

3A95-20

NORTON SOUND
WINTER RED KING CRAB STUDIES 1995

By

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and

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Regional Informational Report¹ No. 3A95-20

July 1995

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

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ACKNOWLEDGMENTS

Commercial Fisheries Management and Development staff who provided assistance with inseason logistics and data collection were Paul Thompson (full season) and Bill Baxter, and Tracy Lingnau (partial season). Fred Bue provided logistical support and assisted in staff training. Charlie Lean provided overall supervision for the project. Reviews of the manuscript were provided by Charlie Lean, Fred Bue, and Larry Buklis.

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ABSTRACT

Red king crab *Paralithodes camtschaticus* support commercial and subsistence harvests in the vicinity of Nome during the winter months. Shorefast ice in good condition allows for relatively easy access to the king crab population that is closely distributed to shore from December through April. Winter pot surveys have been conducted sporadically by the Alaska Department of Fish and Game since 1982. Data collected has included population distribution, length frequencies, shell age, as well as other life history and biological data.

In 1995, shorefast ice conditions were extremely good. Test-fishing stations were setup at twelve different locations within 10 miles east and west of Nome. A total of 858 male and 10 female king crab were captured and sampled at 12 stations and one commercial fisherman's pots between 3 march and 7 April. Male crab catch included 77% (n = 658) legal and 23% (n = 200) sublegal. Prerecruit threes, prerecruit twos, prerecruit ones, recruits, and postrecruits made up 2%, 10%, 11%, 32%, and 45%, respectively. Female catch totaled 10, five adults and 5 juveniles. A total of 514 male crab were tagged and released.

KEY WORDS: Red king crab, test-fishing, *Paralithodes*, prerecruit, recruit, postrecruit, Norton Sound.

INTRODUCTION

Red king crab *Paralithodes camtschaticus* support commercial and subsistence harvests in Norton Sound, with the greatest effort concentrated in the vicinity of Nome. Commercial fisheries occur during summer and winter months and subsistence fisheries occur primarily in winter months. Crab are concentrated nearer to shore and are most accessible from December through April. A winter king crab test-fishing project began in February of 1982 in an attempt to monitor the nearshore distribution and abundance as well as other life history and biological data of red king crab. Sampling procedures were standardized in 1983. Results of prior studies were reported by Schwarz and Lean 1982, 1983, 1984, Lean and Brannian 1987, Lean 1987, Bue and Lean 1989, Knuepfer and Gebhard 1990, Brennan and Anderson 1993, and Brennan 1993.

Shorefast and sea ice conditions constantly change and vary from location to location. Test-fishing stations had been restricted to a narrow section of shorefast ice directly offshore from the Nome State office building, extending 1/2 to 2 miles offshore, from 1982 to 1987. Poor ice conditions precluded any test-fishing efforts in 1988. During the 1989 and 1990 seasons, the study area was expanded to reduce the chance of lost fishing time due to poor ice conditions. The study area was extended to 6 miles west of Nome, in the vicinity of gold dredging activity, and 6 miles east of Nome, where very little subsistence crabbing effort takes place. Test-fishing effort was reduced in 1991 and 1993 due to poor ice conditions and budgets.

Objectives for the 1995 winter field season were:

1. Monitor the number of sublegal and legal king crab and the shell age of each age class in order to evaluate recruitment into the legal population prior to the summer fishery.
2. Document the abundance and distribution of king crab that may be accessible to winter users in the Nome area.
3. Document the intensity and distribution of winter fishing effort.
4. Tag all new shell male king crab.
5. Monitor other life history and biological data such as egg development and clutch size of female crab, disease and parasitism, and incidence of competing species.

METHODS

Study Area

Twelve permanent fishing stations in six different locations were established spanning an area approximately 10 miles either side of Nome (Figure 1). Stations were set at six historical locations and six new locations (Table 1). Each station was deployed in 35 ft to 50 ft deep water and approximately 1 mi to 1.5 miles offshore.

Equipment

Test holes were drilled through the ice using gas powered ice augers. Depths were checked using a weighted string before establishing a station. Other tools used for clearing ice and snow included ice chisels, axes, shovels, and strainers. Conical, four-foot diameter "Japanese style" king crabs pots were baited with two one-quart bait containers containing chopped fall herring and one string of 4 large whole saffron cod. Each pot was deployed and attached to a tethered line at the surface of the ice. Each hole was covered with a plywood door to reduce refreezing of the ice opening. Holes were marked as per regulation.

Sampling Schedule

Once all pots were deployed each pot was checked and rebaited twice per week. Commercial pots from one fisherman were checked once during the season.

Test Fishing

Pots were brought near the surface and suspended so that all crab in the pot remained immersed in water. Crab were removed one at a time and both legal and biological measurements were made to the nearest mm. Shell age was determined, and egg development noted on females. Male crab with new shells and with old shells less than 116 mm in length were tagged with hog ring or spaghetti tags. During periods of extreme cold (<15 °F) crab were processed inside of a warming barrel. All crab were released through the same hole that the pot was suspended in.

RESULTS

Test Fishing

A total of 858 male and 10 female red king crab were captured and sampled at 12 stations and commercial pots between 3 March and 7 April, 1995. A total of 126 pot lifts were made at the 12 stations, for a mean catch per pot lift (CPUE) of 6.16 male and 0.08 female crab (Table 2). Mean male CPUE ranged from 11.6 at station N3 to 2.2 at station E1 (Table 2). Daily catch of crab for all test-fishing stations were as high as 104 on 14 March and as low as 1 on 31 March (Table 3). Other species captured included soft crab *Hapalogaster grebnitzkii*, Arctic Lyre crab *Hyas coarctatus*, Hair crab *Erimacrus spp.*, Flatbottom sea star *Asterias amurensis*, shrimp of the genus *Pandalus* and *Crangon*, and sea urchins of the genus *Strongylocentrotus*.

Catch Sampling

Carapace age and length measurements were taken from 858 male king crab. A total of 77% were legal and 23% were sublegal (Table 4). Of the total male crab catch, 2% were prerecruit threes, 10% were prerecruit twos, 11% were prerecruit ones, 32% were recruit, and 45% were postrecruit (Table 4). Length distributions of all male crab ranged from 69 mm to 144 mm (Figure 2). The mean carapace length for all male crab captured was 107 mm.

Out of 658 legal male crab measured, 42% were recruit crab, and 58% were postrecruit crab. The mean carapace length of legal male crab was 117 mm (Table 5). A total of 200 sublegal male crab were measured, of which 9% were prerecruit threes, 42% were prerecruit twos and 49% were prerecruit ones. The mean carapace length for sublegal male crab was 89 mm (Table 6).

A total of 10 female king crab were captured, five adult and five juveniles (Table 7). One adult had a full egg clutch size, two had high egg clutch sizes, and two had no eggs. The mean carapace length was 82 mm for adult females and 72 mm for juvenile females.

A total of 514 male crab were tagged and released. Legal crab totaled 374 and sublegal totaled 140.

DISCUSSION

Study Area

Ice conditions were good during the 1995 winter season. The leading edge of the shorefast ice extended out past 2 miles for the entire season. Flat pans of ice were readily found both to the east and west of town. Weather conditions were consistent over the season also. Clear skies, little wind, and almost no snow storms dominated the length of the test-fishing season. There was a high level of subsistence effort during the season, probably due to the stable ice conditions. Most of the effort in the Nome area was concentrated directly in front of town and within 2 miles west of town. Commercial effort extended as far as 20 miles west of town.

The expanded study area was successfully sampled in 1995. The crew size was doubled over previous years and the fair weather conditions allowed us to consistently and effectively sample all test-fishing stations. This may not necessarily be true in future years in light of reduced crew size and/or poor weather and ice conditions. There were commercial and subsistence fishers out beyond Department test pots. This has not been a trend noticed in previous studies.

Test Fishing

The winter pot survey had the highest number of pot lifts ($n = 126$) since 1982 (Table 8). Total number of crab caught was the fifth highest but the average CPUE was the third lowest since 1983. The low CPUE could be attributed to high subsistence fishing effort. Extremely good ice and weather conditions probably permitted an increased number of fishermen to participate in the winter fishery. We also expanded the sampling area that may have included non-traditional fishing areas. Some of these areas may have a traditionally low concentration of the crab population in the winter.

Catch Sampling

The 1995 sublegal catch rate was the second lowest (23% of the total male catch) since 1983 (Table 9). Prerecruit twos made up 10% of all crab sampled and prerecruit ones made up 11%. These are well below the average percentages (prerecruit two = 20% and prerecruit one = 30%) for the years 1983 to 1993. Recruit crab made up 32% of all crab sampled compared to the average of 22% recruits for the years 1983 to 1991 (Table 9). Postrecruit crab made up 45% of all crab sampled, well above the average of 29% postrecruits for the years 1983 to 1993 (Table 9).

The 1995 average carapace length for legal males (117 mm) was similar to the average carapace length (116 mm) for the previous three years (Table 10). The average carapace length for females (77 mm) was similar to the average carapace length (78 mm) for the previous seven years (Table 10). In the early 1980's the postrecruit population had been depleted. The population has doubled since 1983, but

recruitment has been constant in numbers. The legal crab population has increased, and in 1995 recruitment was excellent.

Four out of the five female king crab captured and classified as juvenile crab were 72 mm or greater (Table 7). This was done because no egg clutches were observed. These female crab may be adults that have not produced eggs this season. The winter 1995 mean carapace length for juvenile female crab is skewed by these large barren crab.

CONCLUSION

The winter pot survey for red king crab in the vicinity of Nome has occurred sporadically since 1982. During each season of data collection, valuable information has been collected on the crab population immediately available to the residents of Nome during the winter subsistence and commercial fishery. In 1995 the study area was successfully expanded to include traditional and nontraditional fishing areas in the Nome area. In addition to providing information on length frequencies, age classes, female ovigerity, and shell age composition, comparisons of percentages of recruit and postrecruit crab during the winter pot survey and summer commercial fishery have been made in the past (Table 11). The winter survey has provided opportunities to collect and interpret information as it relates to the winter distribution of crab, and also has been used as an indicator for the potential success of the summer commercial fishery. In recent years the winter fisheries have expanded and are now working a broader area than before. This project is keeping up with that trend.

LITERATURE CITED

- Brennan, E.L. and R. Anderson. 1993. Norton Sound winter red king crab studies 1991. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A93-12, Anchorage.
- Brennan, E. L. 1993. Norton Sound winter red king crab studies 1993. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A93-13, Anchorage.
- Bue, F.J. and C.F. Lean. 1989. Norton Sound winter red king crab studies, 1989. Regional Information Report No 3N90-05. Alaska Department of Fish and Game, Division of Commercial Fisheries, Nome.
- Knuepfer G.R. and J.G. Gebhard. 1990. Norton Sound winter red king crab studies, 1990. Regional Information Report No. 3N90-19. Alaska Department of Fish and Game, Division of Commercial Fisheries, Nome.
- Lean, C.F. 1987. Catch rates, size composition and growth of red king crab taken in Norton Sound near Nome during the winter of 1987. AYK Region Shellfish Report #12. Alaska Department of Fish and Game, Division of Commercial Fisheries, Nome.
- Lean, C.F. and Brannian L. 1987. Catch rates, size composition and growth of king crab taken in Norton Sound near Nome during the winters of 1985 and 1986. Alaska Department of Fish and game, Division of Commercial Fisheries, Nome.
- Schwarz, L. and C.F. Lean. 1982. Nearshore Winter King Crab Study, Norton Sound, February through May, 1982. Alaska Department of Fish and Game, Division of Commercial Fisheries, Nome.
- _____. 1983. Nearshore Winter King Crab Study, Norton Sound, January through April, 1983. Alaska Department of Fish and Game, Division of Commercial Fisheries, Nome.
- _____. 1984. Nearshore Winter King Crab Study, Norton Sound, January through April, 1984. Alaska Department of Fish and Game, Division of Commercial Fisheries, Nome.

Table 1. Location of test-fishing stations for the winter crab survey in the Nome area, 1995.

Pot	Location from town	Depth (ft)	Distance offshore (mi)	Historical station
N2	south	40	1.0	yes
N3	south	50	1.5	yes
E1	4 mi east	40	1.0	yes
E2	4 mi east	50	1.5	yes
E3	8 mi east	45	1.0	no
E4	9 mi east	42	1.0	no
W1	6 mi east	40	1.0	yes
W2	6 mi east	50	1.5	yes
W3	1 mi west	40	1.0	no
W4	1 mi west	50	1.5	no
W5	9 mi west	40	1.0	no
W6	9 mi west	35	1.0	no

Table 2. Total number of pot lifts and captured red king crab, by station, for all test-fishing stations in the Nome area from 3 March to 6 April, 1995.

Station	No. pot lifts	No. males captured	Avg. male CPUE	No. females captured	Avg. female CPUE
N2	11	69	6.3	2	0
N3	11	128	11.6	1	0.1
E1	10	22	2.2	0	0.0
E2	10	36	3.6	0	0.0
E3	10	55	5.5	1	0.1
E4	10	78	7.8	1	0.1
W1	11	105	9.5	0	0.0
W2	11	79	7.2	1	0.1
W3	11	69	6.3	0	0.0
W4	11	54	4.9	3	0.3
W5	10	43	4.3	0	0.0
W6	10	38	3.8	1	0.1
Total	126	776	6.2	10	0.1

Table 3. Daily catch of red king crab for all test-fishing stations in the Nome area from 3 March to 6 April, 1995.

Date	No. pots lifted	No. males captured	Avg. male CPUE	Cum. males captured	No. females captured
3-Mar	6	61	10.2	61	0
6-Mar	6	56	9.3	117	0
7-Mar	6	68	11.3	185	0
9-Mar	12	54	4.5	239	0
13-Mar	6	81	13.5	320	2
14-Mar	6	104	17.3	424	0
16-Mar	6	50	8.3	474	0
17-Mar	6	18	3.0	492	1
20-Mar	3	8	2.7	500	1
21-Mar	7	33	4.7	533	1
22-Mar	2	10	5.0	543	0
23-Mar	6	20	3.3	563	0
24-Mar	6	50	8.3	613	1
27-Mar	6	50	8.3	663	0
28-Mar	6	54	9.0	717	1
30-Mar	8	11	1.4	728	1
31-Mar	4	1	0.3	729	0
3-Apr	8	8	1.0	737	1
4-Apr	4	3	0.8	740	0
5-Apr	8	25	3.1	765	1
6-Apr	4	11	2.8	776	0
Total	126	776	6.1	776	10

Table 4. Length frequency distribution of all male king crab captured at all test-fishing stations in the Nome area from 3 March to 6 April, 1995. Catch from one fisherman's commercial pots on 5 April are included.

CARAPACE LENGTH (mm)	PRERECRUIT (Sublegal)		RECRUIT		POSTRECRUIT		TOTALS	
	No.	%	No.	%	No.	%	No.	%
50		0.00%		0.00%		0.00%	0	0.00%
51		0.00%		0.00%		0.00%	0	0.00%
52		0.00%		0.00%		0.00%	0	0.00%
53		0.00%		0.00%		0.00%	0	0.00%
54		0.00%		0.00%		0.00%	0	0.00%
55		0.00%		0.00%		0.00%	0	0.00%
56		0.00%		0.00%		0.00%	0	0.00%
57		0.00%		0.00%		0.00%	0	0.00%
58		0.00%		0.00%		0.00%	0	0.00%
59		0.00%		0.00%		0.00%	0	0.00%
60		0.00%		0.00%		0.00%	0	0.00%
61		0.00%		0.00%		0.00%	0	0.00%
62		0.00%		0.00%		0.00%	0	0.00%
63		0.00%		0.00%		0.00%	0	0.00%
64		0.00%		0.00%		0.00%	0	0.00%
65		0.00%		0.00%		0.00%	0	0.00%
66		0.00%		0.00%		0.00%	0	0.00%
67		0.00%		0.00%		0.00%	0	0.00%
68		0.00%		0.00%		0.00%	0	0.00%
69	1	0.12%		0.00%		0.00%	1	0.12%
70	1	0.12%		0.00%		0.00%	1	0.12%
71	1	0.12%		0.00%		0.00%	1	0.12%
72	2	0.23%		0.00%		0.00%	2	0.23%
73	3	0.35%		0.00%		0.00%	3	0.35%
74	4	0.47%		0.00%		0.00%	4	0.47%
75	3	0.35%		0.00%		0.00%	3	0.35%
76	3	0.35%		0.00%		0.00%	3	0.35%
77	2	0.23%		0.00%		0.00%	2	0.23%
78	5	0.58%		0.00%		0.00%	5	0.58%
79	6	0.70%		0.00%		0.00%	6	0.70%
80	10	1.17%		0.00%		0.00%	10	1.17%
81	8	0.93%		0.00%		0.00%	8	0.93%
82	5	0.58%		0.00%		0.00%	5	0.58%
83	4	0.47%		0.00%		0.00%	4	0.47%
84	3	0.35%		0.00%		0.00%	3	0.35%
85	7	0.82%		0.00%		0.00%	7	0.82%
86	13	1.52%		0.00%		0.00%	13	1.52%
87	4	0.47%		0.00%		0.00%	4	0.47%
88	9	1.05%		0.00%		0.00%	9	1.05%
89	8	0.93%		0.00%		0.00%	8	0.93%
90	8	0.93%		0.00%		0.00%	8	0.93%
91	3	0.35%		0.00%		0.00%	3	0.35%
92	4	0.47%		0.00%		0.00%	4	0.47%
93	9	1.05%		0.00%		0.00%	9	1.05%
94	6	0.70%		0.00%		0.00%	6	0.70%
95	11	1.28%		0.00%		0.00%	11	1.28%
96	4	0.47%	1	0.12%		0.00%	5	0.58%
97	9	1.05%		0.00%		0.00%	9	1.05%
98	7	0.82%	2	0.23%		0.00%	9	1.05%
99	6	0.70%		0.00%		0.00%	6	0.70%
100	10	1.17%	1	0.12%	1	0.12%	12	1.40%
101	4	0.47%	4	0.47%		0.00%	8	0.93%
102	5	0.58%	8	0.93%		0.00%	13	1.52%
103	4	0.47%	3	0.35%	1	0.12%	8	0.93%
104	4	0.47%	9	1.05%		0.00%	13	1.52%
105	2	0.23%	18	2.10%	1	0.12%	21	2.45%
106	1	0.12%	15	1.75%	1	0.12%	17	1.98%
107		0.00%	23	2.68%	2	0.23%	25	2.91%
108	1	0.12%	20	2.33%	3	0.35%	24	2.80%
109		0.00%	24	2.80%	3	0.35%	27	3.15%
110		0.00%	23	2.68%	6	0.70%	29	3.38%
111		0.00%	28	3.28%	2	0.23%	30	3.50%
112		0.00%	32	3.73%	9	1.05%	41	4.78%
113		0.00%	19	2.21%	1	0.12%	20	2.33%
114		0.00%	15	1.75%	6	0.70%	21	2.45%
115		0.00%	32	3.73%	6	0.70%	38	4.43%
116		0.00%		0.00%	25	2.91%	25	2.91%
117		0.00%		0.00%	23	2.68%	23	2.68%
118		0.00%		0.00%	35	4.08%	35	4.08%
119		0.00%		0.00%	24	2.80%	24	2.80%
120		0.00%		0.00%	19	2.21%	19	2.21%
121		0.00%		0.00%	27	3.15%	27	3.15%
122		0.00%		0.00%	32	3.73%	32	3.73%
123		0.00%		0.00%	16	1.86%	16	1.86%
124		0.00%		0.00%	12	1.40%	12	1.40%
125		0.00%		0.00%	19	2.21%	19	2.21%
126		0.00%		0.00%	17	1.98%	17	1.98%
127		0.00%		0.00%	3	0.35%	3	0.35%
128		0.00%		0.00%	15	1.75%	15	1.75%
129		0.00%		0.00%	14	1.63%	14	1.63%
130		0.00%		0.00%	10	1.17%	10	1.17%
131		0.00%		0.00%	9	1.05%	9	1.05%
132		0.00%		0.00%	9	1.05%	9	1.05%
133		0.00%		0.00%	6	0.70%	6	0.70%
134		0.00%		0.00%	6	0.70%	6	0.70%
135		0.00%		0.00%	8	0.93%	8	0.93%
136		0.00%		0.00%	4	0.47%	4	0.47%
137		0.00%		0.00%		0.00%	0	0.00%
138		0.00%		0.00%	2	0.23%	2	0.23%
139		0.00%		0.00%	2	0.23%	2	0.23%
140		0.00%		0.00%		0.00%	0	0.00%
141		0.00%		0.00%		0.00%	0	0.00%
142		0.00%		0.00%	1	0.12%	1	0.12%
143		0.00%		0.00%		0.00%	0	0.00%
144		0.00%		0.00%	1	0.12%	1	0.12%
145		0.00%		0.00%		0.00%	0	0.00%
146		0.00%		0.00%		0.00%	0	0.00%
147		0.00%		0.00%		0.00%	0	0.00%
148		0.00%		0.00%		0.00%	0	0.00%
149		0.00%		0.00%		0.00%	0	0.00%
Total No.	200	23.31%	277	32.28%	381	44.41%	858	100.00%

Number of pre-recruit threes (<77mm) = 18
 Number of pre-recruit twos (77mm to 89mm) = 84
 Number of pre-recruit ones (>=90mm) = 98

Table 5. Shell age and length frequencies of all legal male king crab captured at all test-fishing stations in the Nome area from 3 March to 6 April, 1995. Catch from one fisherman's commercial pots on 5 April are included.

Carapace Length (mm)	New shell			Old shell			Total		
	No.	Ave Length Calc.	%	No.	Ave Length Calc.	%	No.	Ave Length Calc.	%
65		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
66		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
67		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
68		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
69		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
70		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
71		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
72		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
73		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
74		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
75		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
76		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
77		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
78		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
79		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
80		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
81		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
82		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
83		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
84		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
85		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
86		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
87		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
88		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
89		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
90		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
91		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
92		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
93		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
94		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
95		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
96	1	0.19	0.2%	0.00	0.0%	1	0.15	0.2%	
97		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
98	2	0.39	0.4%	0.00	0.0%	2	0.30	0.3%	
99		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
100	1	0.20	0.2%	1	0.84	0.6%	2	0.30	0.3%
101	4	0.81	0.8%	0.00	0.0%	4	0.81	0.8%	
102	8	1.63	1.6%	0.00	0.0%	8	1.24	1.2%	
103	3	0.62	0.6%	1	0.86	0.6%	4	0.63	0.6%
104	9	1.87	1.8%	0.00	0.0%	9	1.42	1.4%	
105	18	3.77	3.8%	1	0.67	0.6%	19	3.03	2.9%
106	15	3.17	3.0%	1	0.58	0.6%	16	2.58	2.4%
107	23	4.91	4.6%	2	1.38	1.3%	25	4.07	3.8%
108	20	4.31	4.0%	3	2.06	1.9%	23	3.78	3.5%
109	24	5.22	4.8%	3	2.08	1.9%	27	4.47	4.1%
110	23	5.05	4.6%	6	4.20	3.8%	29	4.85	4.4%
111	28	6.20	5.6%	2	1.41	1.3%	30	5.06	4.6%
112	32	7.15	6.4%	9	6.42	5.7%	41	6.98	6.2%
113	19	4.29	3.8%	1	0.72	0.6%	20	3.43	3.0%
114	15	3.41	3.0%	6	4.36	3.8%	21	3.64	3.2%
115	32	7.35	6.4%	6	4.39	3.8%	38	6.64	5.8%
116	22	5.09	4.4%	3	2.22	1.9%	25	4.41	3.8%
117	17	3.97	3.4%	6	4.47	3.8%	23	4.09	3.5%
118	31	7.30	6.2%	4	3.01	2.5%	35	6.28	5.3%
119	15	3.56	3.0%	9	6.82	5.7%	24	4.34	3.6%
120	15	3.58	3.0%	4	3.98	3.2%	19	3.47	2.9%
121	19	4.58	3.8%	8	6.17	5.1%	27	4.97	4.1%
122	20	4.87	4.0%	12	9.32	7.6%	32	5.93	4.9%
123	13	3.19	2.6%	3	2.35	1.9%	16	2.99	2.4%
124	8	1.98	1.8%	4	3.16	2.5%	12	2.26	1.8%
125	12	2.99	2.4%	7	5.57	4.5%	19	3.61	2.9%
126	8	2.01	1.8%	9	7.22	5.7%	17	3.26	2.6%
127	3	0.76	0.6%	0.00	0.0%	3	0.58	0.5%	
128	8	2.04	1.8%	7	5.71	4.5%	15	2.92	2.3%
129	7	1.80	1.4%	7	5.75	4.5%	14	2.74	2.1%
130	3	0.78	0.6%	7	5.80	4.5%	10	1.98	1.5%
131	3	0.78	0.6%	6	5.01	3.8%	9	1.79	1.4%
132	5	1.32	1.0%	4	3.36	2.5%	9	1.81	1.4%
133	4	1.06	0.8%	2	1.89	1.3%	6	1.21	0.9%
134	3	0.80	0.6%	3	2.56	1.9%	6	1.22	0.9%
135	3	0.81	0.6%	5	4.30	3.2%	8	1.64	1.2%
136	2	0.54	0.4%	2	1.73	1.3%	4	0.83	0.6%
137		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
138		0.00	0.0%	2	1.76	1.3%	2	0.42	0.3%
139	2	0.55	0.4%	0.00	0.0%	2	0.42	0.3%	
140		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
141		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
142	1	0.28	0.2%	0.00	0.0%	1	0.22	0.2%	
143		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
144		0.00	0.0%	1	0.92	0.6%	1	0.22	0.2%
145		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
146		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
147		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
148		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
149		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
150		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
151		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
152		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
153		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
154		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
155		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
156		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
157		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
158		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
159		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
160		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
161		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
162		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
163		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
164		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
165		0.00	0.0%	0.00	0.0%	0	0.00	0.0%	
Total No.	501		76.1%	157		23.9%	658		100.0%
Mean		115.2			121.6			116.8	
Total legals			858						
Total Recruits			277						
Percent			42.1%						
Total Post Recruits			381						
Percent			57.9%						

Table 6. Shell age and length frequencies of all sublegal male king crab captured at all test-fishing stations in the Nome area from 3 March to 6 April, 1995. Catch from one fisherman's commercial pots on 5 April are included.

Carapace Length (mm)	New Shell			Old Shell			Total		
	No.	Ave Length Calc	%	No.	Ave Length Calc	%	No.	Ave Length Calc	%
55		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
56		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
57		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
58		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
59		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
60		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
61		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
62		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
63		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
64		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
65		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
66		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
67		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
68		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
69	1	0.35	0.5%		0.00	0.0%	1	0.35	0.5%
70	1	0.35	0.5%		0.00	0.0%	1	0.35	0.5%
71	1	0.36	0.5%		0.00	0.0%	1	0.36	0.5%
72	2	0.73	1.0%		0.00	0.0%	2	0.72	1.0%
73	3	1.11	1.5%		0.00	0.0%	3	1.10	1.5%
74	4	1.49	2.0%		0.00	0.0%	4	1.48	2.0%
75	3	1.14	1.5%		0.00	0.0%	3	1.13	1.5%
76	3	1.15	1.5%		0.00	0.0%	3	1.14	1.5%
77	2	0.78	1.0%		0.00	0.0%	2	0.77	1.0%
78	5	1.97	2.5%		0.00	0.0%	5	1.95	2.5%
79	6	2.39	3.0%		0.00	0.0%	6	2.37	3.0%
80	10	4.04	5.1%		0.00	0.0%	10	4.00	5.0%
81	7	2.85	3.5%	1	40.50	0.5%	8	3.24	4.0%
82	5	2.07	2.5%		0.00	0.0%	5	2.05	2.5%
83	4	1.68	2.0%		0.00	0.0%	4	1.66	2.0%
84	3	1.27	1.5%		0.00	0.0%	3	1.26	1.5%
85	7	3.01	3.5%		0.00	0.0%	7	2.98	3.5%
86	13	5.65	6.8%		0.00	0.0%	13	5.59	6.5%
87	4	1.78	2.0%		0.00	0.0%	4	1.74	2.0%
88	9	4.00	4.5%		0.00	0.0%	9	3.96	4.5%
89	8	3.60	4.0%		0.00	0.0%	8	3.56	4.0%
90	8	3.64	4.0%		0.00	0.0%	8	3.60	4.0%
91	3	1.38	1.5%		0.00	0.0%	3	1.37	1.5%
92	4	1.86	2.0%		0.00	0.0%	4	1.84	2.0%
93	9	4.23	4.5%		0.00	0.0%	9	4.19	4.5%
94	6	2.85	3.0%		0.00	0.0%	6	2.82	3.0%
95	11	5.28	5.8%		0.00	0.0%	11	5.23	5.5%
96	4	1.94	2.0%		0.00	0.0%	4	1.92	2.0%
97	9	4.41	4.5%		0.00	0.0%	9	4.37	4.5%
98	7	3.46	3.5%		0.00	0.0%	7	3.43	3.5%
99	6	3.00	3.0%		0.00	0.0%	6	2.97	3.0%
100	9	4.55	4.5%	1	50.00	0.5%	10	5.00	5.0%
101	4	2.04	2.0%		0.00	0.0%	4	2.02	2.0%
102	5	2.58	2.5%		0.00	0.0%	5	2.55	2.5%
103	4	2.08	2.0%		0.00	0.0%	4	2.06	2.0%
104	4	2.10	2.0%		0.00	0.0%	4	2.08	2.0%
105	2	1.06	1.0%		0.00	0.0%	2	1.05	1.0%
106	1	0.54	0.5%		0.00	0.0%	1	0.53	0.5%
107	0	0.00	0.0%		0.00	0.0%	0	0.00	0.0%
108	1	0.55	0.5%		0.00	0.0%	1	0.54	0.5%
109		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
110		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
111		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
112		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
113		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
114		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
115		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
116		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
117		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
118		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
119		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
120		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
121		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
122		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
123		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
124		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
125		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
126		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
127		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
128		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
129		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
130		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
131		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
132		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
133		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
134		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
135		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
136		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
137		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
138		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
139		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
140		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
141		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
142		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
143		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
144		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
145		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
146		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
147		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
148		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
149		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
150		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
sum	198		99.0%	2		1.0%	200		100.0%
Mean		89.3			90.5			89.3	

Total sublegal = 200
 Prerecruit threes (<77mm) = 18
 Prerecruit twos (77mm to 89mm) = 84
 Prerecruit ones (>=90mm) = 98

Table 8. Total catch of red king crab during the winter pot surveys in the Nome area between 1983 and 1995.

Year	No. pot lifts	No. Males captured	Av. Male catch per pot lift	No. females captured	Av. Female catch per pot lift
1983	107	2586	24.0	236	2.0
1984	70	1677	24.0	78	1.1
1985	31	760	24.5	14	0.5
1986	31	594	19.2	74	2.4
1987	26	151	5.8	6	0.0
1988 ^a					
1989	42	548	13.1	9	0.2
1990	99	2076	21.0	18	0.2
1991	56	1283	22.9	8	0.1
1992 ^b					
1993	33	181	5.5	1	0.03
1994 ^b					
1995	126	776	6.2	10	0.1

^a No data collected in winter 1988 due to unstable ice conditions.

^b Project not run due to lack of funds.

Table 9. Percent of total catch, including prerecruit, recruit, and postrecruit crab during the winter pot surveys in the Nome area between 1983 and 1995.

Year	Sublegal prerecruit			Legal		
	twos (%)	ones (%)	total (%)	recruits (%)	postrecruits (%)	total (%)
1983	26	38	64	26	10	36
1984	35	31	66	19	16	35
1985	25	45	70	20	10	30
1986	26	35	61	22	17	39
1987	13	31	44	10	46	56
1988 ^a						
1989	27	15	42	27	31	58
1990	16	33	49	25	26	51
1991	5	30	35	34	31	65
1992 ^b						
1993	3	9	12	17	71	88
1994 ^b						
1995 ^d	10	11	23 ^c	32	45	77
Averages	20	30	49	22	29	51

^a No data collected in winter 1988 due to unstable ice conditions.

^b No data collected due to lack of funds.

^c Includes prerecruit threes.

^d Includes catch from 12 testfishing stations and commercial pots from one commercial fisherman on 5 April.

Table 10. Average length frequencies of legal male and female crab captured during the winter pot surveys in the Nome area between 1983 and 1995.

Year	Avg. length of legal male crab (mm)	Avg. length of female crab (mm)
1983	d	d
1984	d	d
1985	d	79
1986	d	70
1987	d	71
1988 ^a		
1989	d	79
1990	115	83
1991	114	75
1992 ^b		
1993	118	93 ^c
1994 ^b		
1995	117	77

^a No data collected in winter 1988 due to unstable ice conditions.

^b No data collected due to lack of funds.

^c Only one female crab captured during project.

^d Information not available

Table 11. Percent of total catch, classified as recruit and postrecruit crab sampled during the winter pot surveys and summer commercial fisheries in the Nome area between 1983 and 1995.

Year	Winter Study		Summer Commercial	
	Recruits (%)	Postrecruits (%)	Recruits (%)	Postrecruits (%)
1983	73	27	55	45
1984	54	46	59	41
1985	68	32	45	55
1986	55	45	48	52
1987	20	80	22	78
1988 ^a	-	-	25	75
1989	47	53	23	77
1990	49	51	21	79
1991 ^b	52	48	-	-
1992 ^c			28	72
1993	20	80	31	69
1994 ^c			14	86
1995	42	58		

^a No data collected in winter 1988 due to unstable ice conditions.

^b No data collected in summer 1991 due to closed fishery.

^c No data collected due to lack of funds.

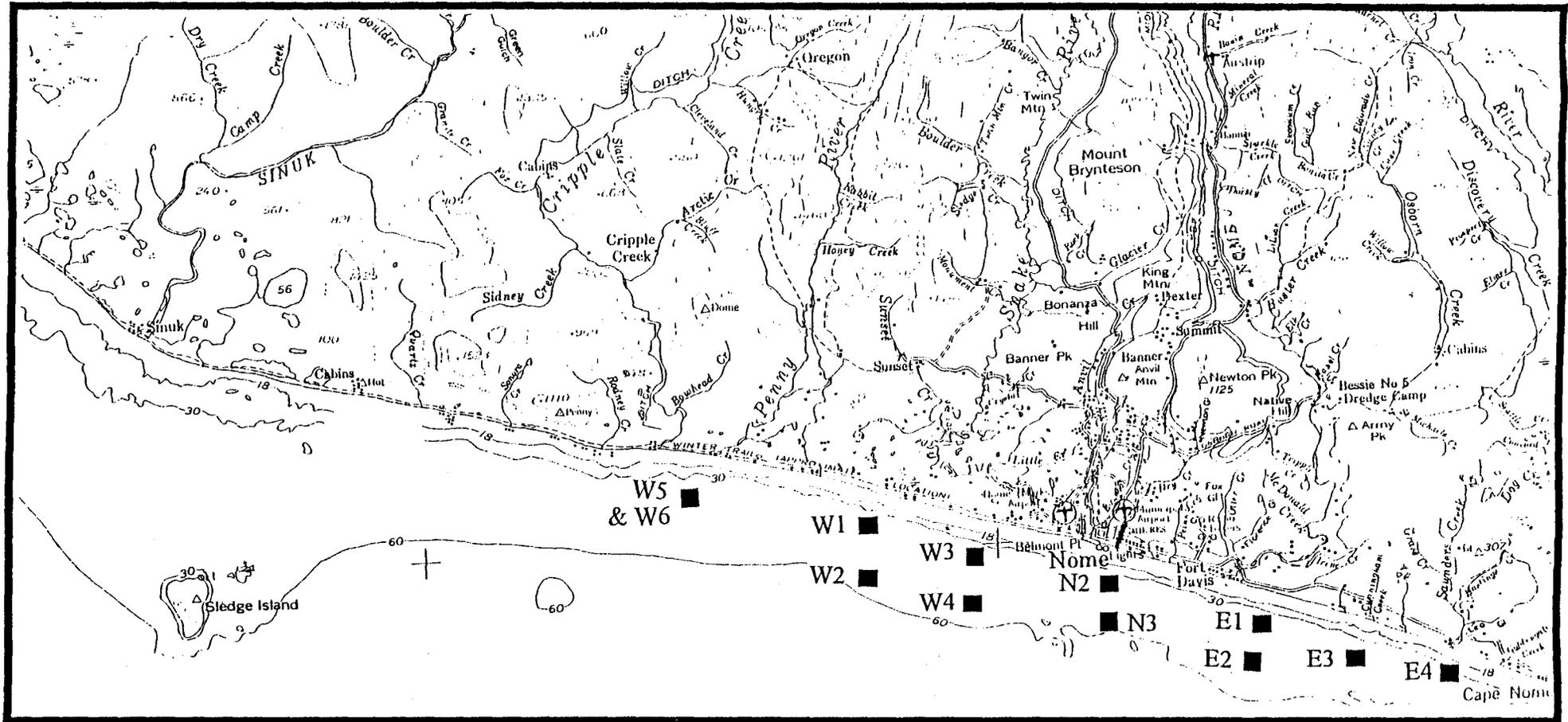


Figure 1. Study area and pot location during the winter red king crab pot survey in the Nome area, 1995.

Winter 1995

Percent

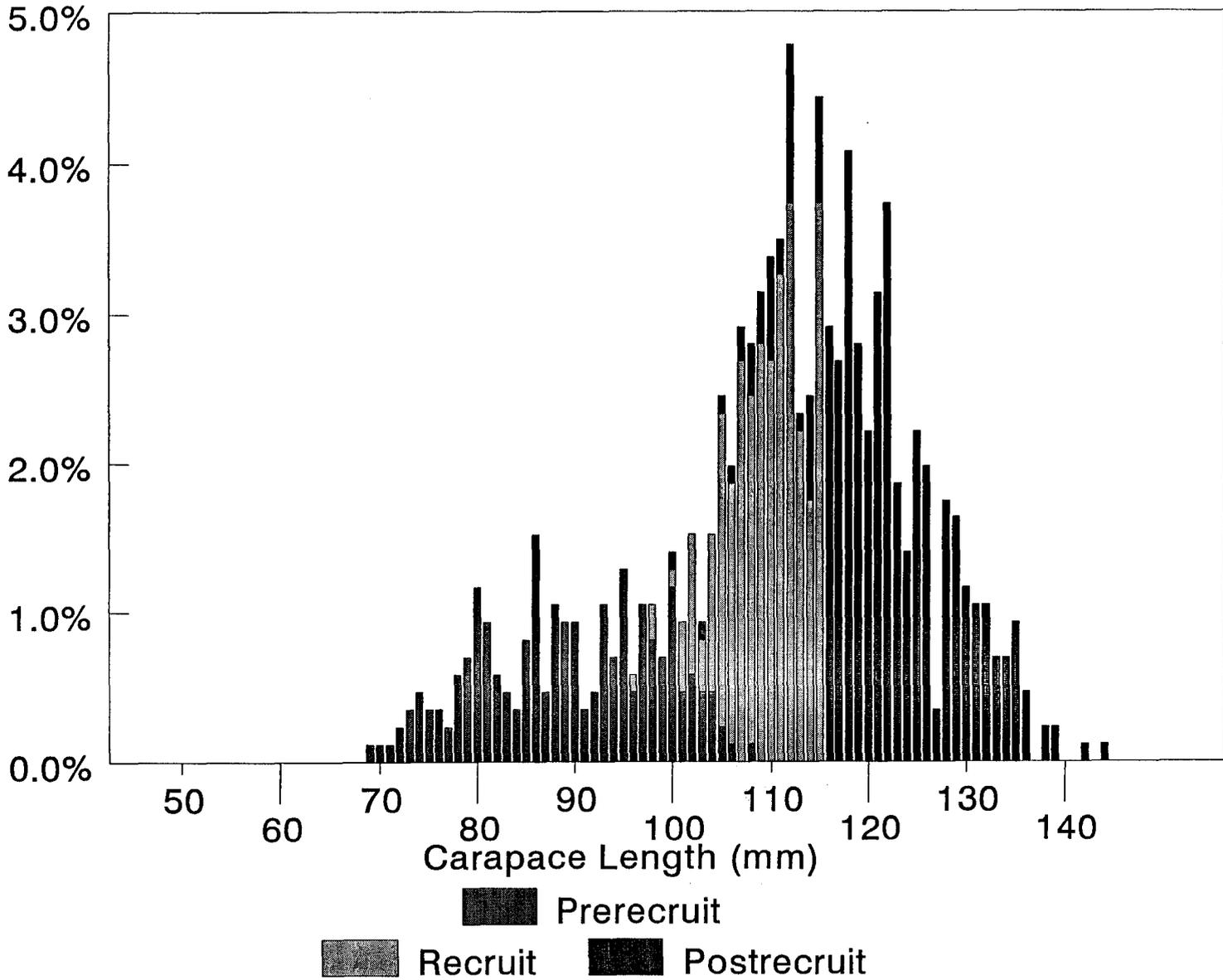


Figure 2. Length frequency distribution of prerecruit, recruit, and postrecruit male king crab captured during the winter pot survey in the Nome area, 1995.

