

1995
NORTON SOUND DISTRICT
SHELLFISH REPORT
to the
Alaska Board of Fisheries

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INTRODUCTION

Norton Sound

The Norton Sound section of the Northern district in Area Q is described in the shellfish regulations as all waters east of 168 degrees W. long., between the latitudes of Cape Romanzof and Cape Prince of Wales (Figure 1). The only shellfish fishery in Norton Sound is for red king crab (*Paralithodes camtschatica*). Blue king crab (*P. platypus*) and Tanner crab (*Chionoecetes opilio*) also occur within this section but are very seldom caught by commercial or subsistence fishermen. Red king crab have been utilized for subsistence purposes by local residents for many years, but the commercial fishery was not initiated until 19 years ago. In April 1977, the Alaska Board of Fisheries opened an "exploratory" commercial fishery in order to increase the knowledge and commercial utilization of Norton Sound king crab. Since 1976 there have been six National Marine Fisheries Service (NMFS) research trawl studies in Norton Sound. The most recent survey was conducted in 1991 (Table 3, Figures 3 & 4). In addition, the State of Alaska Department of Fish and Game (ADF&G) has conducted four research pot fishing studies. Data from population studies, from winter research studies, mining impact studies, and from 19 commercial fishing seasons has greatly increased the knowledge of the Norton Sound king crab. There are two seasons during which crab may be taken commercially: November 15 - May 15 and July 1 - September 3.

St. Lawrence Island

The St. Lawrence Island section lies immediately west and north of the Norton Sound Section. Until recently, the St. Lawrence Island section has been managed by Westward Region's Dutch Harbor office since the Bering Sea crab fleet bases there. The St. Lawrence Island Section; however, has been open to commercial fishing for the same amount of time as the Norton Sound section, until the 1995 season, the only reported commercial catches to date in this section were made in 1983 when 52,557 pounds of blue king crab were delivered from 13 landings, in 1989, when 3,603 pounds of red king crab and 984 pounds of blue king crab were delivered from 8 landings and in 1992 when 53 pounds of blue king crab were landed. The 1995 season was again focused on St. Lawrence Island with a relatively small harvest taken by a single vessel which was prospecting in hope of boundary changes in the future. In keeping with Department policy, these catches will remain confidential for three years.

In 1983, the commercial crab fleet concentrated near the southeast shore of St. Lawrence Island. The following year a regulation proposal to close the waters within 10 miles of all inhabited islands within the section was adopted in an attempt to protect stocks targeted by local fishermen and reduce impacts on subsistence marine mammal harvests during the winter. During the 1989 season, relatively few blue king crab were taken near rocks and shoals still open to commercial fishing, but red king crab were discovered in low densities near Kivalina, the northern boundary

of the section. The villagers of Little Diomed Island have also traded and sold winter caught blue king crab with residents of Nome and other villages for years. The Department has not been able to obtain an accurate record of the magnitude of this trade. The remoteness of this village is also a factor contributing to the lack of catch records. Current regulation allows the commercial harvest and sale of king crab near shore during the winter. The Board provided the same provisions in regulation for the St. Lawrence Island Section, which allow a commercial winter fishery, as are in effect for Norton Sound. However, local residents of St. Lawrence Island have decided not to export any of their winter catch for commercial sale.

COMMERCIAL FISHERY

Norton Sound Summer Commercial Fishery

A total of 48 catcher vessels took part in the 1995 summer commercial red king crab fishery in the Norton Sound Section. The total number of crab caught was 105,967 and the total number of pots pulled was 18,782. The CPUE was 5.6 crab/pot pull. Total harvest was 322,676 pounds of king crab. The harvest goal was 340,000 pounds or roughly 10% of the legal male population estimated by the 1991 National Marine Fisheries Service trawl survey. Average weight per crab was 3.1 pounds.

Regulations specific to Norton Sound Section are:

- 1) 5AAC 34.915, which directs the Department to manage the Norton Sound summer king crab fishery for a harvest of one-half the exploitation rate determined under 5AAC 34.080.
- 2) 5AAC 34.935, which established a closed area with a defined boundary approximating 15 miles from the beach in the Norton Sound section, to protect a long established winter subsistence fishery.
- 3) 5AAC 34.925 (i) and (j), requiring pot tags and limiting vessels of 125 feet in length or less to 40 pots each and larger vessels are limited to 50 pots.

This new regulation, 5AAC 34.925, along with a regulation making Norton Sound a superexclusive registration area was responsible for the change in character of the fishery during the 1994 and 1995 seasons. Apparently, many large vessel owners felt their vessel would not be able to compete economically under the new pot limit and exclusivity requirements. Only one Bering Sea crabber participated in the 1995 fishery.

The 1995 summer commercial red king crab fishery opened at 12 noon, July 1 in the Norton Sound Section. An emergency order relaxed the closure line northward to 64°20' north latitude and eastward to 161°15' west longitude effective 12:00 noon July 1. Regulation 5AAC 34.935 (CLOSED WATERS) also allows the Department the flexibility to reduce the closed waters area to allow an efficient harvest of red king crab during the summer fishery.

A pot survey completed June 26 through June 28 in the Nome area indicated the center of abundance of the red king crab stock was in the deep water from Cape Nome east, five to ten miles offshore. Therefore the closure line was moved northward and set along the outer edge of that concentration. A pre-season pot survey was initiated this year to survey the abundance of legal and sublegal king crab in the Eastern Norton Sound area. This cooperative survey, conducted by private industry and the Department, was also useful in determining where the closed water boundary would be placed.

Residents in eastern Norton Sound requested that commercial fishing be allowed in areas accessible to their villages. Another emergency order relaxed the closure line eastward to 166°30' west longitude, and no closer than three miles to mean high water effective 12:00 noon, July 15.

An interest was expressed by processors and fishermen to fish the northwestern portion of the Norton Sound Section. This portion of the section has never had a summer commercial fishing effort and there has been no survey of the area to assess the crab resource. The Department required all fishermen intending to fish in this area to complete a catch reporting log.

The fishery was extended two days by emergency order due to poor weather and closed 12 noon, September 5, 1995.

A total of 53 catcher vessels were registered for the summer commercial crab season. Forty-eight vessels actually made deliveries and 81 permittees made at least one delivery. There were two land based processors that took part in the fishery. Catch reporting logs were kept by buyers and by skippers of catcher vessels for each statistical area fished. Buyers verbal reports were relayed daily by 9:00 a.m. to the ADF&G office in Nome. Fish tickets were due in to the ADF&G office at the end of each week. Vessel reports from fishermen and Catcher/Seller fish tickets were required every Monday for the duration of the fishery. Compliance with reporting requirements was good. Daily catch statistics can be found in Table 1.

This was the second commercial summer crab season during which a significant portion of the harvest was processed in Nome. Three companies bought crab at Nome, but all three had their crab processed at the same processing plant in Nome. Approximately 98% percent of the harvest or 315,344 pounds were processed in Nome.

The total commercial catch was 105,967 crab. A total of 322,676 pounds were harvested. Thirty-three percent of the harvest was captured in statistical area 646401, 21% in area 646402, 14% in area 656402, 10% in area 656401, 7% in area 636401, 6% in area 656330 and 626401. The remaining 3% of the harvest was caught in areas 666431, 666330, 646330, 646301, 636402, and 616401. Total harvest for individual stat areas can be found in Table 2.

The overall CPUE for the 1995 fishery was 5.6 crab/pot pull. Statistical area 626401 had the greatest CPUE with 23.2 crab/pot pull (Table 2). The CPUE for area 646301 was 19.3 crab/pot pull, 17.8 crab/pot pull for area 636401, 17.5 crab/pot pull for area 636402, 11 crab/pot pull

for area 656330, 8.7 crab/pot pull for area 666431, and 5.3 crab/pot pull for area 666330. The CPUE in areas 646402, 646401, 646330, 656401, 656402, 616401 were all less than 5 crab/pot pull.

Fish ticket reports document that 13 statistical areas were fished (Table 2). A total of 18,782 pot lifts occurred during the fishery. Thirty-eight percent of all pot lifts occurred in statistical area 646401, 24% in area 646402, 17% in area 656402, 12% in area 656401, 3% in area 656330, 2% in area 636401 and 626401. Less than 2% of all pot pulls occurred in areas 666431, 666330, 646330, 646301, 636402, and 616401.

CPUE most graphically demonstrates the eastward shift in the Norton Sound king crab population. Fifteen percent of the harvest occurred just south of Golovin in statistical areas 626401, 636401, and 636402 (Table 2). This area accounted for less than 5% of all pot lifts and only four vessels fished here. The CPUE in the waters offshore of Golovin were over four times greater than the average. Fishing in this area occurred only near the end of the season. Therefore a larger percent of the harvest may have occurred here if fishermen had moved to the area sooner.

Based on fish ticket data, statistical area 626401 had the greatest CPUE of 23.2 crab/pot pull (Table 2). Overall CPUE for the 1995 season was 5.6 crab/pot pull. Appendix Tables 2 and 3 equate previous commercial crab harvest, effort, CPUE and value to the 1995 season. During the 1995 fishery, there were approximately 1,900 pots on the fishing grounds. Therefore, the CPUE in years with a similar number of pots deployed on the grounds are compared to the overall CPUE in 1995: 9.3 crab/pot pull in 1994; 4.3 crab/pot pull in 1992; 19 crab/pot pull in 1990; 10 crab/pot pull in 1987; 11 crab/pot pull in 1985; and 14 crab/pot pull in 1984 (Tables 4 and 5).

There was no floating crab processors or catcher processors operating in Norton Sound during the 1995 summer fishery, therefore no independent observer was placed on board commercial vessels. One ADF&G employee was stationed in Nome to monitor the fishery, act as onboard observer/sampler on catcher vessels and sample legal crab on vessels that delivered to buyers in Nome. This was the only means of collecting essential biological data from the sublegal portion of the population. The observer also provided a means to enforce size and sex restriction regulations that protect the resource. Catcher vessels are not required to have observers onboard, but may choose to allow an ADF&G observer onboard to collect data.

The ADF&G observer was able to monitor pot lifts on three different occasions in 2 statistical areas. Legal male crab made up 72% of the observed catch in area 656402, and 55% of the observed catch in area 646402 (Table 6).

Pre-season Pot Survey

On June 26, pots were set on in a series of 15 transects evenly spaced between the longitudes of 166°13' and 164°28'. Pots were set in these transects beginning at the 64°10' latitude line and continued north. Pots were dropped at an interval of approximately one nautical mile. An ADF&G observer was placed on board each vessel participating in the pre-season pot survey on June 28. All the nine vessels which participated in the survey did so without compensation. Species, sex, biological length, legal size, shell age, and ovigerity of all king crab in each pot pulled was recorded. One hundred crab were kept for research and the remainder of the catch was returned to the sea.

There were a total of 1185 legal red king crab, 722 sublegal male red king crab, and 24 female red king crab captured in all pot pulls during the pre-season survey. The length frequency distribution of all male crab captured was: 38% prerecruit crab, 20% recruit crab, and 42% postrecruit. Only 2 female blue king crab were captured in all pots pulled. Figures 5 and 6 show recruit, prerecruit and postrecruit crab from the 1995 winter crab project (Brennan and LaFlame, 1995) and the summer pot survey. The length frequency distribution of crab captured in both studies are comparable.

Legal male crab with new shell carapace made up 86% of the legal crab sampled, and old shell crab made up 14%. Recruit king crab made up 32% of the sample. The mean carapace length for all legal male crab sampled was 120.1 mm. The greatest concentrations of legal crab were found between the longitudes of 165°03' and 164°28', the eastern portion of the sampling area. Ninety-seven percent of the sublegal male crab measured had a new shell carapace.

Commercial Catch Sampling

Carapace length measurement and age were collected from 1,174 legal male red king crab throughout the duration of the 1995 summer fishery. Carapace age was classified as new (roughly 11 months old) or old (roughly 23 months or older). Male crab with new shell carapaces made up 79% of the total legal male king crab sampled, while old shell crab made up 21% of the sample. Recruit crab made up 36% of all legal male crab sampled. Post recruit crab made up 64% of the legal crab sampled. The overall observed catch of legal crab was 2.5 crab/pot pull.

Carapace length measurements and shell ages were collected from 117 sublegal male red king crab. Data was collected from two statistical areas. New shell crab made up 97% of the sublegal crab sampled and old shell crab made up 3% (Table 4). The overall observed catch of sublegal male crab was 1.2 crab/pot pull.

Carapace length measurement and percent ovigerity was collected from a total of 42 female red king crab during the commercial fishery. Mature female king crab made up 98% of all females sampled. One immature female crab was sampled during the fishery. Ninety percent of the

mature female crab sampled were considered to have a high degree of ovigerity (> 60% full clutch).

Enforcement

The good weather allowed boarding for tank inspections and registrations of all vessels. The Fish and Wildlife Protection officer was able to patrol using a chartered vessel three times throughout the fishery. Fishermen and buyers were cited for violations including possession of undersize crab (3), fishing in closed waters (5), improperly marked gear (3), and failure to report (2).

Norton Sound Winter Commercial Fishery

Regulation allows a winter through-the ice commercial fishery, which typically takes place near Nome in the Norton Sound Section from November 15 through May 15. During the winter of 1993-1994, 25 commercial fishermen reported selling a total of 5,649 red king crab (Table 7). The villages east of Nome reported harvests of crab for the third year in a row. Although ice conditions were unfavorable in the Unalakleet and Shaktoolik area, Elim reported four percent of the harvest and a small harvest was reported from the vicinity of St. Michael. The harvest is split between local residents who buy crab directly from the fishermen and Anchorage or non local markets. Crab sell in Nome for six dollars a piece and Anchorage prices are around \$3.50 per pound, resulting in an average price of \$3.01 per pound. The 1993-1994 winter catch of 17,214 pounds was estimated to be worth about 51,814 dollars.

The winter crab fishermen generally use crab pots but some use handlines to "prospect". Most fishermen consider commercial crabbing to be a sideline and hold other jobs. Usually, two or three fishermen sell the bulk of the crab. Because of the low volume of crab involved, no processor has found it profitable to operate locally. The crab sold locally are all sold fresh as are those shipped to Anchorage or other non local markets. During the mid-winter months fishermen find it difficult keeping the crab from freezing. Many Nome residents prefer to buy frozen crab since they are able to extract the meat prior to cooking. Fresh frozen crab are easily marketed in Nome but are not accepted in Anchorage.

SUBSISTENCE FISHERY

Red king crab are utilized by Norton Sound residents mainly during the winter. Fishing occurs through holes or cracks in the ice with the use of handlines and pots. In order to document trends in the subsistence harvest, the Board of Fisheries enacted a regulation in 1977 requiring subsistence fishermen in Norton Sound to obtain a permit prior to fishing and record daily effort and catches on these permits (Table 7).

The first year subsistence permits were required had the highest number of permits issued to date with a relatively high harvest rate. The fishery declined sharply the following year and remained at very depressed levels through the 1981-82 season. The lack of success in the winter crab fishery during some past years has been attributed to a declining crab population caused by removal of crab in the summer commercial fishery together with low recruitment, low effort due to poor ice conditions, and changes in the nearshore winter distribution of crab. All of these factors probably had some effect on the success of the winter fishery in varying degrees. During the 1978-79 winter fishery, the king crab population was still relatively high. Despite this relatively large population, winter catches were the poorest on record indicating that the major factors limiting winter catches during 1978-79 were probably poor ice conditions and the distribution of crab. During the winter of 1981-82, poor winter catches could more reasonably be attributed to a declining crab population since the crab population was at its lowest documented level. Subsistence fishing success during the winters of 1982-83 through 1986-87 had improved due to a rebuilding of the population and increased use of more efficient gear (pots instead of handlines). Unstable ice conditions and record snowfalls adversely effected the 1987-88, 1988-89, and 1992-93 catches. During years of stable ice conditions, approximately 100 fishermen have harvested an average of 100 crab each (Table 7).

The winter crab fishery can be limited by extreme weather conditions. Shorefast ice can become unstable where crab pots may be carried away or fishermen are unable to cross open leads to get to their pots. Low air temperatures, wind and drifting snow are the primary factors that determine effort levels rather than crab densities.

STOCK STATUS / RESEARCH

In 1976 when monitoring of the Norton Sound king crab population first began, the population was mainly composed of prerecruit and recruit crab (Figure 3). This first population assessment survey by the NMFS estimated the legal male king crab population at 8.1 million pounds. The legal male crab population peaked in 1978 at an estimated 11 million pounds. During the 4 years following 1978, recruitment into the legal male crab population was very low. Subsequent NMFS surveys in 1979 and 1982 documented a population of predominantly postrecruit crab, and estimated the population had declined to 2.6 million pounds by 1982. The Department of Fish and Game conducted their first population assessment survey in 1980, with subsequent surveys in 1981 and 1982 (Table 3). These survey assessments documented a similar decline from 6.6 million pounds (1980) to 1.3 million pounds (1982). Beginning in 1981, sublegal crab abundance began to increase, and by 1983 recruitment into the legal male population also began to increase. No assessment work was conducted in 1983 or 1984. However, samples of the commercial catches indicated a significant increase of recruit crab into the legal male population; from a historic low of 10% in 1981 to 59% in 1984 (Table 4).

In 1985 both NMFS and ADF&G conducted population assessment surveys in Norton Sound (Table 3, Figure 5). The Department fished 65 stations throughout Norton Sound capturing

4,645 legal males, of which one-third was tagged. Subsequent recapture of tagged crab by the commercial fleet in August of 1985 provided tag to untagged ratios, which was used to estimate the population size prior to the fishery. The population was estimated at 2.4 million pounds (Table 3). After the commercial fishery in 1985 NMFS conducted a population assessment survey using trawl gear over a slightly larger area than that surveyed by the Department. Catches of male king crab by NMFS were in the process of or had just molted with the result being that their estimate of 3.4 million pounds of legal male king crab included some recruitment. Adjusting this estimate for molting, and including the summer commercial harvest, the estimate became 3 million pounds present prior to the 1985 August fishery. Both surveys documented relatively substantial numbers of recruit crab and a healthy percentage of prerecruit crab.

During September of 1988, NMFS conducted a fourth population assessment with trawl gear. They swept an area roughly the same size as in 1985, but increased sampling frequency in the proposed mineral lease area near Nome. The timing of the study was almost a month earlier than similar surveys in the past, which occurred during the male molt. Nearly all the 1988 catch was in pre-molt condition. NMFS estimated 3.0 million pounds of legal male and 1.0 million pounds of prerecruit-one male red king crab; totaling 4.0 million pounds. Annual mortality is approximately 20% or in this case 0.8 million pounds. Ignoring growth and the winter harvests, the population prior to the 1989 summer fishery would have been 3.2 million pounds, very close to the 1985 trawl estimate of 3.4 million pounds.

NMFS conducted a fifth trawl survey of Norton Sound during late August 1991 with a reduced number of tows. Each station had only a single sampling tow as compared to each station having both a day and night tow during previous surveys. This reduction in sampling has the affect of introducing more variability into the estimate. The legal crab biomass in the summer fishing area was estimated to be 3,400,000 pounds and the total Norton Sound legal biomass was estimated to be 4,009,000 pounds. Since the survey occurred prior to the molt, a mortality of 10% was assumed for the year following the estimate. With no summer or winter fishery data to compare with the survey results, a conservative biomass of 3,400,000 pounds was used as the basis for the 1994 harvest guideline. A stable Norton Sound red king crab population was thought to be maintained with harvest rates near 10%.

In-season sampling during the 1994 summer commercial fishery found the lowest rate of recruitment of legal males in that fishery since 1983 when this type of data collection began. The incidence of skipped molts was twice that of the long term average. Although no changes in the female indices were noted, that data base was less extensive. It appeared that recruitment did not keep pace with harvest and natural mortality during the 1993-94 season. The Norton Sound population has been considered to be depressed and rebuilding since 1983. The department's goal is the rebuilding trend should be sustained. The poor recruitment discovered during the 1994 season precipitated the pot survey the following winter and the 1995 preseason survey. Both studies found strong recruitment during the fall of 1994.

A small pot survey was conducted in the vicinity of King Island from June 21 to June 24. The survey was intended to document the variety of crab present in the closed waters surrounding this remote island. There was very little crab population data on this area. The study was undertaken to gather information for the proposed regulation change that is presently before the Board. Several fishermen offered to transport an observer, drop and run two strings of 20 pots after soaking them a day. Two vessels were chosen to assist with the data collection, fishing proceeded with the understanding all crab would be returned to the sea. All the king crab that were captured in the survey were blue king crab and the center of abundance seemed to be four miles east of the island. There were very few crab caught west of the Island and the study indicates crab are present in open waters within the Norton Sound Section.

FUTURE INVESTIGATIONS

Norton Sound has been included in the budget increment passed by the legislature. Both funding for a sustained winter program and an triennial trawl survey to evaluate Norton Sound crab populations are part of that proposal. A winter pot survey is planned for the late winter months of 1996 and a trawl survey to generate a population estimate is planned for August of 1996.

Once again it may be possible to conduct pre-season pot surveys of the likely commercial fishing area or the waters east of King Island. These surveys could be used to verify the presence and relative abundance of crab, direct fishing away from sublegal portions of the population and to anticipate fishing patterns.

OUTLOOK FOR 1996

The outlook for 1996 is one of status quo. The low level of recruitment found from the samples collected during the 1994 summer season is always a possibility, but the Norton Sound king crab stock has not seen recruitment failures lasting multiple years. The population is thought to gradually increasing in number and so the current exploitation rate will be maintained. The guideline harvest for the 1996 summer season will be 340,000 pounds.

LITERATURE CITED

Brennan, E.L. and T.LaFlame. 1995. Norton Sound winter king crab studies 1995. Alaska Department of Fish and Game, Commercial Fisheries, Management and Development Division. Nome, Alaska. In press.

Table 1. Daily catch (using fish ticket data) for the commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, July 1 - September 5, 1995.

Date	Permits	Landings	Number of Crab	Lbs of Crab Harvested	Cumulative Total (lbs)	No. of Pots Pulled	Average Weight	CPUE
1-Jul	0	0	0	0	0	0	0	0
2-Jul	2	2	93	266	266	20	2.86	4.7
3-Jul	12	14	1,258	3,622	3,888	451	2.88	2.8
4-Jul	23	26	3,429	10,031	13,919	717	2.93	4.8
5-Jul	20	21	2,262	6,674	20,593	590	2.95	3.8
6-Jul	23	24	2,565	7,808	28,401	688	3.04	3.7
7-Jul	13	14	1,323	3,813	32,214	403	2.88	3.3
8-Jul	4	5	612	1,920	34,134	146	3.14	4.2
9-Jul	20	24	3,810	11,677	45,811	719	3.06	5.3
10-Jul	14	14	1,859	5,635	51,446	359	3.03	5.2
11-Jul	12	15	2,434	7,166	58,612	403	2.94	6.0
12-Jul	19	21	3,347	10,143	68,755	630	3.03	5.3
13-Jul	20	21	3,840	11,862	80,617	676	3.09	5.7
14-Jul	25	27	4,354	13,185	93,802	791	3.03	5.5
15-Jul	12	12	2,149	6,639	100,441	369	3.09	5.8
16-Jul	8	10	1,901	5,657	106,098	271	2.98	7.0
17-Jul	34	37	7,585	21,943	128,041	1,159	2.89	6.5
18-Jul	8	8	1,161	3,511	131,552	236	3.02	4.9
19-Jul	6	6	613	1,831	133,383	132	2.99	4.6
20-Jul	27	28	5,242	17,334	150,717	965	3.31	5.4
21-Jul	13	13	1,773	5,509	156,226	420	3.11	4.2
22-Jul	9	12	1,015	2,964	159,190	260	2.92	3.9
23-Jul	5	6	420	1,188	160,378	135	2.83	3.1
24-Jul	19	21	3,484	10,552	170,930	518	3.03	6.7
25-Jul	8	8	704	2,203	173,133	237	3.13	3.0
26-Jul	20	21	2,001	5,889	179,022	587	2.94	3.4
27-Jul	10	12	775	2,351	181,373	217	3.03	3.6
28-Jul	18	20	2,356	7,210	188,583	637	3.06	3.7
29-Jul	15	15	1,418	4,414	192,997	499	3.11	2.8
30-Jul	8	8	1,349	4,272	197,269	161	3.17	8.4
31-Jul	17	17	2,212	6,793	204,062	582	3.07	3.8
1-Aug	10	10	2,260	6,799	210,861	289	3.01	7.8
2-Aug	6	6	758	2,444	213,305	106	3.22	7.2
3-Aug	8	8	1,195	3,660	216,965	260	3.06	4.6
4-Aug	4	4	2,588	7,897	224,862	160	3.05	16.2
5-Aug	3	3	401	1,290	226,152	104	3.22	3.9
6-Aug	5	6	402	1,183	227,335	141	2.94	2.9
7-Aug	6	6	2,783	8,284	235,619	243	2.98	11.5
8-Aug	10	13	1,158	3,646	239,265	444	3.15	2.6
9-Aug	8	8	1,674	5,322	244,587	292	3.18	5.7
10-Aug	5	6	662	2,003	246,590	125	3.03	5.3
11-Aug	3	4	1,006	3,277	249,867	90	3.26	11.2
12-Aug	3	3	228	713	250,580	40	3.13	5.7
13-Aug	2	2	86	258	250,838	57	3.00	1.5
14-Aug	9	12	1,632	5,207	256,045	248	3.19	6.6
15-Aug	3	5	600	1,869	257,914	90	3.12	6.7
16-Aug	9	11	2,112	6,697	264,611	268	3.17	7.9
17-Aug	5	5	1,067	3,645	268,256	179	3.42	6.0
18-Aug	1	1	30	90	268,346	20	3.00	1.5
19-Aug	3	3	818	2,456	270,802	98	3.00	8.3
20-Aug	6	7	1,923	6,204	277,006	171	3.23	11.2
21-Aug	4	4	328	996	278,002	73	3.04	4.5
22-Aug	4	5	982	3,064	281,066	120	3.12	8.2
23-Aug	9	11	2,218	6,464	287,530	232	2.91	9.6
24-Aug	5	6	1,952	6,349	293,879	122	3.25	16.0
25-Aug	2	2	135	385	294,264	57	2.85	2.4
26-Aug	4	4	349	1,118	295,382	118	3.20	3.0
27-Aug	3	3	2,070	5,826	301,208	81	2.81	25.6
28-Aug	5	6	775	2,389	303,597	126	3.08	6.2
29-Aug	3	3	2,144	5,922	309,519	64	2.76	33.5
30-Aug	2	2	181	628	310,147	49	3.47	3.7
31-Aug	0	0	0	0	310,147	0		
1-Sep	3	3	435	1,435	311,582	83	3.30	5.2
2-Sep	2	2	578	1,950	313,532	63	3.37	9.2
3-Sep	1	1	94	315	313,847	5	3.35	18.8
4-Sep	4	4	682	2,072	315,919	91	3.04	7.5
5-Sep	3	4	2,317	6,757	322,676	95	2.92	24.4
Totals:	81	665	105,967	322,676		18,782	3.05	5.6

Table 2. Red king crab summer commercial catch total (from fish ticket reports) by statistical area for Norton Sound Section, Eastern Bering Sea, July 1 - September 5, 1995.

Statistical Area	Number	Pounds	Pots Pulled	CPUE	Average Weight (Lbs.)	Percent of Pots Pulled in Stat. Area (%)	Percent Harvest in Stat. Area (%)
616401	11	35	43	0.3	3.18	0.2	0.0
626401	6,593	18,971	284	23.2	2.88	1.5	5.9
636401	8,060	24,329	454	17.8	3.02	2.4	7.5
636402	995	3,466	57	17.5	3.48	0.3	1.1
646301	1,542	4,628	80	19.3	3.00	0.4	1.4
646330	441	1,493	100	4.4	3.39	0.5	0.5
646401	34,798	105,045	7,164	4.9	3.02	38.1	32.6
646402	22,157	66,821	4,562	4.9	3.02	24.3	20.7
656330	6,012	19,745	545	11.0	3.28	2.9	6.1
656401	10,312	32,289	2,294	4.5	3.13	12.2	10.0
¹² 656402	14,488	44,000	3,119	4.6	3.04	16.6	13.6
666330	210	730	40	5.3	3.48	0.2	0.2
666431	348	1,124	40	8.7	3.23	0.2	0.3
Total:	105,967	322,676	18,782	5.6	3.05		

Table 3. Results of the population assessment surveys conducted for red king crab in Norton Sound since 1976.

Year	Date	Research Agency	Vessel	Gear Effort	Number of Red King Crab Captured ^a			Population Estimates of Legal Male Crab ^c	
					Sublegal Males	Legal ^b Males	Females	Numbers	Pounds
1976	9/02 - 9/05	NMFS	Miller-Freeman	Trawl	768	555	180	3,119,800	8,111,480
1979	9/16 -10/07	NMFS	Miller-Freeman	158 tows	46	194	40	837,241	2,511,723
	7/26 - 8/05			Trawl					
1980	7/04 - 7/14	ADF&G	Altair	Pots	443	3,290	158	1,900,000	6,600,000 ^d
				397 lifts					
1981	6/28 - 7/14	ADF&G	Altair	Pots	4,097	3,415	1,933	1,285,195	4,755,221
				718 lifts					
1982	7/06 - 7/20	ADF&G	Aleutian #1	Pots	5,019	2,001	424	353,273	1,271,783
1982	9/05 - 9/11	NMFS	Miller-Freeman	Trawl	322	107	265	970,646	2,620,744
				50 tows					
1985	7/01 - 7/14	ADF&G	Arctic Sea	Pots	6,086	4,645	181	907,579	2,414,644
				642 lifts					
1985	9/16 -10/01	NMFS	Argosy	Trawl	266	163	151	1,203,000	3,369,000
				78 tows					
1988	8/16 - 8/30	NMFS	Miller-Freeman	Trawl	258	141	218	1,037,000	3,038,000
				82 tows					
1991	8/22 - 8/30	NMFS	Ocean Hope	Trawl	202	178	105	1,384,000	4,009,000
				53 tows					

^a Number of crab captured on ADF&G surveys represent data standardized for a 24 hour soak.

^b Legal male red king crab were defined as at least 106mm in carapace length for the 1976 NMFS survey; 105mm for the 1979 and 1985 NMFS survey; and at least 121mm in carapace width for all ADF&G surveys.

^c Population est. are valid for the date of the survey, ie either before or after the summer commercial fishery.

^d The 1980 estimate has been revised from the original estimate of 13.4 million pounds. The original estimate was thought inaccurate due to under-reporting of recovered tagged crab.

Table 4. Historic summer commercial red king crab harvest, Norton Sound Section, Bering Sea, 1977 - 1995.

Year	Number of Vessels	Number of Permits	Number of Landings	Number of Crab	Harvest (lbs) ^{a,b}	Number of Pot Lifts	CPUE	Percent Old Shell	Average Weight (lbs)	Avg. Legal Mean Length (mm)
1977	7	7	13	195,877	0.52	5,457	36	d	2.7	113.4
1978	8	8	54	660,829	2.09	10,817	64	d	3.0	118.9
1979	34	34	76	970,962	2.93	34,773	28	d	3.0	119.8
1980	9	9	50	329,778	1.19	11,199	29	d	3.6	125.8
1981	36	36	108	376,313	1.38	33,745	11	d	3.7	128.5
1982	11	11	33	63,949	0.23	11,230	6	d	3.6	125.4
1983	23	23	26	132,205	0.37	11,195	12	d	2.8	115.2
1984	8	8	21	139,759	0.39	9,706	14	d	2.8	112.5
1985	6	6	72	146,669	0.43	13,209	11	d	2.9	115.8
1986	3	3	^d	162,438	0.48	4,284	38	d	2.9	115.9
1987	9	9	^d	103,338	0.33	10,258	10	13	3.2	121.7
1988	2	2	^d	76,148	0.24	2,350	32	26	3.1	119.0
1989	10	10	^d	79,116	0.25	5,149	15	29	3.1	119.8
1990	4	4	^d	59,132	0.19	3,172	19	17	3.1	121.1
1991 ^c										
1992	27	27	^d	24,902	0.07	5,746	4	29	3.0	119.7
1993	14	20	208	115,913	0.33	7,063	16	10	2.9	119.1
1994	34	52	407	108,824	0.32	11,729	9	71	3.0	118.8
1995	48	81	665	105,967	0.32	18,782	5.6	21	3.0	118.2

^a Deadloss included in total.

^b Millions of pounds.

^c No summer commercial fishery.

^d Information not available.

Table 5. Historic Norton Sound summer commercial red king economic performance, 1977 - 1995.

Year	Guideline	Legal Male	Commercial	Number of			Number of Pots		Exvessel	Fishery Value	Season Length	
	Harvest Level (lbs) ^b	Pop. Est.(lbs) ^b	Harvest (lbs) ^{a,b}	Vessels	Permits	Landings	Registered	Pulls	Price/lb	(millions \$)	Days	Dates
1977	^d	10.0	0.52	7	7	13	^d	5,457	0.75	0.229	60	^d
1978	3.00	11.0	2.09	8	8	54	^d	10,817	0.95	1.897	60	6/7-8/15
1979	3.00	5.4	2.93	34	34	76	^d	34,773	0.75	1.878	16	7/15-7/31
1980	1.00	6.6	1.19	9	9	50	^d	11,199	0.75	0.890	16	7/15-7/31
1981	2.50	4.7	1.38	36	36	108	^d	33,745	0.85	1.172	38	7/15-8/22
1982	0.50	1.3	0.23	11	11	33	^d	11,230	2.00	0.405	23	8/9-9/1
1983	0.30	2.1	0.37	23	23	26	3,583	11,195	1.50	0.537	3.8	8/1-8/5
1984	0.40	2.7	0.39	8	8	21	1,245	9,706	1.02	0.395	13.6	8/1-8/15
1985	0.45	2.4	0.43	6	6	72	1,116	13,209	1.00	0.427	21.7	8/1-8/23
1986	0.42	2.8	0.48	3	3	^d	578	4,284	1.25	0.600	13	8/1-8/25 ^e
1987	0.40	2.2	0.33	9	9	^d	1,430	10,258	1.50	0.491	11	8/1-8/12
1988	0.20	3.2	0.24	2	2	^d	360	2,350	^d	^d	9.9	8/1-8/11
1989	0.20	3.2	0.25	10	10	^d	2,555	5,149	3.00	0.739	3	8/1-8/4
1990	0.20	3.2	0.19	4	4	^d	1,388	3,172	^d	^d	4	8/1-8/5
1991 ^c	0.34	3.4										
1992	0.34	3.4	0.07	27	27	^d	2,635	5,746	1.75	0.130	2	8/1-8/3
1993	0.34	3.4	0.33	14	20	208	560	7,063	1.28	0.430	52	7/1-8/28 ^f
1994	0.34	3.4	0.32	34	52	407	1,360	11,729	2.02	0.646	31	7/1-7/31
1995	0.34	3.4	0.32	48	81	665	1,900	18,782	2.87	0.926	67	7/1-9/5

^a Deadloss included in total.

^b Millions of pounds.

^c No summer commercial fishery.

^d Information not available.

^e Fishing actually began 8/12.

^f Fishing actually began 7/8.

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Table 7. Winter commercial and subsistence red king crab harvests, Norton Sound 1978-1995.

Commercial			Subsistence						
Year ^a	Fishermen	# Crab Harvested	Winter ^b	Permits Issued	Permits Returned	Permits Fished	Total Crab Caught ^c	Total Crab Harvested ^d	Average Harvest/fm
1978	37	9,625	1977-78	290	206	149	^e	12,506	84
1979	1	221	1978-79	48	43	38	^e	224	6
1980	1	22	1979-80	22	14	9	^e	213	24
1981	0	0	1980-81	51	39	23	^e	360	16
1982	1	17	1981-82	101	76	54	^e	1,288	24
1983	5	549	1982-83	172	106	85	^e	10,432	123
1984	8	856	1983-84	222	183	143	15,923	11,220	78
1985	9	1,168	1984-85	203	166	132	10,757	8,377	63
1986	5	2,168	1985-86	136	133	107	10,751	7,052	66
1987	7	1,040	1986-87	138	134	98	7,406	5,772	59
1988	10	425	1987-88	71	58	40	3,573	2,724	68
1989	5	403	1988-89	139	115	94	7,945	6,126	65
1990	13	3,626	1989-90	136	118	107	16,635	12,152	114
1991	11	3,800	1990-91	119	104	79	9,295	7,366	93
1992	13	7,478	1991-92	158	105	105	15,051	11,736	112
1993	8	1,788	1992-93	88	79	37	1,193	1,097	30
1994	25	5,753	1993-94	118	95	71	4,894	4,113	58
1995	42	7,538	1994-95	167	57	57	5,918	4,059	71

^a Prior to 1985 the winter commercial fishery occurred from January 1 - April 30; As of March 1985, the winter commercial harvest may occur from November 15 - May 15.

^b The winter subsistence fishery occurs during months of two calendar years (as early as December, through May).

^c The Number of crab actually caught; some may have been returned.

^d The number of crab harvested is the number of crab caught and kept.

^e Data unavailable.

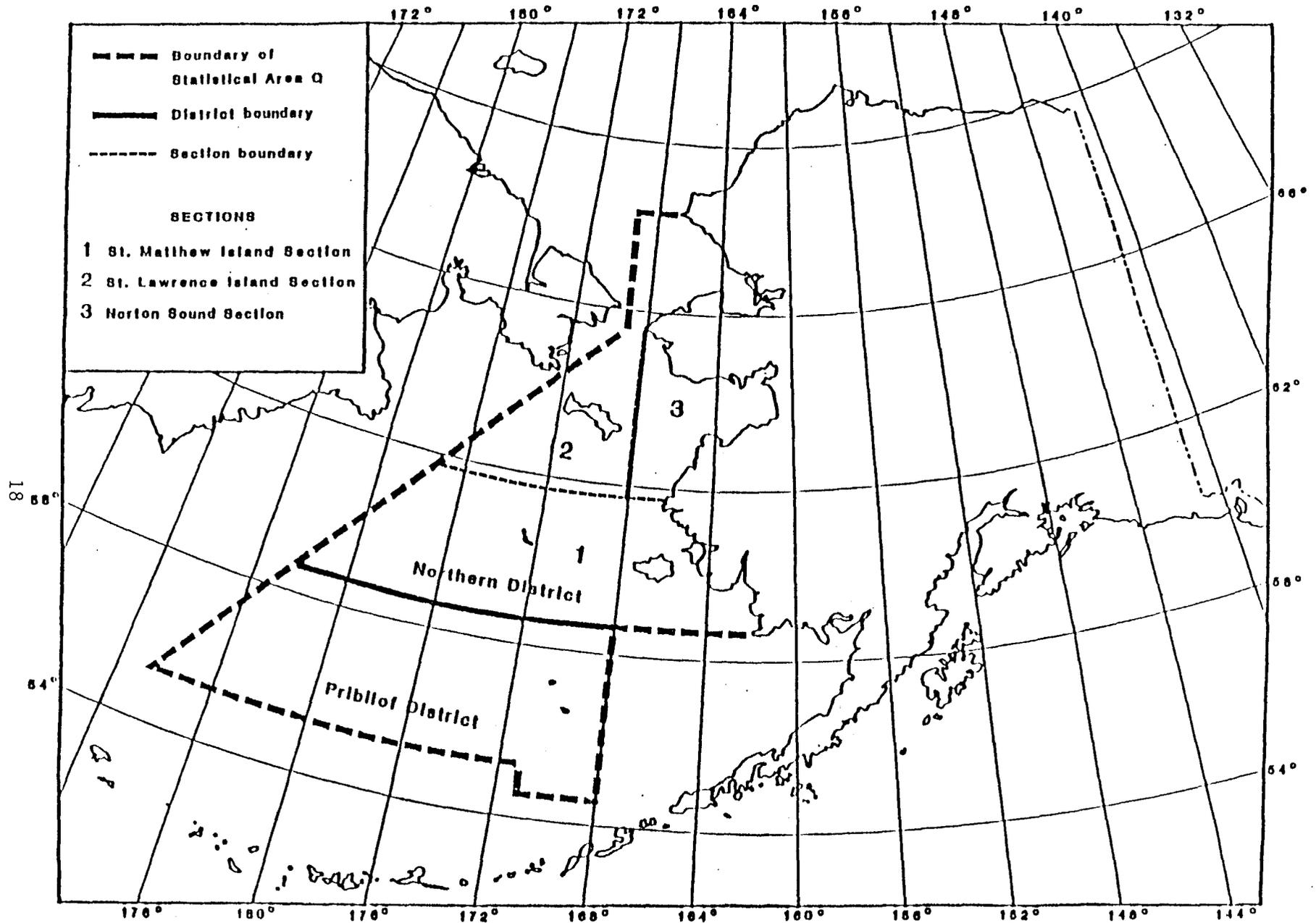


Figure 1. King crab fishing districts and sections of Statistical Area Q

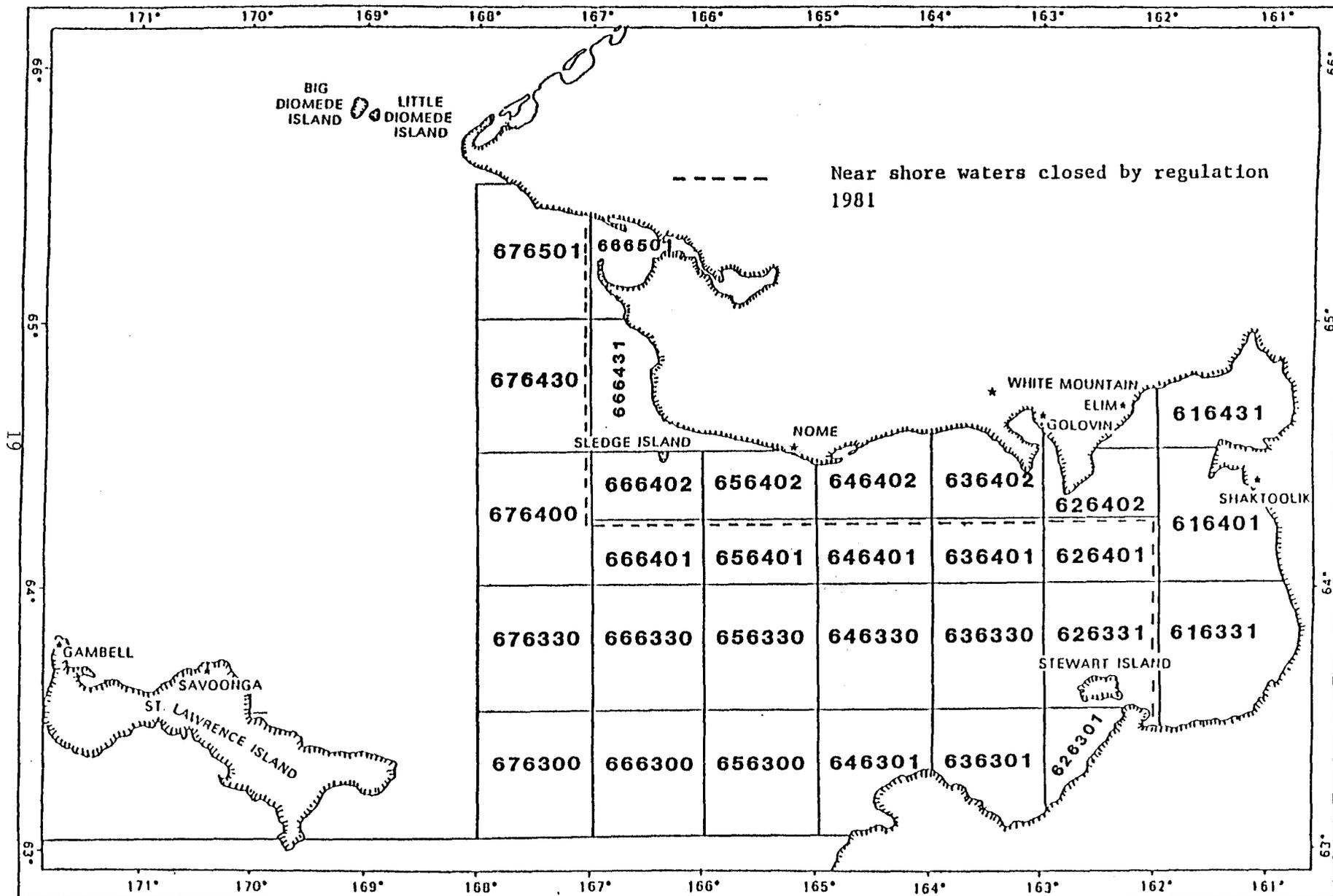


Figure 2. Statistical areas for the Norton Sound red king crab fishery.

Norton Sound Red King Crab

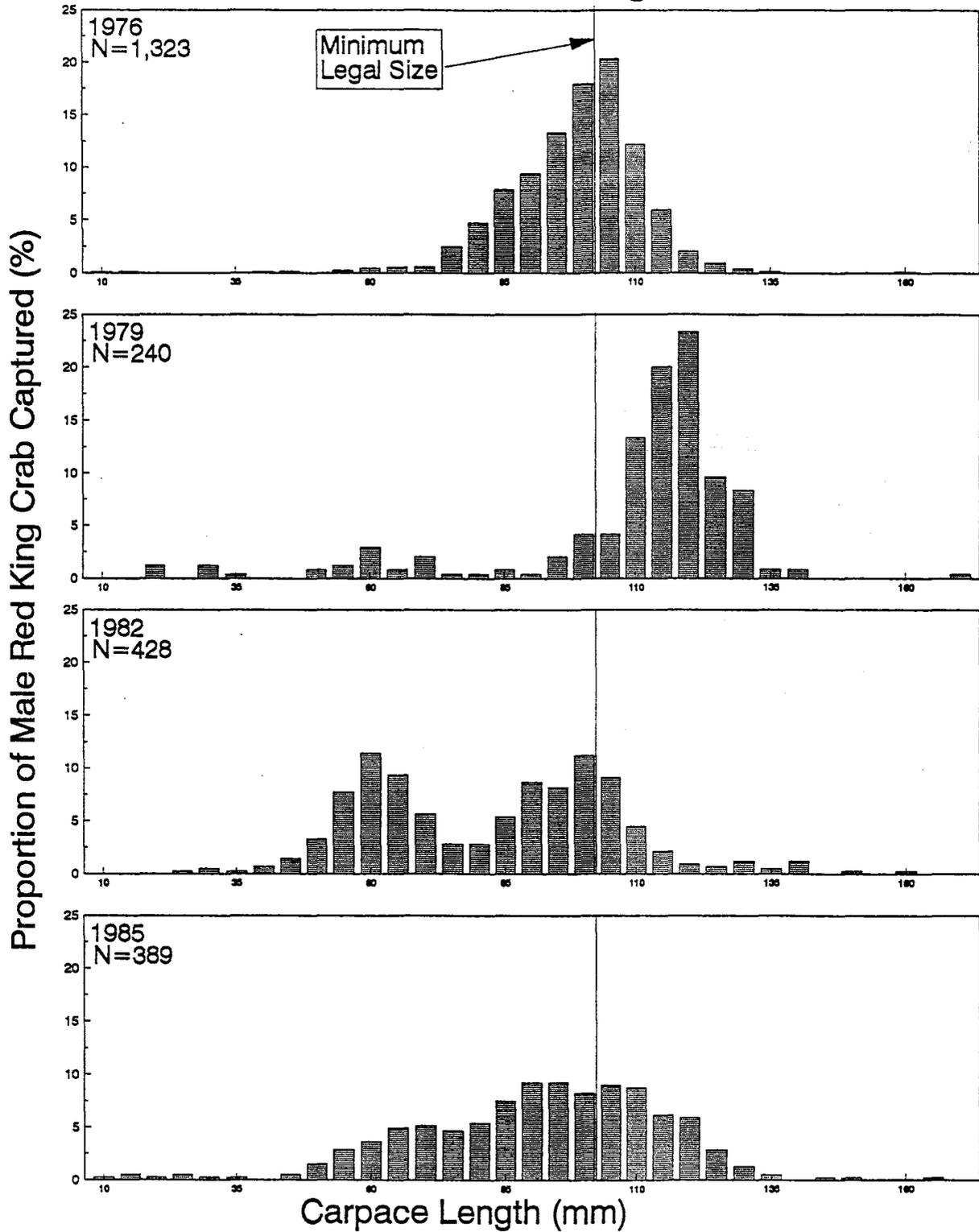


Figure 3. Norton Sound male red king crab size distribution from trawl assessment surveys conducted by the National Marine Fisheries Service, 1976, 1979, 1982, 1985, 1988, and 1991.

Norton Sound Red King Crab

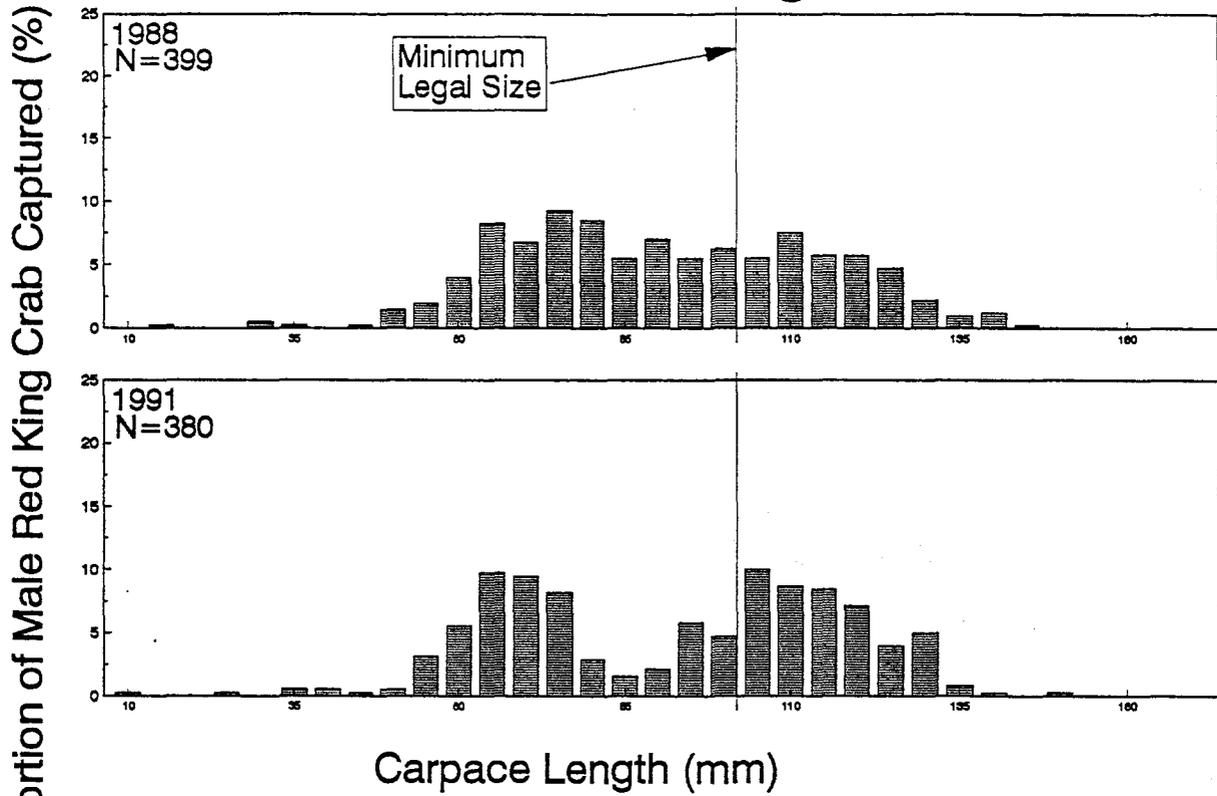


Figure 3. (Page 2 of 2)

Norton Sound Red King Crab

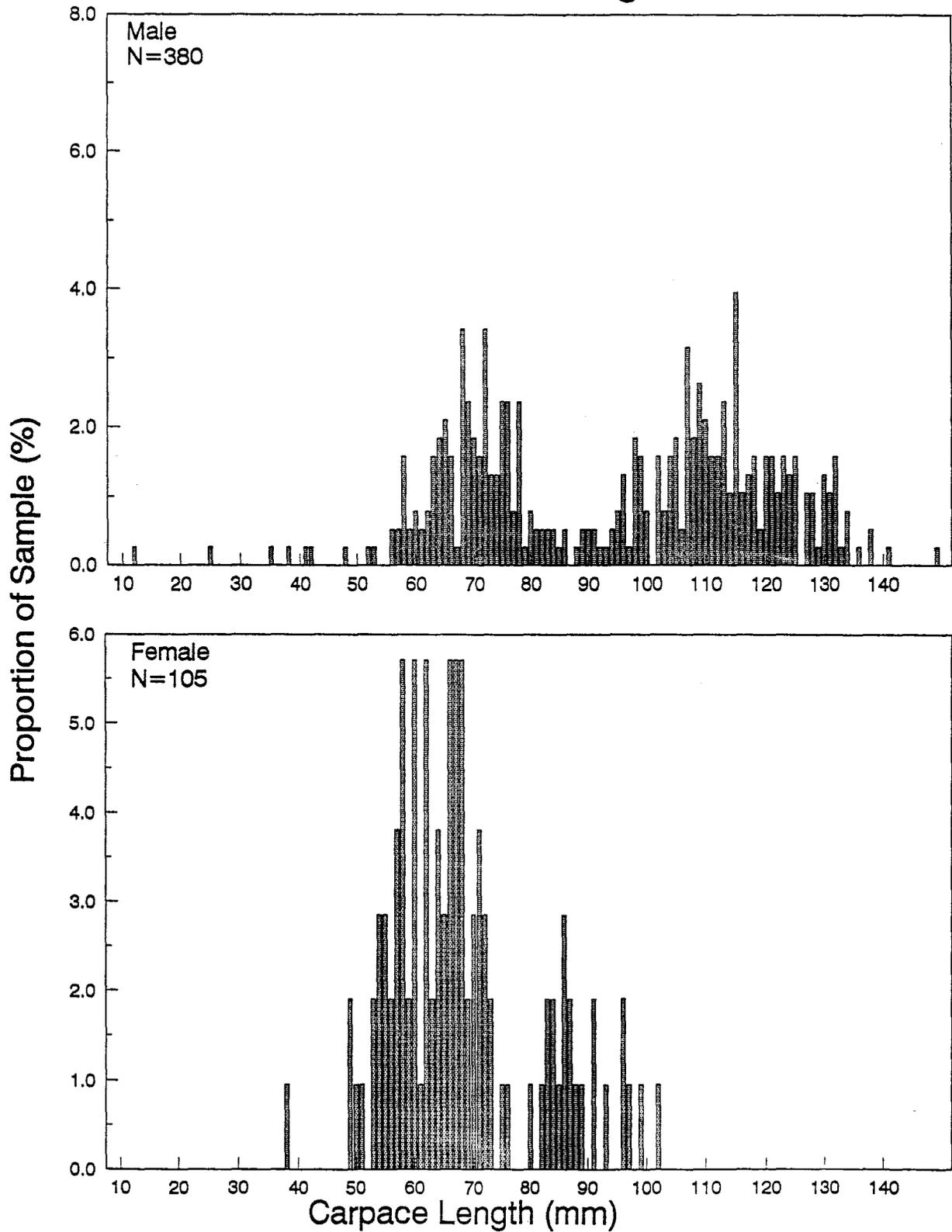


Figure 4. Norton Sound male and female red king crab size distribution from a trawl assessment survey conducted by the National Marine Fisheries Service, 1991.

Red King Crab

1995 Norton Sound Summer Pot Survey

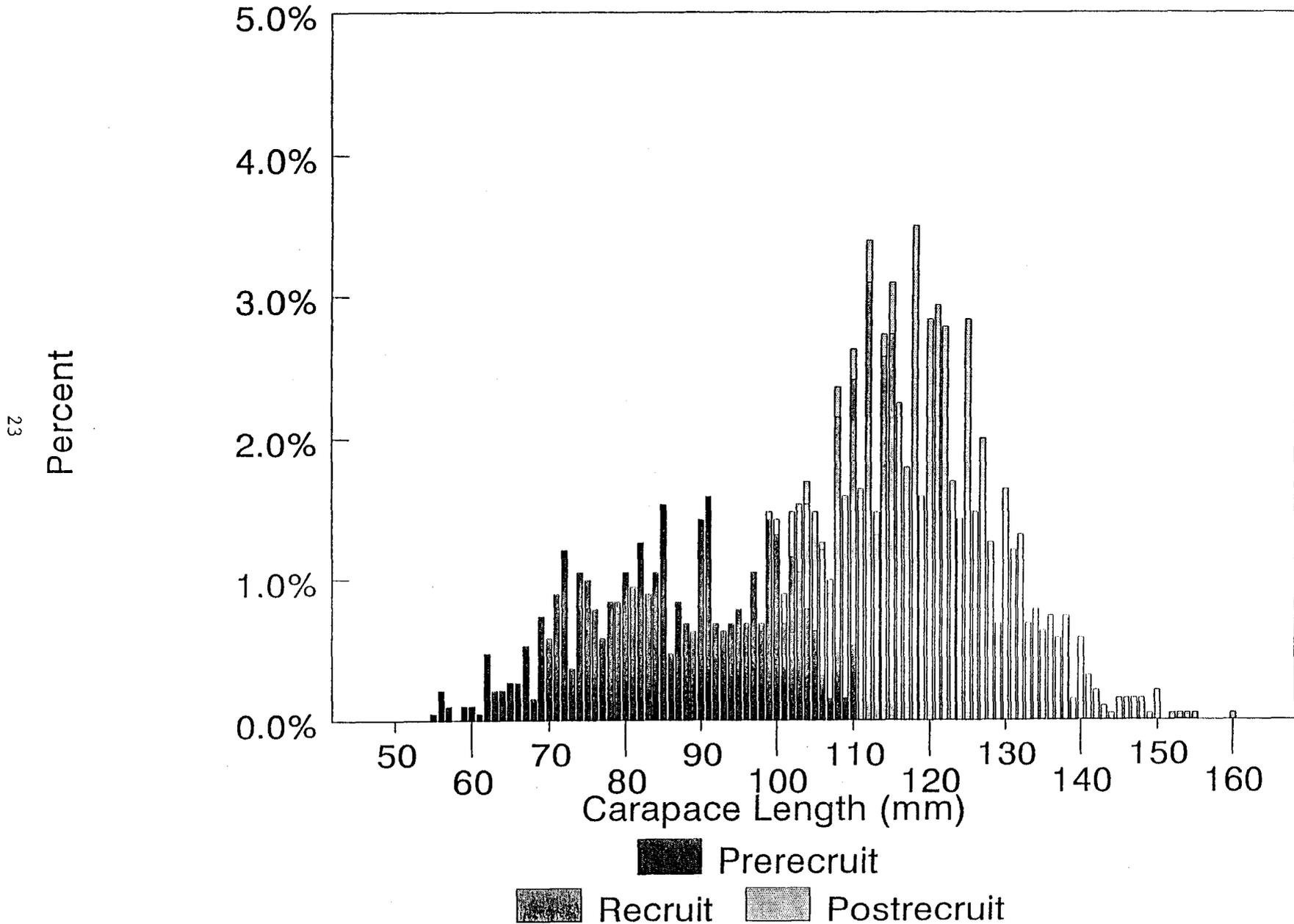


Figure 6. Length frequency distribution of prerecruit, recruit, and postrecruit, male king crab, captured during the Norton Sound summer king crab pot survey, June 26 - June 28, 1995.

Winter 1995

24
Percent

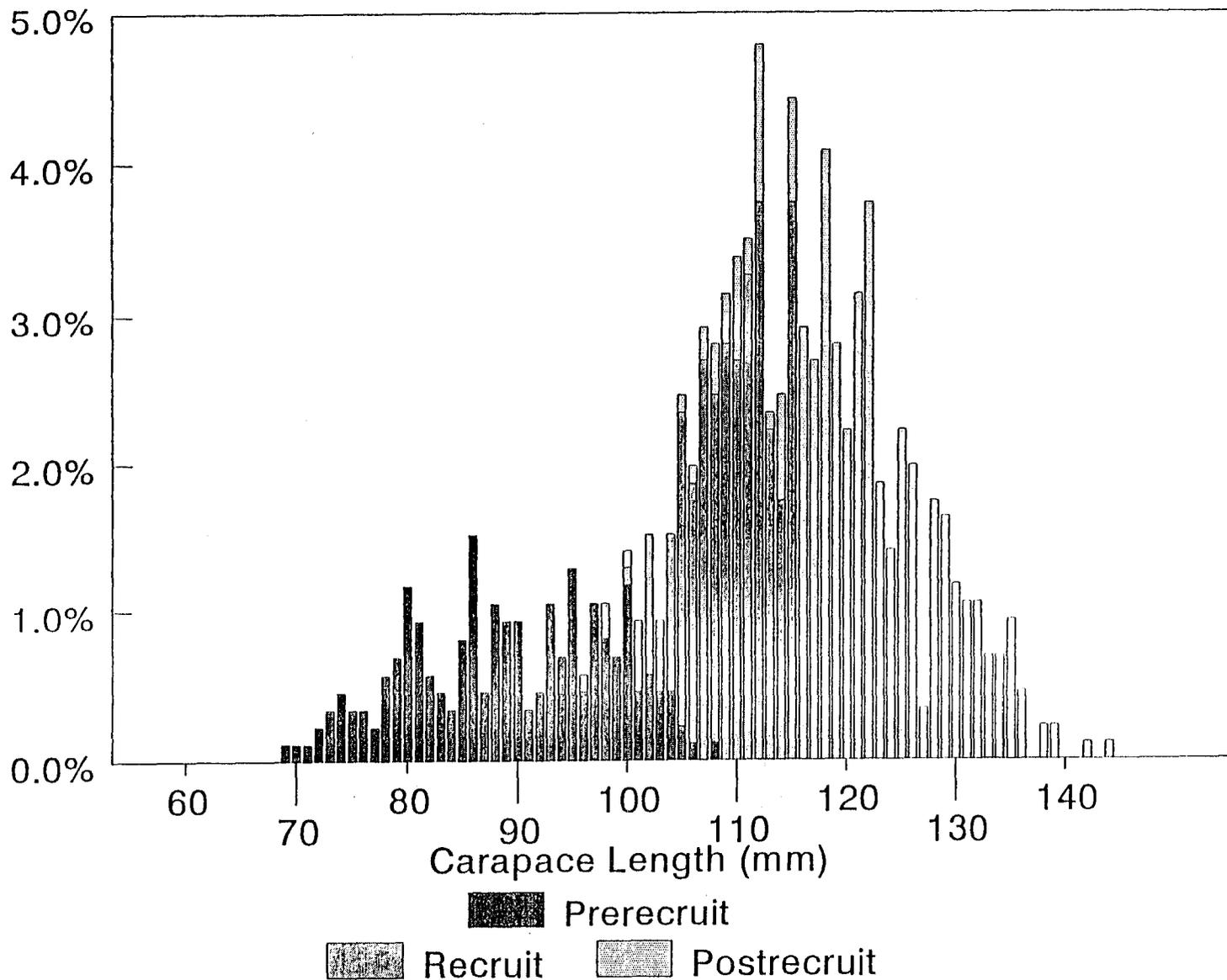


Figure 5. Length frequency distribution of prerecruit, recruit, and postrecruit male king crab captured during the winter pot survey, 1995.