

NORTON SOUND
WINTER RED KING CRAB STUDIES 1993

By

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INTRODUCTION

The winter king crab project began in February of 1982, with sampling procedures 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 and Anderson and Brennan 1993. The entire 1988 season was missed due to poor ice conditions.

The study had been restricted in the past to a narrow section of ice, directly offshore from the Nome State office building and extending 1/2 to 2 miles offshore. Shorefast and sea ice conditions constantly change and vary from location to location. During the 1989 and 1990 seasons, the study area was expanded 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 took place. This wider range in study area reduced the chance of lost fishing time due to poor ice conditions.

OBJECTIVES

The objectives of this winter crab project were to:

1. Monitor nearshore distribution and abundance of king crab during the months of highest local use.
2. Document distribution of fishermen.
3. Monitor the number and carapace age of sublegal and legal crab in the study's catch to determine recruitment.
4. Monitor other life history and biological data such as egg development and clutch size of female crab, disease and parasitism, incidence of competing species.
5. Investigate the potential use of large mesh panels built into crab pots as functional escape mechanisms for sublegal crab.

The 1993 winter crab study was reduced in scope due to funding considerations. The tagging studies of the past were abandoned because of the work involved, tag reward costs and the fact that annual growth and frequency of molt were established by previous tagging studies.

METHODS

Study Area

Four permanent fishing stations were established at various depths during the 1983 winter crab study (Figure 1). This was done so that the distribution of crab in nearshore waters could be evaluated. Station one was approximately 0.5 mile from shore and in water measuring 20 feet in depth from the surface of the ice to the ocean bottom. Stations two, three, and four were approximately 0.75, 1.25 and 2 miles offshore in depths of 42, 40, and 60 feet of water. Depths were checked using a weighted string before establishing a station. The proper location along the shore was determined by aligning the middle White Alice tower with the stack on top of the post office. Since 1983, study sites have been located as close as possible to these sites so results would be comparable.

In the 1989 and 1990 season, test sites were expanded and modified due to the changed project design (Figure 2). During the 1989 study, only stations 2 and 3 were used and renamed Nome 2 and Nome 3. Three new test sites were also established. Two stations were placed approximately 6 miles west of Nome, labeled West 1 and West 2. West 1 (in 40 feet of water) was located by the intersection of three rays. One ray is the line of site along the major mountain ridge between Bowhead and Willow Creeks. Another is along the Anvil Mountain West ridge. The third ray is the alignment of a rock outcropping, near the Teller Road between Penny River and Sunset Creek, with the 1270 foot peak directly north. Station West 2 (in 50 feet of water) was located due south of West 1 along the third alignment ray. The third station, labeled East 1, was placed approximately 6 mile east of Nome, aligned with the V.O.R. transmitter and the White Alice tower, in 40 feet of water. In 1990 an additional station named East 2 was located approximately 0.5 mile farther offshore from East 1 in 50 feet of water.

Three fishing stations were set up during the 1993 winter crab study (Figure 3) and one subsistence pot was used. Due to poor ice conditions, stations could not be placed in the traditional sites of previous studies. Station W was placed approximately 2 miles west of the Nome jetty, 0.5 miles offshore in 45 feet of water. Station N was placed directly in front of the State Office Building, approximately 0.5 miles offshore in 43 feet of water. Station E was placed approximately 2 miles east of town, 0.5 miles offshore in 45 feet of water. The subsistence pot utilized was approximately 3 miles west of the Nome jetty, 0.5 miles offshore in 45 feet of water. Detailed instructions on how the station ice is prepared to put a pot down are given in the operational plan.

Test Fishing

Throughout the history of the winter study, the same crab pot design has been used. Pots were purchased at "Arc 'n' Spark Welding, Inc." in Kodiak, Alaska. The shape of the pot is a truncated cone with a base diameter of 4 feet and a top diameter of 24 inches. The height is approximately 24 inches. The entrance is 16-18 inches in diameter, and located in the center of the top of the pot. There is a 6-8 inch plastic collar hanging from the entrance to keep crab from escaping. The escape pots were constructed using primarily 4 inch mesh webbing except for the escape panel. The panel was one of either 6, 8, or 10 inch mesh making up approximately 1/3 of the verticle surface and was adjacent to the base.

Standardized baiting of pots was conducted so that differing catches between stations would not be attributed to the amount of bait used but rather to differences in the abundance of crab at each station. Two, one quart bait containers of chopped herring and a string of 3 whole herring were hung in each pot, each time the pot was sampled. Bait was thawed before use, but occasionally became partially frozen before it could be put into the pot. Herring used was commercial quality bait. The three "escape" pots were not baited when crab were placed into them.

Detailed instructions on how the catch is processed are given in the operational plan. The following is a summary of the sampling procedure. Pots were brought near the surface and suspended so that all crab in the pot were covered with about one foot of water. Crab were removed one at a time, measured, shell age determined, egg development noted on females. Crab were then released through the same hole that the pot was suspended in. Crab spent less than 10 seconds exposed to outside air temperatures, which ranged from -35 to +35 F. Pots were then rebated, and placed back into hole. Crab pots were checked twice each week on non adjacent days and when weather cooperated.

The following is a summary of the procedure used in the escape pot portion of the study. Crab caught in study pots were measured and then tagged with a green band using an elastrator. Crab were then placed in a cooler which was used to transfer crab to the escape pot site. Crab were placed in the escape pot and a lid was fastened to the opening on top. The pot was then lowered into the water, through the hole in the ice. The escape pot was checked along with standard study pots twice each week.

RESULTS

Test Fishing

A total of 181 male and 1 female red king crab were captured at the 3 stations and one subsistence station between March 3, 1993 and April 16, 1993. A total of 33 pot lifts were made, for an average catch per pot lift of 5.5 male and 0.03 female crab (Tables 1 and 2). Average male catch per pot lift by station was: 6.7 crab/pot at W, 4.8 crab/pot at N, 5.0 crab/pot at E and 3.0 crab/pot at the subsistence pot (Table 2). Daily catch for each station is found in Appendix A Tables 1-4.

Catch Sampling

Carapace age and length measurements were taken from 181 male king crab. Twelve percent of these crab were sublegal, and 88% were legal (Table 3). In the total male crab catch, 3% were prerecruit twos, 9% were prerecruit ones, 17% were recruit, and 71% were postrecruit (Tables 3 and 8). The average carapace length for all male crab captured was 107 mm.

Out of 159 legal crab measured, 20% were recruit crab, and 80% were postrecruit crab. The average carapace length of legal male crab was 118 mm (Table 4). A total of 22 sublegal male crab were measured, of which 27% were prerecruit twos and 73% were prerecruit ones. The average carapace length for sublegal male crab was 96 mm (Table 5).

Only 1 female king crab was captured during the study. It had a carapace length of 93mm, a egg clutch size of 60-89%, and uneyed eggs (Table 6).

On March 30, 1993 an aerial survey was flown along the coast of Norton Sound to document effort and distribution of subsistence and commercial king crab fishermen. See Appendix B for memo and survey map.

Escape Pot Study

A total of 13 crab were placed in the 6 inch mesh panel escape pot between March 17, 1993 and March 29, 1993 at station W. Three of these crab were kept in the pot for 12 days, the remaining 10 crab were held for 7 days. Carapace length ranged from 98mm to 120mm. None of the 13 crab were able to escape from the pot with a 6 inch mesh panel. The same 13 crab were placed in an escape pot with an 8 inch mesh panel from March 29 to April 1, 1993. None of the 13

crab were able to escape from the 8 inch mesh panel pot during this time period. Most of the crab were showing signs of bloating and were released. A total of 7 crab were placed in the escape pot with a 10 inch mesh panel between April 5 and April 9, 1993 at station N. Carapace length ranged from 105 mm to 120 mm. When the pot was checked on April 9, 6 crab had been eaten by sea fleas (only the shell remained) and 1 crab was partially eaten. On April 12, 1993, 9 crab were put in the escape pot with a 10 inch mesh panel at Station E. Carapace length ranged from 103mm to 130 mm. When the pot was checked on April 15, no crab were left in the pot. There was no evidence that the pot had been tampered with.

DISCUSSION

The 1993 winter crab study documented the lowest catch per pot lift of female and male crab since baiting was standardized in 1983 (Table 7). The total number of crab caught and number of pots pulled were significantly less than those of the previous three winter crab studies (Table 7). This may be due to the fact that poor ice conditions restricted the placement of pots to sites closer to shore and to the town of Nome where fishing competition is greatest. The fact that the normal stations could not be used combined with impacts of the significant fall storm that occurred kept catch rates slow for all fisheries during the 1993 winter season. Prerecruit twos made up only 3% of all crab sampled and prerecruit ones made up only 9%. This is well below the average percentages for the years 1983 to 1991 (Table 8). Recruit crab made up 17% of all crab sampled compared to the average of 23% recruits for the years 1983 to 1991. Postrecruit crab made up 71% of all crab sampled, well above the average of 23% postrecruits for the years 1983 to 1991 (Table 8). Table 9 compares the Winter Study recruit and postrecruit percentages with that of the summer commercial fisheries.

The total number of pots lifted at the three stations were: 12 pot lifts at Station W and 10 pot lifts each at Station N and E. The subsistence pot was checked only one time throughout the study. Station W had the highest average male catch per pot lift (6.7 crab/pot) and the greatest number of male crab captured at any station (80 male crab) (Table 2).

Table 9 compares the legal crab size composition of the winter and summer fisheries. Generally the two harvests trend together and provide a predictor of the size of the crab to be harvested during the summer season. This index has yet to be fully developed as a management tool.

Average carapace length for all male crab measured (107 mm) was higher than the previous four study seasons (105 mm in 1991, 104 mm

in 1990, 105 mm in 1989, and 104 mm in 1987). The average carapace length for legal males (118 mm) was greater than that seen in the previous two winter crab studies (114 mm in 1991, 115 mm in 1990) (Table 10).

During the escape pot portion of the 1993 Winter Crab Project, crab were able to escape from the pot with 10 inch mesh panels. Crab placed in the pot with a 6 inch mesh panel were not able to escape during the holding time. None of the crab in the pot with the 8 inch mesh panel escaped and they were released after only 3 days due to their poor condition. However, this does not indicate that crab are not able escape from 8 inch mesh. Their weakened condition may have prevented the crab from escaping. Also, given a longer time period, the crab may have been able to escape. Five of the crab that died in the first test of the 10 inch mesh panel crab pot were transported in a cooler from Station E to Station N. They were out of water and exposed to air temperatures of approximately 7 degrees F for at least 0.5 hours. They were most likely in a weakened condition when placed in the pot and were then infested with sand flies.

Ice conditions were extremely poor during the 1993 winter season. The leading edge of the shorefast ice was approximately .75 miles offshore. In past winters the leading edge of the shorefast ice extended out past 2 miles. The ice pack past the .75 mile mark was continually being blown out by winds. Many subsistence and commercial crab pots were lost due to shifting ice. This made it impossible to set ADF&G crab pots past this edge. Because of this problem, crab pots were not set in traditional sites of up to 2 miles offshore, and 6 miles east and west of town. The most likely explanations for the low catch rate are: crab did not migrate as close to shore, or near to town as usual; fishing stations were catching the outer fringe of the migrating population; and fishing stations could not be placed far enough offshore to sample the population. Poor ice conditions and funding reductions also left less time to conduct the winter study.

Major climatological events that occurred within the previous eight months may have affected the crab distribution. Spring breakup in 1992 occurred an entire month later than normal in Norton Sound. This fact could have influenced the timing of the seasonal migration of crab. This seemed apparent in that the 1992 summer commercial fishery did not find crab in the usual locations. In addition a 50 year storm occurred in the fall which could have changed water salinity, temperature, altered the substrate or redistributed the food source. Nearly all comments from winter commercial and subsistence winter crab fishermen include, "... Where are all the crab?", "What happened to the crab?", or "This is the worst crabbing I can remember." One crabber extended his efforts as far as Cape Wooley with very little success.

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Table 1. Norton Sound winter king crab study, 1993. Daily Catch totals for all stations combined.

| Date | No. pots lifted | No. males captured | No. females captured | Avg. male catch per pot lift | Cum males captured | Cum avg. per pot |
|-------|-----------------|--------------------|----------------------|------------------------------|--------------------|------------------|
| 03/07 | 2 | 0 | 0 | 0.0 | 0 | 0.0 |
| 03/11 | 4 | 8 | 0 | 2.0 | 8 | 1.3 |
| 03/14 | 3 | 20 | 0 | 6.7 | 28 | 3.1 |
| 03/17 | 3 | 3 | 0 | 1.0 | 31 | 2.6 |
| 03/22 | 1 | 11 | 0 | 11.0 | 42 | 3.2 |
| 03/24 | 1 | 0 | 1 | 0.0 | 42 | 3.0 |
| 03/25 | 1 | 17 | 0 | 17.0 | 59 | 3.9 |
| 03/29 | 2 | 27 | 0 | 13.5 | 86 | 5.1 |
| 04/01 | 3 | 34 | 0 | 11.3 | 120 | 6.0 |
| 04/05 | 1 | 2 | 0 | 2.0 | 122 | 5.8 |
| 04/06 | 2 | 21 | 0 | 10.5 | 143 | 6.2 |
| 04/09 | 3 | 8 | 0 | 2.7 | 151 | 5.8 |
| 04/12 | 3 | 19 | 0 | 6.3 | 170 | 5.9 |
| 04/15 | 3 | 10 | 0 | 3.3 | 180 | 5.6 |
| 04/16 | 1 | 1 | 0 | 1.0 | 181 | 5.5 |
| TOTAL | 33 | 181 | 1 | 5.5 | 181 | 5.5 |

Table 2. Norton Sound winter king crab study, 1993. Catch by station.

| Station | No. pot lifts | No. males captured | Avg. male catch per pot lift | No. females captured | Avg. female catch per pot lift |
|--------------------------|---------------|--------------------|------------------------------|----------------------|--------------------------------|
| W | 12 | 80 | 6.7 | 0 | 0 |
| N | 10 | 48 | 4.8 | 0 | 0 |
| E | 10 | 50 | 5.0 | 1 | 0.1 |
| Subsistence ^a | 1 | 3 | 3.0 | 0 | 0 |
| TOTAL | 33 | 181 | 5.5 | 1 | 0.03 |

^a Subsistence pot not used to calculate total average catch per pot lift

Table 3. Length frequency distribution of male crab captured at all fishing stations during the winter king crab study, Norton Sound, 1992.

| CARAPACE LENGTH (mm) | PRE-RECRUIT (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 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 70 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 71 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 72 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 73 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 74 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 75 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 76 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 77 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 78 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 79 | 1 | 0.55% | | 0.00% | | 0.00% | 1 | 0.55% |
| 80 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 81 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 82 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 83 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 84 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 85 | 1 | 0.55% | | 0.00% | | 0.00% | 1 | 0.55% |
| 86 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 87 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 88 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 89 | 4 | 2.21% | | 0.00% | | 0.00% | 4 | 2.21% |
| 90 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 91 | 1 | 0.55% | | 0.00% | | 0.00% | 1 | 0.55% |
| 92 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 93 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 94 | 1 | 0.55% | | 0.00% | | 0.00% | 1 | 0.55% |
| 95 | 2 | 1.10% | | 0.00% | | 0.00% | 2 | 1.10% |
| 96 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 97 | 1 | 0.55% | | 0.00% | | 0.00% | 1 | 0.55% |
| 98 | 3 | 1.66% | | 0.00% | | 0.00% | 3 | 1.66% |
| 99 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 100 | | 0.00% | | 0.00% | | 0.00% | 0 | 0.00% |
| 101 | 3 | 1.66% | 1 | 0.55% | | 0.00% | 4 | 2.21% |
| 102 | 1 | 0.55% | | 0.00% | | 0.00% | 1 | 0.55% |
| 103 | | 0.00% | 1 | 0.55% | | 0.00% | 1 | 0.55% |
| 104 | 1 | 0.55% | | 0.00% | 1 | 0.55% | 2 | 1.10% |
| 105 | | 0.00% | 2 | 1.10% | 1 | 0.55% | 3 | 1.66% |
| 106 | | 0.00% | 1 | 0.55% | 1 | 0.55% | 2 | 1.10% |
| 107 | 1 | 0.55% | 4 | 2.21% | 4 | 2.21% | 9 | 4.97% |
| 108 | 1 | 0.55% | 1 | 0.55% | 2 | 1.10% | 4 | 2.21% |
| 109 | | 0.00% | 4 | 2.21% | 4 | 2.21% | 8 | 4.42% |
| 110 | 1 | 0.55% | 2 | 1.10% | 3 | 1.66% | 6 | 3.31% |
| 111 | | 0.00% | 2 | 1.10% | 6 | 3.31% | 8 | 4.42% |
| 112 | | 0.00% | 2 | 1.10% | 3 | 1.66% | 5 | 2.78% |
| 113 | | 0.00% | 2 | 1.10% | 9 | 4.97% | 11 | 6.08% |
| 114 | | 0.00% | 4 | 2.21% | 2 | 1.10% | 6 | 3.31% |
| 115 | | 0.00% | 5 | 2.78% | 2 | 1.10% | 7 | 3.87% |
| 116 | | 0.00% | | 0.00% | 7 | 3.87% | 7 | 3.87% |
| 117 | | 0.00% | | 0.00% | 7 | 3.87% | 7 | 3.87% |
| 118 | | 0.00% | | 0.00% | 7 | 3.87% | 7 | 3.87% |
| 119 | | 0.00% | | 0.00% | 11 | 6.08% | 11 | 6.08% |
| 120 | | 0.00% | | 0.00% | 13 | 7.16% | 13 | 7.16% |
| 121 | | 0.00% | | 0.00% | 8 | 3.31% | 8 | 3.31% |
| 122 | | 0.00% | | 0.00% | 4 | 2.21% | 4 | 2.21% |
| 123 | | 0.00% | | 0.00% | 2 | 1.10% | 2 | 1.10% |
| 124 | | 0.00% | | 0.00% | 4 | 2.21% | 4 | 2.21% |
| 125 | | 0.00% | | 0.00% | 1 | 0.55% | 1 | 0.55% |
| 126 | | 0.00% | | 0.00% | 1 | 0.55% | 1 | 0.55% |
| 127 | | 0.00% | | 0.00% | 2 | 1.10% | 2 | 1.10% |
| 128 | | 0.00% | | 0.00% | 5 | 2.78% | 5 | 2.78% |
| 129 | | 0.00% | | 0.00% | 2 | 1.10% | 2 | 1.10% |
| 130 | | 0.00% | | 0.00% | 2 | 1.10% | 2 | 1.10% |
| 131 | | 0.00% | | 0.00% | 3 | 1.66% | 3 | 1.66% |
| 132 | | 0.00% | | 0.00% | 3 | 1.66% | 3 | 1.66% |
| 133 | | 0.00% | | 0.00% | 1 | 0.55% | 1 | 0.55% |
| 134 | | 0.00% | | 0.00% | 2 | 1.10% | 2 | 1.10% |
| 135 | | 0.00% | | 0.00% | 1 | 0.55% | 1 | 0.55% |
| 136 | | 0.00% | | 0.00% | 1 | 0.55% | 1 | 0.55% |
| 137 | | 0.00% | | 0.00% | 1 | 0.55% | 1 | 0.55% |
| 138 | | 0.00% | | 0.00% | 0 | 0.00% | 0 | 0.00% |
| 139 | | 0.00% | | 0.00% | 0 | 0.00% | 0 | 0.00% |
| 140 | | 0.00% | | 0.00% | 1 | 0.55% | 1 | 0.55% |
| 141 | | 0.00% | | 0.00% | 1 | 0.55% | 1 | 0.55% |
| 142 | | 0.00% | | 0.00% | 1 | 0.55% | 1 | 0.55% |
| 143 | | 0.00% | | 0.00% | 0 | 0.00% | 0 | 0.00% |
| 144 | | 0.00% | | 0.00% | 0 | 0.00% | 0 | 0.00% |
| 145 | | 0.00% | | 0.00% | 0 | 0.00% | 0 | 0.00% |
| 146 | | 0.00% | | 0.00% | 0 | 0.00% | 0 | 0.00% |
| 147 | | 0.00% | | 0.00% | 0 | 0.00% | 0 | 0.00% |
| 148 | | 0.00% | | 0.00% | 1 | 0.55% | 1 | 0.55% |
| 149 | | 0.00% | | 0.00% | 0 | 0.00% | 0 | 0.00% |
| Total No. | 22 | 12.15% | 31 | 17.13% | 126 | 70.72% | 181 | 100.00% |

Number of pre-recruit crabs (<=80mm) = 6
 Number of pre-recruit crabs (>=90mm) = 16
 Mean carapace length = 107 mm

Table 4. Carapace length measurement summary of legal male red king crab captured during the winter king crab study, Norton Sound, 1993.

| Carapace Length (mm) | New shell | | | Old shell | | | Total | | |
|----------------------|-----------|------------|---------|-----------|------------|---------|-------|------------|---------|
| | No. | Ave Length | Calc. % | No. | Ave Length | Calc. % | No. | Ave Length | Calc. % |
| 97 | | 0.00 | 0.0% | | 0.00 | 0.0% | 0 | 0.00 | 0.0% |
| 98 | | 0.00 | 0.0% | | 0.00 | 0.0% | 0 | 0.00 | 0.0% |
| 99 | | 0.00 | 0.0% | | 0.00 | 0.0% | 0 | 0.00 | 0.0% |
| 100 | | 0.00 | 0.0% | | 0.00 | 0.0% | 0 | 0.00 | 0.0% |
| 101 | 1 | 2.10 | 2.1% | | 0.00 | 0.0% | 1 | 0.84 | 0.6% |
| 102 | | 0.00 | 0.0% | | 0.00 | 0.0% | 0 | 0.00 | 0.0% |
| 103 | 1 | 2.15 | 2.1% | | 0.00 | 0.0% | 1 | 0.85 | 0.6% |
| 104 | | 0.00 | 0.0% | 1 | 0.94 | 0.9% | 1 | 0.85 | 0.6% |
| 105 | 2 | 4.38 | 4.2% | 1 | 0.95 | 0.9% | 3 | 1.98 | 1.9% |
| 108 | 1 | 2.21 | 2.1% | 1 | 0.95 | 0.9% | 2 | 1.33 | 1.3% |
| 107 | 4 | 8.92 | 8.3% | 4 | 3.88 | 3.6% | 8 | 5.38 | 5.0% |
| 108 | 1 | 2.25 | 2.1% | 2 | 1.95 | 1.8% | 3 | 2.04 | 1.9% |
| 109 | 4 | 9.06 | 8.3% | 4 | 3.93 | 3.6% | 8 | 5.48 | 5.0% |
| 110 | 2 | 4.58 | 4.2% | 3 | 2.97 | 2.7% | 5 | 3.46 | 3.1% |
| 111 | 2 | 4.63 | 4.2% | 6 | 6.00 | 5.4% | 8 | 5.58 | 5.0% |
| 112 | 2 | 4.67 | 4.2% | 3 | 3.03 | 2.7% | 5 | 3.52 | 3.1% |
| 113 | 2 | 4.71 | 4.2% | 9 | 9.16 | 8.1% | 11 | 7.82 | 6.9% |
| 114 | 4 | 9.50 | 8.3% | 2 | 2.05 | 1.8% | 6 | 4.30 | 3.8% |
| 115 | 5 | 11.98 | 10.4% | 2 | 2.07 | 1.8% | 7 | 3.08 | 4.4% |
| 116 | 2 | 4.83 | 4.2% | 5 | 5.23 | 4.5% | 7 | 5.11 | 4.4% |
| 117 | 2 | 4.88 | 4.2% | 5 | 5.27 | 4.5% | 7 | 5.15 | 4.4% |
| 118 | 3 | 7.38 | 6.3% | 4 | 4.25 | 3.8% | 7 | 5.19 | 4.4% |
| 119 | 3 | 7.44 | 6.3% | 8 | 8.58 | 7.2% | 11 | 8.23 | 6.9% |
| 120 | 2 | 5.00 | 4.2% | 11 | 11.89 | 9.9% | 13 | 9.81 | 8.2% |
| 121 | | 0.00 | 0.0% | 6 | 6.54 | 5.4% | 6 | 4.57 | 3.8% |
| 122 | | 0.00 | 0.0% | 4 | 4.40 | 3.8% | 4 | 3.07 | 2.5% |
| 123 | | 0.00 | 0.0% | 2 | 2.22 | 1.8% | 2 | 1.58 | 1.3% |
| 124 | 2 | 5.17 | 4.2% | 2 | 2.23 | 1.8% | 4 | 3.12 | 2.5% |
| 125 | | 0.00 | 0.0% | 1 | 1.13 | 0.9% | 1 | 0.79 | 0.6% |
| 126 | 1 | 2.63 | 2.1% | | 0.00 | 0.0% | 1 | 0.79 | 0.6% |
| 127 | | 0.00 | 0.0% | 2 | 2.29 | 1.8% | 2 | 1.60 | 1.3% |
| 128 | | 0.00 | 0.0% | 5 | 5.77 | 4.5% | 5 | 4.03 | 3.1% |
| 129 | | 0.00 | 0.0% | 2 | 2.32 | 1.8% | 2 | 1.62 | 1.3% |
| 130 | 1 | 2.71 | 2.1% | 1 | 1.17 | 0.9% | 2 | 1.64 | 1.3% |
| 131 | | 0.00 | 0.0% | 3 | 3.54 | 2.7% | 3 | 2.47 | 1.9% |
| 132 | 1 | 2.75 | 2.1% | 2 | 2.38 | 1.8% | 3 | 2.48 | 1.9% |
| 133 | | 0.00 | 0.0% | 1 | 1.20 | 0.9% | 1 | 0.84 | 0.6% |
| 134 | | 0.00 | 0.0% | 2 | 2.41 | 1.8% | 2 | 1.69 | 1.3% |
| 136 | | 0.00 | 0.0% | 1 | 1.22 | 0.9% | 1 | 0.85 | 0.6% |
| 136 | | 0.00 | 0.0% | 1 | 1.23 | 0.9% | 1 | 0.86 | 0.6% |
| 137 | | 0.00 | 0.0% | 1 | 1.23 | 0.9% | 1 | 0.86 | 0.6% |
| 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% | 1 | 1.28 | 0.9% | 1 | 0.88 | 0.6% |
| 141 | | 0.00 | 0.0% | 1 | 1.27 | 0.9% | 1 | 0.89 | 0.6% |
| 142 | | 0.00 | 0.0% | 1 | 1.28 | 0.9% | 1 | 0.89 | 0.6% |
| 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% |
| 148 | | 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% | 1 | 1.33 | 0.9% | 1 | 0.93 | 0.6% |
| 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. | 48 | | 30.2% | 111 | | 69.8% | 159 | | 100.0% |
| Mean | | 113.9 | | | 119.4 | | | 117.8 | |

Total legal 159

Total Recruits 31
Percent 19.5%

Total Post Recruits 128
Percent 80.5%

Table 5. Carapace length measurement summary of sublegal male red king crab captured during the winter crab study, Norton Sound, 1993.

| Carapace Length (mm) | New Shell | | | Old Shell | | | Total | | |
|----------------------|-----------|-----------------|-------|-----------|-----------------|-------|-------|-----------------|--------|
| | No. | Ave Length Calc | % | No. | Ave Length Calc | % | No. | Ave Length Calc | % |
| 52 | | 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 | | 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 | 1 | 4.39 | 5.6% | | 0.00 | 0.0% | 1 | 3.59 | 4.5% |
| 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 | 1 | 4.72 | 5.6% | | 0.00 | 0.0% | 1 | 3.86 | 4.5% |
| 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 | 4 | 19.78 | 22.2% | | 0.00 | 0.0% | 4 | 16.18 | 18.2% |
| 90 | | 0.00 | 0.0% | | 0.00 | 0.0% | 0 | 0.00 | 0.0% |
| 91 | 1 | 5.06 | 5.6% | | 0.00 | 0.0% | 1 | 4.14 | 4.5% |
| 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 | 1 | 5.22 | 5.6% | | 0.00 | 0.0% | 1 | 4.27 | 4.5% |
| 95 | 2 | 10.56 | 11.1% | | 0.00 | 0.0% | 2 | 8.64 | 9.1% |
| 96 | | 0.00 | 0.0% | | 0.00 | 0.0% | 0 | 0.00 | 0.0% |
| 97 | 1 | 5.39 | 5.6% | | 0.00 | 0.0% | 1 | 4.41 | 4.5% |
| 98 | 2 | 10.89 | 11.1% | 1 | 24.50 | 25.0% | 3 | 13.36 | 13.6% |
| 99 | | 0.00 | 0.0% | | 0.00 | 0.0% | 0 | 0.00 | 0.0% |
| 100 | | 0.00 | 0.0% | | 0.00 | 0.0% | 0 | 0.00 | 0.0% |
| 101 | 2 | 11.22 | 11.1% | 1 | 25.25 | 25.0% | 3 | 13.77 | 13.6% |
| 102 | | 0.00 | 0.0% | 1 | 25.50 | 25.0% | 1 | 4.64 | 4.5% |
| 103 | | 0.00 | 0.0% | | 0.00 | 0.0% | 0 | 0.00 | 0.0% |
| 104 | 1 | 5.78 | 5.6% | | 0.00 | 0.0% | 1 | 4.73 | 4.5% |
| 105 | | 0.00 | 0.0% | | 0.00 | 0.0% | 0 | 0.00 | 0.0% |
| 106 | | 0.00 | 0.0% | | 0.00 | 0.0% | 0 | 0.00 | 0.0% |
| 107 | 1 | 5.94 | 5.6% | | 0.00 | 0.0% | 1 | 4.86 | 4.5% |
| 108 | | 0.00 | 0.0% | 1 | 27.00 | 25.0% | 1 | 4.91 | 4.5% |
| 109 | | 0.00 | 0.0% | | 0.00 | 0.0% | 0 | 0.00 | 0.0% |
| 110 | 1 | 6.11 | 5.6% | | 0.00 | 0.0% | 1 | 5.00 | 4.5% |
| 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% |
| sum | 18 | | 81.8% | 4 | | 18.2% | 22 | | 100.0% |
| Mean | | 95.1 | | | 102.3 | | | 96.4 | |

Total sublegals 22

Table 6. Norton Sound winter king crab study, 1993.
Egg development and size of female crab.

| Capture Date | Station | Carapace length (mm) | Clutch size (%) | Comments |
|--------------|---------|----------------------|-----------------|-------------|
| 03/24 | E | 93 | 60–89 | uneyed eggs |

Table 7. Norton Sound winter king crab study, 1993. Comparison of winter king crab study catches by year, 1982 to 1993.

| Year | No. pot lifts | No. Males captured | Av. Male catch per pot lift | No. females captured | Av. Female catch per pot lift |
|-------------------|---------------|--------------------|-----------------------------|----------------------|-------------------------------|
| 1982 ^a | 60 | 246 | 4.1 | 10 | 0.2 |
| 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 | 0.2 |
| 1988 ^b | | | | | |
| 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 ^c | | | | | |
| 1993 | 33 | 181 | 5.5 | 1 | 0.03 |

^a Fishing stations and baiting techniques were not standardized.

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

^c No data collected in winter 1992 due to lack of funds for winter project.

Table 8. Norton Sound winter king crab study, 1993. Comparison of percent prerecruits, recruits, and postrecruits by year, 1983 to 1993.

| 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 |
| Avg. % 1983–1991 | 22 | 32 | | 23 | 23 | |

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

^b No data collected in winter 1992 due to lack of funds for a winter project.

Table 9. Comparison of percent recruit and postrecruit king crab sampled from summer commercial fisheries and winter crab studies, Norton Sound, 1983 to 1993.

| 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 | | |

^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 in winter 1992 due to lack of funds for a winter project.

Table 10. Norton Sound winter king crab study, 1993. Comparison of average carapace lengths for female and male king crab captured, by year, 1983 to 1993.

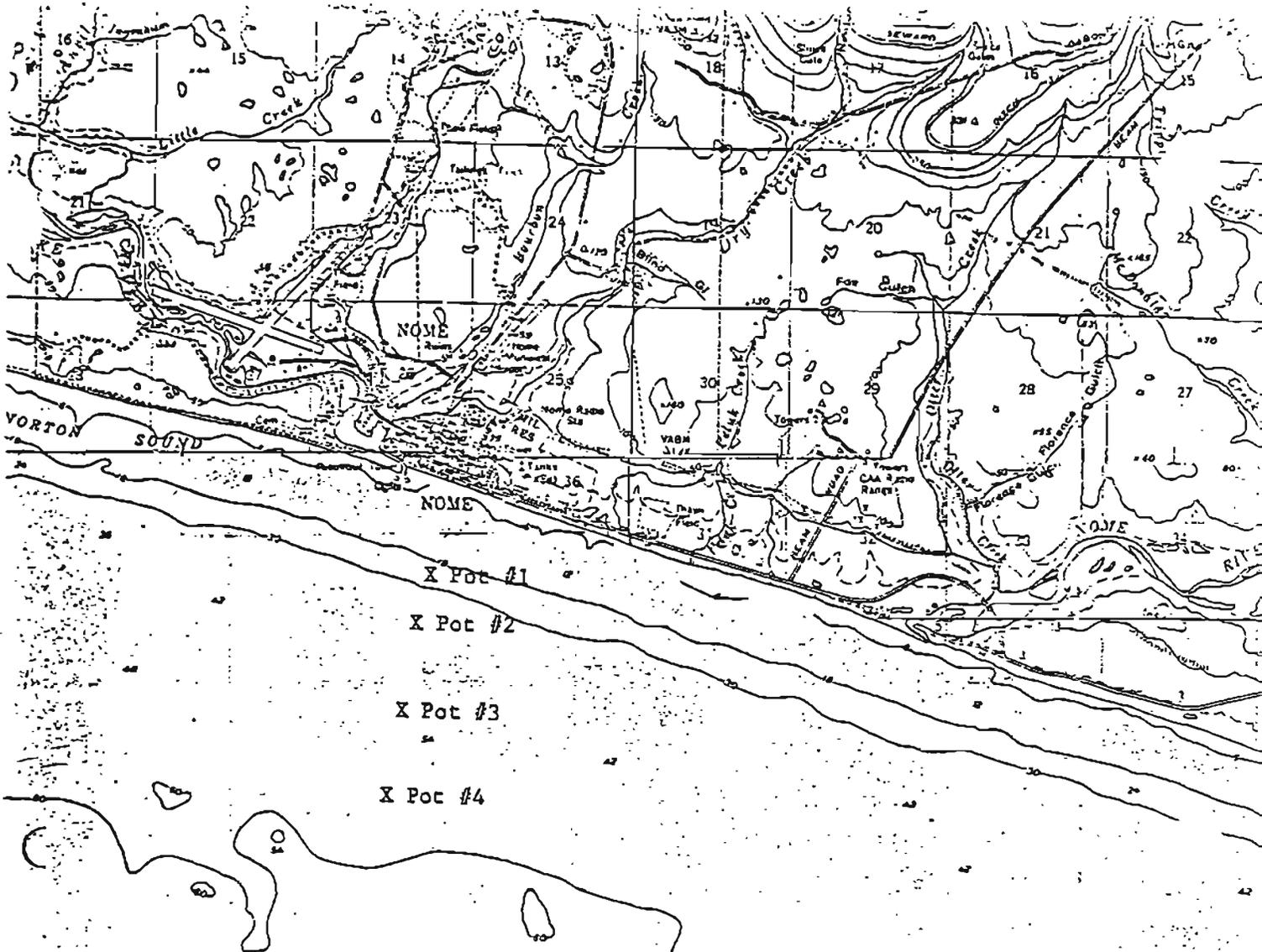
| Year | Avg. length of all male crab (mm) | Avg. length of legal male crab (mm) | Avg. length of female crab (mm) |
|-------------------|-----------------------------------|-------------------------------------|---------------------------------|
| 1983 | 98 | d | d |
| 1984 | 94 | d | d |
| 1985 | 97 | d | 79 |
| 1986 | 97 | d | 70 |
| 1987 | 104 | d | 71 |
| 1988 ^a | | | |
| 1989 | 105 | d | 79 |
| 1990 | 104 | 115 | 83 |
| 1991 | 105 | 114 | 75 |
| 1992 ^b | | | |
| 1993 | 107 | 118 | 93 ^c |

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

^b No data collected in winter 1992 due to lack of funds for a winter project.

^c Only one female crab captured during project.

^d Information not available



| Station # | Depth (Feet) | Distance from Shore (Miles) |
|-----------|--------------|-----------------------------|
| 1 | 20 | 1/2 |
| 2 | 42 | 3/4 |
| 3 | 50 | 1 1/2 |
| 4 | 60 | 2 |

Figure 1. Winter king crab study area and pot locations, Norton Sound Section, 1983-1987.

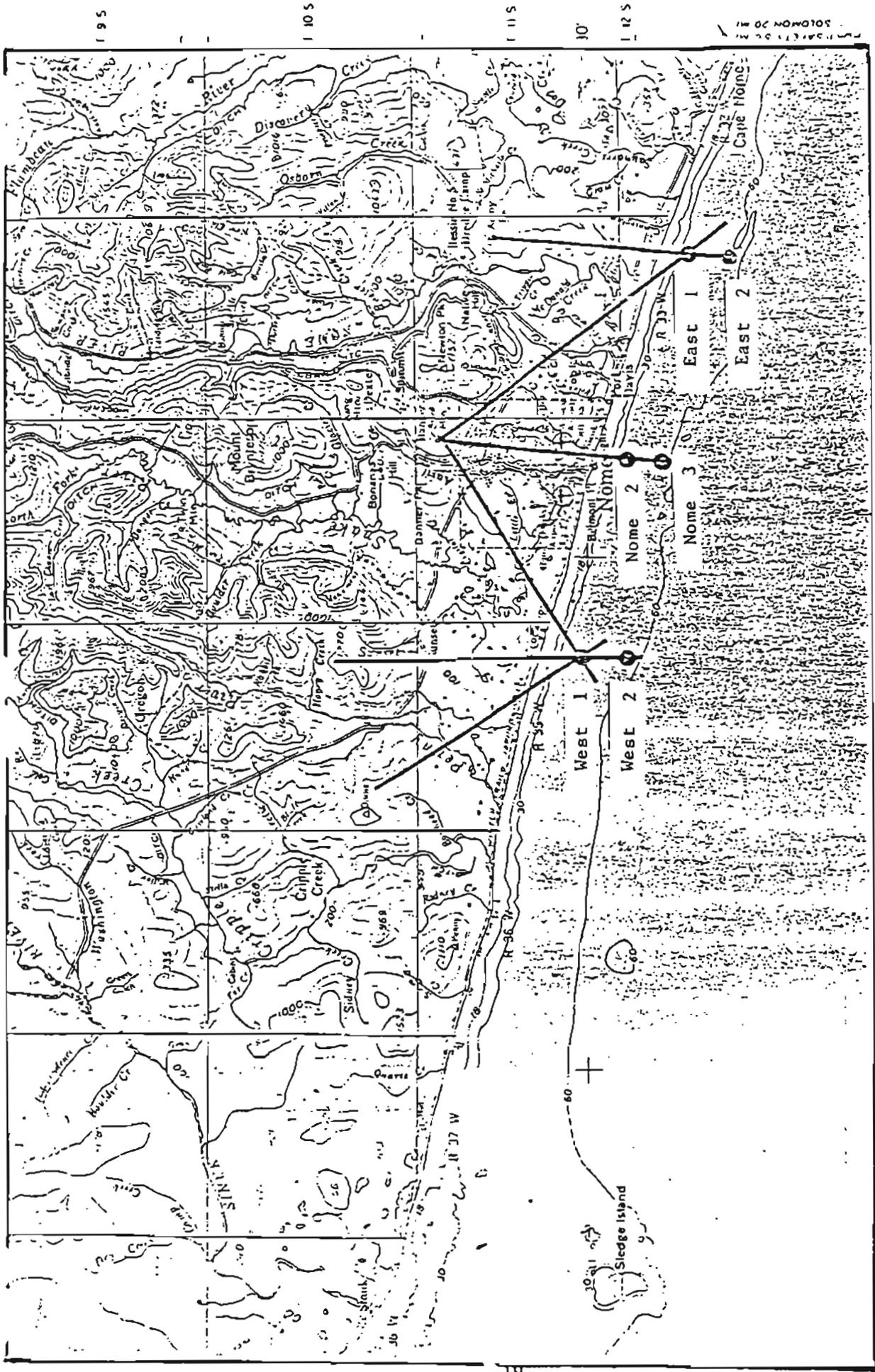


Figure 2. Winter king crab study area and pot locations, Norton Sound Section, 1990.

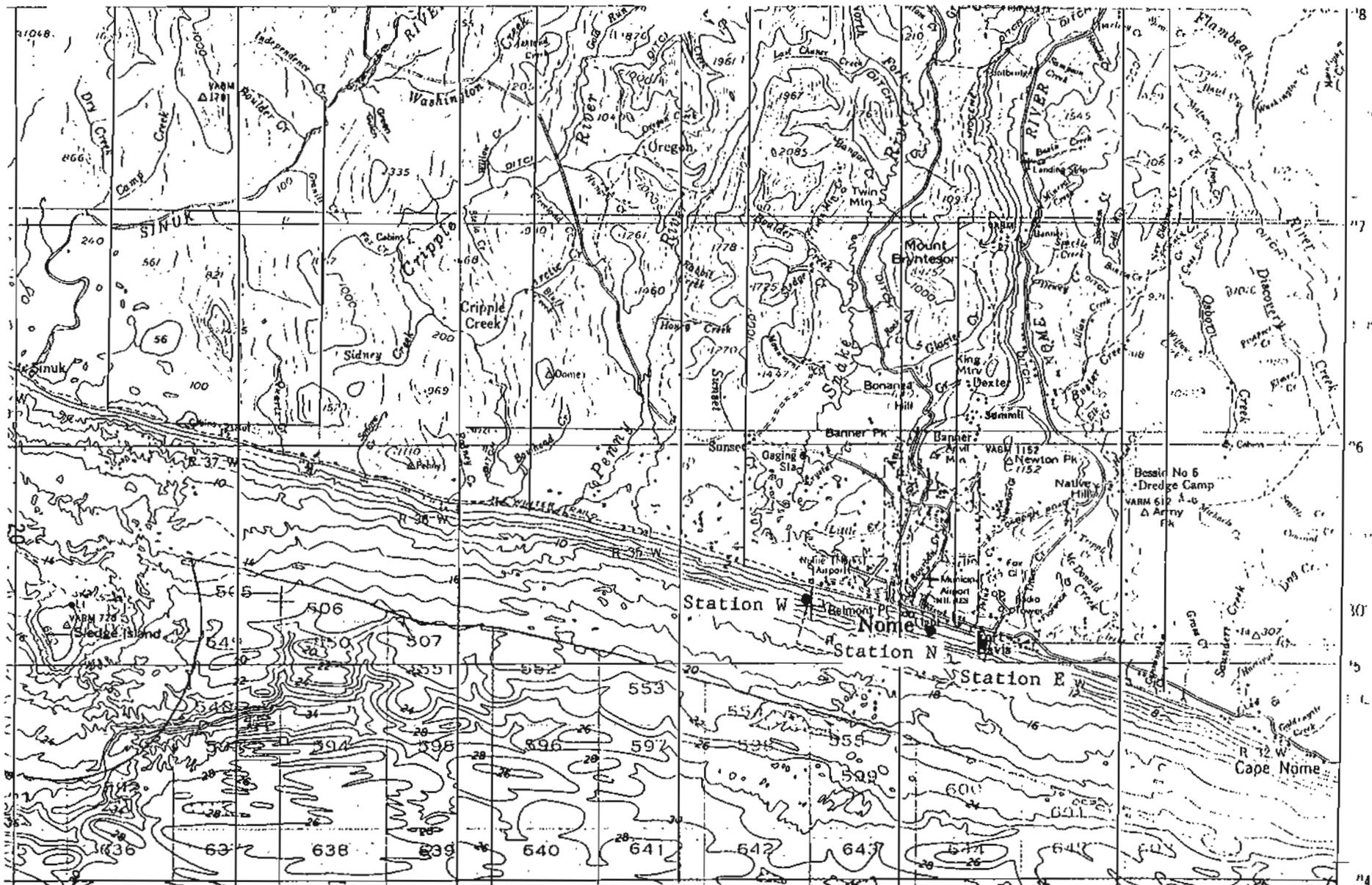


Figure 3. Winter king crab study area and pot locations, Norton Sound Section, Winter 1993.

Norton Sound Male King Crab Winter 1993

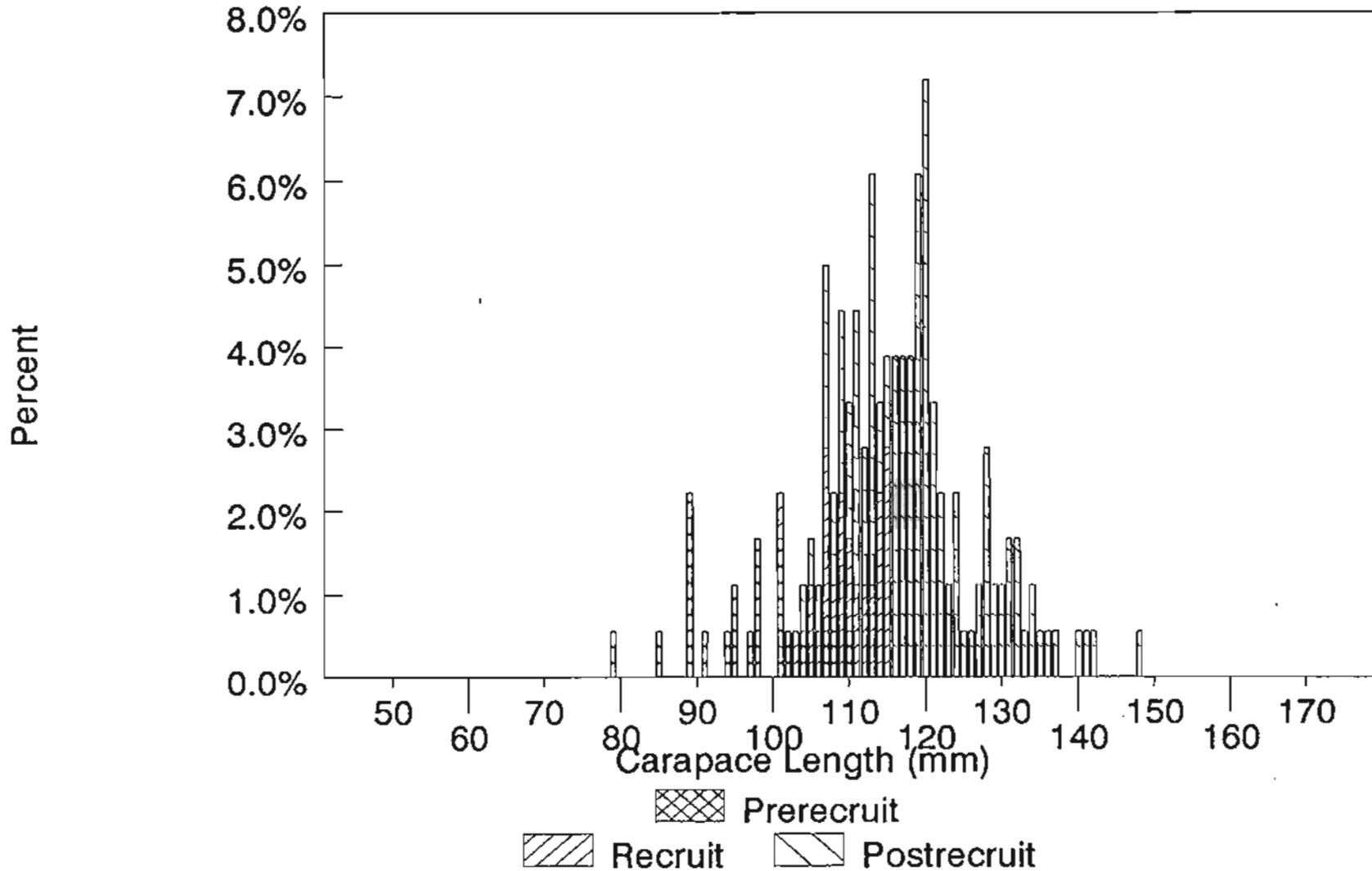


Figure 4. Length frequency distribution of prerecruit, recruit and postrecruit male king crab, Norton Sound Section, Winter 1993.

APPENDIX A

Appendix A

Table 1. Norton Sound winter king crab study, 1993.
Record of catches for fishing station W.

| Date | Soak time (days) | Daily No. males captured | Cum. No. males captured | Daily No. females captured | Cum. No. females captured |
|----------|------------------|--------------------------|-------------------------|----------------------------|---------------------------|
| 03/07 | 3 | 0 | 0 | 0 | 0 |
| 03/11 | 4 | 1 | 1 | 0 | 0 |
| 03/14 | 3 | 10 | 11 | 0 | 0 |
| 03/17 | 3 | 3 | 14 | 0 | 0 |
| 03/22 | 5 | 11 | 25 | 0 | 0 |
| 03/29 | 7 | 9 | 34 | 0 | 0 |
| 04/01 | 3 | 1 | 35 | 0 | 0 |
| 04/06 | 5 | 13 | 48 | 0 | 0 |
| 04/09 | 3 | 7 | 55 | 0 | 0 |
| 04/12 | 3 | 15 | 70 | 0 | 0 |
| 04/15 | 3 | 9 | 79 | 0 | 0 |
| 04/16 | 1 | 1 | 80 | 0 | 0 |
| 12 lifts | 43 | 80 | 80 | 0 | 0 |

Avg. number of males per pot lift: 6.6

Avg. number of female per pot lift: 0

Appendix A

Table 2. Norton Sound winter king crab study, 1993.
Record of catches for fishing station N.

| Date | Soak time (days) | Daily No. males captured | Cum. No. males captured | Daily No. females captured | Cum. No. females captured |
|----------|------------------|--------------------------|-------------------------|----------------------------|---------------------------|
| 03/07 | 2 | 0 | 0 | 0 | 0 |
| 03/11 | 4 | 0 | 0 | 0 | 0 |
| 03/14 | 3 | 4 | 4 | 0 | 0 |
| 03/17 | 3 | 0 | 4 | 0 | 0 |
| 03/25 | 8 | 17 | 21 | 0 | 0 |
| 04/01 | 7 | 25 | 46 | 0 | 0 |
| 04/05 | 4 | 2 | 48 | 0 | 0 |
| 04/09 | 4 | 0 | 48 | 0 | 0 |
| 04/12 | 3 | 0 | 48 | 0 | 0 |
| 04/15 | 3 | 0 | 48 | 0 | 0 |
| 10 lifts | 41 | 48 | 48 | 0 | 0 |

Avg. number of males per pot lift: 4.8

Avg. number of females per pot lift: 0

Appendix A

Table 3. Norton Sound winter king crab study, 1993.
Record of catches for fishing station E.

| Date | Soak time (days) | Daily No. males captured | Cum. No. males captured | Daily No. females captured | Cum. No. females captured |
|----------|------------------|--------------------------|-------------------------|----------------------------|---------------------------|
| 03/11 | 3 | 4 | 4 | 0 | 0 |
| 03/14 | 3 | 6 | 10 | 0 | 0 |
| 03/17 | 3 | 0 | 10 | 0 | 0 |
| 03/24 | 7 | 0 | 10 | 1 | 1 |
| 03/29 | 5 | 18 | 28 | 0 | 1 |
| 04/01 | 3 | 8 | 36 | 0 | 1 |
| 04/06 | 5 | 8 | 44 | 0 | 1 |
| 04/09 | 3 | 1 | 45 | 0 | 1 |
| 04/12 | 3 | 4 | 49 | 0 | 1 |
| 04/15 | 3 | 1 | 50 | 0 | 1 |
| 10 lifts | 38 | 50 | 50 | 1 | 1 |

Avg. number of males per pot lift: 5.0

Avg. number of females per pot lift: 0.1

Appendix A

Table 4. Norton Sound winter king crab study, 1993.
Record of catches for subsistence fishing station.

| Date | Soak time (days) | Daily No. males captured | Cum. No. males captured | Daily No. females captured | Cum. No. females captured |
|------------|------------------|--------------------------|-------------------------|----------------------------|---------------------------|
| 03/07 | 4 | 3 | 3 | 0 | 0 |
| 1 pot lift | 4 | 3 | 3 | 0 | 0 |

Appendix B

M E M O R A N D U M**S T A T E O F A L A S K A**
Department of Fish and Game

To: King Crab File
Comm Fish Div.
Norton Sound Area

Date: April 2, 1993

Phone: 443 - 5167

From: Fred Bue
Asst. Area Biologist
Comm Fish, Nome

Subject: King Crab Aerial
Survey of Effort
and Distribution

On March 30, 1993 I flew an aerial survey along the coast of Norton Sound to document effort and distribution of local subsistence and commercial king crab fishermen utilizing the nearshore resource. For the investigation I chartered a Cessna 185 based out of Unalakleet. The survey began near Spruce Creek south of Unalakleet and continued along the coast to Cape Dexter where I followed the ice edge to Elim, and then back along the coast to Cripple River west of Nome. Survey conditions were overall good with high overcast along the East coast and clear skies along the North coast.

The method was to fly between the beach and ice edge looking for active fishing holes or snowmachine tracks that would eventually lead to fishing holes. Relative locations were noted on survey maps along with observed sea ice conditions (Figure 1). The Koyuk area was not surveyed because of time and there has been no indication that people in that area crab through the ice. The St. Michael/Stuart Island and Port Clarence areas were not surveyed due to time. We know that those residents do crab fish, but typically less than those in the area surveyed.

Unalakleet Area

People from Unalakleet fish two different areas, south of town out from Coral Lake (8 holes) and north of town between Egavik and Junction Creeks (15 holes). I talked with a couple people from Unalakleet who said fishing was usually done in 25 to 35 feet of water and success was slightly better to the north, 8 or 10 per pot versus 3 to 6. It is also farther to travel to the northern location.

Shaktoolik Area

No crabbing activity was observed in the Shaktoolik vicinity during this survey. People have reported the typical crab fishing method is to stand at the ice edge near Cape Denbigh using handlines (strings with bait lowered to the bottom and retrieved to the

surface with clinging crab). People also look for crab in the shallow water near the beach just after the ice leaves.

Elim Area

The crab fishing in the Elim area was concentrated between Walla Walla Creek and Portage Roadhouse (21 holes). I landed and talked with two separate fishermen who had each just pulled up 6 crabs apiece from single pots. I did not measure the crab which looked slightly larger than those caught near Nome and the fishermen said they were typical size for the area. Most of the crab were new-shells with more shell scaring on the underside than common near Nome. Dolly Varden was used for bait and fishing was done in 20 and 35 feet depth of water.

Rocky Point Area

No crabbing activity was observed in the area between Rocky Point and Bluff during this survey. Earlier fishermen reports indicated at least two fishermen (from White Mountain) were fishing near Square Rock in 60 feet of water with varied success.

Nome Area

A total of 40 pots and 15 handline holes were observed to be active between Fort Davis and Cripple River. There were 18 pot and 15 handline holes east of the Nome causeway and 22 pot holes to the west. Nearly all holes were along the shorefast ice edge at about the 40 foot isobath. There was an open lead along the edge and one hole was observed to be separating out of reach by snowmachine. The ice was jumbled which created shadows and made spotting holes more difficult than in other years.

General Comments and Observations

Crab catches are just beginning to increase in all areas. Fishermen and the ADF&G test pots have noted larger catches in the Nome area. Other fishermen from surrounding villages are still increasing their effort with the longer day length and warmer temperatures.

Fishing effort is seldom located in water deeper than 40 feet even near Unalakleet and Elim where the solid ice edge extends several miles offshore.

There has been a recent increase in winter commercial crabbing by people from Unalakleet and Elim. This is partly due to newly learned method of how and where to catch crab and the realization that they can make some money.

All of the people contacted indicated that crabbing was one of the highlights of their winter.

cc: Lean
Cannon
Brennan

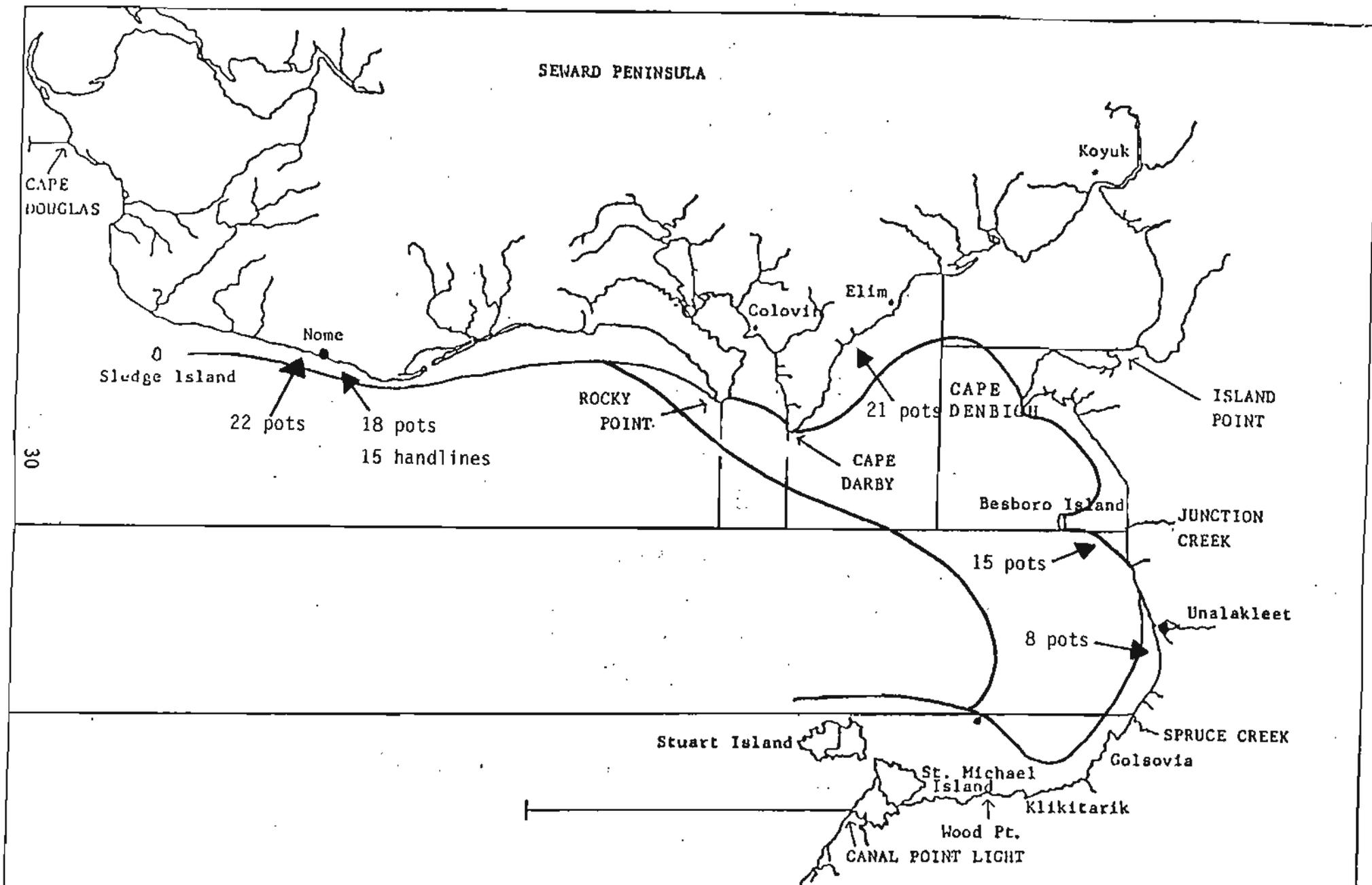


Figure 1. Aerial survey count of winter crab fishing effort and distribution, Norton Sound, 30 March 1993.