Southern District, 1992 Cook Inlet trawl survey.

Station	Area (sqnm)	Date	Latitude (start)	Longitude (start)	Heading (degrees)	Time (min)	Length (nm)	Depth (min)	Depth (max)	Catch (lbs)
1	7.15	07/14/92	59 43.05	151 06.83	200	27	1.00	37	40	1346
2	3.59	07/14/92	59 40.89	151 10.86	205	30	1.00	29	32	1422
3	5.52	07/15/92	59 38.39	151 14.45	160	28	1.00	32	35	1010
4	2.63	07/15/92	59 37.87	151 17.62	45	28	1.00	32	32	1500
5	4.2	07/14/92	59 38.41	151 18.60	220	27	0.95	17	21	1534
6	9.	07/15/92	59 37.18	151 17.83	200	29	1.00	40	40	2538
7	5.41	07/16/92	59 36.37	151 21.48	21	28	1.00	36	39	2982
8	3.57	07/16/92	59 33.35	151 30.28	50	26	1.00	68	88	3460
9	4.59	07/16/92	59 33.57	151 31.85	210	29	1.00	72	73	2340
10	8.52	07/17/92	59 32.93	151 37.18	35	29	1.00	46	48	1846
11	4.63	07/18/92	59 31.98	151 36.60	220	27	1.00	52	53	2112
12	6.25	07/17/92	59 33.28	151 40.94	295	30	1.00	43	47	1086
13	6.25	07/24/92	59 31.63	151 40.19	235	27	1.00	56	57	2096
14	3.97	07/18/92	59 33.86	151 45.71	218	28	1.00	40	42	4172
15	6.25	07/18/92	59 31.46	151 46.82	210	26	0.90	42	43	2241
17	8.94	07/24/92	59 33.24	151 50.84	215	27	1.00	26	28	3182
18	6.25	07/18/92	59 31.88	151 51.12	205	30	1.00	38	38	1596
20	6.25	07/24/92	59 32.76	151 59.01	40	30	1.00	20	23	2312

Number of stations: 18
 Total area (sqnm): 102.97
 Total catch (lbs): 38775

Appendix B. Fishing log and catch (lbs.) by station in the Kamishak District, 1992 Cook Inlet trawl survey.

Station	Area (sqnm)	Date	Latitude (start)	Longitude (start)	Heading (degrees)	Time (min)	Length (nm)	Depth (min)	Depth (max)	Catch (lbs)
27	26.12	06/21/92	59 31.55	153 12.81	300	30	1.00	14	16	696
28	26.12	06/21/92	59 30.78	153 03.34	300	30	1.00	19	20	972
29	26.12	06/21/92	59 32.36	152 57.28	130	28	1.00	21	22	378
31	26.12	06/21/92	59 28.29	153 24.11	205	30	1.00	14	14	404
32	26.12	06/22/92	59 26.81	153 14.81	110	29	1.00	19	20	552
33	26.12	06/21/92	59 27.49	153 07.87	10	30	1.00	21	22	574
34	26.12	06/20/92	59 27.29	152 55.53	15	28	1.00	26	26	496
36	24.89	06/22/92	59 22.23	153 15.15	280	31	1.00	24	25	356
37	26.12	06/22/92	59 21.81	153 04.57	280	31	1.00	25	26	1322
38	26.12	06/22/92	59 22.37	152 55.61	28	28	1.00	32	34	432
44	26.12	06/22/92	59 17.28	153 05.31	25	16	0.60	29	30	378
45	26.12	06/23/92	59 17.67	152 55.32	25	26	1.00	43	45	990
47	26.12	06/24/92	59 12.51	153 35.77	320	28	1.00	18	19	760
41 48	26.12	06/24/92	59 11.94	153 24.33	145	26	1.00	21	22	510
49	26.12	06/24/92	59 12.61	153 14.62	15	28	1.00	28	29	340
50	26.12	06/24/92	59 12.52	153 05.32	15	30	1.00	38	38	332
51	26.12	07/19/92	59 12.81	152 55.62	100	26	1.00	58	66	3830
52	26.12	06/23/92	59 13.97	152 44.50	270	26	1.00	60	62	1096
53	26.12	06/25/92	59 07.89	153 27.70	170	27	1.00	23	24	880
54	26.12	07/20/92	59 08.00	153 13.16	5	27	1.00	30	32	584
55	26.12	07/20/92	59 08.21	153 05.41	158	30	1.00	56	62	1522
56	26.12	07/19/92	59 07.31	152 55.38	95	28	1.00	77	78	3314
58	24.74	06/25/92	59 03.26	153 26.04	310	27	1.00	23	23	726
59	26.12	06/24/92	59 02.66	153 16.14	125	11	0.44	37	41	300
60	26.12	07/19/92	59 02.85	153 06.39	90	30	1.00	75	77	1804
61	26.12	07/19/92	59 02.97	152 56.09	90	29	1.00	81	83	2834
64	26.12	07/20/92	58 56.92	153 04.81	310	29	1.00	87	89	706
67	26.12	07/20/92	58 53.78	153 04.74	330	27	1.00	89	90	1204

Number of stations: 28
 Total area (sqnm): 728.75
 Total catch (lbs): 28292

Appendix C. Data logger temperature recordings from the 1992
Cook Inlet crab trawl survey.

Date	Station	Temp. (°C)	Depth (fm)
<u>KAMISHAK DISTRICT</u>			
7/19/92	61	6.7	82
7/20/92	67	6.3	90
7/21/92	53	9.3	24
<u>SOUTHERN DISTRICT</u>			
7/15/92	4	7.5	32
7/16/92	7	7.5	37
7/17/92	10	7.8	47
7/18/92	11	7.9	55

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