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THE 1995 ST. MATTHEW ISLAND
BLUE KING CRAB SURVEY

By

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TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	i
LIST OF FIGURES	ii
LIST OF APPENDICES.....	iii
INTRODUCTION.....	1
Survey Objectives.....	1
METHODS	2
Survey Design.....	2
Station Grid and Strata	2
Pots Per Station and Stations Per Day.....	2
Target Soak Times for Pots	2
Chartered Vessel and Crews	2
Pots, Bait, and Deck Equipment Used.....	2
Navigational/Communication Equipment	3
Catch Sorting and Sampling.....	3
Crab Measurements	3
Size Categories.....	3
Shell-Aging.....	4
Tagging Equipment and Procedures.....	5
Miscellaneous Species.....	6
Observer Practicum	6
Forms	6
Database.....	6
RESULTS	6
Fishing Statistics.....	6
Survey Overview	6
Soak Times.....	6
Depths Fished.....	7
Bottom Types.....	7
Blue King Crab Data Summaries	7

TABLE OF CONTENTS (Cont.)

	<u>Page</u>
Number Captured	7
Spatial Distribution of Blue King Crabs.....	7
Sex Distribution by Depth.....	7
Size Range and Length Frequencies	8
Blue King Crabs Tagged.....	8
Exoskeleton or Shell-Aging	8
Female Reproductive Condition	8
Sublegal-Legal Size Overlap	9
Diseases and Symbionts	9
 Snow Crabs.....	 9
 Miscellaneous Marine Life.....	 10
Crabs Captured for Mandatory Observer Practicum	10
Video	10
 DISCUSSION	 10
 LITERATURE CITED.....	 13
 TABLES	 14
 FIGURES	 25
 APPENDIX	 32

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Soak times of the king crab pots pulled on the August 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game	14
2. Location and catch per station of blue king crabs <i>Paralithodes platypus</i> and snow crabs <i>Chionoecetes opilio</i> on Alaska Department of Fish and Game's 1995 blue king crab survey in the St. Matthew Section, of the Bering Sea king crab registration area Q2	15
3. Number and catch per unit of effort (CPUE) of blue king crabs captured on the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game	21
4. Exoskeletal shell-ages observed on blue kings <i>Paralithodes platypus</i> and snow crabs <i>Chionoecetes opilio</i> during the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game	22
5. Size overlap of sublegal and legal male blue king crabs from the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game	23
6. External reproductive conditions of female blue king crabs observed on the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game	24

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Station locations and strata fished on the August 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game. For latitude and longitude of each station see Table 2. Stratum 1 is outside the five-side striped figure and Stratum 2 is inside that figure; there station density is 1.74 times greater than in Stratum 1	25
2. Bottom types recorded at fished stations during the August 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game	26
3. Total blue king crabs captured by station (legals, sublegals, females) on the August 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game	27
4. Legal blue king crab males captured by station on the August 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game	28
5. Female blue king crabs captured by station on the August 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game	29
6. Number of male and female blue king crabs captured at depth intervals during the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game	30
7. Carapace length frequencies of male and female blue king crabs captured on the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game	31

LIST OF APPENDICES

<u>Appendix</u>	<u>Page</u>
A.1. Pilot house log used to record station and pot location, depth, and set and pull times, on the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game. Form shown here was reduced to 85% of its original size	33
B.1. Male blue king crab recording form used on the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game. Form shown here was reduced to 77% of its original size.....	34
C.1. Female blue king crab recording form used on the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game. Form shown here was reduced to 77% of its original size.....	35
D.1. Crab research recording form used to record snow crab data on the 1995 St. Matthew Island blue king crab survey, conducted by the Alaska Department of Fish and Game. Form shown here was reduced to 77% of its original size.....	36

INTRODUCTION

The St. Matthew Section, Northern District of the Bering Sea king crab registration Area, Q2, includes the waters north of Cape Newenham (58°39' N latitude) and south of the latitude of Cape Romanzof (61°49' N)(ADF&G 1994). Commercial fishing for blue king crabs *Paralithodes platypus* in St. Matthew Section has occurred every year from 1977-94 with a peak harvest of 489.9 t (8.7 million pounds) landed in 1982 (ADF&G 1995). During the 5-year period 1990-94, two statistical areas located adjacent to and extending south of St. Matthew Island, have accounted for nearly 90% of the commercial effort and catch of blue king crabs in that fishery (Watson et al. 1995).

National Marine Fisheries Service (NMFS) has conducted annual surveys in the St. Matthew Section, since 1978 to determine distributions of crabs and bottomfish and to estimate their population abundance (Stevens et al. 1994). These surveys use 400 eastern otter trawls and generally complete one tow per every 400 nmi². However according to Stevens et al. (1994) "...estimates of (St. Matthew blue king crab) juvenile and female abundance are usually very imprecise due to the preference of such crab for rocky habitat which is not sampled well by trawls." Due to the noted habitat preference of blue king crabs for rocky areas and the incompatibility of trawls in rocky areas Alaska Department of Fish and Game (ADF&G) decided to survey blue king crabs on the southern side of St. Matthew Island using king crab pots in 1995.

Survey Objectives

Alaska Department of Fish and Game began planning its first survey on blue king crabs in the St. Matthew Section during the winter of 1995 and decided to conduct the survey in August of that year. The major objectives were documented in Watson et al. 1995 and are listed below .

- I. Determine the 1995 commercial harvest rate of legal St. Matthew blue king crabs relative to their preseason distribution.
- II. Determine preseason geographic distribution of blue king crab by sex, size, and shell age class in the August pot survey .
- III. Characterize the reproductive condition of females collected in the August pot survey.
- IV. Tag and release mature female blue king crabs to provide the opportunity for estimating recapture rates of mature female blue kings as bycatch in the 1995 St. Matthew blue king crab commercial fishery.
- V. Tag and release mature female blue king crabs to provide the opportunity for estimating interannual growth-per-molt and probability of molt for mature St. Matthew blue king crabs and for observing interannual changes in reproductive condition of mature female blue king crabs.

This report documents on the survey results relative to objectives II and III above. Results relative to the remaining objectives will be reported in companion reports.

METHODS

Survey Design

Station Grid and Strata

A grid pattern of 138 numbered survey stations was selected south of St. Matthew Island between 59°30' and 60°30' North latitude, and 172°00' and 173°55' West longitude (Figure 1). The survey area was divided into two strata that differed in station density. There were 84 stations in Stratum 1, each five nmi apart. There were 54 stations in Stratum 2, 31 stations were an extension of the same 5x5 nmi station pattern in Stratum 1, and 23 stations were set at the midpoint of the diagonal (3.5 nmi) between the regular stations. Overall station density was 1.74 greater in Stratum 2 compared to Stratum 1. Stratum 2 included the area where most of the commercial fleet concentrated during the 1990-94 blue king crab fisheries based on location data collected by onboard observers (Watson et al. 1995).

Pots Per Station and Stations Per Day

Each station consisted of four pots, fished in a north-south fashion at predetermined latitude and longitude readings (Watson et al. 1995). Distance between adjacent pots was 1/8 nmi, therefore each station's length was 3/8 nmi. The goal was to fish nine stations per day, with contingencies allowed for days when the seas were too rough, or large numbers of crabs were captured.

Target Soak Times for Pots

Target soak time goal for each pot was from 30 to 36 hr. Departures from this range could occur, but soak times <24 hr or >48 hr were considered unacceptable unless bad weather or other constraints made them unavoidable.

Chartered Vessel and Crews

ADF&G chartered the 39.4 m (130 ft) long *FV Notorious* and 5-man crew from August 1-21, 1995 at the rate of \$2,500 per day, totaling \$52,500. The St. Matthew charter began and ended in Dutch Harbor. ADF&G crew aboard the vessel consisted of two biologists and two Fish and Wildlife Technicians.

Pots, Bait, and Deck Equipment Used

King crab pots, measuring 213x213x81 cm (7x7x2.5 ft) were webbed with tarred nylon twine having a 12.5 cm (5 in) stretch mesh, except the two tunnels which were webbed with untarred nylon twine having a 10.2 cm (4 in) stretch mesh. Tunnel ways were located on opposing sides of each pot and tapered inward to a 17.8 cm (7 in) by 88.9 cm (35 in) rigid rectangular tunnel

opening, oriented approximately 45 degrees from horizontal. Each pot was baited with 1.9 L (2 qt) of chopped frozen herring in a perforated plastic container. Pots were fished singly, having line connecting the bridle of the pot to two labeled polypropylene surface buoys. A picking boom lifted pots aboard once they were at the ocean's surface and brought pots to the hydraulic pot launcher when setting gear. An Aurora¹ hydraulic crane stacked and unstacked pots on deck. A hydraulic crab block lifted pots over the side on their deployment and retrieved pots from the bottom to the surface. A Marco¹ king coiler, coiled line as it came off the block.

Navigational/Communication Equipment

Navigational equipment used to establish and relocate pots and give a profile of the bottom type included: a Trimbal¹ (NT 200) Global Positioning System (GPS), Furuno¹ fathometer and a Simrad/Inritsu¹ marine radar, with a 60 nmi maximum range. The GPS and fathometer were interfaced with a SeaNav¹ 1050, 486 computer/plotter using SeaNav software. Single side band marine radios, Sea¹ 222 and Icom¹ M700, were used to communicate daily position, numbers of crabs caught and tagged, to either the ADF&G office in Kodiak or Dutch Harbor.

Catch Sorting and Sampling

Contents of retrieved pots were dumped into an aluminum sorting table 152x244x66 cm (5x8x2.5 ft) directly from the pot launcher. Crabs were then sorted by species, size and sex into plastic tubs or totes or directly into the 122x244x31 cm (4x8x1 ft) aluminum sampling table. The sampling table had a removable divider in the middle and a slidable wooden divider on each half to help sort the catch further. At each end of the sampling table a smaller aluminum table 61x122x0.8 cm (24x122x5/16 in) was secured. These tables were the working platforms to measure and tag crabs.

Crab Measurements

Crab measurements were taken to the nearest millimeter (0.04 in) using Vernier calipers. Minimum legal male blue king crab carapace width (CW) was 139.7 mm CW (5.5 in) outside the spines. It was checked using a fixed go-no-go measuring "stick." Carapace length (CL) on blue king crabs was measured from the right eye orbit to the midpoint of the posterior margin of the carapace. Carapace width was taken from the greatest straight line distance across the carapace at a right angle to a line midway between the eyes to the midpoint of the posterior portion of the carapace. Carapace width on snow crabs *Chionoecetes opilio* was measured inside the carapace spines. All blue king crabs were measured but snow crabs were routinely subsampled.

Size Categories

No juvenile or adult categories were defined for female blue king or snow crabs, although females possessing external embryos or empty embryo cases were classified as adults. Legal blue king crabs were males ≥ 139.7 mm CW (≥ 5.5 in) outside the spines and legal snow crabs were males ≥ 79 mm CW (3.1 in) outside the spines (ADF&G 1994). Male blue king crabs were further divided into the following sublegal and legal-sized categories: sublegals were either prerecruits

¹ Reference to trade names does not imply endorsement by ADF&G.

(<105 mm CL) or prerecruit ones (\geq 105 mm CL but less than legal width); legal-sized crabs were divided into recruits (new shell crabs with carapace width \geq 139.7 mm (5.5 in) with carapace length <135 mm) while postrecruits were all other legal-sized crabs. Male categories were based on growth studies (Otto and Cumiskey 1989) and follow closely the size categories used by NMFS on annual Bering Sea surveys (Stevens et al. 1994).

Shell-Aging

Blue King Crabs. The ventral side of the crab, specifically the coxa of the walking legs (pereopods), was used as the primary location to shell "age" each crab. Shell-aging was somewhat subjective. Shell age classes were defined into the following categories:

New-soft shell: Crabs estimated to have had their new exoskeletons for approximately 1-3 months. Coxa and ventral surface of exoskeleton white. Their legs were easily compressed when pinched, since their legs contain small amounts of meat in them. Any part of exoskeleton was subject to breakage or puncture when a crab of this shell-age was dumped from the pot, sorted or tagged. If the carapace was removed from a new-soft shelled crab, the gills were light to translucent in color.

New-shell: Crabs estimated to have had their exoskeletons for 4-12 months. Coxa and ventral surface of exoskeleton white. Legs mostly full of meat, meri not easily compressed by pinching meri. If carapace removed gills light cream color.

Old-shell: Crabs estimated to have had their exoskeletons for 13-24 months. Distal portion of ventral coxa partially or totally rimed with brown scratches or dots. Legs full of meat, meri not easily compressed by pinching. If carapace removed, gills tan in color (from fouling microorganisms). By convention females that had "matted setae" (empty embryo cases and funiculi) were also placed in this category.

Very old-shell: Crabs estimated to have had their exoskeletons for >24 months. Distal portion of ventral coxa continuously rimed with black scratches or dots. Legs full of meat, meri not easily compressed by pinching. Most spines on carapace and ventral surface of abdomen black from wear. Tips of dactyls worn and black. If carapace removed, gills dark gray or dark gray-brown in color (from fouling microorganisms).

New- and -Old Shell: Male crabs that had either the new-shell or old-shell characteristic listed above were lumped into this category during the first third of the survey (sequential pot numbers 1-188) because there was no category on the crab data form to record new-soft crabs and due initial confusion of separating new and old shell crab.

Snow Crabs. Shell-aging was somewhat subjective. Shell age classes were defined into the following categories:

New-shell: Crabs estimated to have had their exoskeletons \leq 12 months. Dorsal side of the exoskeleton pinkish, ventral surface whitish-translucent. No visible scratches on ventral surface. Carapace spines sharp, unworn.

Old-shell: Crabs estimated to have had their exoskeletons for 13-24 months. Dorsal and ventral surfaces tan to light brown. Ventral surface marked frequently with scratches. Carapace spines worn.

Very old-shell: Crabs estimated to have had their exoskeletons >24 months. Dorsal and ventral surfaces dark tan to brown. Ventral surface heavily marked with scratches. Carapace spines very worn and rounded.

Tagging Equipment and Procedures

Only blue king crabs were tagged. Legal males were tagged with either a Floy¹ isthmus loop ("spaghetti") tag or a passive integrated transponder (PIT) tag. No sublegal-sized males were tagged. Females were tagged only with Floy tags, with a goal of tagging females ≥ 90 mm CL.

Floy tags were made of yellow vinyl tubing 41 cm (16 in) long having a diameter of 2 mm (1/8 in). Each tag had the series A followed a unique four digit number printed in black near the middle of the tubing's length for recovery identification. The tubing looped through a red oval piece of plastic. The tag series and number were printed on one side of the plastic tubing; "LEAVE TAG ON CRAB, NOTIFY ADF&G" was printed on the reverse side. A piece of tagging wire 7 cm (2.75 in) long, from 18 gauge galvanized wire, was sharpened at each end then bent into a U-shape, to form the tagging needle. One end of the tagging needle was pushed into one end of a Floy tag tubing, then the wire and about half of the tubing were threaded through the isthmus muscle. The end of the tubing was then threaded through a 9 mm (1/3 in) Nicopress¹ swedge. The two ends of the tubing were drawn up to near equal lengths, then the swedge was crimped closed with end nipper pliers.

Each PIT tag used was a glass-encapsulated cylinder, 2.2 mm (0.09 in) in diameter by 11 mm (0.4 in) long. One tag was injected into the coxa of the left fifth pereopod of legal-sized crabs using a Ralgro¹ gun. To check if the tag was embedded and to read the tag number, a Trovan¹ LID 500 hand-held reader-exciter was used. When excited the PIT tag transmitted a unique 12-digit code which was captured, read, verified and stored by the reader-exciter (Pengilly and Watson 1994). Each day the electronically stored PIT numbers were downloaded from the Trovan reader onto an AST¹ 386 laptop computer and a daily record was also printed out to assist in data editing.

Only blue king crab were tagged. In Stratum 1 only legal males were tagged with Floy tags with a goal of 40 per station. In Stratum 2 males were tagged equally with Floy and PIT tags, with a goal of up to 60 of each tag type per station. Also in Stratum 2 tagging 25 females per station using Floy tags was the goal. Females ≥ 90 mm CL was the target size group to tag. All tagged crabs were released on station, from deck level, from the holds' water exit chute, from a height of 112 cm (44 in) above sea level.

¹ Reference to trade names does not imply endorsement by ADF&G.

Miscellaneous Species

Only blue king and snow crabs were measured and enumerated. A list of all other marine species captured was compiled.

Observer Practicum

Fifteen king crab pots were set north of St. Paul Island for the purpose of collecting a variety of commercial crab species for a Shellfish Observer Program practicum exam by ADF&G held in Dutch Harbor following completion of the survey charter.

Forms

Onboard data were written onto the following forms: Pilot House Log (Appendix A.1), Male Blue King Crab (Appendix B.1), Female Blue King Crab (Appendix C.1), and Crab Research Data Form, used to record snow crab data (Appendix D.1).

Database

After completion of the survey, all data from the forms were keyed and verified in Kodiak and added to a R:Base¹ 4.5 database called StMatt95. Electronic PIT tag data was also added to that database. All editing of the database occurred at the ADF&G office in Kodiak.

RESULTS

Fishing Statistics

Survey Overview

On the St. Matthew blue king crab survey there were 138 stations fished and 552 pots lifted during the 16 day period, August 4-19, 1995 (Table 1). Seven to ten stations, of four pots each, were sampled per day. Nine stations fished daily was the norm. The survey area encompassed approximately 6,400 nmi².

Soak Times

Soak times for individual pots ranged from 30-40 hours, and 76% of the soak times fell within the 30-36 hour target soak period set prior to the survey (Table 1). Average station soak times ranged from 30.19 to 39.68 hours (Table 2).

¹ Reference to trade names does not imply endorsement by ADF&G.

Depths Fished

Pots were fished from 16 to 59 fm (29 to 108 m) and mean station depths ranged from 17 to 59 fm (31 to 108 m) (Table 2). There was an increasing depth trend from nearshore to offshore heading south, from the south side of St. Matthew Island.

Bottom Types

Fifty-five stations were recorded as having rock bottoms, 46 stations had mud bottoms, 24 had silt bottoms, and three had sand bottoms (Figure 2). In each of the aforementioned stations the bottom type recorded by the vessel captain was the same for each of the four pots in that station. The skipper did not record the bottom types at 10 stations.

Blue King Crab Data Summaries

Number Captured

A total of 10,690 blue king crabs were captured on the survey of which 7,664 (71.7%) were males and 3,206 (28.3%) were females (Table 3). The numbers of legal and sublegal males captured were nearly equal: 3,856 (50.3%) were legal-sized and 3,807 (49.7%) were sublegals. Even though Stratum 2 had less pots lifted in it compared to Stratum 1 (216 vs. 336) it had 3.7 times as many crabs and had higher catch-per-unit-of-effort (CPUEs) in every size-sex category. For the entire survey the CPUE of blue king crabs, by sex and size category were: 19.4 overall, 5.5 for females, 3.2 for males <105 mm CL, 3.7 for prerecruit ones, and 7.0 for legals.

Spatial Distribution of Blue King Crabs

Blue king crabs were captured at every station except station 142 (Table 2 and Figure 3). The largest concentrations of these crabs were located in a crescent shaped area east and west around Pinnacle Island, a distance of approximately 12-20 nmi south of St. Matthew Island. A much smaller concentration of males was located approximately 40 nmi southwest of St. Matthew Island. Legals were captured at 133 stations (Figure 4) and sublegals occurred at 135 stations. Females had a limited distribution close to St. Matthew Island and occurred at only 61 stations (Figure 5).

Sex Distribution by Depth

Male blue king crabs were captured throughout the depths fished 29 to 108 m (16 to 59 fm), but females were captured in a narrower depth range from 40 to 70 m (22 to 38 fm) (Figure 6). Seventy percent of all blue king crabs captured (7,296) were in depths ranging from 40 to 59 m (22 to 32 fm) yet the number of pots pulled in that range equaled only 25% of the total lifted. The greatest CPUEs of crabs from the survey, 129 to 161, came from the following depths: 40, 42, 46, 48 and 53 m (22, 23, 25, 26 and 29 fm). These were at least 2.8 times greater than the next highest CPUE of 46, which occurred at 55 m (30 fm).

Size Range and Length Frequencies

Carapace lengths of female blue king crabs ranged from 41 to 125 mm and males ranged from 50 to 164 mm (Figure 7). Of the 7,664 males captured only eight had no carapace length measurements recorded, and only one female out of 3,026 captured was not measured. The three carapace lengths with the most crabs measured in them were; for females, 92 mm CL (n = 116), 100 mm CL (n = 115) and 97 mm CL (n = 114); for males, 127 mm CL (n = 127), 128 mm CL (n = 194) and 122 mm CL (n = 190).

Blue King Crabs Tagged

Tagging of blue king crabs occurred at 132 (97%) stations (Table 2). Of the 3,935 crabs tagged, 3,498 were legal-sized males and 437 were females. In Stratum 1 there were 1,099 males and one female tagged with Floy tags and 35 males tagged with PIT tags. In Stratum 2 there were 1,196 males and 436 females Floy tagged and 1,168 males PIT tagged.

PIT tagged males sizes ranged from 112 to 155 mm CL, and Floy tagged males ranged from 111 to 164 mm CL. Floy tagged females ranged in size from 78 to 122 mm CL. Generally females ≥ 90 mm CL were tagged, but 18 females ranging from 78 to 89 mm CL were also tagged.

Exoskeleton or Shell-Aging

Nearly all (99.9%) of the blue king crabs had their exoskeletons aged and recorded (Table 4). Most females were either old-shell (77.1%) or new-shell (22.6%) (99% were from Stratum 2). New-shell (36.3%) and new-and-old-shell male crabs (25.1%) were most commonly observed on the whole survey followed by old-shell (18.6%), new-soft (18.3%), and very old-shell (1.6%). New-soft shell males were present at 102 (73.9%) of the stations sampled. Sublegal crabs in the new-soft category made up a higher percentage in both strata compared to legal-sized males. New-shell males in Stratum 1 were twice as abundant as new-shell males in Stratum 2. Conversely, the percentages of males in the new and old-shell, old-shell and very old-shell categories were all greater in Stratum 2 when compared with Stratum 1.

Female Reproductive Condition

Nearly 100% of the female blue king crabs captured on the survey (n = 3,025) had their pleopods examined for clutch size and condition. There were 2,509 females whose lengths ≥ 80.6 mm CL, the estimated size at 50% maturity (SM50) for St. Matthew female blue king crabs (Somerton and MacIntosh 1983). Most females, 2,316 (77%) were barren having only empty embryo cases and funiculi (embryo stalks) on their pleopods (Table 6), of those 2,221 \geq SM50. There were 642 (21%) barren females with clean pleopodal setae, of these 224 were \geq SM50. The unmated females ranged from 64 to 108 mm CL. The female size at maturity data from this survey will be fit to a logistic curve and documented in a future ADF&G report.

There were only 67 (2%) females that had clutches containing embryos (Table 6). Fifty-eight (87%) of those 67 females were captured at four stations (21,146,147, and 148) located northeast of Pinnacle Island. Depths for those stations were among the shallowest fished, 35 to 46 m (19

to 25 fm). The majority (74%) of the females encountered at those four stations had empty embryo cases and only a small portion (5%) carried embryos.

Thirty-one had clutches in the 1-29% fullness range. Five of those crabs had eyed embryos and were considered as having hatching embryos since the remainder of their clutches had only empty embryos cases. The remaining 26 females had clutches 1-29% full, but no embryo development phase was recorded for them. Of the 36 females having clutches in the 60-100% range 17 had uneyed embryos and 18 had eyed embryos. Forty-nine of the females with embryos had five different embryo colors recorded for them. Thirty-four females had no dead embryos apparent in their clutches and three had <20% dead embryos in their clutches.

Sublegal-Legal Size Overlap

The size range over which male blue king crabs can be either sublegal or legal was 111-135 mm CL (Table 5). The size at which 50% of the male blue king crabs had legal-sized carapace lengths was closest to 121 mm CL. Ninety percent of the male crabs within ± 5 mm CL of 121 mm CL were legal-sized.

Diseases and Symbionts

One sublegal male, 92 mm CL from station 42 was randomly chosen for dissection. The internal organs, principally the hepatopancreas, were visibly overgrown with a microsporidian. These microsporidians have been called the "cottage cheese disease" due to the lumpy, white clumps of the microsporidial masses present. The abdomen of this crab was not distended prior to internal examination, which is a common method to detect infected crabs. The carapaces of six other male crabs were also removed to reveal the correlation between external and internal shell aging. The progressive darkening of the gills from new-soft to very old-shell crabs was apparent as a result of fouling microsymbionts on the gills through time. Both the diseased crab and various shades of gill color and shell-ages were captured on the survey's documentary video.

Seven females were opened to examine their ovarian conditions related to shell-age and size. No macroscopic diseases were visible in these crabs.

The ventral abdominal surface and pleopods of all but one female were examined, but no symbionts (i.e. nemertean or turbellarians) or externae of the parasitic barnacle, *Briarosaccus callosus*, were recorded. The dorsal portion of the abdomen of males was not examined for parasitic barnacles.

The exoskeletons of the blue king crabs were relatively free of macroscopic organisms, except for a few that had barnacles (*Balanus* spp.?) attached.

Snow Crabs

There were 14,704 male and 17 female snow crabs captured on the survey, with males occurring at 64 stations and females at 2 stations (Table 2). All the stations where snow crabs were

captured, except for one, were located in Stratum 1. Average station depths where snow crabs were capture ranged from 57 to 108 m (31 to 59 fm).

Snow crabs were commonly subsampled for carapace width and shell-aging. Carapace width of males ranged from 35 to 139 mm and females 43 to 80 mm. Seventy percent of the snow crabs were new-shell, 13% old-shell and 2% very old-shell (Table 4). There were 3,693 legal-sized male snow crabs ≥ 79 CW (≥ 3.1 in) and 463 ≥ 102 CW (≥ 4 in). Only male crabs ≥ 102 CW (≥ 4 in) or larger are taken in the current self-imposed industry standard.

Miscellaneous Marine Life

Miscellaneous species (except snow crabs) that came up in the pots but were not measured or enumerated. However a list of those observed were compiled and included the following: Pacific cod, great sculpin, prowfish, pollock, snailfish, skates, yellowfin sole, Pacific halibut, Greenland tourbut and arrowtooth flounder. Invertebrates occurring in the pots included: hermit and Hyas crabs, several snail species, jellyfish, various sea stars (including Crossaster and basket stars), sand dollars and sea urchins.

Crabs Captured for Mandatory Observer Practicum

A total of 287 crabs of various sizes were collected for the Shellfish Observer Program practicum which was held in Dutch Harbor on August 24, 1995.

Video

A documentary video of the survey was made onboard to record the setting and retrieving of pots; crab measuring, recording, and tagging procedures; interviews with the vessel and ADF&G crews; and to show sea birds and Dall's porpoises. Copies of the video have been placed on file in both ADF&G offices in Dutch Harbor and Kodiak.

DISCUSSION

The 1995 survey of blue king crabs by ADF&G in the St. Matthew Island area was successful in completing the presurvey goals. One of the most important of the goals achieved was the tagging of legal-sized blue king crabs with either Floy or PIT tags. Recoveries of tagged females may provide information on handling rates in the 1995 fishery. Male and female tagged crabs released in 1995 and recovered in future seasons can also provide data on movement, growth, shell-aging, and reproductive condition.

The overall distribution of blue king crabs were similar between the 1995 NMFS trawl (Stevens et al. 1996) and 1995 ADF&G pot survey where the surveys overlapped. There was a large disparity between the sampling units of the two surveys. One station on the ADF&G survey occurred every 25 nmi² (or less) compared to one trawl station every 400 nmi² on the NMFS survey. Bottom type and depth were two environmental factors which correlated with the high abundances of blue king crabs

found in Stratum 2. The bottom was "hard" or rocky in Stratum 2 but not in Stratum 1 (Figure 2). The highest CPUEs and 70% of the captured blue king crabs occurred in 40 to 59 m (22 to 32 fm) most of those depths fished occurred in Stratum 2. Of the 24 tows made by NMFS which captured blue king crabs around St. Matthew Is. in 1995, only three tows were made on the outer fringes of the pot survey's Stratum 2. There the abundance of blue king crabs was much lower than shallower, more shoreward stations fished on the pot survey. The pot survey captured the greatest number of male and female blue king crabs in a crescent-shaped shallow zone in Stratum 2, revealing the importance of sampling these crabs with pots in nearshore rocky habitats.

Other findings from this survey of interest to managers, researchers and the crabbing industry were: 1) the high percentage of new-soft male crabs present shortly before the September 15 commercial season opening, 2) the potential for high handling rate of nonlegals during the commercial fishery, and 3) female reproductive condition. New-soft male crabs comprised 18% of total males capture on the 1995 ADF&G survey. They were easily damaged when dumped from pots and sorted during the survey. With the commercial St. Matthew blue king crab opening only a month after the ADF&G 1995 survey, the meat recovery would still be light in these crabs, and the potential for higher handling mortality and deadloss of new-soft crabs compared to new to very old-shell crabs exists.

In Stratum 2, where most of the blue king crab commercial fishery occurs, nonlegal crabs outnumbered legals by a 3:1 ratio on the 1995 ADF&G survey. That potential for high bycatch of nonlegal crabs, particularly females, is also evident in observer data. A 5:1 ratio of nonlegals to legals was documented during the 1994 St. Matthew blue king crab fishery by observers (Tracy 1995).

Knowing the size distribution and external reproductive condition of female blue king crabs around St. Matthew Island is essential to judging the stocks's reproductive output potential. Primiparous female blue king crabs are often able to spawn in two consecutive years while multiparous females are biennial spawners (Somerton and MacIntosh 1985; Jensen and Armstrong 1989). Biennial spawning makes interpreting data on clutch fullness and presence of matted setae difficult. Female blue king crabs with matted setae composed 72% and 69% of the females examined by observers during the 1993 and 1994 St. Matthew blue king crab fishery (Tracy 1995) and 77% of all females captured on the 1995 ADF&G survey including 88% of the females \geq SM50. These consecutive high percentages of females whose embryos have hatched is difficult to reconcile with female biennial reproductive cycles presented in either Somerton and MacIntosh (1985) or Jensen and Armstrong (1989) unless each year had a strong cohort of primiparous females entering adulthood, which was not evident in either the observer or this survey's data.

Future surveys using pots should continue to effectively cover the major reproductive and commercial fishing area on the south side of St. Matthew Island including at a minimum the area within Stratum 2, fished on the 1995 ADF&G survey. It would also be useful to survey all the way around St. Matthew and Hall Islands; focusing on depths \leq 46 m (\leq 25 fm) since the 1995 pot survey revealed the importance of those depths to embryo bearing females. Perhaps fishing even shallower than the depths fished in 1995 would reveal greater concentrations of fecund females. Conducting the survey in May or June would increase the percentage of females having embryos which may help sort out the mystery of why there are high percentages of females with matted setae later in the year. New-soft and new-hard shell age categories should be added to observer and ADF&G crab sampling forms to delineate these different shell ages, the lack of those categories caused initial lumping of the new and old-shell

crabs on the first third of the pots pulled on 1995 ADF&G survey. Under reasonable conditions, data entry could be completed at sea with the additional benefit of correcting hand logged entry errors daily.

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Table 1. Soak times of the king crab pots pulled on the August 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game.

Soak Times --Hours--	No. Pots	Percent of Total
30	4	0.7
31	53	9.6
32	109	19.7
33	163	29.5
34	96	17.4
35	70	12.7
36	18	3.3
37	14	2.5
38	13	2.4
39	7	1.3
40	5	0.9
Totals:	552	100.0

Table 2. Location and catch per station of blue king crabs *Paralithodes platypus* and snow crabs *Chionoecetes opilio* on Alaska Department of Fish and Game's 1995 blue king crab survey in the St. Matthew Section, of the Bering Sea king crab registration area Q2.

Station	Date Retrieved	Location Mid-Station		Mean Soak Hrs	Mean Depth FM	No. Snow Crabs		No. Blue King Crabs Captured and Tagged							Total Kings
		N. Lat. Deg. Min.	W. Long. Deg. Min.			Females	Males	Females		Males					
								No.	Floy ^a	<105 ^b	Ones ^c	Legals	Floy ^a	PIT ^d	
1	8/13/95	60 27.57	173 55.05	32.17	43	0	139	0	0	4	7	10	8	0	21
2	8/13/95	60 27.43	173 45.12	32.51	38	0	32	0	0	1	4	6	5	0	11
3	8/13/95	60 27.55	173 35.04	32.61	35	0	1	0	0	9	7	13	13	0	29
4	8/11/95	60 27.54	173 25.19	33.77	32	0	0	1	0	21	22	20	7	11	64
5	8/11/95	60 27.42	173 14.98	32.98	27	0	0	17	3	63	68	91	43	44	239
6	8/13/95	60 22.5	173 55.12	32.58	45	0	49	0	0	0	1	3	3	0	4
7	8/13/95	60 22.43	173 45.98	32.58	40	0	36	0	0	2	2	6	6	0	10
8	8/13/95	60 22.56	173 35.05	32.87	35	0	9	0	0	10	23	15	15	0	48
9	8/11/95	60 22.46	173 25.05	34.25	32	0	0	4	3	22	17	22	11	9	65
10	8/11/95	60 22.43	173 15.04	32.28	30	0	0	8	0	47	32	28	14	8	115
11	8/9/95	60 22.46	173 5.04	36.15	26	0	0	112	25	88	54	154	59	63	409
12	8/11/95	60 19.96	173 19.99	31.82	32	0	0	2	0	9	7	12	7	5	28
13	8/9/95	60 20.07	173 10.12	37.26	30	0	0	3	1	24	14	26	13	13	67
14	8/9/95	60 19.97	173 0.02	34.51	26	0	0	150	25	51	70	256	60	58	527
15	8/13/95	60 17.57	173 54.98	32.61	48	0	52	0	0	2	2	2	2	0	6
16	8/13/95	60 17.44	173 44.98	32.65	42	0	6	0	0	1	7	5	5	0	13
17	8/13/95	60 17.54	173 35.2	33.19	38	0	1	0	0	3	2	8	8	0	13
18	8/11/95	60 17.57	173 25.11	34.74	35	0	0	0	0	13	21	17	8	6	51
19	8/11/95	60 17.45	173 15.1	31.43	32	0	0	5	0	40	21	13	5	7	79
20	8/9/95	60 17.57	173 5.1	37.78	30	0	0	4	3	16	21	46	22	23	87
21	8/9/95	60 17.45	172 55.1	32.86	25	0	0	419	26	24	24	115	58	57	582
24	8/11/95	60 14.94	173 20.01	31.14	34	0	0	4	2	5	3	9	5	4	21
25	8/9/95	60 15.06	173 10.18	38.54	31	0	0	11	1	52	50	41	21	20	155
26	8/9/95	60 14.99	173 0.03	31.34	30	0	0	14	10	6	28	52	23	21	106

- Continued -

Table 2. (page 2 of 6)

Sta- tion	Date Retrieved	Location Mid-Station		Mean Soak Hrs	Mean Depth FM	No. Snow Crabs		No. Blue King Crabs Captured and Tagged							Total Kings
		N. Lat. Deg. Min.	W. Long. Deg. Min.			Females	Males	Females		Males					
								No.	Floy ^a	<105 ^b	Ones ^c	Legals	Floy ^a	PIT ^d	
28	8/14/95	60 12.44	173 44.93	35.18	44	2	84	0	0	8	12	17	17	0	37
29	8/14/95	60 12.55	173 35.05	32.88	40	0	34	0	0	7	3	10	10	6	14
30	8/10/95	60 12.54	173 25.1	32.88	37	0	0	0	0	5	1	3	1	2	9
31	8/10/95	60 12.42	173 15.12	32.43	34	0	0	5	2	39	38	46	22	24	128
32	8/8/95	60 12.57	173 5.1	34.41	32	0	0	7	2	14	4	17	7	7	42
33	8/8/95	60 12.47	172 55.08	33.79	30	0	0	104	27	56	34	91	46	44	285
34	8/6/95	60 12.63	172 35.19	32.96	26	0	0	591	25	57	48	146	60	59	842
35	8/5/95	60 12.51	172 25.09	34.44	29	0	0	26	20	43	112	143	69	74	324
36	8/5/95	60 12.53	172 15.09	31.81	30	0	0	17	0	29	28	32	32	0	106
37	8/5/95	60 12.49	172 5.12	31.41	30	0	0	0	0	4	3	3	2	0	10
38	8/10/95	60 10.	173 19.94	33.21	37	0	0	1	0	11	11	19	9	10	42
39	8/10/95	60 9.93	173 9.95	32.03	34	0	0	5	1	9	7	9	4	5	30
40	8/8/95	60 10.06	173 0.11	34.77	32	0	0	6	5	13	6	17	9	8	42
41	8/8/95	60 9.92	172 50.08	32.72	30	0	0	212	25	33	26	107	53	53	378
42	8/6/95	60 9.95	172 40.12	35.64	29	0	0	267	24	80	81	205	60	61	633
43	8/6/95	60 9.98	172 30.16	31.83	30	0	0	11	8	7	18	33	16	17	69
45	8/14/95	60 7.43	173 45.05	34.79	47	0	138	0	0	2	6	18	18	0	26
46	8/14/95	60 7.54	173 35.07	33.43	42	0	3	0	0	5	9	21	21	0	35
47	8/10/95	60 7.13	173 25.03	33.7	39	0	0	1	1	7	18	15	7	8	43
48	8/10/95	60 7.45	173 15.	31.83	36	0	0	1	1	2	3	5	2	3	11
49	8/8/95	60 7.55	173 5.09	35.1	34	0	0	9	5	14	10	9	4	5	42
50	8/8/95	60 7.44	172 55.03	31.84	32	0	0	32	24	20	22	40	21	16	114
51	8/6/95	60 7.57	172 45.06	36.84	31	0	0	55	26	44	48	87	42	41	234
52	8/6/95	60 7.57	172 35.03	33.97	31	0	0	7	5	14	30	46	24	22	97
53	8/5/95	60 7.45	172 25.05	33.46	31	0	0	7	6	13	12	12	6	6	44
54	8/5/95	60 7.57	172 15.1	32.37	31	0	0	2	0	19	6	11	11	0	38
55	8/5/95	60 7.44	172 5.	31.03	31	0	0	5	0	16	4	3	3	0	28

- Continued -

Table 2. (page 3 of 6)

Sta- tion	Date Retrieved	Location Mid-Station		Mean Soak Hrs	Mean Depth FM	No. Snow Crabs		No. Blue King Crabs Captured and Tagged							Total Kings
		N. Lat. Deg. Min.	W. Long. Deg. Min.			Females	Males	Females		Males					
						No.	Floy ^a	<105 ^b	Ones ^c	Legals	Floy ^a	PIT ^d			
56	8/10/95	60 5.04	173 20.08	34.02	39	0	0	1	0	4	9	14	7	7	28
57	8/10/95	60 4.97	173 10.01	31.45	37	0	0	2	0	3	7	12	4	6	24
58	8/8/95	60 5.06	173 0.13	35.38	35	0	0	7	6	8	3	8	4	4	26
59	8/8/95	60 4.93	172 50.08	31.33	33	0	0	18	5	7	14	36	18	18	75
60	8/6/95	60 4.94	172 40.02	34.79	32	0	0	2	2	4	9	13	6	7	28
61	8/6/95	60 4.94	172 30.13	31.38	33	0	0	1	0	1	2	6	3	3	10
63	8/14/95	60 2.44	173 45.03	34.28	50	0	292	0	0	3	10	9	9	0	22
64	8/14/95	60 2.57	173 35.09	33.96	45	0	2	0	0	15	28	71	69	0	114
65	8/10/95	60 2.43	173 25.09	34.38	41	0	0	0	0	3	7	20	10	10	30
66	8/10/95	60 2.5	173 15.	31.11	39	0	0	1	1	1	2	2	1	1	6
67	8/8/95	60 2.57	173 5.08	35.84	37	0	0	2	2	8	4	12	6	6	26
68	8/8/95	60 2.46	172 55.13	30.99	35	0	0	5	5	3	2	11	6	5	21
69	8/6/95	60 2.57	172 45.06	37.56	34	0	0	4	3	6	15	15	7	7	40
70	8/6/95	60 2.5	172 35.1	34.38	34	0	0	3	0	13	11	18	9	9	45
71	8/5/95	60 2.47	172 24.98	33	35	0	1	3	0	11	7	13	6	6	34
72	8/5/95	60 2.56	172 15.05	32.72	35	0	0	1	0	9	2	2	2	0	14
73	8/5/95	60 2.47	172 5.03	30.79	34	0	1	0	0	7	2	1	1	0	10
74	8/15/95	59 57.54	173 55.06	32	54	0	346	0	0	6	11	9	9	0	26
75	8/15/95	59 57.44	173 45.19	33.85	51	0	478	0	0	1	7	14	14	0	22
76	8/15/95	59 57.57	173 35.09	34.35	47	0	0	0	0	23	68	79	77	0	171
77	8/16/95	59 57.45	173 25.02	35.72	43	0	0	0	0	10	33	75	73	0	118
78	8/16/95	59 57.52	173 15.07	32.74	41	0	13	0	0	3	7	10	8	0	20
79	8/16/95	59 57.45	173 4.9	32.6	40	0	6	0	0	4	3	11	11	0	19
80	8/7/95	59 57.54	172 54.97	33.13	38	0	0	1	1	11	10	16	8	8	38
81	8/7/95	59 57.51	172 45.18	32.99	37	0	0	0	0	3	2	2	1	1	7
82	8/7/95	59 57.54	172 35.08	31.99	37	0	0	0	0	1	0	0	0	0	1
83	8/4/95	59 57.43	172 25.14	33.65	38	0	53	0	0	8	3	5	5	0	16

17

- Continued -

Table 2. (page 4 of 6)

Sta- tion	Date Retrieved	Location Mid-Station		Mean Soak Hrs	Mean Depth FM	No. Snow Crabs		No. Blue King Crabs Captured and Tagged							Total Kings
		N. Lat. Deg. Min.	W. Long. Deg. Min.			Females	Males	Females		Males					
								No.	Floy ^a	<105 ^b	Ones ^c	Legals	Floy ^a	PIT ^d	
84	8/4/95	59 57.56	172 15.12	32.76	38	0	83	0	0	3	2	5	5	0	10
85	8/4/95	59 57.5	172 5.09	32.59	37	0	32	1	0	6	0	1	1	0	8
86	8/15/95	59 52.56	173 54.94	32.46	55	0	713	0	0	6	11	16	16	0	33
87	8/15/95	59 52.47	173 45.08	33.49	52	0	347	0	0	4	8	10	10	0	22
88	8/15/95	59 52.55	173 35.03	34.91	51	0	168	0	0	3	8	25	25	0	36
89	8/16/95	59 52.55	173 24.92	34.9	48	0	2	1	0	88	62	98	97	0	249
90	8/16/95	59 52.55	173 15.02	33.03	44	0	14	0	0	2	11	25	23	0	38
91	8/16/95	59 52.45	173 5.02	32.39	43	0	7	0	0	5	10	19	17	0	33
92	8/7/95	59 52.56	172 55.11	33.5	42	0	0	1	0	5	15	13	6	6	34
93	8/7/95	59 52.43	172 45.05	32.82	41	0	0	0	0	7	5	3	1	1	15
94	8/7/95	59 52.54	172 35.04	32.2	40	0	0	0	0	2	0	0	0	0	2
95	8/4/95	59 52.44	172 24.98	33.43	40	3	422	1	0	9	4	6	6	0	20
96	8/4/95	59 52.56	172 15.29	33.04	40	0	67	0	0	1	0	2	2	0	3
97	8/4/95	59 52.44	172 4.92	32.47	39	0	68	0	0	4	1	0	0	0	5
98	8/15/95	59 47.56	173 55.05	32.82	56	0	2070	0	0	3	3	7	7	0	13
99	8/15/95	59 47.44	173 44.96	33.16	54	0	846	0	0	2	2	11	11	0	15
100	8/15/95	59 47.54	173 35.23	35.38	52	0	138	0	0	4	11	42	42	0	57
101	8/16/95	59 47.43	173 25.03	34.22	51	0	25	0	0	4	17	56	55	0	77
102	8/16/95	59 47.57	173 15.	33.57	48	0	0	0	0	9	39	103	102	0	151
103	8/16/95	59 47.48	173 4.95	32.15	46	0	4	1	0	9	6	6	6	0	22
104	8/7/95	59 47.58	172 55.05	33.9	44	0	0	0	0	1	6	16	8	8	23
105	8/7/95	59 47.44	172 45.	32.52	43	0	0	0	0	5	9	9	5	4	23
106	8/7/95	59 47.62	172 35.21	32.4	43	0	0	0	0	0	0	2	1	1	2
107	8/4/95	59 47.49	172 24.94	33.2	42	1	130	0	0	2	0	2	2	0	4
108	8/4/95	59 47.57	172 15.14	33.17	42	0	167	0	0	1	1	0	0	0	2
109	8/4/95	59 47.43	172 5.09	32.1	44	8	173	0	0	1	0	1	1	0	2

- Continued -

Table 2. (page 5 of 6)

Sta- tion	Date Retrieved	Location Mid-Station		Mean Soak Hrs	Mean Depth FM	No. Snow Crabs		No. Blue King Crabs Captured and Tagged							Total Kings
		N. Lat. Deg. Min.	W. Long. Deg. Min.			Females	Males	Females		Males					
								No.	Floy ^a	<105 ^b	Ones ^c	Legals	Floy ^a	PTT ^d	
110	8/17/95	59 42.53	173 55.09	32.1	58	0	544	0	0	0	1	3	3	0	4
111	8/17/95	59 42.48	173 45.02	33.88	56	0	599	0	0	3	9	9	9	0	21
112	8/17/95	59 42.53	173 35.06	34.22	54	0	287	0	0	3	5	36	32	0	44
113	8/18/95	59 42.55	173 25.12	34.23	53	0	223	0	0	3	8	25	25	0	36
114	8/18/95	59 42.45	173 15.07	33.7	51	0	14	0	0	3	3	13	13	0	19
115	8/18/95	59 42.55	173 5.11	32.19	49	0	8	0	0	3	8	17	11	0	28
116	8/19/95	59 42.44	172 54.1	30.8	47	0	60	0	0	0	3	8	8	0	11
117	8/19/95	59 42.56	172 45.07	31.13	47	0	93	0	0	1	1	1	1	0	3
118	8/19/95	59 42.49	172 35.15	32.47	46	0	0	0	0	0	2	4	4	0	6
122	8/17/95	59 37.58	173 55.03	32.41	58	0	861.8	0	0	5	3	11	11	0	19
123	8/17/95	59 37.48	173 44.98	33.07	57	0	367	0	0	2	3	9	9	0	14
124	8/17/95	59 37.57	173 35.06	34.56	55	0	588	0	0	4	0	7	5	0	11
125	8/18/95	59 37.34	173 25.12	34.63	54	0	459	0	0	2	3	5	5	0	10
126	8/18/95	59 37.44	173 15.09	33.36	53	0	434	0	0	1	1	6	6	0	8
127	8/18/95	59 37.51	173 4.93	32.53	52	0	112	0	0	1	3	7	5	0	11
128	8/19/95	59 37.44	172 54.05	30.57	50	0	97	0	0	0	4	3	3	0	7
129	8/19/95	59 37.56	172 45.12	31.34	48	0	133	0	0	1	5	1	1	0	7
130	8/19/95	59 37.44	172 35.09	32.15	46	0	0	0	0	1	0	1	1	0	2
134	8/17/95	59 32.56	173 55.1	32.75	59	0	551	0	0	0	5	16	16	0	21
135	8/17/95	59 32.47	173 44.9	33.17	58	3	490	0	0	2	3	4	4	0	9
136	8/17/95	59 32.57	173 35.22	34.8	56	0	575	0	0	0	1	2	2	0	3
137	8/18/95	59 32.55	173 25.	34.92	55	0	381	0	0	2	2	3	3	0	7
138	8/18/95	59 32.44	173 15.07	34.05	54	0	294	0	0	1	3	5	5	0	9
139	8/18/95	59 32.56	173 5.01	32.77	53	0	99	0	0	1	0	3	3	0	4
140	8/19/95	59 32.47	172 55.	30.19	51	0	182	0	0	1	1	1	1	0	3

- Continued -

Table 2. (page 6 of 6)

Sta- tion	Date Retrieved	Location Mid-Station		Mean Soak Hrs	Mean Depth FM	No. Snow Crabs		No. Blue King Crabs Captured and Tagged							Total Kings	
		N. Lat. Deg. Min.	W. Long. Deg. Min.			Females	Males	Females		Males						
								No.	Floy ^a	<105 ^b	Ones ^c	Legals	Floy ^a	PIT ^d		
141	8/19/95	59 32.54	172 45.14	31.57	50	0	0	0	0	0	0	0	1	1	0	1
142	8/19/95	59 32.43	172 35.	31.83	48	0	0	0	0	0	0	0	0	0	0	0
146	8/12/95	60 14.94	172 49.9	34.57	22	0	0	366	33	34	41	114	61	51	555	
147	8/12/95	60 22.3	172 55.12	35.77	19	0	0	68	25	9	35	31	17	13	143	
148	8/12/95	60 24.93	173 0.14	36.67	22	0	0	332	23	65	30	114	59	71	541	
149	8/12/95	60 27.39	173 4.81	37.58	17	0	0	14	7	28	64	101	53	28	207	
150	8/12/95	60 24.92	173 10.09	38.47	26	0	0	56	17	81	86	114	56	57	337	
151	8/12/95	60 24.93	173 19.92	39.34	31	0	0	3	0	43	44	59	30	28	149	
152	8/12/95	60 29.99	173 20.18	39.68	31	0	0	6	1	33	33	25	12	11	97	
TOTALS:						17	14,704	3,026	437	1,779	2,026	3,856	2,295	1,203	10,690	

^a Number of crabs tagged with Floy spaghetti tags.

^b Millimeters carapace length.

^c Prerecruit ones are male crabs ≥ 105 mm carapace length but whose carapace width are < 139.5 mm (5.5 in) outside the spines.

^d Number of Passive Integrated Transponders or PIT tags, applied one per legal male crab.

Table 3. Number and catch per unit of effort (CPUE) of blue king crabs captured on the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game.

Strata	Females	Sublegals			Legals			Total Males	Total Crabs
		<105 mm CL	Prerecruits Ones ^a	Total	Recruits ^b	Postrecruits ^c	Total		
1 ^d	29	444	617	1,061	567	541	1,163 ^e	2,225 ^f	2,254
CPUE	<0.1	1.3	1.8	3.2	1.7	1.6	3.5	6.6	6.7
2 ^g	2,997	1,335	1,409	2,746 ^h	518	1,141	2,693 ⁱ	5,439	8,436
CPUE:	13.9	6.2	6.5	12.7	2.4	5.3	12.5	14.9	39.1
Total	3,206	1,779	2,026	3,807	1,085	1,682	3,856	7,664 ⁱ	10,690
CPUE:	5.8	3.2	3.7	6.9	2.0	3.0	7.0	13.9	19.4

^a Prerecruit ones included all male blue king crabs which had carapace lengths ≥ 105 mm but whose carapace width were < 139.7 mm (5.5 in) in carapace width.

^b Recruits were new-shell male blue king crabs that have carapace lengths < 135 mm and have carapace widths ≥ 139.7 mm (5.5 in).

^c Postrecruits included all other legal-sized crabs which were not recruits.

^d There were 336 king crab pots lifted in Stratum 1.

^e Included in this total were 54 legal-sized crabs that could not be sorted into either recruit or postrecruit categories because they were lumped into a shell age category that included new and old-shell crabs.

^f One male crab that was captured in Stratum 1 that had a new shell was not recorded as sublegal or legal-sized crab and with its length it could have been either.

^g There were 216 king crab pots lifted in Stratum 2.

^h Two sublegal crabs that were captured in Stratum 2 that were not categorized into either sublegal category.

ⁱ Included in this total were 1,028 legal-sized crabs that could not be categorized further since they were lumped into a shell age category that included new and old-shell crabs. Also six additional legal-sized crabs whose shell ages were not recorded, were included in this total.

Table 4. Exoskeletal shell-ages observed on blue kings *Paralithodes platypus* and snow crabs *Chionoecetes opilio* during the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game.

Shell-Age Categories:	Null		New-Soft		New		New & Old		Old		Very Old		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
BLUE KING CRABS													
Females													
Stratum 1	1	3.45	1	3.45	18	62.1	0	0	9	31.0	0	0	29
Stratum 2	1	0.03	1	0.03	668	22.3	0	0	2,323	77.5	4	0.14	2,997
Total Females	2	0.1	2	0.1	686	22.6	0	0	2,332	77.1	4	0.1	3,026
Males Stratum 1													
Sublegals	0	0	280	26.4	635	59.8	59	5.6	86	8.1	1	0.1	1,061
Legals	0	0	222	19.1	727	62.5	55	4.7	149	12.8	10	0.9	1,163
Males Stratum 2													
Sublegals	0	0	619	22.5	907	33.0	782	28.5	417	15.2	21	0.8	2,746
Legals	6	0.2	284	10.6	511	19.0	1,029	38.2	774	28.7	89	3.3	2,693
Total Males	6	0.1	1,405	18.3	2,780	36.3	1,925	25.1	1,426	18.6	121	1.6	7,664
Total Crabs Strata 1 & 2	8	0.1	1,407	13.2	3,466	32.4	1,925	18.0	3,758	35.1	125	1.2	10,689
SNOW CRABS													
Females	1	6.0	0	0	10	59.0	0	0	6	35	0	0	17
Male Sublegals	277	6.1	0	0	3,319	72.8	0	0	790	17.3	175	3.8	4,561
Male Legals	587	5.8	0	0	8,266	81.5	0	0	1,133	11.2	157	1.5	10,143
Total Males	864	5.8	0	0	11,585	78.8	0	0	1,923	13.1	332	2.3	14,704

Table 5. Size overlap of sublegal and legal male blue king crabs from the 1995 St. Matthew Island blue king crab conducted by the Alaska Department of Fish and Game.

Carapace Length (mm)	Number		Total Sampled	Percent Legal
	Sublegals	Legals		
111 ^a	102	2	104	2%
112	144	1	145	1%
113	128	0	128	0%
114	144	3	147	2%
115	131	1	132	1%
116	97	5	102	5%
117	139	12	151	8%
118	154	19	173	11%
119	89	27	116	23%
120	115	58	173	34%
121	50	64	114	56%
122	72	118	190	62%
123	26	130	156	83%
124	19	147	166	89%
125	10	158	168	94%
126	10	148	158	94%
127	7	198	205	97%
128	2	192	194	99%
129	1	149	150	99%
130	0	175	175	100%
131	1	141	142	99%
132	0	181	181	100%
133	0	146	146	100%
134	0	157	157	100%
135 ^b	1	185	186	99%
Totals	1442	2417	3859	63%

^a All male blue king crabs <111 mm CL had sublegal widths.

^b All male blue king crabs >135 mm CL had legal widths.

Table 6. External reproductive conditions of female blue king crabs observed on the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game.

Clutch & Embryo Categories	Shell Age Categories					Totals
	Null ^a	New-Soft	New-Shell	Old-Shell	Very Old-Shell	
Clutch						
Barren, clean setae	0	1	633	8	0	642
Barren, empty embryo cases	1	0	14 ^b	2,297 ^c	4	2,316
Clutch 1-29% full (Hatching)	0	0	5	26 ^d	0	31
Clutch 30-59% full	0	0	0	0	0	0
Clutch 60-89% full	0	0	12	0	0	12
Clutch 90-100% full	0	1	22	1	0	24
Total						3,025
Embryo Color						
Tan	0	0	12	0	0	12
Purple	0	1	14	1	0	16
Brown	0	0	9	0	0	9
Purple-Brown	0	0	11	0	0	11
Reddish	0	0	1	0	0	1
Total						49
Embryo Development						
Uneyed	0	1	16	1	0	18
Eyed	0	0	18	0	0	18
Total						36
Dead Embryos						
Not Apparent			32	1	0	34
Less Than 20%			3	0	0	3
Total						37

^a Crabs not assessed for shell age.

^b By convention, female blue king crabs captured during this survey having clutches containing only empty embryo cases and funiculi should have been classified as old-shell animals.

^c It is probable that the female 41 mm CL in this total was too small to have had embryos.

^d By convention, females captured during this survey with embryos should have been classified only as new-soft or new-shell.

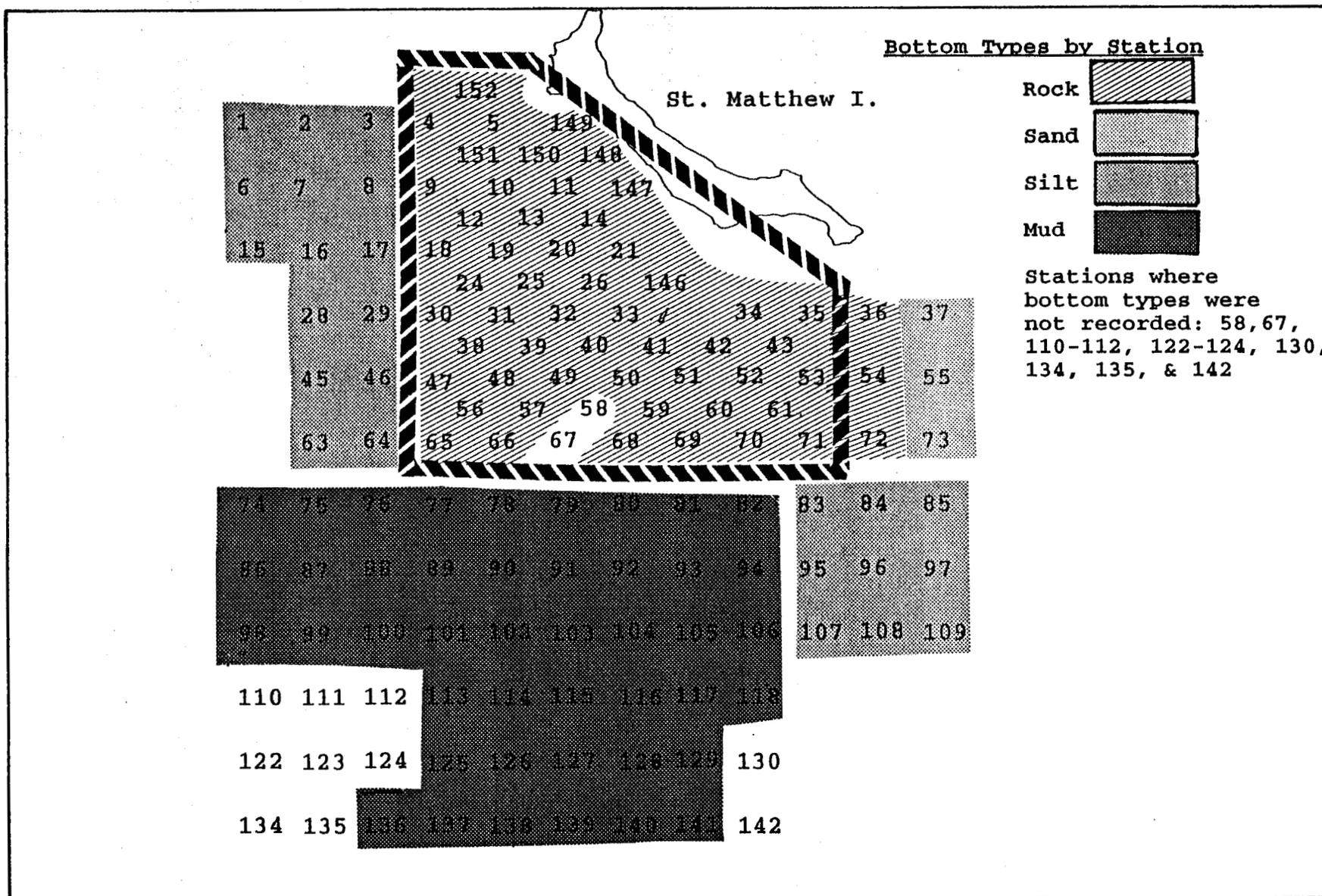


Figure 2. Bottom types recorded at fished stations during the August 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game.

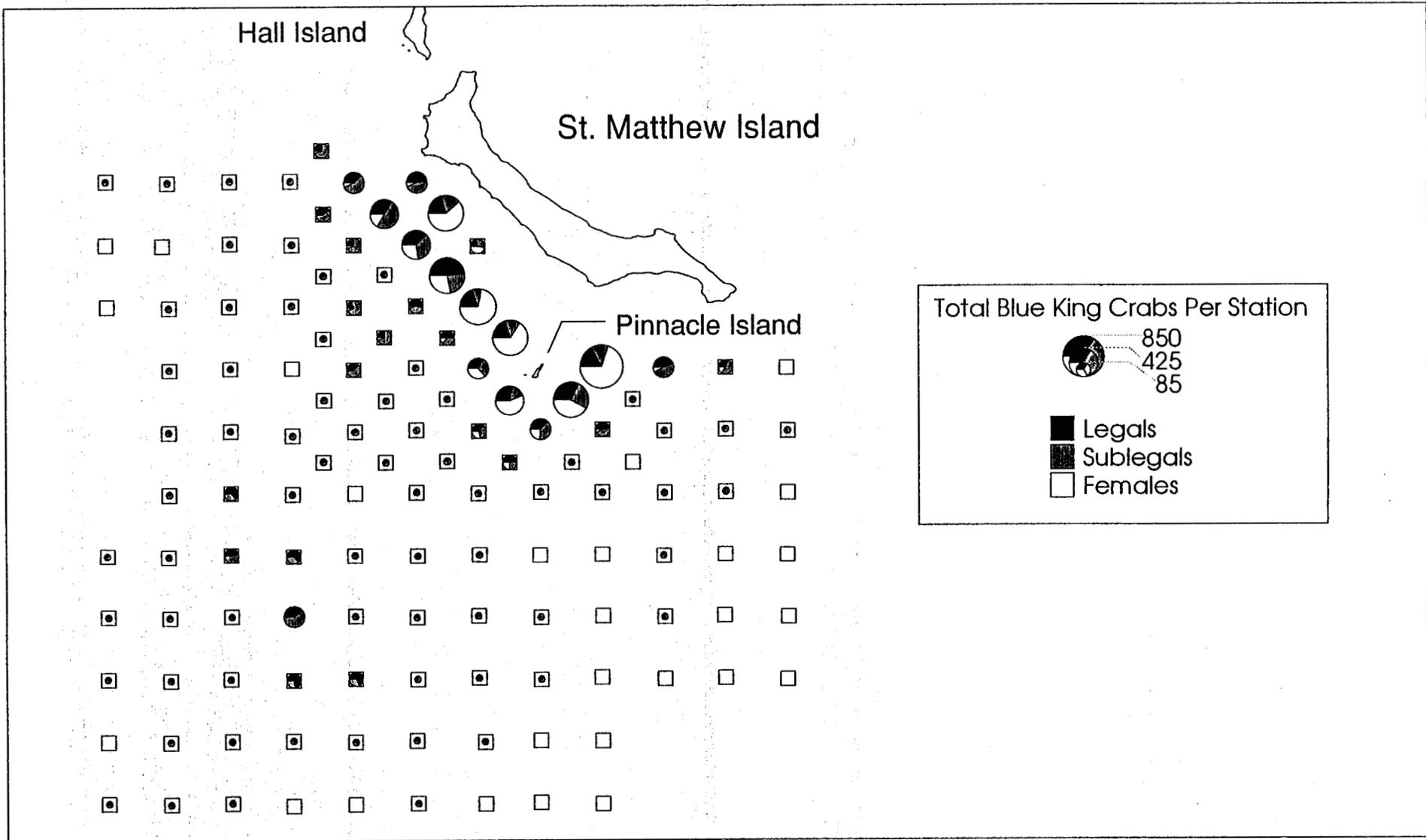


Figure 3. Total blue king crabs captured by station (legals, sublegals, females) on the August 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game.

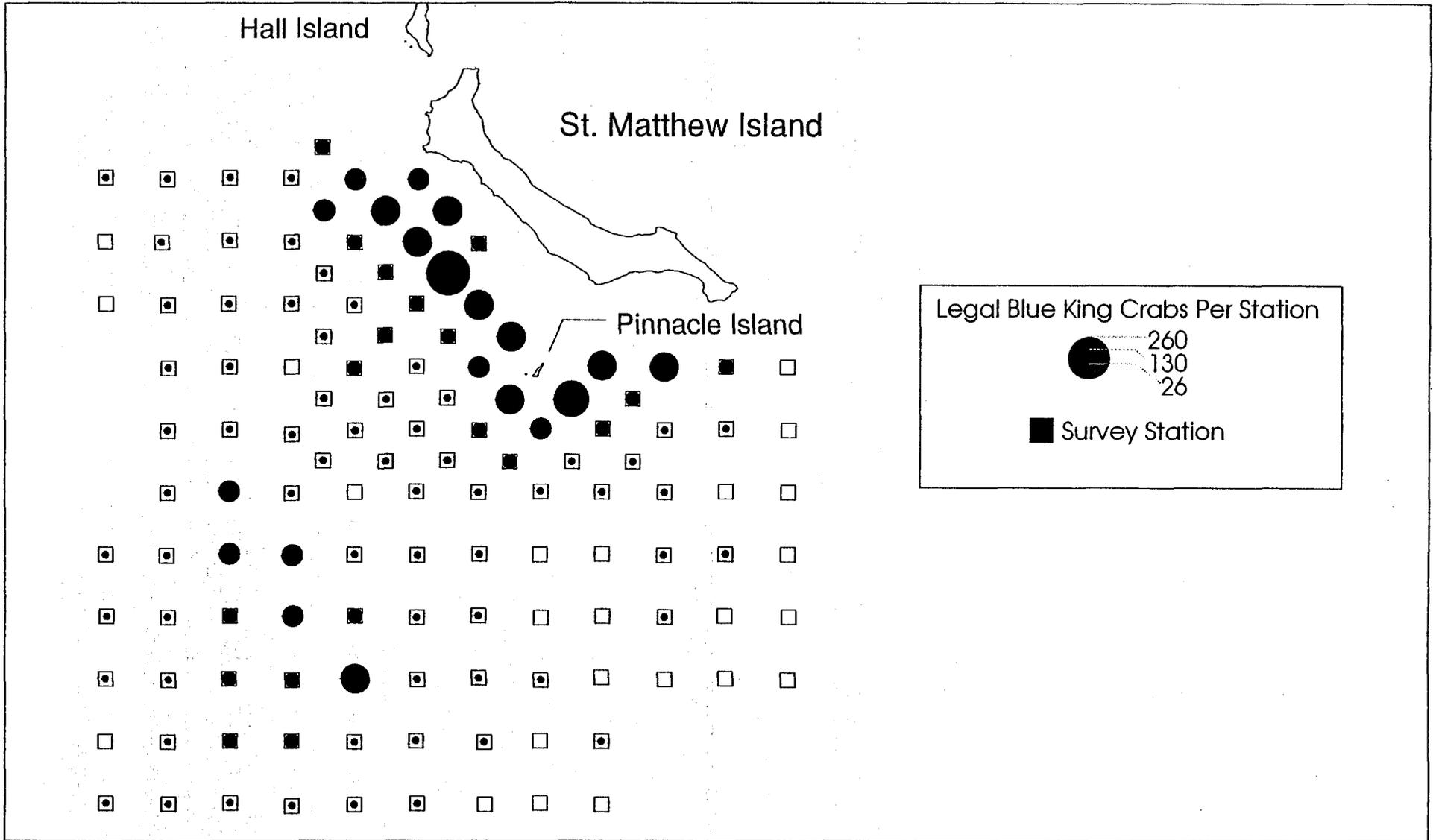


Figure 4. Legal blue king crab males captured by station on the August 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game.

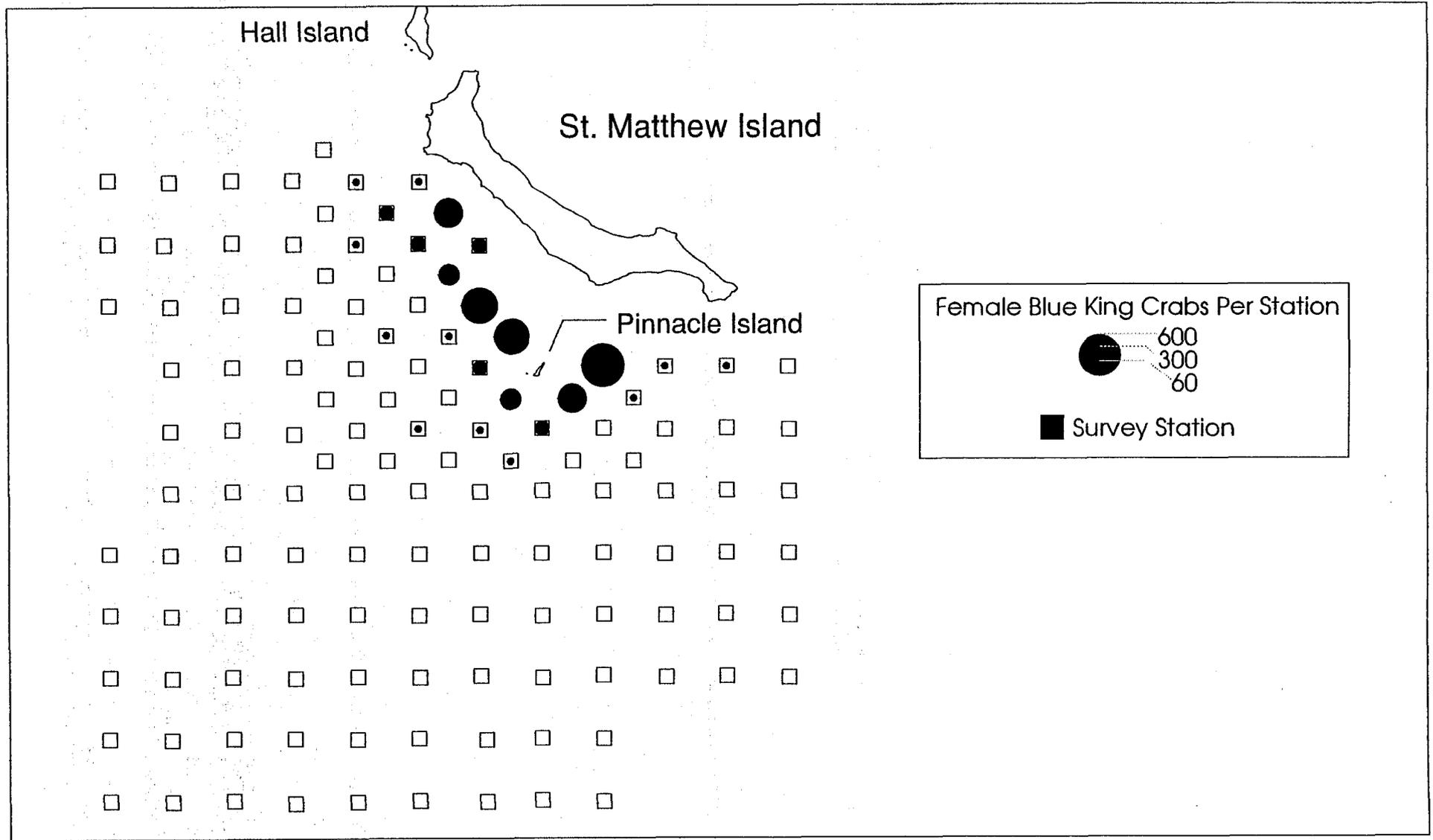


Figure 5. Female blue king crabs captured by station on the August 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game.

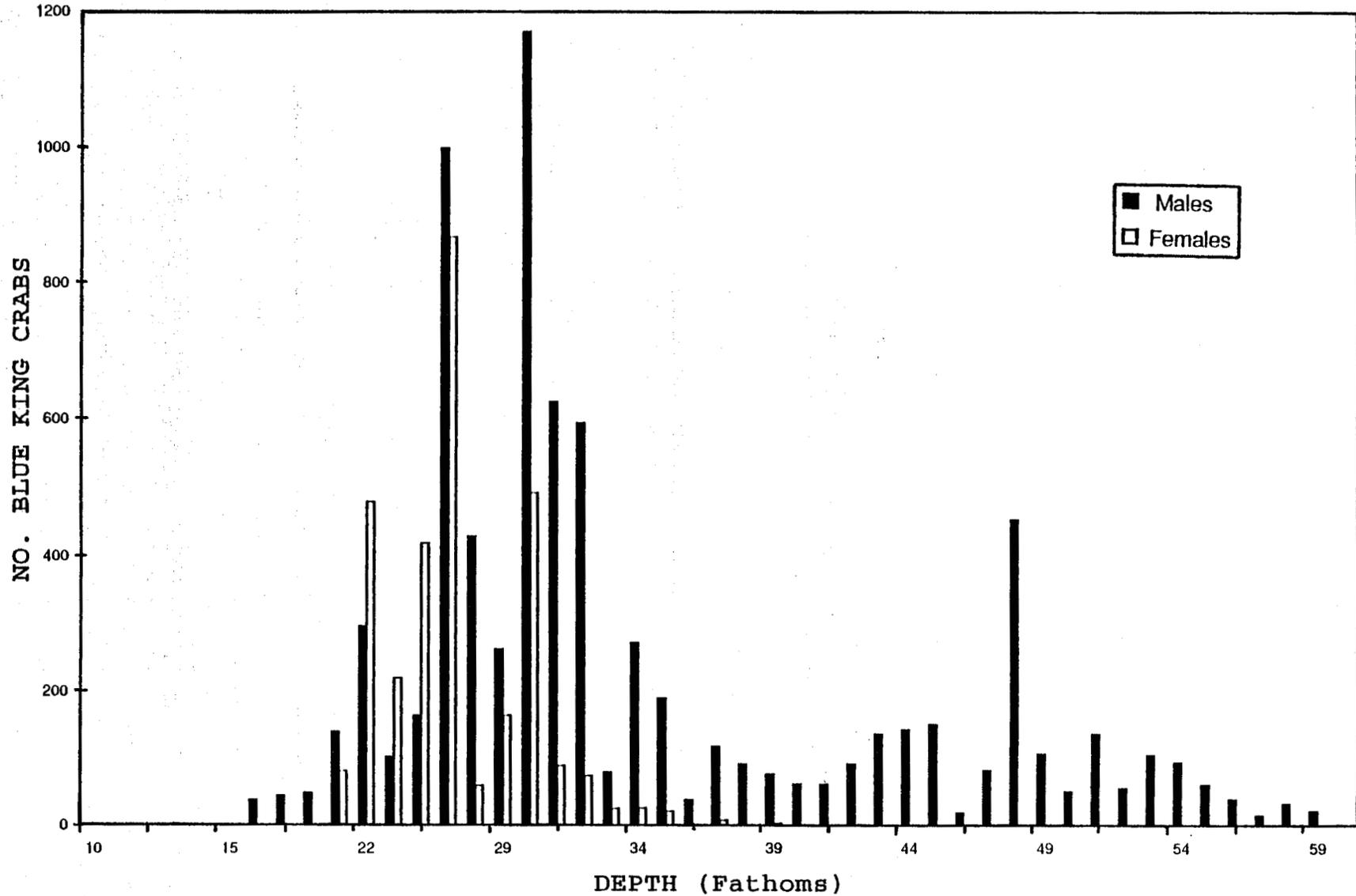


Figure 6. Number of male and female blue king crabs captured at depth intervals during the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game.

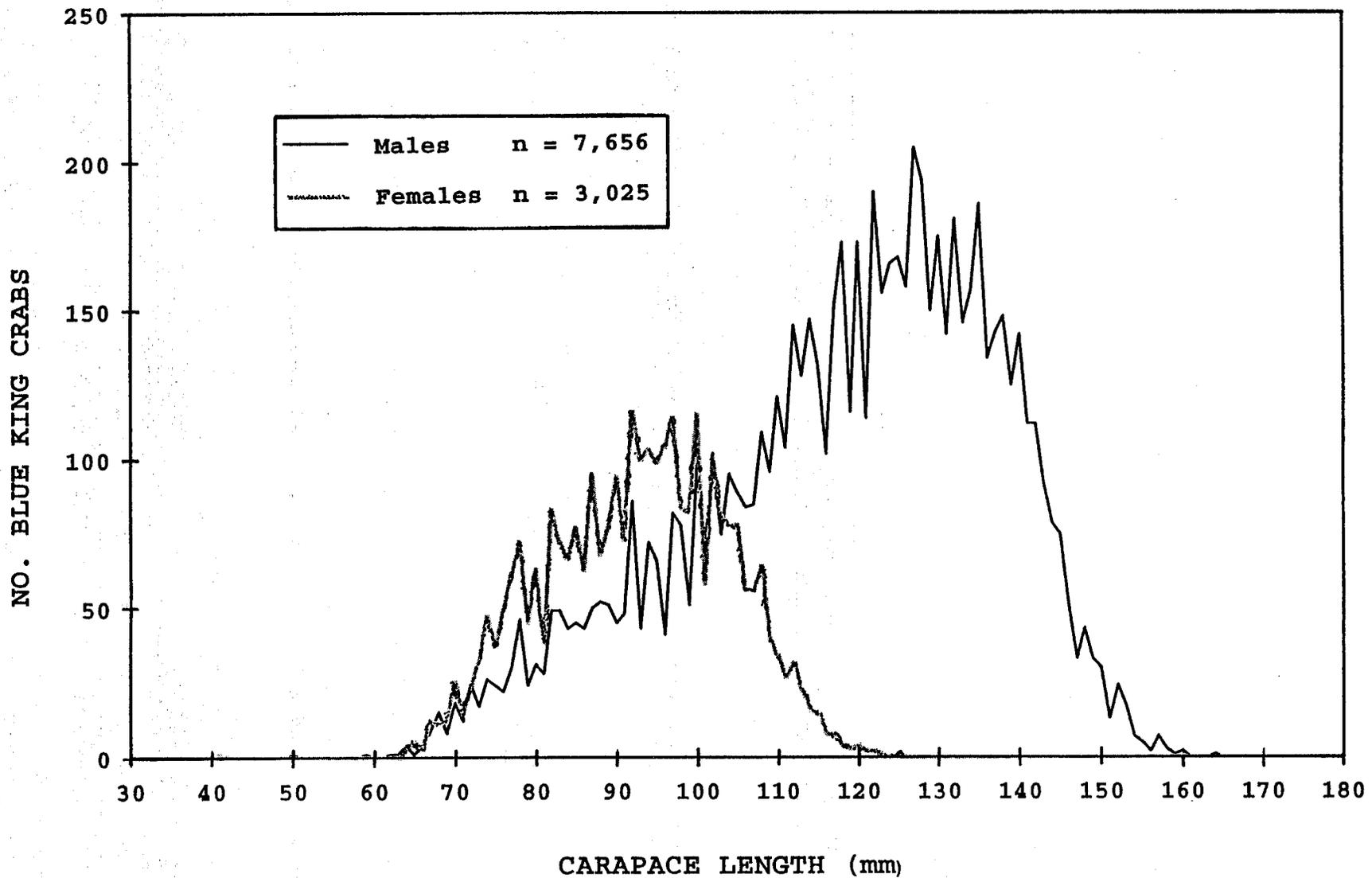


Figure 7. Carapace length frequencies of male and female blue king crabs captured on the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game.

APPENDIX

ADF&G MALE BLUE KING CRAB - 1995 ST. MATTHEW POT SURVEY

VESSEL FV/NOTORIOUS

DATE 08-19-95

STRATUM

STATION NUMBER

BUOY NUMBER NUMBER

NO. CRAB MEASURED

TOTAL NO. CAUGHT

TAGGER

MEASURER

RECORDER

PAGE OF

SEQUENTIAL POT NUMBER	SPECIES	SEX	SIZE (mm CL)	LEGAL	SHELL AGE	PIT TAG				FLOY TAG		OTHER	COMMENTS
						CARTRIDGE NO.	TAG READER	SAVED LOT NO.	PIT TAG ID NO. (last four digits)	SERIES	TAG NO.		
1	3	1								A			
2	3	1								A			
3	3	1								A			
4	3	1								A			
5	3	1								A			
6	3	1								A			
7	3	1								A			
8	3	1								A			
9	3	1								A			
10	3	1								A			
11	3	1								A			
12	3	1								A			
13	3	1								A			
14	3	1								A			
15	3	1								A			
16	3	1								A			
17	3	1								A			
18	3	1								A			
19	3	1								A			
20	3	1								A			
21	3	1								A			
22	3	1								A			
23	3	1								A			
24	3	1								A			
25	3	1								A			
26	3	1								A			
27	3	1								A			
28	3	1								A			
29	3	1								A			
30	3	1								A			

STRATUM

- 1 - Low Density
- 2 - High Density

LEGAL

- 1 - Sublegal < 5 1/2" CW
- 2 - Legal ≥ 5 1/2" CW
- 5 1/2" = 134.75mm

SHELL AGE

- 0 - Soft
- 1 - New
- 2 - Old
- 3 - Very Old

OTHER

- 1 - Dead
- 2 - Alive
- 3 - Nemertean in clutch
- 4 - Turbellarians in clutch
- 5 - Black mat
- 6 - Bitter crab disease
- 7 - "cottage cheese disease"
- 8 - Shell rust
- 9 - B. callosus

FILE: MALEbk 7/95

Appendix B.1. Male blue king crab recording form used on the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game. Form shown here was reduced to 77% of its original size.

ADF&G FEMALE BLUE KING CRAB - 1995 ST. MATTHEW POT SURVEY

VESSEL FV/NOTORIOUS

STATION NUMBER

MEASURER _____

DATE 08 95

BUOY NUMBER

RECORDER _____

NO. CRAB MEASURED

TOTAL NO. CAUGHT

STRATUM

EGGS

PAGE _____ OF _____

SEQUENTIAL POT NUMBER	SPECIES	SEX	SIZE (mm-CL)	SHELL AGE	EGGS				OTHER	SERIES	FLOY TAG NO.	COMMENTS
					COLOR	DEVELOPMENT	CONDITION	% CLUTCH				
1		3	2							A		
2		3	2							A		
3		3	2							A		
4		3	2							A		
5		3	2							A		
6		3	2							A		
7		3	2							A		
8		3	2							A		
9		3	2							A		
10		3	2							A		
11		3	2							A		
12		3	2							A		
13		3	2							A		
14		3	2							A		
15		3	2							A		
16		3	2							A		
17		3	2							A		
18		3	2							A		
19		3	2							A		
20		3	2							A		
21		3	2							A		
22		3	2							A		
23		3	2							A		
24		3	2							A		
25		3	2							A		

SHELL AGE

- 0 - Soft
- 1 - New
- 2 - Old
- 3 - Very Old

STRATUM

- 1 - Low Density
- 2 - High Density

LIVE EGG COLOR

- 1 - Tan
- 2 - Purple
- 3 - Brown
- 4 - Orange
- 5 - Purple-brown
- 6 - Pink
- 7 - Reddish
- 8 -
- 9 -
- 0 - Other, describe in comments

EGG DEVELOPMENT

- 1 - Uneyed
- 2 - Eyed

CLUTCH CONDITION

- 1 - Dead eggs not apparent
- 2 - Dead eggs <20%
- 3 - Dead eggs >20%

PERCENT CLUTCH

- 1 - Barren, clean pleopods
- 2 - Barren, with empty egg cases and/or stalks
- 3 - Clutch 1-29% full
- 4 - Clutch 30-59% full
- 5 - Clutch 60-89% full
- 6 - Clutch 90-100% full

OTHER

- 1 - Dead
- 2 - Alive
- 3 - Nemertean in clutch
- 4 - Turbellarians in clutch
- 5 - Black mat
- 6 - Bitter crab disease
- 7 - "cottage cheese" disease
- 8 - Shell rust
- 9 - B. callosus

FILE: FEMBKC. 7/95

Appendix C.1. Female blue king crab recording form used on the 1995 St. Matthew Island blue king crab survey conducted by the Alaska Department of Fish and Game. Form shown here was reduced to 77% of its original size.

ADF&G CRAB RESEARCH DATA FORM

SPECIES _____

STATION NO. _____

VESSEL _____

SEX _____

BUOY NO. _____

MEASURER _____

DATE

--	--	--	--	--

NO. CRAB MEASURED _____

RECORDER _____

TOTAL NO. CAUGHT

--	--	--

PAGE _____ OF _____

STRATUM OR SAMPLE TYPE

--

	SEQUENTIAL POT NUMBER	SPECIES	SEX	SIZE CRABS(MM) FISH(CM)	LEGAL	SHELL AGE	EGGS				OTHER	COMMENTS
							COLOR	DEVELOPMENT	CONDITION	% CLUTCH		
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

- | | | | | | | |
|--|--|---|---|--|--|---|
| Crab Species
1 - L. acaesopina
2 - P. camtschaticus
3 - P. platyus
4 - S. virgatus
5 - C. borealis
6 - C. borealis
7 - C. borealis
8 - C. angulatus
9 - Cancer magister
10 - L. oregonus
11 - C. tanneri | Fish & Invertebrate Species
See coded species list
Sex
1 - Male
2 - Female
Legal
1 - Sublegal
2 - Legal
Shell
0 - Soft
1 - New
2 - Old
3 - Very Old | Live Fox Color
1 - Tan
2 - Purple
3 - Brown
4 - Orange
5 - Purple-brown
6 - Pink
7 - Reddish
8 -
9 -
0 - Other, describe in comments | Egg Development
1 - Uneyed
2 - Eyed
Clutch Condition
1 - Dead eggs not apparent
2 - Dead eggs < 20%
3 - Dead eggs > 20% | Percent Clutch
1 - Barrer, clean pleopods
2 - Barrer, with empty eggs cases and/or stalks
3 - Clutch 1-29% full
4 - Clutch 30-59% full
5 - Clutch 60-89% full
6 - Clutch 90-100% full | Other
1 - Dead
2 - Alive
3 - Nematodes in clutch
4 - Turbellarians in clutch
5 - Black rot
6 - Bitter crab disease
7 - "rotting cheese" disease
8 - Shell rust
9 - E. caesus | Stratum
1 - Low Density
2 - High Density
Sample Type
3 - 3" Tunnel
5 - 5" Tunnel |
|--|--|---|---|--|--|---|

FILE CRABFORM 7/95

Appendix D.1. Crab research recording form used to record snow crab data on the 1995 St. Matthew Island blue king crab survey, conducted by the Alaska Department of Fish and Game. Form shown here was reduced to 77% of its original size.

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