

**NOAA Technical Memorandum NMFS-AFSC**

**The 2017 Eastern Bering Sea Continental Shelf Bottom Trawl Survey: Results for Commercial Crab Species**

**By**

**C.A. Lang, J. I. Richar, R. J. Foy**

**U.S. Department of Commerce  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Alaska Fisheries Science Center  
Kodiak Laboratory**

**September 13, 2017 DRAFT**

This Page Intentionally Left Blank

## ABSTRACT

The eastern Bering Sea bottom trawl survey has been conducted annually since 1975 by the Resource Assessment and Conservation Engineering Division of the Alaska Fisheries Science Center, National Marine Fisheries Service. The purpose of this survey is to collect data on the distribution and abundance of crab, groundfish, and other benthic resources in the eastern Bering Sea. These data are used to estimate population abundances for the management of commercially important species in the region. This document includes the time series of results from 1975 to the present. In 2017, 377 standard stations were sampled on the eastern Bering Sea shelf. The biomass estimates, reported in metric tons (t) and pounds (lb) with 95% confidence intervals ( $\pm 1.96$  SE) for legal-sized males of each commercial crab stock in the eastern Bering Sea, were as follows:

Commercial crab species	2017 legal or preferred-sized male biomass ( $\pm 95\%$ CI)	
	t*	lb**
Bristol Bay District red king crab ( <i>Paralithodes camtschaticus</i> )	20,842 (7,703)	45,947,862 (16,981,361)
Pribilof District red king crab	3,513 (4,500)	7,743,840 (9,920,761)
Pribilof District blue king crab ( <i>P. platypus</i> )	223 (250)	490,565 (551,088)
St. Matthew Is. Section blue king crab	1,333 (1,482)	2,938,261 (3,267,009)
Southern Tanner crab ( <i>Chionoecetes bairdi</i> ), east 166° W	15,614 (5,226)	34,421,900 (11,521,214)
Southern Tanner crab, east 166° W ≥ 4.9 inches	12,425 (4,403)	27,391,444 (9,706,323)
Southern Tanner crab, west 166° W	21,288 (7,339)	46,932,435 (16,180,417)
Southern Tanner crab, west 166° W ≥ 4.9 inches	12,553 (5,631)	27,675,164 (12,414,277)
Snow crab, all Districts ( <i>C. opilio</i> )	52,149 (13,402)	114,968,484 (29,546,423)
Snow crab, all Districts ≥ 4.0 inches	20,617 (5,817)	45,452,034 (12,824,312)

\*Estimates for preferred size classes are those with sizes listed in the left column.

\*\*Biomass estimates in pounds were derived by converting the raw length data to pounds using regressions in Table 3 prior to calculating the area-swept estimates.

This Page Intentionally Left Blank



## CONTENTS

ABSTRACT.....	iii
INTRODUCTION .....	1
Survey History and Purpose .....	1
Eastern Bering Sea Crab Stock Assessment Process.....	1
METHODS .....	2
Survey Area and Sampling Logistics .....	2
Biological Data Collection .....	3
Crab Biomass Estimates .....	6
Centers of Distribution .....	7
Recruitment.....	7
RESULTS .....	8
Survey Overview .....	8
Bristol Bay District Red King Crab.....	9
Pribilof District Red King Crab.....	11
Pribilof District Blue King Crab.....	13
St. Matthew Island Section, Northern District Blue King Crab .....	14
Tanner Crab .....	15
Snow Crab .....	17
<i>Chionoecetes</i> spp. hybrid.....	19
Other Crab Stocks and Species of Interest .....	20

Northern District Red King Crab .....	20
Northern District Blue King Crab .....	20
Hair Crab .....	20
Golden King Crab.....	20
ACKNOWLEDGMENTS .....	21
CITATIONS .....	22
APPENDIX: Standard Survey Station Details.....	140
APPENDIX: Retow Station Details.....	174

## INTRODUCTION

### Survey History and Purpose

The eastern Bering Sea (EBS) bottom trawl survey has been conducted by scientists in the Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center (AFSC), National Marine Fisheries Service (NMFS), since the early 1970s. Starting in 1975, surveys were conducted annually and were expanded beyond Bristol Bay to include the majority of the Bering Sea continental shelf with the original purpose of assessing potential resource impacts of offshore oil development (Pereyra et al. 1978). The annual collection of data on the distribution and abundance of crab and groundfish resources provides fishery-independent estimates of population abundances and biological data for the management of commercially important species in the EBS. The crab species that have historically been assessed during the survey because of their commercial importance include: red king crab (*Paralithodes camtschaticus*), blue king crab (*P. platypus*), southern Tanner crab (*Chionoecetes bairdi*), snow crab (*C. opilio*), and hair crab (*Erimacrus isenbeckii*). The common name for *C. bairdi* changed from Tanner crab to southern Tanner crab in 2005 (McLaughlin et al. 2005), but it will still be referred to as Tanner crab in this document.

Prior to 1988, the total number of stations varied and gradually increased until they were standardized in 1988 (Fig. 1). Therefore, the pre-1988 estimates provided in this document for stocks that extend northwest of the Pribilof Islands are biased as the entire stocks were not sampled. Since 1988, 376 standard stations have been included in the survey approximately covering 140,350 square nautical mile (nmi<sup>2</sup>) area of the EBS with station depths ranging from 20 to 200 m (Fig. 2). The annual EBS bottom trawl survey begins in the northeast section of Bristol Bay in early June and approximately 4 to 6 stations are sampled each day from each of two vessels. The standard survey is completed in late July or early August at the western edge of the survey grid, northwest of St. Matthew Island. In some years (i.e., 1999, 2000, 2006-2012, 2017) when the reproductive cycle of red king crab is delayed due to colder water temperatures, a small portion of the inner Bristol Bay area is resampled after the conclusion of the standard survey (see Methods). Because station Z-04 (see Fig. 2) has a limited area within a trawlable depth range, tows were often completed at the northeast corner of station Z-04 (AZ-0504). We now exclude station Z-04 (AZ-0504) for crab population estimation. Thus 375 stations are used for crab analysis rather than 376 as listed in technical reports prior to 2015.

### Eastern Bering Sea Crab Stock Assessment Process

Crabs included in the federal Bering Sea and Aleutian Islands (BSAI) King and Tanner Crab Fisheries Management Plan are managed by the Alaska Department of Fish and Game (ADF&G) with federal oversight by NMFS (NPFMC 2011a). The annual stock assessment and fishery evaluation (SAFE) report prepared by the North Pacific Fishery Management Council provides current biological, ecosystem, and economic data associated with these commercial crab species. The NMFS determines the procedure for setting overfishing levels (OFL) and allowable biological catch (ABC) while ADF&G sets the annual total allowable catch (TAC) or guideline harvest level (GHL) for each crab stock. Currently, the Council's Crab Plan Team (CPT) and the

Scientific and Statistical Committee (SSC) review the assessment, biological, economic, and modeling data to recommend biological reference points associated with the status of crab stocks. Crab stock boundaries are defined by ADF&G management units for king crab and Tanner crab species (Fitch et al. 2012); however, the Pribilof Islands blue king crab stock boundary also includes a 20 nmi column on the east side of the management unit, which was added in 2013 to account for blue king crab survey and bycatch data. Red king crab are split into Bristol Bay and Pribilof Islands stocks and blue king crab are split into Pribilof Islands and St. Matthew Island stocks for management purposes, while Tanner and snow crab fisheries are considered single stocks but are split into separate management fishery units defined by the ADF&G Board of Fisheries using 166°W and 173°W as the boundary for each east and west unit, respectively.

This report summarizes the 2017 survey results for commercially important crab resources in the EBS. Note that area-swept estimates in this document are indices of abundance and may not match the final modeled population estimates in the SAFE reports because the models include additional population dynamics information. The results of the 2017 standard EBS bottom trawl survey are presented for these crab stocks as defined by the management units. Details of the survey design and fishing gear specifications in addition to the number and weights of the groundfish species sampled at each standard station during this survey will be reported in a separate NOAA Technical Memorandum (e.g., Conner and Lauth 2017).

## METHODS

### Survey Area and Sampling Logistics

The 2017 standard survey was conducted onboard the chartered fishing vessels FV *Alaska Knight* and FV *Vesteraalen*, beginning 4 June in the northeast corner of Bristol Bay, moving westward, and finishing on 31 July. The vessels did not sample in close proximity to each other for much of the survey (Fig. 2) due to special projects conducted on one vessel and due to vessel mechanical breakdowns. The FV *Vesteraalen* also returned to Bristol Bay to resample 20 stations between 10 August and 15 August. These stations were resampled due to the delaying effects of cold water temperatures on the red king crab reproductive cycle (see Results: Bristol Bay District Red King Crab).

The survey stations are divided into multiple management units defined by ADF&G commercial registration areas and districts, and further divided into strata with either standard or high station densities (Fig. 3). Standard-density strata have stations centered in  $20 \times 20$  nmi ( $37.04 \times 37.04$  km) cells, while high-density strata include additional stations at the corners of the  $20 \times 20$  nmi cells. To calculate the total area for each stock strata the area for each  $20 \times 20$  nmi cell is assumed to be  $401 \text{ nmi}^2$  due to the effects of a spherical projection of the flat grid surface in an area as large as the EBS.

The king crab Registration Area T in Bristol Bay (south of 58°39'N and east of 168°W) is  $54,536 \text{ nmi}^2$  and consists of 136 stations. The king crab Registration Area Q in the Bering Sea is

divided into the Northern District (north of 58° 39' N) and the Pribilof District (south of 58° 39' N and west of 168°W). The area for the St. Matthew Island Section of the Northern District is divided into two sampling strata: 1) a high-density 7,218 nmi<sup>2</sup> stratum with 28 stations (one of which is not trawlable but is included in the total area surveyed) and 2) a standard-density 11,629 nmi<sup>2</sup> stratum with 29 stations creating a total of 56 stations within the St. Matthew Island Section. The area of the Pribilof District is divided into two sampling strata: 1) a high-density 10,025 nmi<sup>2</sup> stratum with 41 total stations and 2) a standard-density 14,436 nmi<sup>2</sup> stratum with 36 stations creating a total of 77 stations within the stock area. For Pribilof District blue king crab, the eastern stock boundary is 20 miles east of the Pribilof District and includes nine additional stations, as indicated in the 2013 Pribilof Islands Blue King Crab Rebuilding Plan (NPFMC 2014). High-density strata have more stations (standard, corner) per area than standard-density strata.

The fishing gear used in 2017 was identical to that of previous EBS annual bottom trawl surveys since 1982 with both vessels fishing a standard 83-112 Eastern otter trawl with an 83 ft (25.3 m) headrope and a 112 ft (34.1 m) footrope (Lauth and Nichol 2013). The codend mesh size is 8.9 cm stretched and the liner is 3.2 cm. The trawl nets on each vessel were removed from service and replaced with new nets every 20-30 consecutive tows (~5 days) to mitigate potential impacts from changes in net configuration due to fishing. Each tow was approximately 0.5 h in duration and 1.5 nmi (2.8 km) in length at a speed of 3 knots (1.54 m sec<sup>-1</sup>) (see Results for details) and conducted in strict compliance with NMFS bottom trawl protocols established by the National Oceanic and Atmospheric Administration (Stauffer 2004).

Net mensuration equipment (Marport sensors) was used to monitor the net's fishing performance during each tow. A bottom contact sensor was attached to the center of the footrope to measure bottom contact of the net at 1-second intervals. The net mensuration system also consisted of an acoustic sensor attached to the headrope and two sensors attached to the port and starboard dandyines to measure net height and width during trawling operations. The bottom contact of the footrope and GPS data were used to calculate distance fished. Fishing power was assumed to be equal between the two vessels.

Surface and bottom water temperatures along with temperature-depth profiles were collected at 6-second intervals throughout the duration of each tow using a Sea-Bird SBE-39 bathythermograph continuous data recorder (Sea-Bird Electronics Inc., Bellevue, WA) attached to the headrope of the net. The temperature measurement range of the SBE-39 is -5 to 35 ± 0.002 °C with pressure sensors measuring to a maximum depth of 1,000 ± 1 m and are calibrated every year by Sea-Bird Electronics. Bottom depth was also derived from these data by adding the net height from the net mensuration system to the headrope depth recorded by the SBE-39.

## **Biological Data Collection**

All crab were removed from the catch, sorted by species and sex, and a total catch weight was obtained for each species. Tanner and snow crab hybrids are identified by a combination of characteristics including curve of the epistome margin, eye color, carapace shape, and space between or shape of the rostrum horns (Karinen and Hoopes 1971, Urban et al. 2002). A random

subsample of the total catch occurred when an exceptionally large number (approximately > 300) of a species was caught in a tow. Subsamples varied in size and composition depending on the particular tow. The subsample may have occurred at the level of the entire catch or at the level of a particular size and sex category once the catch was sorted. The total weights of the sampled crab and non-sampled crab were recorded and an expansion factor was calculated to determine the final number of each species in the catch.

Individual crab carapaces were measured ( $\pm 0.1$  mm) to provide a size-frequency distribution of each sample. Crab sizes are reported as carapace width (CW) excluding spines for Tanner and snow crab, and carapace length (CL) for all king crab and hair crab (Donaldson and Byersdorfer 2005). Since 2006, individual weights were measured for blue king crabs every year, red king crab and snow crab in odd years, and for Tanner crab in even years to add to the existing length-weight data and to monitor temporal variability in length-weight regressions. For every haul in 2017, length-weight data were collected on up to five snow and red king crab per each of the following categories: 1) male crab, 2) ovigerous crab, and 3) non-ovigerous female crab. Because of their relative rarity, weight data were collected for all intact blue king crabs encountered that met the sampling requirements (i.e., whole, live crab without regenerating limbs). Weights were collected from representative size ranges throughout the spatial distribution of each species. Collections were regionally stratified and tally sheets ensured all size ranges were equally sampled within each region.

In the absence of specific age data, shell condition classification by length and sex is necessary for apportioning stock abundance and biomass for determination of stock status, analytical stock assessment, and for establishing annual management controls. Shell condition class serves as a semi-quantitative index of molt status and time in shell post-molt. For all EBS crab stocks, and particularly those which exhibit a terminal molt at maturity (i.e., *Chionoecetes* spp.), shell condition is a requisite for setting overfishing limits and harvest quotas. Carapace shell condition was assessed for each crab sampled and assigned to one of six classes according to specific criteria (0 = premolt or molting, 1 = soft and pliable, 2 = new hardshell both firm and clean, 3 = oldshell slightly worn, 4 = oldshell worn, 5 = very oldshell).

Clutch assessment is used to estimate spawning stock biomass and overall reproductive health and to monitor demographic changes in the mating population. All female crab abdomens were evaluated to determine reproductive condition based on the color of the eggs (0 = no eggs, 2 = purple, 3 = brown, 4 = orange, 5 = purple-brown, 6 = pink), the condition of the eggs (0 = no eggs, 1 = uneyed, 2 = eyed, 3 = dead, 4 = empty egg cases), and the size of the egg clutch (0 = immature, 1 = mature female no eggs, 2 = trace to 1/8, 3 = 1/4, 4 = 1/2, 5 = 3/4, 6 = full).

For mature females, egg clutch and egg condition codes were used to identify the stage in the molt-mate cycle, where the presence of eyed embryos, empty egg cases, or absence of eggs (barren, hereafter) in morphologically mature females were indications of an incomplete cycle while mature females brooding uneyed embryos indicated completion of the cycle. The ratio of females with eyed embryos, empty egg cases, and old shell barren to uneyed embryos was derived as a measurement of the molt-mate cycle progression during the survey.

Understanding reproductive biology is critical for managing crab stocks in the Bering Sea. Spatiotemporal variability in reproductive potential including fecundity, sperm reserves, and reproductive condition likely regulates fluctuations in population abundances. Yet, most stock assessment models use spawning stock biomass (i.e., number and average weight of mature animals), but not embryo production, which can lead to different perceptions of productivity (Trippel 1999, Swiney et al. 2012). In recent years, egg clutches for red king crabs in Bristol Bay and *Chionoecetes* spp. throughout the eastern Bering Sea were collected during the survey to support process studies to assess female reproductive potential. Red king crab and snow crab fecundity varies interannually and spatially likely due to demographic variability in crab age as measured by size and shell condition (Rugolo et al. 2005, Swiney et al. 2012). Starting in 2012, mature female red king crab samples were collected (even years only) throughout their distribution to monitor fecundity changes over time. Future analyses will consider the correlations of reproductive potential with demographic and environmental patterns. In addition, mature female *Chionoecetes* spp. with shell condition 1-3 were collected in collaboration with ADF&G (see Table 4).

Maturity in male *Chionoecetes* spp. can be defined by morphometric characteristics of the chela where morphometrically immature and mature crab are separated into two morphometric groups based on the frequency distribution of the chela height (large claw or small claw) to carapace width ratio (Stevens et al. 1993, Tamone et al. 2007). To assess the difference between morphometric maturity and true functional maturity, additional special projects have been conducted in recent years. As standard sampling protocol, chela height and carapace width measurements were taken for male Tanner crabs during even years starting in 2008, while chela height and carapace width measurements for male snow crabs were taken in odd years starting in 2009. In 2017, chela height and carapace width measurements ( $\pm 0.1$  mm) were collected from all male Tanner crab caught at each station.

Bitter crab syndrome is caused by a parasitic dinoflagellate, *Hematodinium* sp., and is found in Tanner and snow crab throughout Alaska waters (Meyers et al. 1996). The mortality rate of parasitized crabs is believed to be high and symptoms include lethargy, pink carapace pigmentation, and white opaque hemolymph (Meyers and Burton 2009a). Meats of parasitized crabs are harmless to humans but are bitter tasting making the crabs unmarketable. The prevalence of bitter crab syndrome fluctuates temporally and spatially between *Chionoecetes* spp. in the eastern Bering Sea (Meyers et al. 1996) and may be affected by changes in environmental conditions (Morado et al. 2010). Black mat syndrome is caused by a parasitic fungus, *Trichomarix invadens*, and was prevalent in the 1970s and 1980s throughout Alaska waters, primarily infecting Tanner crab, but does not pose human health concerns if infected Tanner crab meat is consumed (Meyers and Burton 2009b). Infected crabs have a dense, hard, black, tar-like covering over parts of the exoskeleton, which invades internal tissue causing destruction of the host (Meyers and Burton 2009b). Infections can prevent molting, cause blindness if eyestalks are infected, or result in mortality depending on the severity of the infection. Infected sub-legal crabs could fail to reach legal size or sexual maturity. All crab carapaces were scanned for evidence of bitter crab syndrome and black mat fungus to understand its temporal and spatial variability. In addition, Tanner and snow crab blood samples were collected in each of three index sites, which was comprised of 10 stations per index site (20 crabs

were attempted to be sampled per station). Samples were set aside for further testing by scientists in the Shellfish Assessment Program, Pathobiology group at the AFSC in Seattle, Washington.

### Crab Biomass Estimates

Crab density (number nmi<sup>-2</sup>) was estimated at each station for legal males, or sublegal males, as well as mature and immature males and females of each stock. Maturity and legal size classes were based on literature values and State of Alaska regulations (Table 1). The ADF&G definitions for legal size classes (CW in inches) include spines (ADF&G 2017), while CW measurements reported in this document exclude spines (Table 1). The area-swept by the trawl (nmi<sup>2</sup>) was calculated as the product of the distance traveled while the net had bottom contact by the mean net width over the duration of the tow. Prior to 2009, data reported in this annual document used a fixed width of 15.2 m (0.008 nmi) in the area-swept calculation to maintain consistency with historical calculations of crab abundances. Since 2009, all population biomass estimates for the entire time series are calculated using the variable net width based on net mensuration data (Table 2). The effective width of the trawl typically ranges from 14.6 to 18.3 m when towing at a speed of 3 knots (Weinberg 2003; Fig. 4), and changes with the depth of the tow due to changes in scope of the trawl wire (Rose and Walters 1990). For 2017 and all historical data reported in this current document, crab densities were calculated using the mean net width recorded for the duration of each tow and a mean net width-inverse scope regression relationship was calculated when net width values were not recorded during a tow (Rose and Walters 1990). From 1975 to 1981, the net width estimates used for the area-swept calculations were derived from a single width estimate calculated each year for a particular type of trawl used during the annual survey. From 1982 to 1987, the net width used in the area-swept calculations was estimated using the inverse relationship between net scope and net width developed by Rose and Walters (1990). From 1988 to 2017, the net width was estimated using the net mensuration system described above, which measures the height and width of the net throughout the duration of the tow (Table 2, Fig. 4). Distance traveled by the trawl was determined from ship GPS positions recorded at the beginning and end of each tow.

All reported historical data and the current biomass estimates are calculated for the number of individual male and female crab species at each 1 mm size category using the weight-size relationships developed by the AFSC's Kodiak Laboratory (Table 3). The size-weight relationships are described by the expression:

$$W = a L^b ,$$

where  $W$  is the total weight in grams,  $L$  is either CL or CW in millimeters,  $a$  is the intercept in log scale and  $b$  is the slope. Parameters  $a$  and  $b$  for the size-weight relationships are estimated from a linear regression fitted to log-transformed size-weight data collected between 2000 and 2009.

The weights calculated at each 1 mm size category are summed within the legal male, sublegal male, mature and immature size categories for each species and sex caught at a station. The crab biomass within a district or section stratum was estimated by averaging crab densities from all stations within the defined district or section stratum and multiplied by the total area of the



district or section stratum specific to that stock. Total biomass was calculated using a stratified design based on management units (standard density, high density, ADF&G-defined districts, or section stratum). Population biomass estimates were calculated in each stratum and then summed among strata. Variance of the total biomass estimate for each size class was calculated by summing the variance of each stratum. The 95% confidence intervals were calculated using the standard error of the total population multiplied by 1.96. All biomass estimates and confidence intervals ( $\pm 95\%$ ) reported in this document are reported in metric tons (t) except in the Abstract where both t and pounds (lb) are reported. Metric tons can be converted to lb by multiplying the biomass in t by 2,204.62 for comparison with ADF&G reported values of total allowable catch (TAC) and guideline harvest levels (GHL).

In years with colder than average bottom water temperatures (1999, 2000, and 2006-2012), a small number of standard Bristol Bay stations sampled at the beginning of the survey were resampled in mid-August to accurately assess the percentage of ovigerous red king crab females which had extruded a new clutch of uneyed embryos. In 2017, it was necessary to resample 20 Bristol Bay stations in late July due to the low number of newly molted, ovigerous female with clutches of uneyed embryos encountered in early June. These resample stations were selected based on the density of female red king crab at these stations during the first sampling event and from expected distributions based on previous Bristol Bay surveys. The 2017 total population estimates for Bristol Bay red king crab males were calculated using only standard tows from leg 1 in June. Bristol Bay female red king crab biomass estimates were calculated by replacing data collected at the original stations with data collected at the resample stations in July due to crab movement into the sampling area during the time between the standard survey and the resampling event.

The population biomass estimates reported in this document are point estimates and have substantial uncertainty due to the expanse of the area being sampled and the distributions of the resource. These point estimates are least precise for small crabs due to gear selectivity, and for females of some stocks due to crab behavior. For example, female blue king crab prefer rocky habitat, which is difficult to sample with bottom trawls. For consistent analyses and due to a lack of available data, catchability is assumed to be near or equal to one for the indices developed in this document. The stock assessment models that incorporate these survey data consider catchability when estimating abundance and biomass.

## **Centers of Distribution**

The centers of distribution for male and female crab from 1975 to 2017 were determined by averaging the latitude and longitude of each positive tow for a particular species. Latitude and longitude were weighted by the CPUE for each size and sex class. For years with retows both tows were included separately.

## **Recruitment**

Population fluctuations are likely influenced by variations in recruitment strength. Thus, assessing temporal variability in abundances of new individuals reaching the minimum legal size

is important to predict the following season's catches. The term "recruitment" can refer to various life history stages including newly settled juveniles, individuals reaching sexual maturity, or individuals reaching the legal size limit. For the purposes of this technical memorandum, "pre-recruits" are defined as mature male crabs in the size class that will likely enter the fishery (minimum legal size limit) the following year, also referred to as "P1" crabs by some stock assessment authors (Table 1). A time series of pre-recruit abundance estimates are provided as an index for future abundances of legal crab.

## RESULTS

### Survey Overview

The 2017 EBS bottom trawl survey consisted of 395 total bottom trawls (375 standard survey stations, and 20 resampled stations in Bristol Bay) conducted from 4 June to 15 August over an area of approximately 140,350 nmi<sup>2</sup> beginning in the southeast corner of Bristol Bay, moving east to west and finally moving from the stations northwest of St. Matthew Island to the stations along the slope edge south to finish on 31 July. The latitude and longitude of the midpoint of each successful tow along with the duration (h), distance fished (km), bottom depth (m) and bottom temperatures (°C) are listed in the Appendix. The mean distance fished across all tows was 1.52 nmi (2.82 km, SD = 0.10 nmi) with a range of 0.72 to 1.85 nmi (1.34 to 3.44 km) and the mean tow duration was 30.9 minutes (SD = 1.85 min, range = 14.8 to 36.5 min) for both standard and retow stations. The fishing depth of the 83-112 Eastern otter trawl ranged from 19 to 193 m with a mean gear depth of 78.9 m (SD = 34.0 m) for standard survey stations. The fishing depth for the 20 retow stations ranged from 38 to 89 m with a mean gear depth of 60.4 m (SD = 12.1 m). The mean net width per tow ranged from 13.6 to 20.1 m and the average mean net width for all 375 standard successful tows was 17.0 m (SD = 1.0 m, Fig. 6). The mean net width per tow for 20 retow stations ranged from 15.4 to 17.4 m and the average mean net width was 16.4 m (SD = 0.5 m). The 2017 net fishing performance (distance fished, tow duration, gear depth, net width) was consistent with previous years with the exception of 1975, when tow duration was 60 minutes and mean distance fished was  $2.26 \pm 0.18$  nmi.

The bottom temperature at each station during the standard survey ranged from -1.6 °C to 8.2 °C (Fig. 5). A cold pool of water < 2°C extended onto the middle shelf between the 50 and 100 m isobaths and almost into the eastern edge of Bristol Bay with cold temperatures persisting northeast of the Pribilof Islands, which was extended relative to previous years. Warmer bottom temperatures were evident between the 100 and 200 m isobaths in the southern region of the survey area and in shallow waters north of Bristol Bay and around Nunivak Island. Cold water temperatures persisted in the northwestern area between the 50 and 200 m isobaths and the waters surrounding St. Matthew Island. In 2017, the average bottom water temperature during the first survey leg (4 June to 20 June) was 1.7 °C (SD = 2.0), which was colder than the average mean bottom water temperature during the same time period during the previous 4 years. The bottom water temperatures at the 20 stations resampled in August ranged from 1.9 to 7.8 °C, with a mean of 5.0 °C (SD = 1.5) (Fig. 6).

Population abundance and biomass of the seven commercial crab stocks sampled during this survey fluctuated dramatically from 1975 to 2017 (Figs. 7-12). Overall commercial crab mature male biomass decreased from approximately 300,000 t to below 100,000 t in the mid-1980s, increased to just below 500,000 t in the early 1990s due to increases in snow and Tanner crab, leveled out around 200,000 t between 2005 and 2015, but dropped to approximately 100,000 t in 2017 (Fig. 7).

Six special projects were conducted in addition to the standard assessment survey to collect specific biological data from particular crab species (Table 4). Five of the projects originated from the AFSC: 1) collect Tanner and snow crab blood samples at three index sites to monitor bitter crab syndrome, 2) collect female snow crabs to assess annual versus biennial reproductive cycles, 3) collect snow crab shell to identify variability in shell structure and calcification, 4) collect male Tanner crab chela height measurements for estimating maturity, and 5) collect mature female snow and Tanner crabs for laboratory larval and juvenile growth studies. One project originated from ADF&G: collect snow crab for research of genetics mating dynamics.

Five-hundred and fourteen snow crab and 610 Tanner crab blood samples were collected from six index sites to monitor bitter crab syndrome. Approximately 600 snow crabs were collected for the annual versus biennial reproduction study. Six hundred snow crab claws were collected for the shell structure and calcification project. Chela heights were measured for maturity estimates; 3,293 male Tanner crab and 3,322 male snow crab chela heights were measured in 2017. Fifteen ovigerous female snow crabs and 15 ovigerous female Tanner crabs were collected for growth studies. Mature female snow crab were also collected for a genetics mating dynamics project. All collections were completed within the guidelines stipulated by the ADF&G collection permit for each project (CF-16-010(1), CF-17-076).

### **Bristol Bay District Red King Crab**

Red king crab were caught at 72 of the 136 stations in the Bristol Bay management district in 2017. Similar to historical trends over the last 30 years, Bristol Bay red king crab were caught at an average depth of 55.5 m (SD = 13.8 m). The density of legal-sized male crab caught at a station ranged from 62 to 2,355 crab nmi<sup>-2</sup> (see Appendix). Legal-sized male Bristol Bay red king crab were caught at 60 stations (Table 5; Appendix), resulting in a total biomass estimate ( $\pm$  95% CI) of 20,842  $\pm$  7,703 t (Table 6) and a total abundance estimate ( $\pm$  95% CI) of 6.4  $\pm$  2.4 million crab (Table 7) in the Bristol Bay District. The majority of mature males were concentrated in the central and southern section of Bristol Bay along the Alaska Peninsula (Figs. 13-15). The 2017 estimated biomass of legal-sized males is lower than last year, and lower than the 20-year average of 28,745  $\pm$  4,466 t (Table 6).

Red king crab mature males were encountered at 64 of the 136 surveyed stations with no one station dominating in abundance (Fig. 14). One-hundred percent of the 266 mature males and 112 immature males caught were measured (Table 5). The estimated biomass of 23,102  $\pm$  8,328 t for mature males is 91% of the total male biomass in 2017 (Table 6) with immature male red king crab estimated at 2,239  $\pm$  780 t (Table 5). The majority of both size categories were located in the central and northern Bristol Bay District (Figs. 14 and 15).

In 2017, an overall decrease in male red king crabs was observed compared to last year (Fig. 16). Fifty-three percent of legal-sized males were new hardshell crabs and 47% were oldshell and very oldshell crabs with the majority of oldshell males caught in central Bristol Bay (Fig. 17).

One objective of this multi-species bottom trawl survey is to assess the mature red king crab population when mature females are carrying newly extruded, uneyed embryos after completion of the molt-mate cycle (Otto 1986). Embryo development and larval hatching in female red king crab, followed by the molting and mating cycle, are delayed in years with cold bottom water temperatures (Chilton et al. 2010, Shirley et al. 1990, Stevens and Swiney 2007, Dew 2008). During years with colder than average bottom temperatures (1999, 2000, and 2006-2012, 2017), the ratio of eyed to uneyed embryos encountered in mature females on the survey in June was higher compared to warmer years (2001-2005, 2013-2016) (Table 8). The eyed to uneyed embryo ratio ranged from 6.54 to 0.42 in cold years, compared to 0.06 to 0.00 in the warmer years. The ratio of eyed to uneyed embryos in mature females decreased dramatically when the Bristol Bay stations were resampled in cold years, ranging from 0.06 to  $< 0.01$ , and indicating that the majority of mature females completed the mating and molting cycle (Table 8). The determination that the molting and mating cycle has been delayed is made when high numbers of oldshell mature females either brooding eyed embryos, which were fertilized from the previous season, or with pleopods exhibiting empty egg cases, are encountered during the first leg of the survey. To determine whether it is necessary to tow the Bristol Bay red king crab stations again, the reproductive condition of the mature female red king crab and the change in abundance of males and females between survey legs during cold years are assessed.

Similar to the previous years (1999, 2000, and 2006-2012), the cold water temperatures in 2017 delayed the molting and mating cycle in mature female red king crab and only 29% of the 490 mature females sampled during the standard survey had extruded a new clutch of uneyed embryos. Bottom temperatures significantly increased from June ( $3.18^{\circ}\text{C}$ ) to the retow in August ( $5.01^{\circ}\text{C}$ ) which was followed by a significant change in the eyed to uneyed ratio during the survey (Table 8). In early June, the oldshell females with empty egg cases and the new, hardshell females with uneyed embryos were distributed throughout Bristol Bay (Figs. 18 and 20a). Among resurveyed female crab in early August, 89% were mature females and 100% of these were in new, hardshell condition with newly extruded uneyed embryos (Figs. 18a and 20b). These new, hardshell females had molted and mated over the 6-week period between the first sampling event in early June samples and the resample in early August. In 2017, the ratio of eyed to uneyed embryos decreased from 0.15 in early June during the standard survey to 0.00 in early August during the resampling event (Table 8). The average density of mature female red king crab caught at the 20 resample stations in early June was  $1,286 \text{ crab nmi}^{-2}$  compared to a total density of  $1,824 \text{ crab nmi}^{-2}$  at those same resample stations in early August (Figs. 13 and 13a).

The 2017 biomass estimates for female red king crab were calculated by replacing data collected at the original stations in early June with data collected at the resample stations in early August. The 2017 mature female red king crab biomass estimate of  $26,424 \pm 13,139 \text{ t}$  (Table 6) and abundance estimate of  $17.5 \pm 8.6$  million crabs (Table 7) is 88% of the total female abundance with immature female red king crab biomass estimated at  $1193 \pm 680 \text{ t}$  (Table 6). The majority of

the mature female red king crab were caught in the central area of Bristol Bay and along the Alaska Peninsula (Figs. 14 and 18).

Spatial distribution of red king crabs have fluctuated since the start of the survey. The centers of distribution for mature male and female red king crab shifted north and east of the southwest Bristol Bay region from 1980 to 1987 (Fig. 21). From 1988 to 1991, the mature female distribution slightly shifted south before returning to the northeastern distribution while males remained in the northeast. Loher and Armstrong (2005) hypothesized that the shift during the late 1970s and early 1980s was due to warmer bottom temperatures. Yet an alternative hypothesis suggests the disappearance of the southwestern portion of the population near the Unimak region during the late 1970s and early 1980s was caused by fishing effects (Dew and McConnaughey, 2005). In more recent years when the cold pool extended onto the Bristol Bay shelf area (from 2008 to 2012), the distribution of mature females and males moved from the central area of Bristol Bay to the nearshore areas along the Alaska Peninsula supporting the temperature hypothesis (Chilton et al. 2010). This may be because females avoid water cold enough to delay embryogenesis during brooding (Stone et al. 1992). The centers of distribution for mature males and females in 2017 was approximately 10 nmi north relative to 2016 centers of distribution and 20 nmi north relative to the previous two years (Fig. 21).

The location of ovigerous females at larval release may impact post-larval settlement success and recruitment strength in subsequent years. Given the known current structure in Bristol Bay, larvae released from females located in southwestern Bristol Bay would have a higher likelihood of settling in inner Bristol Bay. A northward shift in adult spatial distribution may reduce larval supply along the Alaska Peninsula and in inner Bristol Bay which is likely more favorable for juvenile survival than elsewhere in Bristol Bay (McMurray et al. 1984, Zheng and Kruse 2006). If this hypothesis is correct, reduced settlement success in warm years relative to cold years (Evans et al. 2012) may explain population trends over the past several decades. Year-class strength was high during the 1970s and early 1980s, but has been generally low since 1985 (Figs. 22 and 23). High abundances in the 1970s occurred when the spawning stock was located in southern Bristol Bay (Armstrong et al. 1993), while the low abundances starting in the mid-1980s may be caused by the warmer bottom temperatures and potentially related adult spatial shift. Despite relatively cold years in 2008-2012 and an extended cold pool, estimated population abundance has been low in recent years. A strong juvenile size group (40 mm to 50 mm CL size category) was observed in 2011 and could be associated with the colder temperatures in 2008-2012. The strong 2011 juvenile size class was not observed in 2012 or 2013, but relatively high abundances of females appeared in the 110-120 mm size class in 2014, which may be attributed to the strong juvenile size group seen in 2011 (Figs. 22 and 23). The 2017 mature male and pre-recruit population abundance estimates were lower compared to 2016. Mature female estimates were lower in 2017 compared to 2016, and still below the 20-year average of  $26.8 \pm 3.4$  million crabs.

### **Pribilof District Red King Crab**

Historically, red king crab were not abundant in the Pribilof District and landings were taken incidentally during the blue king crab fishery. The red king crab fishery first opened in 1993

while fishing for blue king crab was closed. A combined fishery for red and blue king crab occurred in the Pribilof District from 1995 through 1998, but due to low abundance of blue king crab, the combined fishery and the red king crab fishery have both remained closed since the 1998-1999 season (Gish 2006).

Red king crab were caught at 9 of the 77 stations in the Pribilof District, most of which were in the high-density sampling area in 2017 (Fig. 24). Pribilof District red king crab were caught at an average depth of 60.8 m (SD = 9.0 m), which is slightly deeper than the long-term average (56.0 m). The density of legal-sized males caught at a station ranged from 71 to 2,333 crab nmi<sup>-2</sup> (Appendix). Legal-sized male red king crab were caught at 8 of the 77 stations in the Pribilof District (Table 5) with a biomass estimate ( $\pm$  95% CI) of  $3,513 \pm 4,500$  t (Table 9) and an abundance estimate ( $\pm$  95% CI) of  $1.0 \pm 1.2$  million crab (Table 10). Legal-size males represented 94% of the total male biomass and were below the average of  $6,176 \pm 2,471$  t from the previous 10 years (Table 9).

Mature males were encountered at 8 of the 77 stations in the Pribilof District, most of which were in the high-density sampling area (Fig. 25). All of the 57 mature and 6 immature males caught were measured (Table 5). Two stations accounted for 88% of all mature red king crab caught (Fig. 26). The biomass estimate of mature males was  $3,658 \pm 4,632$  t and represented 98% of the total male biomass (Table 9) with the remaining 2% represented by  $88 \pm 98$  t of immature male red king crab (Table 5). Mature males were distributed around St. Paul Island in the nearshore shallow water stations and to the north, south, and east of St. Paul Island (Figs. 25 and 26).

The 2017 size-frequency for red king crab males shows considerably fewer newshell legal-sized males compared to 2016 (Fig. 27). In 2017, 58% of the legal-sized males were new hardshell crabs and primarily distributed around St. Paul Island. Forty-two percent of the legal-sized males were in oldshell and very oldshell condition and distributed around St. Paul Island (Fig. 28).

The 2017 biomass estimate of mature red king crab females was  $505 \pm 550$  t and abundance was  $0.3 \pm 0.3$  million crab, representing 100% of the total female biomass collected during the survey (Tables 9 and 10). Female biomass estimates are imprecise due to the limited number of tows with positive crab catches (Appendix; Fig. 24), and 2017 estimates indicate mature female biomass is much lower than the average over the last 10 years (Fig. 11). One-hundred percent of the mature females were new hardshell between 111 and 166 mm CL and 78% of the mature females were carrying either 75% or 100% full clutches of uneyed embryos (Fig. 29).

The centers of distribution for both males and females have moved within a 40 nmi by 40 nmi region around St. Paul Island (Fig. 30). The center of the red king crab distribution moved to within 20 nmi of the northeast side of St. Paul Island as the population abundance increased in the 1980s and remained in that region until the 1990s. Since then, the centers of distribution have been located closer to St. Paul Island. Centers of distribution in 2017 were located toward the north east and were slightly closer to St. Paul Island compared to 2016.

Specific mechanisms for population fluctuations are unknown for Pribilof District red king crab. However, it is generally acknowledged that climate change impacts marine ecosystems,

including Bering Sea crab and fish species. A climatic regime shift took place in the North Pacific Ocean during the winter of 1976-77, which was characterized by an abrupt transition from a negative to positive Aleutian Low Pressure Index (ALPI) and Pacific Decadal Oscillation (PDO) resulting in warmer air and sea surface temperatures relative to pre-1977 conditions. After the 1977 regime shift, a slight increase in Pribilof District red king crab occurred followed by a larger increase in the 1990s (Figs. 31 and 32). Male and female Pribilof red king crabs decreased in 2017, with a decrease in male pre-recruits as well (Fig. 12).

### **Pribilof District Blue King Crab (including total stock boundary)**

Blue king crab were caught at 7 of the 86 stations in the Pribilof stock boundary area; all in the high-density sampling area in 2017 (Fig. 33). Pribilof District blue king crab were caught at an average depth of 66.1 m (SD = 4.1 m), which has been similar over the last 30 years. The 2017 biomass estimate ( $\pm$  95% CI) of legal-sized males was  $223 \pm 250$  t (Table 11) and abundance was  $0.1 \pm 0.1$  million crab (Table 12), representing 75% of the total male biomass and well below the average of  $708 \pm 361$  t for the previous 20 years (Tables 11 and 12).

Blue king crab mature males were caught at 4 of the 86 stations in the Pribilof stock boundary area and all of the four mature males and four immature males caught were measured (Table 5; Fig. 34). The mature male biomass estimate of  $253 \pm 254$  t represents 85% of the total male biomass with  $45 \pm 68$  t of immature male blue king crab estimated in the Pribilof stock boundary area (Tables 5 and 11). All male blue king crab were captured to the north and east of St. Paul Island (Figs. 34-37).

Ten mature female blue king crab were caught in the Pribilof stock boundary area high-density sampling area which extrapolated to a biomass estimate of  $152 \pm 166$  t (Table 11) and an abundance estimate of  $0.16 \pm 0.17$  million crab, and represents 58% of the total female biomass. Estimates of female biomass are imprecise due to their preference for rocky habitat which is difficult to sample with bottom trawls. Blue king crab females are predominantly biennial spawners with only a portion of the female population carrying eyed embryos in a given year, while the remainder are in a non-embryo-bearing phase (Somerton and Macintosh 1985). Nine of the 10 mature female blue king crab sampled in the Pribilof stock boundary area were brooding uneyed embryos and one mature had no eggs (Fig. 38). All of the females with embryos had 100% full clutches (Fig. 38).

The centers of distribution for both males and female blue king crab are located within a 40 nmi by 40 nmi region east of St. Paul Island (Fig. 39). The center of the blue king crab distribution moved to within 20 nmi of the northeast side of St. Paul Island as the population abundance decreased in the 1980s before moving easterly in the 1990s. In 2017, the mature male and female centers of distribution were located approximately 25 nmi east of St. Paul Island.

Pribilof blue king crab production was higher in the late 1970s and early 1980s, and increased in the 1990s with female abundances at an all-time high in 1980 (Figs. 40 and 41). A pulse of male and female blue king crabs in the 55-60 mm CL size class was seen in 2005, yet this cohort was

not observed at elevated abundances in subsequent years. Overall male and female blue king crab abundances have been extremely low in recent years with no evidence of increasing.

### **St. Matthew Island Section, Northern District Blue King Crab**

The blue king crab fishery in the St. Matthew Island Section of the Northern District opened in 2009 after a 10-year rebuilding plan but was closed due to ADF&G harvest regulations in 2013. Blue king crab were caught at 13 of the 56 total stations in the St. Matthew Island Section sampling strata; all 13 stations were in the high density area (Fig. 42). St. Matthew Island blue king crab were caught at an average depth of 84.0 m (SD = 20.5 m), which is slightly deeper than the long-term average depth (72.5 m; SD=21.8 m). Twenty-seven legal-sized male blue king crab were caught in 2017 with a biomass estimate ( $\pm$  95% CI) of  $1333 \pm 1482$  t (Table 13) and abundance estimate ( $\pm$  95% CI) of  $0.7 \pm 0.8$  million crab (Table 14) representing 55% of the total male biomass which is below the average of  $2,807 \pm 773$  t from the previous 20 years (Table 13).

Mature male blue king crab were caught at 13 of the 56 stations surveyed in the St. Matthew Island Section sampling strata and 100% of the 39 mature and 9 immature males caught were measured (Table 5, Figs. 43 and 44). The mature male biomass estimate in 2017 was  $1,721 \pm 1968$  t, representing 93% of the total male biomass (Table 13), while the immature male biomass was estimated at  $122 \pm 155$  t (Table 5). Historically, one station (R-24) has greatly impacted population estimates for St. Matthew Island blue king crab. In 2017, 51% of the mature males were caught at R-24, compared to 17% in 2016 (Fig. 44). The majority of the immature male blue king crab were distributed within the 100 m isobath south of St. Matthew Island while the majority of mature males were caught south of St. Matthew island, with the exception of station R-24 north of St. Matthew Island (Figs. 43 and 44).

Overall St. Matthew Island blue king crab male abundance decreased in 2016 compared to 2015 and 2014, including newshell and oldshell crabs (Fig. 45). In 2017, 93% of the legal-sized males were new hardshell crabs, and the two stations with the highest catches were nearshore to the north (R-24) and southwest (PO2726) of St. Matthew Island (Fig. 46).

The 2017 mature female blue king crab biomass estimate was  $0.0 \pm 0.0$  t and abundance was  $0.0 \pm 0.0$  million crab (Table 14), as there were no mature females caught in the St. Matthew Island Section (Table 13). Six immature females were caught at two stations in the St. Matthew Island Section sampling strata (Fig. 43). All 6 immature females were new hardshell crabs (Fig. 47).

The centers of distribution for both males and female blue king crab are located within a 30 nmi by 30 nmi region around St. Matthew Island (Fig. 48). The center of the blue king crab distribution has randomly moved within this region without a clear pattern of years proximal to each other. In 2017, the mature male center of distribution was located approximately 10 nmi south of St. Matthew Island (Fig. 48).



NMFS survey abundance estimates for St. Matthew blue king crab do not exist prior to 1978. As such, production cannot be compared before or after the 1977 regime shift. Size distribution abundance estimates (Figs. 49 and 50) suggest that production of male crabs has been relatively stable in recent years. In 2017, the abundance of pre-recruit male crab in the 105-119 mm size class was low compared to 2016 and 2015, and below the previous 20-year average (Fig. 12). The high variability suggest trends should be interpreted with caution. It is important to highlight that recent fluctuations in population abundance estimates are primarily caused by catch numbers in one station (R-24).

## **Tanner Crab**

In 2011, the ADF&G Board of Fish changed the legal-size limit of Tanner crab from  $\geq 5.5$  inches CW (138 mm, without spines) to  $\geq 4.4$  inches CW (110 mm, without spines) west of  $166^{\circ}\text{W}$  and  $\geq 4.8$  inches CW (120 mm, without spines) east of  $166^{\circ}\text{W}$  (Table 1). According to the regulatory harvest strategy of the State of Alaska (5 AAC 35.508), the annual TAC or GHF for Tanner crab in both areas is determined by the biomass estimate of males  $\geq 125$  mm CW. The harvest strategy is based on the assumption that the commercial fishery will target legal size crab (Zheng and Pengilly 2011), although the industry may self-impose retention of crab  $\geq 4.9$  inches CW (125 mm, without spines) east and west of  $166^{\circ}\text{W}$ . We provided the 2017 biomass estimates for the two legal-size categories as well as for  $\geq 4.9$  inches CW east and west of  $166^{\circ}\text{W}$  in the abstract.

Tanner crab were caught at 95 of the 120 stations east of  $166^{\circ}\text{W}$ , and 114 of the 255 stations west of  $166^{\circ}\text{W}$ . In addition, Tanner crab occurred at 40 and 6 stations in the high-density areas of the Pribilof District and St. Matthew Island Section, respectively (Appendix; Fig. 51). Tanner crab were caught at an average depth of 66.4 m (SD = 22.0 m) east of  $166^{\circ}\text{W}$ , and 106.6 m (SD = 33.0 m) west of  $166^{\circ}\text{W}$ , which are similar to what has been observed throughout the entire time series.

Legal-sized Tanner crab were caught at 75 of the 120 stations east of  $166^{\circ}\text{W}$ , and 101 of the 255 stations west of  $166^{\circ}\text{W}$  (Table 5, Fig. 52). All of the legal-sized males caught east of  $166^{\circ}\text{W}$  were measured, while 99.9% of the legal-sized males caught west of  $166^{\circ}\text{W}$  were measured (Table 5).

The 2017 biomass estimate ( $\pm 95\%$  CI) for legal male Tanner crab east of  $166^{\circ}\text{W}$  was  $15,614 \pm 5,226$  t (Table 15), with an associated abundance estimate of  $21.8 \pm 7.1$  million crab. Seventy three percent of legal males were  $\geq 4.9$  inches CW, with a biomass estimate of  $12,424 \pm 4,403$  t ( $15.9 \pm 5.5$  million crab; Tables 15 and 16). The 2017 estimated biomass of legal Tanner crab in the eastern area was above the 20-year average biomass of  $12,148 \pm 3,108$  t. The majority of the Tanner males  $\geq 113$  mm CW occurring east of  $166^{\circ}\text{W}$  were distributed in the southwest section of Bristol Bay (Figs. 52 and 53).

The 2017 biomass estimate for legal male Tanner crab west of  $166^{\circ}\text{W}$  was  $21,288 \pm 7,339$  t (Table 17), while abundance was estimated at  $34.9 \pm 10.9$  million crab. Forty-eight percent of legal males were  $\geq 4.9$  inches CW, for a biomass estimate of  $12,553 \pm 5,631$  t ( $16.8 \pm 7.1$  million

crab; Tables 17 and 18). The 2017 estimated biomass of legal Tanner crab in the western area was well above the 20-year average biomass of  $16,213 \pm 4,990$  t. The majority of Tanner males  $\geq 103$  mm CW occurring west of  $166^\circ\text{W}$  were distributed around the Pribilof Islands (Figs. 52 and 53).

In 2017, a total of 3,293 male Tanner crab chela height measurements were collected on the EBS bottom trawl survey. The scatterplot of the allometric relationship between chela height and carapace width using data collected in 2008, 2010, 2012, 2014, 2016, and 2017 ( $n = 10,115$  for all years combined) graphically represents two distinct maturity groups: immature, small claw males with a ratio of less than 0.18 and mature, large claw males with a ratio greater than or equal to 0.18 (Fig. 54). The carapace widths for small claw males ranged from 10.0 to 152.3 mm compared to 59.5 to 177.2 mm for large claw males. Large claw males with carapace widths below the legal-size limit will not recruit to the fishery in the future, as morphometrically mature male *Chionoecetes* spp. crab will not molt again during their lifespan (Tamone et al. 2007).

In the areas east and west of  $166^\circ\text{W}$ , overall newshell males decreased slightly (Figs. 55 and 56). In both areas, for male crabs above 100 mm CW the oldshell category dominated newshell, while both categories were primarily distributed in the southwest section of the EBS shelf at depths greater than 50 m (Fig. 57).

The 2017 mature female Tanner crab biomass estimates east and west of  $166^\circ\text{W}$  were  $1,985 \pm 769$  t and  $5,018 \pm 3,069$  t ( $10.2 \pm 4.0$  and  $35.6 \pm 21.4$  million crabs), respectively, while the immature female Tanner crab estimated biomasses east and west of  $166^\circ\text{W}$  were  $157 \pm 122$  t and  $1,255 \pm 493$  t, respectively (Tables 5, 15-18). Twenty-nine percent of the mature female population were distributed east of  $166^\circ\text{W}$  in the ADF&G Eastern management district, within the central and southwestern areas of the Bristol Bay District (Fig. 52). In the eastern area only, approximately 2% of the mature females were softshell, while 10% were new-hardshell and 88% were oldshell and very oldshell (Fig. 58). In the western area only, less than 1% of the mature females were softshell, while 19% were new-hardshell and 81% were oldshell or very oldshell (Fig. 59). In the eastern region 59% of the mature females carried newly extruded embryos while 29% were brooding eyed embryos, had not produced a new clutch, or were barren (Fig. 58). In the western region, 90% of the mature females carried newly extruded embryos, while approximately 1% were brooding eyed embryos and 9% had empty egg cases or were barren (Fig. 59). In the eastern region, 23% of the mature females were 1/2 full, 35% were 3/4 full, and 18% were full, while in the western region 10% were 1/2 full, 29% were 3/4 full, and 46% were full (Figs. 58 and 59).

Pulses of strong recruitment to the mature male and female population appear to have been cyclical throughout the eastern Bering Sea (Figs. 60 and 61), yet it is unclear what environmental conditions triggered the pulses, or if strong cohorts are sequentially linked as theorized for snow crab (Ernst et al. 2005, Ernst et al. 2012, Parada et al. 2010). Shell condition can be used to infer if mature female Tanner crab are primiparous (first clutch of eggs) or multiparous (subsequent clutches). For example, mature newshell female crabs (shell condition 2) are assumed to be primiparous (first clutch of eggs) and likely molted to maturity during the prior winter (Ernst et al. 2005).

The shell condition time series demonstrates that the survey fails to detect portions of the population. For example, the population estimate of newshell (shell condition 2) female Tanner crab east of 166°W was 37 million in 1990, yet the estimate of oldshell (shell condition 3) mature females was 76 million in 1991 (Fig. 60). Assuming newshell females become oldshell the following year, estimates of oldshell females should be at or below levels of newshell females the year prior. Further, the shell condition time series for mature male Tanner crab should be interpreted with caution, as physiological, morphological, and functional male maturity vary by size. In most of the historical survey data, it is not possible to differentiate morphologically mature and immature males. Thus, a size cutoff is suboptimal for assessment of mature crabs, and future research will strive to refine the accuracy of estimating mature population abundances.

The centers of distribution for both males and female Tanner crab have moved within a 160 nmi by 100 nmi region east of the Pribilof Islands and west of Bristol Bay (Fig. 62). The center of the distribution moved from the eastern extent of the distribution in the 1970s to the western extent in more recent years.

There is little evidence of changes in Tanner crab production related to the 1977 regime shift (NPFMC 2011b), yet pulses of strong production have been cyclical from 1975 to the present (Figs. 63-66). A less pervasive regime shift occurred in 1989, as characterized by briefly negative ALPI and PDO indices, but the system did not return to pre-1977 conditions. A slight increase in Tanner crab production coincided with the 1989 shift, although the links between climate and crab production remain speculative. Male pre-recruit abundance both east and west of 166°W was down relative to 2016, and levels are above the average over the past 20 years (Fig. 12). The male size frequency distribution in 2014 reveals an increase in abundance of male crabs between 100 and 125 mm CW west of 166°W, which may be related to the slight increase of crabs between 120 and 140 mm CW in 2015 and 2016, though this size category has decreased as of 2017 (Figs. 63-66).

## **Snow Crab**

Although the legal minimum size limit for male snow crab is 3.1 inches CW (78 mm), processors currently prefer a minimum size of 4.0 inches CW (102 mm). The biomass estimates for male snow crab are reported for both legal and preferred size categories in the abstract.

Snow crab were caught at 222 of the 375 stations in the combined areas of the Bristol Bay District, Pribilof District, and St. Matthew Island Section sampling strata (Fig. 67). Snow crab were caught at an average depth of 93.5 m (SD = 27.5 m), similar to what has been observed throughout the history of the survey.

Legal-sized snow crab were caught at 196 of the 375 standard stations and 75% of the legal-sized males caught were measured (Table 5). Legal-sized male snow crab estimated biomass ( $\pm$  95% CI) was  $52,149 \pm 13,402$  t (Table 19) and abundance was  $151.7 \pm 43.6$  million crab (Table 20) which was 4% of the total male abundance. This biomass remains much lower than the 20-year (1997- 2016) average legal male snow crab biomass of  $126,464 \pm 30,181$  t. Twenty

four percent of those legal males were  $\geq 4.0$  inches CW with a biomass estimate of  $20,616 \pm 5,817$  t ( $35.8 \pm 9.9$  million crab). Males  $\geq 95$  mm CW were distributed throughout the EBS survey area in waters deeper than 50 m (Figs. 68 and 69).

The scatterplot of the allometric relationship between chela height and carapace width using the data collected in 2009 ( $n = 1,303$ ), 2011 ( $n = 1,130$ ), 2013 ( $n = 943$ ), 2015 ( $n = 1,008$ ) and 2017 ( $n = 3,322$ ) graphically represents two distinct maturity groups for snow crab; immature males (small claw) with a ratio of  $< 0.20$  and mature males (large claw) with a ratio of  $\geq 0.20$  (Fig. 70). The carapace widths for small claw males ranged from 7.9 to 121.2 mm compared to 40.3 to 151.6 mm for large claw males.

An increase in the number of juvenile new hardshell males in the 30 to 75 mm size category was observed over the past 4 years; however, these strong size classes did not appear in subsequent years in larger size categories (Fig. 71). Among legal-sized male crab in 2017, 0% were in molting or softshell condition while approximately 60% were in new-hardshell condition and distributed largely between the 50 and 100 m isobaths in the middle shelf of the EBS survey area as well as between the 100 and 200 m isobaths in the northwest area of the EBS shelf (Figs. 71 and 72). Approximately forty percent of the legal-sized males were either oldshell or very oldshell condition crabs, and were primarily distributed between the 100 and 200 m isobaths within the EBS region (Fig. 72).

The mature female snow crab biomass estimate of  $103,422 \pm 44,445$  t and abundance estimate of  $2,087 \pm 924$  million crab was 46% of the total female biomass (Tables 19 and 20). The immature female crab biomass estimate was  $66,240 \pm 24,910$  t (Tables 5 and 19). Among sampled mature females, 47% were in new-hardshell condition and 52% were oldshell and very oldshell condition (Fig. 73). Ninety-three percent of the mature females were brooding new embryos, while less than 1% had eyed embryos (Fig. 73). Two percent of the mature females had empty egg cases, and 4% were barren (Fig. 73). Seventy-seven percent of mature females with embryos were either 75% or 100% full (Fig. 73).

Pulses of strong recruitment to the mature female population have been cyclical (Fig. 74), and it is hypothesized that strong cohorts are sequentially linked (see Ernst et al. 2012, Parada et al. 2010 for a detailed discussion). As with Tanner crab, shell condition can be used to infer if mature female snow crab are primiparous (first clutch of eggs) or multiparous (subsequent clutches). Mature newshell female crabs (shell condition 2) are assumed to be primiparous (first clutch of eggs) and likely molted to maturity during the prior winter (Ernst et al. 2005). Strong cohorts of mature primiparous females occurred approximately every 7 years starting in 1980 (Fig. 74), which matches the theoretical time required between egg extrusion of mature females and those offspring reaching maturity (Ernst et al. 2012). It is unknown what specific environmental conditions triggered the initial pulse or how long the sequence may last.

As with Tanner crab, the shell condition time series demonstrates that the survey fails to detect portions of the population. For example, population estimates of newshell (shell condition 2) female snow crab were 125 million in 1999, yet estimates of oldshell (shell condition 3) mature females was nearly 1,000 million in 2000 (Fig. 74). Estimates of oldshell females should be at or below levels of newshell females the year prior. As with Tanner crab, the shell condition time

series for mature male snow crab should be interpreted with caution, as physiological, morphological, and functional male maturity vary by size, and it is not possible to differentiate morphologically mature and immature males in most survey data. Future research will strive to refine the accuracy of estimating mature population abundances.

With the exception of 1975 to 1979, the centers of distribution for both males and female snow crab have moved within a 120 nmi by 120 nmi region between St. Matthew Island and the Pribilof Islands (Fig. 75). The center of snow crab distribution moved dramatically to the northwest after 1979. Since then, the centers of distribution have moved throughout the distribution with males having a broader distribution while females are located more to the north. The 2017 mature female center of distribution was among the farthest north, located near St. Matthew Island (Fig. 75).

Mature male abundance and biomass are substantially down from 2014 and 2015, and marginally lower than in 2016, while pre-recruit abundance and biomass are both increased relative to 2016, but are still substantially lower from 2014 and 2015 estimates (Figs. 8-12, and 76). Abundance and biomass estimates for both male categories remain below the previous 10-year average (Figs. 8-12, 76).

Mature male abundance and biomass are substantially down from 2014 and 2015, and marginally lower than in 2016, while pre-recruit abundance and biomass are both increased relative to 2016, but are still substantially lower from 2014 and 2015 estimates (Figs. 8-12, and 76). Abundance and biomass estimates for both male categories remain below the previous 10-year average (Figs. 8-12, 76). Mature female abundance and biomass are substantially higher than 2016 estimates, and are higher than the previous 10-year average (Figs. 8-12, and 77). An increase in juvenile abundance over the past 4 years provides further hope for strong recruitment in upcoming years (Figs. 71, 76, and 77). Ovigerous female snow crab held in water with temperatures below 1.5 °C become biennial spawners in the Bering Sea (NPFMC 2011b). Consequently, environmental conditions relating to temperature, including the extent of the cold pool, are likely to regulate recruitment strength via the relative numbers of annual to biennial spawners, and individual fecundity of the female crab.

### ***Chionoecetes* spp. hybrid**

*Chionoecetes* spp. hybrid crab were caught at 101 of the 375 stations in the combined areas of the Bristol Bay, Pribilof, and Northern Districts (Fig. 78, Appendix).

In this document, *Chionoecetes* spp. hybrid crab size classes for legal males and mature females are based on the size categories for snow crab (see Snow Crab section and Table 1). Legal-sized male *Chionoecetes* spp. hybrid crab were caught at 81 stations, throughout all Districts combined, resulting in a biomass estimate ( $\pm$  95% CI) of  $4,143 \pm 1,284$  t and were primarily distributed around the Pribilof Islands between 50 and 100 m (Fig. 79). Seventy-one percent of those legal males were  $\geq 4$  inches in carapace width, with a biomass estimate of  $3,451 \pm 1,152$  t. Sublegal male *Chionoecetes* spp. hybrid crab were distributed throughout the northeastern Bering Sea shelf at depths greater than 50 m (Fig. 79).

The 2017 mature female *Chionoecetes* spp. hybrid crab biomass estimate was  $587 \pm 310$  t and the immature female crab biomass estimate was  $57 \pm 56$  t. The majority of the mature female *Chionoecetes* spp. hybrid crab were primarily distributed south of the Pribilof Islands and St. Matthew Island and between 100 and 200 m in the northwestern area of the eastern Bering Sea shelf (Fig. 79). Twenty-six percent of the mature female abundance was located at one station (K-24) north of St. George Island (Fig. 78).

## **Other Crab Stocks and Species of Interest**

### Northern District Red King Crab

Red king crab were caught at 19 stations in the Northern District (Fig. 80) outside of the current management units where red king crab are commercially fished (Fig. 5). Legal-sized males were caught at 14 of those stations and the density at a station ranged from 73 to 296 crab  $\text{nmi}^{-2}$  (Appendix). The 2017 biomass estimate ( $\pm 95\%$  CI) of legal-sized males was  $2,138 \pm 942$  t while the biomass estimate of mature and immature males was  $2,393 \pm 967$  and  $78 \pm 85$  t, respectively. The biomass estimate of mature female red king crab was  $404 \pm 227$  t. The majority of mature males and mature female red king crab were caught near the 50 m isobath at stations south and west of Nunivak Island (Fig. 80).

### Northern District Blue King Crab

No Northern District blue king crab were caught in 2017.

### Hair Crab

In this report, legal male hair crab are defined as  $> 3.25$  inches CW ( $\geq 83$  mm CL) which was specified in the previous Pribilof District fishery while the female hair crab biomass estimate is presented for all sizes combined. Hair crab were caught at 48 of the 375 stations throughout all Districts combined on the survey (Fig. 82). The 2017 density of legal male hair crab caught at a station ranged from 62 to 457 crab  $\text{nmi}^{-2}$  resulting in a biomass estimate of  $1,084 \pm 364$  t (Table 21) and abundance of  $1.6 \pm 0.6$  million crab (Table 22). Historically, hair crab have been concentrated just north of the Alaska Peninsula and near the Pribilof Islands. In 2017, legal male hair crab were primarily concentrated near St. Paul Island and distributed along the 50 m isobath from the Alaska Peninsula to Nunivak Island (Fig. 82).

The 2017 sublegal male hair crab biomass estimate ( $\pm 95\%$  CI) was  $208 \pm 140$  t and the female hair crab biomass estimate was  $71 \pm 45$  t (Table 21). Sublegal males were caught near St. Paul Island and west of Nunivak Island (Fig. 82).

The Pribilof District hair crab fishery has been closed since 2000 due to a shift in the distribution of legal males to the Northern District and, after one year of experimental fishing with minimal vessel participation, the Northern District fishery was closed in 2001 (Fitch et al. 2012). Biomass estimates of both size classes of male hair crab have been on an increasing trend between 2005 and 2013 and then there was a decline in biomass every year from 2014 to 2016. In 2017, the 2017 biomass estimate for legal-sized male hair crab was higher than 2016, but lower than the 20-year average of  $1,873 \pm 616$  t (Table 21).

Golden King Crab

No golden king crab were caught in 2017.

DRAFT

## ACKNOWLEDGMENTS

We thank Captain Steven Elliott of the FV *Vesteraalen*, and Captain Shawn Russell of the FV *Alaska Knight* and all their crew without whom the annual EBS bottom trawl survey would not occur. We also thank the dedicated field party chiefs, deck bosses, and scientific crew from AFSC, ADF&G, and all those who volunteered to come out on the survey. The scientific personnel who made up the 2017 “crab crew” included; P. Jensen (AFSC, Seattle), J. Richar (AFSC, Kodiak Lab), V. Lowe (AFSC volunteer), M. Wesphal (ADF&G), R. Foy (AFSC, Kodiak Lab), J. Andres (USCG), W.C. Long (AFSC, Kodiak Lab), T. Jackson (ADF&G), A. Bateman (AFSC, Kodiak lab), D. Benjamin (AFSC, Seattle), C. Pagett (AFSC, Kodiak Lab), J. Newby (AFSC, Kodiak Lab), and D. Wehde (NSEDG).



## CITATIONS

- ADF&G. 2017. 2017-2019 King and Tanner Crab Commercial Fishing Regulations. Alaska Department of Fish and Game.
- Armstrong, D. A., T. C. Wainwright, G. C. Jensen, P. A. Dinnel, and H.B. Andersen. 1993. Taking refuge from bycatch issues: red king crab (*Paralithodes camtschaticus*) and trawl fisheries in the Eastern Bering Sea. *Can. J. Fish. Aquat. Sci.* 50(9):1993-2000.
- Chilton, E. A., R. J. Foy, and C. E. Armistead. 2010. Temperature effects on assessment of red king crab in Bristol Bay, Alaska, p. 249-263. *In* Kruse, G.H., G.L. Eckert, R.J. Foy, R.N. Lipcius, B. Sainte-Marie, and D. Stram (eds.), *Biology and Management of Exploited Crab Populations Under Climate Change*. Alaska Sea Grant AK-SG-10-01, Anchorage, AK.
- Conner, J. and R. R. Lauth. 2017. Results of the 2016 eastern Bering Sea continental shelf bottom trawl survey of groundfish and invertebrate resources. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-352, 159 p.
- Dew, C. B. 2008. Red king crab mating success, sex ratio, spatial distribution, and abundance estimates as artifacts of survey timing in Bristol Bay, Alaska. *N. Am. J. Fish. Manage.* 28, 1618-1637.
- Dew, C. B., and R. A. McConnaughey. 2005. Did trawling on the brood stock contribute to the collapse of Alaska's king crab? *Ecol. Appl.* 15: 919-941.
- Donaldson, W., and S. Byersdorfer. 2005. Biological field techniques for lithodid crabs. Alaska Sea Grant College Program AK-SG-05-03, 76 p.
- Ernst, B., J. Orensanz, and D. Armstrong. 2005. Spatial dynamics of female snow crab (*Chionoecetes opilio*) in the eastern Bering Sea. *Can. J. Fish. Aquat. Sci.* 62(2): 250-268.
- Ernst, B., D. A. Armstrong, J. Burgos, and J. M. Orensanz. 2012. Life history schedule and periodic recruitment of female snow crab (*Chionoecetes opilio*) in the eastern Bering Sea. *Can. J. Fish. Aquat. Sci.* 69(3):532-550.
- Evans, D., M. Fey, R. J. Foy, and J. Olson. 2012. The evaluation of adverse impacts from fishing on crab essential fish habitat. NMFS and NPFMC staff discussion paper. Item C-4(c)(1), 37. <http://www.npfmc.org/habitat-protections/essential-fish-habitat-efh/>
- Fitch, H., M. Schwenzfeier, B. Baechler, T. Hartill, M. Salmon, M. Deiman, E. Evans, E. Henry, L. Wald, J. Shaishnikoff, K. Herring, and J. Wilson. 2012. Annual management report for the commercial and subsistence shellfish fisheries of the Aleutian Islands, Bering Sea and the Westward Region's shellfish observer program, 2010/11. Alaska Department of Fish and Game Fishery Management Report No. 12-22, Anchorage, AK.

- Gish, R. K., 2006. The 2005 Pribilof district king crab survey. Alaska Department of Fish and Game Fisheries Management Report No. 06-60, Anchorage, AK.
- Karinen, J., and D. Hoopes. 1971. Occurrence of Tanner crabs (*Chionoecetes* sp.) in the eastern Bering Sea with characteristics intermediate between *C. bairdi* and *C. opilio*. Proc. Natl. Shellfish Assoc. 61:8-9.
- Lauth, R. R., and D. G. Nichol. 2013. Results of the 2012 eastern Bering Sea continental shelf bottom trawl survey of groundfish and invertebrate resources. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-256, 162 p.
- Loher, T., and D. A. Armstrong. 2005. Historical changes in the abundance and distribution of ovigerous red king crabs (*Paralithodes camtschaticus*) in Bristol Bay (Alaska), and potential relationship with bottom temperature. Fish. Oceanogr. 14(4):292-306.
- McLaughlin, P. A., D. K. Camp, M. V. Angel, E. L. Bousfield, P. Brunel, R. C. Brusca, D. Cadien, A. C. Cohen, K. Conlan, L. G. Eldredge, D. L. Felder, J. W. Goy, T. Haney, B. Hann, R. W. Heard, E. A. Hendrycks, H. H. Hobbs III, J. R. Holsinger, B. Kensley, D. R. Laubitz, S. E. LeCroy, R. Lemaitre, R. F. Maddocks, J. W. Martin, P. Mikkelsen, E. Nelson, W. A. Newman, R. M. Overstreet, W. J. Poly, W. W. Price, J. W. Reid, A. Robertson, D. C. Rogers, A. Ross, M. Schotte, F. R. Schram, C. T. Shih, L. Watling, G. D. F. Wilson, and D. D. Turgeon. 2005. Common and scientific names of aquatic invertebrates from the United States and Canada: Crustaceans. American Fisheries Society Special Publication 31. Bethesda, Maryland. 545 p.
- McMurray, G., A. H. Vogel, P. A. Fishman, D. A. Armstrong, and S. C. Jewett. 1984. Distribution of larval and juvenile red king crab (*Paralithoides camtschatica*) in Bristol Bay. U.S. Dep. Commer., NOAA, Outer Continental Shelf Environmental Assessment Program Final Report. 53(1986):267-477.
- Meyers, T., and T. Burton. 2009a. *Hematodinium* sp. - Bitter crab disease of Tanner crabs. p. 84-89. In Diseases of wild and cultured shellfish in Alaska. Alaska Department of Fish and Game, Commercial Fisheries Division, Anchorage, AK.
- Meyers, T., and T. Burton. 2009b. Black mat syndrome, p. 76-77. In Diseases of wild and cultured shellfish in Alaska. Alaska Department of Fish and Game, Commercial Fisheries Division, Anchorage, AK.
- Meyers, T., J. Morado, A. Sparks, G. Bishop, T. Pearson, D. Urban, and D. Jackson. 1996. Distribution of bitter crab syndrome in Tanner crabs (*Chionoecetes bairdi*, *C. opilio*) from the Gulf of Alaska and the Bering Sea. Dis. Aquat. Org. 26:221-227.
- Morado, J. F., E. G. Dawe, D. R. Mullowney, C. A. Shavey, V. C. Lowe, and R. J. Cawthorn. 2010. Climate Change and the Worldwide Emergence of *Hematodinium*-Associated Disease: Is There Evidence for a Relationship?, p. 153-173. In Kruse, G.H., G.L. Eckert, R.J. Foy, R.N. Lipcius, B. Sainte-Marie, D. Stram, and D. Woodby (Eds.), Biology and

- Management of Exploited Crab Populations Under Climate Change. Alaska Sea Grant College Program AK-SG-10-01, University of Alaska Fairbanks, Anchorage, Alaska.
- NPFMC. 2011a. Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs. North Pacific Fishery Management Council, 605 West 4<sup>th</sup> Ave., Anchorage, AK.
- NPFMC. 2011b. Stock assessment and fishery evaluation report for the king and Tanner crab fisheries of the Bering Sea and Aleutian Islands regions, 2011 Crab Stock Assessment and Fishery Evaluation. North Pacific Fishery Management Council, 605 West 4<sup>th</sup> Ave., Anchorage, AK.
- NPFMC. 2014. Final Environmental Assessment for proposed amendment 43 to the Fishery Management Plan for Bering Sea/Aleutian Island King and Tanner Crabs and proposed amendment 103 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Island. North Pacific Fishery Management Council, 605 West 4<sup>th</sup> Ave., Anchorage, AK.
- Otto, R. 1986. Management and assessment of eastern Bering Sea king crab stocks. p. 83-106. *In* Jamieson, G. S., and N. Bourne (Eds.), North Pacific workshop on stock assessment and management of invertebrates. Can. Spec. Publ. Fish. Aquat. Sci. 92.
- Parada, C., D.A. Armstrong, B. Ernst, S. Hinckley, and J. Orensanz. 2010. Spatial dynamics of snow crab (*Chionoecetes opilio*) in the eastern Bering Sea putting together the pieces of the puzzle. *Bull. Mar. Sci.* 86(2):413-437.
- Pereyra, W. T., J. E. Reeves, and R. G. Bakkala. 1978. Demersal fish and shellfish resources of the eastern Bering Sea in the baseline year 1975,: Distribution of crab resources from research surveys. NWAFC Processed Rep., 62 p. Northwest and Alaska Fish. Cent., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way NE, Seattle, WA 98115.
- Rose, C. S., and G. E. Walters. 1990. Trawl width variation during bottom trawl surveys: Causes and consequences, p. 57-67. *In* Low, L. (ed.), Proceedings of the symposium on application of stock assessment techniques to gadids. Oct. 31 - Nov. 1 1989, Int. North Pac. Fish. Comm. Bull. Seattle, Washington.
- Rugolo, L., D. Pengilly, R. A. Macintosh, and K. Gravel. 2005. Reproductive potential and life history of snow crabs in the eastern Bering Sea, p. 1-267. *In* Pengilly, D. (ed.), Comprehensive report for Bering Sea snow crab fishery restoration research NA17FW1274. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau, AK.
- Shirley, T. C., S. M. Shirley, and S. Korn. 1990. Incubation period, molting and growth of female red king crabs: effects of temperature, p. 51-63. *In* Melteff, B. (ed.), Proceedings of the International Symposium on King and Tanner Crabs. Lowell Wakefield Symposia. Alaska Sea Grant Program Report 90-04.

- Somerton, D. A., and R. A. Macintosh. 1985. Reproductive biology of the female blue king crab *Paralithodes platypus* near the Pribilof Islands, Alaska J. Crust. Biol. 5(3):365-376.
- Stauffer, D. A. 2004. NOAA protocols for groundfish bottom trawl surveys of the Nation's fishery resources U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/SPO-65, 205 p.
- Stevens, B., W. Donaldson, J. Haaga, and J. Munk. 1993. Morphometry and maturity of paired Tanner crabs, *Chionoecetes bairdi*, from shallow-and deepwater environments. Can. J. Fish. Aquat. Sci. 50(7):1504-1516.
- Stevens, B. G., and K. M. Swiney. 2007. Hatch timing, incubation period, and reproductive cycle for captive primiparous and multiparous red king crab, *Paralithodes camtschaticus*. J. Crust. Biol. 27(1):37-48.
- Stone, R., C. O'Clair, and T. Shirley. 1992. Seasonal migration and distribution of female red king crabs in a southeast Alaskan estuary. J. Crust. Biol. 12(4):546-560.
- Swiney, K. M., W. C. Long, G. L. Eckert, and G. H. Kruse. 2012. Red king crab, *Paralithodes camtschaticus*, size-fecundity relationship, and inter-annual and seasonal variability in fecundity. J. Shellfish Res. 31(4):925-933.
- Tamone, S. L., S. J. Taggart, A. G. Andrews, J. Mondragon, and J. K. Nielsen. 2007. The relationship between circulating ecdysteroids and chela allometry in male Tanner crabs: Evidence for a terminal molt in the genus *Chionoecetes*. J. Crust. Biol. 27(4):635-642.
- Trippel, E.A. 1999. Estimation of stock reproductive potential: history and challenges for Canadian Atlantic gadoid stock assessments. J. Northwest Atla. Fish. Sci. 25:61-81.
- Urban, D., D. Pengilly, L. Jadamec, and S. Byersdorfer. 2002. Testing carapace morphology characteristics for the field identification of *Chionoecetes* hybrids, p. 97-113. In Paul, A.J., E.G. Dawe, R. Elner, G.S. Jamieson, G.H. Kruse, R.S. Otto, B. Sainte-Marie, T.C. Shirley, and D. Woodby, (eds.), Crabs in cold water regions: Biology, management, and economics. Alaska Sea Grant College Program AK-SG-02-01, Anchorage, Alaska.
- Weinberg, K. L. 2003. Change in the performance of a Bering Sea survey trawl due to varied trawl speed. Alaska Fish. Res. Bull. 10(10):42-49.
- Zheng, J., and G. H. Kruse. 2006. Recruitment variation of eastern Bering Sea crabs: Climate-forcing or top-down effects? Prog. Oceanogr. 68(2):184-204.
- Zheng, J., and D. Pengilly. 2011. Overview of proposed harvest strategy and minimum size limits for Bering Sea district Tanner crab. Alaska Department of Fish and Game Special Publication No. 11-02, Anchorage, AK.

Table 1. -- Definition of carapace size classes for crab species caught in National Marine Fisheries Service's eastern Bering Sea standard survey. Carapace length (CL) is measured for *Paralithodes* spp. and *Erimacrus isenbeckii*, while carapace width (CW excluding spines) is measured for *Chionoecetes* species. ADF&G uses size to define female maturity (presented in Table 1); however, we define female maturity based on abdominal flap morphology and egg presence throughout this document. The legal size classes defined by ADF&G (CW in inches) include spines.

Species	District		Immature	Mature	Pre-recruit	Legal Male
<i>Paralithodes camtschaticus</i>	Bristol Bay	male	<120 mm	≥ 120 mm	110-134 mm	≥ 135 mm CL or ≥ 6.5 in. CW
		female	< 90 mm	≥ 90 mm		
	Pribilof	male	<120 mm	≥ 120 mm	120-134 mm	≥ 135 mm CL or ≥ 6.5 in. CW
		female	< 90 mm	≥ 90 mm		
<i>P. platypus</i>	Pribilof	male	<120 mm	≥ 120 mm	120-134 mm	≥ 135 mm CL or ≥ 6.5 in. CW
		female	< 100 mm	≥ 100 mm		
	St. Matthew	male	< 105 mm	≥ 105 mm	105-119 mm	≥ 120 mm CL or ≥ 5.5 in. CW
		female	< 80 mm	≥ 80 mm		
<i>Chionoecetes bairdi</i>	East of 166° W	male	< 113 mm	≥ 113mm	113-124 mm	≥ 120 mm or ≥ 4.8 in. CW <sup>1</sup>
		female	< 85 mm	≥ 85 mm		
	West of 166° W	male	< 103 mm	≥ 103 mm	103-124 mm	≥ 110 mm or ≥ 4.4 in. CW <sup>1</sup>
		female	< 80 mm	≥ 80 mm		
<i>C. opilio</i>		male	< 95 mm	≥ 95 mm	95-101 mm	≥ 78 mm or ≥ 3.1 in. CW <sup>2</sup>
		female	< 50 mm	≥ 50 mm		
<i>Erimacrus isenbeckii</i>		male				≥ 83 mm CL or > 3.25 in. CW <sup>3</sup>
		female				

<sup>1</sup> The legal minimum size limit for *C. bairdi* is ≥ 4.8 inches CW (120 mm excluding spines; 122 mm including spines) east of 166° W and ≥ 4.4 inches CW (110 mm excluding spines; 112 including spines) west of 166° W (ADF&G reg. **5 AAC 35.520(b)(1)**).

<sup>2</sup> The legal minimum size limit for *C. opilio* is 3.1 inches CW (78 mm excluding spines; 79 mm including spines), although processors currently prefer a minimum size of 4.0 inches CW (102 mm).

<sup>3</sup> Legal-sized male crab for *E. isenbeckii* are larger than a minimum size of 3.25 inches CW (≥ 83 mm CL) defined by Alaska Department of Fish and Game permit guidelines.

Table 2. -- History of methods for determining trawl on bottom and estimating net width on National Marine Fisheries Service eastern Bering Sea bottom trawls.

Year	Net width (m)	Trawling methodology
1975		First and only year tow duration = 1 hour
1976-2012		Tow duration = 30 minutes
1975-1995		Brake set and haul back of winch drum wire defined trawl contact with seafloor (net on bottom)
1996-2012		Began using bottom contact sensors to determine trawl contact with seafloor
1975 - 1980	12.2	Mean width of 400-mesh eastern trawl*
1981	18.0	Mean width* of 83-112 Eastern trawl for Vessel 1
1981	13.4 or 14.3	Mean width* of 400-mesh Eastern trawl measurements different on haul 1-112 and 114-156 for Vessel 37*
1982 - 1987	Variable with each tow	Rose and Walters (1990) calculated the 83-112 net width based on an inverse relationship to net scope
1988 - 2001	Variable with each tow	All survey vessels used ScanMar acoustic sensors on the 83-112 trawl net
2001 - 2012	Variable with each tow	All survey vessels used NetMind acoustic sensors on the 83-112 trawl net
2013 - 2017	Variable with each tow	All survey vessels used Marport acoustic sensors on the 83-112 trawl net

\*Single value used for net width when calculating area-swept.

Table 3. -- Weight-size regression relationships used to calculate biomass of crab species caught in National Marine Fisheries Service eastern Bering Sea bottom trawl surveys.

Stock	Sex	<i>a</i>	<i>b</i>
Bristol Bay red king crab	males	0.000403	3.141334
	females	n/a	n/a
	non-ovigerous females	0.000408	3.127956
	ovigerous females	0.003593	2.666076
Pribilof Islands red king crab	males	0.000403	3.141334
	females	n/a	n/a
	non-ovigerous females	0.000408	3.127956
	ovigerous females	0.003593	2.666076
Pribilof Islands blue king crab	males	0.000508	3.106409
	females	0.02065	2.27
	non-ovigerous females	n/a	n/a
	ovigerous females	n/a	n/a
St. Matthew blue king crab	males	0.000502	3.107158
	females	0.02065	2.27
	non-ovigerous females	n/a	n/a
	ovigerous females	n/a	n/a
Tanner crab	males	0.00027	3.022134
	females	n/a	n/a
	non-ovigerous females	0.000562	2.816928
	ovigerous females	0.000441	2.898686
snow crab	males	0.000267	3.097253
	females	n/a	n/a
	non-ovigerous females	0.001047	2.708367
	ovigerous females	0.001158	2.708793
hair crab	males	0.00071731	3.02
	females	0.00119453	2.86

Table 4. -- Special projects related to crab species conducted on National Marine Fisheries Service eastern Bering Sea bottom trawl survey in 2017.

Project title	Principle Investigator	Agency
Bitter crab syndrome	Pam Jensen	RACE <sup>1</sup> -SAP <sup>2</sup>
Annual vs. biennial snow crab reproductive cycle	Jennifer Newby	RACE <sup>1</sup> -SAP <sup>2</sup>
Spatial variance in shell structure of snow crab	Robert Foy	RACE <sup>1</sup> -SAP <sup>2</sup>
Tanner crab chela height measurements	Robert Foy	RACE <sup>1</sup> -SAP <sup>2</sup>
Live collection of mature snow and Tanner crabs	Cliff Ryer	RACE <sup>1</sup> -FBE <sup>3</sup>
Genetics of mating dynamics in EBS snow crab	Tyler Jackson	ADF&G <sup>4</sup>

<sup>1</sup> Alaska Fisheries Science Center, Resource Assessment and Conservation Engineering Division, Seattle, Washington.

<sup>2</sup> AFSC, Resource Assessment and Conservation Engineering Division, Shellfish Assessment Program, Kodiak, Alaska.

<sup>3</sup> AFSC, Resource Assessment and Conservation Engineering Division, Fisheries Behavioral Ecology Program, Newport, Oregon.

<sup>4</sup> State of Alaska, Department of Fish and Game.



Table 5. -- Summary of 2017 National Marine Fisheries Service eastern Bering Sea bottom trawl survey details for seven commercial crab stocks. Size categories are defined in Table 1.

		Tows in District	Tows with crab	Crab measured	Crab caught	Biomass (t)	CI ( $\pm$ 95%)
Bristol Bay District	Immature male	136	38	112	112	2,239	780
Red King Crab	Mature Male	136	64	266	266	23,102	8,328
	Legal	136	60	220	220	20,842	7,703
	Immature female	136	27	81	81	1,193	680
	Mature female	136	49	574	574	26,424	13,139
Pribilof District	Immature male	77	5	6	6	88	98
Red King Crab	Mature Male	77	8	57	57	3,658	4,632
	Legal	77	8	52	52	3,513	4,500
	Immature female	77	0	0	0	0	0
	Mature female	77	5	18	18	505	550
Pribilof District	Immature male	86	2	4	4	45	68
Blue King Crab	Mature Male	86	4	4	4	253	254
	Legal	86	3	3	3	223	250
	Immature female	86	4	5	5	55	54
	Mature female	86	4	10	10	204	237
St. Matthew Is.	Immature male	56	4	4	9	122	155
Blue King Crab	Mature Male	56	13	39	39	1,721	1,968
	Legal	56	10	27	27	1,333	1,482
	Immature female	56	2	6	6	61	94
	Mature female	56	0	0	0	0	0
Tanner Crab	Immature male	120	89	721	721	4,487	1,859
east of 166°W	Mature Male	120	80	1,053	1,053	19,313	6,298
	Legal	120	75	772	772	15,614	5,226
	Immature female	120	33	193	193	157	122
	Mature female	120	49	366	366	1,986	769
Tanner Crab	Immature male	255	153	2,966	3,793	5,415	1,395
west of 166°W	Mature Male	255	107	1,953	1,955	24,268	7,812
	Legal	255	101	1,578	1,580	21,288	7,339
	Immature female	255	99	2,390	3,808	1,255	493
	Mature female	255	69	973	1,383	5,019	3,069
Opilio Tanner Crab	Immature male	375	205	12,318	126,581	188,849	59,034
	Mature Male	375	167	2,116	2,198	29,240	7,303
	Legal	375	196	4,311	5,767	52,149	13,402
	Immature female	375	109	4,282	88,474	66,240	24,910
	Mature female	375	135	8,202	74,073	103,422	44,445

Table 6. -- Time series of biomass estimates (t) for Bristol Bay District red king crab (*Paralithodes camtschaticus*) by size category (CL) and sex from the National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1977 data.

Year	Immature male < 120 mm	Mature male ≥ 120 mm	Mature male ± CI	Legal male ≥ 135 mm	Immature female	Mature female	Mature female ± CI
1978	54,371	146,682	66,417	98,241	3,795	141,265	54,370
1979	16,886	86,906	43,304	63,107	5,132	59,165	21,521
1980	37,369	129,829	65,411	106,655	7,594	73,712	46,197
1981	27,294	41,520	12,659	27,368	4,215	59,099	30,597
1982	51,268	23,038	8,656	10,184	21,932	48,913	18,738
1983	25,675	9,796	2,494	2,867	7,257	7,237	2,683
1984	79,710	16,849	8,751	7,623	38,806	17,529	14,374
1985	12,823	14,006	4,130	5,356	1,602	5,723	2,805
1986	12,382	28,189	27,164	13,033	1,847	5,062	2,860
1987	16,626	30,197	14,575	18,167	7,074	15,427	9,677
1988	9,513	25,861	9,178	19,117	1,205	18,019	14,900
1989	7,059	35,503	15,936	27,552	1,322	11,615	7,455
1990	6,344	32,481	14,786	24,527	2,871	17,995	14,579
1991	6,395	60,142	69,981	52,119	1,826	15,553	13,342
1992	6,787	18,327	6,835	13,747	1,088	11,163	5,657
1993	6,939	28,740	12,766	19,839	1,170	16,101	7,849
1994	3,601	19,775	6,740	13,371	1,104	8,283	3,558
1995	6,359	20,939	14,711	15,570	2,992	7,868	3,839
1996	9,067	18,111	7,309	15,073	5,380	12,042	6,829
1997	27,126	32,533	13,321	27,403	3,051	21,365	14,033
1998	13,035	33,297	10,450	19,409	2,161	35,849	17,889
1999	5,093	39,870	16,942	30,005	1,163	19,126	13,276
2000	6,961	31,450	10,638	22,090	2,615	26,387	18,086
2001	8,942	19,060	5,746	15,360	1,692	22,866	13,703
2002	12,113	33,359	12,655	25,241	5,150	19,144	10,306
2003	11,514	63,271	57,913	51,115	5,642	35,587	16,085
2004	27,917	63,159	54,053	53,895	6,162	34,826	18,589
2005	17,036	38,105	14,021	28,373	8,455	42,715	17,805
2006	11,756	39,808	17,766	32,148	6,521	37,005	14,306
2007	14,043	44,115	17,880	34,226	2,257	42,931	19,123
2008	15,840	51,375	35,542	38,155	1,675	44,194	28,234
2009	8,926	34,250	25,727	21,996	760	46,616	30,241
2010	5,441	33,586	16,497	24,891	535	40,951	21,869
2011	7,952	21,990	9,231	16,622	3,515	38,035	19,244
2012	5,841	24,837	13,411	19,858	2,881	27,282	17,713
2013	5,515	34,141	14,164	28,358	547	22,031	15,783
2014	12,621	48,038	17,559	36,130	1,560	50,926	22,953
2015	4,984	32,121	11,019	27,209	838	26,296	15,078
2016	2,077	25,481	7,302	22,424	772	33,370	17,051
2017	2,239	23,102	8,328	20,842	1,193	26,424	13,139

Table 7. -- Time series of abundance estimates (in millions) for Bristol Bay District red king crab (*Paralithodes camtschaticus*) by size category (CL) and sex from the National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1977 data.

Year	Immature male < 120 mm	Mature male ≥ 120 mm	Mature male ± CI	Legal male ≥ 135 mm	Immature female	Mature female	Mature female ± CI
1978	89.5	67.9	30.7	38.5	27.8	161.3	61.9
1979	33.4	38.0	19.1	23.6	22.1	57.9	20.3
1980	70.8	51.3	25.3	37.5	34.4	87.9	66.4
1981	41.1	18.4	5.4	9.7	13.1	58.4	29.6
1982	110.9	12.0	4.9	4.0	72.4	52.9	21.8
1983	46.2	5.7	1.5	1.3	23.8	8.7	3.6
1984	164.9	9.1	4.7	3.3	109.8	27.4	23.9
1985	16.8	7.6	2.2	2.3	4.3	8.4	4.1
1986	15.2	14.8	14.6	5.6	5.2	6.4	3.6
1987	24.4	14.6	7.0	7.3	17.4	18.5	11.4
1988	11.3	11.6	4.0	7.5	2.5	20.1	17.0
1989	10.0	15.1	6.5	10.4	3.9	13.2	8.6
1990	9.7	13.7	6.1	8.9	7.8	17.0	13.8
1991	9.7	23.2	26.1	18.5	4.8	14.9	13.8
1992	8.3	7.5	3.0	4.6	2.3	10.2	4.9
1993	8.2	12.5	5.6	7.0	2.8	14.0	7.0
1994	7.1	8.6	2.9	4.8	3.8	6.1	2.5
1995	11.0	9.1	6.9	5.9	6.1	6.3	3.0
1996	17.5	7.2	2.8	5.3	14.3	9.8	5.6
1997	32.6	12.3	4.8	9.2	5.1	21.8	17.1
1998	16.8	15.4	5.0	6.8	6.3	31.7	17.5
1999	11.3	17.4	7.7	11.7	4.1	15.4	10.8
2000	10.7	14.0	4.9	8.4	6.3	21.0	13.6
2001	12.0	7.4	2.2	5.1	4.3	20.9	12.9
2002	22.9	13.6	5.2	8.6	17.6	17.0	9.7
2003	18.8	24.4	19.4	17.1	13.2	28.3	13.2
2004	43.3	23.7	19.8	18.0	19.7	31.7	18.9
2005	31.5	15.6	5.4	9.6	23.6	35.6	15.3
2006	21.2	16.4	7.2	11.8	16.9	31.0	12.2
2007	17.5	18.2	7.1	12.3	4.5	35.8	16.3
2008	17.1	20.9	13.8	12.9	3.7	36.8	24.3
2009	9.6	15.6	11.5	8.3	1.7	35.8	22.4
2010	6.5	14.7	7.0	9.4	1.2	31.5	17.4
2011	37.5	9.3	3.9	6.1	33.0	29.3	15.1
2012	8.0	9.7	4.9	6.7	7.6	19.6	13.2
2013	6.7	12.9	5.3	9.4	1.3	15.6	11.1
2014	15.5	19.7	7.3	12.4	2.8	36.9	17.0
2015	6.7	11.6	4.0	8.7	2.4	18.4	10.6
2016	4.7	9.0	2.6	7.1	3.6	22.4	11.6
2017	3.3	7.7	2.7	6.4	2.5	17.5	8.6

Table 8. -- Average bottom water temperatures collected at stations with mature female Bristol Bay red king crab (*Paralithodes camtschaticus*) on the National Marine Fisheries Service eastern Bering Sea bottom trawl survey and the mean ratio of eyed to uneyed embryos in mature red king crab females with the warm years highlighted in gray. Bristol Bay stations were sampled twice during the cold years. An \* indicates statistical significance within the year using a two sample t-test, alpha = 0.95 and  $P < 0.001$ .

Sample event	Average bottom temperature (°C)	Standard deviation (n = stations)	Two sample t-test values	Mean eyed to uneyed embryo ratio
May 1999	0.1	0.8 (41)	t = -11.9	6.54
July 1999	2.5*	0.8 (31)		0.02
May 2000	1.7	0.5 (49)	t = -9.2	1.45
July 2000	4.6*	1.6 (23)		0.01
June 2001	3.5	0.3 (40)		0.01
June 2002	3.4	0.6 (52)		0.06
June 2003	4.2	0.4 (51)		0.01
June 2004	3.9	0.5 (61)		0.03
June 2005	4.3	0.5 (49)		0.01
June 2006	2.2	0.7 (69)	t = -12.5	0.59
July 2006	4.2*	0.8 (30)		0.01
June 2007	1.8	0.9 (68)	t = -7.4	0.86
July 2007	3.4*	1.0 (32)		0.01
June 2008	1.4	0.7 (76)	t = -9.5	0.45
July 2008	3.6*	1.1 (32)		0.00
June 2009	1.5	1.6 (73)	t = -8.6	0.42
July 2009	4.5*	1.5 (32)		0.00
June 2010	2	0.9 (40)	t = -10.9	0.64
July 2010	4.8*	1.0 (23)		0.03
June 2011	2.9	0.8 (46)	t = -8.6	0.80
July 2011	5.9*	1.1 (20)		0.06
June 2012	0.9	1.2 (40)	t = -8.4	0.91
July 2012	4.0*	1.3 (15)		0.00
June 2013	2.9	1.1 (35)		0.02
June 2014	4.4	0.8 (40)		0.00
June 2015	4.6	0.4 (44)		0.00
June 2016	5.7	0.7 (57)		0.00
June 2017	3.18	1.02 (51)	t = -4.9153	0.15
August 2017	5.01	1.54 (20)		0.0

Table 9. -- Time series of biomass estimates (t) for Pribilof District red king crab (*Paralithodes camtschaticus*) by size category (CL) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1977 data.

Year	Immature male < 120 mm	Mature male ≥ 120 mm	Mature male ± CI	Legal male ≥ 135 mm	Immature female	Mature female	Mature female ± CI
1978	0	1,250	2,022	1,250	0	52	102
1979	0	556	561	488	0	93	182
1980	18	1,269	950	1,269	0	262	374
1981	0	312	358	312	0	35	68
1982	18	1,464	2,002	1,464	14	919	1,402
1983	26	527	551	493	0	309	292
1984	0	317	341	283	0	112	125
1985	0	61	121	61	0	0	0
1986	0	138	188	138	0	79	154
1987	0	54	105	54	31	0	0
1988	713	107	209	44	283	553	940
1989	675	1,529	2,728	871	924	1,327	2,140
1990	7,477	1, 141	2,077	138	522	2,200	3,048
1991	640	4,430	6,913	1,321	66	4,967	5,864
1992	274	3,305	3,864	2,528	278	3,153	5,620
1993	282	9,873	17,834	9,189	7	6,471	9,096
1994	430	9,139	13,748	8,117	47	3,917	6,772
1995	431	18,056	21,267	16,793	315	4,834	6,393
1996	68	2,361	1,720	2,330	31	1,976	2,867
1997	1,510	6,159	7,515	5,940	218	1,744	2,018
1998	416	2,324	1,639	1,778	50	1,669	2,487
1999	3,358	5,523	7,217	4,472	4,117	1,302	1,826
2000	157	4,320	3,164	3,843	8	987	1,214
2001	2,339	8,603	13,262	5,770	406	5,369	10,462
2002	8	7,037	9,461	7,014	12	775	803
2003	0	5,373	6,928	5,275	1	2,268	4,032
2004	152	3,622	4,183	3,622	105	1,187	1,238
2005	55	1,238	1,420	1,238	0	3,118	4,791
2006	109	7,003	5,252	6,696	10	2,173	2,627
2007	214	5,224	5,042	5,007	50	1,760	2,647
2008	332	5,462	5,418	5,102	192	2,825	3,701
2009	44	2,500	3,125	2,127	15	811	841
2010	53	4,405	3,767	3,973	0	840	1,167
2011	44	3,834	4,872	3,751	3	814	1,165
2012	336	4,477	5,031	4,360	0	663	710
2013	104	7,749	9,409	7,567	0	169	194
2014	82	12,047	18,525	11,433	0	1,093	2,015
2015	113	15,173	21,971	14,788	0	3,859	7,270
2016	526	4,150	5,700	3,653	26	1,873	2,241
2017	88	3,658	4,632	3,513	0	505	550

Table 10. -- Time series of abundance estimates (in millions) for Pribilof District red king crab (*Paralithodes camtschaticus*) by size category (CL) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 120 mm	Mature male ≥ 120 mm	Mature male ± CI	Legal male ≥ 135 mm	Immature female	Mature female	Mature female ± CI
1979	0.0	0.2	0.2	0.2	0.0	0.1	0.1
1980	0.1	0.4	0.3	0.4	0.0	0.1	0.2
1981	0.0	0.1	0.1	0.1	0.0	0.0	0.0
1982	0.0	0.3	0.4	0.3	0.0	0.5	0.7
1983	0.0	0.1	0.1	0.1	0.0	0.2	0.1
1984	0.0	0.1	0.1	0.1	0.0	0.1	0.1
1985	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1986	0.0	0.0	0.1	0.0	0.0	0.0	0.1
1987	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1988	1.9	0.1	0.1	0.0	1.6	0.4	0.7
1989	1.1	0.8	1.4	0.4	1.8	1.1	1.7
1990	7.1	0.8	1.4	0.1	0.7	2.3	3.0
1991	0.7	2.4	3.8	0.6	0.3	4.3	5.1
1992	0.4	1.5	1.8	1.0	0.4	2.4	4.4
1993	0.3	3.5	6.4	3.1	0.0	4.5	6.4
1994	0.4	3.1	4.7	2.4	0.1	2.4	4.2
1995	0.5	5.2	5.9	4.4	0.3	3.0	3.9
1996	0.1	0.6	0.4	0.5	0.0	1.1	1.6
1997	1.6	1.6	1.7	1.4	0.3	1.0	1.1
1998	0.4	0.8	0.6	0.4	0.1	1.0	1.4
1999	7.2	1.9	2.2	1.3	9.5	0.9	1.1
2000	0.1	1.5	1.2	1.3	0.0	0.7	0.8
2001	2.5	3.7	6.1	1.9	0.6	3.8	7.5
2002	0.0	1.9	2.5	1.9	0.0	0.4	0.4
2003	0.0	1.5	2.0	1.4	0.0	1.2	2.1
2004	1.4	0.8	0.9	0.8	1.1	0.5	0.6
2005	0.1	0.2	0.3	0.2	0.0	1.3	2.0
2006	0.1	1.4	1.1	1.2	0.0	1.0	1.1
2007	0.2	1.2	1.3	1.1	0.1	0.8	1.3
2008	0.4	1.3	1.2	1.1	0.2	1.5	2.1
2009	0.0	0.9	1.2	0.7	0.0	0.3	0.3
2010	0.1	1.4	1.3	1.2	0.0	0.6	0.8
2011	0.0	1.0	1.3	1.0	0.0	0.5	0.6
2012	0.4	1.2	1.5	1.2	0.0	0.4	0.5
2013	0.1	1.7	2.0	1.6	0.0	0.1	0.1
2014	0.1	3.0	4.2	2.6	0.0	0.5	0.9
2015	0.1	3.5	4.9	3.3	0.0	1.8	3.3
2016	0.5	1.3	1.9	1.0	0.04	1.3	1.4
2017	0.1	1.0	1.3	1.0	0.0	0.3	0.3

Table 11. -- Time series of biomass estimates (t) for blue king crab (*Paralithodes platypus*) by size category (CL) and sex in the Pribilof District from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 120 mm	Mature male ≥ 120 mm	Mature male ± CI	Legal male ≥ 135 mm	Immature female	Mature female	Mature female ± CI
1979	61	10,959	6,775	9,040	92	1,097	1,706
1980	2,084	23,553	19,846	20,679	699	211,604	408,004
1981	1,704	11,628	3,963	10,554	497	5,987	5,507
1982	1,152	7,389	2,712	6,893	553	8,824	11,724
1983	962	5,409	1,882	4,474	258	9,990	15,495
1984	130	2,216	993	1,824	15	3,070	2,292
1985	39	1,055	551	755	5	520	457
1986	4	1,505	893	1,473	11	2,420	4,272
1987	191	2,923	2,357	2,781	119	795	909
1988	170	842	873	842	190	528	508
1989	1,275	827	1,034	827	801	945	1,075
1990	2,004	3,078	3,617	1,514	1,118	1,810	1,803
1991	1,377	4,690	3,544	3,326	343	2,433	1,973
1992	1,801	4,391	3,637	3,035	802	1,848	1,737
1993	1,088	4,556	2,743	3,203	444	1,647	1,489
1994	619	3,410	2,305	2,806	87	4,806	4,207
1995	968	8,360	9,898	6,787	331	3,948	4,017
1996	745	4,641	2,444	3,873	177	5,408	5,318
1997	381	3,233	1,749	2,765	194	2,835	2,386
1998	692	2,798	1,367	2,510	267	1,914	1,654
1999	161	1,729	1,141	1,426	0	2,868	2,625
2000	113	2,091	1,212	1,746	0	1,462	1,319
2001	87	1,599	2,302	1,461	0	1,816	2,571
2002	0	680	674	647	0	1,401	2,129
2003	19	702	550	671	21	1,286	1,880
2004	36	107	122	48	25	98	114
2005	326	344	479	344	477	370	413
2006	87	166	196	139	38	538	801
2007	197	306	479	206	59	223	384
2008	212	46	90	46	222	450	560
2009	254	497	695	187	80		907
2010	92	303	274	190	84	310	401
2011	0	461	763	399	3	34	49
2012	165	644	928	459	9	229	296
2013	15	250	391	190	12	154	211
2014	83	233	320	233	16	91	108
2015	82	622	480	428	0	160	207
2016	70	129	154	68	49	352	340
2017	45	253	254	223	55	204	237

Table 12. -- Time series of abundance estimates (in millions) by size category (CL) and sex for blue king crab (*Paralithodes platypus*) in the Pribilof District from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 120 mm	Mature male ≥ 120 mm	Mature male ± CI	Legal male ≥ 135 mm	Immature female	Mature female	Mature female ± CI
1979	0.1	4.1	2.6	3.0	0.1	1.2	1.9
1980	2.7	7.8	6.3	6.2	0.8	182.9	350.4
1981	2.1	3.8	1.3	3.2	0.8	5.4	4.7
1982	1.4	2.4	0.8	2.1	0.9	7.8	10.0
1983	1.0	1.9	0.7	1.3	0.5	9.3	14.2
1984	0.5	0.8	0.3	0.6	0.5	2.8	2.1
1985	0.1	0.4	0.2	0.3	0.3	0.5	0.4
1986	0.0	0.5	0.3	0.5	0.0	2.1	3.7
1987	0.6	0.9	0.7	0.8	0.4	0.7	0.8
1988	1.2	0.2	0.2	0.2	0.9	0.5	0.4
1989	3.5	0.2	0.3	0.2	2.6	1.1	1.5
1990	2.4	1.5	1.8	0.6	2.2	2.0	2.2
1991	1.9	2.0	1.4	1.2	0.8	2.8	2.3
1992	2.4	1.9	1.6	1.2	1.8	2.1	2.1
1993	1.5	1.9	1.1	1.1	0.9	1.8	1.6
1994	0.6		0.9	0.9	0.1	5.0	4.4
1995	1.1	3.1	3.6	2.2	0.7	4.0	4.1
1996	0.7	1.7	0.9	1.3	0.3	5.0	4.8
1997	0.5	1.2	0.7	0.9	0.3	2.6	2.2
1998	0.9	1.0	0.5	0.8	0.5	1.8	1.6
1999	0.2	0.6	0.4	0.5	0.0	2.8	2.6
2000	0.2	0.7	0.4	0.5	0.0	1.4	1.2
2001	0.1	0.5	0.7	0.4	0.0	1.7	2.5
2002	0.0	0.2	0.2	0.2	0.0	1.2	1.9
2003	0.0	0.2	0.2	0.2	0.1	1.1	1.7
2004	0.1	0.0	0.1	0.0	0.1	0.1	0.1
2005	2.0	0.1	0.1	0.1	2.3	0.3	0.3
2006	0.1	0.1	0.1	0.0	0.1	0.4	0.6
2007	0.2	0.1	0.2	0.1	0.1	0.2	0.3
2008	0.2	0.0	0.0	0.0	0.3	0.4	0.6
2009	0.3	0.2	0.4	0.1	0.2	0.5	0.8
2010	0.1	0.1	0.1	0.1	0.2	0.2	0.3
2011	0.0	0.2	0.3	0.1	0.0	0.0	0.0
2012	0.2	0.3	0.4	0.2	0.0	0.3	0.5
2013	0.1	0.1	0.2	0.1	0.0	0.2	0.2
2014	0.1	0.1	0.1	0.1	0.0	0.1	0.1
2015	0.1	0.2	0.2	0.1	0.0	0.2	0.3
2016	0.1	0.1	0.1	0.02	0.1	0.4	0.4
2017	0.1	0.1	0.1	0.1	0.1	0.2	0.3



Table 13. -- Time series of biomass estimates (t) for blue king crab (*Paralithodes platypus*) by size category (CL) and sex in the St. Matthew Island Section sampling stratum of the Northern District from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1978-1979 data.

Year	Immature male < 105 mm	Mature male ≥ 105 mm	Mature male ± CI	Legal male ≥ 120 mm	Immature female	Mature female	Mature female ± CI
1980	2,646	7,826	7,151	4,786	423	737	1,248
1981	527	6,175	4,894	4,715	97	63	71
1982	1,758	14,934	9,259	12,065	416	0	0
1983	1,162	8,834	4,907	6,919	78	1,597	2,183
1984	539	3,737	1,358	3,145	42	216	285
1985	404	2,831	1,208	2,405	95	38	60
1986	252	1,267	971	725	99	13	25
1987	495	2,022	1,130	1,284	205	35	49
1988	702	2,830	1,346	1,880	612	123	147
1989	3,041	4,790	2,344	3,415	1,219	504	448
1990	1,122	5,931	3,073	4,707	336	13	25
1991	1,664	6,073	2,918	4,099	521	270	506
1992	1,250	6,279	2,513	4,608	280	216	250
1993	2,106	8,425	2,685	6,258	643	1,635	3,026
1994	916	5,812	2,008	4,246	99	128	131
1995	1,038	4,889	1,653	3,448	182	21	28
1996	1,291	8,494	4,013	6,218	364	432	770
1997	1,342	10,005	6,471	7,341	287	407	707
1998	902	7,478	5,269	5,487	210	243	261
1999	272	1,423	507	1,163	93	14	28
2000	315	1,880	1,136	1,534	52	37	52
2001	483	2,512	1,254	1,937	145	43	48
2002	119	1,640	1,033	1,371	1	89	120
2003	542	1,233	765	918	94	339	430
2004	443	1,341	754	1,139	194	66	82
2005	449	1,396	987	1,016	93	52	76
2006	1,050	3,223	2,262	2,460	145	14	28
2007	2,618	4,564	3,113	2,217	247	47	47
2008	1,972	3,655	2,059	2,701	214	40	45
2009	1,891	5,079	2,630	2,571	218	192	191
2010	3,974	8,141	5,955	4,317	112	456	856
2011	1,699	9,516	10,167	5,701	122	32	46
2012	907	5,652	3,668	3,313	52	74	64
2013	446	2,022	860	1,485	85	27	38
2014	796	5,472	4,750	3,568	40	62	75
2015	825	5,134	7,656	3,592	5	24	35
2016	509	3,072	2,273	2,305	0	129	104
2017	122	1,721	1,968	1,333	61	0	0

Table 14. -- Time series of abundance estimates (in millions) for blue king crab (*Paralithodes platypus*) by size category (CL) and sex in the St. Matthew Island Section sampling stratum of the Northern District from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1978-1979 data.

Year	Immature male < 105 mm	Mature male ≥ 105 mm	Mature male ± CI	Legal male ≥ 120 mm	Immature female	Mature female	Mature female ± CI
1980	4.2	5.1	5.1	2.5	1.1	1.3	2.2
1981	0.9	3.5	2.5	2.3	0.2	0.1	0.1
1982	3.0	8.3	5.5	5.9	0.9	0.0	0.0
1983	2.0	5.0	2.9	3.3	0.4	2.6	3.5
1984	1.3	1.9	0.7	1.5	0.2	0.3	0.4
1985	0.7	1.5	0.7	1.1	0.3	0.1	0.1
1986	0.6	0.8	0.7	0.4	0.3	0.0	0.0
1987	1.0	1.3	0.8	0.7	0.6	0.1	0.1
1988	1.5	1.8	0.9	1.0	1.6	0.2	0.2
1989	6.2	2.9	1.5	1.8	3.2	1.0	0.8
1990	1.9	3.4	1.8	2.3	0.8	0.0	0.0
1991	3.3	3.9	1.9	2.2	1.4	0.4	0.8
1992	2.2	3.7	1.5	2.3	0.8	0.5	0.5
1993	4.2	5.1	1.7	3.3	1.7	2.3	4.3
1994	1.4	3.6	1.3	2.3	0.2	0.2	0.2
1995	1.7	2.9	1.0	1.7	0.6	0.0	0.1
1996	2.4	5.0	2.5	3.1	1.1	0.7	1.2
1997	2.3	6.0	4.2	3.8	0.8	0.6	1.1
1998	2.1	4.5	3.4	2.8	0.6	0.4	0.4
1999	0.5	0.8	0.3	0.6	0.3	0.0	0.0
2000	0.5	1.0	0.6	0.7	0.1	0.1	0.1
2001	0.8	1.4	0.7	0.9	0.4	0.1	0.1
2002	0.2	0.9	0.5	0.6	0.0	0.1	0.2
2003	1.2	0.7	0.5	0.5	0.3	0.6	0.7
2004	0.9	0.7	0.5	0.6	0.5	0.1	0.1
2005	0.9	0.8	0.6	0.5	0.3	0.1	0.1
2006	1.8	1.9	1.4	1.2	0.3	0.0	0.0
2007	4.5	3.2	2.3	1.2	0.8	0.1	0.1
2008	3.8	2.3	1.3	1.5	0.7	0.1	0.1
2009	3.4	3.6	2.0	1.4	0.6	0.4	0.4
2010	6.2	5.7	4.6	2.5	0.4	1.0	1.9
2011	2.6	6.5	7.2	3.2	0.4	0.1	0.1
2012	1.6	3.8	2.6	1.8	0.2	0.1	0.1
2013	0.8	1.3	0.5	0.8	0.3	0.1	0.1
2014	1.3	3.4	3.4	1.8	0.1	0.1	0.1
2015	1.2	3.2	4.8	2.0	0.0	0.1	0.1
2016	0.8	1.8	1.5	1.2	0.0	0.3	0.2
2017	0.2	1.0	1.2	0.7	0.1	0.0	0.0

Table 15. -- Time series of biomass estimates (t) for Tanner crab (*Chionoecetes bairdi*) by size category (CW) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys, east of 166° W. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 113 mm	Mature male ≥ 113 mm	Mature male ± CI	Legal male ≥ 120 mm	Immature female	Mature female	Mature female ± CI
1979	2,278	15,700	5,632	14,652	591	2,858	2,042
1980	8,433	40,546	25,266	37,082	1,321	11,562	8,541
1981	4,668	18,722	8,004	16,324	893	7,684	4,249
1982	5,518	11,084	3,934	9,415	1,310	6,797	3,505
1983	3,289	10,047	4,708	8,572	913	4,438	2,368
1984	2,522	9,498	4,010	8,376	671	4,129	3,590
1985	1,735	6,495	3,007	5,971	324	2,836	2,350
1986	4,583	5,043	3,078	4,005	1,499	2,006	1,000
1987	17,778	11,085	4,604	9,840	11,912	3,097	1,426
1988	26,460	31,670	29,201	22,482	3,703	19,182	11,150
1989	27,575	60,142	20,624	49,413	6,666	12,309	4,797
1990	23,938	52,942	18,111	47,567	5,990	19,032	8,996
1991	25,932	63,893	40,349	54,968	3,633	27,708	17,830
1992	15,381	74,538	47,450	66,517	346	11,013	4,847
1993	8,056	45,337	17,552	40,826	153	5,171	2,167
1994	3,217	29,086	9,786	26,534	65	5,268	3,096
1995	1,985	17,687	8,332	16,321	250	5,732	3,442
1996	3,435	16,545	10,642	15,562	1,015	5,533	3,885
1997	3,301	5,787	2,014	5,026	967	1,947	857
1998	3,175	5,229	1,580	4,259	550	1,202	492
1999	8,470	6,365	3,007	4,498	1,089	2,272	1,486
2000	5,297	11,131	6,847	8,913	729	2,885	2,197
2001	5,780	10,451	4,498	9,036	2,617	1,314	618
2002	4,359	10,043	4,434	9,030	1,768	1,701	1,106
2003	6,281	10,883	4,939	9,175	705	2,090	940
2004	3,444	9,011	5,060	7,773	267	863	341
2005	5,325	12,118	5,182	10,289	1,673	2,820	2,022
2006	15,136	13,500	5,467	10,921	2,451	4,025	2,318
2007	12,137	15,802	8,749	11,884	696	5,916	4,373
2008	10,424	26,753	28,996	22,447	622	4,457	2,665
2009	3,849	10,937	5,728	8,947	533	4,021	3,045
2010	3,674	10,752	5,420	9,137	795	2,115	1,752
2011	11,865	11,525	6,302	9,814	4,390	2,225	1,174
2012	30,882	14,485	6,790	10,602	5,694	8,550	5,264
2013	25,423	39,157	25,944	23,823	2,344	11,054	7,122
2014	18,262	39,934	12,430	30,404	489	8,159	7,538
2015	7,853	27,241	6,936	22,853	628	4,675	3,126
2016	6,997	18,523	4,755	14,143	50	1,429	850
2017	4,487	19,313	6,298	15,614	157	1,986	769

Table 16. -- Time series of abundance estimates (in millions) for Tanner crab (*Chionoecetes bairdi*) by size category (CW) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys, east of 166° W. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 113 mm	Mature male ≥ 113 mm	Mature male ± CI	Legal male ≥ 120 mm	Immature female	Mature female	Mature female ± CI
1979	12.7	20.1	7.0	17.8	7.7	13.0	9.5
1980	40.5	50.4	30.6	43.0	15.6	50.5	37.7
1981	29.2	26.2	11.3	21.0	16.1	35.1	20.4
1982	28.2	16.3	6.0	12.7	14.7	31.2	16.6
1983	38.6	15.2	7.1	12.1	30.2	18.3	10.0
1984	27.4	13.0	5.3	10.6	19.5	16.3	13.1
1985	12.0	8.5	3.7	7.4	5.4	10.8	8.0
1986	50.6	7.3	3.8	5.1	37.5	8.7	3.9
1987	136.0	15.7	5.9	13.0	123.1	13.4	5.5
1988	138.2	49.3	41.4	29.6	56.3	84.4	47.9
1989	243.7	89.5	30.2	66.4	183.1	57.8	22.9
1990	167.4	68.1	22.0	56.7	98.7	101.5	47.2
1991	123.4	90.2	61.3	71.3	41.8	145.9	103.7
1992	54.7	105.7	67.0	88.5	5.1	53.9	23.2
1993	30.0	63.8	25.1	54.2	2.9	24.9	10.8
1994	12.8	39.4	13.4	34.0	2.7	27.0	17.2
1995	10.6	24.0	11.0	21.2	5.6	30.2	18.5
1996	29.3	21.8	13.8	19.8	18.1	28.9	20.4
1997	36.5	7.9	2.6	6.3	34.7	11.1	5.2
1998	24.9	7.8	2.4	5.8	13.4	6.7	2.9
1999	50.1	10.1	4.8	6.1	21.3	12.6	7.8
2000	32.7	16.8	10.0	12.1	16.6	15.0	11.2
2001	118.0	14.5	5.6	11.5	112.2	7.1	3.3
2002	45.8	13.2	5.3	11.0	36.4	10.8	7.9
2003	41.8	14.9	5.8	11.2	13.6	12.0	5.7
2004	18.2	12.4	5.3	9.7	8.6	4.5	2.1
2005	41.9	17.5	6.4	13.5	39.3	16.1	12.1
2006	84.0	20.1	7.7	14.6	29.1	21.9	12.0
2007	52.2	24.7	13.0	16.2	11.5	30.5	21.1
2008	42.1	37.8	36.2	28.7	8.9	24.6	15.2
2009	32.8	16.1	8.1	11.8	23.9	22.1	16.9
2010	39.1	15.3	7.3	11.9	29.7	10.6	8.4
2011	135.2	16.0	7.5	12.4	88.8	12.2	6.2
2012	167.6	22.7	10.7	14.4	65.8	52.4	35.7
2013	110.0	69.6	49.7	37.0	33.2	60.8	42.5
2014	75.5	62.3	19.0	41.9	15.1	44.7	42.0
2015	40.2	40.0	9.4	30.7	14.5	27.6	19.2
2016	24.6	29.6	7.7	20.2	1.4	7.7	4.7
2017	20.2	29.7	9.5	21.8	5.2	10.2	4.0

Table 17. -- Time series of biomass estimates (t) for Tanner crab (*Chionoecetes bairdi*) by size category (CW) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys, west of 166° W. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 103 mm	Mature male ≥ 103 mm	Mature male ± CI	Legal male ≥ 110 mm	Immature female	Mature female	Mature female ± CI
1979	16,462	15,596	6,183	12,913	3,236	16,465	11,111
1980	64,467	39,038	17,099	27,984	12,199	52,221	33,389
1981	29,763	26,777	8,029	18,061	631	34,893	20,587
1982	14,735	34,520	12,749	25,512	410	57,347	32,263
1983	7,761	16,947	6,540	13,195	1,426	15,993	6,928
1984	5,865	12,625	4,735	10,016	1,573	10,785	5,490
1985	2,533	4,143	1,442	3,169	675	2,718	1,636
1986	6,228	5,758	4,123	3,286	1,210	1,360	831
1987	8,047	8,601	3,960	6,994	3,095	2,042	837
1988	19,282	21,812	12,530	17,868	6,484	6,184	3,169
1989	15,988	29,119	12,768	24,883	5,165	7,090	3,186
1990	16,029	39,509	22,820	35,175	3,869	18,663	17,538
1991	17,926	38,059	13,836	34,230	3,390	17,056	7,234
1992	11,419	26,255	11,787	23,410	1,644	15,213	6,889
1993	7,226	12,651	4,912	10,873	913	6,470	2,484
1994	5,070	10,962	3,745	9,526	1,137	4,579	2,492
1995	3,553	11,757	6,911	10,592	808	6,667	4,052
1996	2,927	7,863	6,170	6,682	424	4,047	3,539
1997	1,986	3,575	1,185	2,873	442	1,451	884
1998	3,041	3,563	1,227	2,602	1,413	1,076	505
1999	4,409	2,311	961	1,679	1,793	1,554	635
2000	4,116	2,787	850	2,003	1,753	1,246	622
2001	8,171	4,918	2,069	3,943	3,741	3,247	1,915
2002	8,691	4,318	1,595	3,029	3,733	2,766	1,375
2003	12,528	8,133	3,789	6,424	3,984	6,313	3,007
2004	13,064	13,404	7,012	9,732	3,866	3,865	1,569
2005	18,964	27,348	10,511	23,655	8,710	8,759	3,745
2006	33,861	39,045	19,584	32,859	10,808	10,914	4,484
2007	35,745	40,540	25,656	31,673	4,944	7,521	2,312
2008	15,705	32,031	17,342	26,351	2,238	7,206	3,191
2009	9,673	22,980	9,143	19,770	2,039	4,456	1,569
2010	8,305	26,296	14,128	23,372	3,008	3,358	1,567
2011	13,198	26,123	17,353	23,259	6,001	3,189	983
2012	19,737	15,027	4,271	11,928	5,982	3,805	1,338
2013	18,417	20,423	9,311	15,939	4,071	6,795	2,393
2014	17,345	33,394	8,146	24,859	2,023	6,705	3,547
2015	8,036	31,122	9,281	27,067	1,038	6,536	4,526
2016	8,196	35,119	8,671	31,252	1,057	6,076	3,664
2017	5,415	24,268	7,812	21,288	1,255	5,019	3,069

Table 18. -- Time series of abundance estimates (in millions) for Tanner crab (*Chionoecetes bairdi*) by size category (CW) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys, west of 166° W. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 103 mm	Mature male ≥ 103 mm	Mature male ± CI	Legal male ≥ 110 mm	Immature female	Mature female	Mature female ± CI
1979	135.8	28.2	10.9	20.7	49.0	118.3	80.6
1980	476.3	80.0	33.1	49.0	159.2	380.4	259.6
1981	156.1	56.8	16.8	32.3	10.3	268.7	170.6
1982	74.3	71.3	26.1	46.0	15.5	433.1	265.7
1983	108.0	34.6	13.5	24.1	96.5	109.9	48.3
1984	67.2	25.8	9.6	18.5	59.0	70.1	36.8
1985	28.6	8.4	2.9	5.7	21.0	18.6	12.3
1986	49.3	13.5	10.5	6.5	24.1	8.3	4.6
1987	91.0	16.2	6.6	11.6	74.9	12.9	5.3
1988	198.0	39.9	21.1	28.8	129.9	38.1	18.6
1989	156.4	50.2	19.6	38.3	101.9	43.3	19.2
1990	130.0	65.5	35.9	53.4	75.1	107.5	91.6
1991	162.7	65.2	22.5	54.4	84.1	109.2	48.3
1992	101.9	43.2	15.5	35.1	48.6	97.0	43.1
1993	58.1	23.4	8.4	18.4	26.4	42.6	16.4
1994	46.8	20.0	6.4	15.9	34.3	29.2	15.6
1995	32.4	21.3	12.3	18.1	20.6	43.1	25.9
1996	24.3	15.0	11.1	11.7	15.0	26.2	22.3
1997	24.6	7.3	2.3	5.3	22.6	9.0	5.4
1998	49.1	7.4	2.5	4.7	44.7	6.6	3.1
1999	83.4	5.0	2.2	3.2	79.7	10.1	4.0
2000	71.5	6.0	1.8	3.8	57.0	7.3	3.6
2001	145.2	9.8	3.7	7.0	127.2	21.0	11.5
2002	128.8	9.1	3.2	5.5	111.6	19.1	10.9
2003	171.5	16.4	7.2	11.6	123.8	48.5	26.2
2004	207.5	29.2	15.9	18.9	169.9	27.7	13.5
2005	241.1	49.5	17.8	39.2	215.7	60.7	27.9
2006	287.0	72.3	30.4	54.8	178.1	76.4	31.2
2007	279.4	80.2	45.3	55.1	114.3	51.5	16.3
2008	110.8	62.2	29.9	46.2	53.4	48.6	21.8
2009	98.3	42.7	16.6	33.7	71.4	29.2	10.0
2010	114.2	45.7	21.5	37.5	91.6	21.9	10.1
2011	186.6	42.9	22.9	34.8	157.6	20.3	6.0
2012	223.8	28.7	8.1	20.0	122.0	25.6	8.9
2013	183.9	39.7	17.1	27.0	97.2	48.0	17.0
2014	140.4	68.0	17.8	43.8	90.4	43.6	23.7
2015	67.7	57.4	16.5	46.0	36.3	45.4	33.7
2016	75.2	62.2	15.5	51.3	42.1	42.6	27.3
2017	98.8	43.2	12.4	34.9	101.1	35.6	21.4

Table 19. -- Time series of biomass estimates (t) for eastern Bering Sea snow crab (*Chionoecetes opilio*) by size category (CW) and sex from National Marine Fisheries Service bottom trawl surveys, all Districts combined. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature male < 95 mm	Mature male ≥ 95 mm	Mature male ± CI	Legal male ≥ 78 mm	Immature female	Mature female*	Mature female ± CI*
1980	236,814	99,240	30,937	180,837	27,575	271,682	174,119
1981	166,540	38,042	8,061	97,286	10,988	118,845	40,403
1982	250,475	65,864	19,430	177,794	3,654	141,492	43,943
1983	184,837	68,047	18,468	163,096	3,622	82,182	32,620
1984	119,438	119,971	32,543	183,321	14,119	39,369	15,417
1985	44,214	55,691	12,225	79,334	5,364	5,889	2,487
1986	83,408	58,725	14,454	84,159	26,043	15,174	6,209
1987	266,342	107,536	23,901	178,662	107,989	119,551	44,272
1988	331,332	144,135	53,992	246,515	36,803	165,619	57,314
1989	372,788	143,216	29,275	291,753	23,265	256,728	163,114
1990	306,733	347,750	102,169	521,713	38,213	174,942	72,149
1991	293,255	347,976	105,727	477,618	68,925	199,020	94,676
1992	179,621	166,483	35,962	223,585	49,374	123,479	48,802
1993	273,570	98,857	22,246	143,013	74,921	127,081	41,412
1994	289,633	57,386	12,134	109,683	68,240	122,604	33,649
1995	368,026	61,758	20,003	158,155	31,019	164,959	44,039
1996	341,043	143,856	52,118	312,771	9,274	104,429	31,008
1997	209,131	232,388	57,042	362,928	5,452	101,393	39,142
1998	100,536	164,119	32,216	219,422	13,324	70,183	38,534
1999	44,127	67,352	13,850	87,096	6,160	29,849	13,945
2000	77,782	53,942	16,022	76,830	12,480	93,882	99,120
2001	167,671	56,449	11,370	106,070	17,033	74,840	43,557
2002	83,002	55,907	26,886	100,734	4,388		18,448
2003	81,606	44,423	10,558	72,396	14,838	38,761	30,847
2004	89,330	44,162	14,554	61,726	30,472	47,743	26,154
2005	184,025	50,072	10,120	105,971	55,125	62,603	27,395
2006	124,579	90,152	61,487	141,960	28,090	50,592	20,186
2007	140,003	99,875	36,249	162,108	27,875	54,449	34,546
2008	114,297	79,600	16,993	123,530	8,994	49,352	22,756
2009	98,468	103,188	30,883	149,588	29,660	50,002	22,623
2010	146,025	105,278	27,471	134,170	90,479	94,956	34,177
2011	149,214	111,662	25,824	145,916	41,232	169,117	63,699
2012	123,683	67,476	18,910	104,438	41,425	143,268	65,922
2013	100,506	58,389	14,779	99,733	31,364	125,672	50,923
2014	140,092	105,441	41,571	151,453	54,523	111,362	46,704
2015	85,434	46,410	14,071	71,550	35,701	81,628	29,256
2016	103,747	29,961	6,869	51,670	53,788	52,022	21,010
2017	188,849	29,240	7,303	52,149	66,240	103,422	44,445

\* Differences from previous six reports due to reanalysis of length-weight regression data.

Table 20. -- Time series of abundance estimates (in millions) for eastern Bering Sea snow crab (*Chionoecetes opilio*) by size category (CW) and sex from National Marine Fisheries Service bottom trawl surveys, all Districts combined. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature male < 95 mm	Mature male ≥ 95 mm	Mature male ± CI	Legal male ≥ 78 mm	Immature female	Mature female	Mature female ± CI
1980	2,567.0	194.8	65.0	513.4	898.5	4,830.3	3,219.6
1981	1,575.4	79.8	17.7	318.8	233.3	2,047.8	713.9
1982	1,779.0	145.3	44.0	591.1	79.9	2,317.2	770.8
1983	1,486.0	150.3	41.2	511.7	240.5	1,466.0	611.0
1984	1,223.6	237.6	62.8	476.1	551.9	670.0	273.8
1985	444.6	105.9	23.3	195.9	213.0	103.4	44.7
1986	1,143.1	110.6	27.0	211.2	842.1	267.4	110.5
1987	3,758.6	215.7	48.8	493.3	2,955.5	2,040.2	768.0
1988	3,677.9	276.9	94.8	683.8	1,045.8	2,795.6	975.4
1989	3,111.0	292.3	60.6	882.5	564.7	4,625.9	3,417.8
1990	2,263.9	710.4	214.0	1,348.1	1,043.9	3,008.7	1,392.7
1991	3,331.8	618.3	179.4	1,093.8	2,270.7	3,545.4	1,930.8
1992	2,776.2	293.2	62.7	512.9	1,862.2	2,068.9	849.0
1993	4,805.5	182.8	41.9	355.8	2,909.2	2,396.3	818.2
1994	4,116.9	106.4	22.2	320.6	2,684.2	2,204.8	552.4
1995	3,635.3	128.0	43.9	515.7	1,021.7	3,109.1	825.9
1996	2,309.8	302.4	105.2	958.6	258.4	2,107.2	680.4
1997	1,204.4	447.1	100.4	945.8	142.9	2,001.0	813.2
1998	778.2	308.4	59.3	514.6	336.0	1,386.7	791.2
1999	422.4	124.9	23.9	198.8	187.6	551.0	270.0
2000	971.1	102.4	31.8	191.1	391.9	1,649.1	1,711.0
2001	1,529.4	111.3	24.1	312.7	470.9	1,243.8	727.5
2002	596.3	114.7	54.8	284.5	121.1	502.8	342.5
2003	1,073.7	88.1	21.3	196.0	542.4	680.2	601.4
2004	1,491.2	79.9	24.2	147.8	1,375.9	931.9	525.2
2005	1,890.3	89.2	17.6	312.5	1,512.2	1,110.9	498.3
2006	1,178.4	171.9	119.4	377.6	765.7	744.3	304.8
2007	1,260.8	196.7	67.0	435.0	620.4	839.6	623.2
2008	1,008.8	154.3	31.6	325.2	395.9	747.7	445.2
2009	1,055.4	195.7	57.9	371.5	1,059.9	747.2	356.6
2010	2,460.5	184.4	45.1	293.7	3,027.6	1,777.8	654.1
2011	1,829.8	194.1	45.7	330.8	1,175.4	3,137.0	1,190.0
2012	1,384.9	123.5	34.3	274.1	1,165.5	2,656.1	1,309.6
2013	1,055.9	112.6	27.6	280.0	1,029.4	2,222.2	994.7
2014	1,527.8	204.2	76.8	385.3	1,590.8	1,815.6	894.7
2015	1,504.2	84.2	22.3	183.8	1,461.0	1,238.6	497.4
2016	2,361.9	57.8	13.2	143.2	2,131.6	818.4	347.2
2017	3,541.9	57.8	14.0	151.7	2,495.6	2,087.0	923.7



Table 21. -- Time series of biomass estimates (t) for hair crab (*Erimacrus isenbeckii*) by size category (CL) and sex from National Marine Fisheries Service bottom trawl surveys, all Districts combined. The 95% confidence intervals (CI) are 1.96 SE.

Year	Sublegal males < 83 mm	Legal males ≥ 83 mm	Legal males ± CI	Total female	Total female ± CI
1980	988	16,164	11,703	758	1,041
1981	183	10,091	3,658	182	114
1982	182	6,717	3,942	120	70
1983	67	4,231	1,331	296	152
1984	310	3,048	999	106	94
1985	83	2,084	1,041	73	57
1986	207	1,482	787	100	69
1987	355	1,083	607	208	110
1988	631	618	354	168	89
1989	2,955	404	240	43	40
1990	2,540	783	453	255	155
1991	1,393	795	434	230	130
1992	778	591	300	80	53
1993	1,111	2,296	1,588	217	148
1994	1,324	2,413	1,253	194	133
1995	1,396	4,326	2,791	158	84
1996	1,152	3,163	1,738	277	132
1997	584	3,103	1,289	92	56
1998	213	1,984	798	361	241
1999	196	1,735	510	308	125
2000	180	2,873	1,259	331	180
2001	132	1,287	521	565	243
2002	65	1,375	529	101	64
2003	357	659	275	83	49
2004	204	491	191	83	71
2005	328	212	132	273	134
2006	357	661	415	877	954
2007	575	1,278	519	357	168
2008	623	1,346	631	387	174
2009	1,104	1,916	731	464	250
2010	903	1,610	677	469	186
2011	1,752	2,129	935	377	162
2012	3,626	2,878	1,128	534	234
2013	3,357	6,469	2,626	1,055	433
2014	1,144	3,391	1,298	304	139
2015	616	1,338	511	127	74
2016	213	716	307	71	50
2017	208	1,084	364	71	45

Table 22. -- Time series of abundance estimates (in millions) for hair crab (*Erimacrus isenbeckii*) by size category (CL) and sex from National Marine Fisheries Service bottom trawl surveys, all Districts combined. The 95% confidence intervals (CI) are 1.96 SE.

Year	Sublegal males < 83 mm	Legal males ≥ 83 mm	Legal males ± CI	Total female	Total female ± CI
1980	3.0	20.8	15.2	4.8	7.8
1981	0.5	12.2	4.5	0.5	0.3
1982	0.6	8.4	4.9	0.4	0.2
1983	0.3	5.3	1.7	0.9	0.5
1984	1.1	3.8	1.3	0.4	0.3
1985	0.3	2.5	1.3	0.3	0.2
1986	0.7	1.9	1.0	0.4	0.3
1987	1.6	1.4	0.7	0.9	0.4
1988	3.9	0.8	0.4	0.9	0.7
1989	12.6	0.5	0.3	0.1	0.1
1990	10.1	1.2	0.8	1.0	0.6
1991	4.8	1.3	0.7	1.2	0.7
1992	2.5	1.1	0.6	0.5	0.4
1993	3.8	3.9	2.6	1.3	1.0
1994	5.0	4.0	2.1	1.3	1.1
1995	5.0	6.6	4.3	0.7	0.3
1996	3.6	5.1	2.7	1.0	0.5
1997	1.7	4.6	1.8	0.4	0.2
1998	0.6	2.9	1.1	1.3	0.8
1999	0.6	2.4	0.7	1.2	0.4
2000	0.5	4.1	1.7	1.2	0.7
2001	0.5	1.8	0.7	2.2	1.0
2002	0.3	2.0	0.8	0.5	0.3
2003	1.3	0.9	0.4	0.5	0.3
2004	0.6	0.8	0.3	0.3	0.2
2005	1.0	0.3	0.2	0.8	0.5
2006	1.2	1.0	0.7	3.6	4.6
2007	2.3	1.9	0.7	1.3	0.9
2008	2.3	2.2	1.0	1.4	0.6
2009	3.6	3.1	1.1	1.7	0.9
2010	3.3	2.5	1.0	2.2	1.1
2011	6.9	3.5	1.4	1.6	0.6
2012	11.8	4.6	1.8	2.2	0.8
2013	10.3	10.7	4.6	4.0	1.7
2014	3.3	5.4	2.0	1.0	0.4
2015	1.8	2.1	0.8	0.6	0.3
2016	0.6	1.2	0.5	0.3	0.3
2017	0.6	1.6	0.6	0.3	0.2

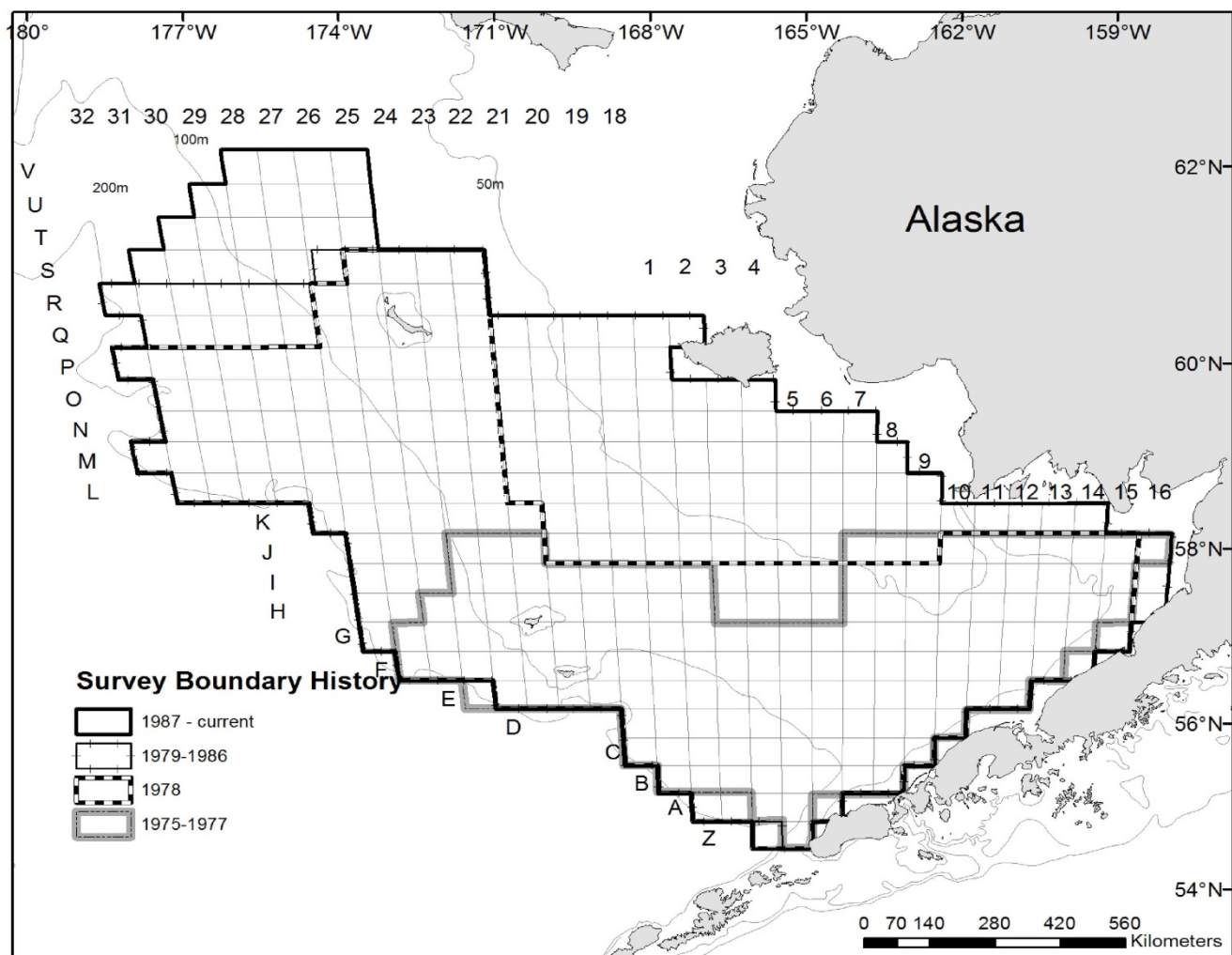


Figure 1. -- National Marine Fisheries Service eastern Bering Sea bottom trawl survey boundary from 1975 to present indicating four major stanzas in total coverage.

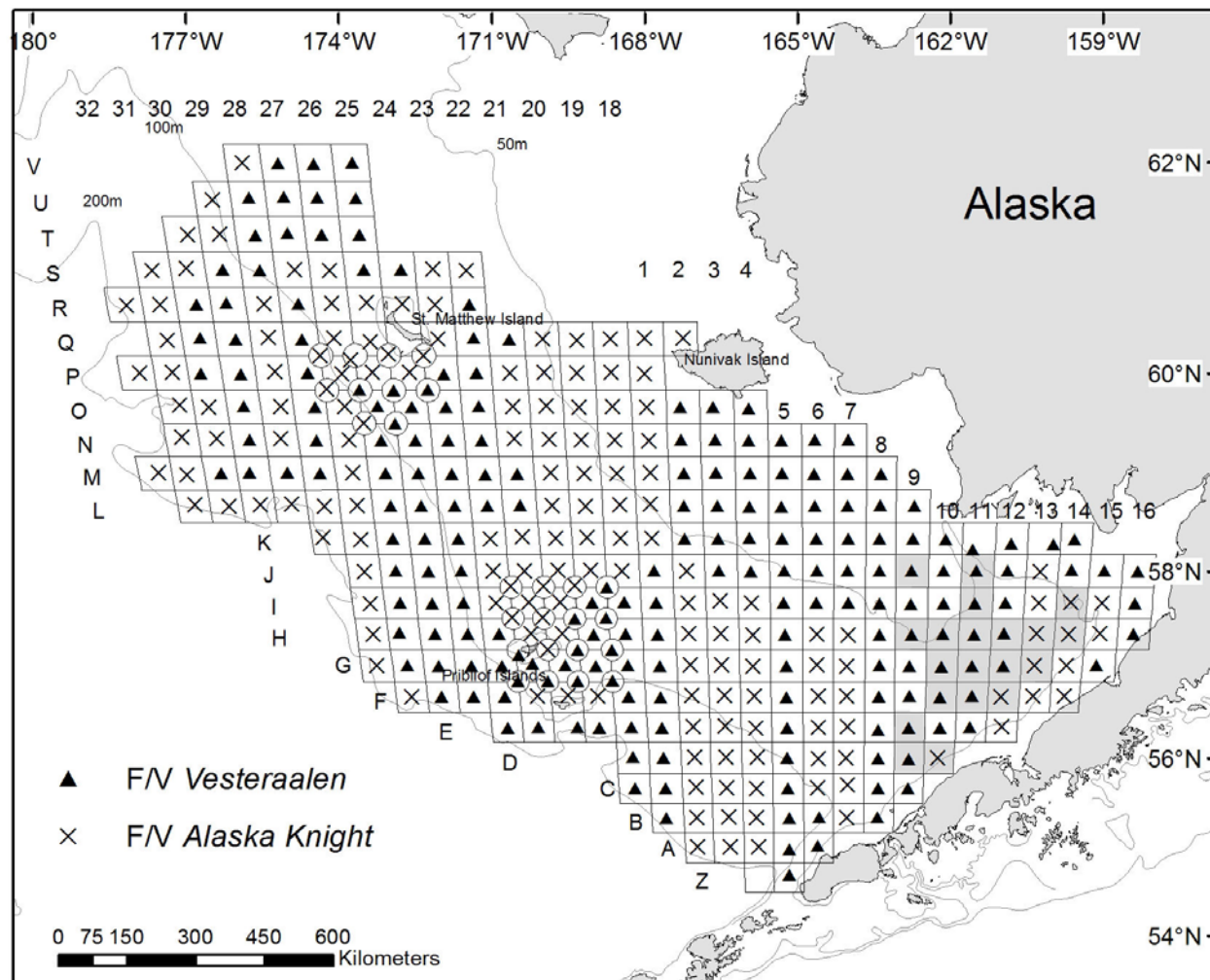


Figure 2. -- National Marine Fisheries Service eastern Bering Sea standard bottom trawl area surveyed by the FV *Alaska Knight* and the FV *Vesteraalen* from 4 June to 31 July 2017. Shaded area depicts Bristol Bay resample stations, 10 August to 15 August 2017.

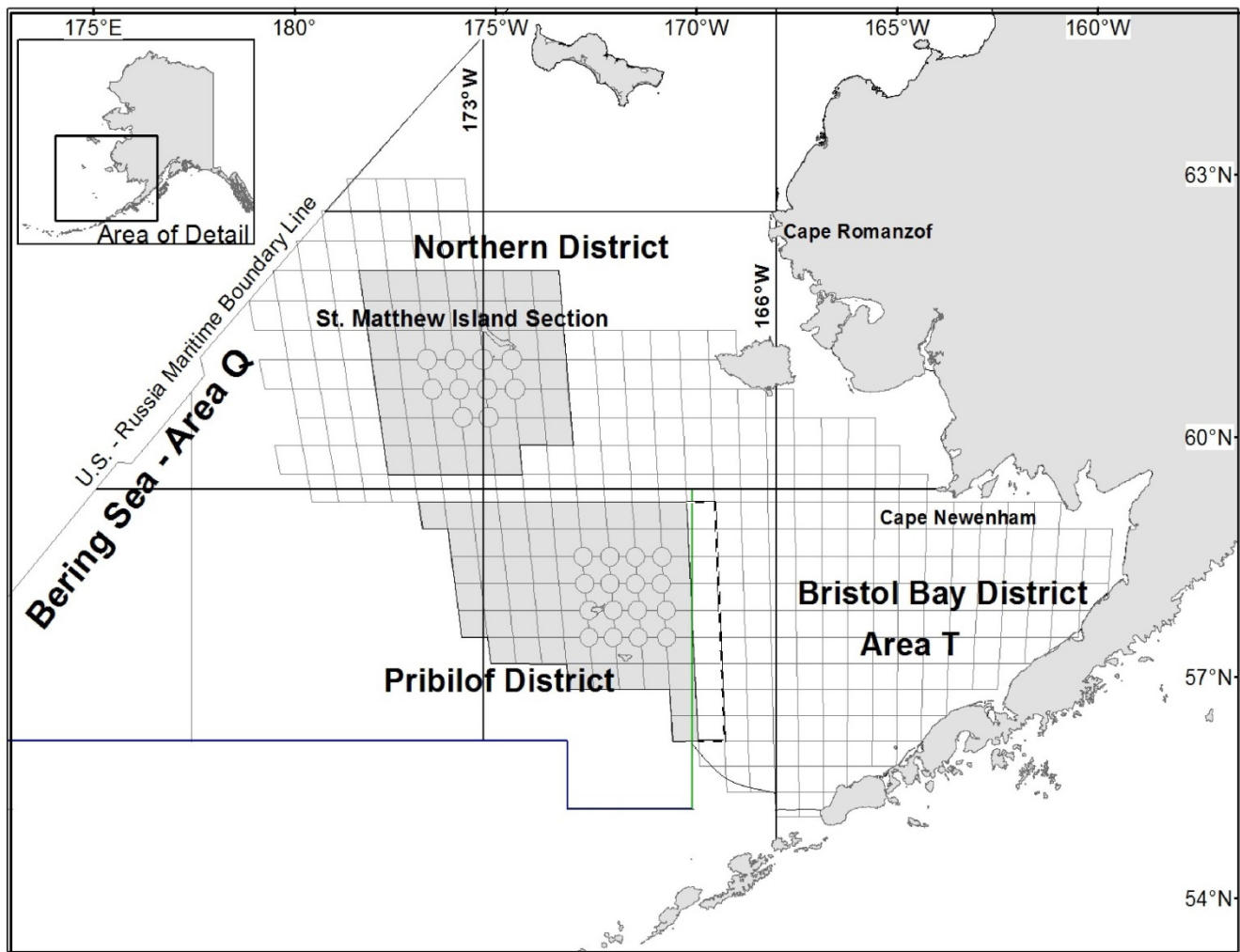


Figure 3. -- Alaska Department of Fish and Game commercial crab management units within the 2017 eastern Bering Sea bottom trawl survey area. Grey areas represent stations included in the Pribilof District (dashed line indicates expanded stock boundary for blue king crab) and St. Matthew Island Section, Northern District sampling strata and circles represent the high-density sampling areas.

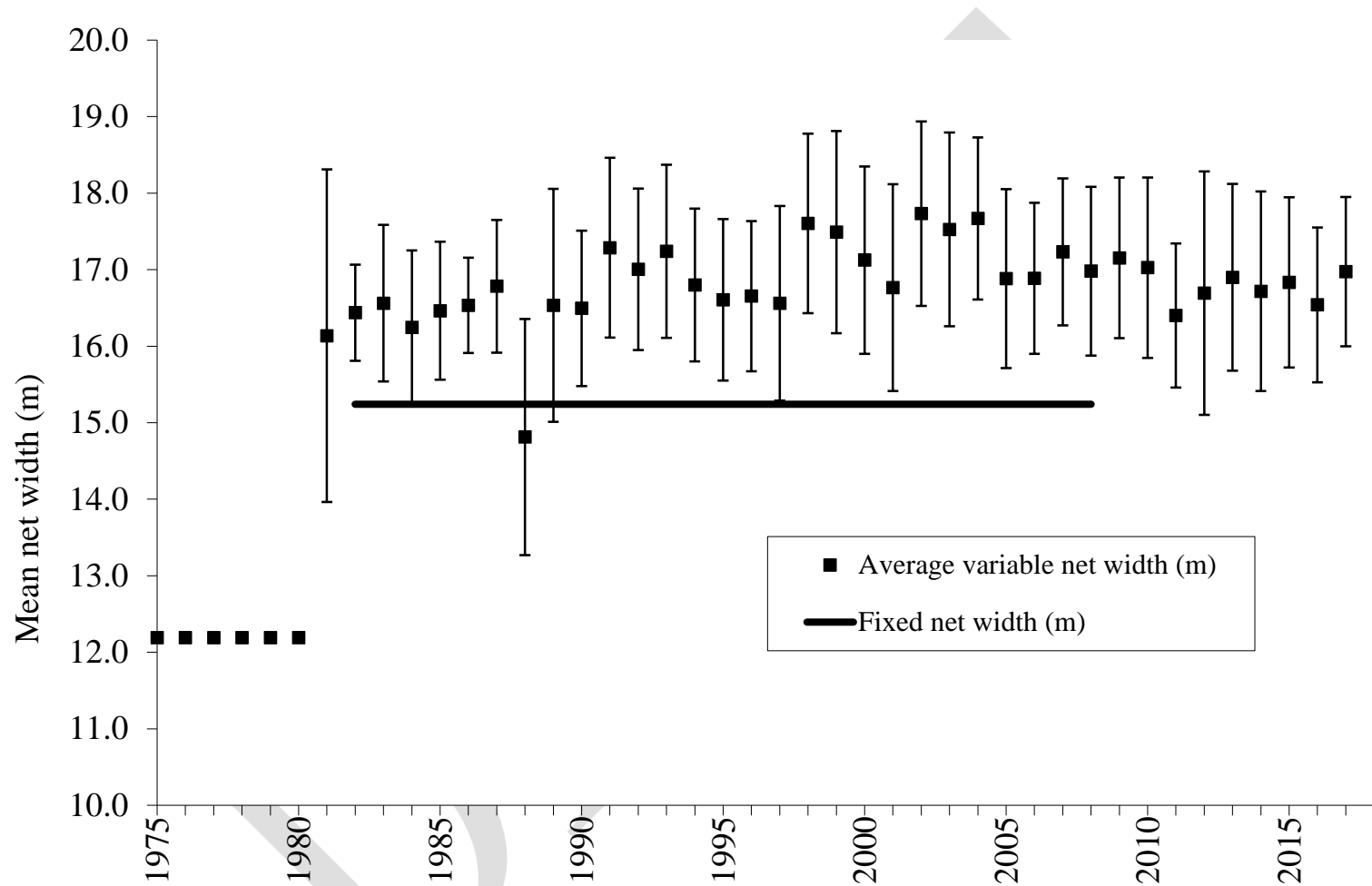


Figure 4. -- Fixed and average variable net widths ( $\pm$  SD) used to calculate area-swept by National Marine Fisheries Service eastern Bering Sea standard bottom trawls from 1975 to the present.

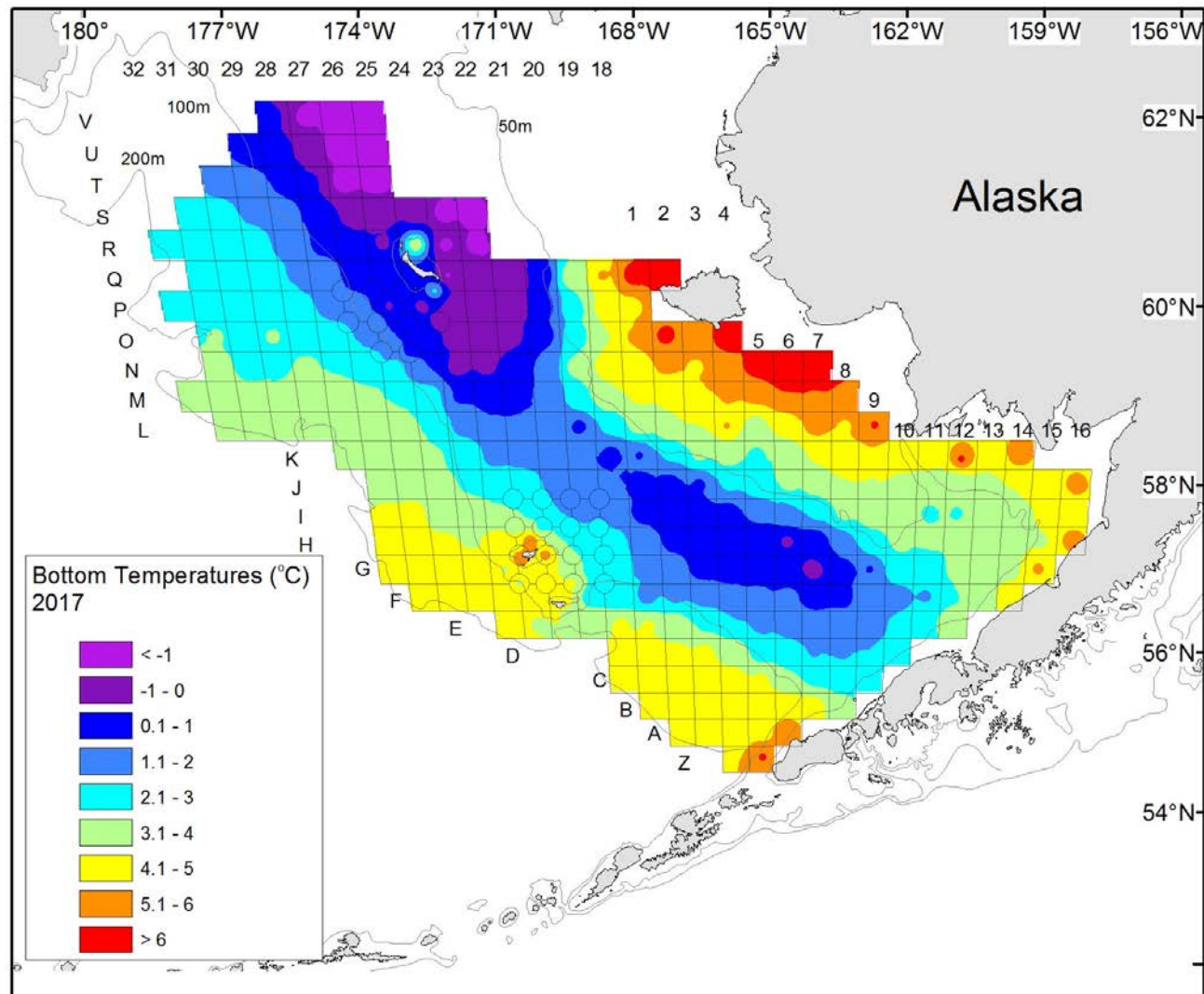


Figure 5. -- Bottom temperatures (°C) measured at stations from the National Marine Fisheries Service eastern Bering Sea bottom trawl survey, beginning 4 June 2017 in Bristol Bay and ending on 31 July 2017 at the western edge of the survey. This figure does not reflect the 20 stations resampled in Bristol Bay from 10 August to 15 August 2017.



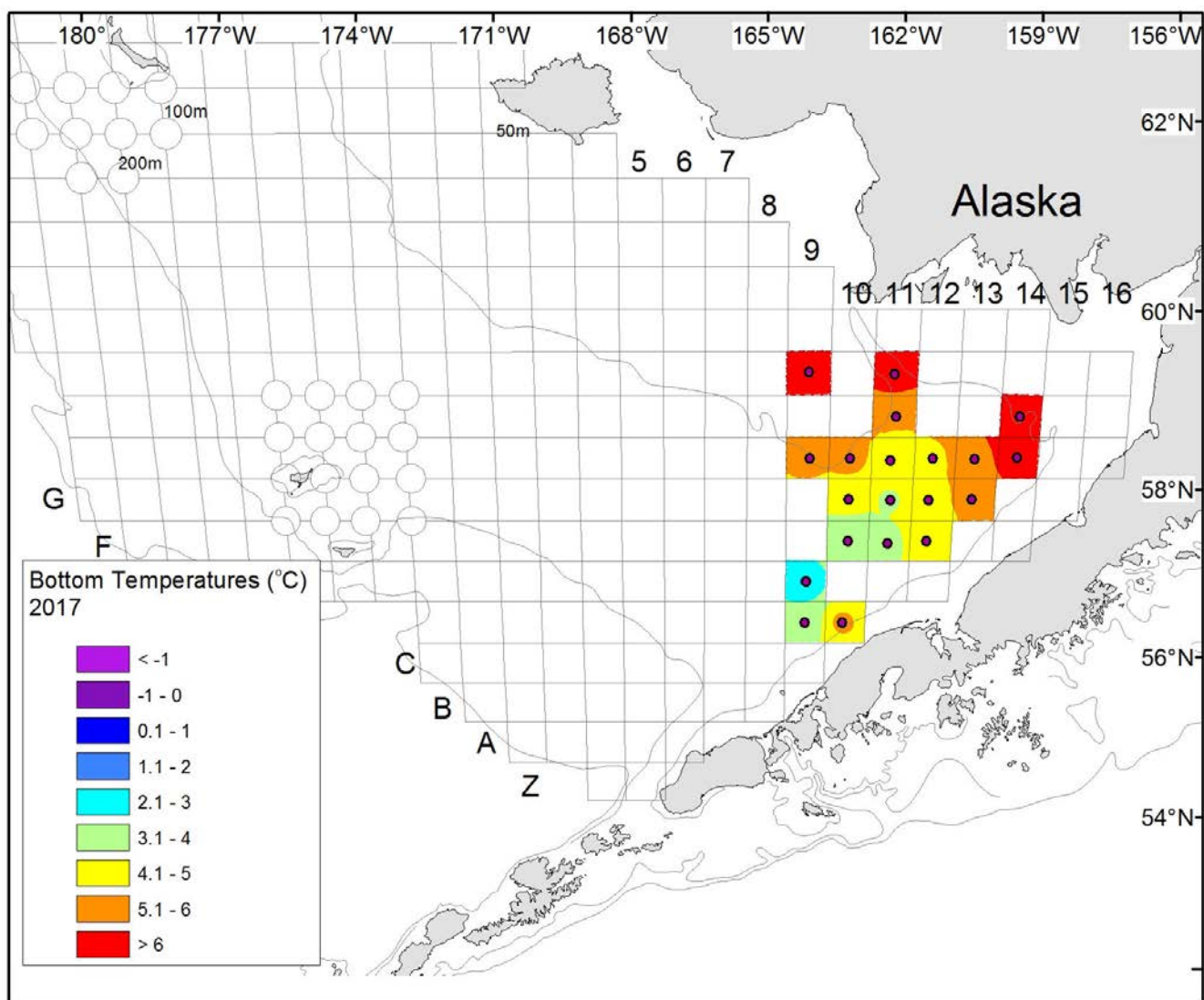


Figure 5a. Bottom temperatures (°C) measured at the 20 resample stations in Bristol Bay, surveyed from 10 August to 15 August 2017.



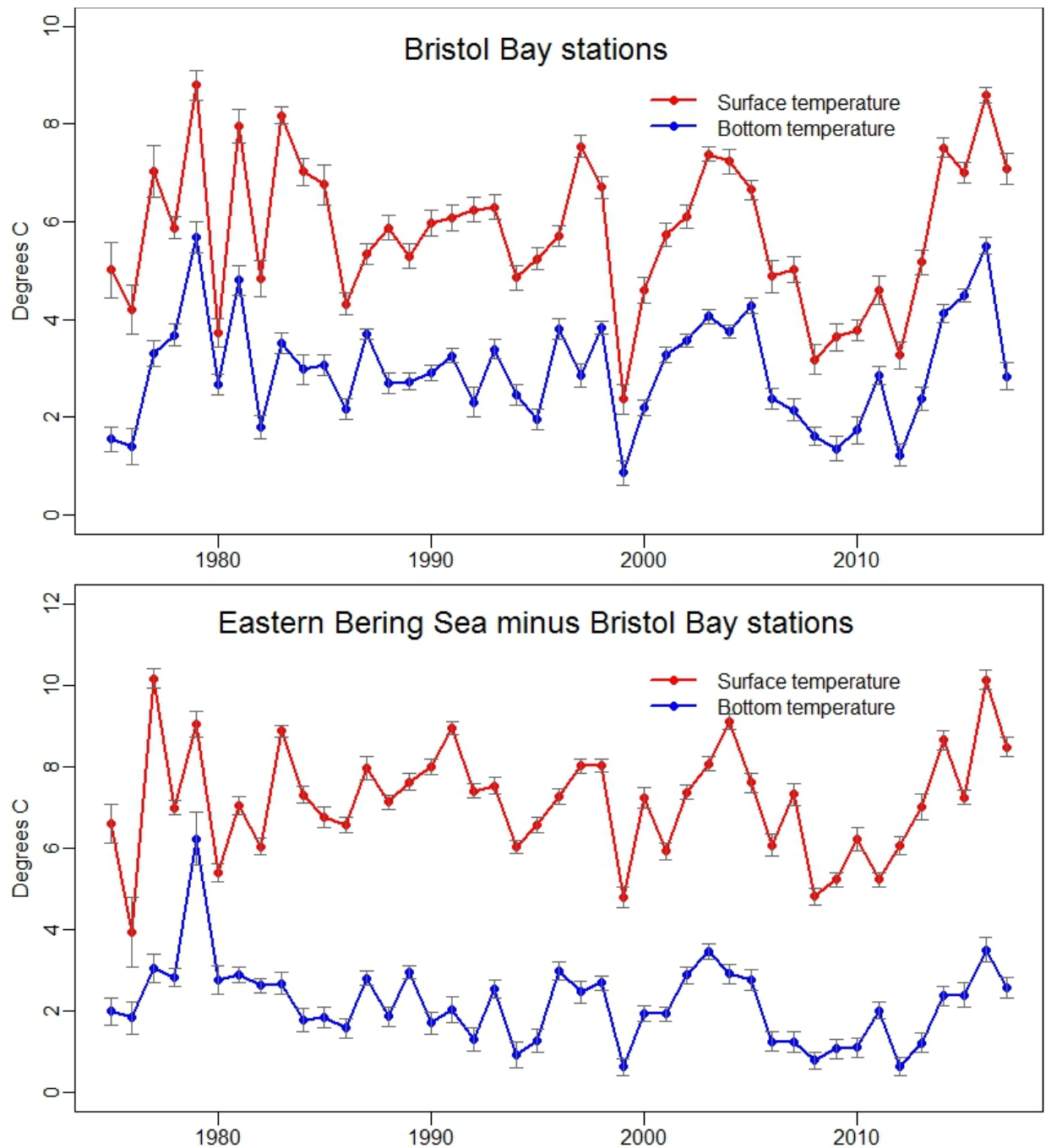


Figure 6. -- Average ( $\pm$  95% CI) bottom (blue) and surface (red) temperatures for Bristol Bay (standard) stations and the rest of the eastern Bering Sea during the National Marine Fisheries Service's eastern Bering Sea bottom trawl survey. The number of stations used to calculate averages was inconsistent among years, particularly as the survey boundary expanded from 1975 to 1987.

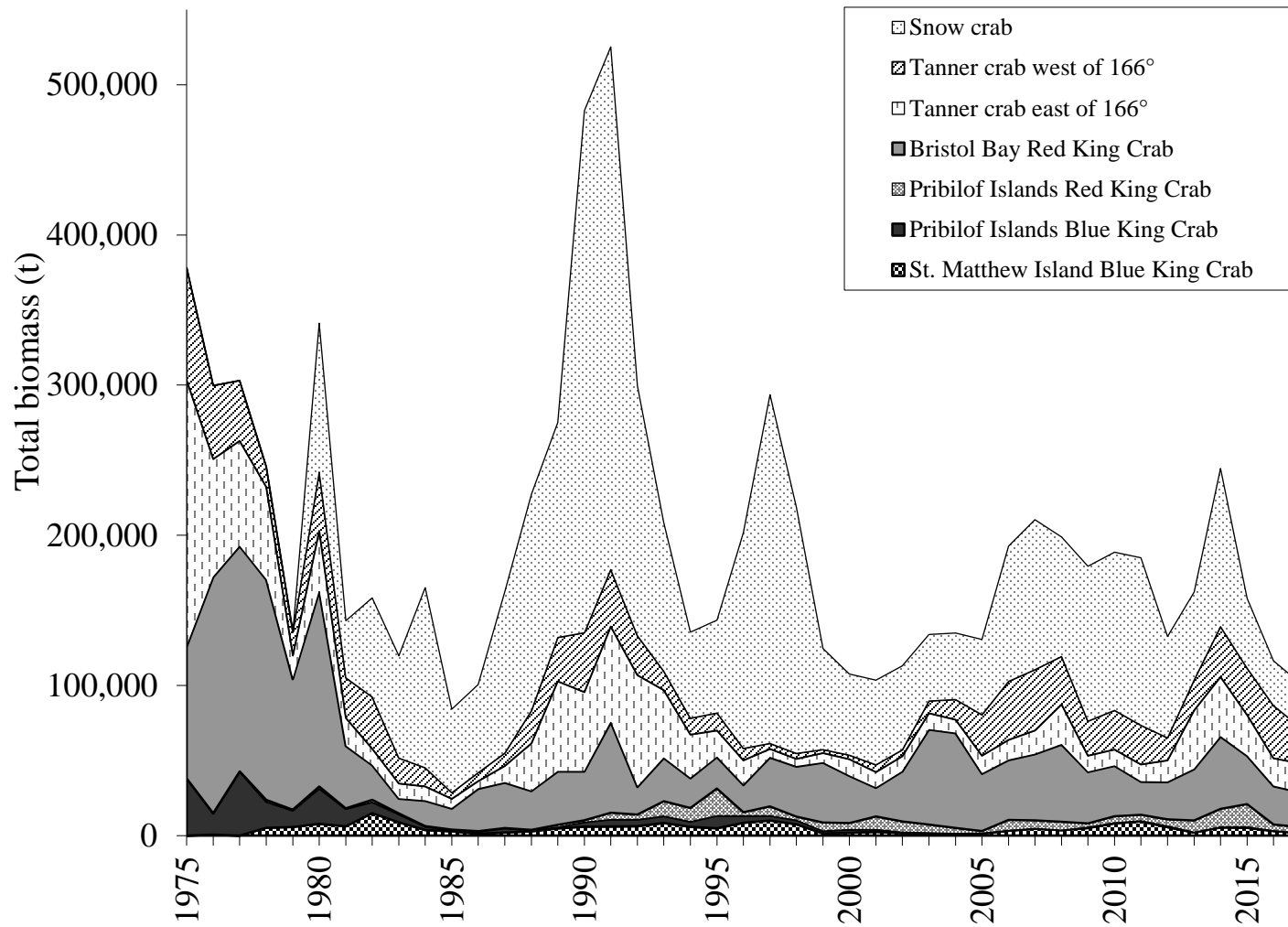


Figure 7. -- Historical mature male biomass (t) for six commercial species caught on National Marine Fisheries Service eastern Bering Sea bottom trawl surveys.

## Mature Males

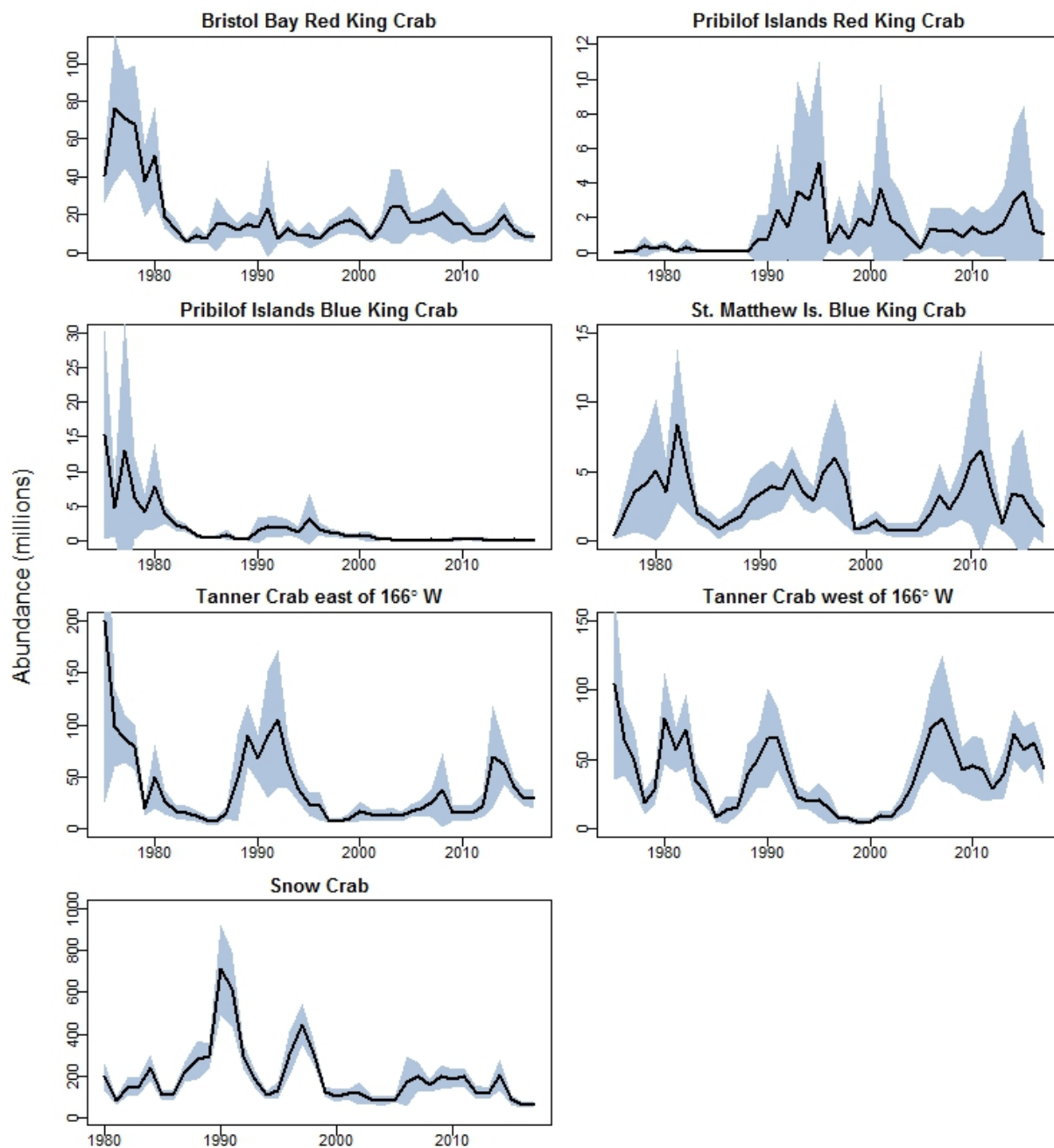


Figure 8. -- Historical mature male abundance (millions, gray area indicates  $\pm$  95% CI) for six commercial species caught on the National Marine Fisheries Service eastern Bering Sea bottom trawl surveys (1975-2017).

## Mature Males

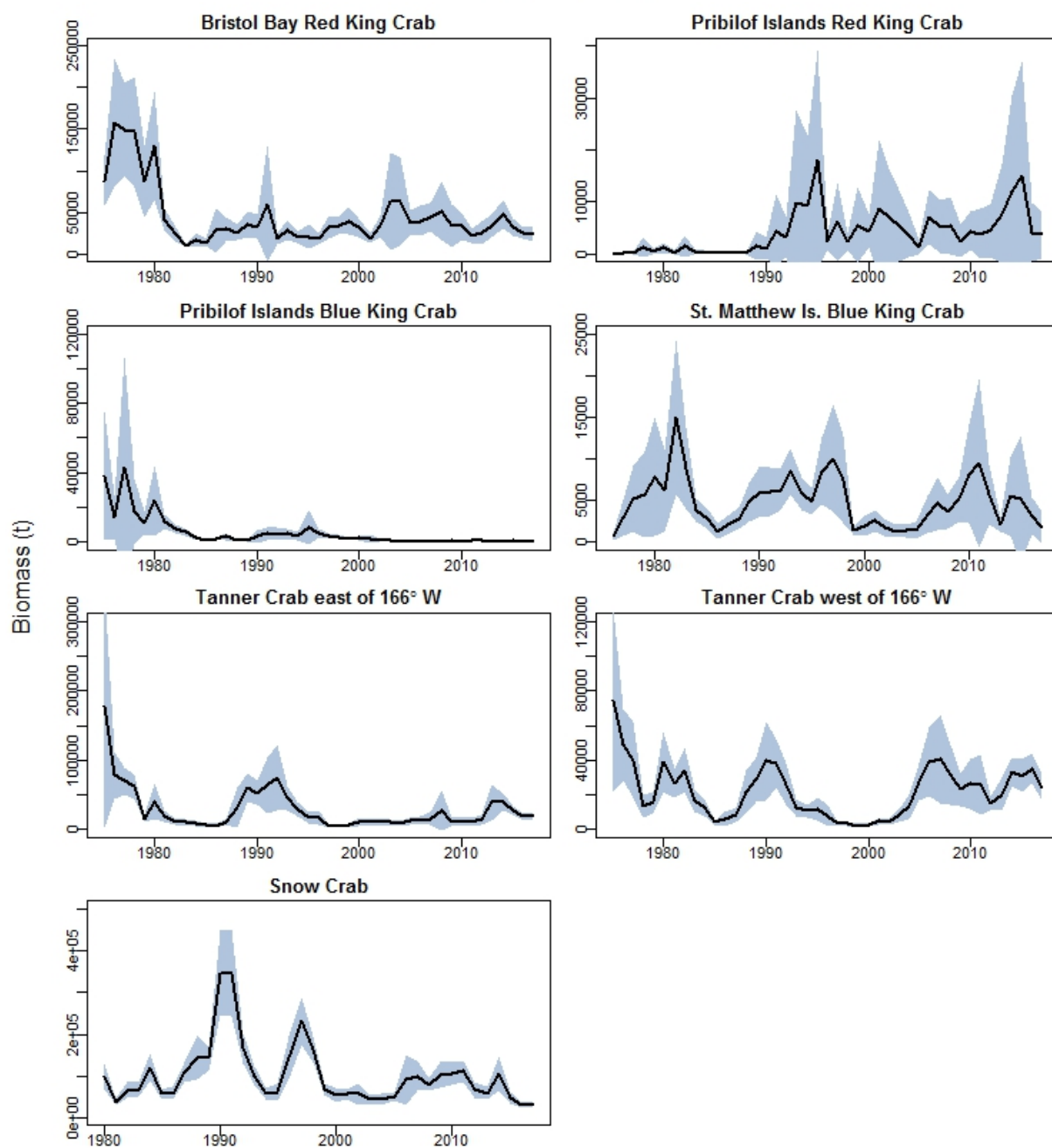


Figure 9. -- Historical mature male biomass (t, gray area indicates  $\pm 95\%$  CI) for six commercial species caught on the National Marine Fisheries Service eastern Bering Sea bottom trawl surveys (1975-2017).

## Mature Females

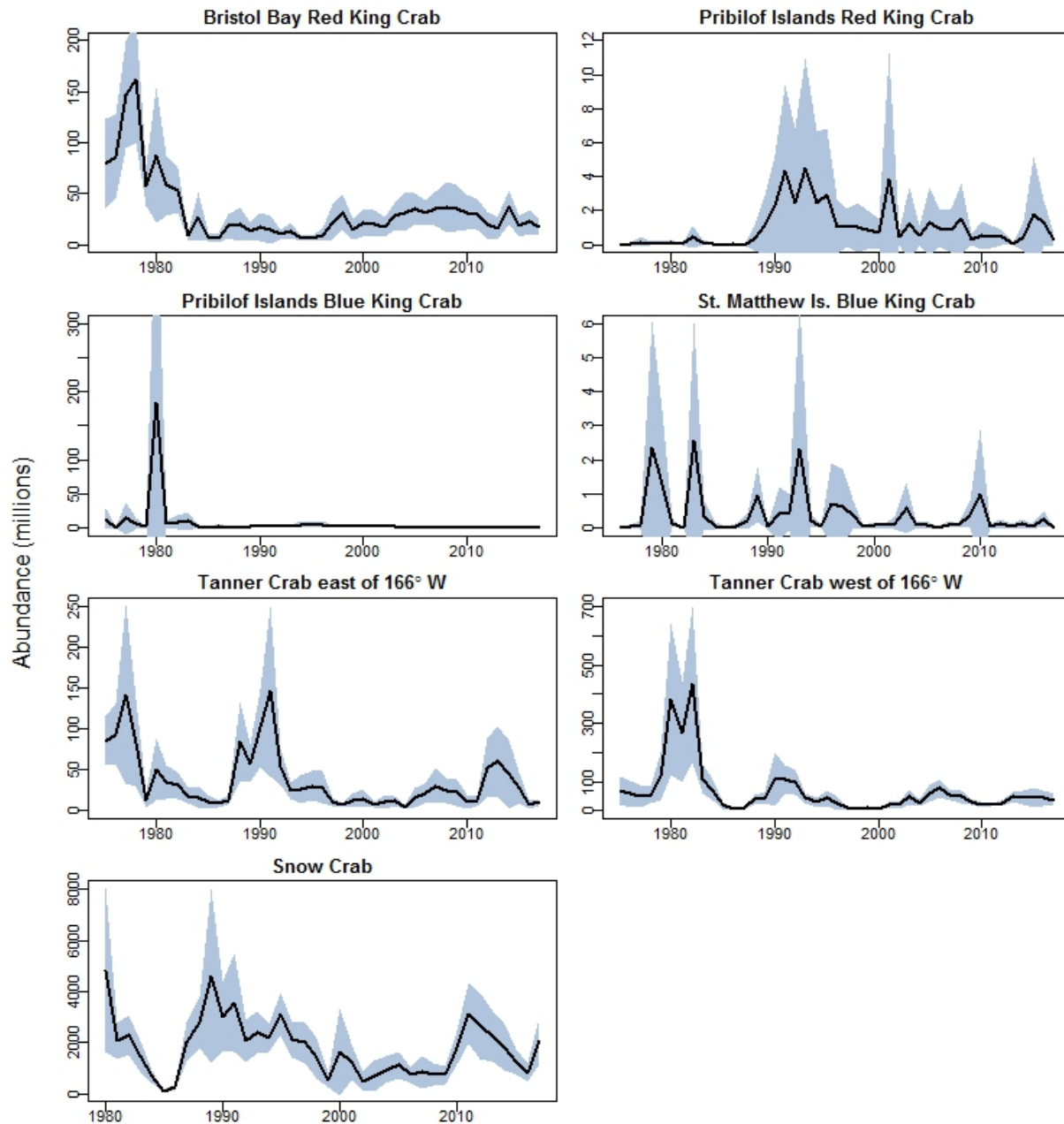


Figure 10. -- Historical mature female abundance (millions, gray area indicates  $\pm 95\%$  CI) for six commercial species caught on the National Marine Fisheries Service eastern Bering Sea bottom trawl survey (1975-2017). Abundance was calculated using actual maturity (abdominal flap morphology and clutch fullness index) as opposed to the size cut-off method used for males.

## Mature Females

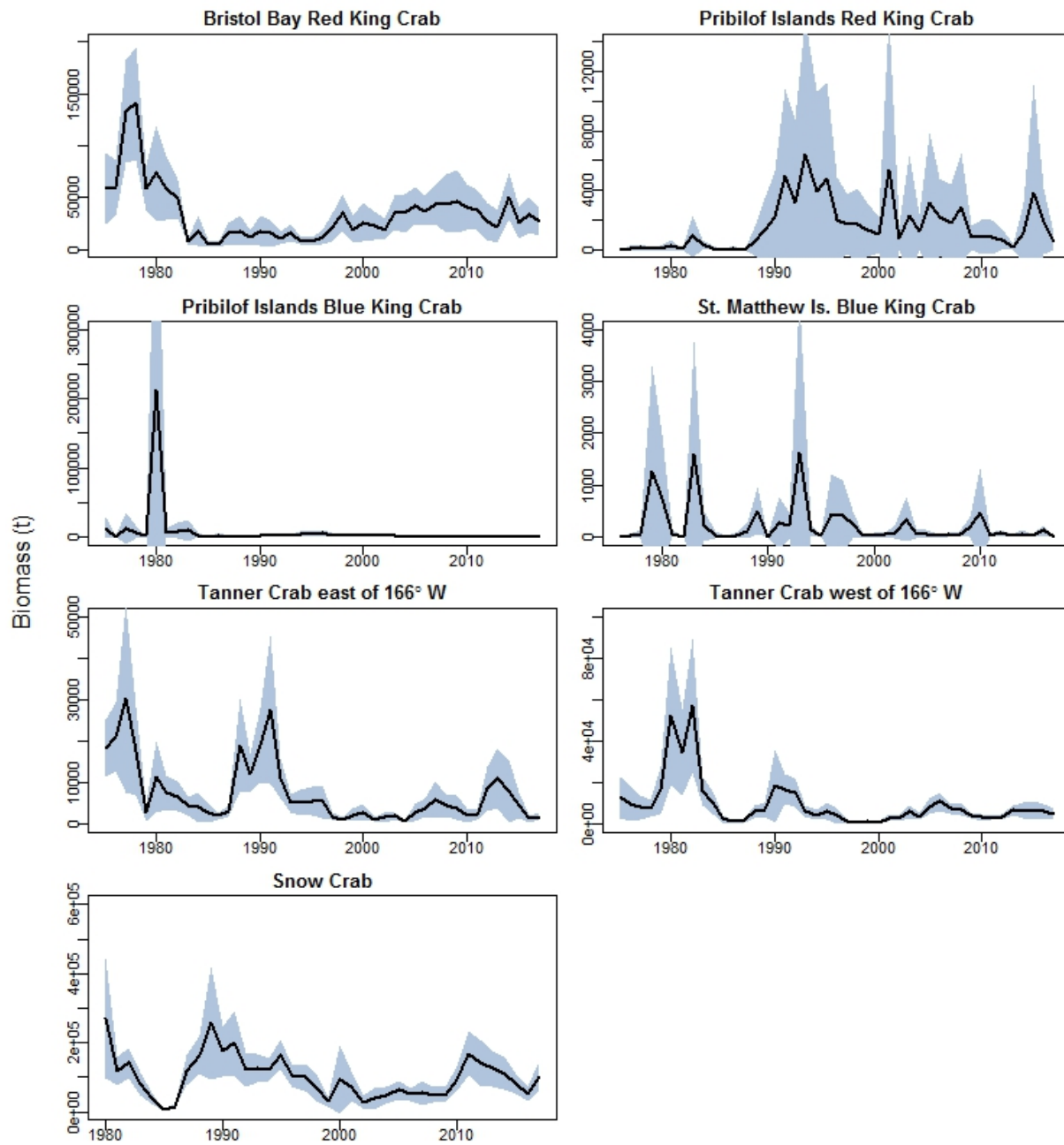


Figure 11 -- Historical mature female biomass (t, gray area indicates  $\pm 95\%$  CI) for six commercial species caught on the National Marine Fisheries Service eastern Bering Sea bottom trawl survey (1975-2017). Biomass was calculated using actual maturity (abdominal flap morphology and clutch fullness index), as opposed to the size cut-off method used for males.

## Pre-recruit (P1) Males

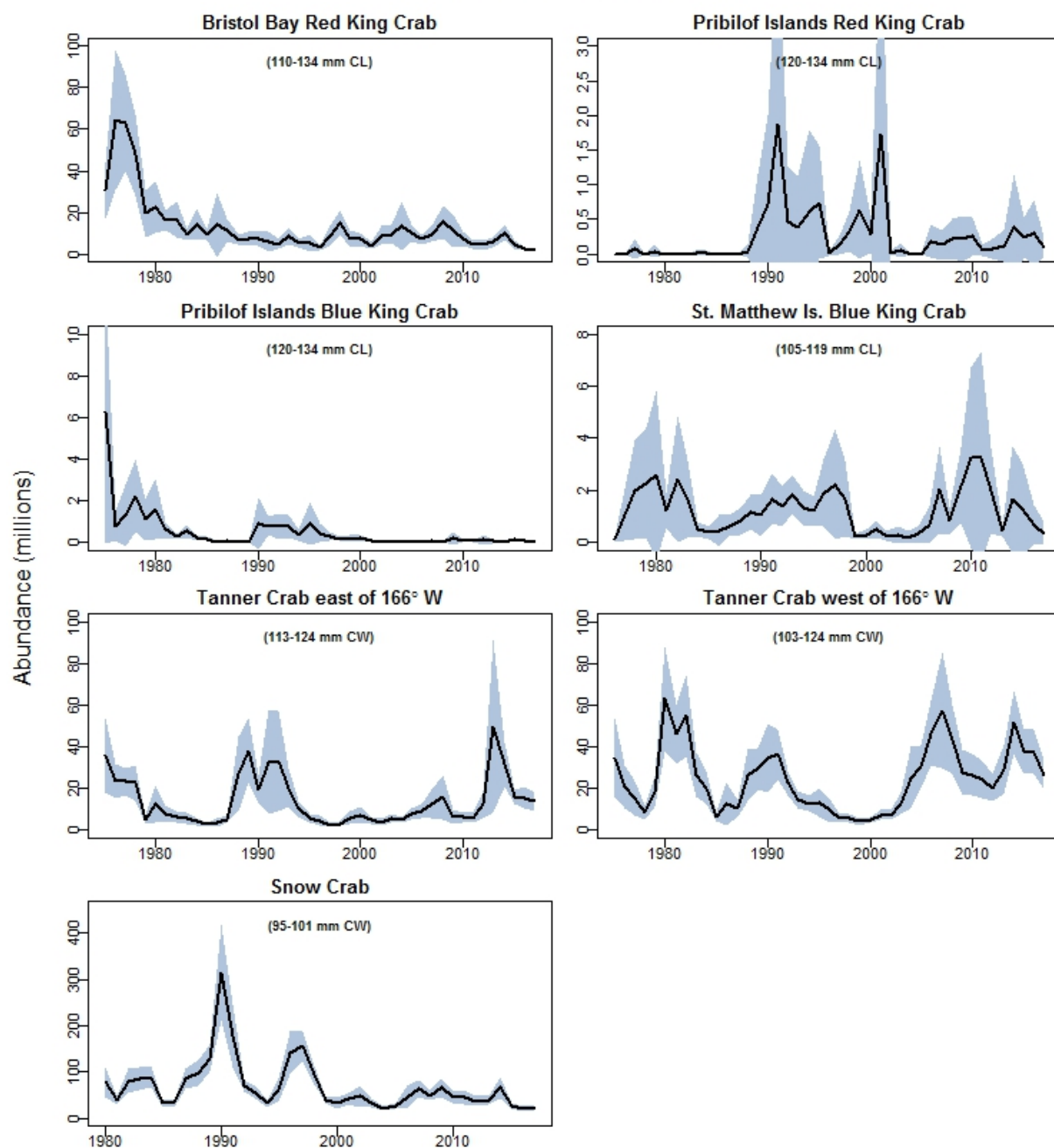


Figure 12. -- Historical abundance (millions, gray area indicates  $\pm$  95% CI) of pre-recruit (P1) males for six commercial species caught on the National Marine Fisheries Service eastern Bering Sea bottom trawl survey (1975-2017).



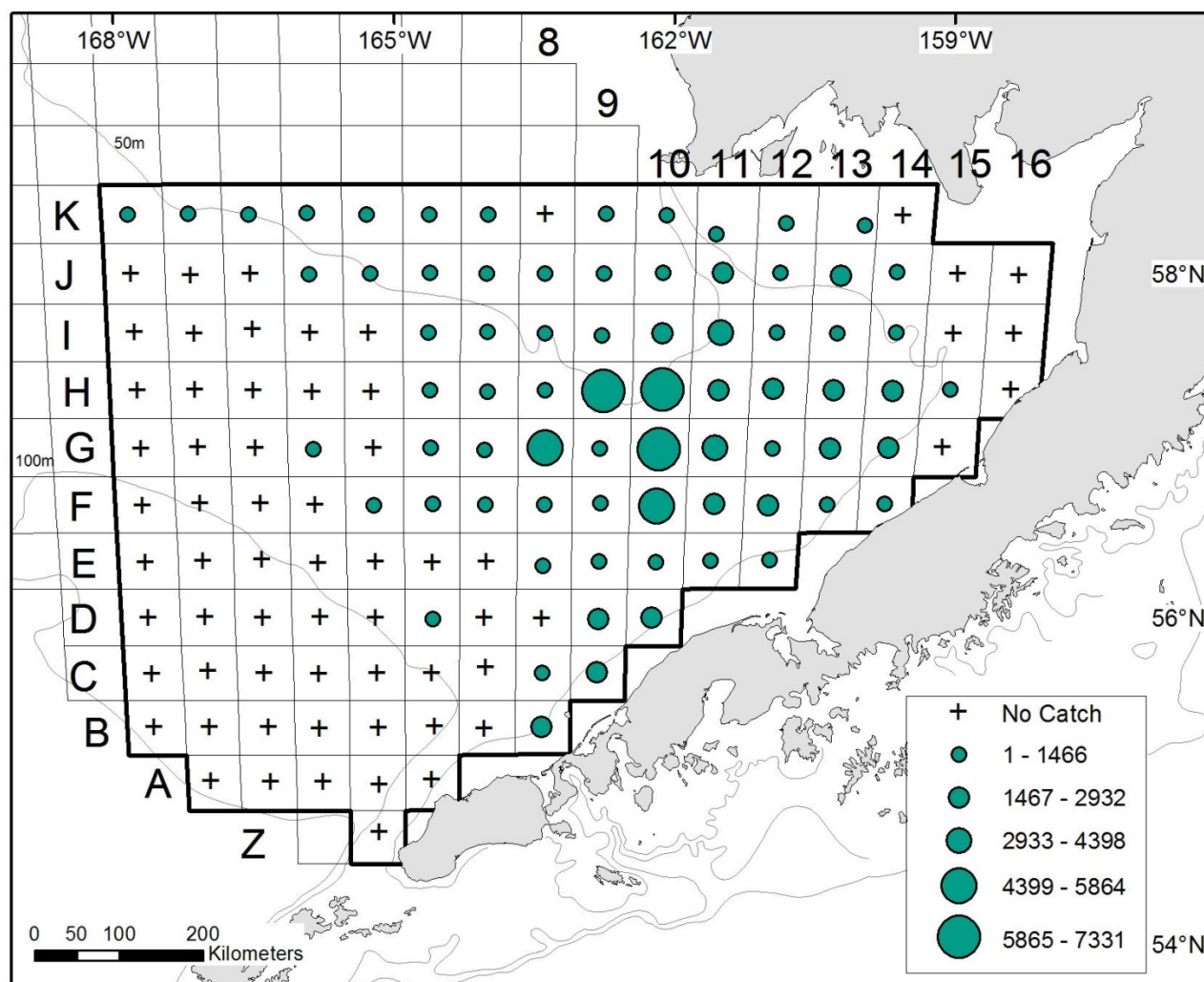


Figure 13. -- Total density (number  $\text{nmi}^{-2}$ ) of male and female red king crab (*Paralithodes camtschaticus*) at each station sampled in the 2017 Bristol Bay District from standard leg 1 stations. Data depicted by circles are equal interval densities. Outlined area depicts the management district.



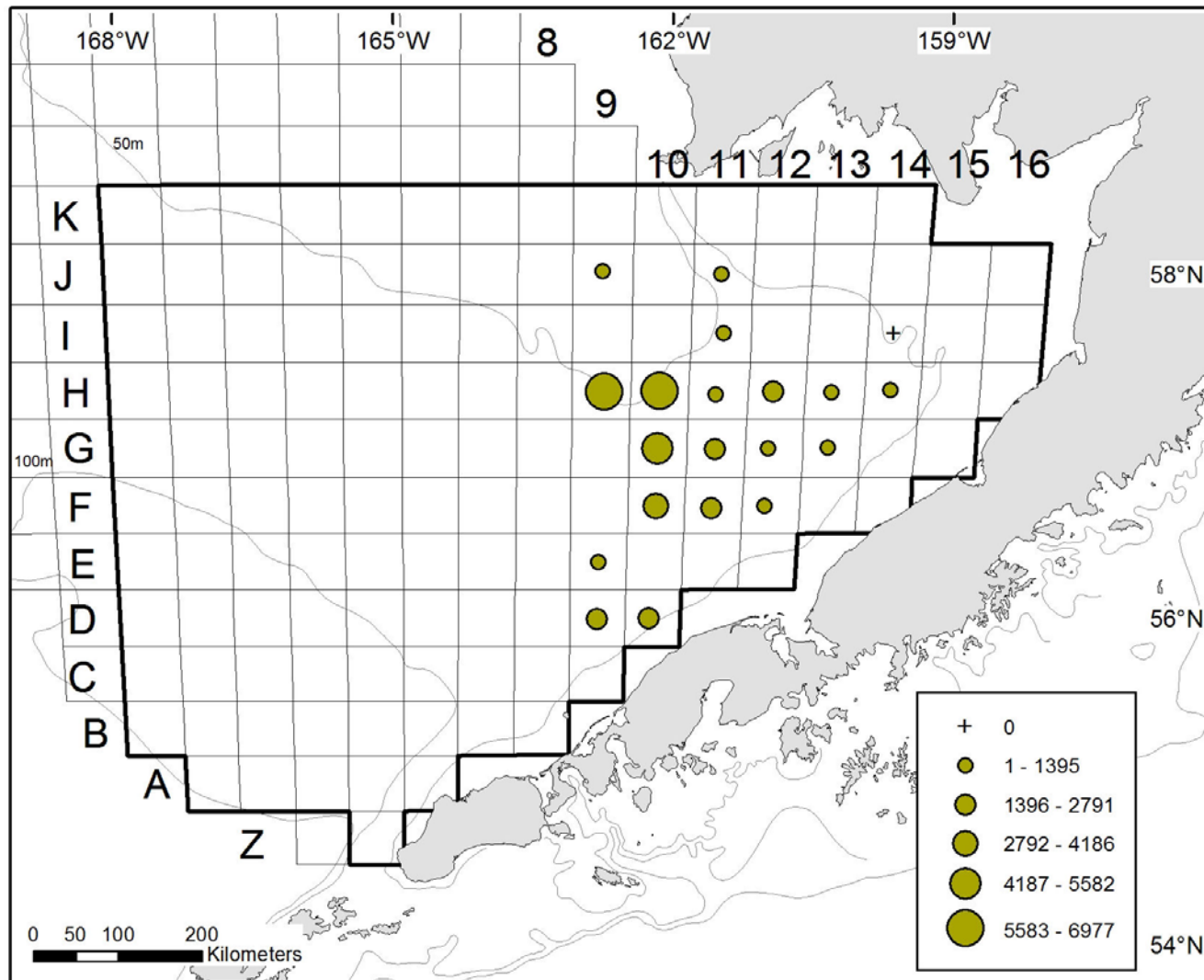


Figure 13a. -- Total density (number  $\text{nmi}^{-2}$ ) of female red king crab (*Paralithodes camtschaticus*) at 20 retow stations in August 2017  
Data depicted by circles are equal interval densities. Outlined area depicts the management district.

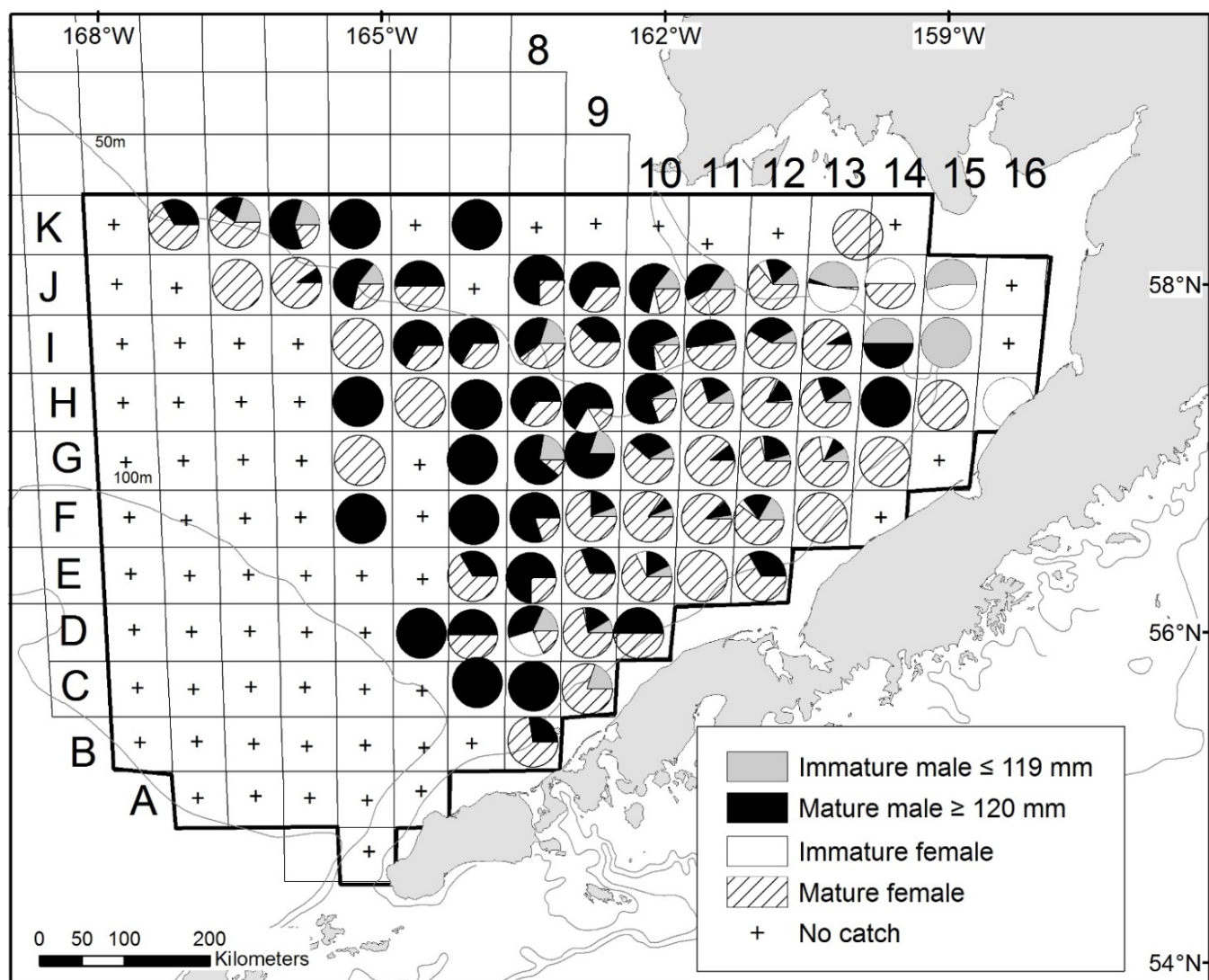


Figure 14. -- Percentage of male and female red king crab (*Paralithodes camtschaticus*) maturity classes caught at each station sampled in the 2017 Bristol Bay District from standard leg 1 stations. Outlined area depicts the management.

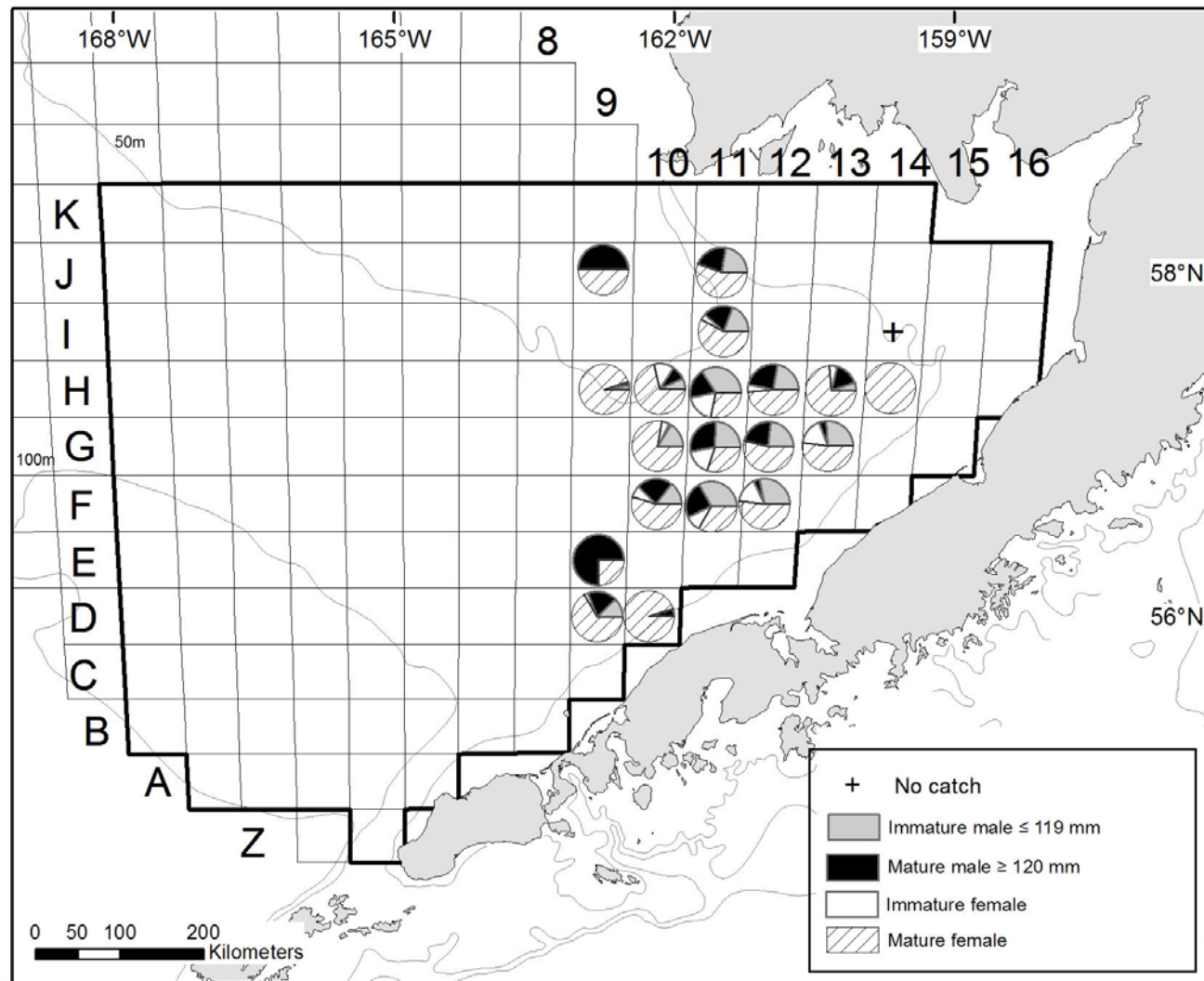


Figure 14a. -- Percentage of female red king crab (*Paralithodes camtschaticus*) maturity classes caught at 20 retow stations in August 2017. Outlined area depicts the management.

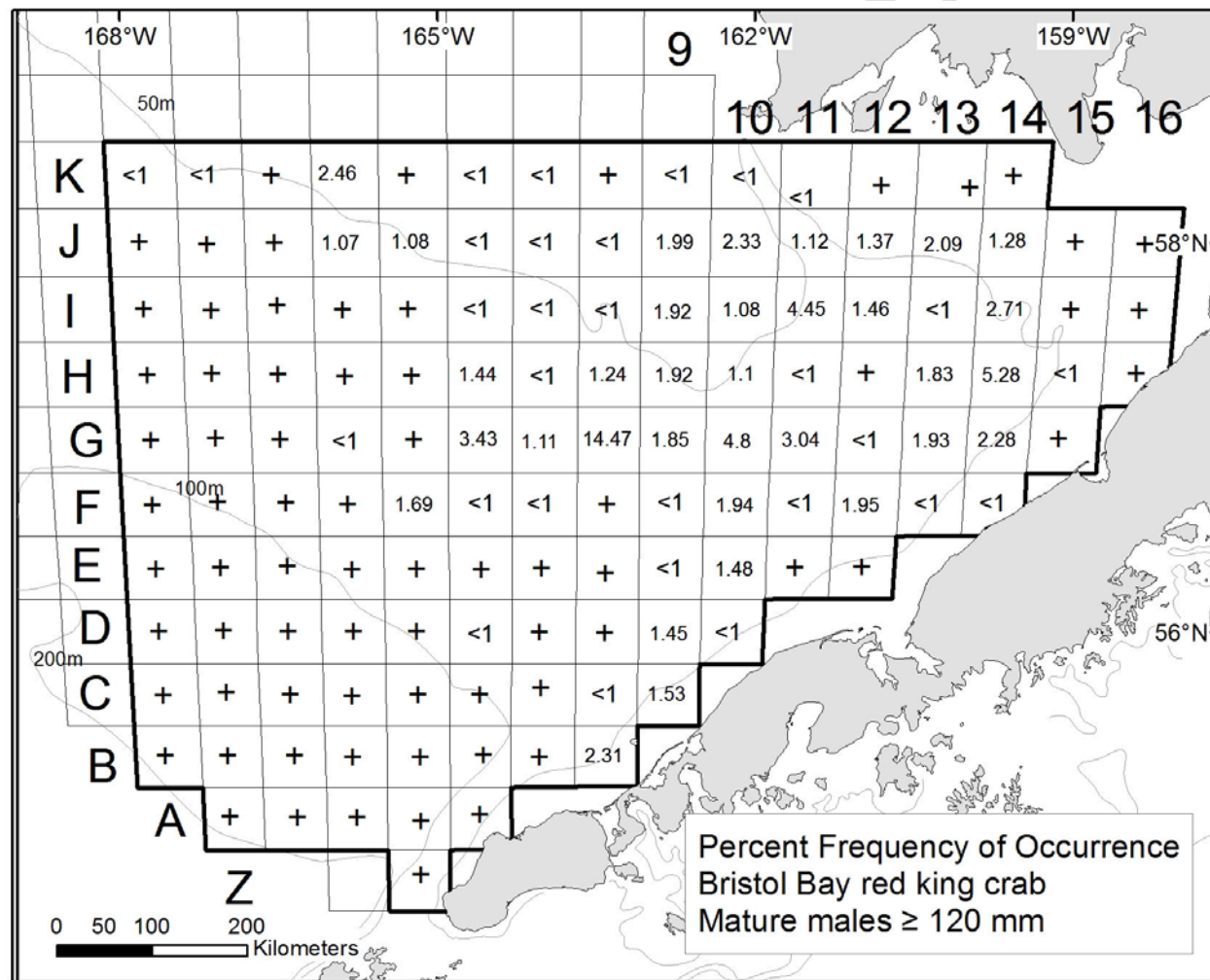


Figure 15. -- Percent frequency of occurrence of mature male red king crab (*Paralithodes camtschaticus*) at stations sampled in the 2017 Bristol Bay District. Outlined area depicts the management district.

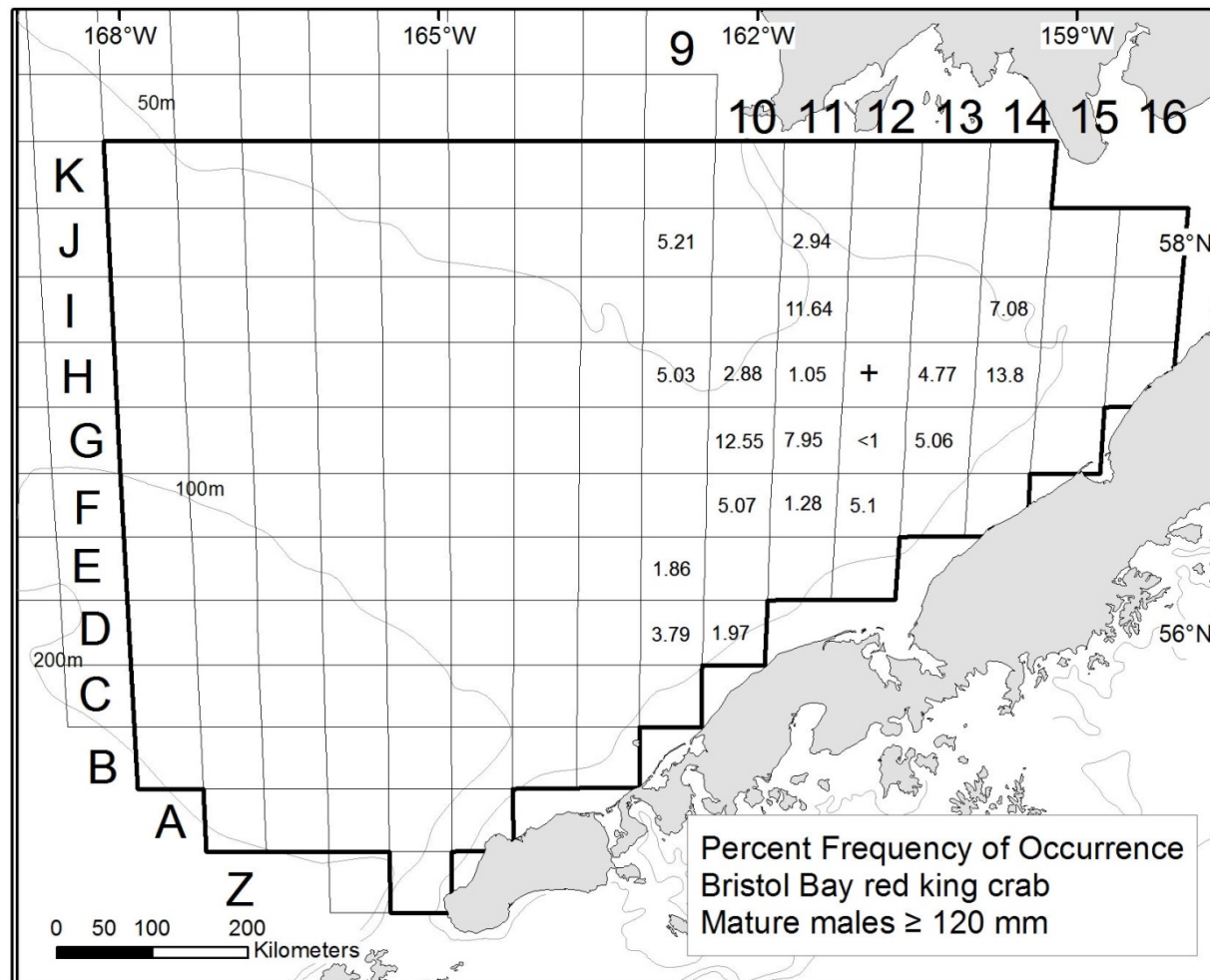


Figure 15a. -- Percent frequency of occurrence of mature male red king crab (*Paralithodes camtschaticus*) at stations sampled during standard survey (June 2017) in Bristol Bay District. The 20 stations were retowed in August 2017.

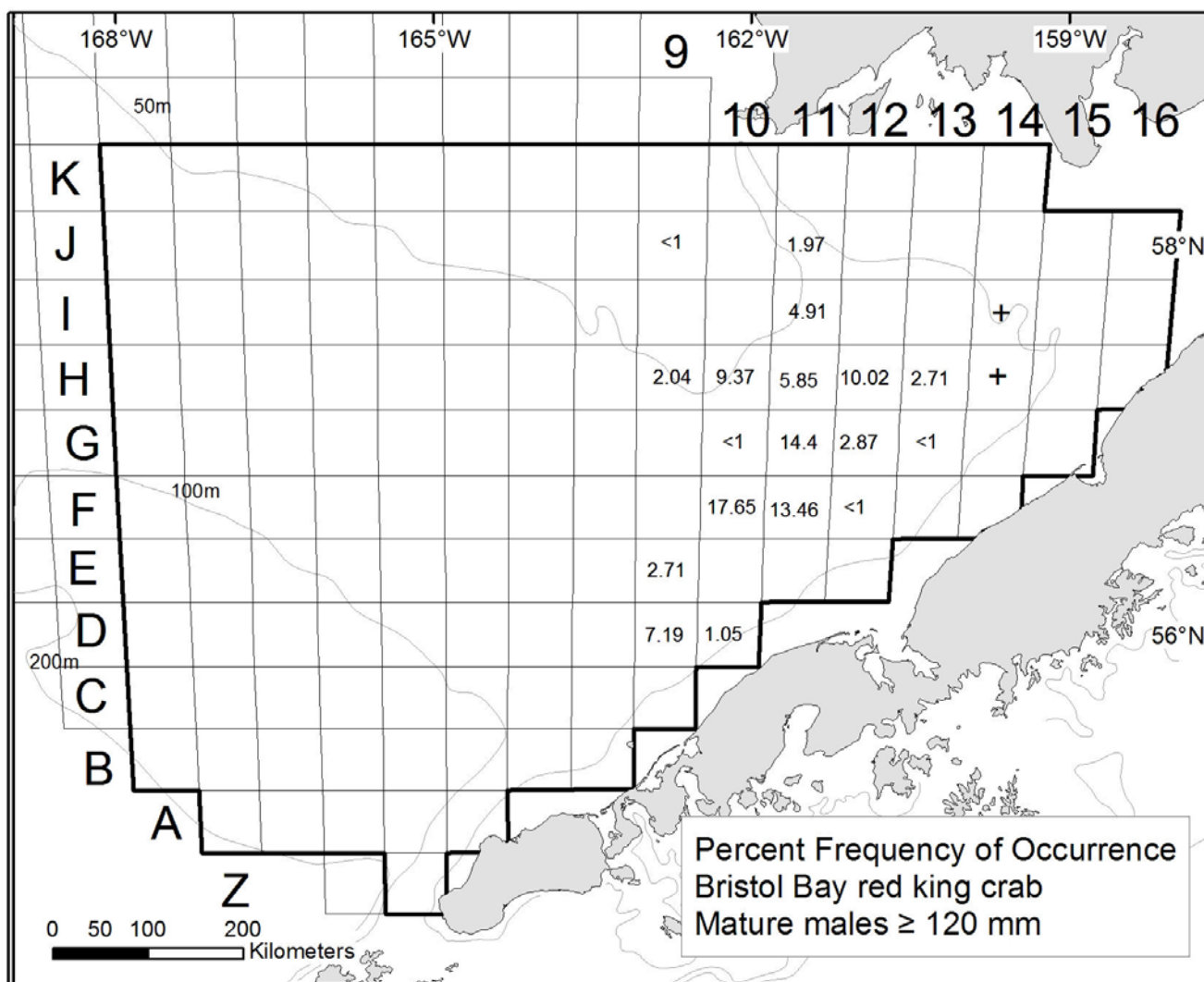


Figure 15b. -- Percent frequency of occurrence of mature male red king crab (*Paralithodes camtschaticus*) at stations sampled during retow of 20 Bristol Bay District stations (August 2017).



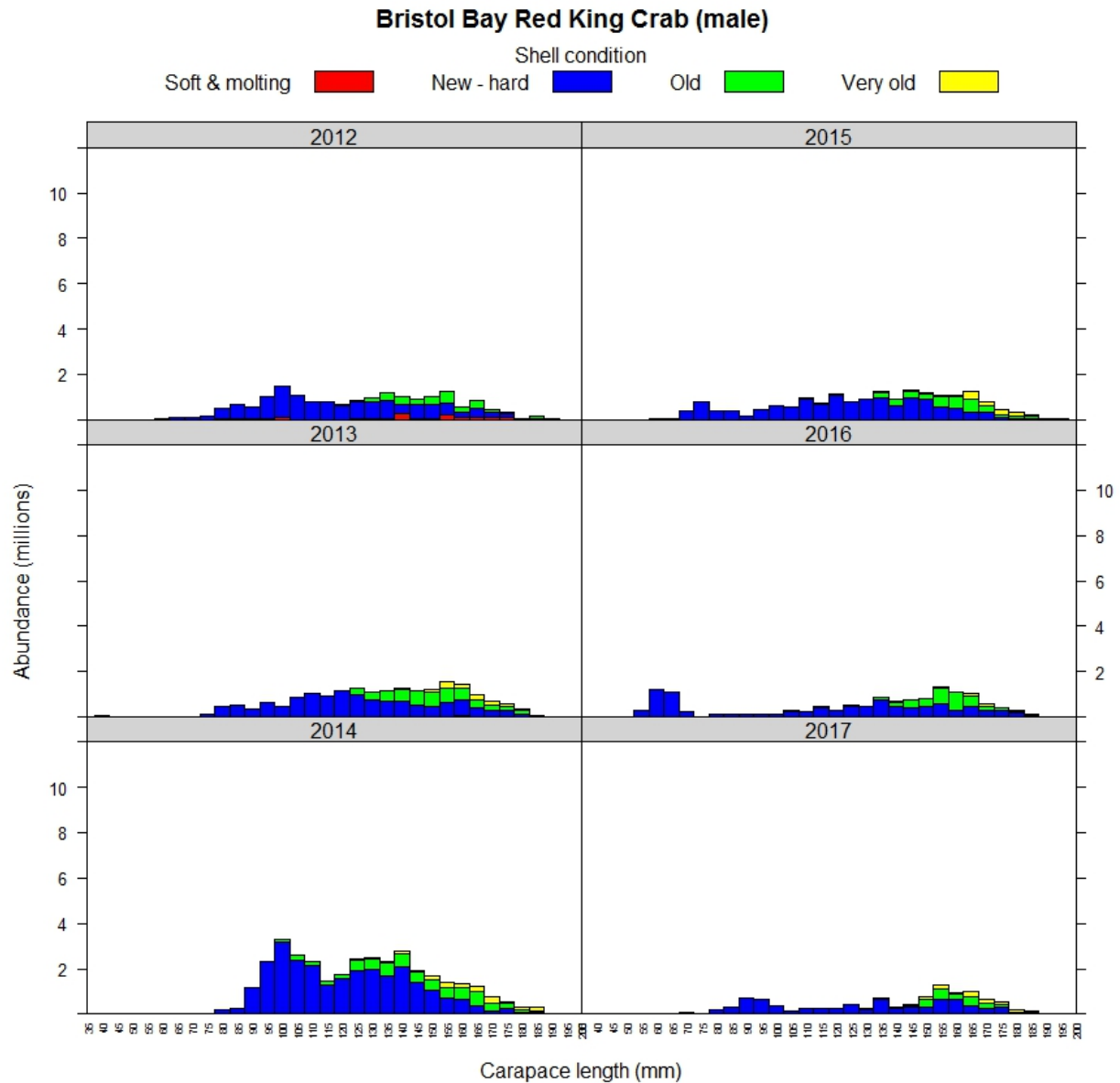


Figure 16. -- Size frequency by shell condition of Bristol Bay District male red king crab (*Paralithodes camtschaticus*) by 5 mm length classes, 2012-2016.

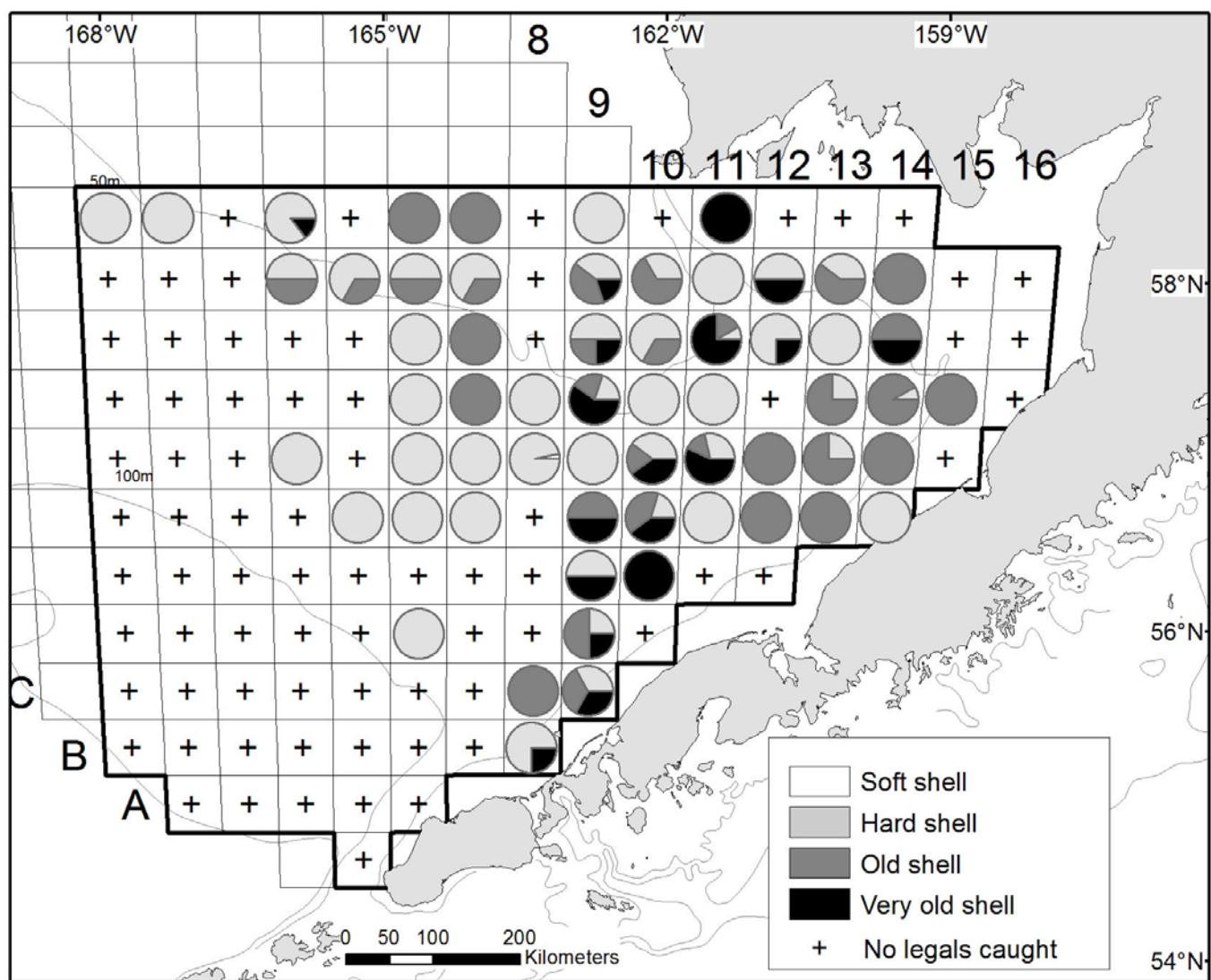


Figure 17. -- Distribution of legal-sized male red king crab (*Paralithodes camtschaticus*) caught at each station in the 2017 Bristol Bay District distinguished by shell condition. The outlined area depicts management district.



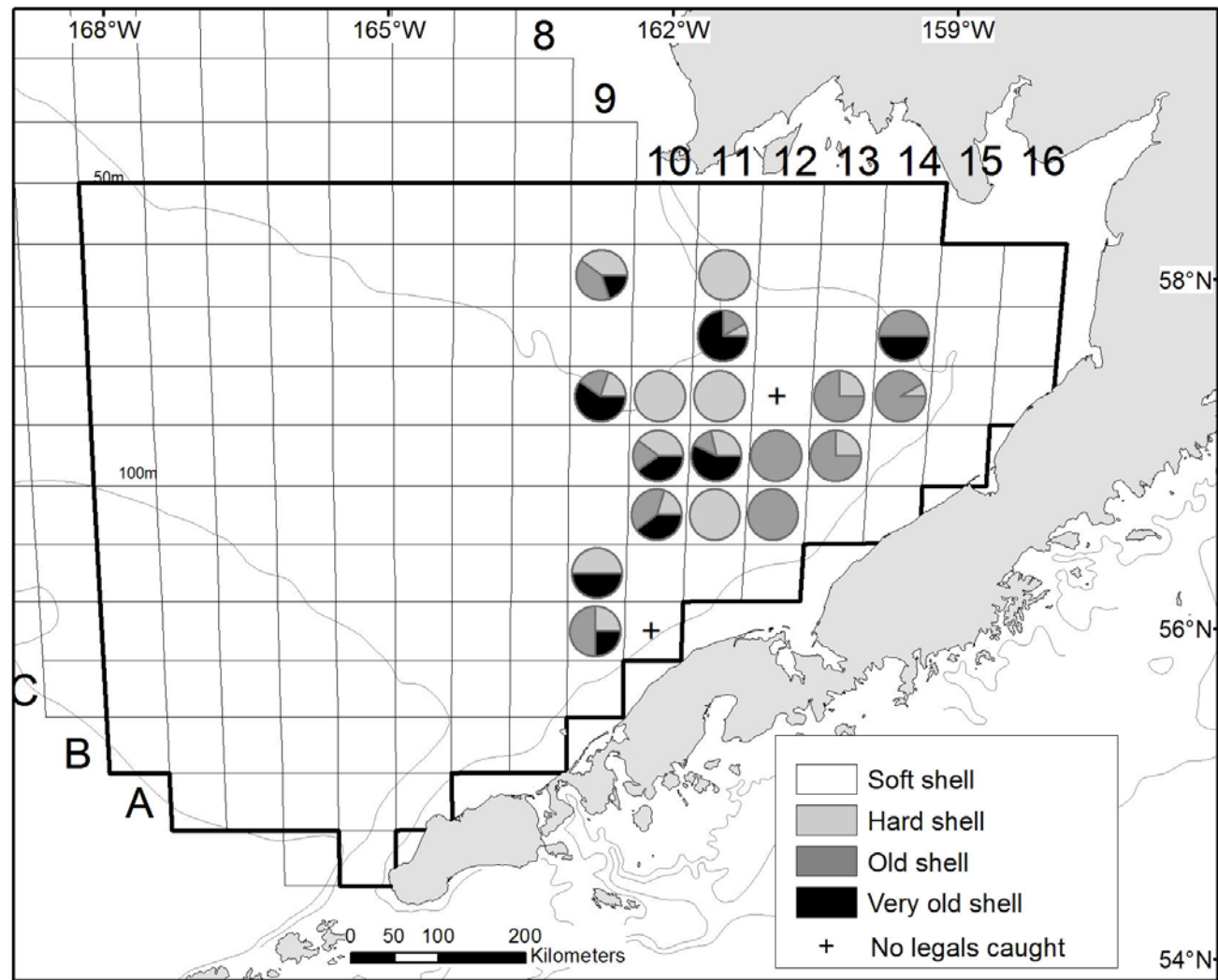


Figure 17a. -- Distribution of legal-sized male red king crab (*Paralithodes camtschaticus*) caught at each station sampled during standard survey (June 2017) in Bristol Bay District distinguished by shell condition. The 20 stations were retowed in August 2017.

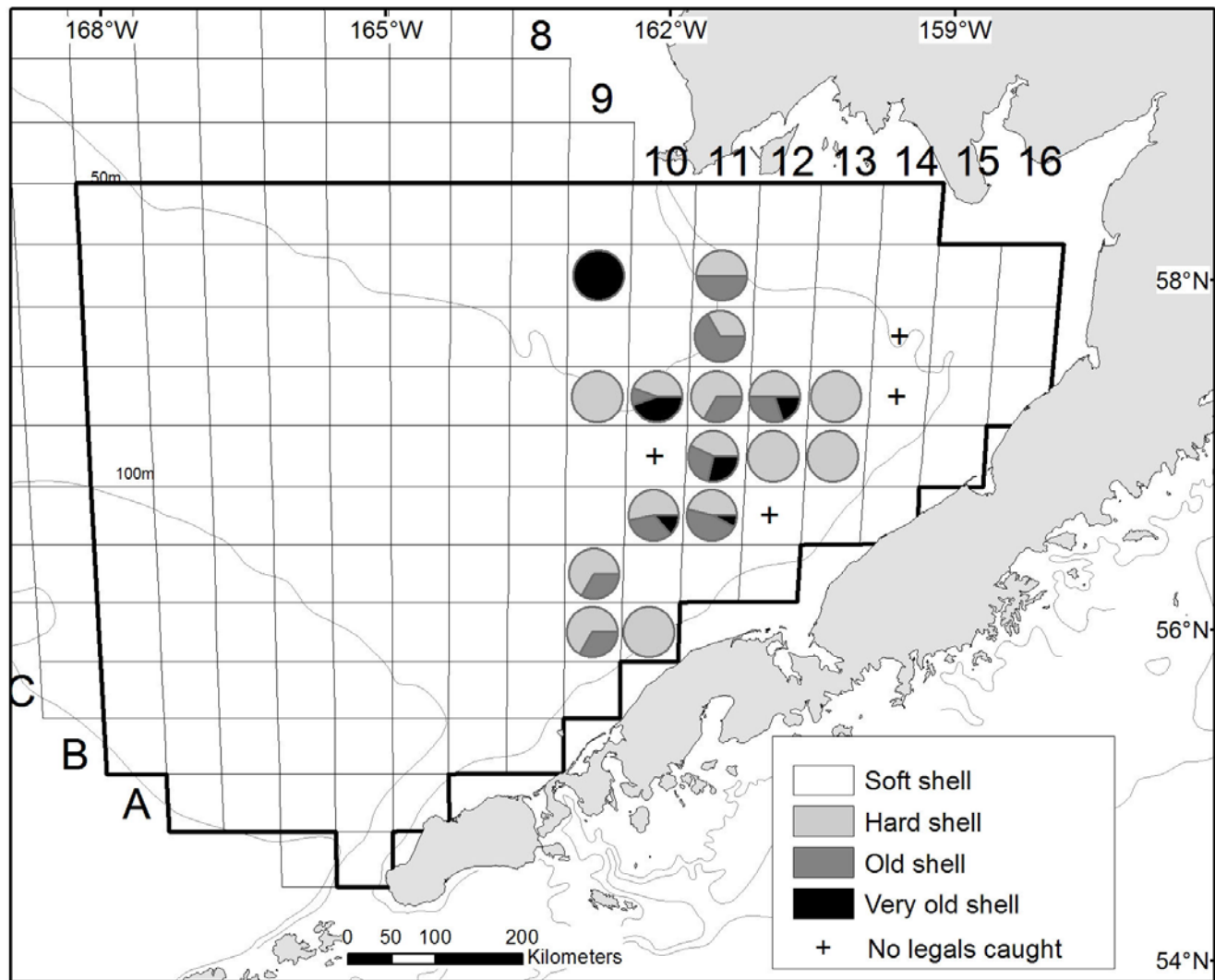


Figure 17b. -- Distribution of legal-sized male red king crab (*Paralithodes camtschaticus*) caught at each station sampled during during retow of 20 Bristol Bay District stations (August 2017) distinguished by shell condition.

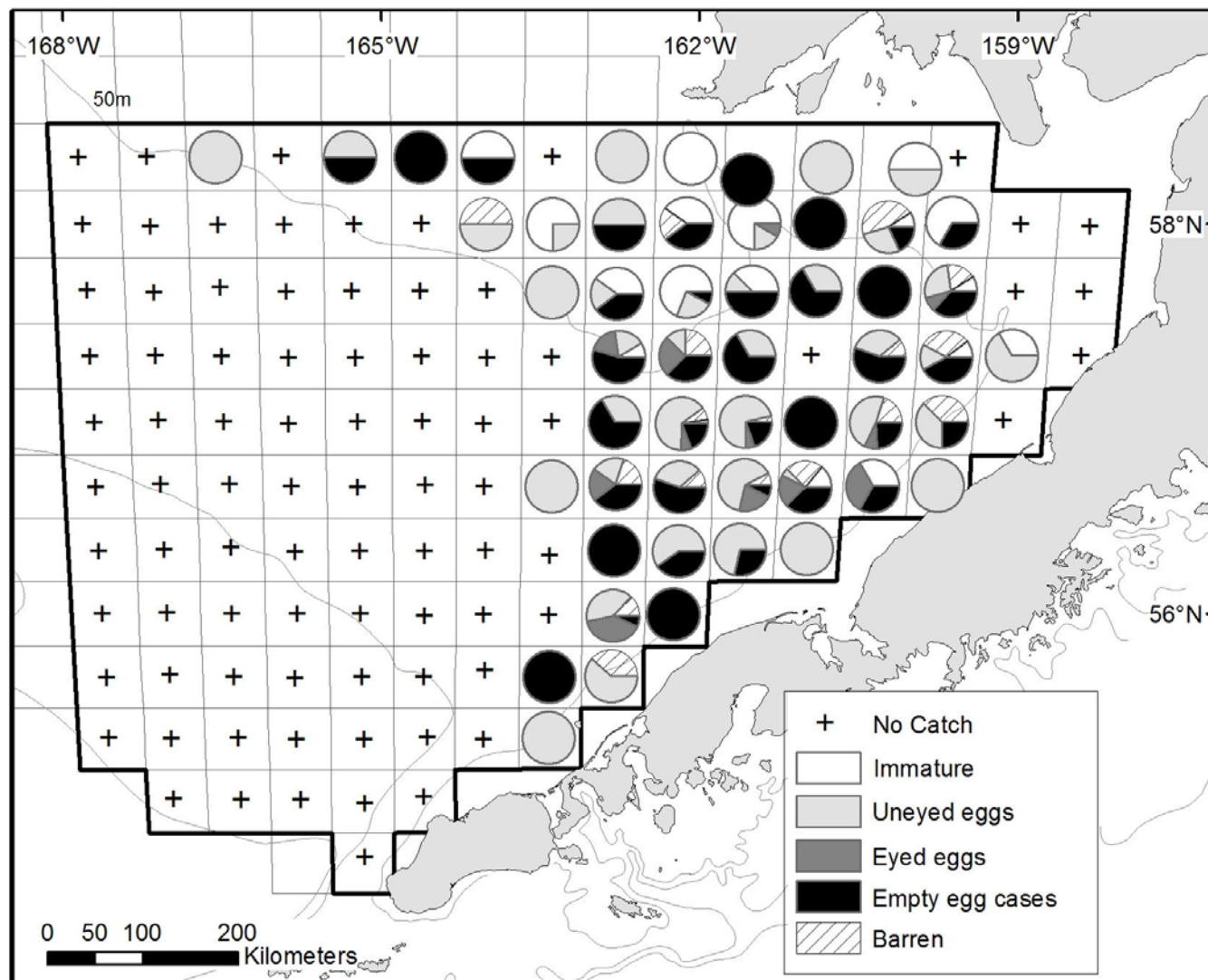


Figure 18. -- Distribution and egg condition of female red king crab (*Paralithodes camtschaticus*) at each station sampled in the 2017 Bristol Bay District from standard leg 1 stations. The outlined area depicts management district.

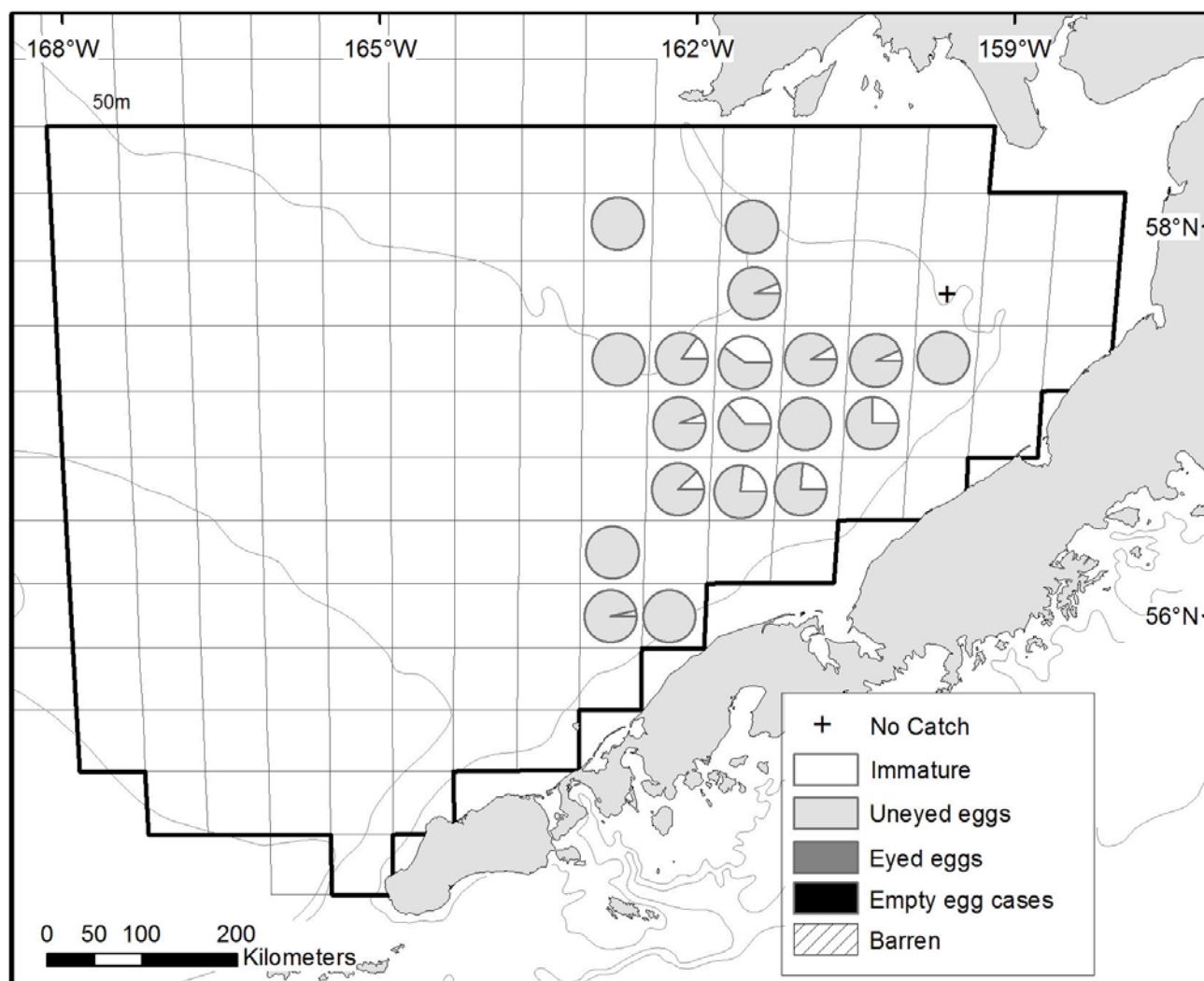


Figure 18a. -- Distribution and egg condition of female red king crab (*Paralithodes camtschaticus*) at 20 retow stations in August 2017. The outlined area depicts management district.

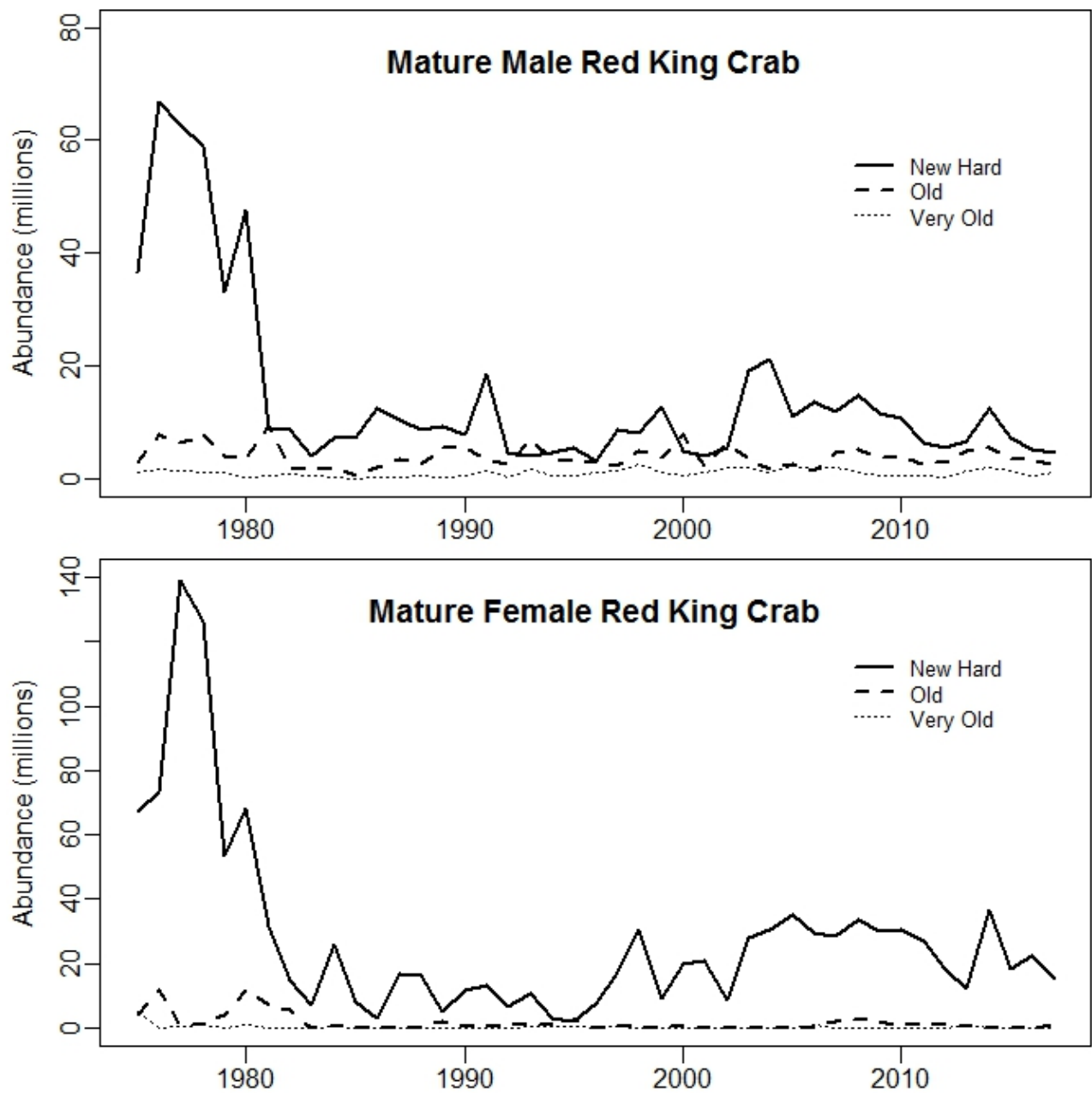


Figure 19. -- Time series of mature male ( $\geq 120$  mm CL) and female (actual maturity) Bristol Bay District red king crab (*Paralithodes camtschaticus*) by shell condition, 1975-2017. New- Hard = shell condition 2; Old = shell condition 3; Very Old = shell condition 4 and 5 combined. Mature male data is from leg 1 standard stations, mature female data is from 20 retow stations in August 2017.

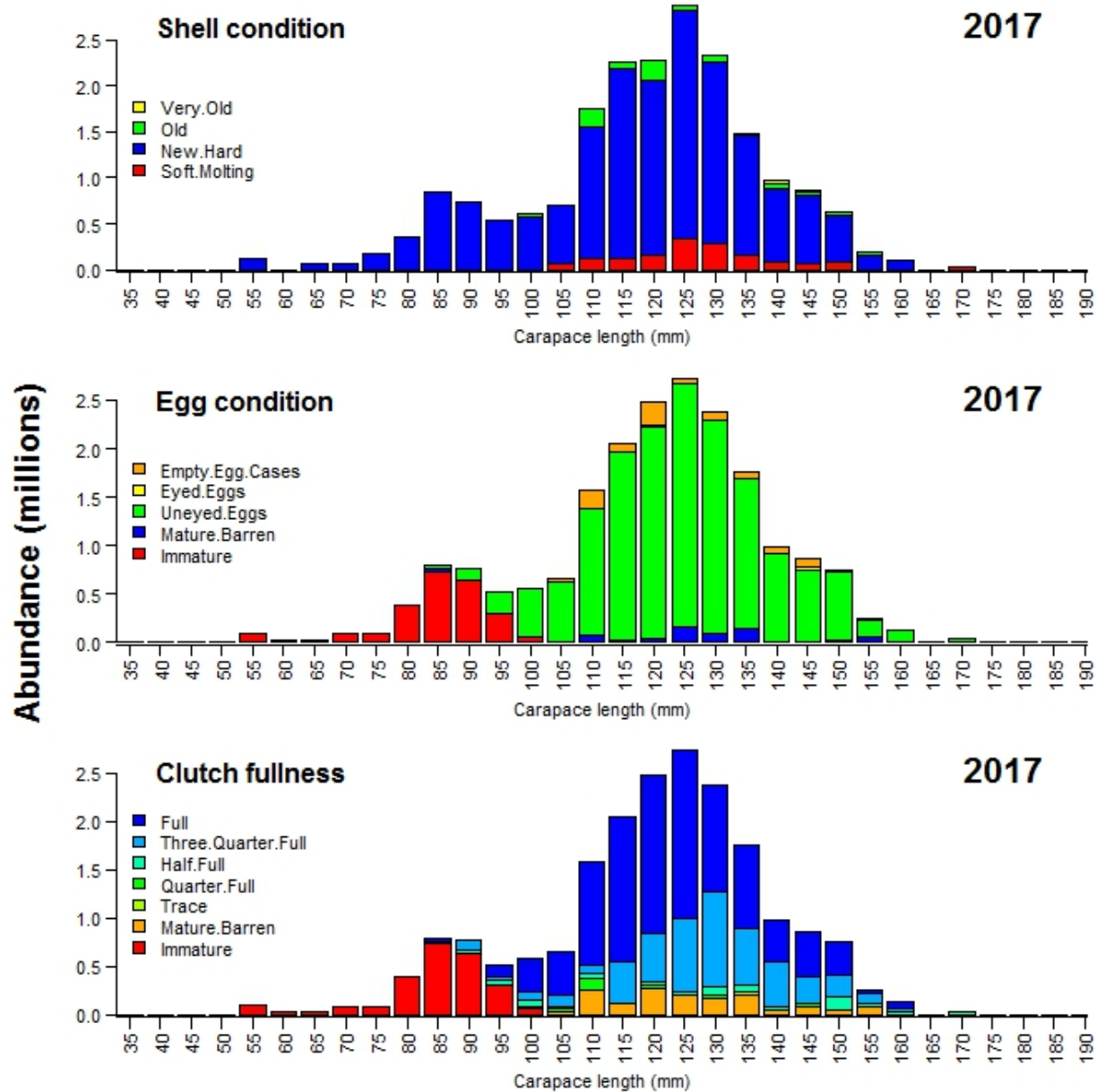


Figure 20. -- Size frequency by shell condition, egg condition, and clutch fullness of Bristol Bay District female red king crab (*Paralithodes camtschaticus*) by 5 mm length classes. Data includes 2017 standard leg 1 stations, with superseded retow stations from August 2017.

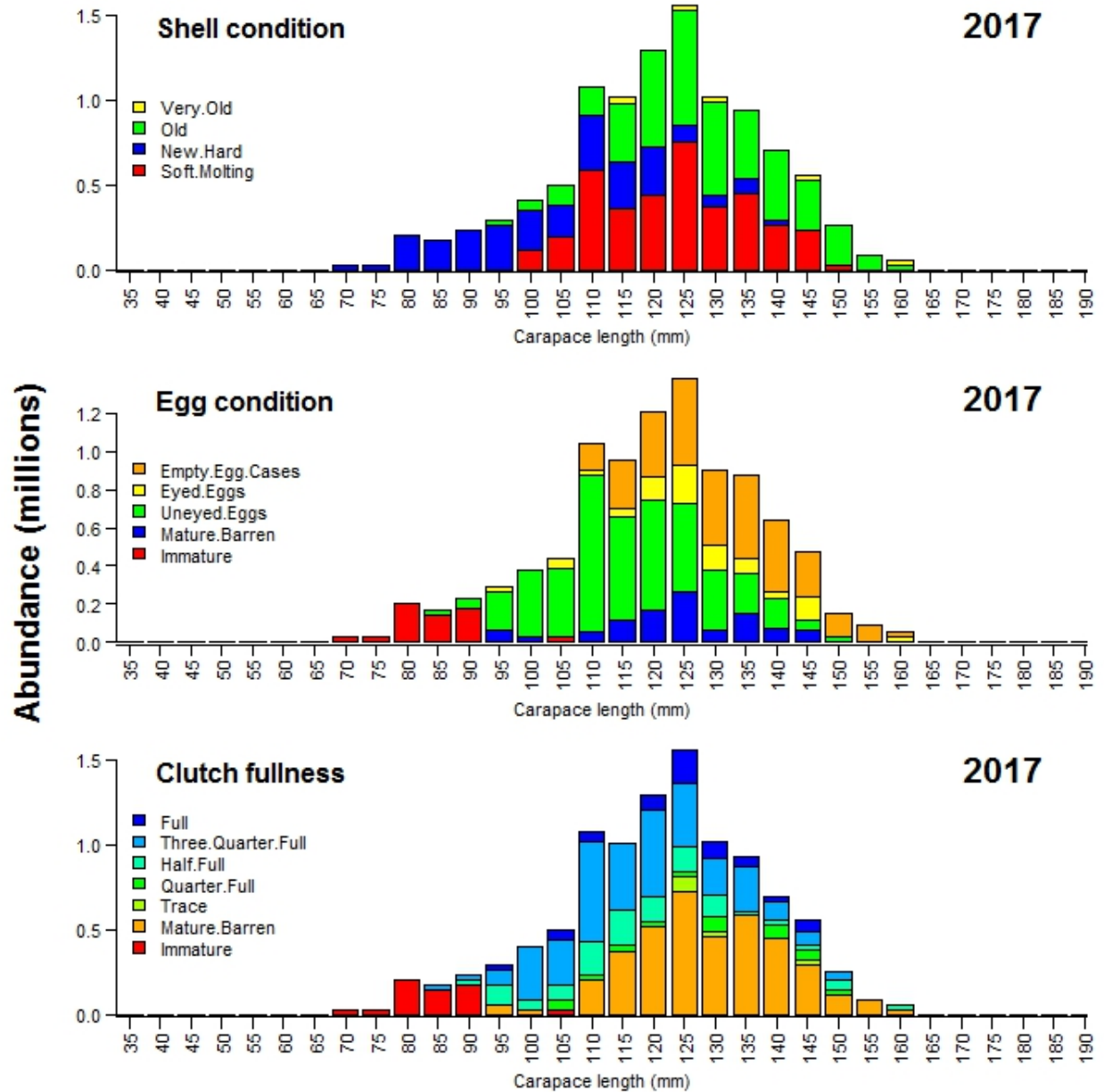


Figure 20a Size frequency by shell condition, egg condition, and clutch fullness of Bristol Bay District female red king crab (*Paralithodes camtschaticus*) by 5 mm length classes. Data is from 20 standard survey stations (Leg 1, June 2017).



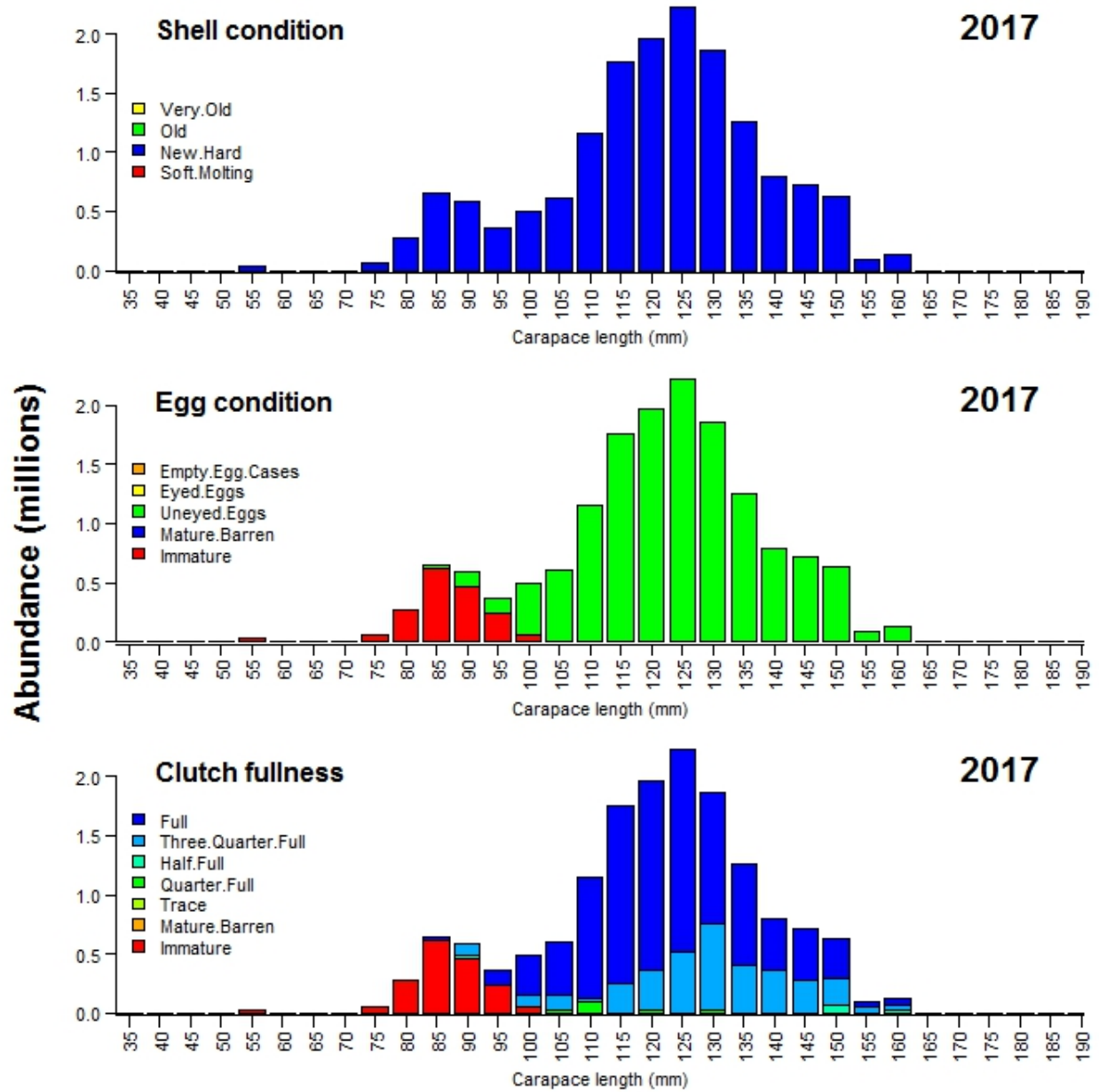


Figure 20b Size frequency by shell condition, egg condition, and clutch fullness of Bristol Bay District female red king crab (*Paralithodes camtschaticus*) by 5 mm length classes. Data is from 20 retow stations (Leg 4, August 2017).



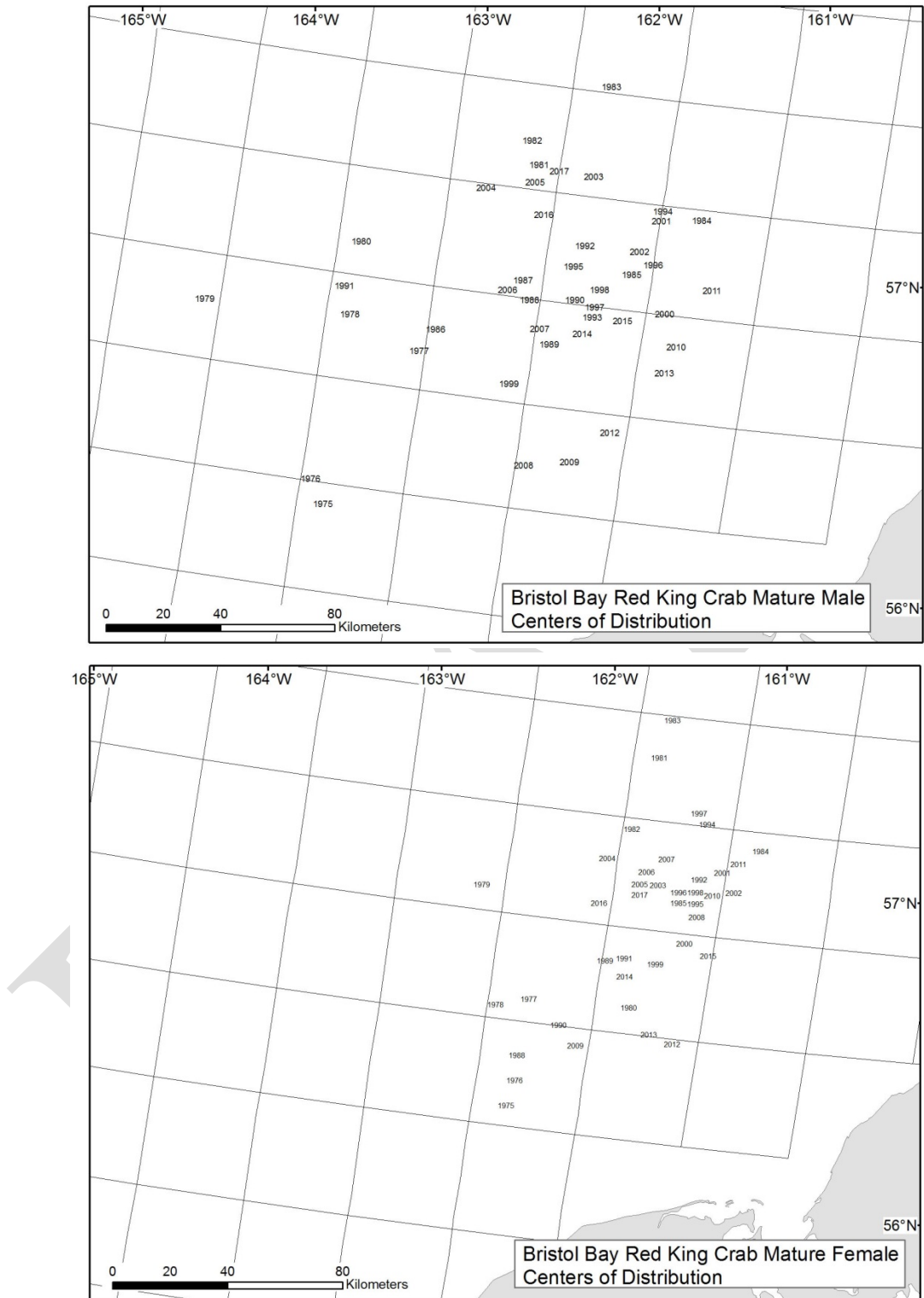


Figure 21. -- Centers of stock distribution of Bristol Bay District mature male and female red king crab (*Paralithodes camtschaticus*) from 1975 to 2017. Female data from

standard leg 1 stations.

DRAFT

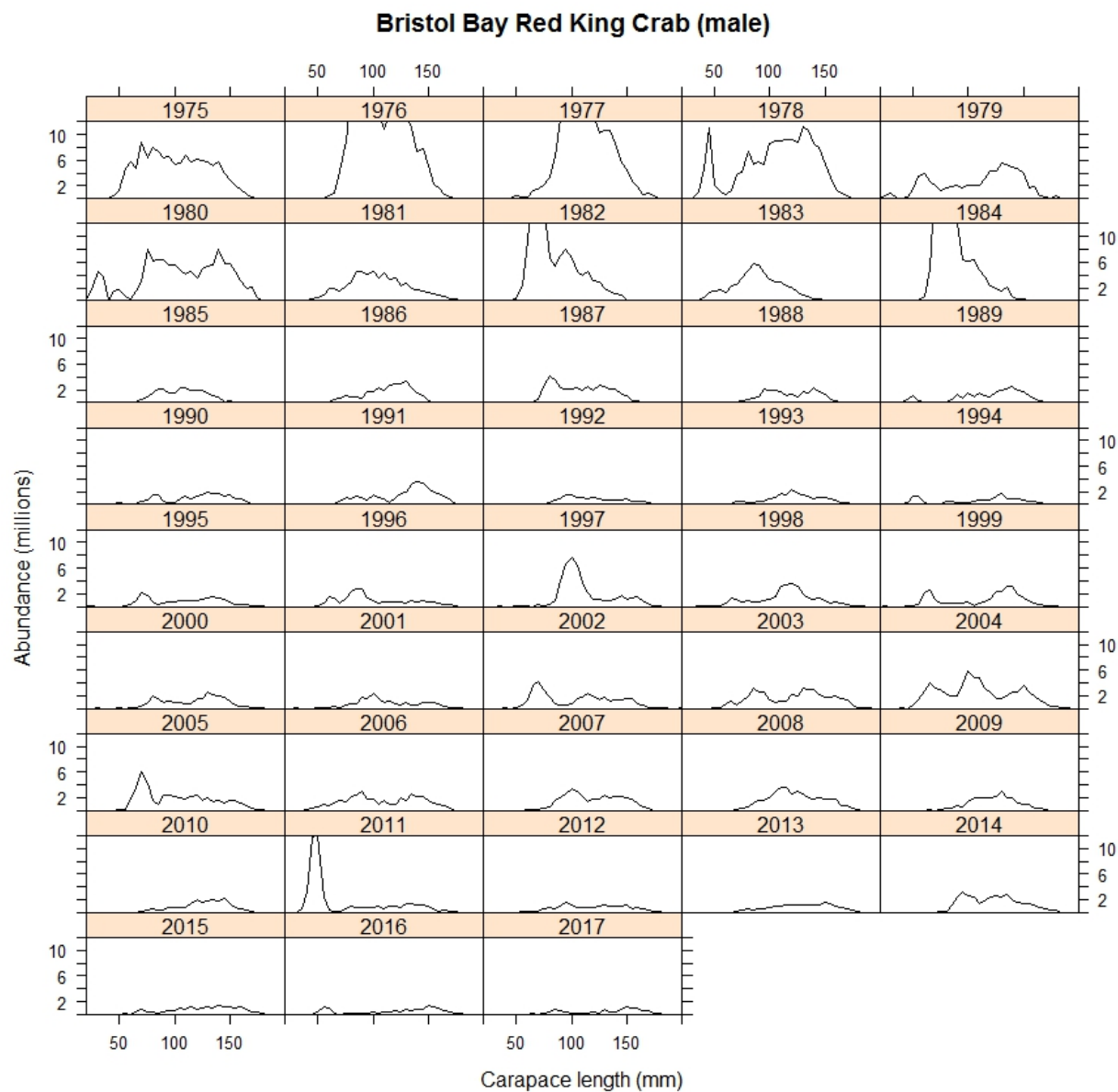


Figure 22. -- Historical size frequency by 5 mm length classes of Bristol Bay District male red king crab (*Paralithodes camtschaticus*), 1975 to 2017.

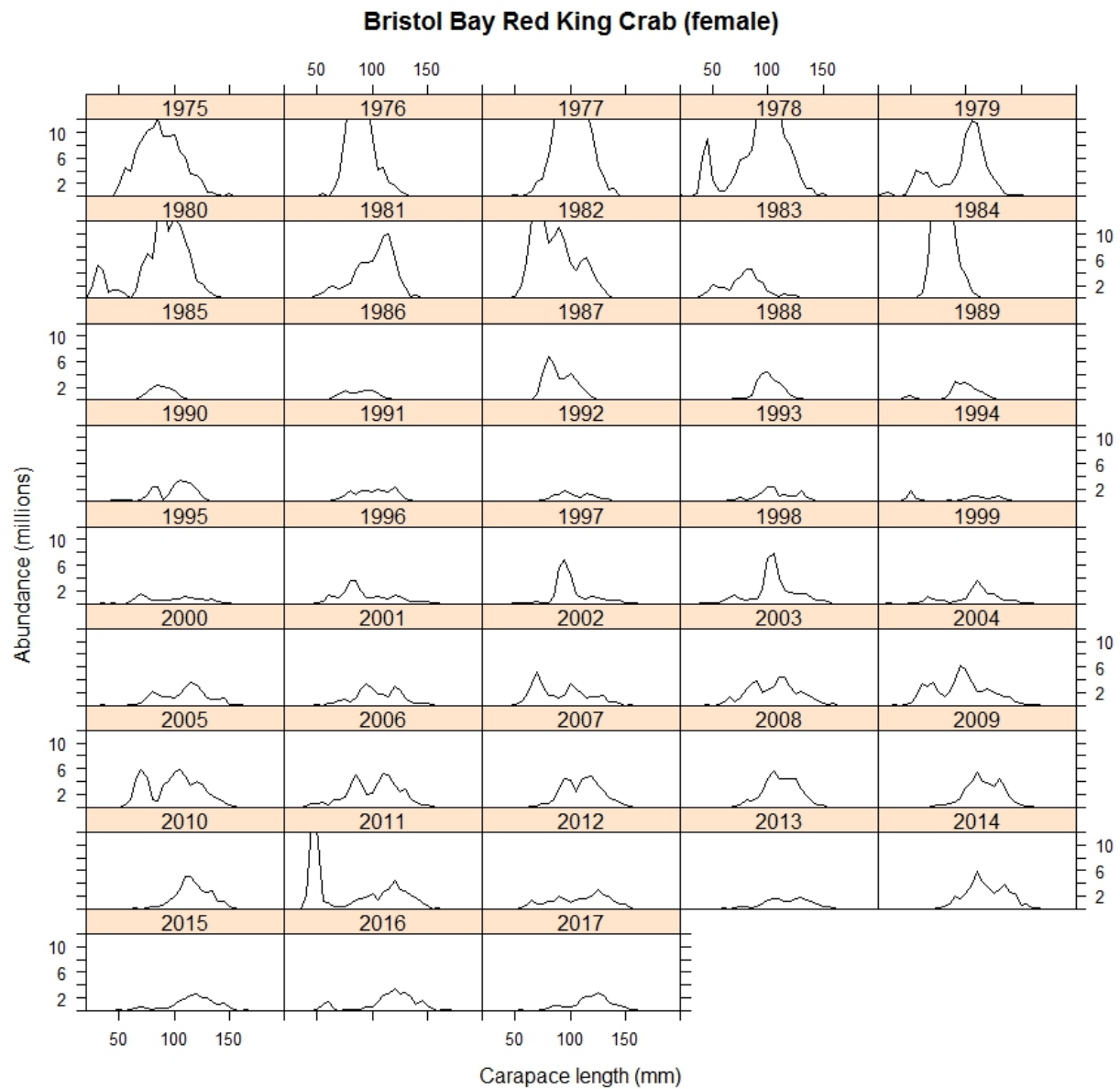


Figure 23. -- Historical size frequency by 5 mm length classes of Bristol Bay District female red king crab (*Paralithodes camtschaticus*), 1975 to 2017. Data from standard leg 1 stations.

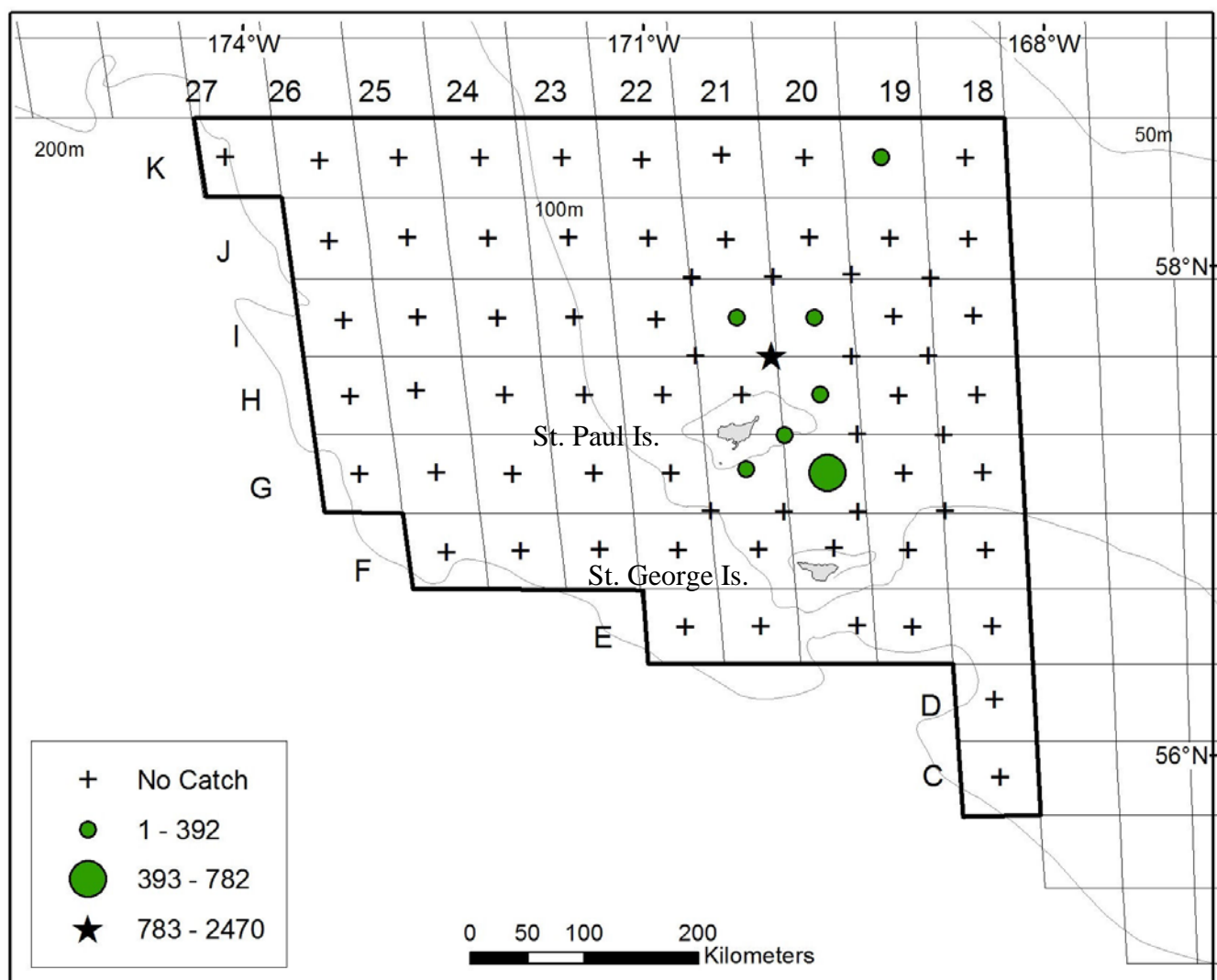


Figure 24. -- Total density (number nmi<sup>-2</sup>) of red king crab (*Paralithodes camtschaticus*) at each station sampled in the Pribilof District in 2017. Data depicted by circles are equal interval densities, while stars represent densities larger than the standard scale. The outlined area depicts stations within the management district.

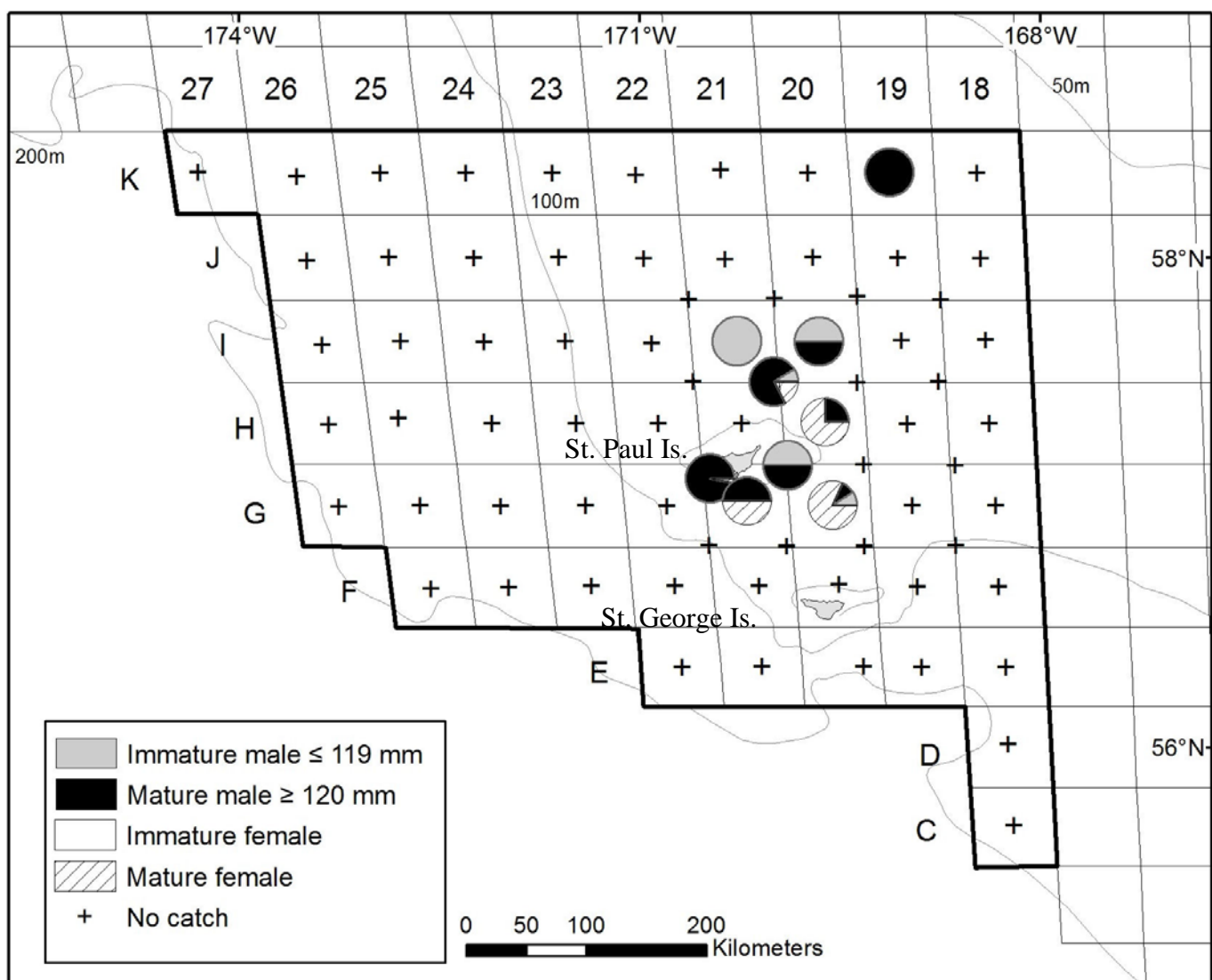


Figure 25. -- Percentage of male and female red king crab (*Paralithodes camtschaticus*) maturity classes at each station of the Pribilof District in 2017. The outlined area depicts stations within the management district.

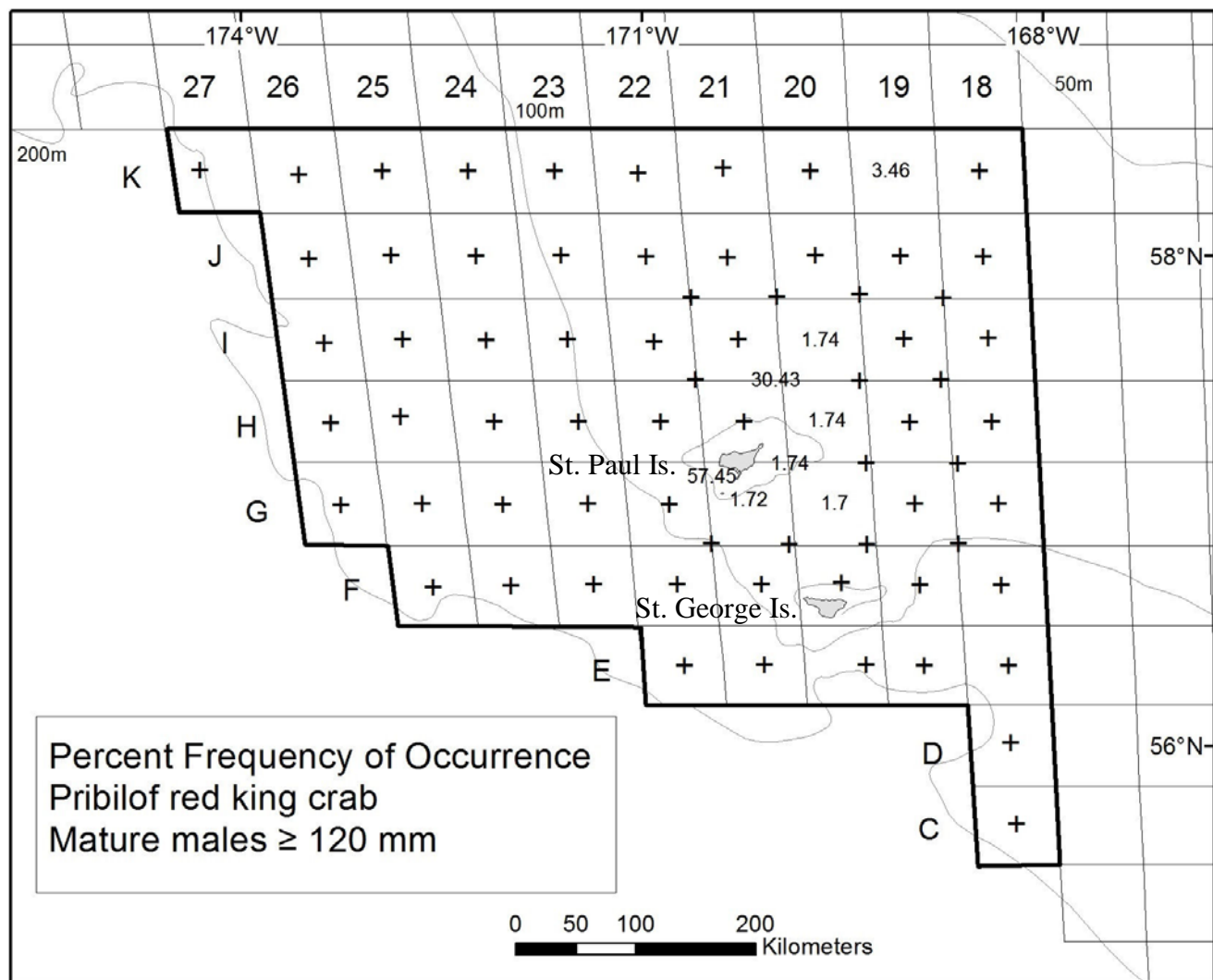


Figure 26. -- Percent frequency of occurrence of mature male red king crab (*Paralithodes camtschaticus*) at stations sampled in the 2017 Pribilof District.

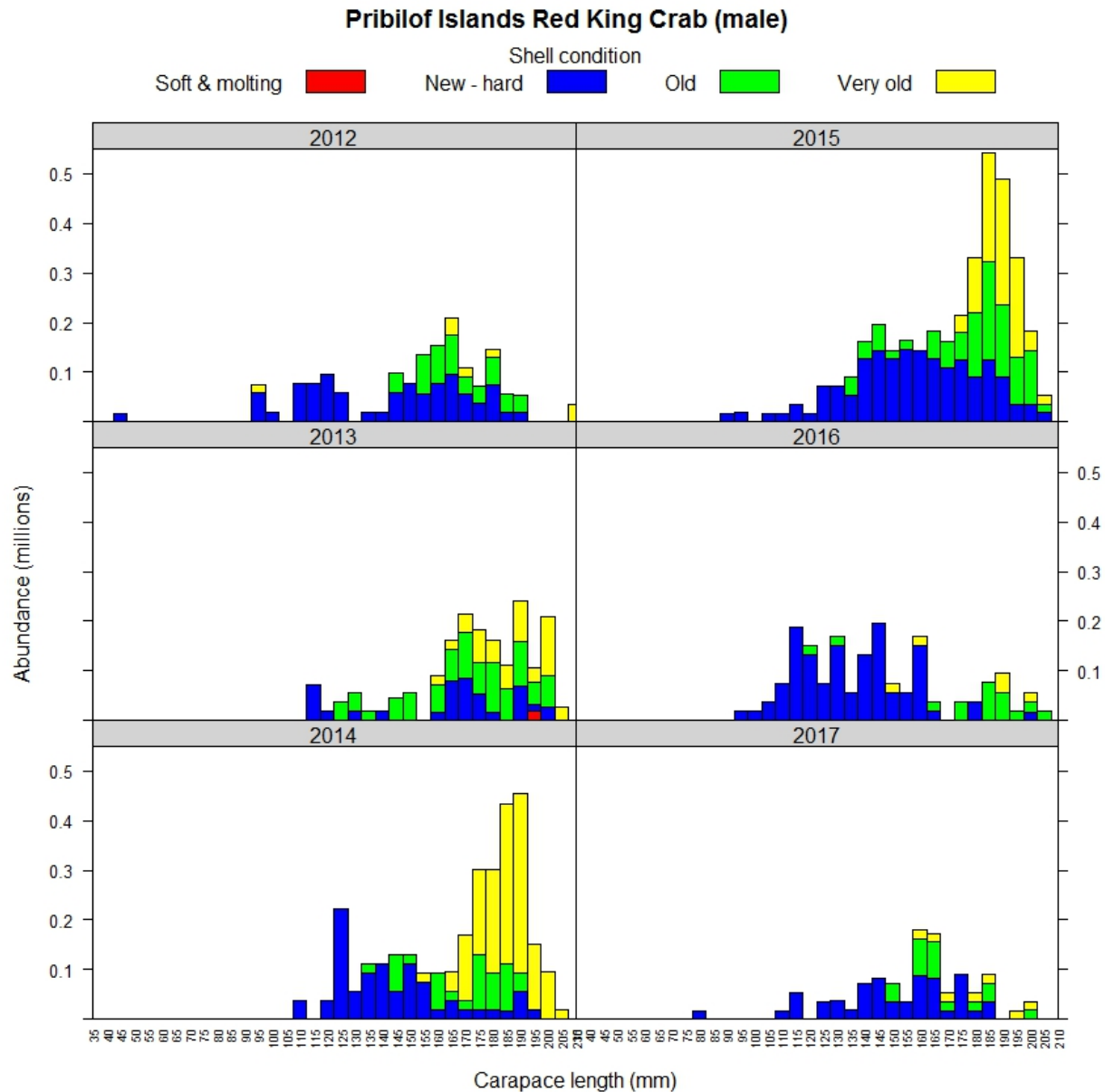


Figure 27. -- Size frequency by shell condition of Pribilof District male red king crab (*Paralithodes camtschaticus*) by 5 mm length classes, 2012-2017.



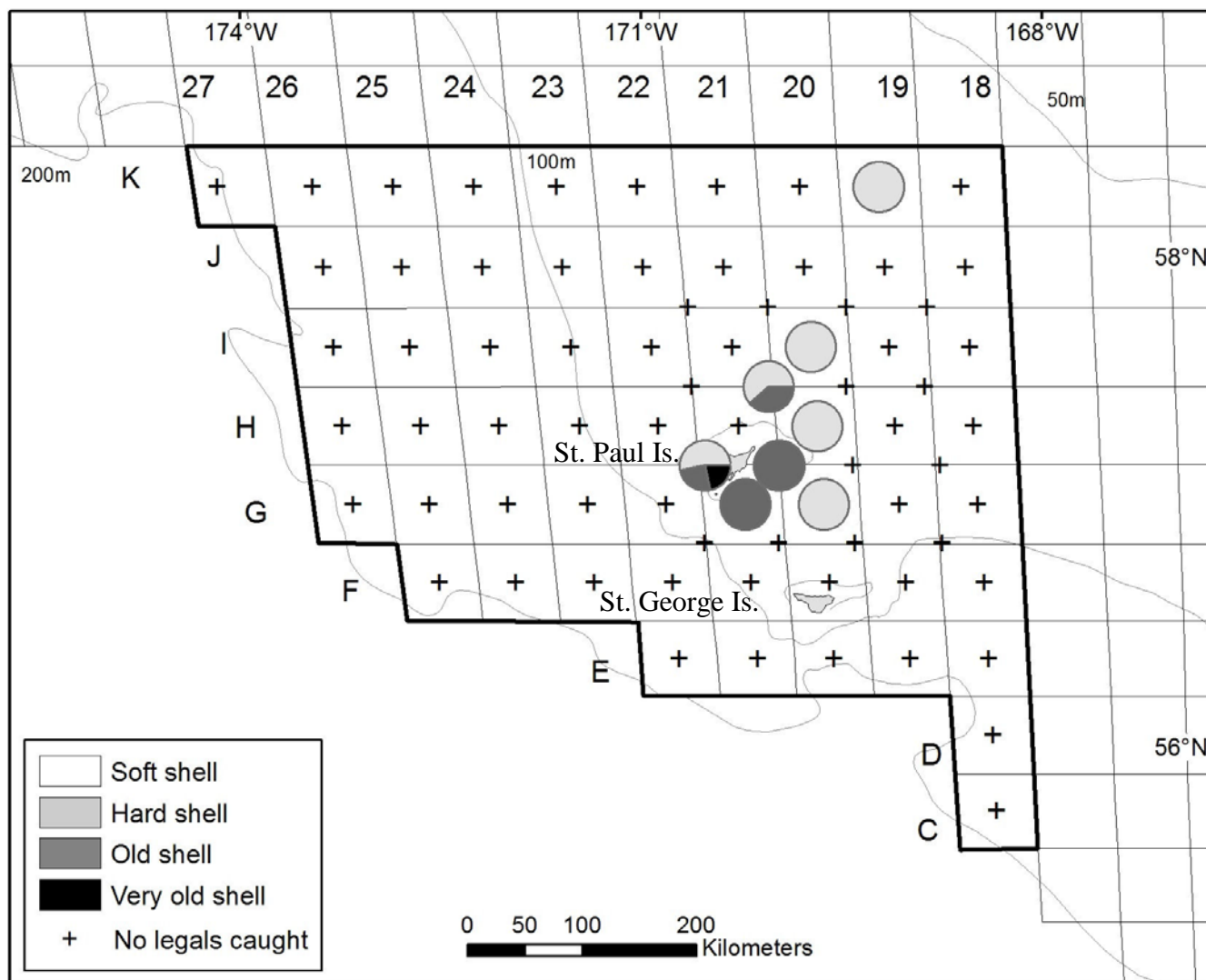


Figure 28. -- Distribution of legal-sized male red king crab (*Paralithodes camtschaticus*) caught at each station of the Pribilof District in 2017 and distinguished by shell condition. The outlined area depicts stations within the management district.

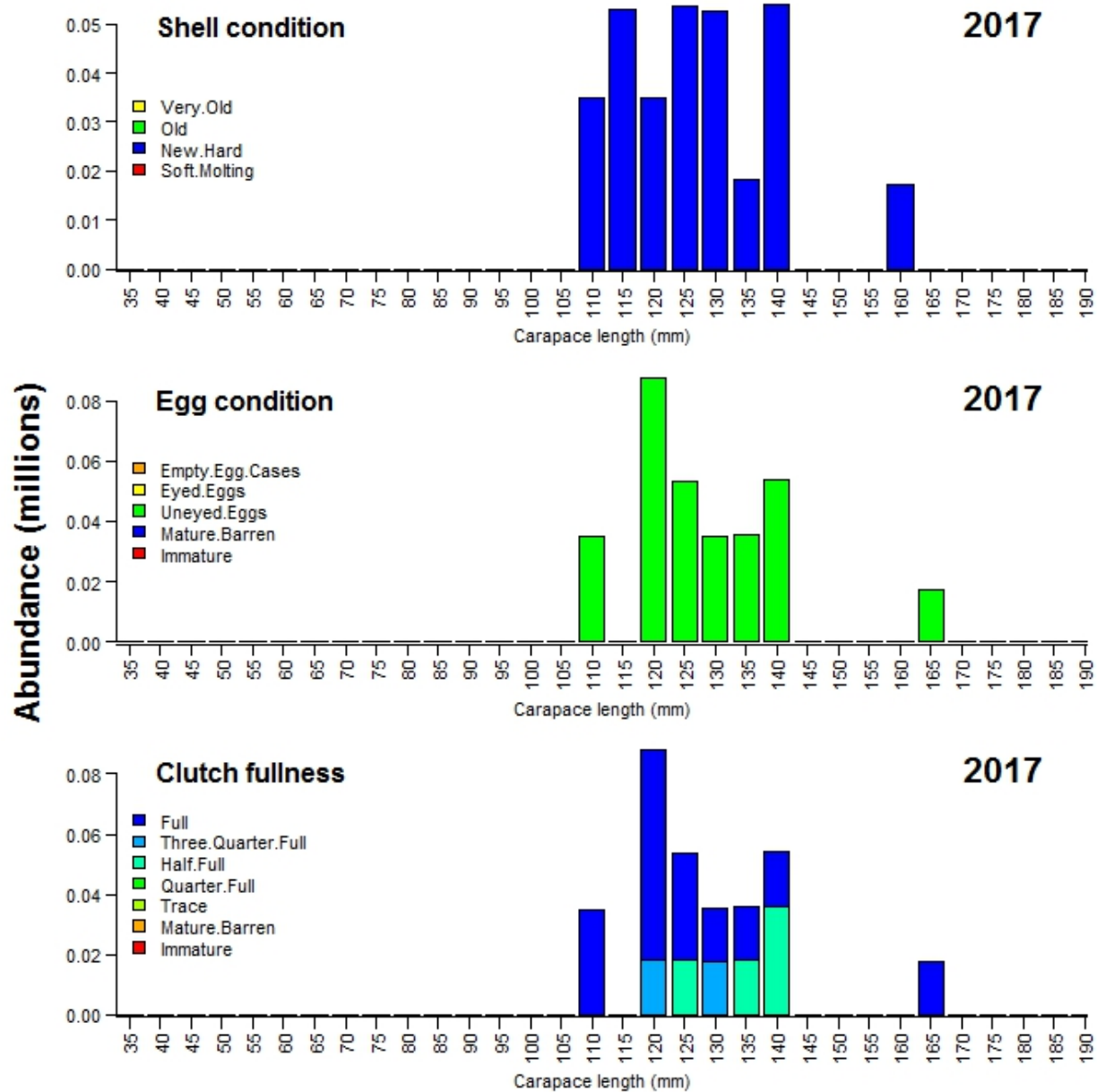


Figure 29. -- Size frequency by shell condition, egg condition, and clutch fullness of Pribilof District female red king crab (*Paralithodes camtschaticus*) by 5 mm length classes in 2017.

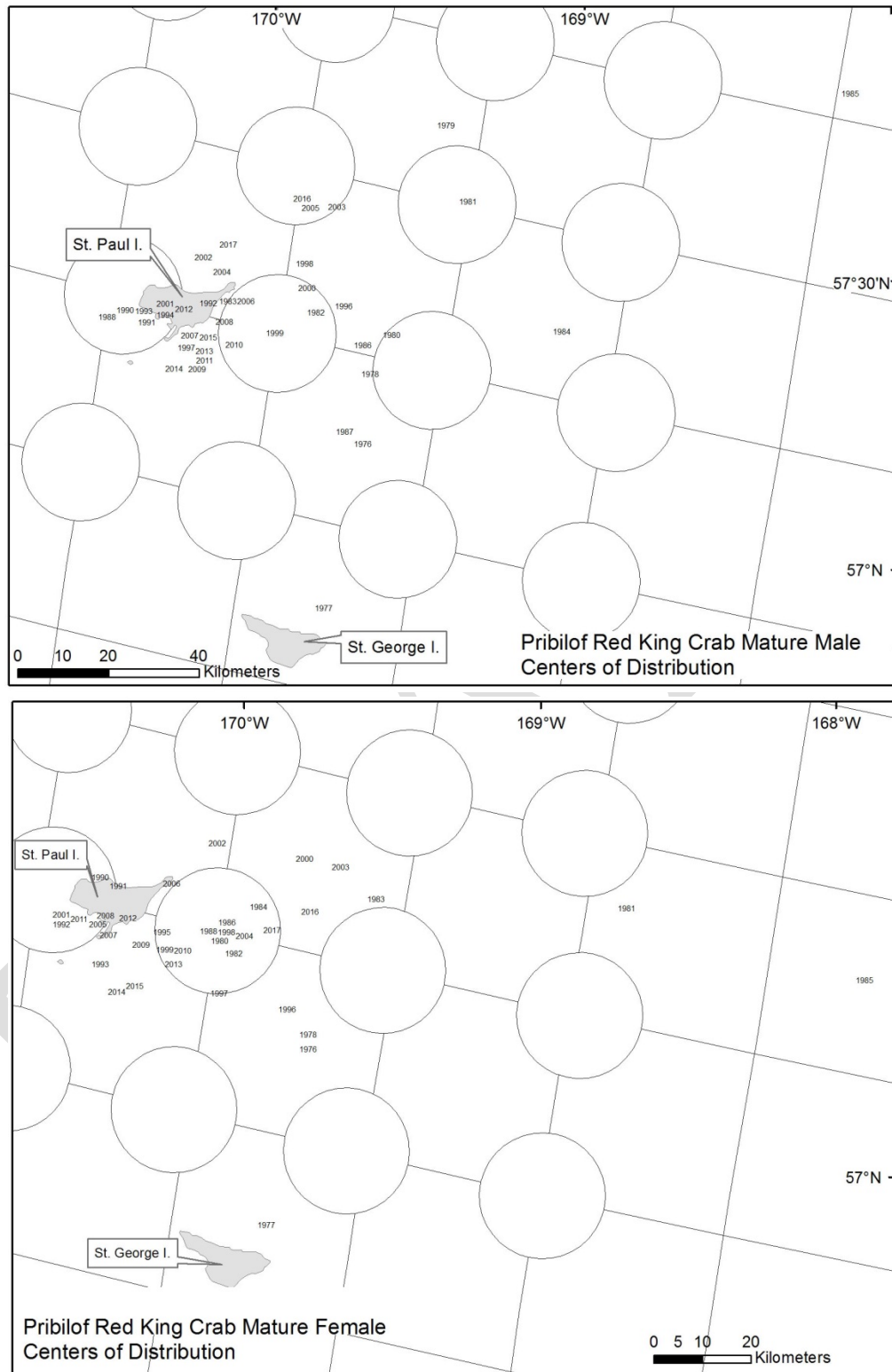


Figure 30. -- Centers of stock distribution of Pribilof Islands male and female red king crab (*Paralithodes camtschaticus*) from 1975 to 2017.

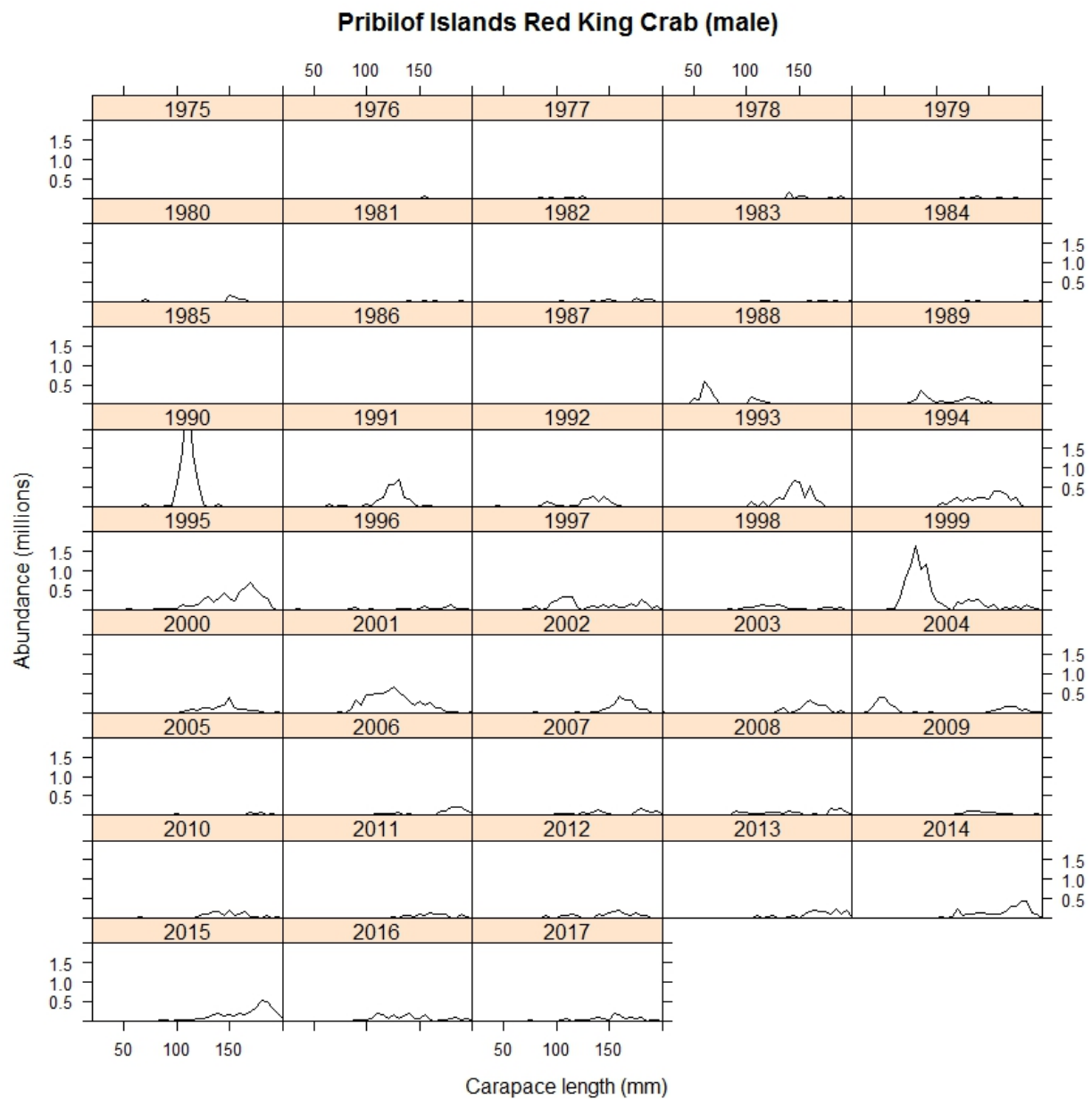


Figure 31. -- Size frequency by 5 mm length classes of Pribilof Islands male red king crab (*Paralithodes camtschaticus*) from 1975 to 2017.

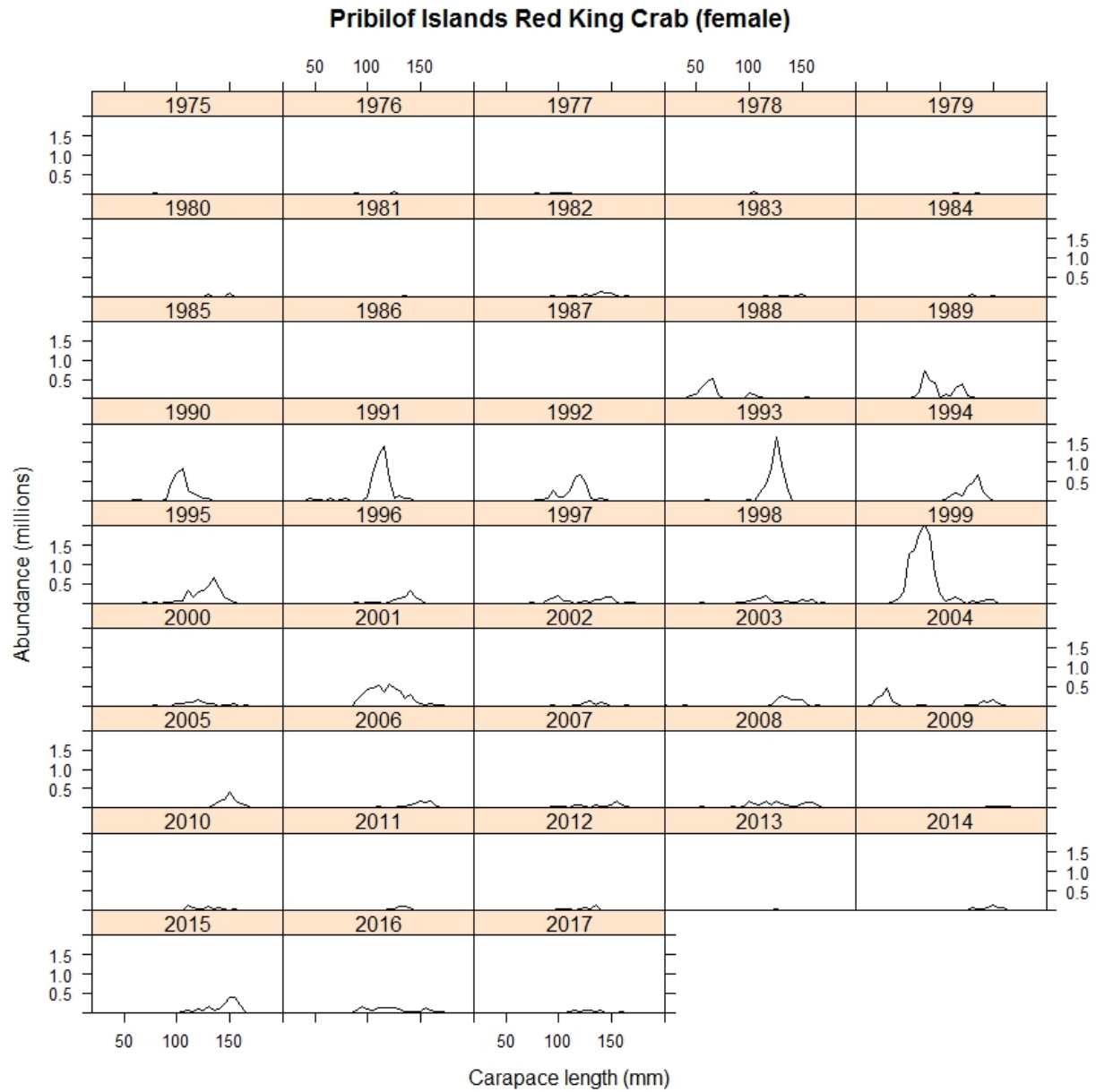


Figure 32. -- Size frequency by 5 mm length classes of Pribilof Islands female red king crab (*Paralithodes camtschaticus*) from 1975 to 2017.

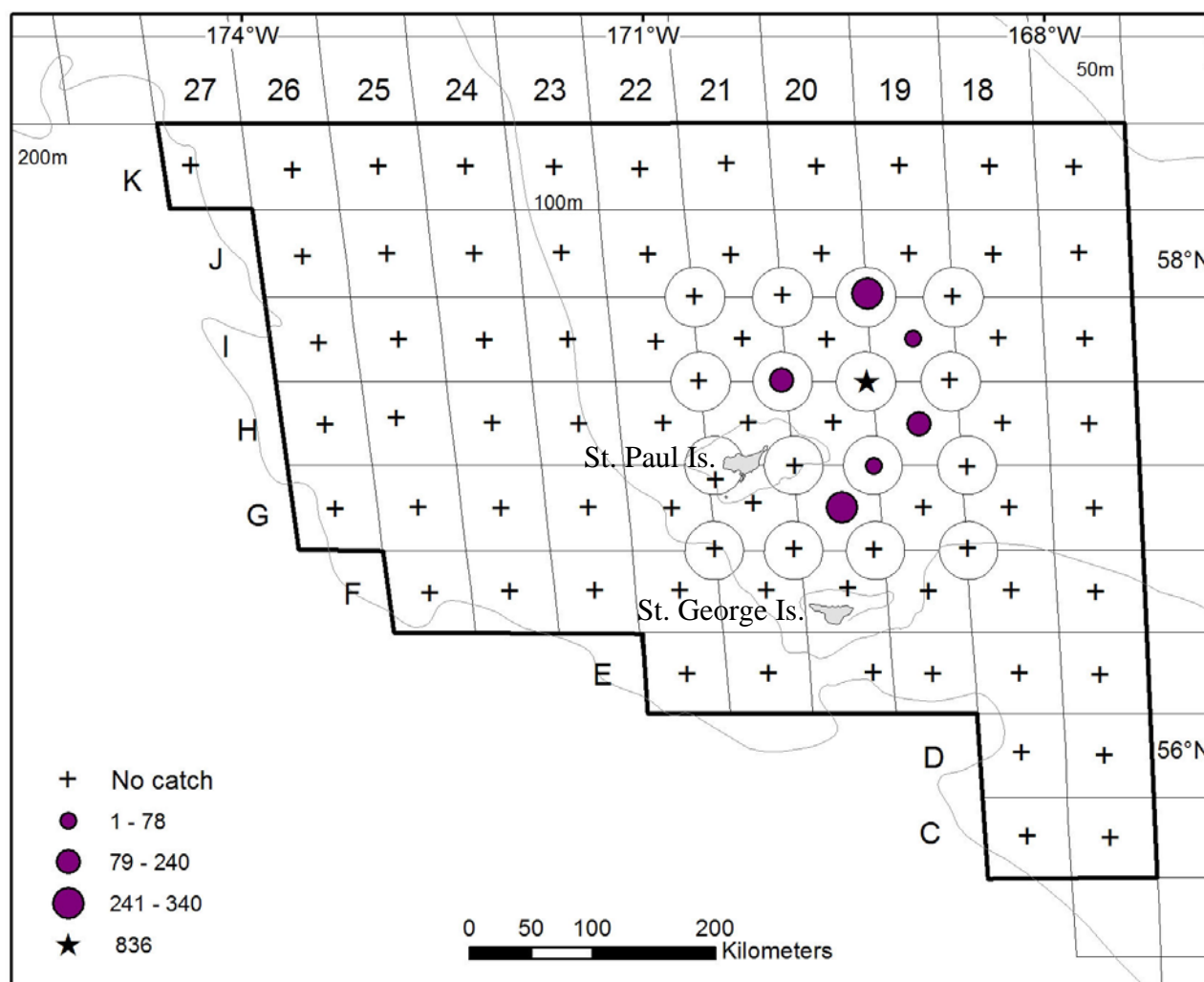


Figure 33. -- Total density (number  $\text{nmi}^{-2}$ ) of blue king crab (*Paralithodes platypus*) at each station sampled in the Pribilof District in 2017. Data depicted by circles are equal interval densities, while stars represent densities larger than the standard scale. The outlined area depicts the management district as defined by ADF&G, while the dashed line depicts the modified eastern boundary as defined in the 2013 Rebuilding Plan (additional 9 stations).

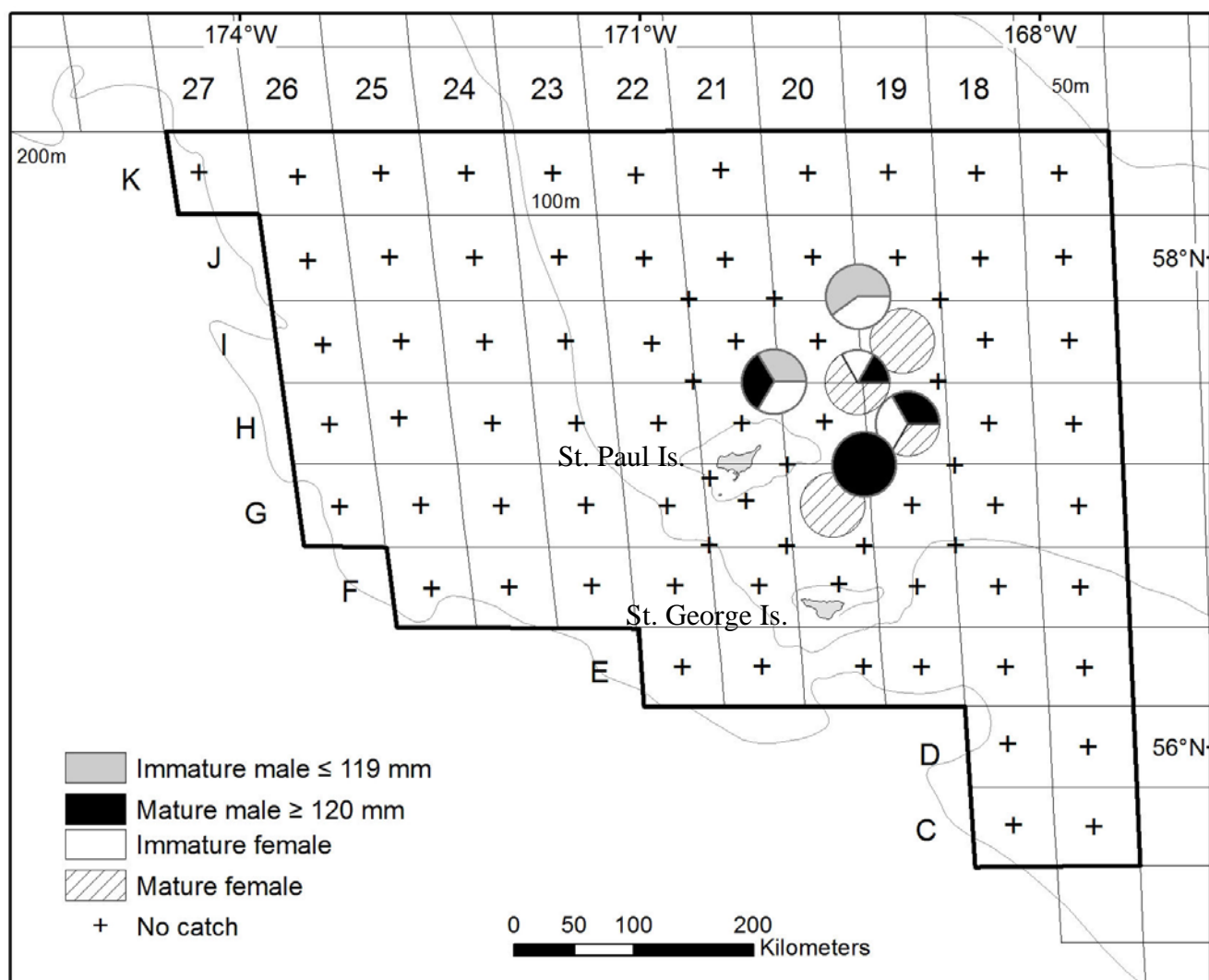


Figure 34. -- Percentage of male and female blue king crab (*Paralithodes platypus*) maturity categories at each station of the Pribilof District in 2017. The outlined area depicts the management district as defined by ADF&G, while the dashed line depicts the modified eastern boundary as defined in the 2013 Rebuilding Plan (additional 9 stations).

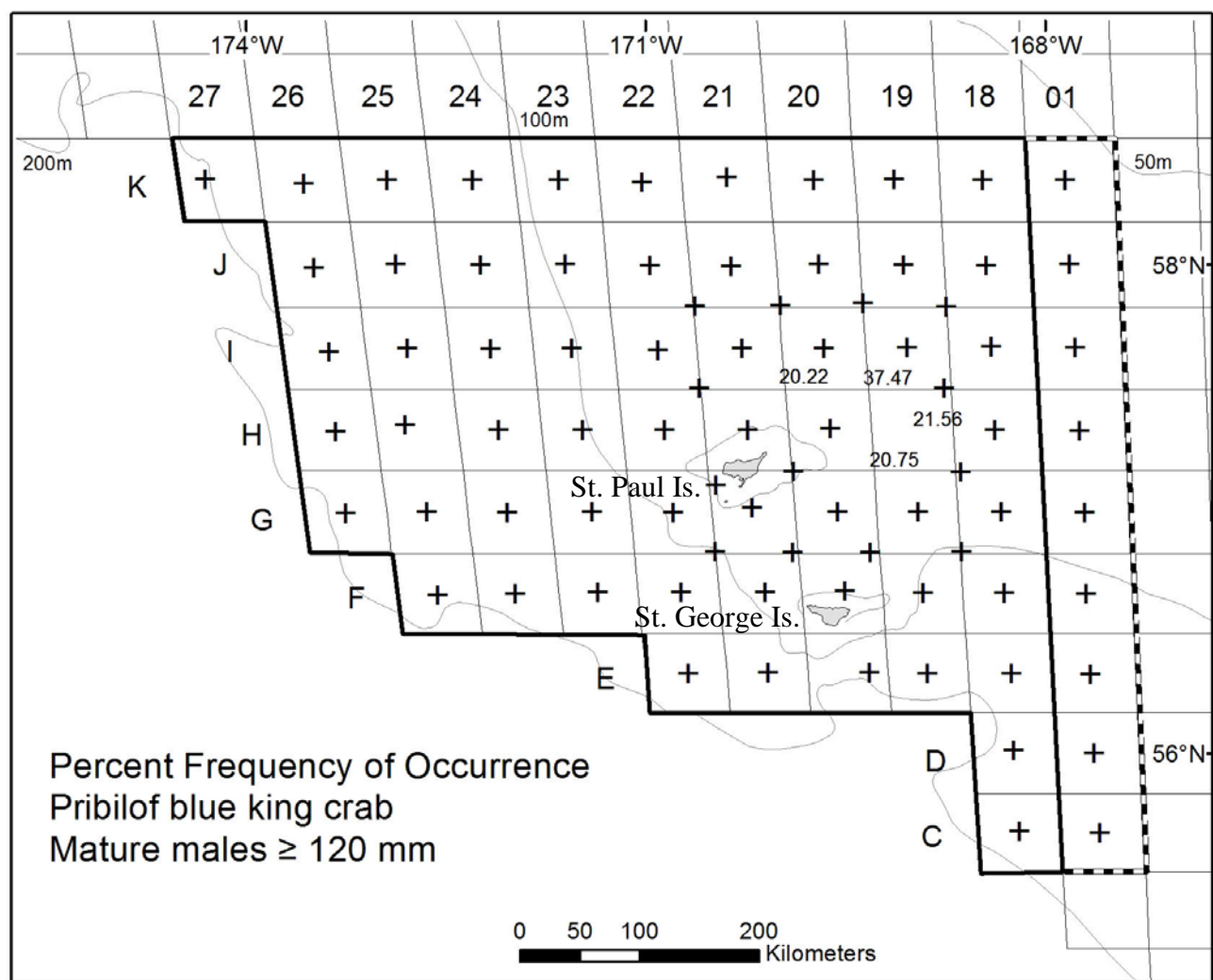


Figure 35. -- Percent frequency of occurrence of mature male blue king crab (*Paralithodes platypus*) at Pribilof District stations sampled in 2017. The outlined area depicts the management district as defined by ADF&G, while the dashed line depicts the modified eastern boundary as defined in the 2013 Rebuilding Plan (additional 9 stations).



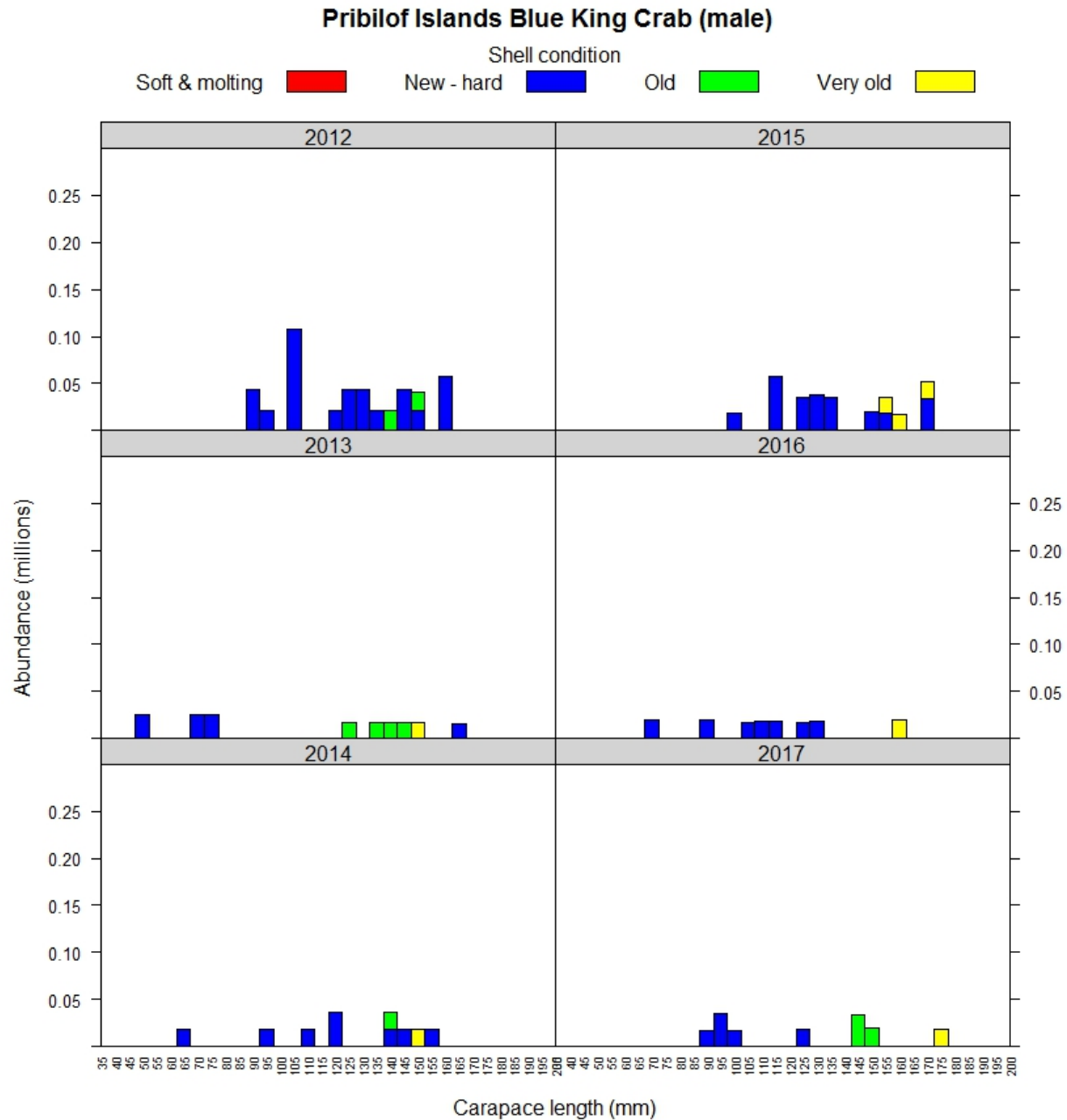


Figure 36. -- Size frequency by shell condition of Pribilof District male blue king crab (*Paralithodes platypus*) by 5 mm length classes, 2012-2017.

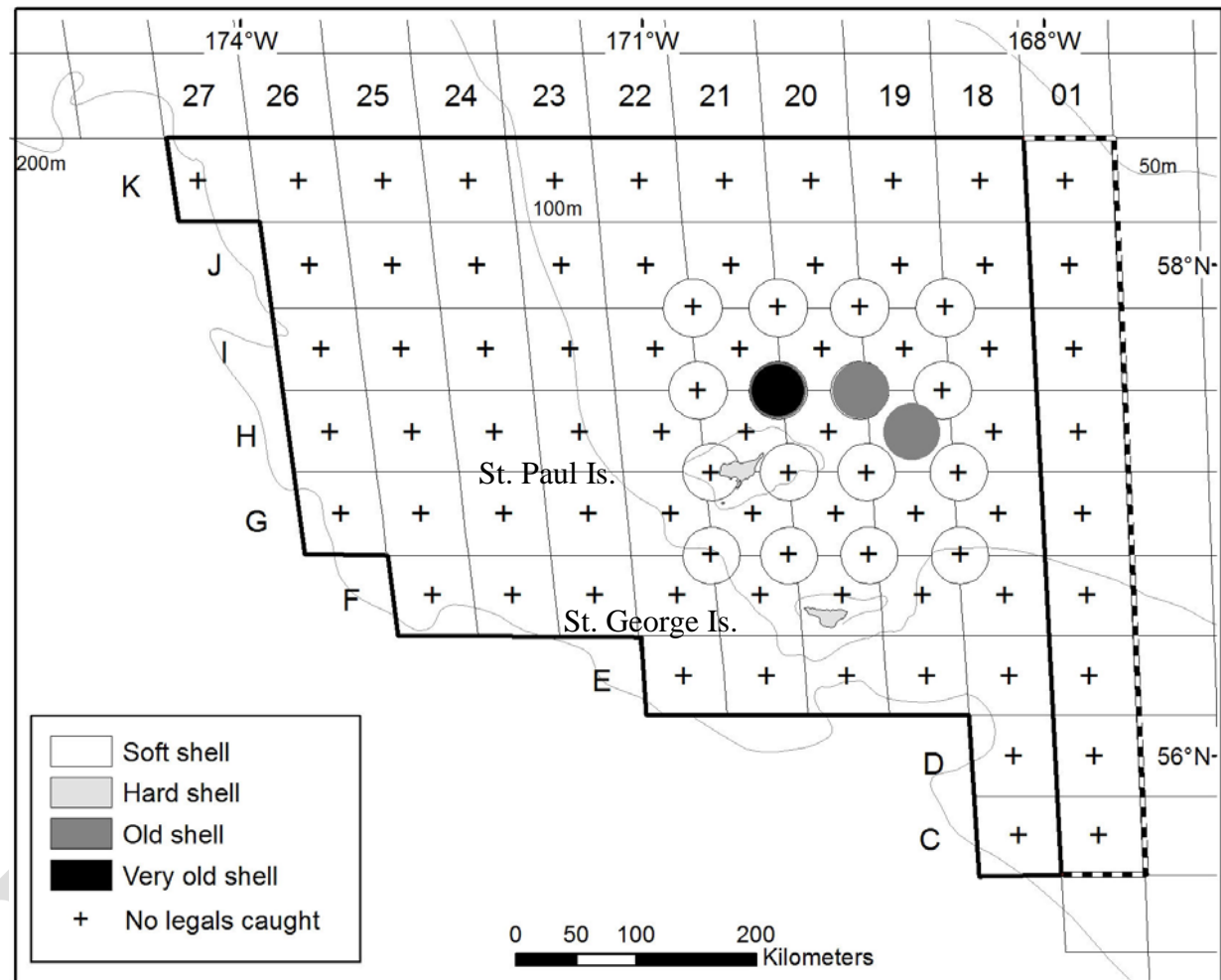


Figure 37. -- Distribution of legal-sized male blue king crab (*Paralithodes platypus*) caught at each station of the Pribilof District in 2017 distinguished by shell condition. The outlined area depicts the management district as defined by ADF&G, while the dashed line depicts the modified eastern boundary as defined in the 2013 Rebuilding Plan (additional 9 stations).

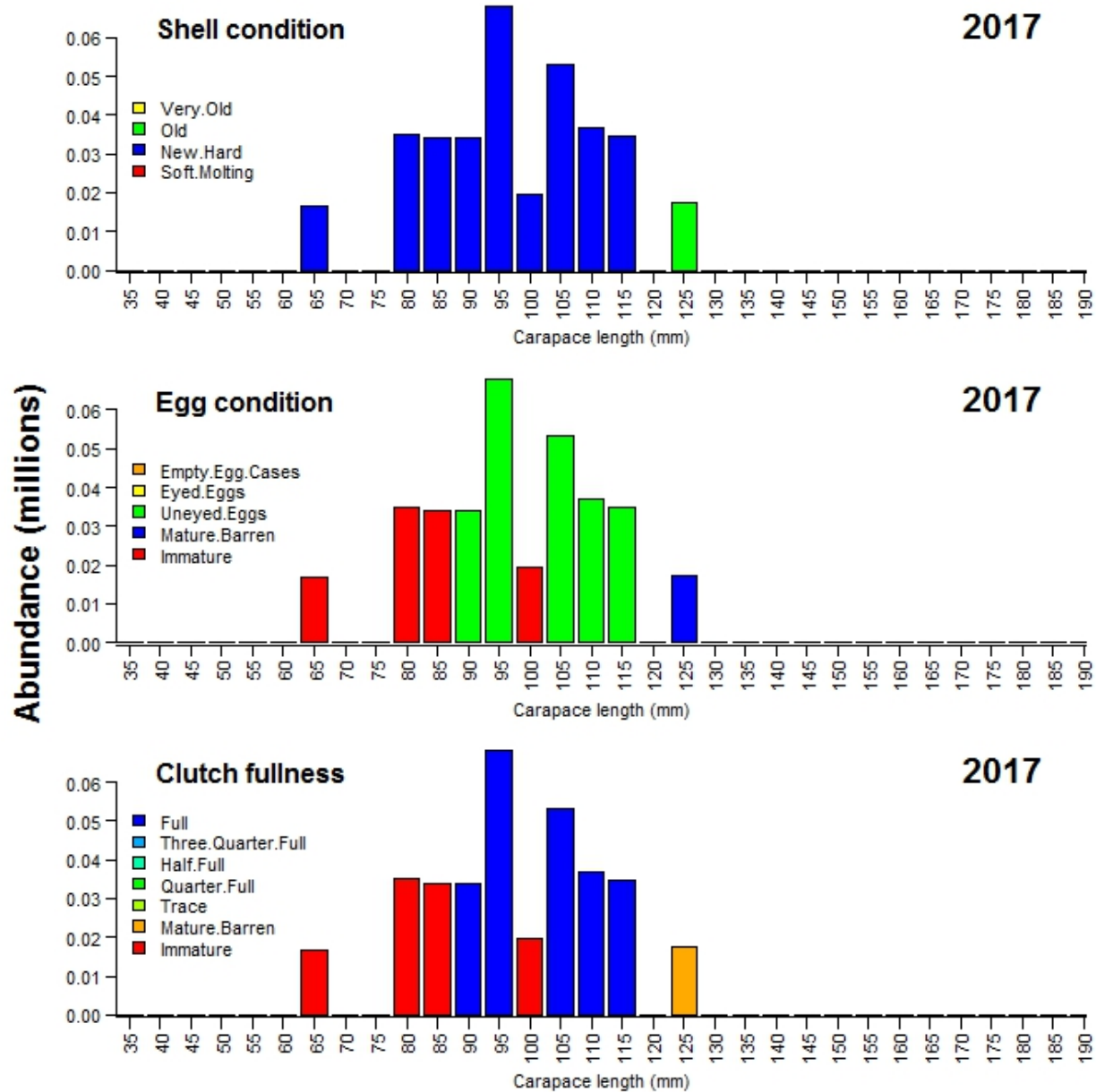


Figure 38. -- Size frequency by shell condition, egg condition, and clutch fullness of Pribilof District female blue king crab (*Paralithodes platypus*) by 5 mm length classes in 2017.

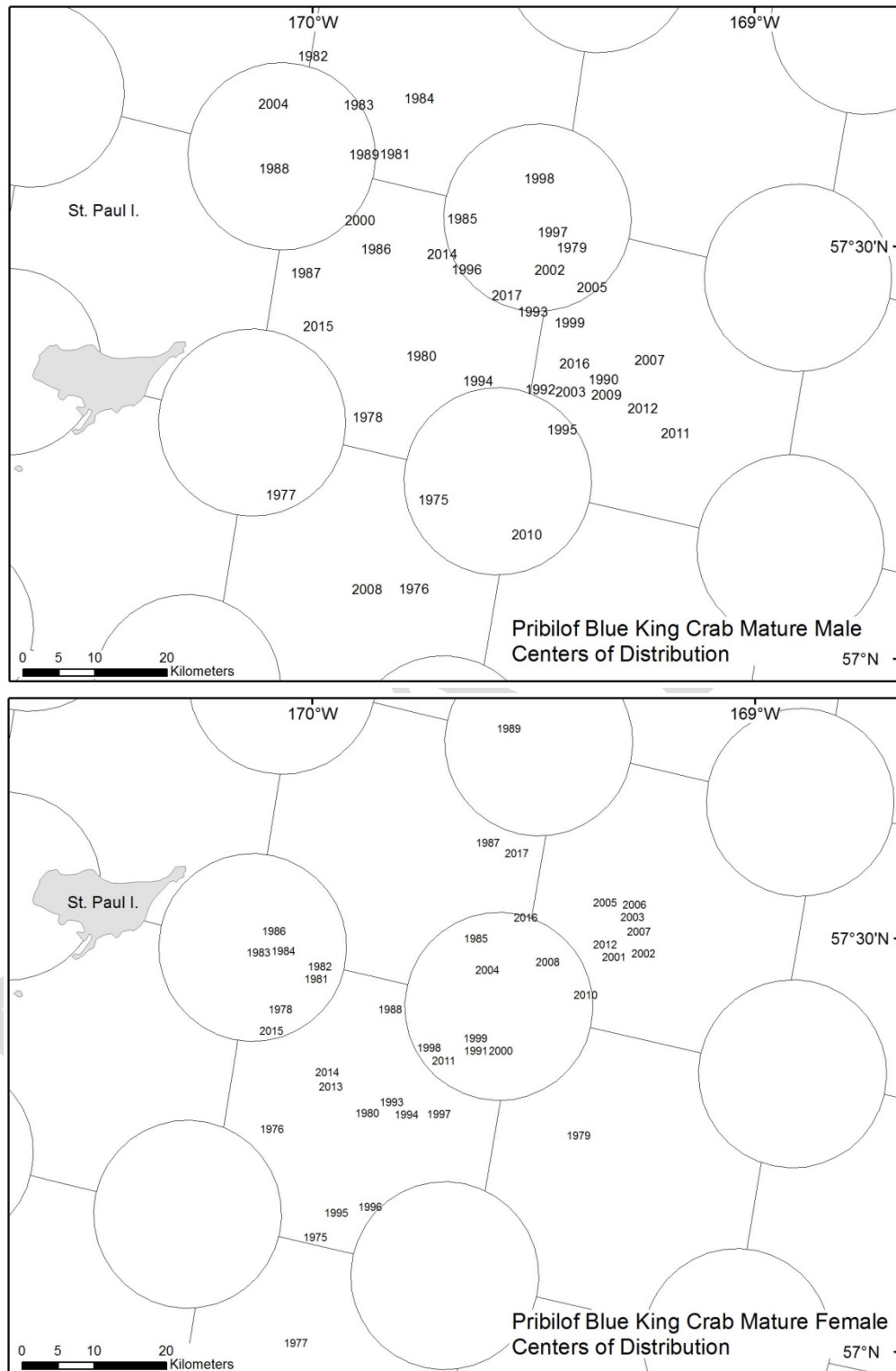


Figure 39. -- Centers of stock distribution of Pribilof Islands male and female blue king crab (*Paralithodes platypus*) from 1975 to 2017.

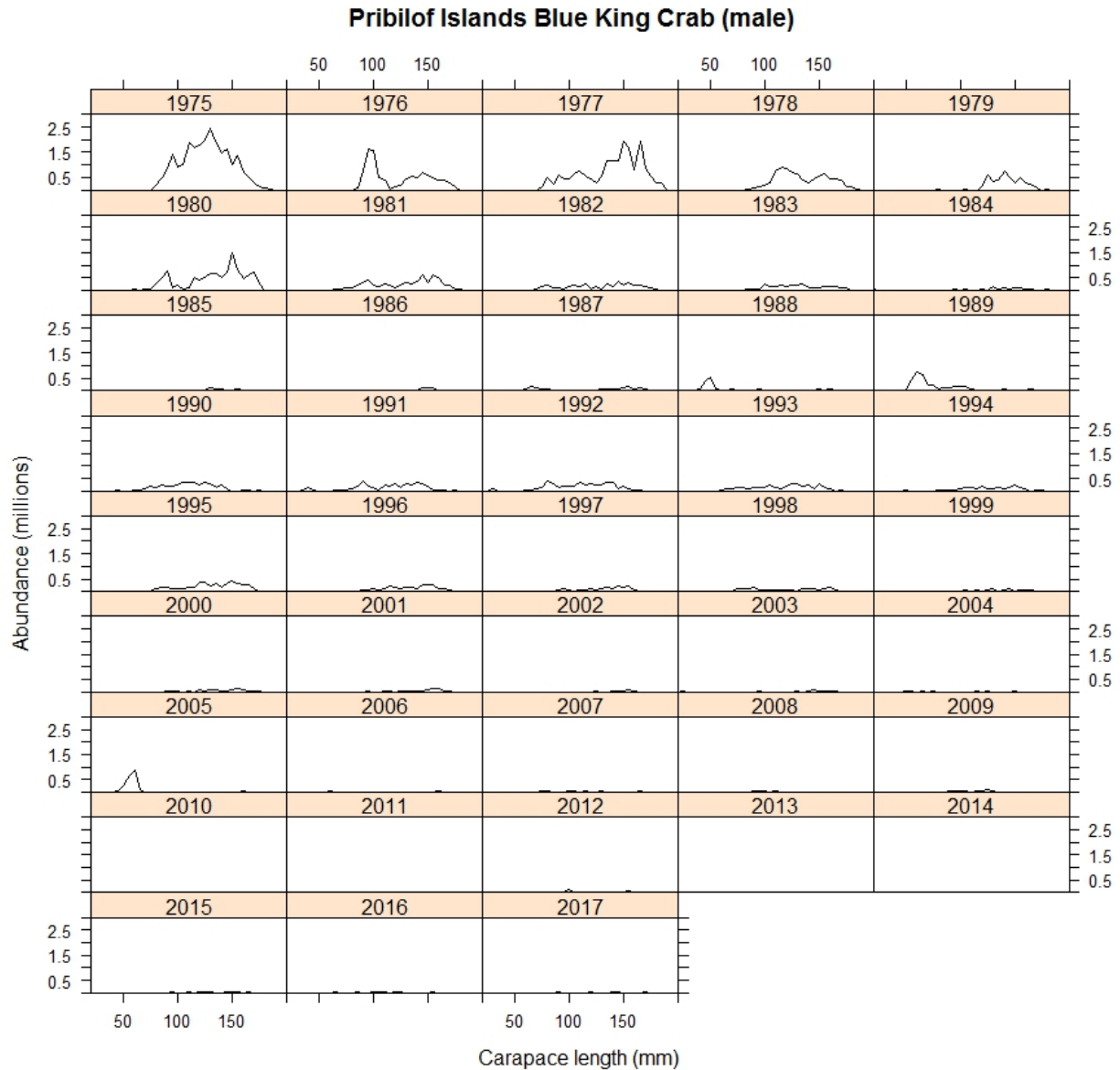


Figure 40. -- Size frequency by 5 mm length classes of Pribilof Islands male blue king crab (*Paralithodes platypus*) from 1975 to 2017.

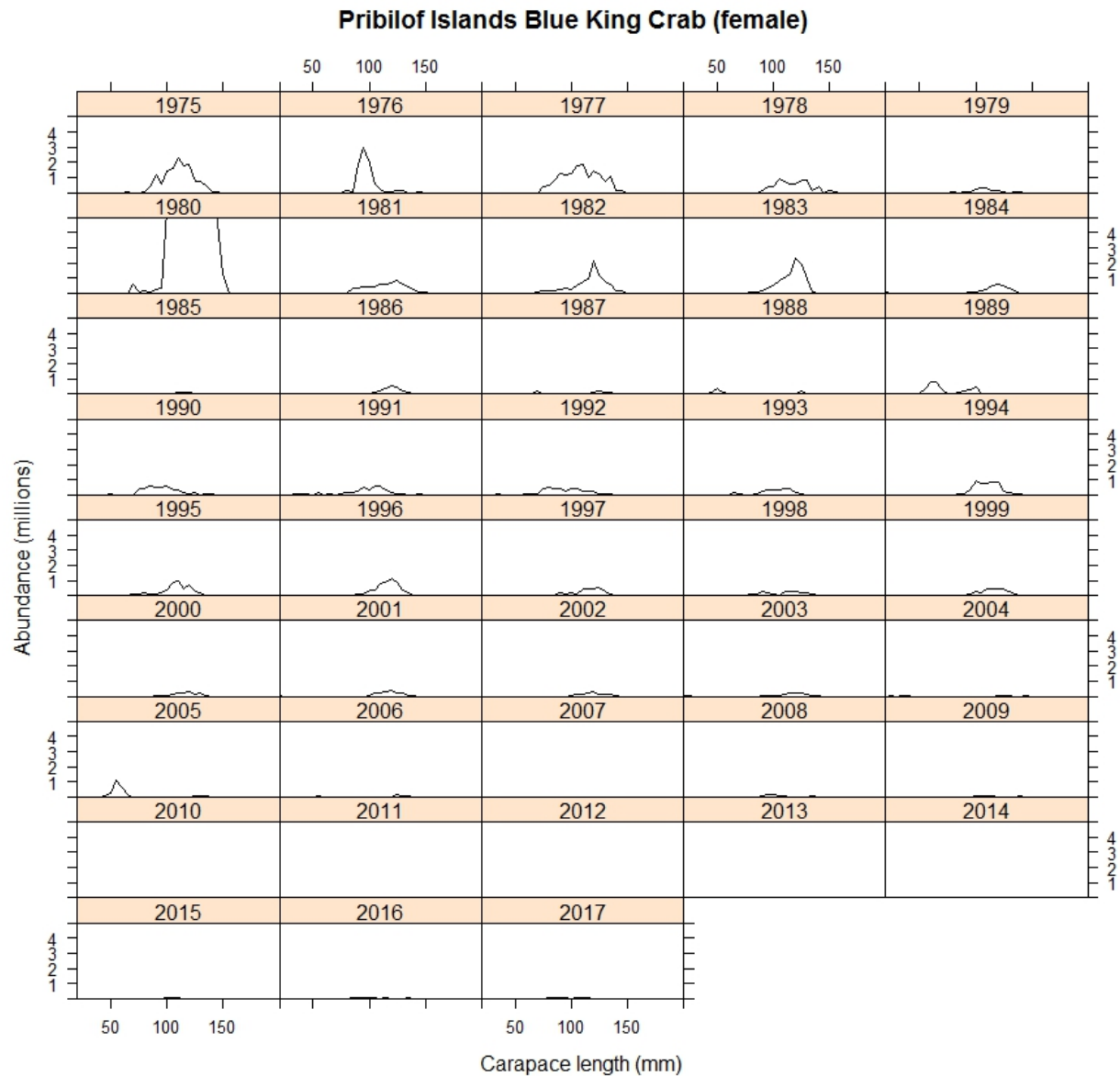


Figure 41. -- Size frequency by 5 mm length classes of Pribilof Islands female blue king crab (*Paralithodes platypus*) from 1975 to 2017.

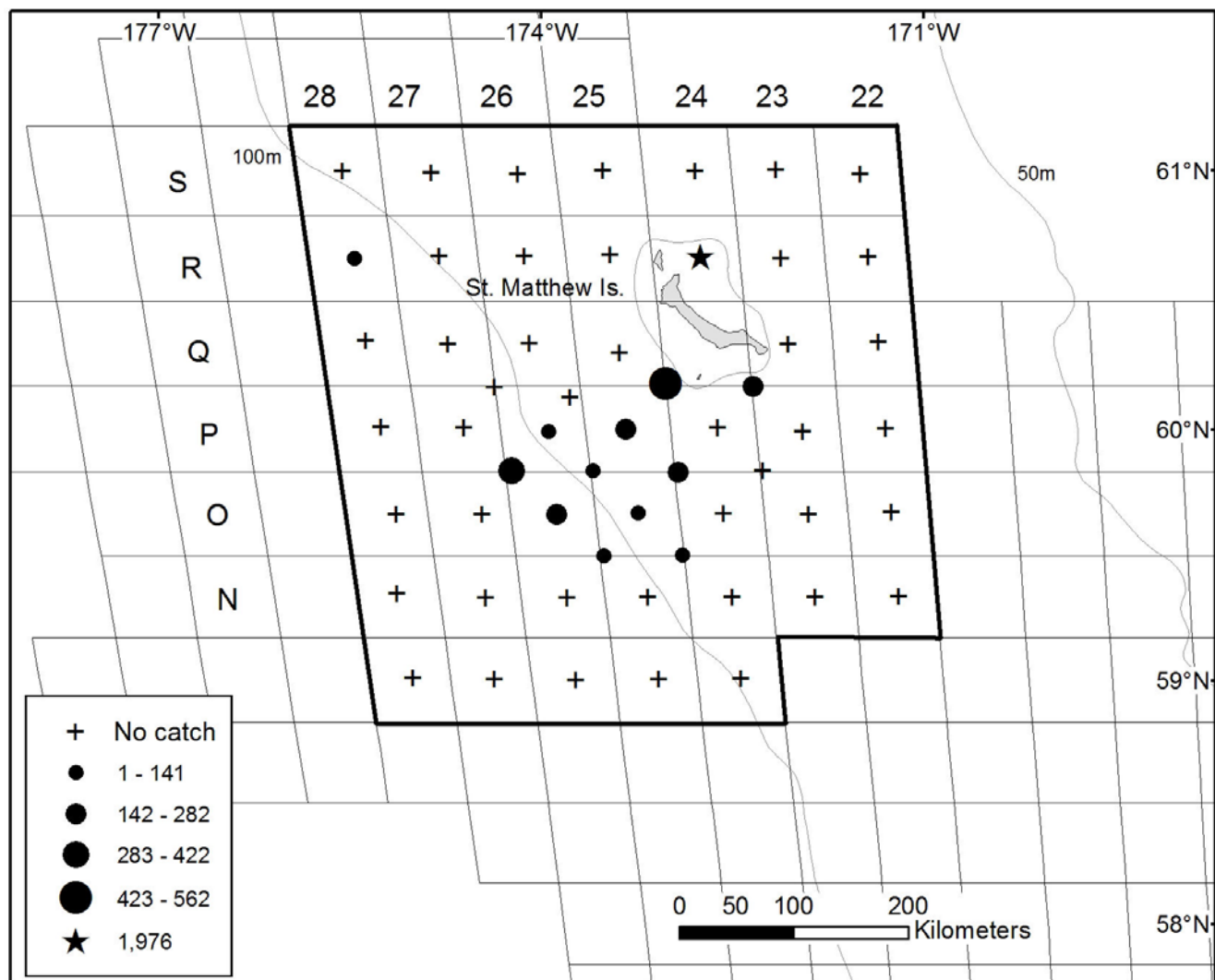


Figure 42. -- Total density (number  $\text{nmi}^{-2}$ ) of blue king crab (*Paralithodes platypus*) at each station sampled in the St. Matthew Island Section of the Northern District in 2017. Data depicted by circles are equal interval densities, while stars are densities larger than the standard scale. The outlined area depicts stations within the St. Matthew Island Section sampling strata.

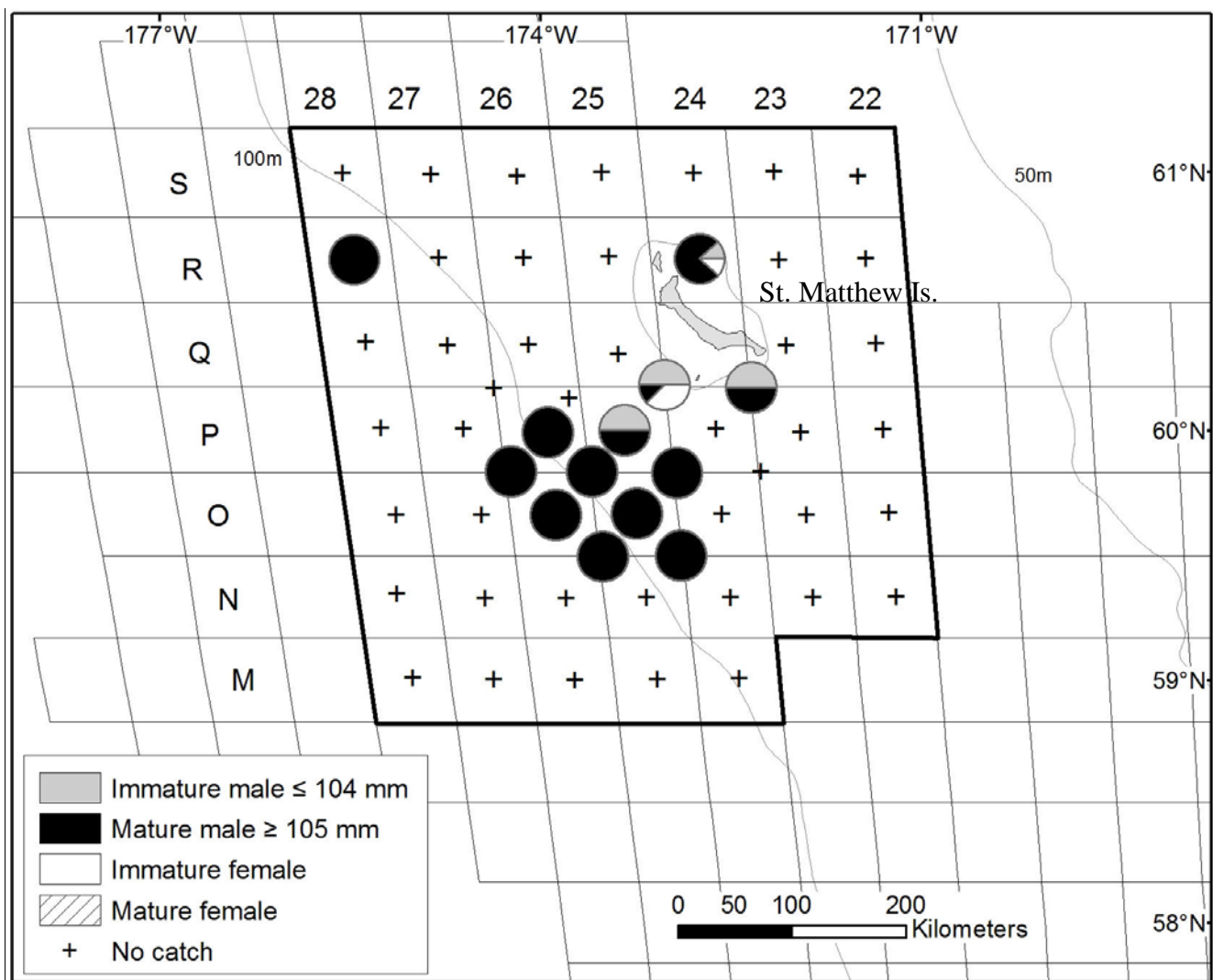


Figure 43. -- Percentage of male and female blue king crab (*Paralithodes platypus*) maturity categories at each station of the St. Matthew Island Section of the Northern District in 2017. The outlined area depicts stations within the St. Matthew Island Section sampling strata.



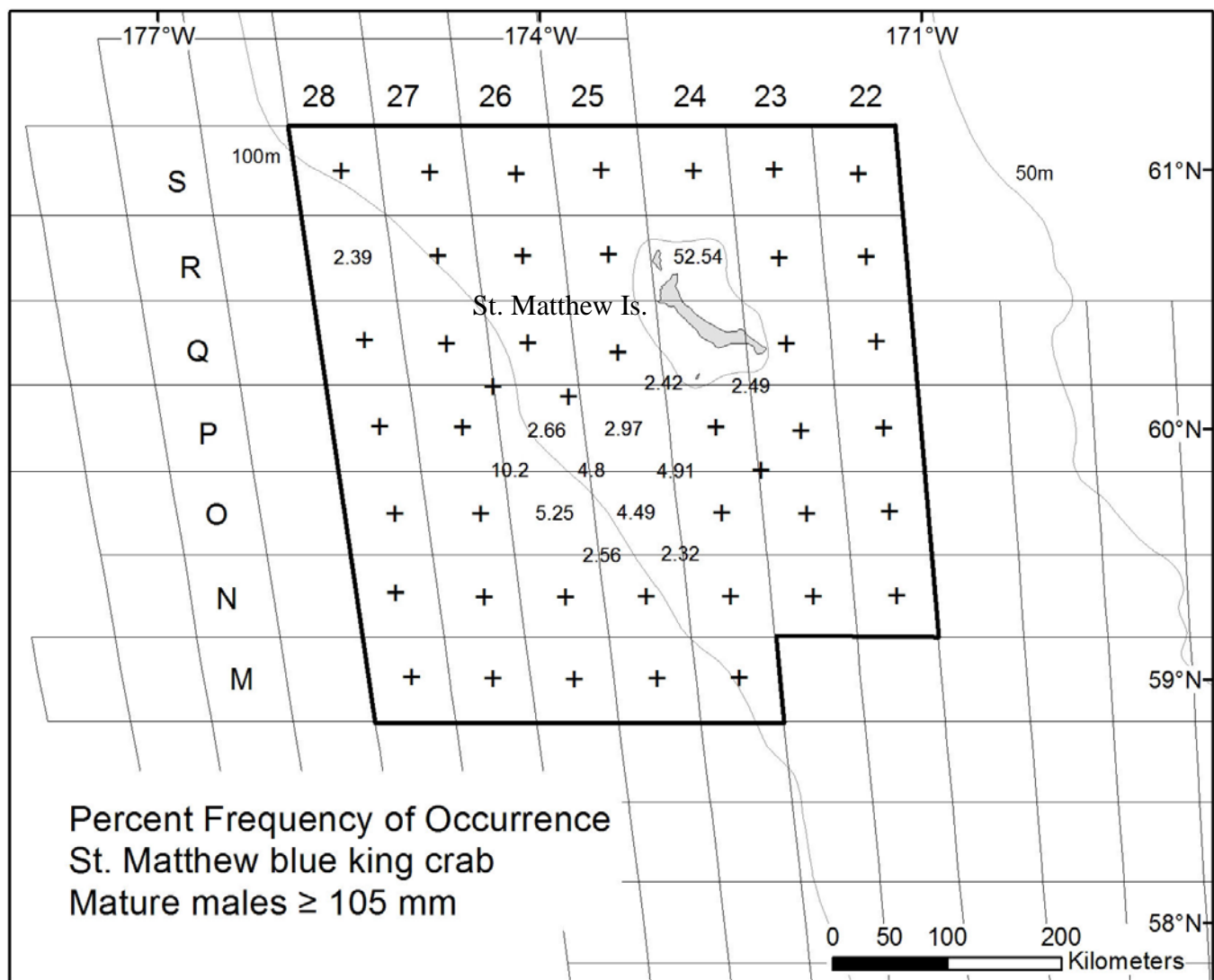


Figure 44. -- Percent frequency of occurrence of mature male blue king crab (*Paralithodes platypus*) at stations in the 2017 St. Matthew Island Section sampling strata of the Northern District.

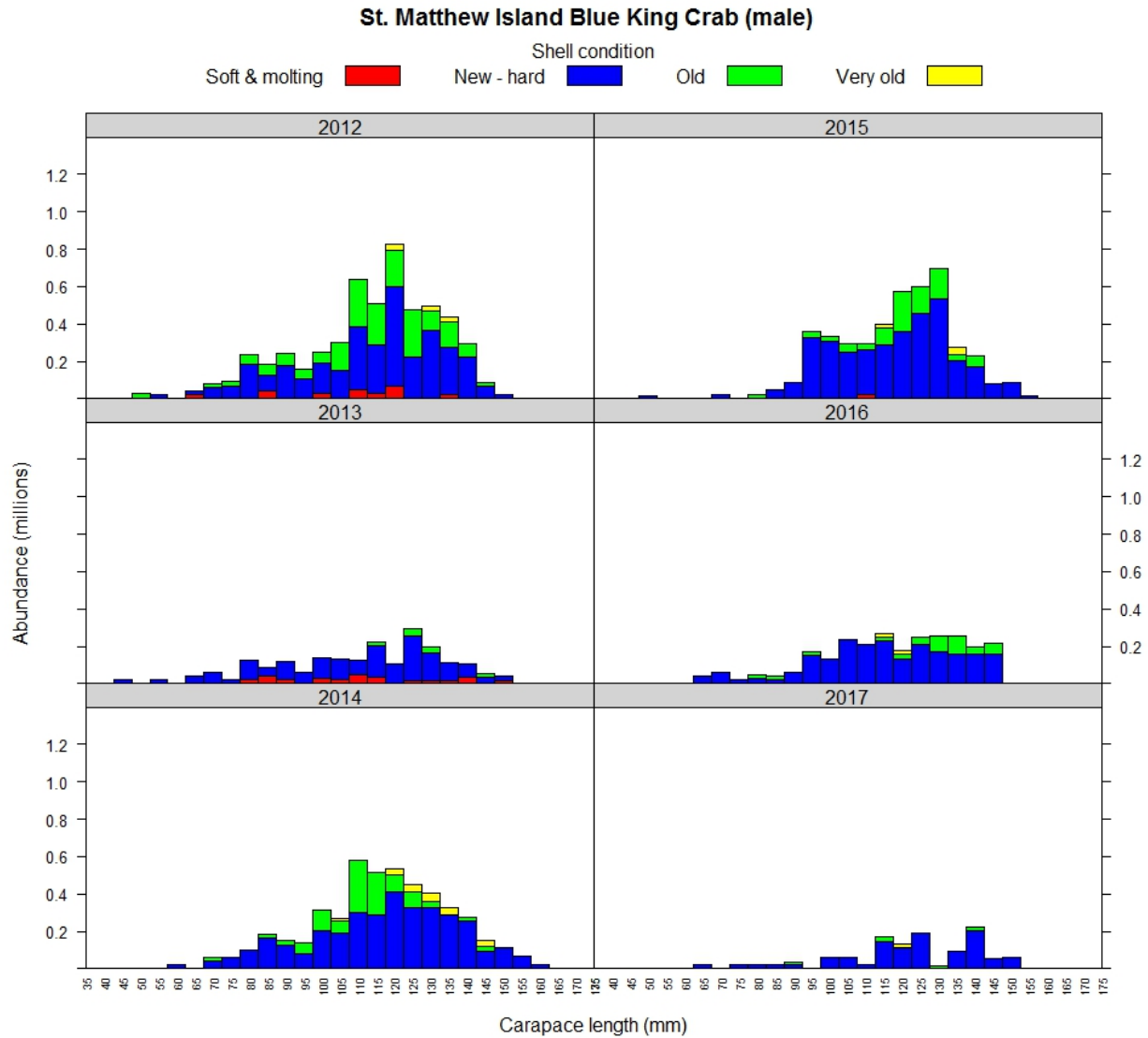


Figure 45. -- Size frequency by shell condition of St. Matthew Island Section male blue king crab (*Paralithodes platypus*) by 5 mm length classes, 2012-2017.

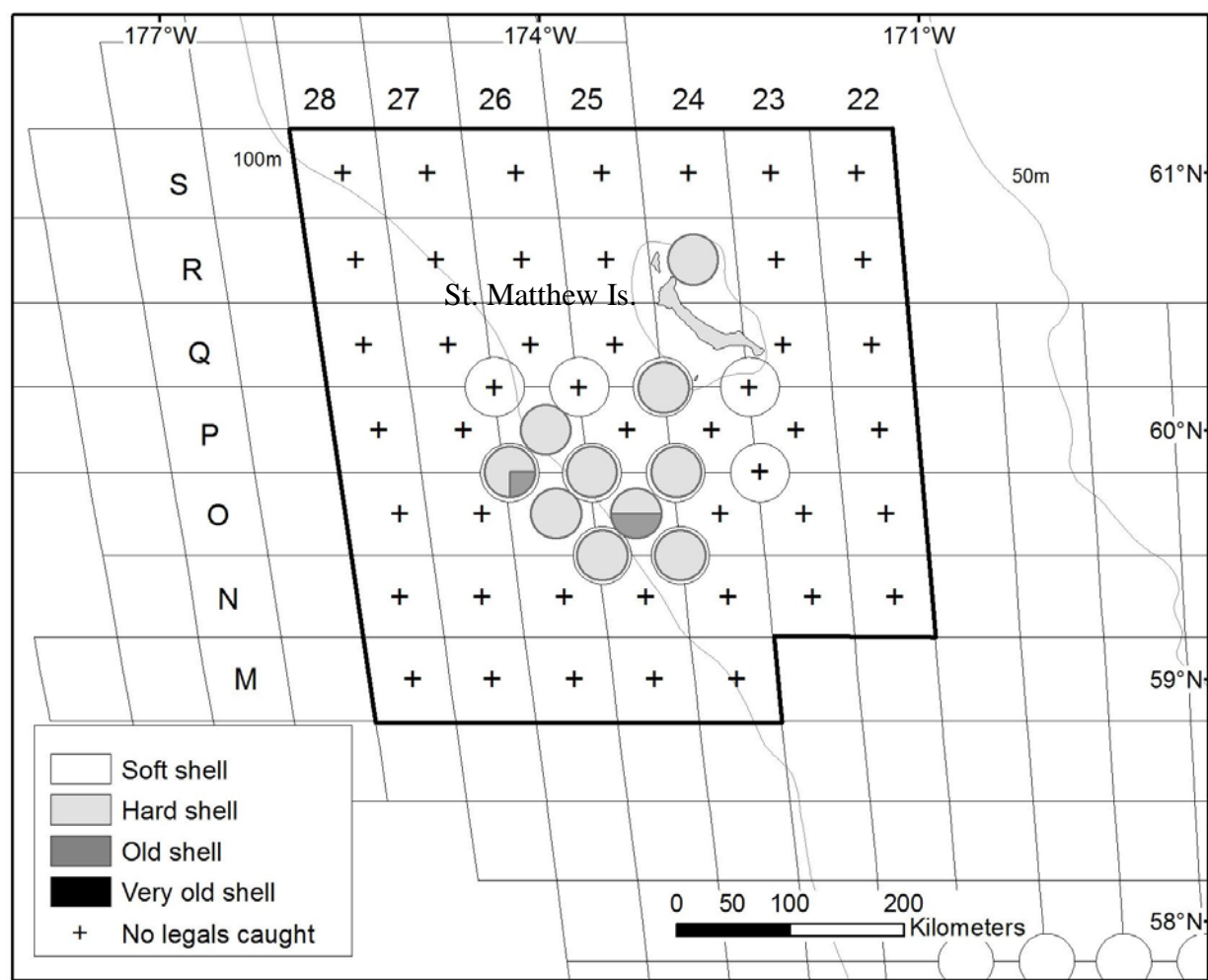


Figure 46. -- Distribution of legal-sized male blue king crab (*Paralithodes platypus*) caught at each station of the St. Matthew Island Section of the Northern District in 2017 and distinguished by shell condition. The outlined area depicts stations within the St. Matthew Island Section sampling strata.

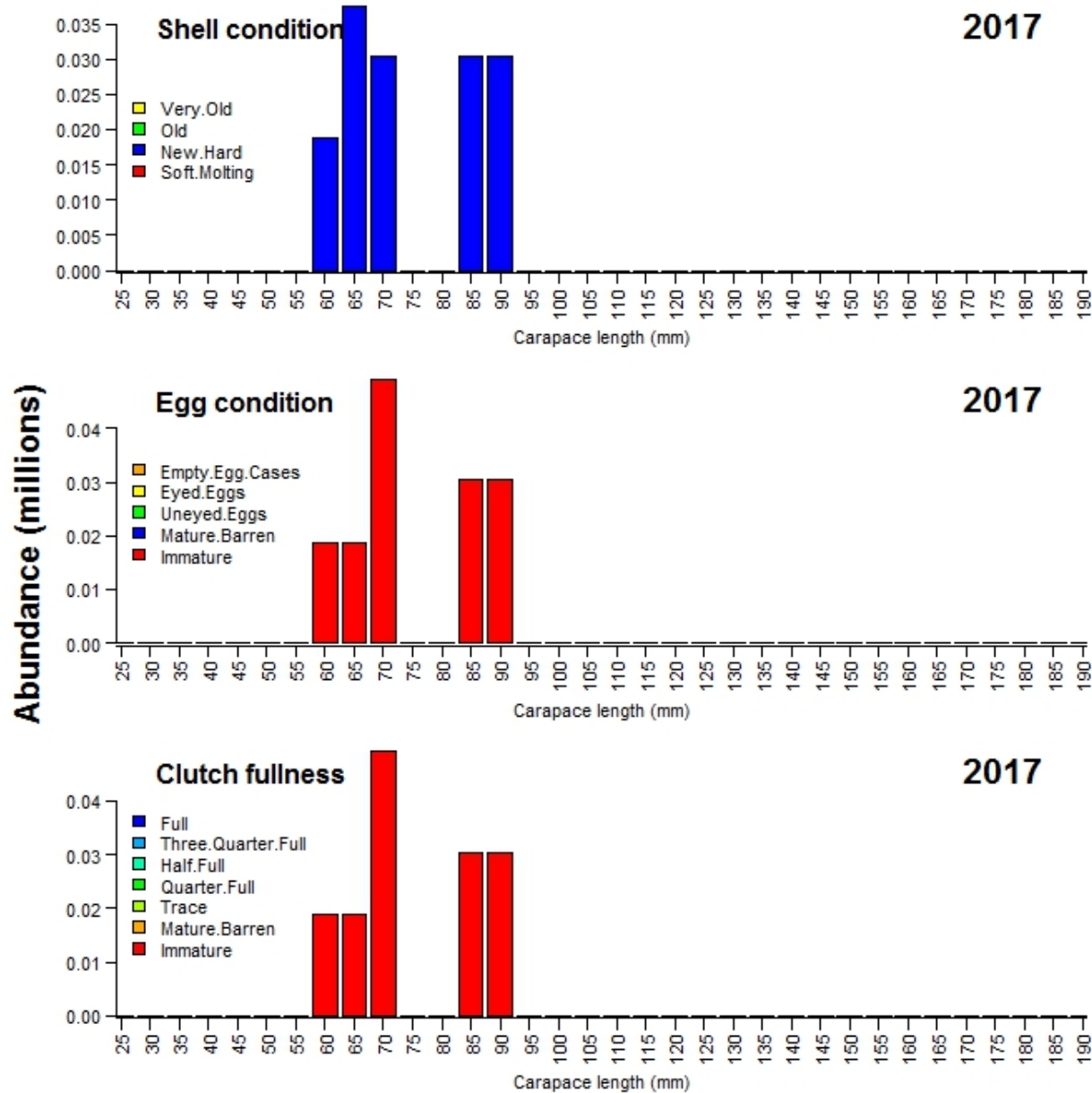


Figure 47. -- Size frequency by shell condition, egg condition, and clutch size of St. Matthew Island Section female blue king crab (*Paralithodes platypus*) by 5 mm length classes in 2017.

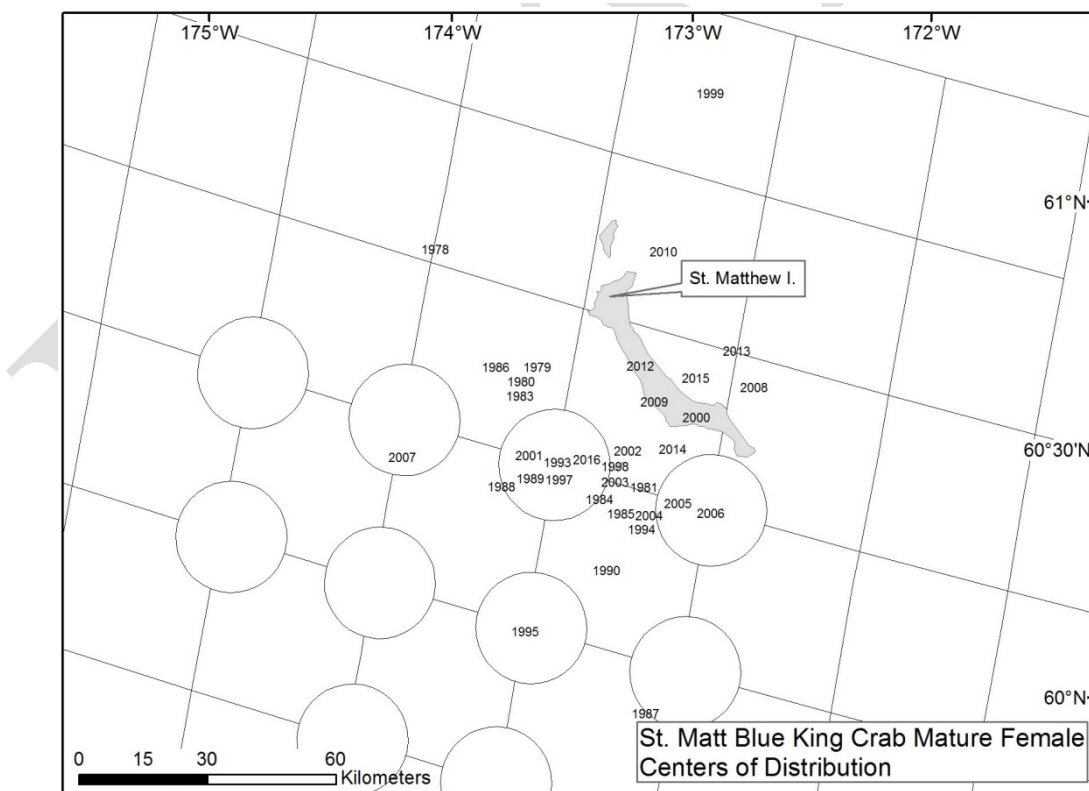
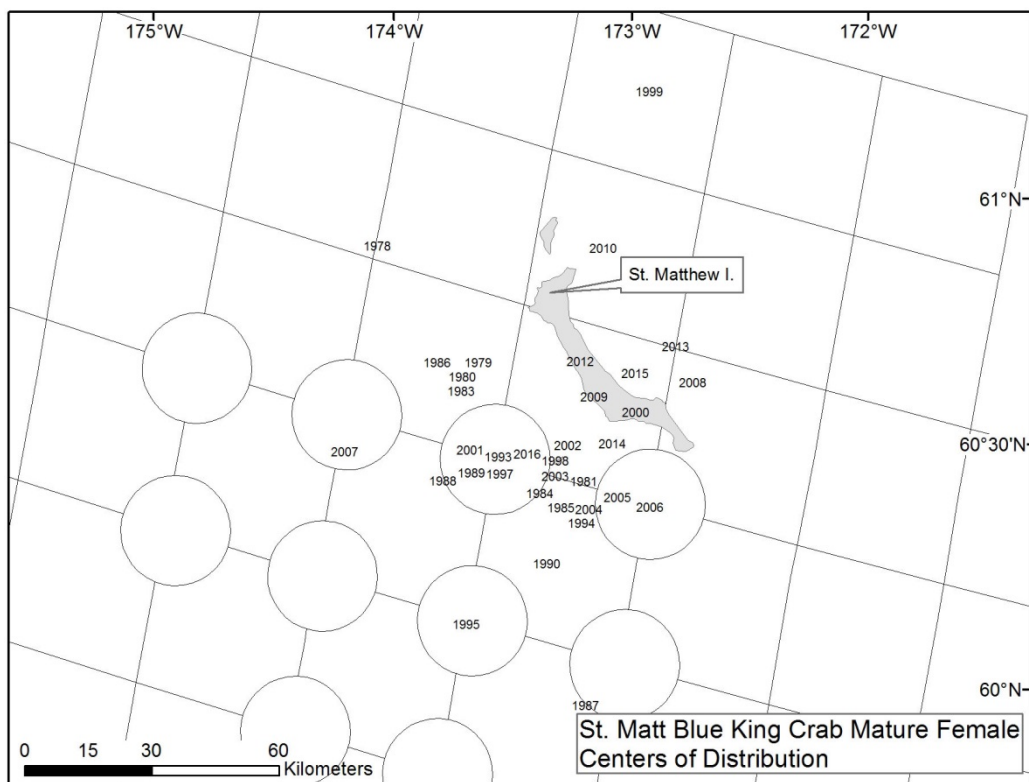


Figure 48. -- Centers of stock distribution of St. Matthew Island male and female blue king crab (*Paralithodes platypus*) from 1975 to 2017.

DRAFT

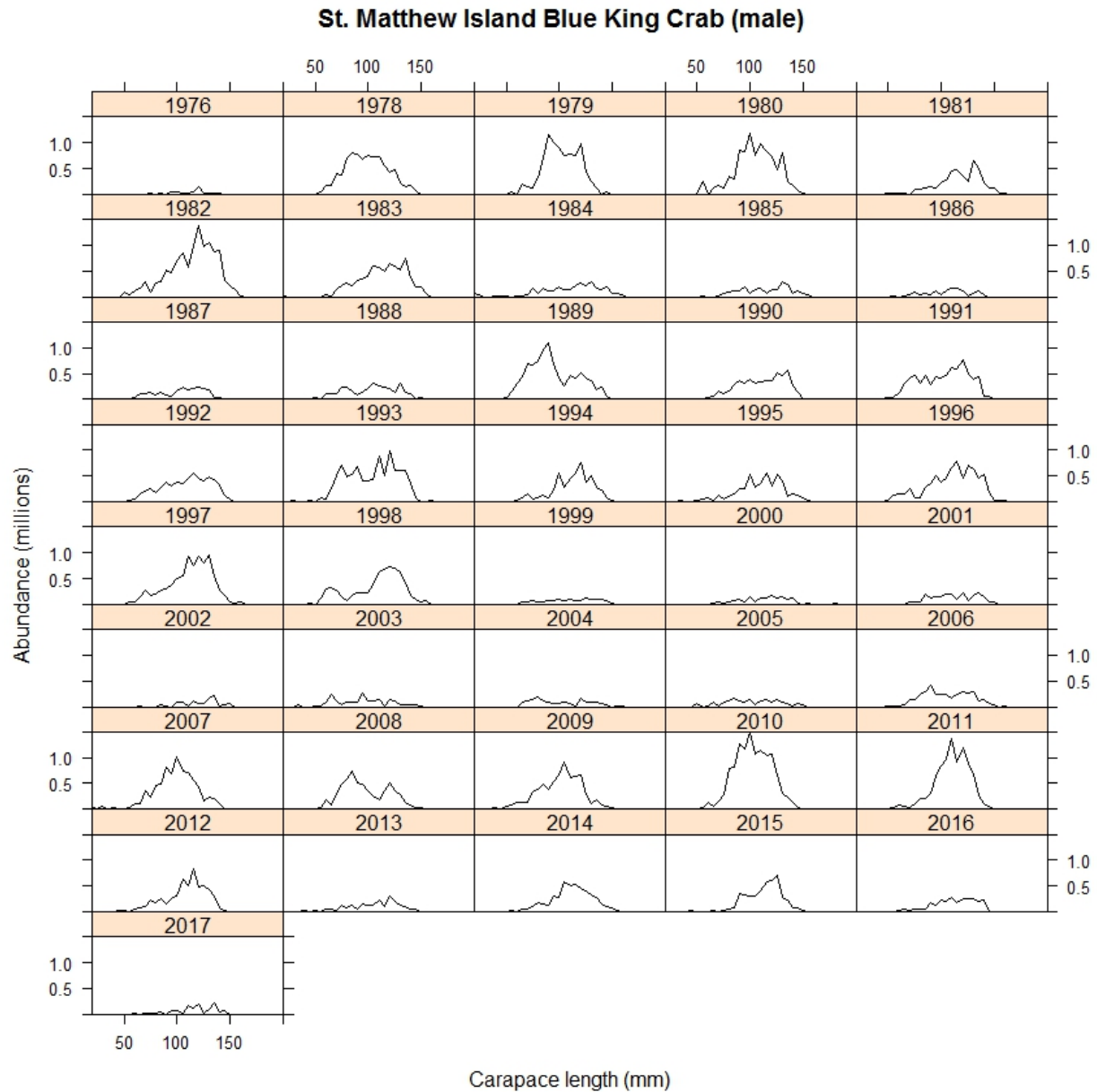


Figure 49. -- Size frequency by 5 mm length classes of St. Matthew Island Section male blue king crab (*Paralithodes platypus*) from 1976 to 2017.

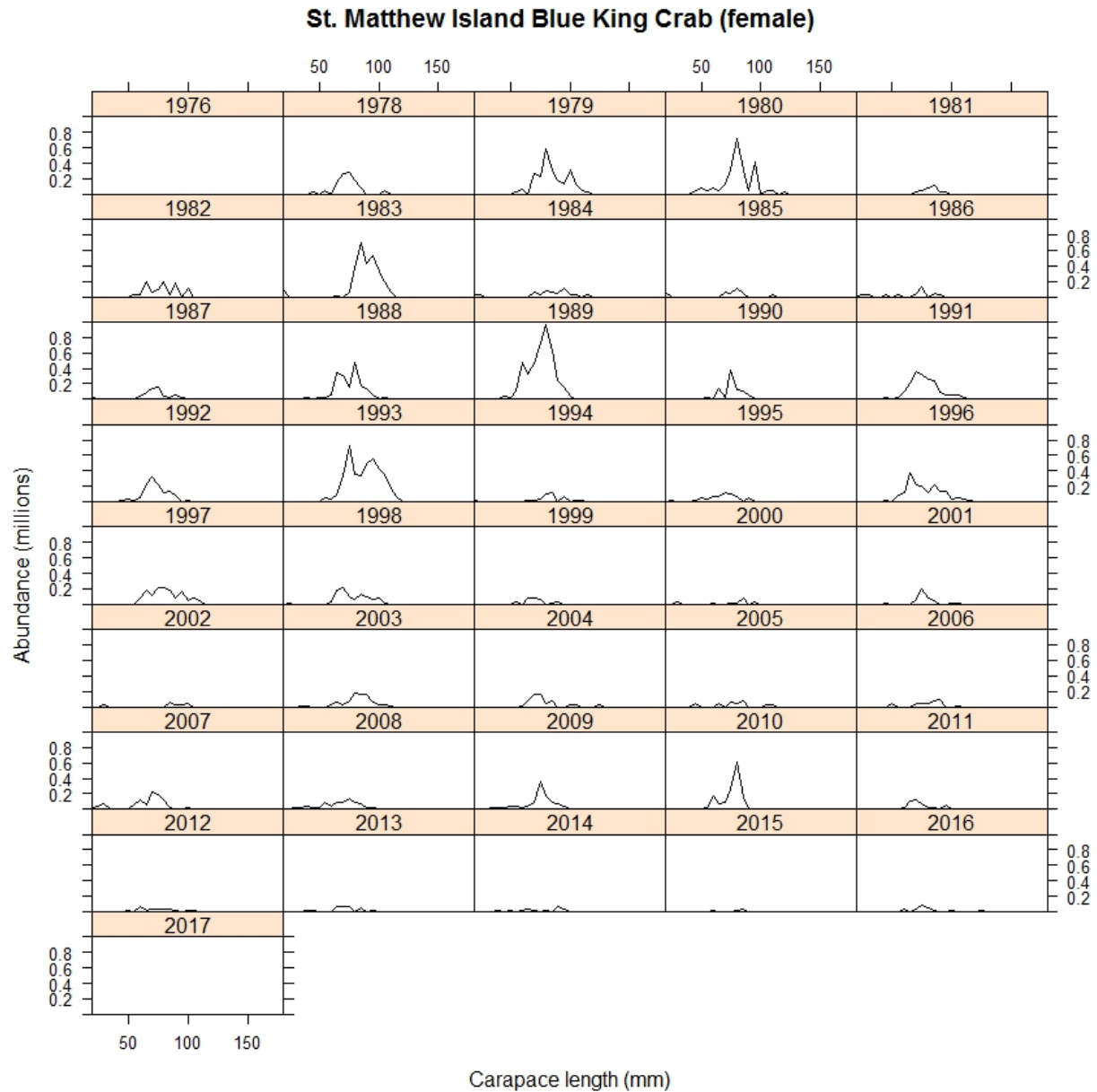


Figure 50. -- Size frequency by 5 mm length classes of St. Matthew Island Section female blue king crab (*Paralithodes platypus*) from 1976 to 2017.



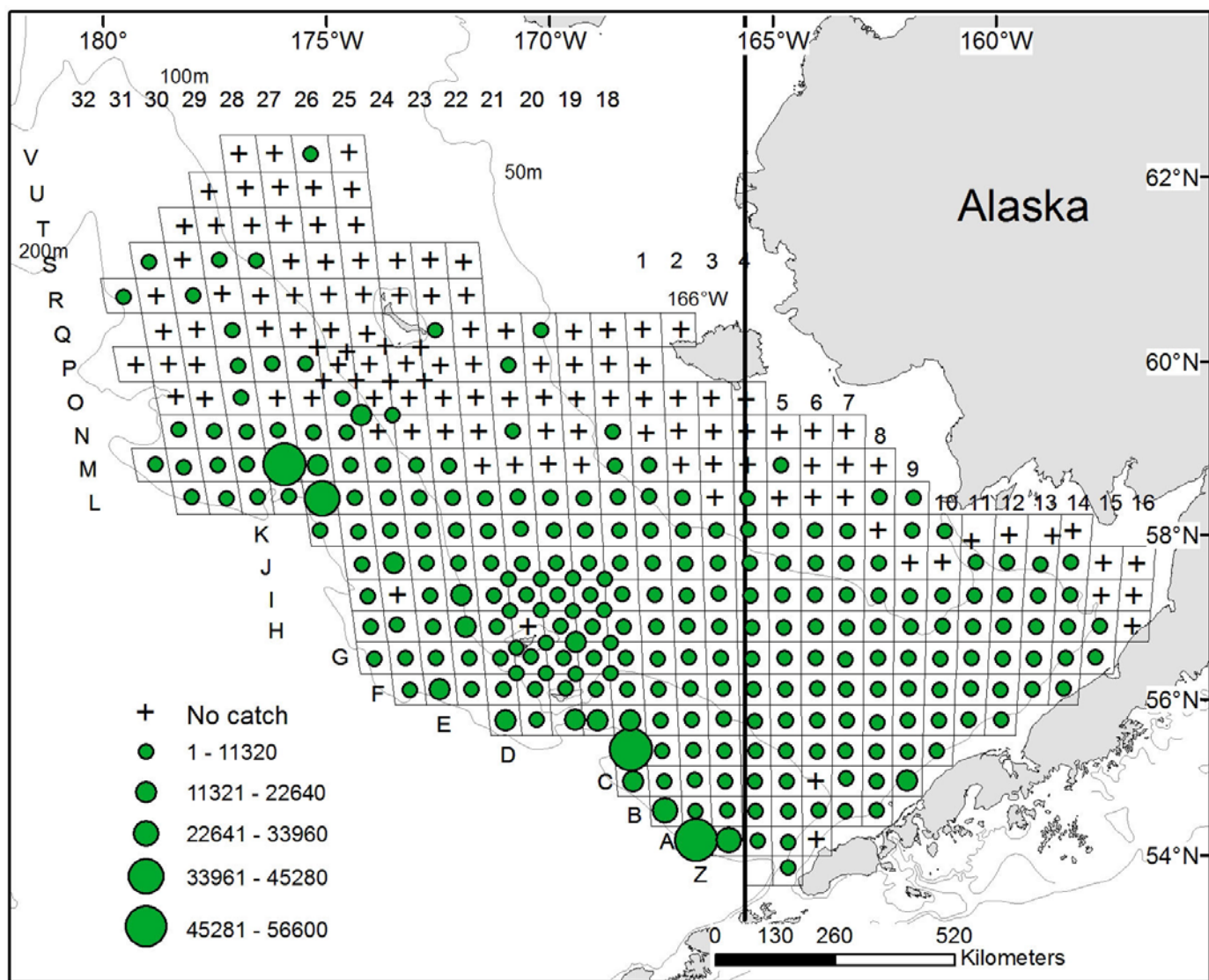


Figure 51. -- Total density (number nmi<sup>-2</sup>) of Tanner crab (*Chionoecetes bairdi*) at each station sampled in 2017.

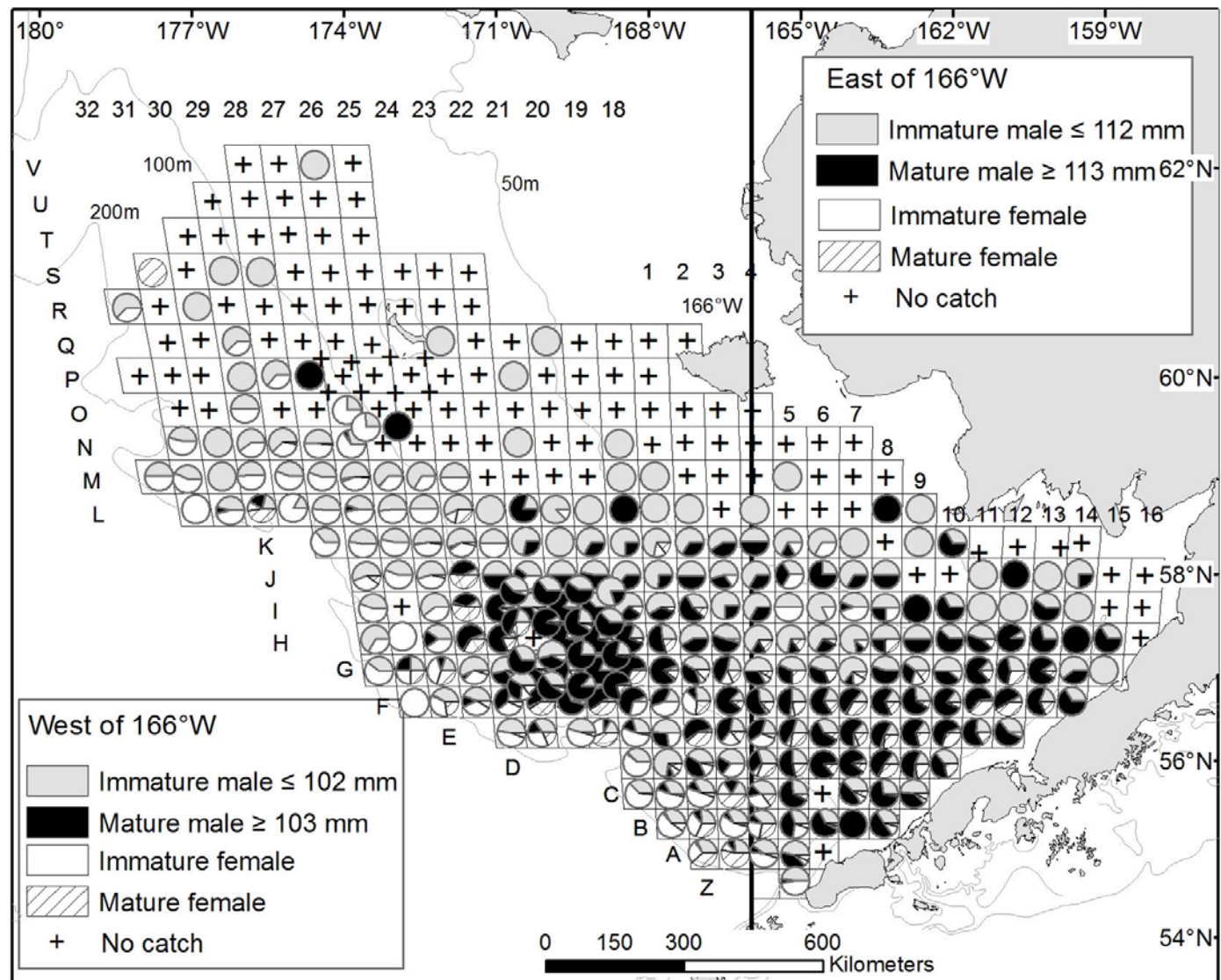


Figure 52. -- Percentage of male and female Tanner crab (*Chionoecetes bairdi*) maturity categories at each station sampled in 2017.

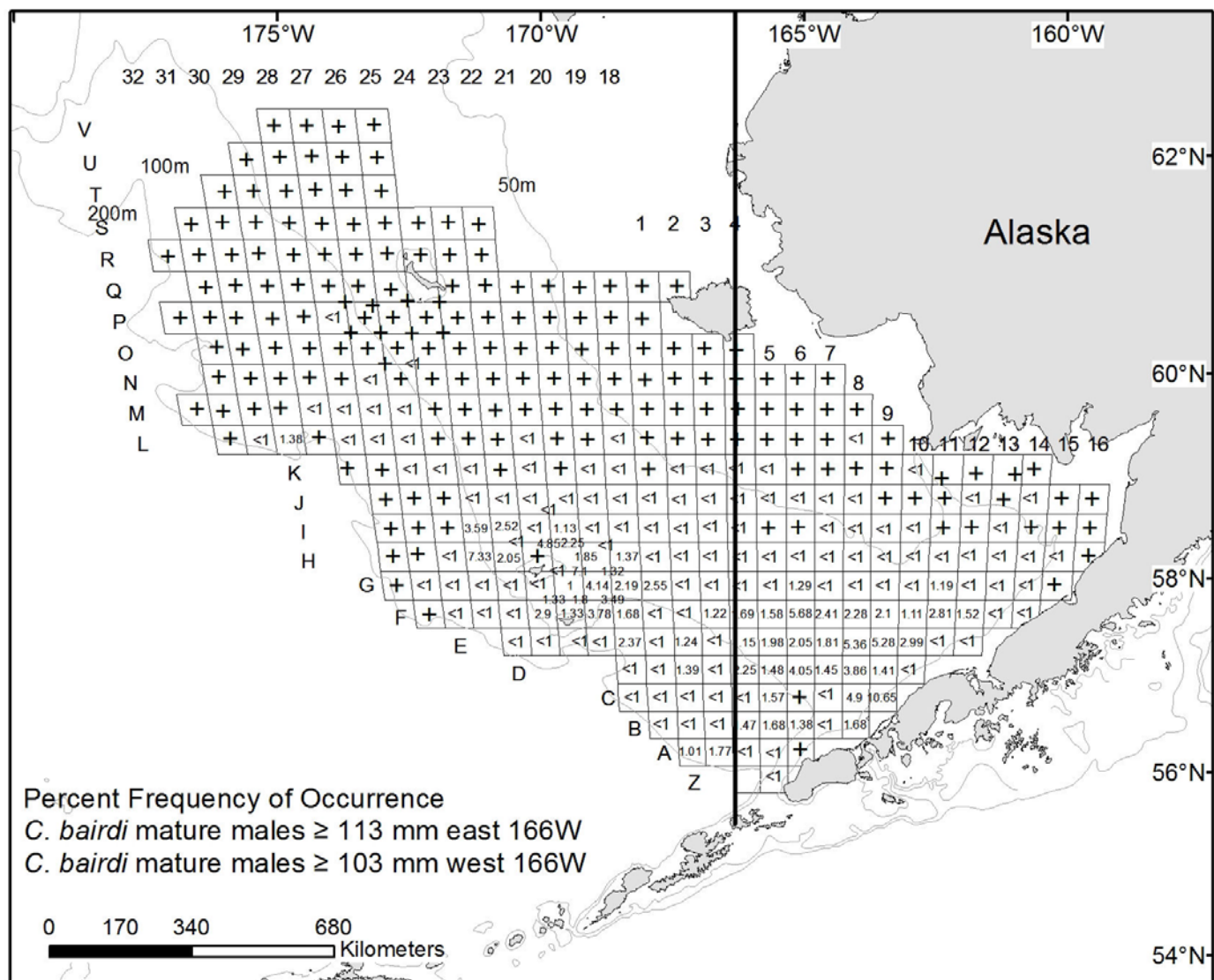


Figure 53. -- Percent frequency of occurrence of mature male Tanner crab (*Chionoecetes bairdi*) at stations sampled in 2017.

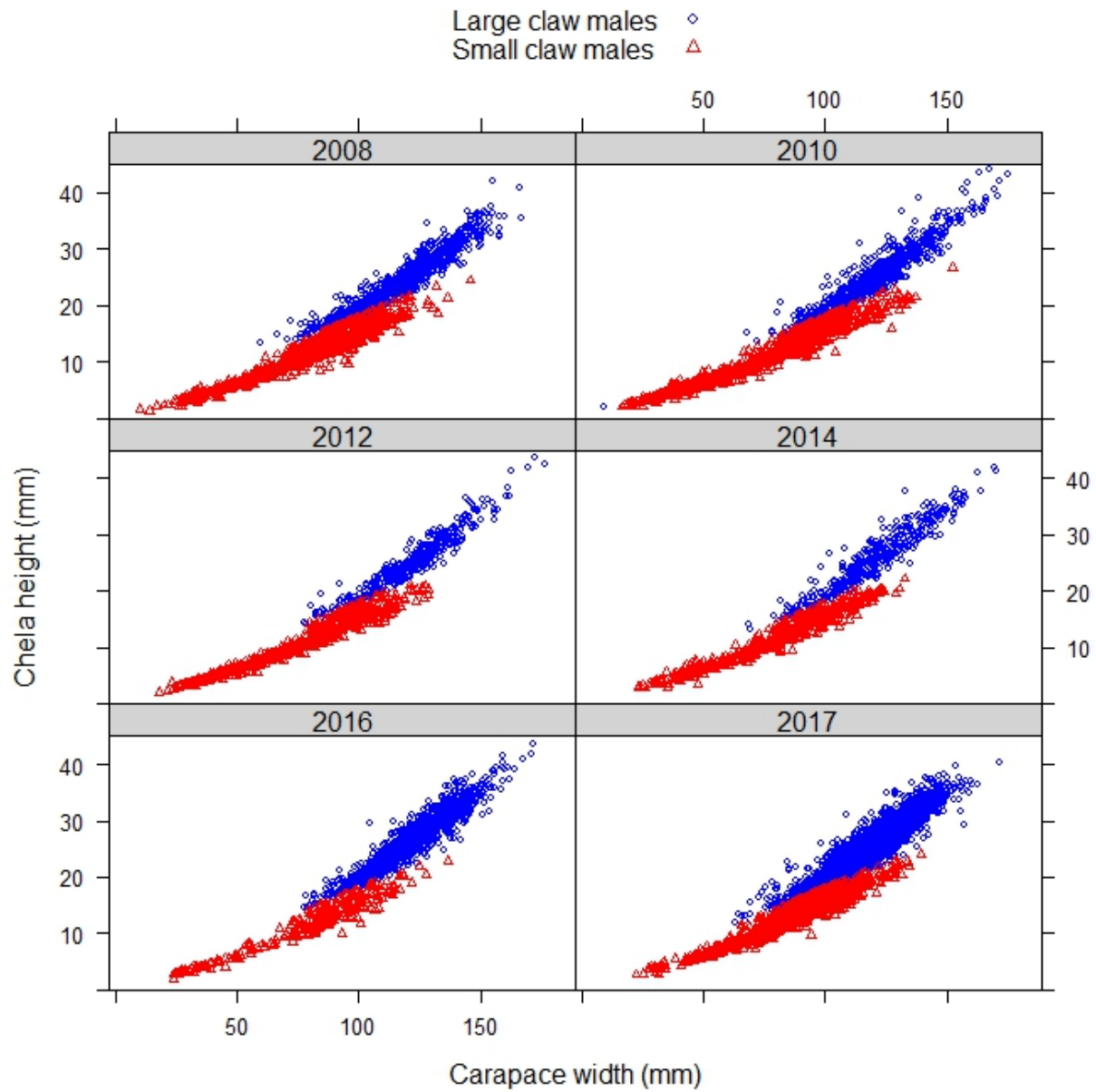


Figure 54. -- Male Tanner crab (*Chionoecetes bairdi*) chela height versus carapace width measurements collected on the 2008, 2010, 2012, 2014, 2016, and 2017 (all years combined, n = 10,115) National Marine Fisheries Service eastern Bering Sea bottom trawl surveys.

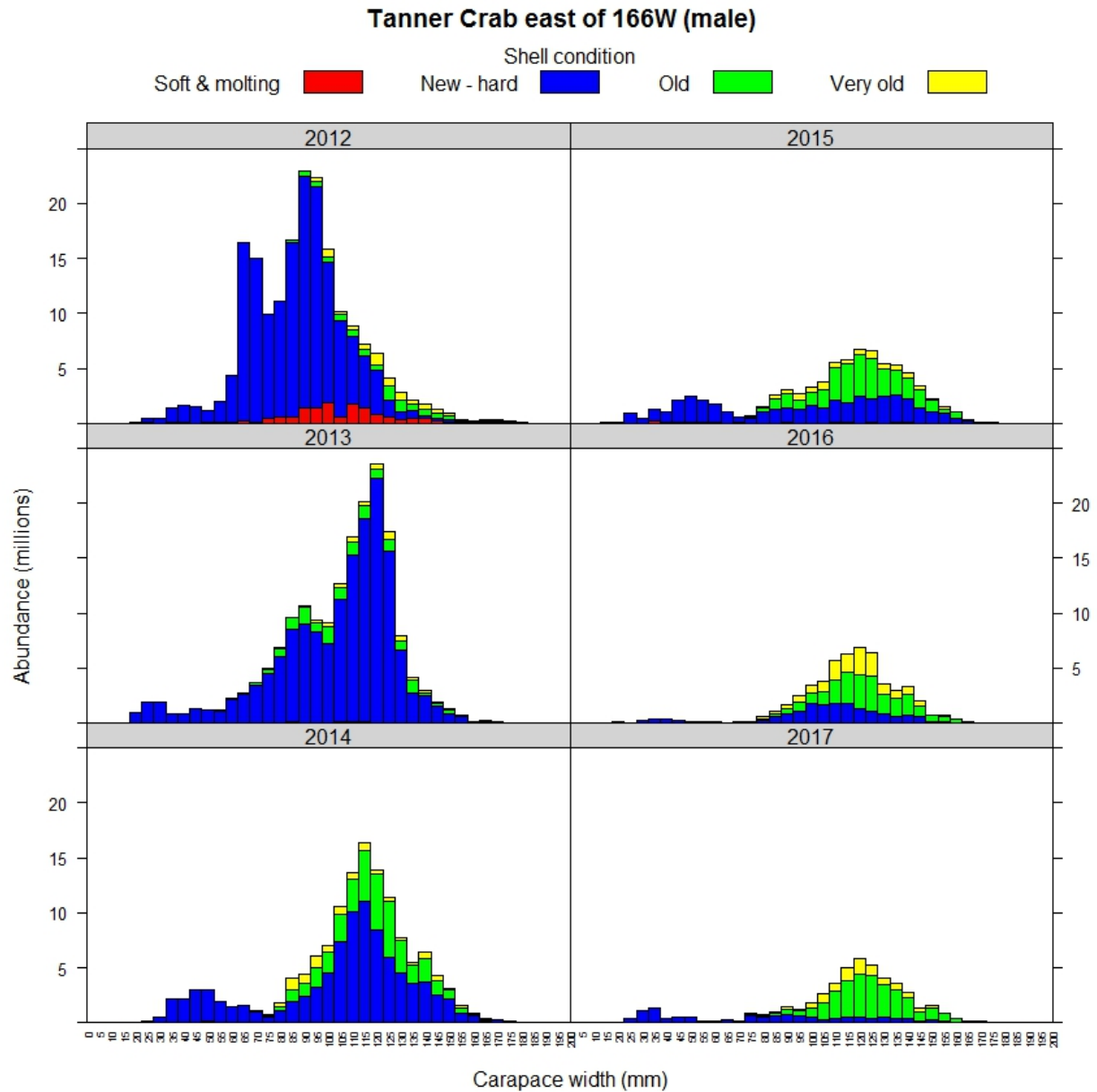


Figure 55. -- Size frequency by shell condition of male Tanner crab (*Chionoecetes bairdi*) east of 166° W by 5 mm width classes of all districts combined, 2012-2017.



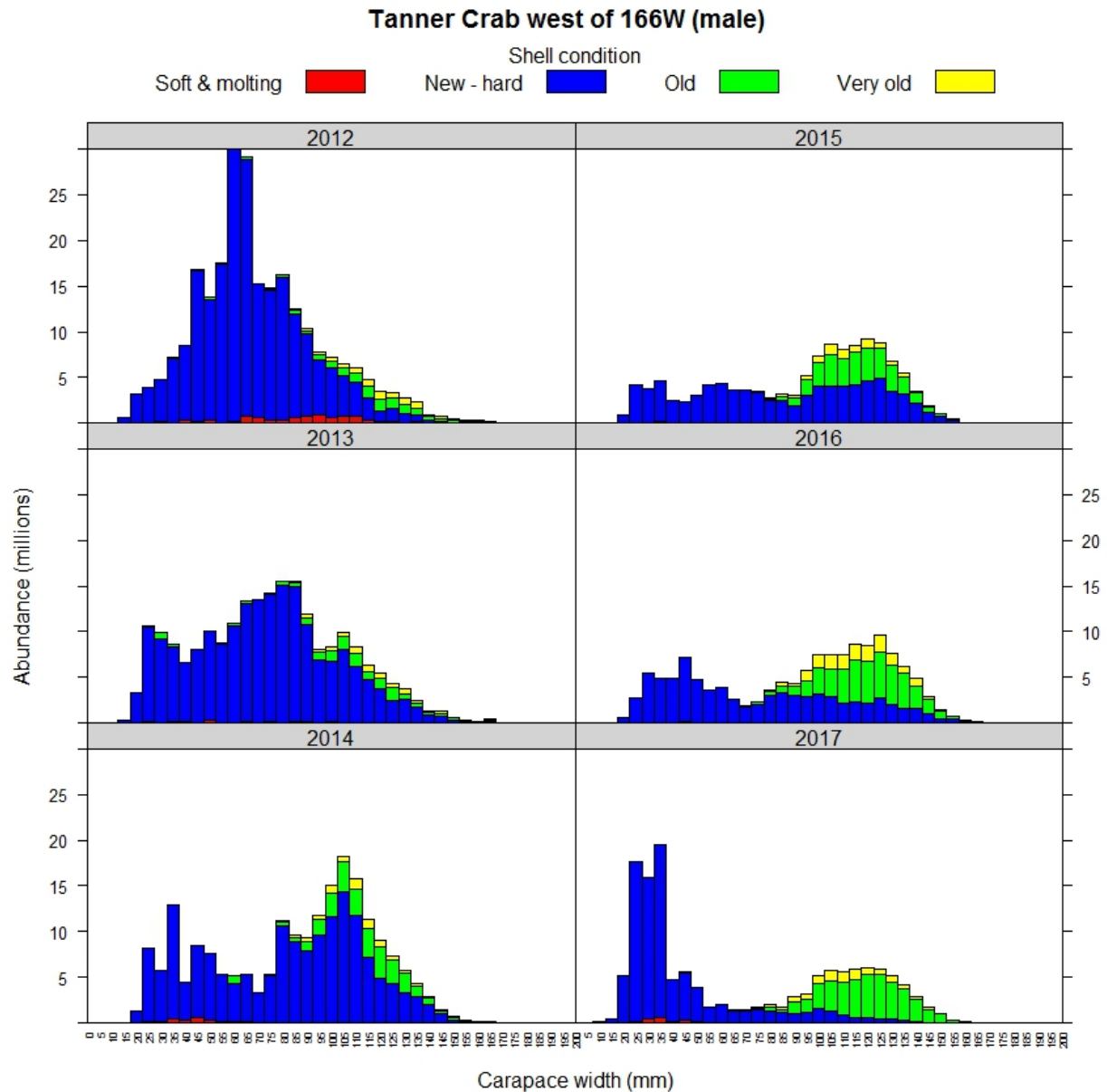


Figure 56. -- Size frequency by shell condition of male Tanner crab (*Chionoecetes bairdi*) west of 166° W by 5 mm width classes of all districts combined, 2012-2017.

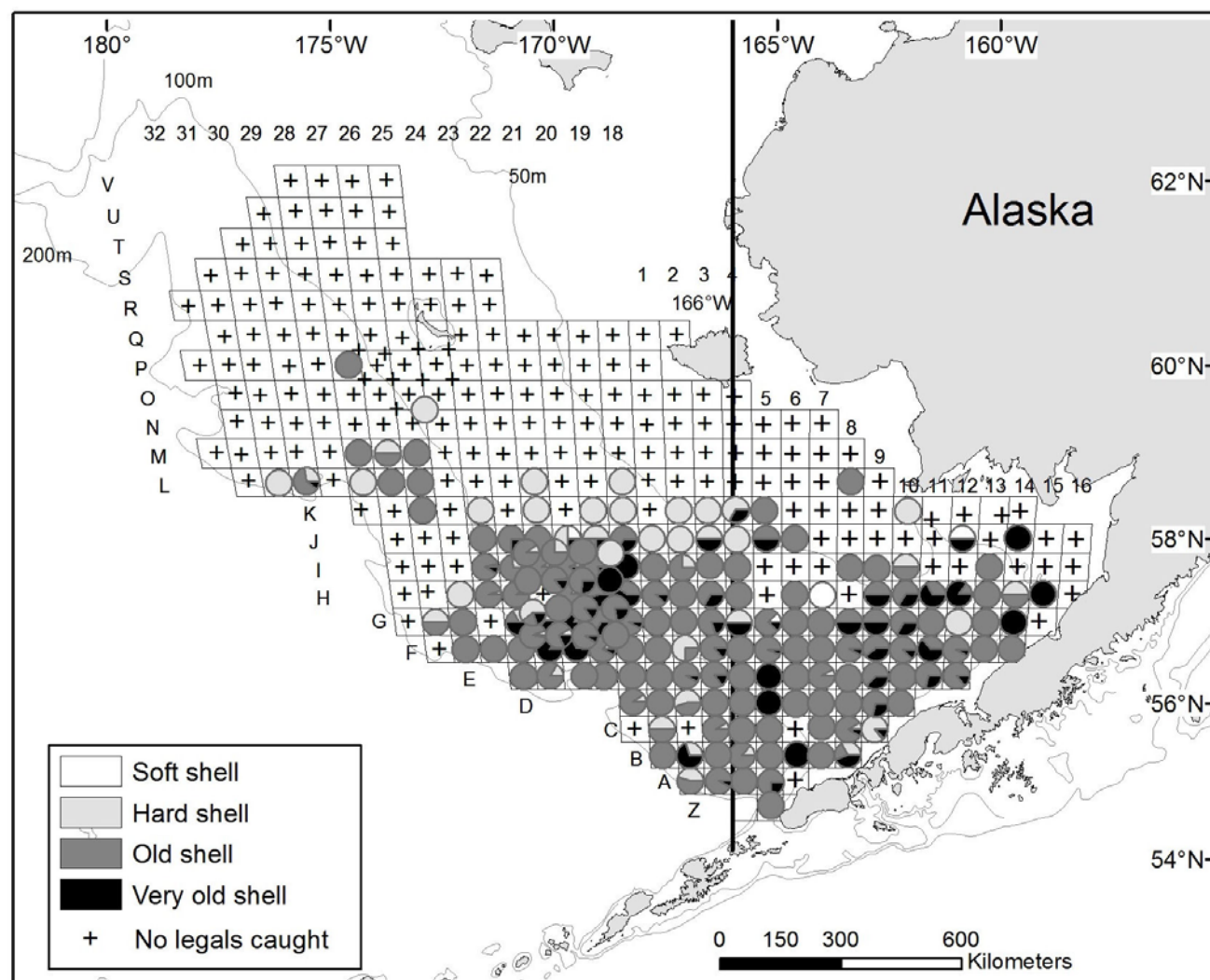


Figure 57. -- Distribution of legal-sized male Tanner crab (*Chionoecetes bairdi*) caught at each station in 2017 and distinguished by shell condition. Tanner male crab  $\geq 120$  mm and  $\geq 110$  mm CW are the legal-size categories for east and west of 166° W, respectively.

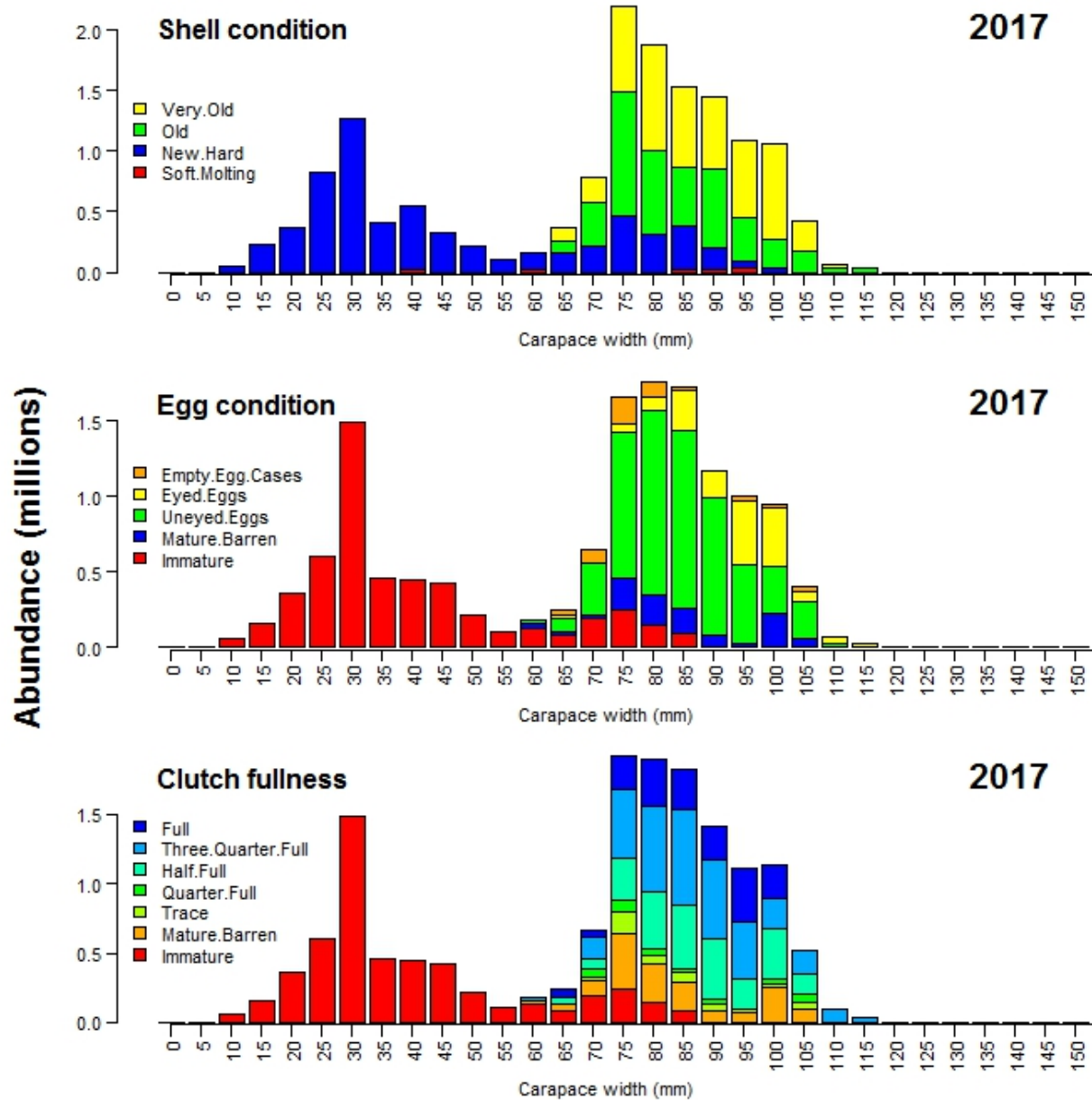


Figure 58. -- Size frequency by shell condition, egg condition, and clutch fullness of female Tanner crab (*Chionoecetes bairdi*) east of 166° W by 5 mm width classes for all districts combined in 2017.



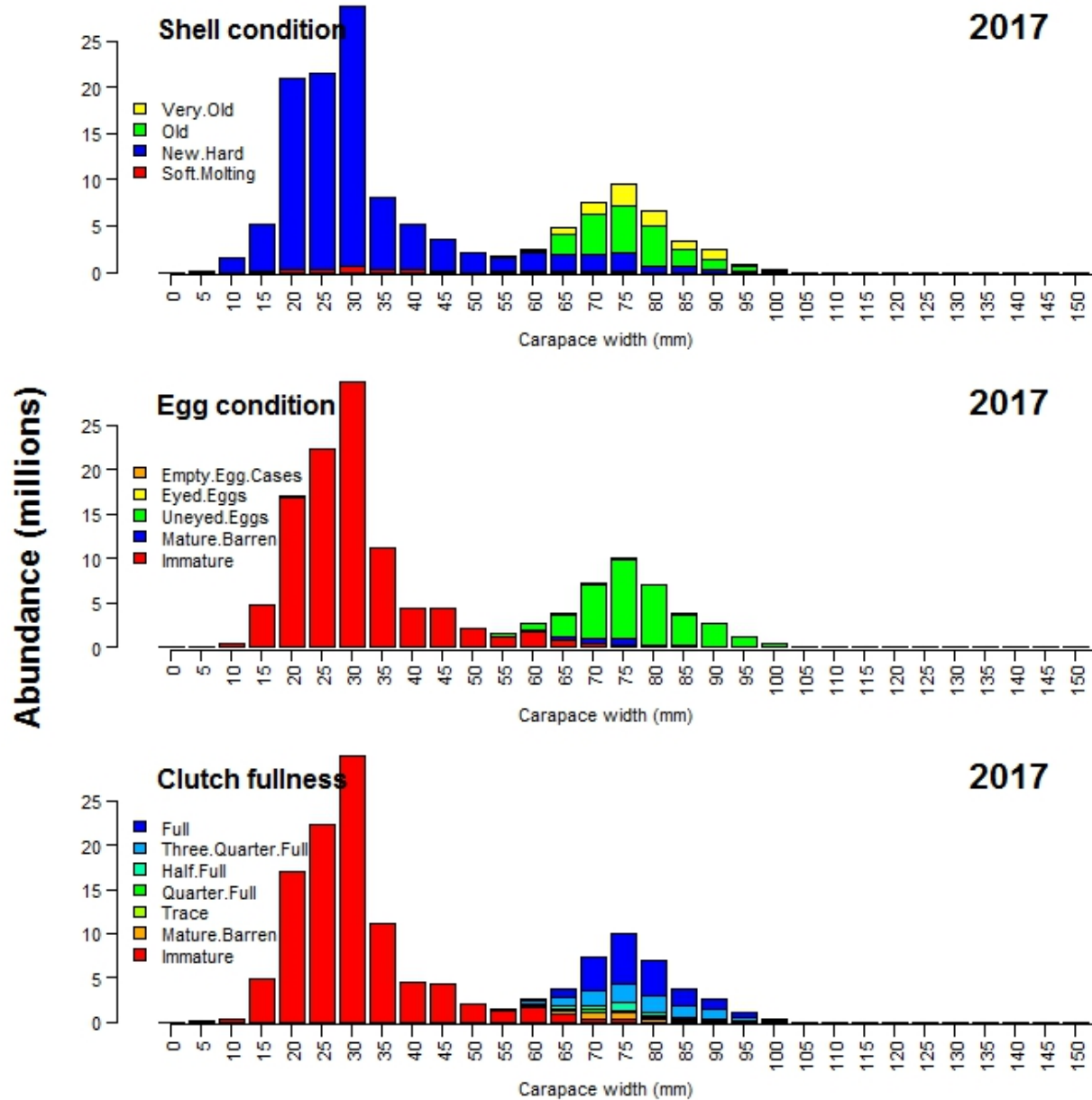


Figure 59. -- Size frequency by shell condition, egg condition, and clutch fullness of female Tanner crab (*Chionoecetes bairdi*) west of 166° W by 5 mm width classes for all districts combined in 2017.

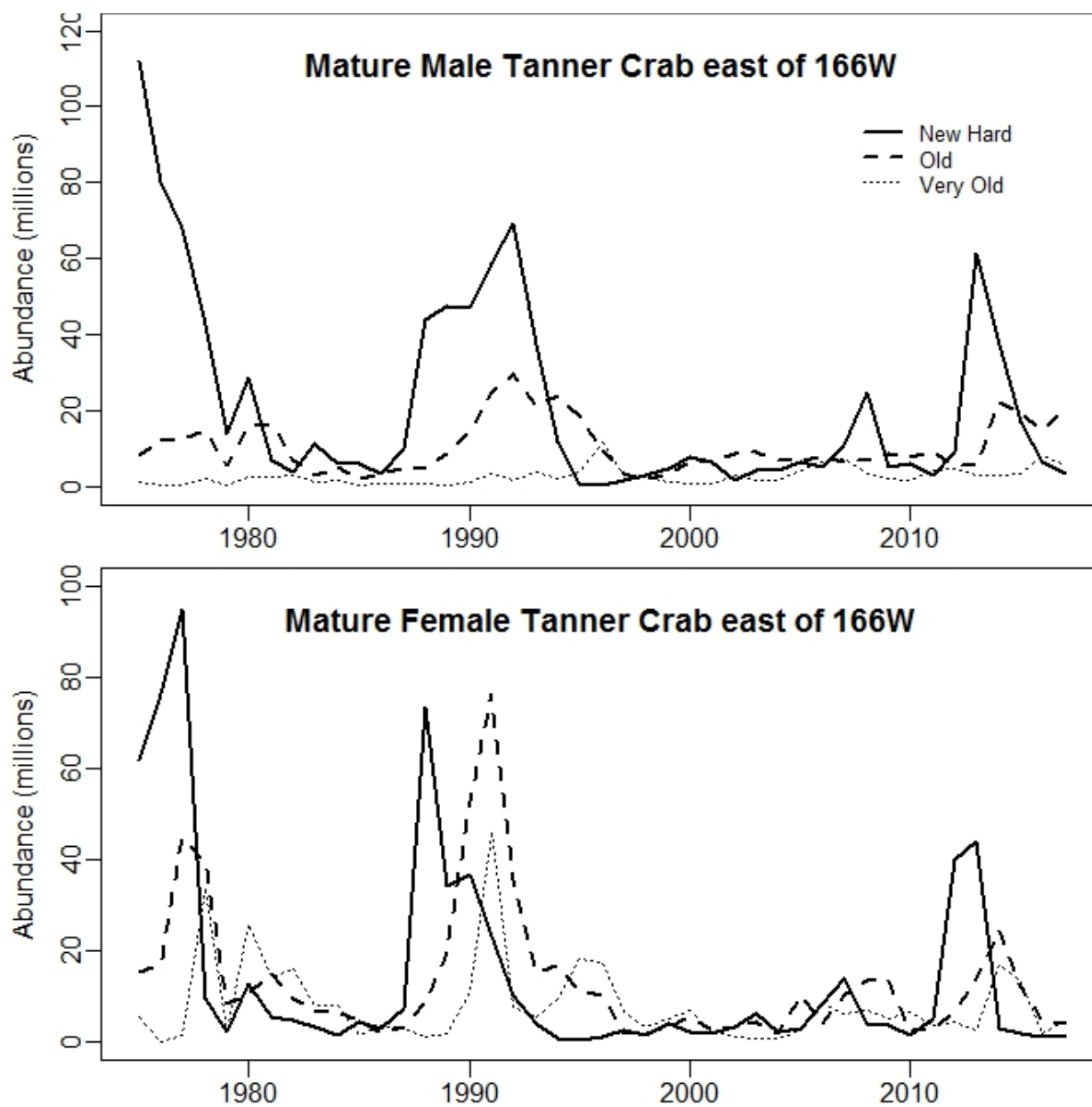


Figure 60. -- Time series of mature male ( $\geq 113$  mm CW) and female (actual maturity) Tanner crab (*Chionoecetes bairdi*) east of 166° W by shell condition, 1975-2017. New-Hard = shell condition 2; Old = shell condition 3; Very Old = shell condition 4 and 5 combined.

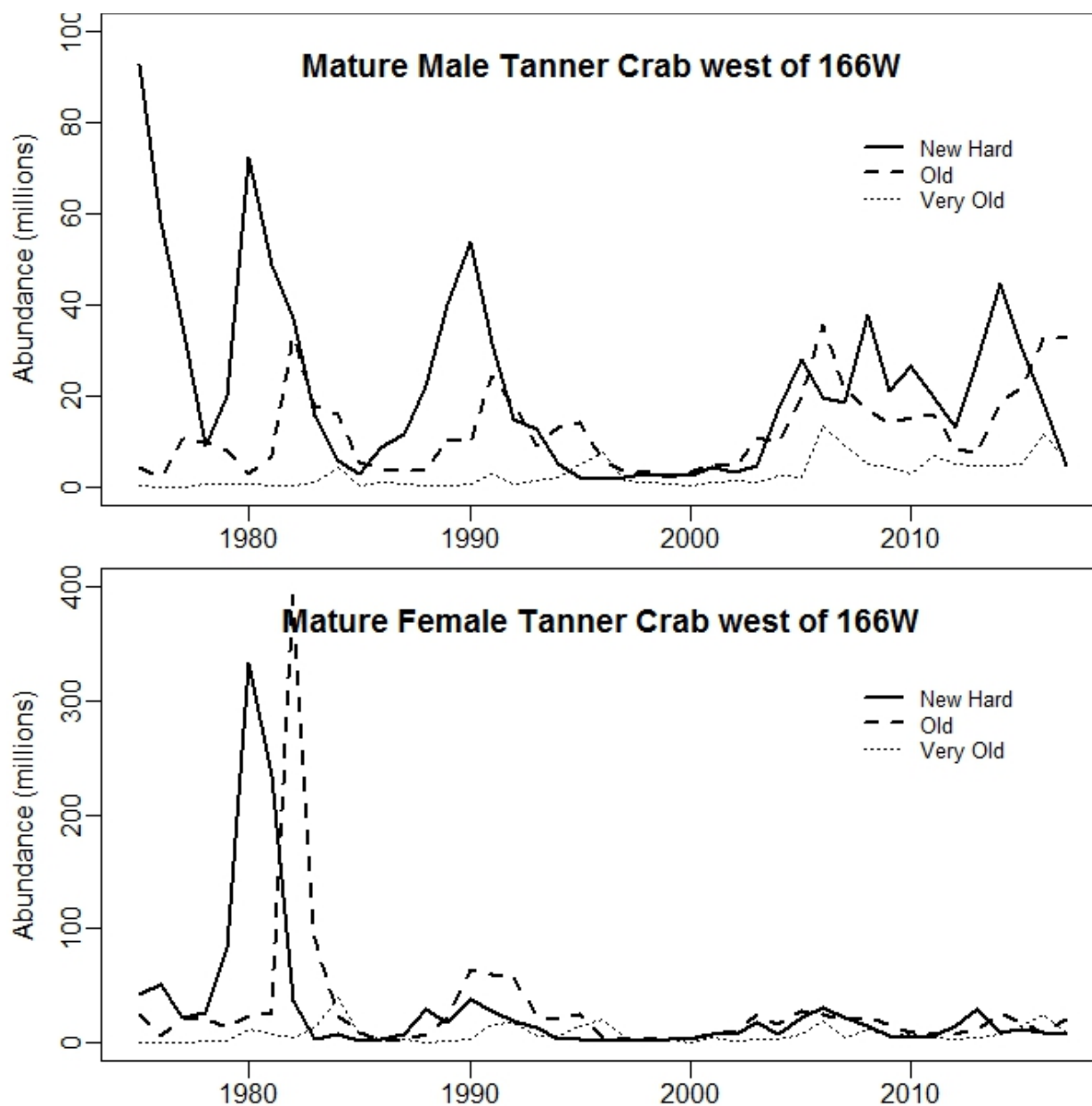


Figure 61. -- Time series of mature male ( $\geq 103$  mm CW) and female (actual maturity) Tanner crab (*Chionoecetes bairdi*) west of  $166^{\circ}$  W by shell condition, 1975-2017. New-Hard = shell condition 2; Old = shell condition 3; Very Old = shell condition 4 and 5 combined.

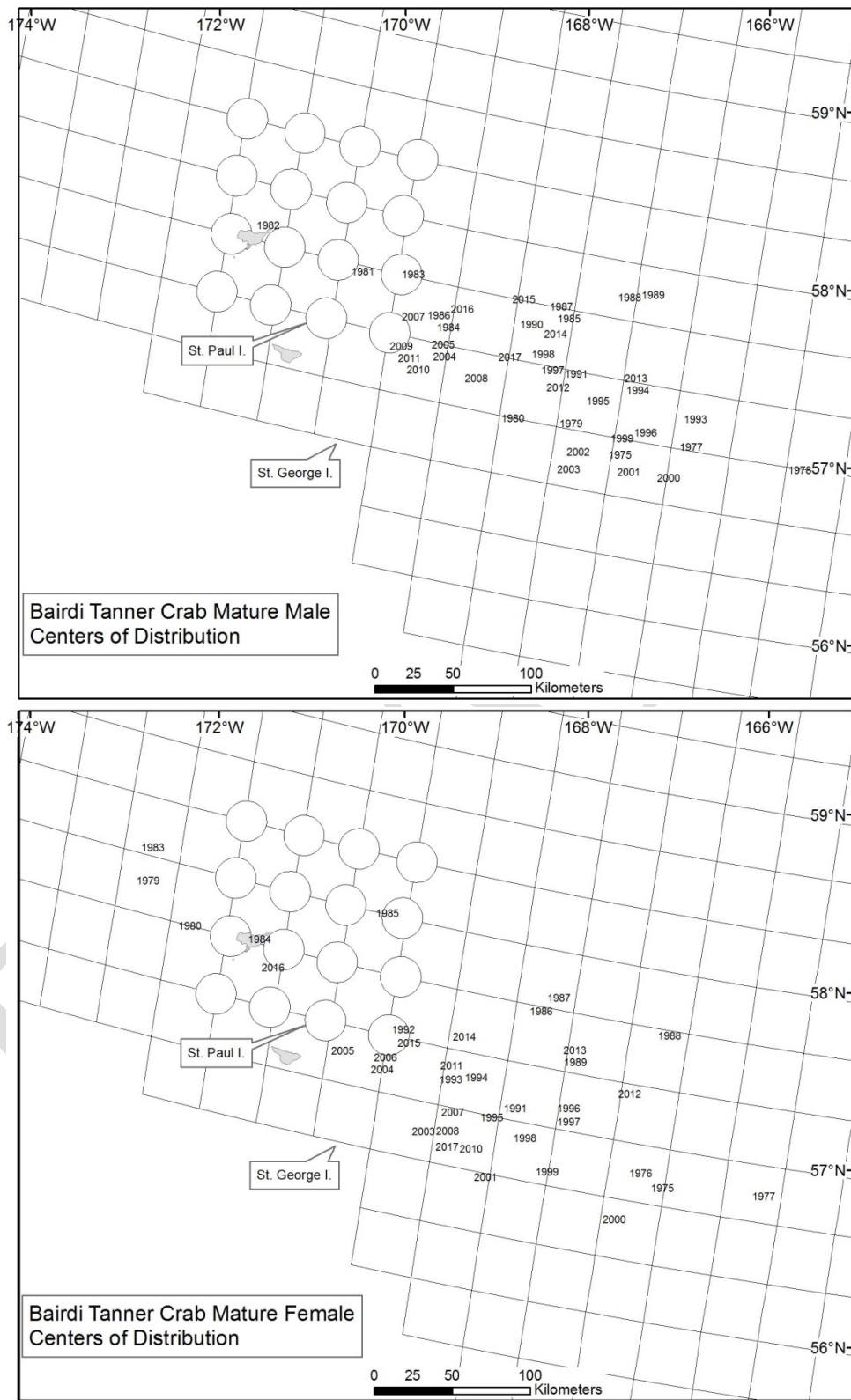


Figure 62. -- Centers of stock distribution of male and female Tanner crab (*Chionoecetes bairdi*)

from 1975 to 2017.

DRAFT

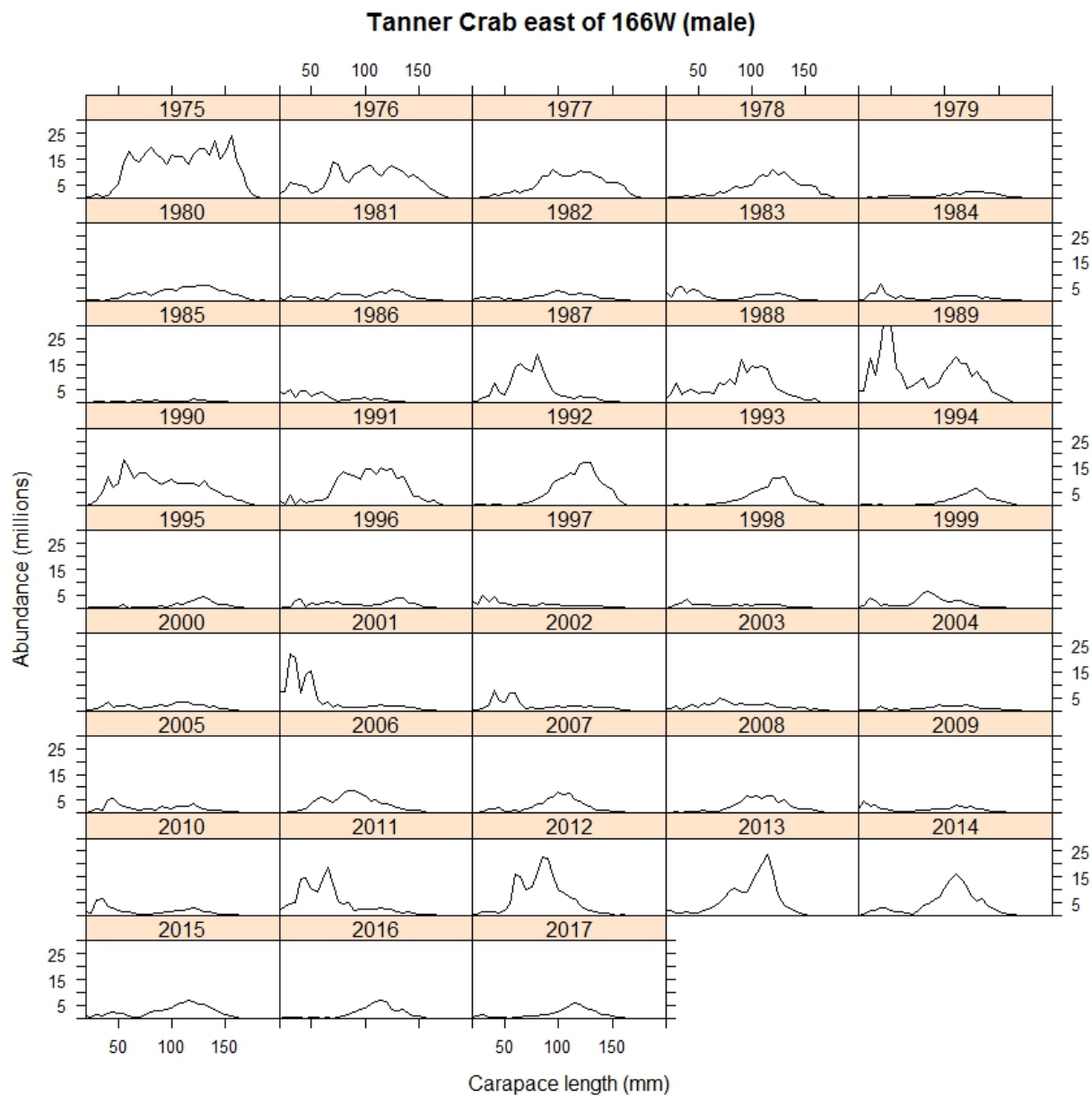


Figure 63. -- Historical size frequency by 5 mm width classes of male Tanner crab (*Chionoecetes bairdi*) east of 166°W, 1975 to 2017.

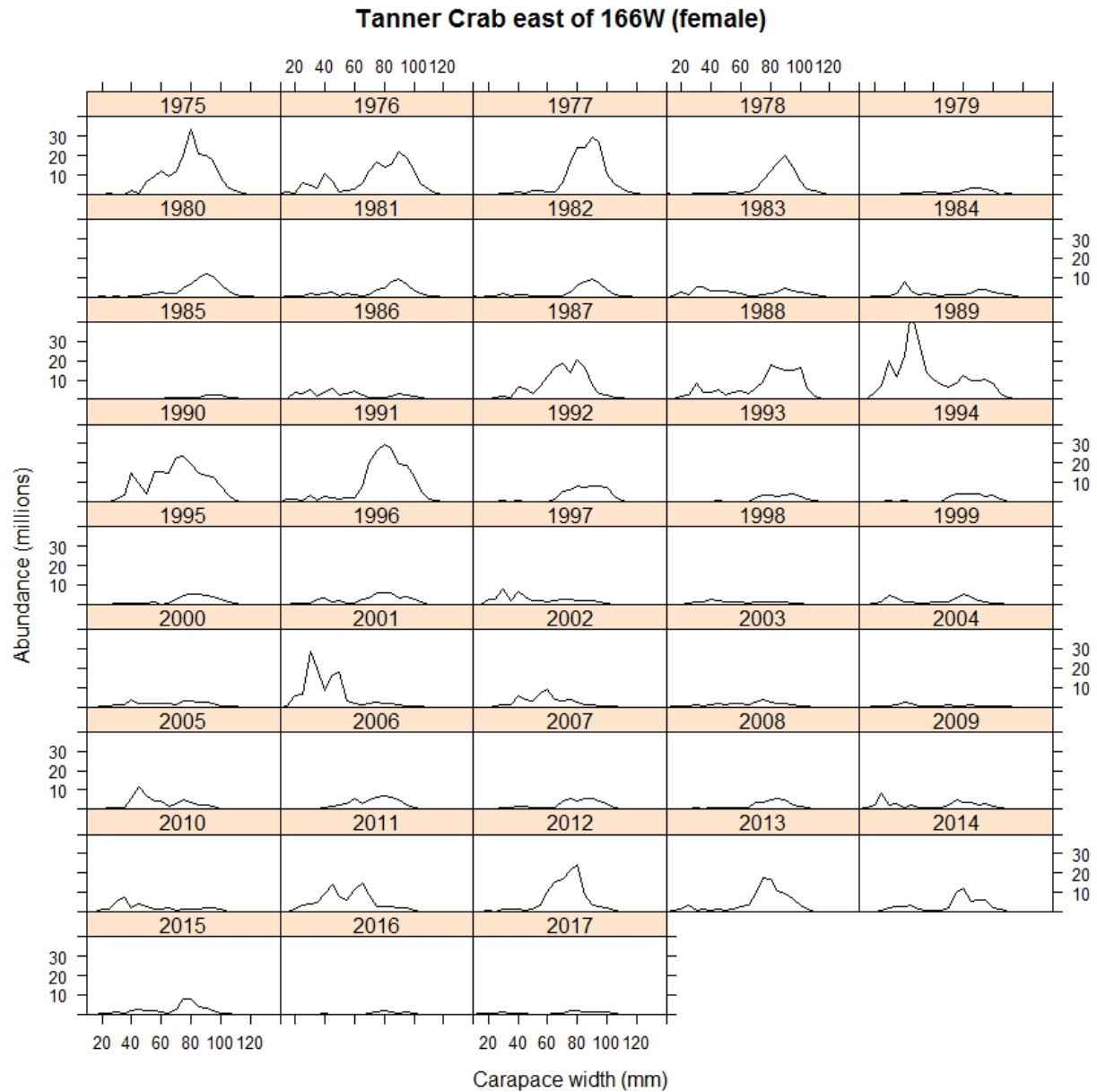


Figure 64. -- Historical size frequency by 5 mm width classes of female Tanner crab (*Chionoecetes bairdi*) east of 166°W, 1975 to 2017.

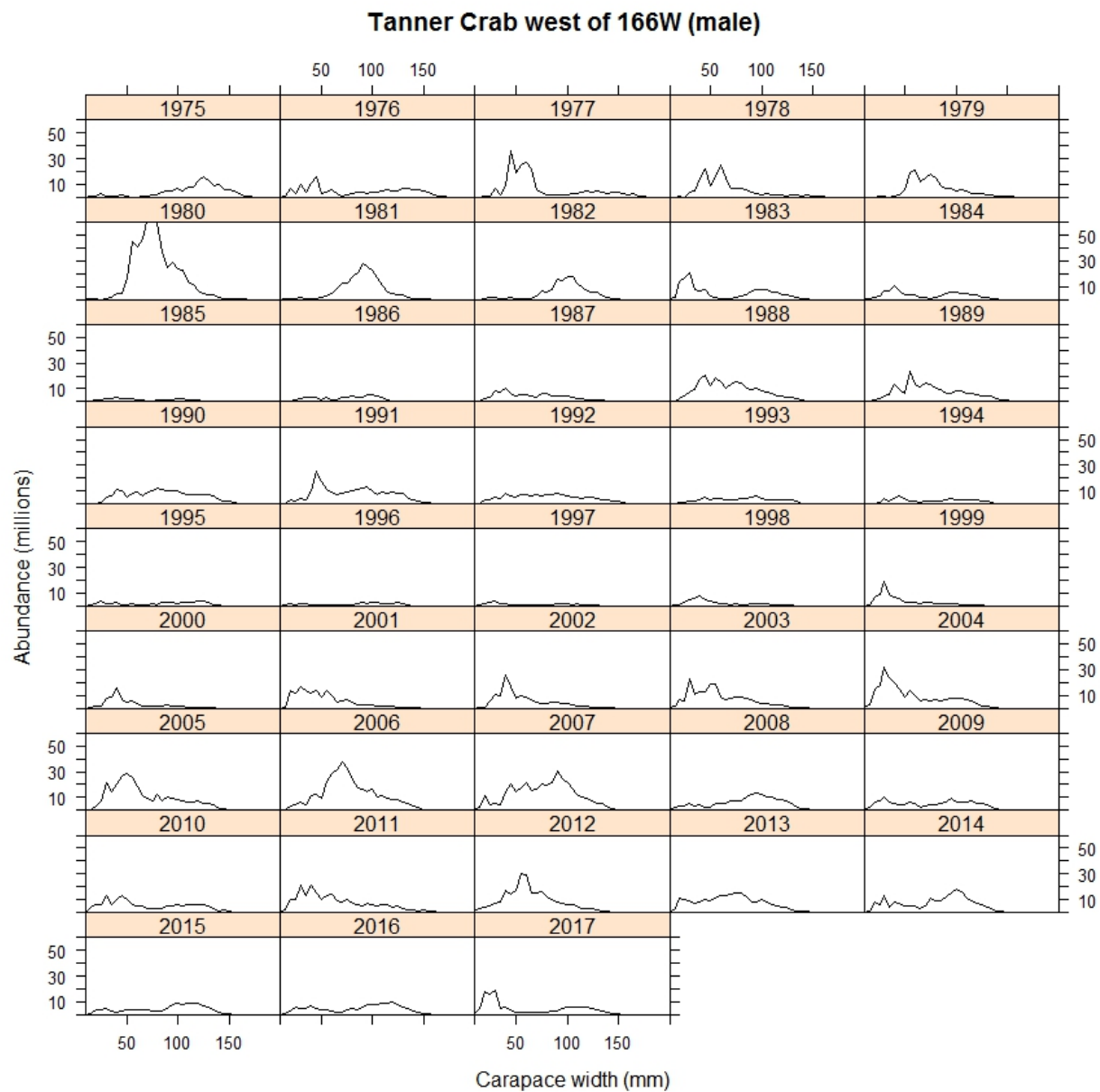


Figure 65. -- Historical size frequency by 5 mm width classes of male Tanner crab (*Chionoecetes bairdi*) west of 166°W, 1975 to 2017.



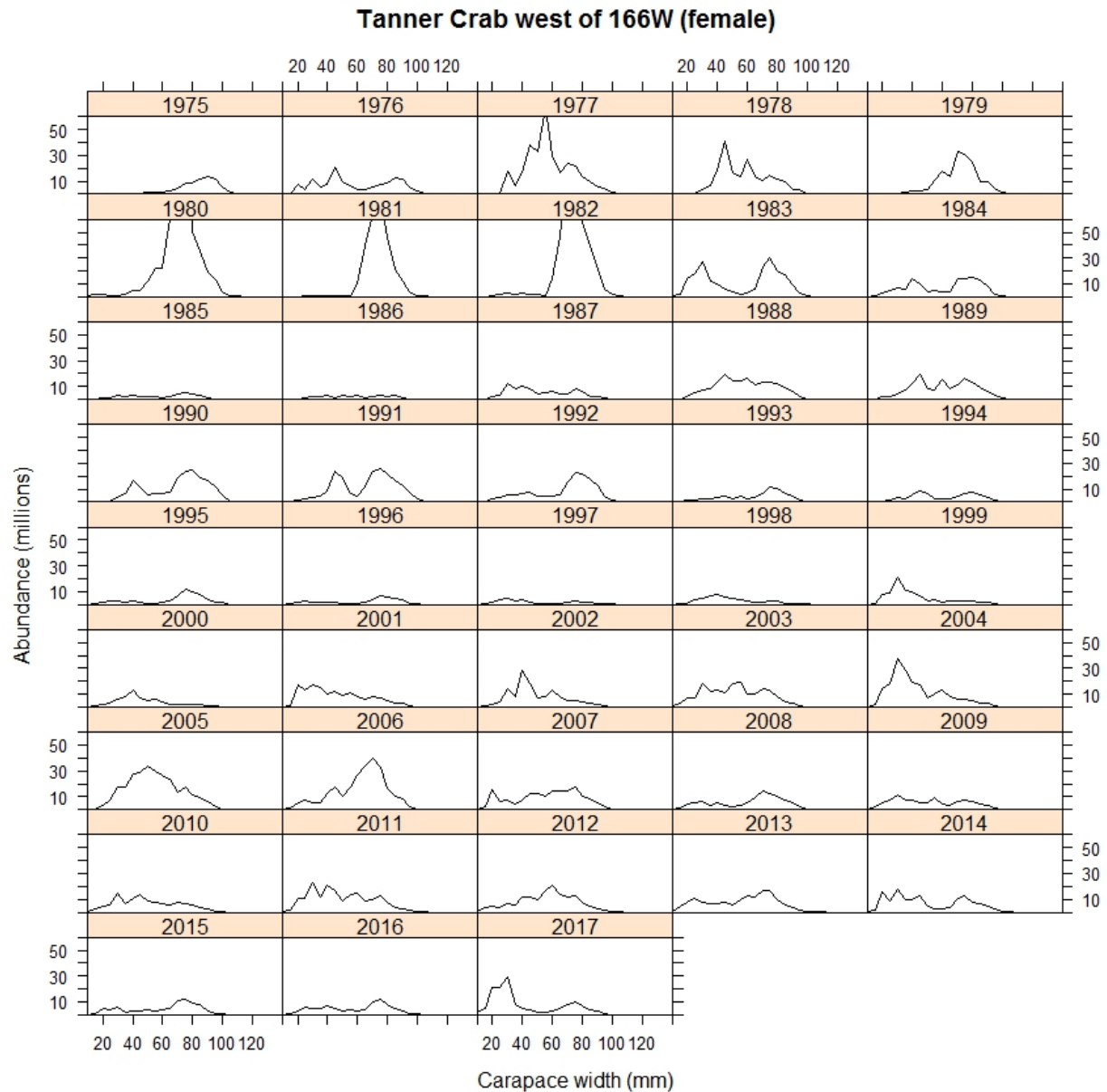


Figure 66. -- Historical size frequency by 5 mm width classes of female Tanner crab (*Chionoecetes bairdi*) west of 166°W, 1975 to 2017.

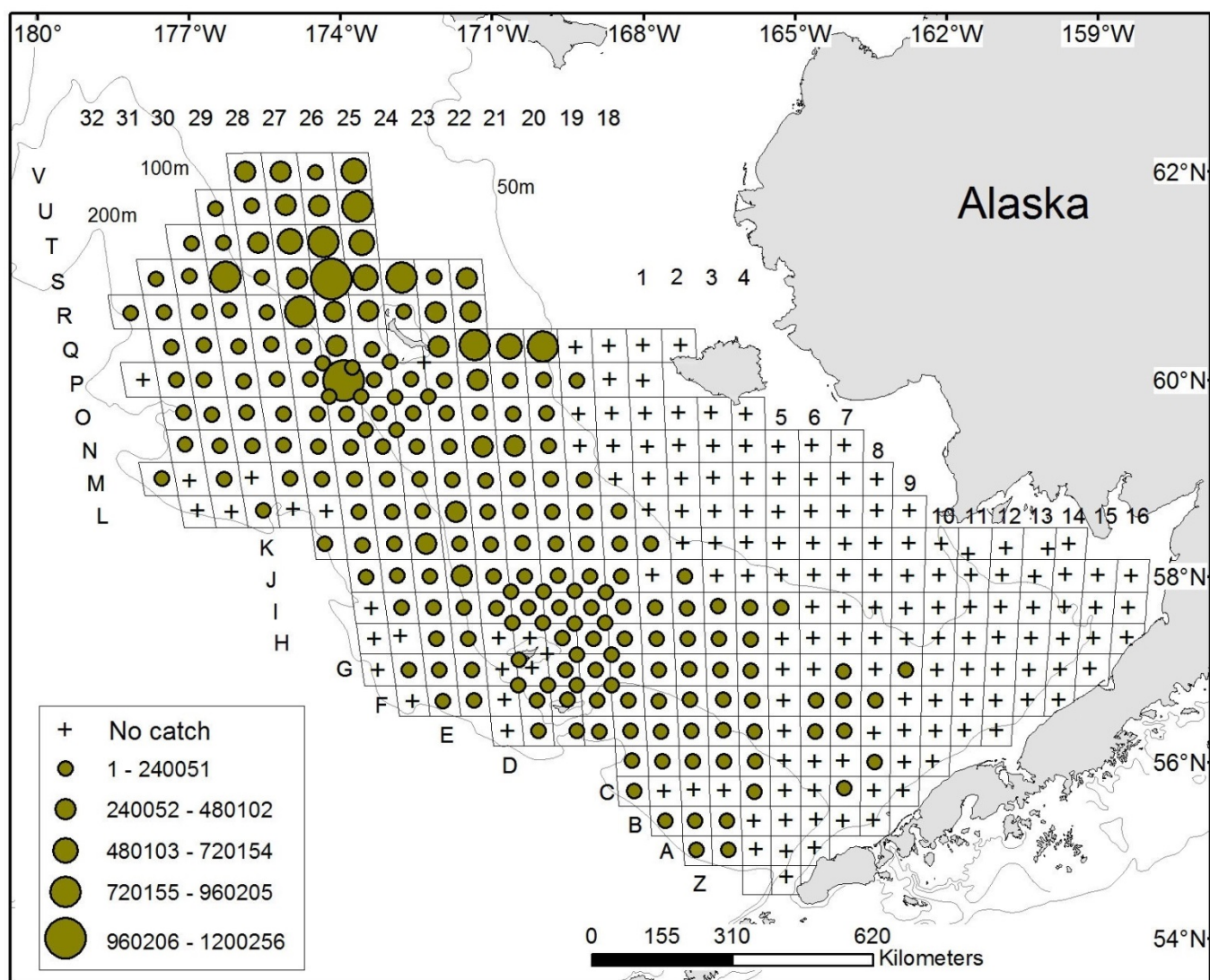


Figure 67. -- Total density (number nmi<sup>-2</sup>) of snow crab (*Chionoecetes opilio*) at each station sampled in 2017. Data depicted by circles are equal interval densities.

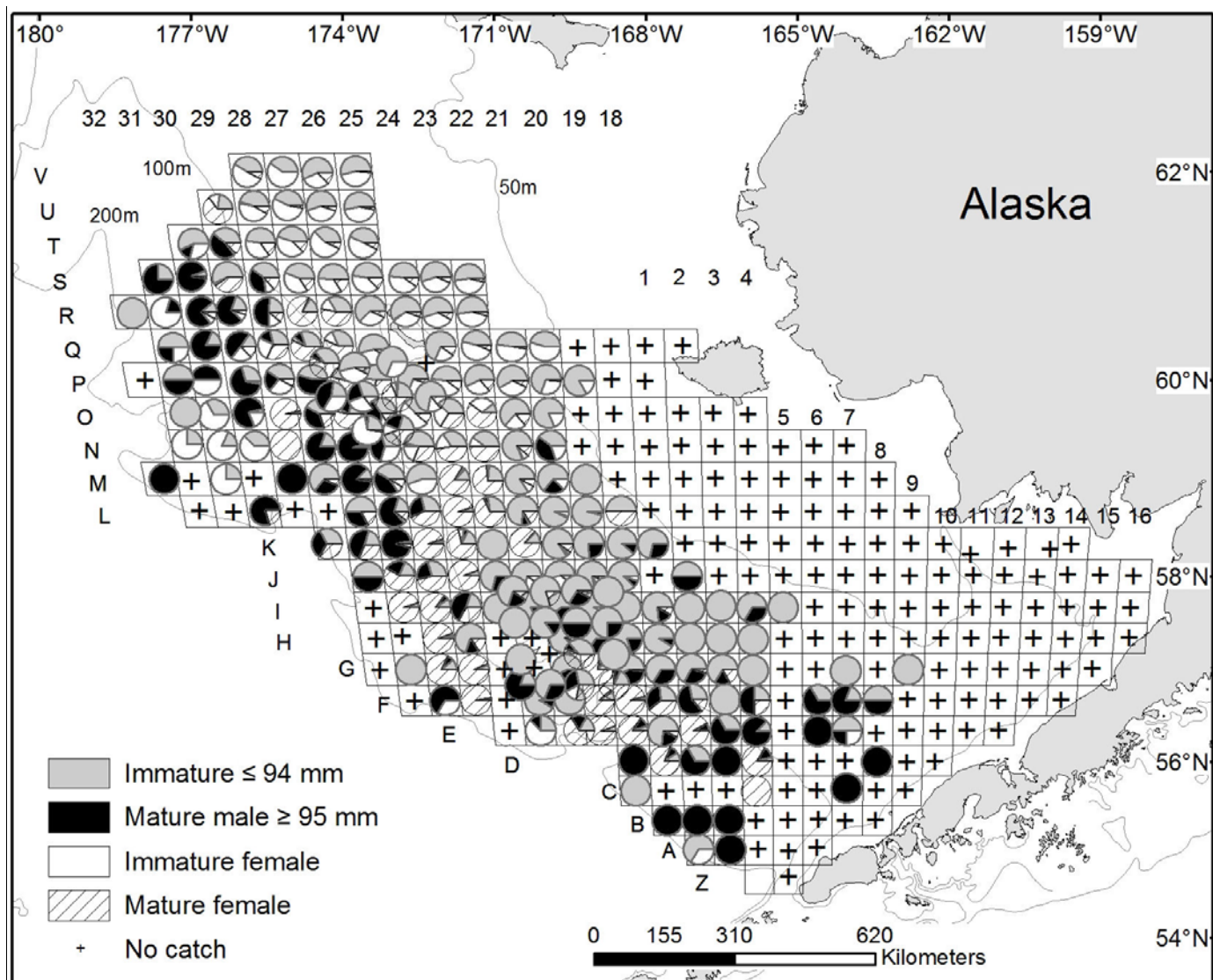


Figure 68. -- Percentage of male and female snow crab (*Chionoecetes opilio*) maturity categories at each station sampled in 2017.

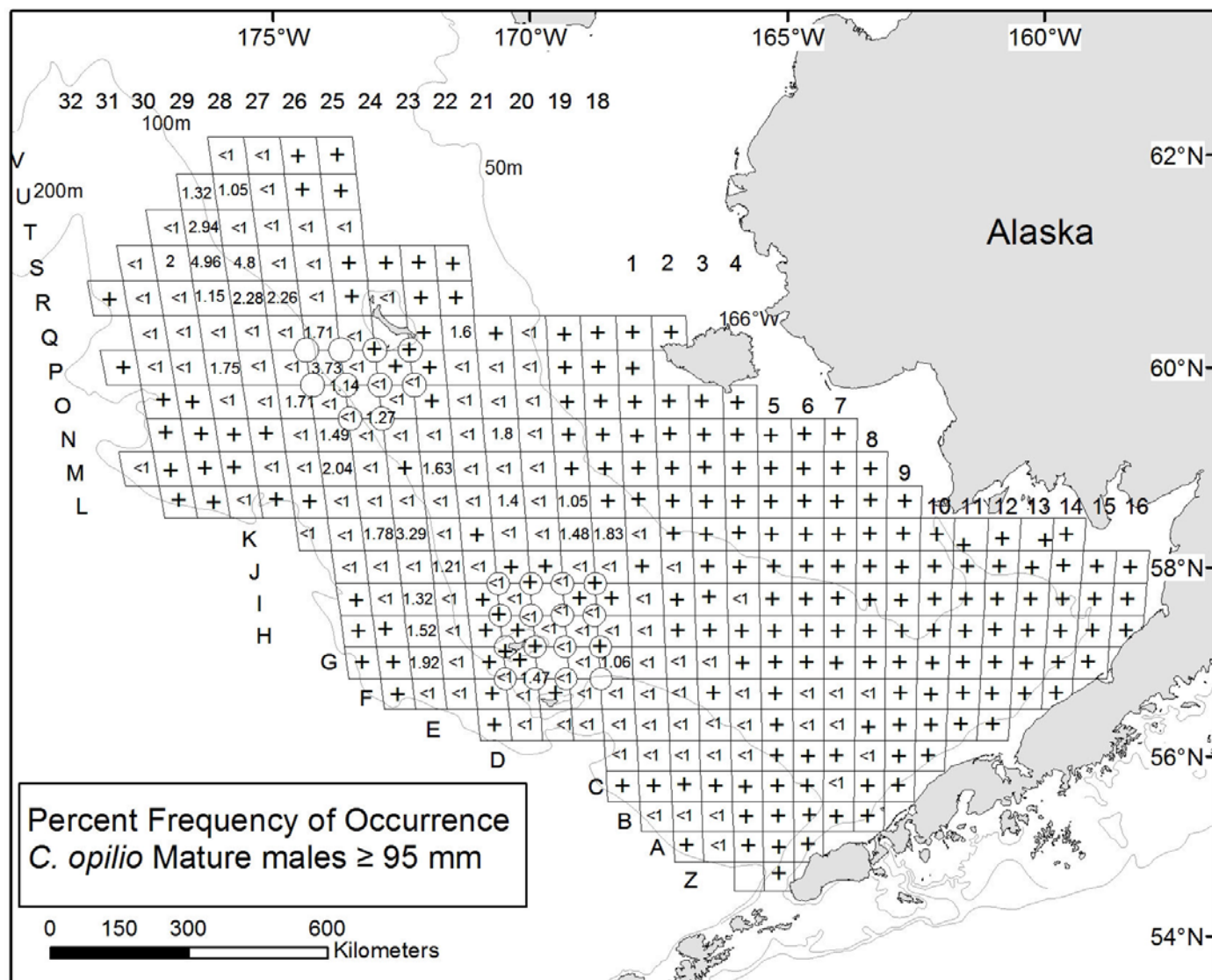


Figure 69. -- Percent frequency of occurrence of mature male snow crab (*Chionoecetes opilio*) at stations sampled in 2017.



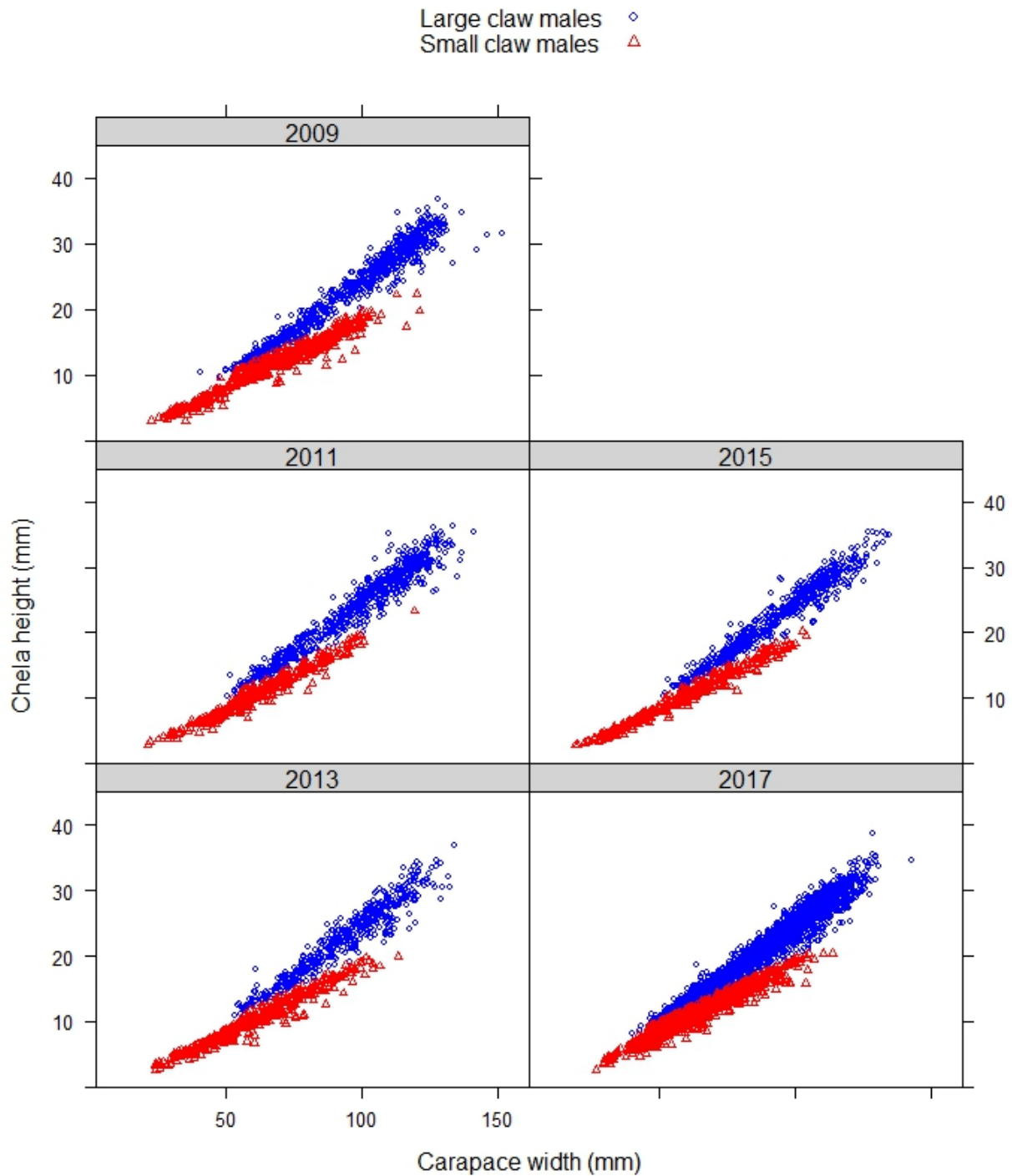


Figure 70. -- Male snow crab (*Chionoecetes opilio*) chela height versus carapace width measurements collected during the 2009 (n = 1,303), 2011 (n = 1,130), 2013 (n = 943), 2015 (n = 1,008), and 2017 (n=3,322) National Marine Fisheries Service eastern Bering Sea bottom trawl surveys.

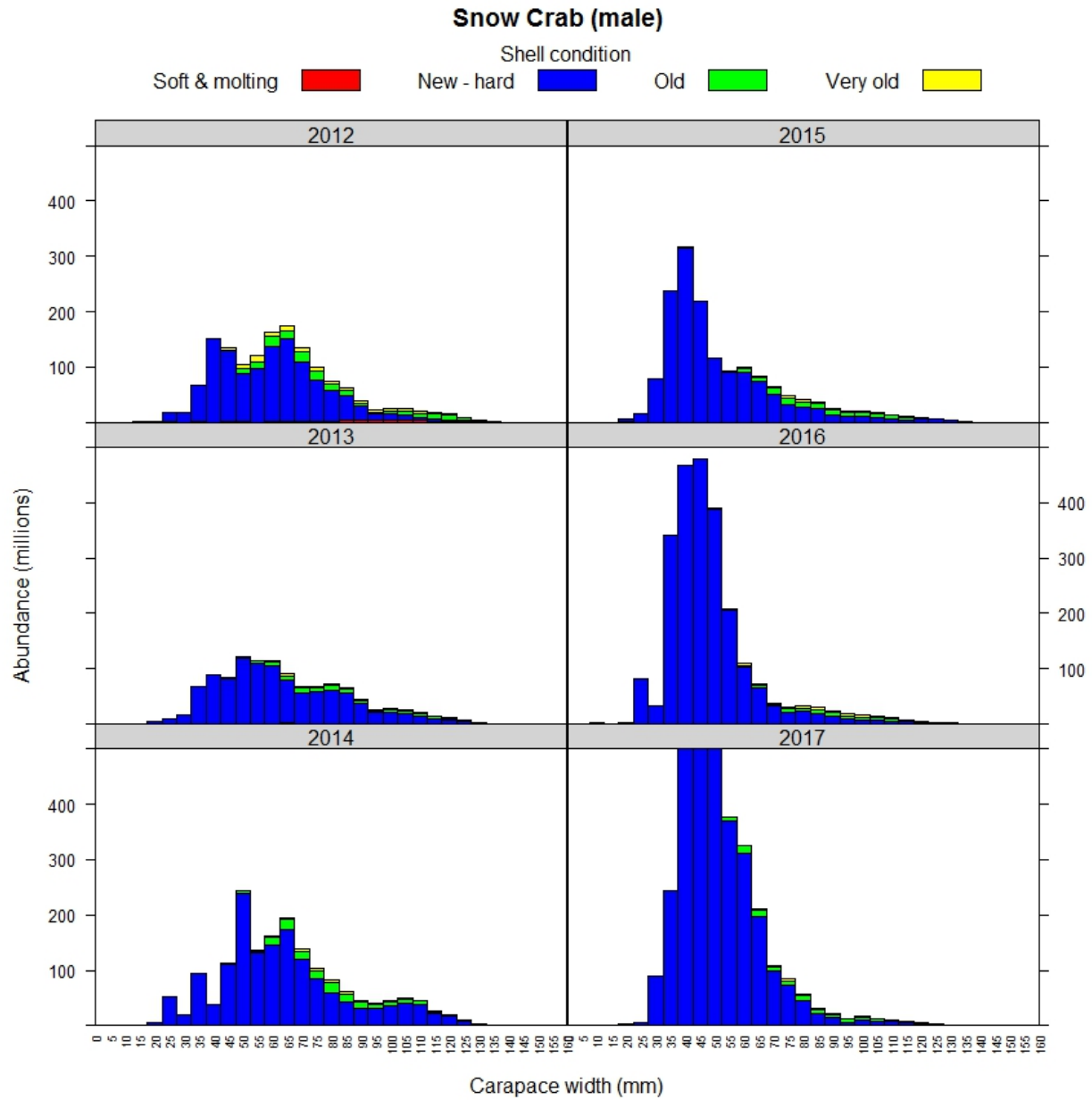


Figure 71. -- Size frequency by shell condition of male snow crab (*Chionoecetes opilio*) by 5 mm width classes of all districts combined, 2012-2017.

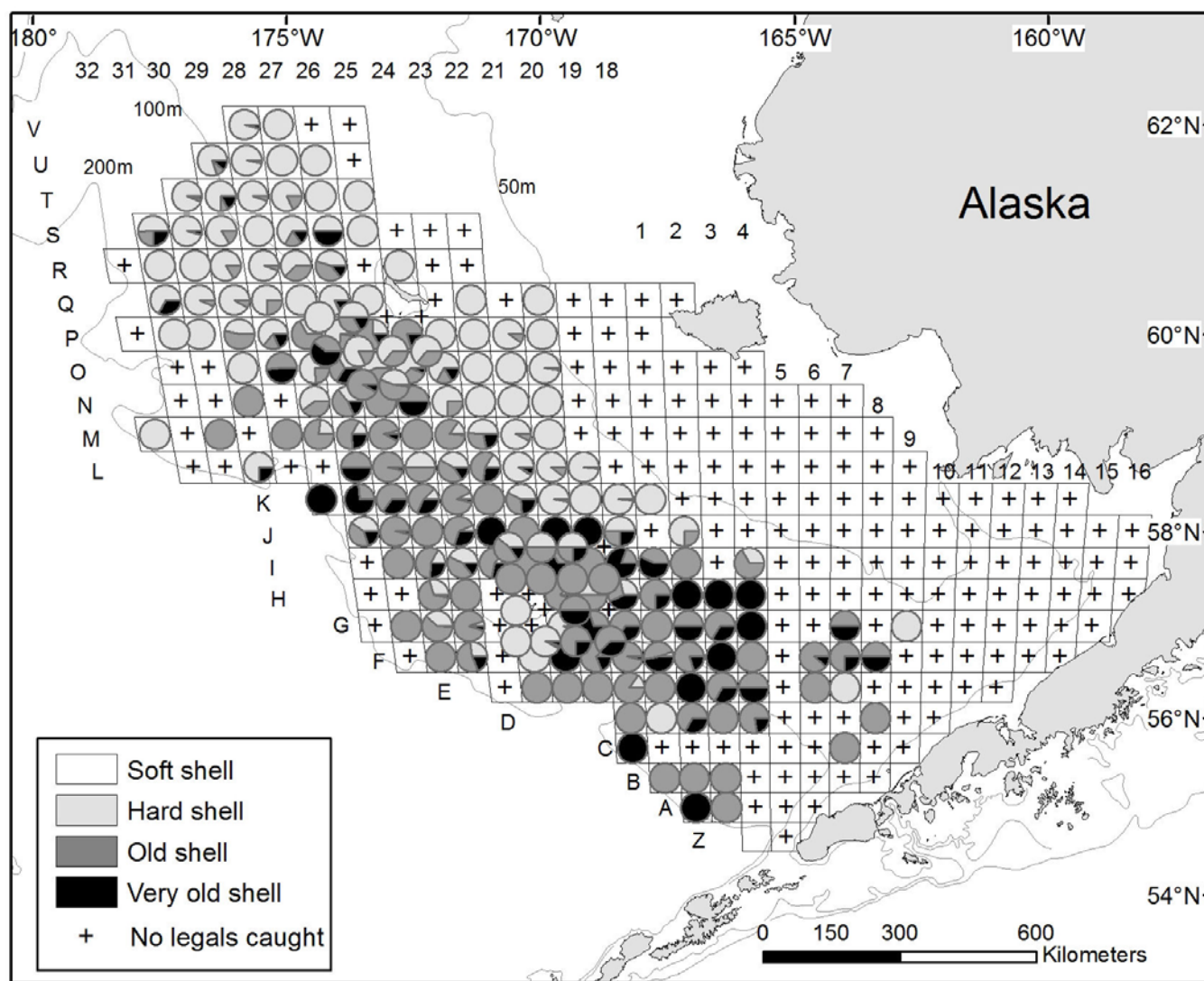


Figure 72. -- Distribution of legal-sized male snow crab (*Chionoecetes opilio*) caught at each station in 2017 and distinguished by shell condition.

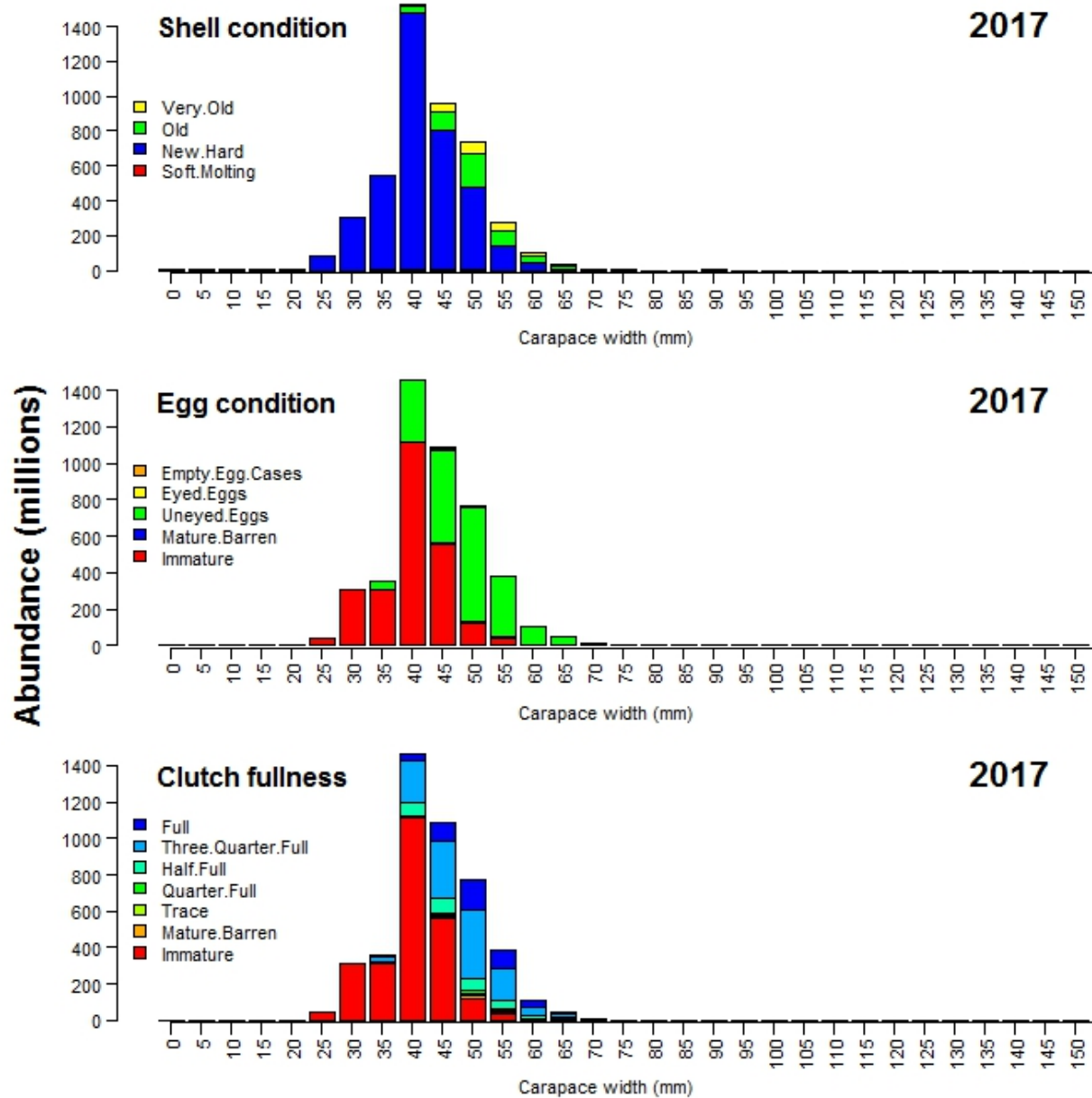


Figure 73. -- Size frequency by shell condition, egg condition, and clutch fullness of female snow crab (*Chionoecetes opilio*) by 5 mm width classes of all districts combined in 2017.



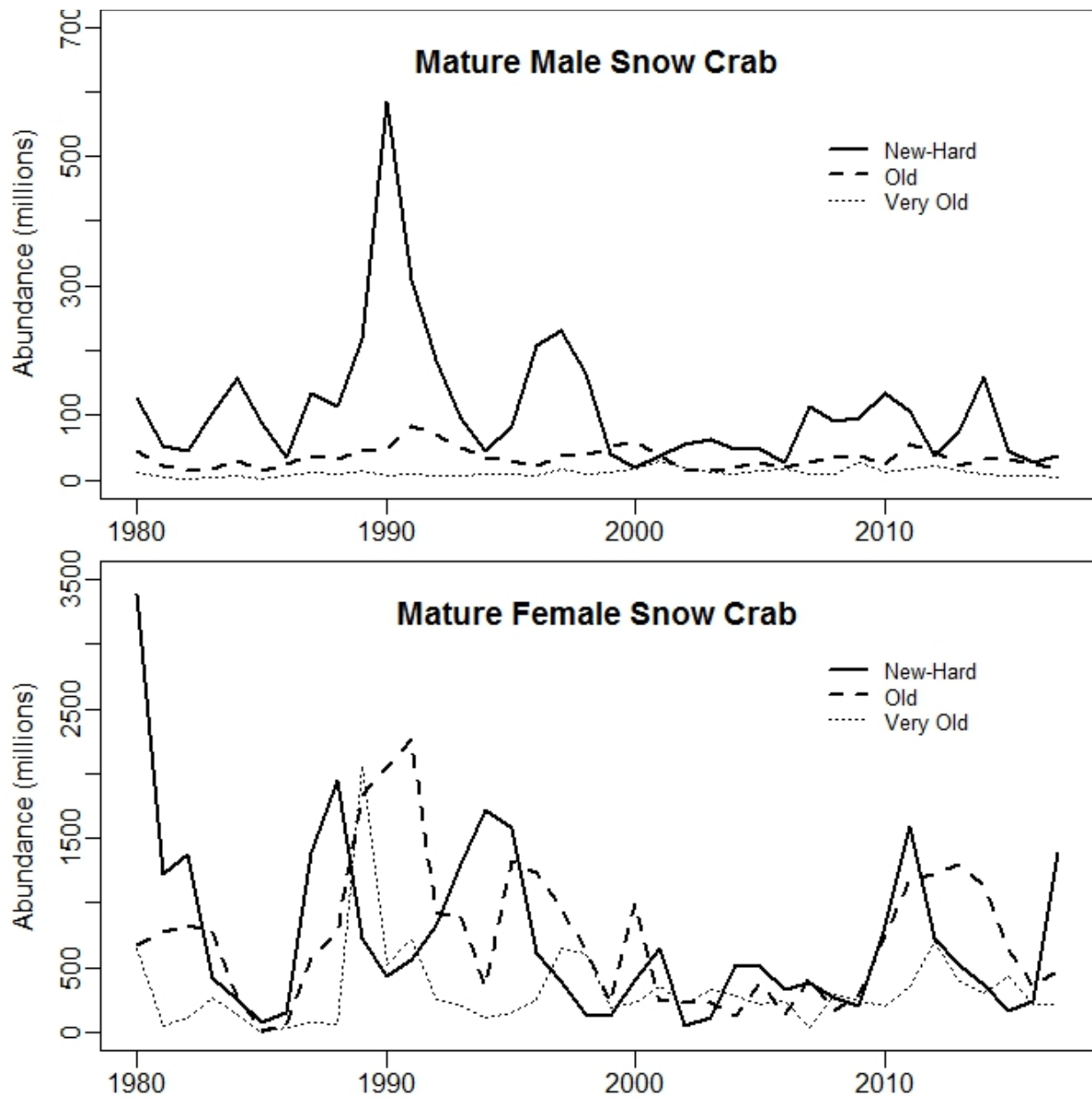


Figure 74. -- Time series of mature male ( $\geq 95$  mm CW) and female (actual maturity) snow crab (*Chionoecetes opilio*) by shell condition, 1980-2017. New- Hard = shell condition 2; Old = shell condition 3; Very Old = shell condition 4 and 5 combined.

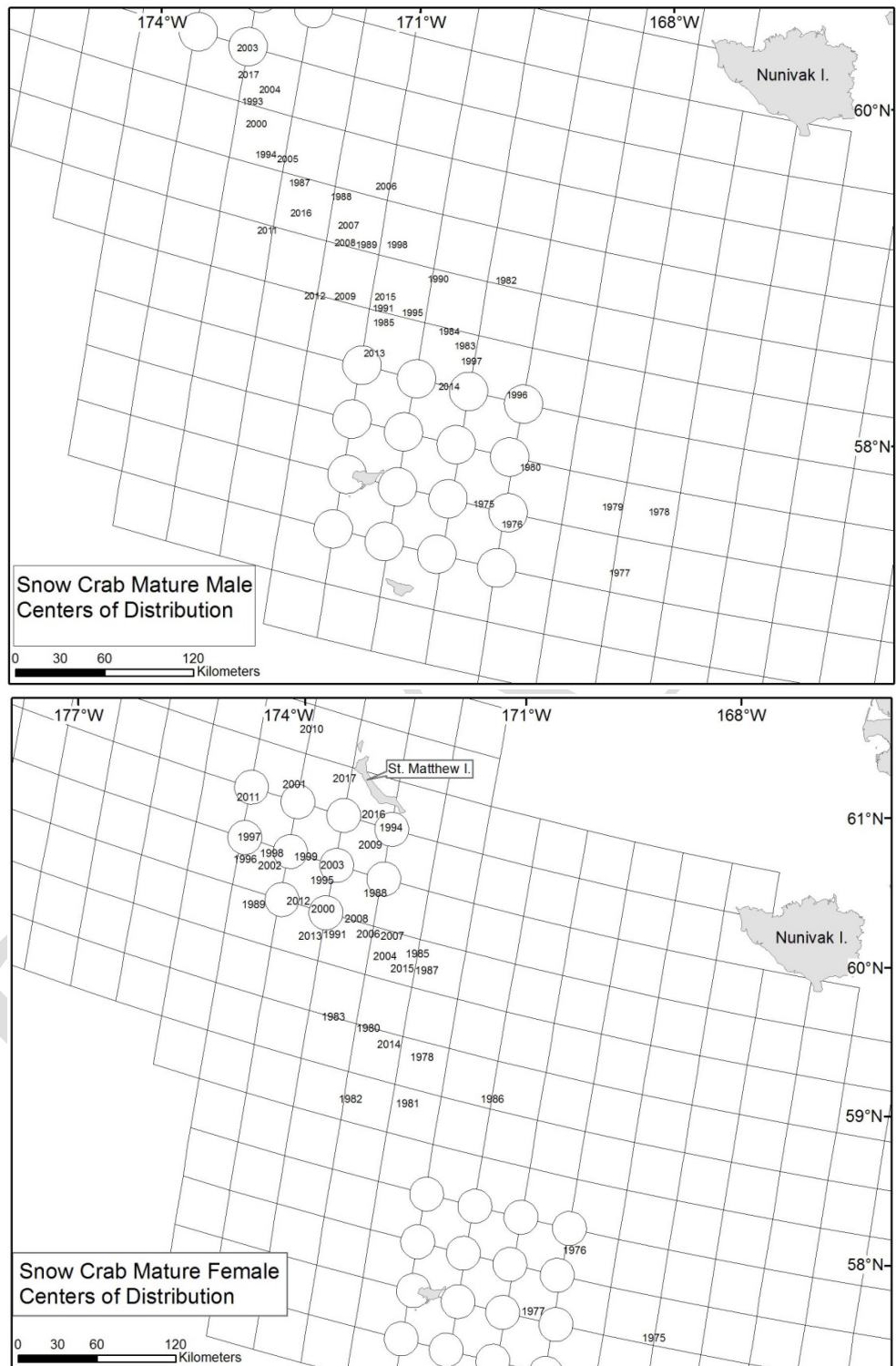


Figure 75. -- Centers of stock distribution of male and female snow crab (*Chionoecetes opilio*) from 1975 to 2017.

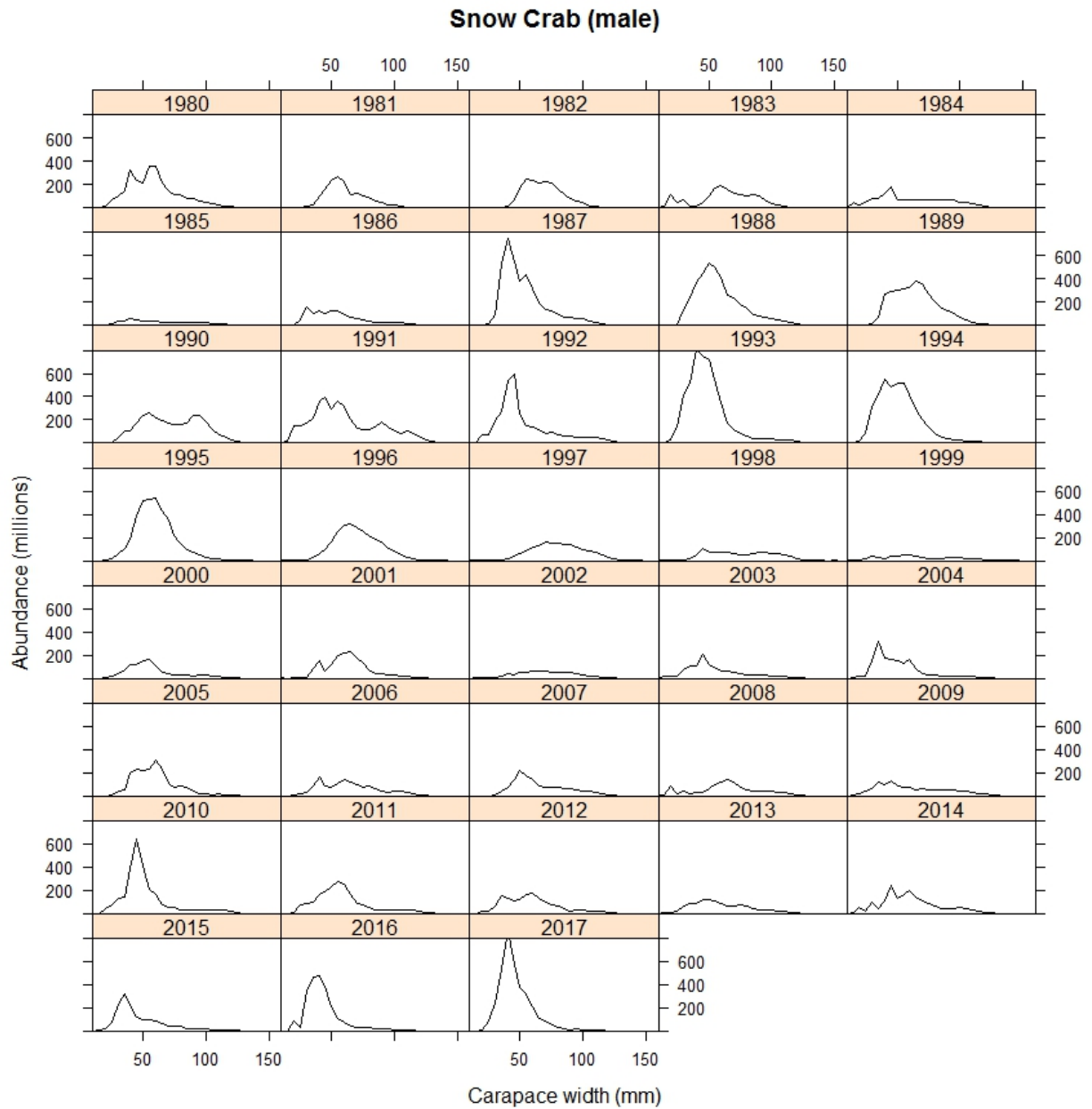


Figure 76. -- Historical size frequency by 5 mm width classes of male snow crab (*Chionoecetes opilio*), 1980 to 2017.

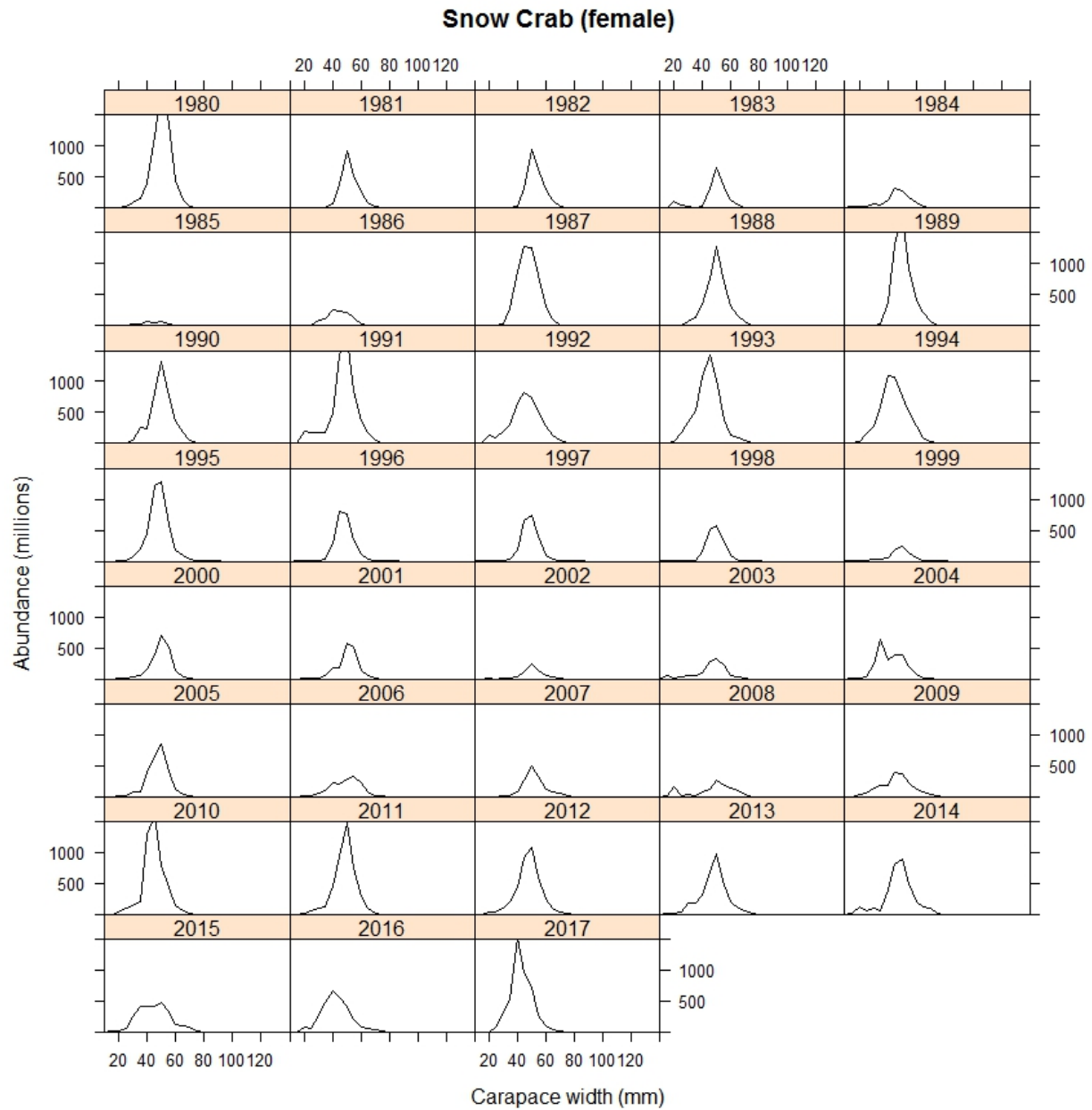


Figure 77. -- Historical size frequency by 5 mm width classes of female snow crab (*Chionoecetes opilio*), 1980 to 2017.

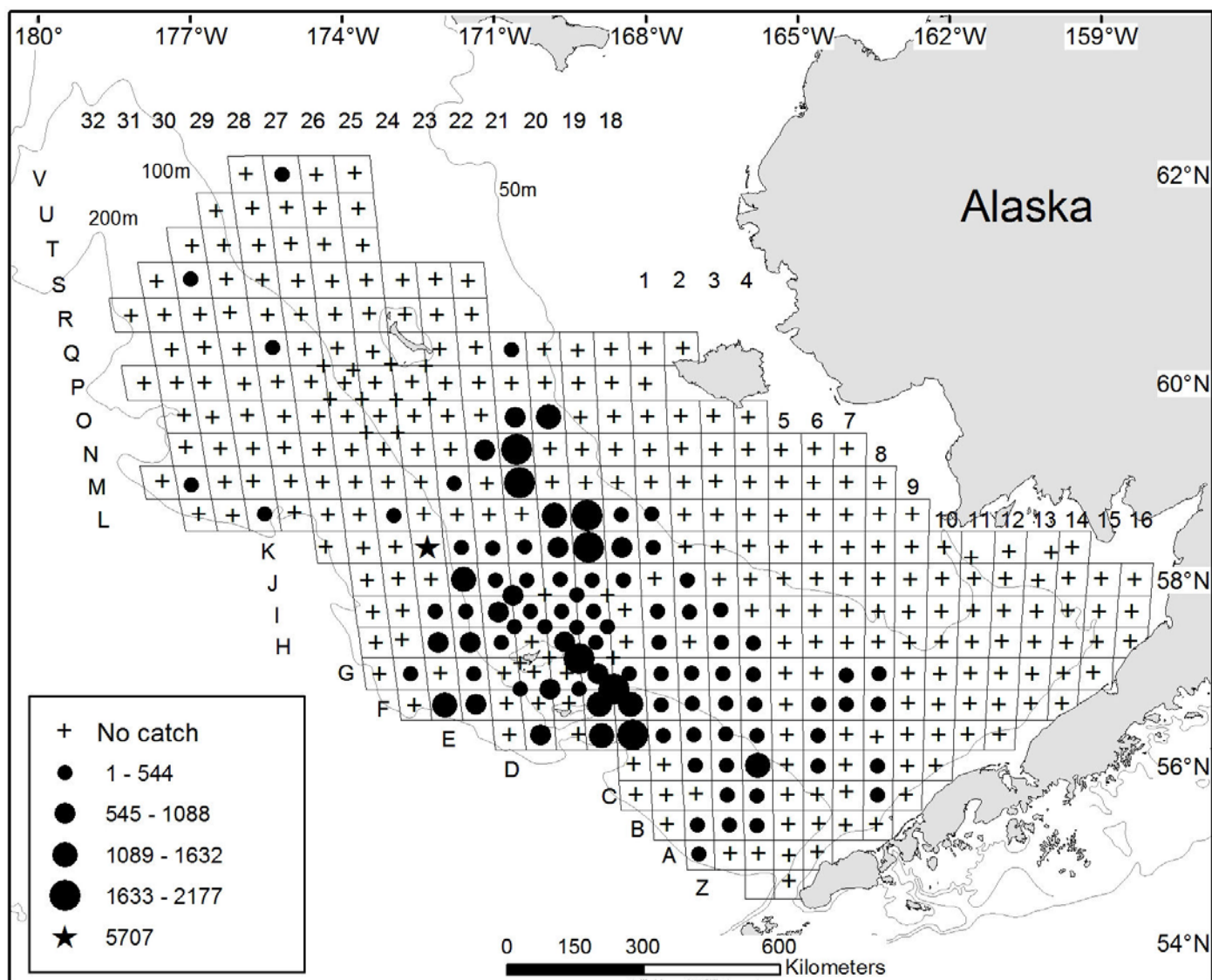


Figure 78. -- Total density (number  $\text{nm}^{-2}$ ) of *Chionoecetes* spp. hybrid crab at each station sampled in 2017. Data depicted by circles are crab densities at equal intervals.

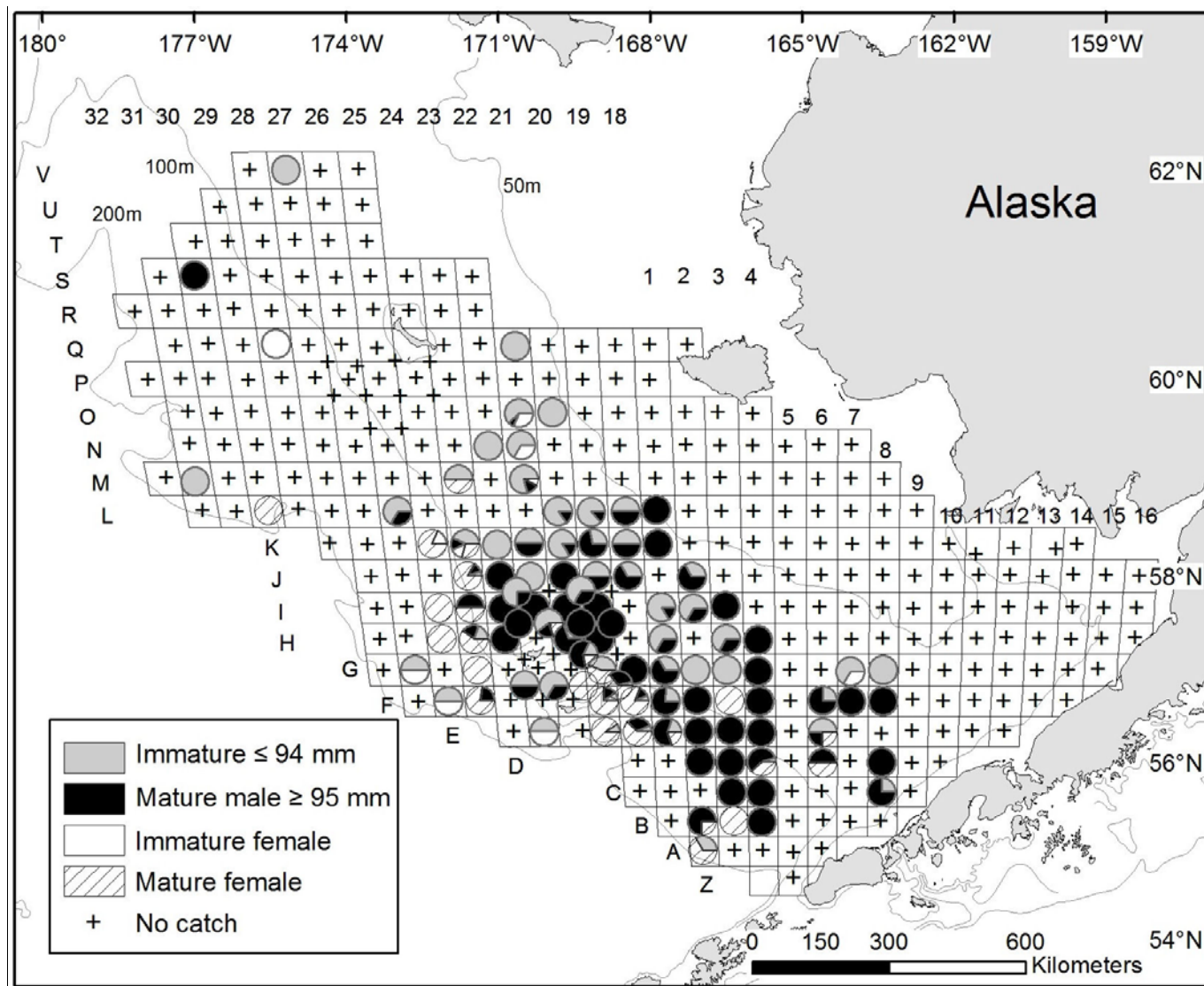


Figure 79. -- Percentage of male and female *Chionoectes* spp. hybrid crab size and maturity categories at each station sampled in 2017.



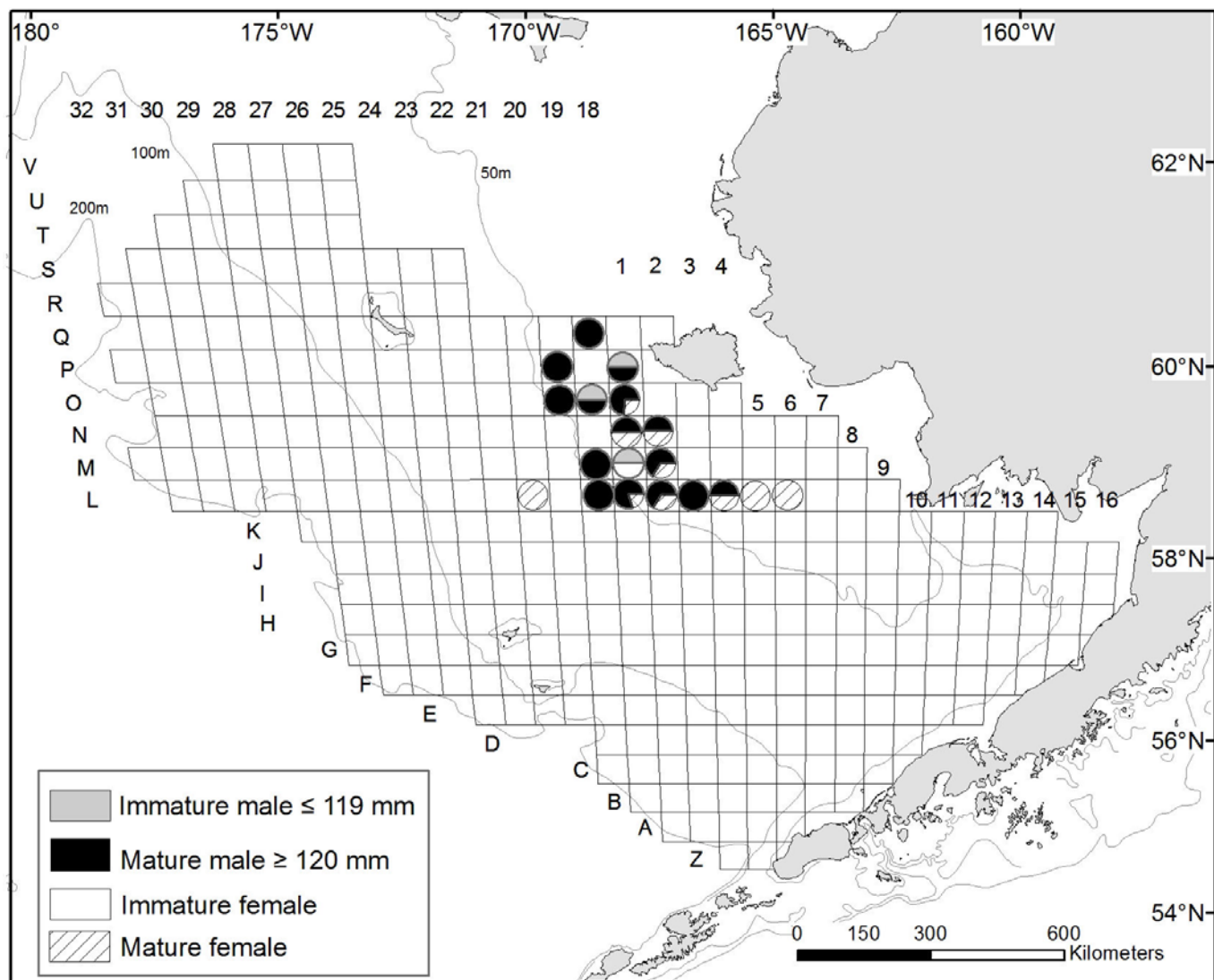


Figure 80. -- Total density (number  $\text{nm}^{-2}$ ) and percentage of male and female red king crab (*Paralithodes camtschaticus*) maturity categories at each station sampled in the Northern District in 2017.

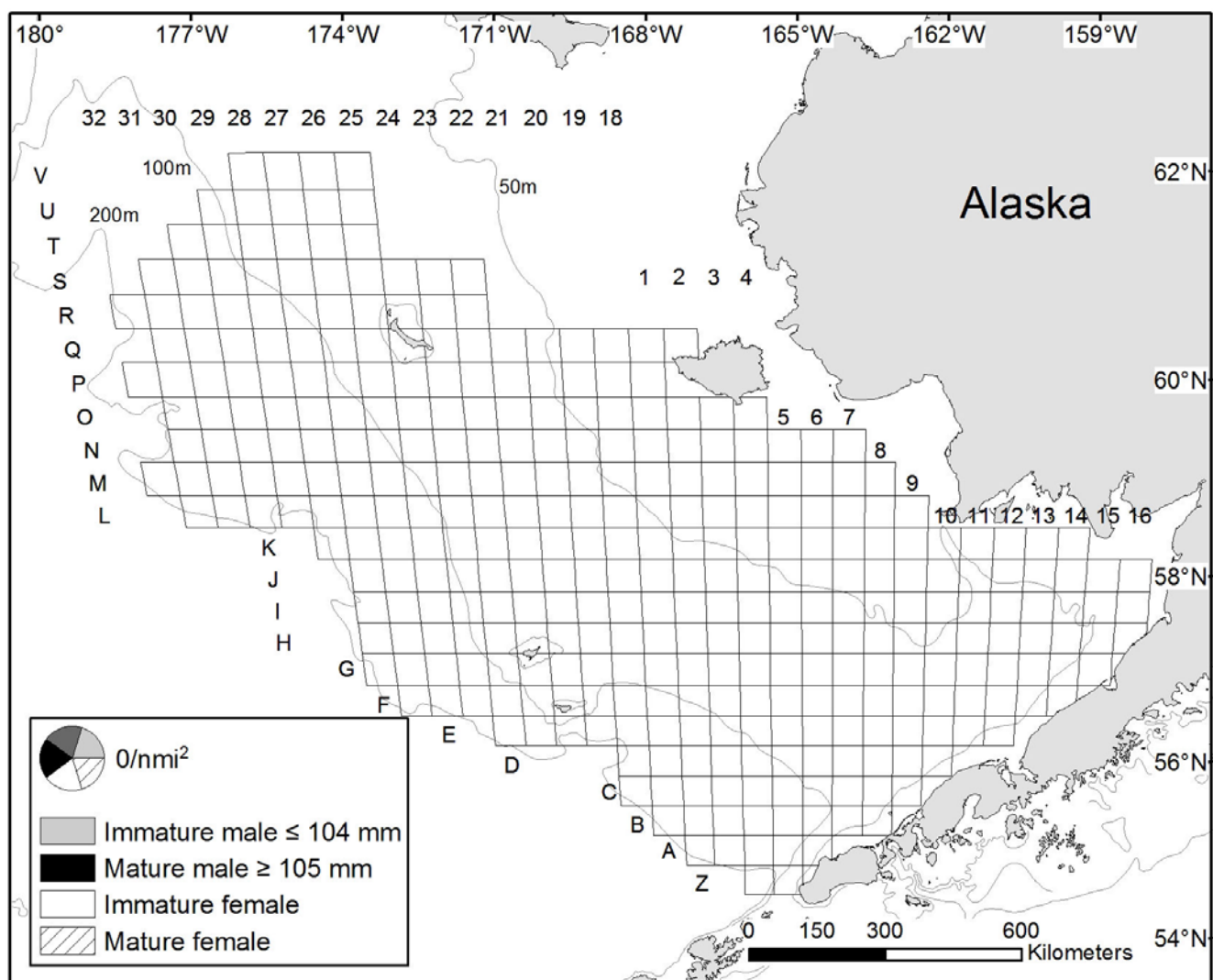


Figure 81. -- Total density (number  $\text{nmi}^{-2}$ ) and percentage of male and female blue king crab (*Paralithodes platypus*) size and maturity categories at stations sampled outside of the Pribilof District and St. Matthew Island section of the Northern District in 2016 – Note no catch.



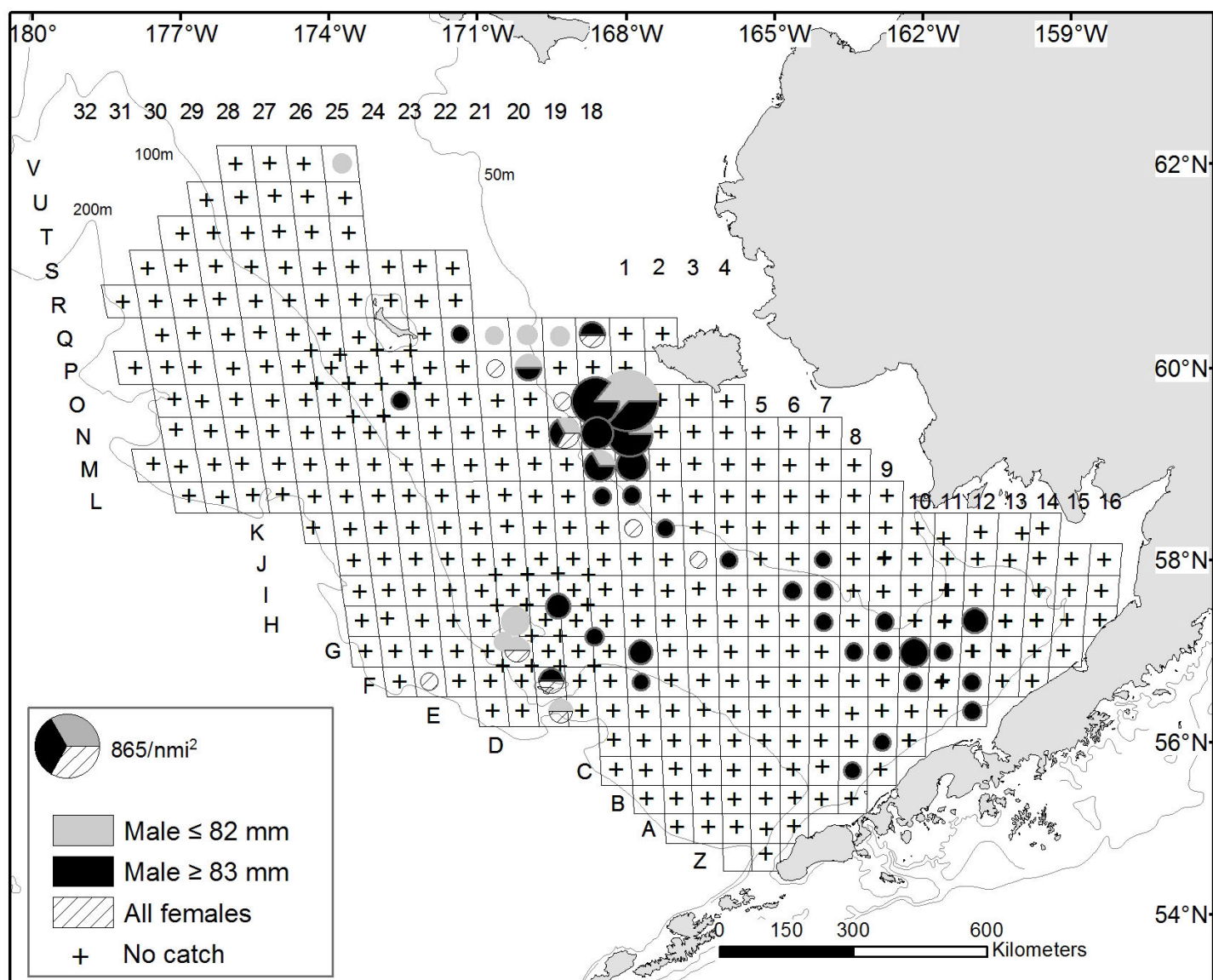


Figure 82. -- Total density (number nmi<sup>-2</sup>) and percentage of male and female hair crab (*Erimacrus isenbeckii*) size categories at each station sampled in 2017.

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	A-02	A-03	A-04	A-05	A-06	B-01	B-02	B-03	B-04	B-05	B-06
Start Date	6/27/2017	6/26/2017	6/23/2017	6/23/2017	6/23/2017	6/30/2017	6/27/2017	6/26/2017	6/23/2017	6/24/2017	6/23/2017
Duration (hour)	0.52	0.5	0.52	0.55	0.52	0.51	0.52	0.53	0.52	0.53	0.52
Distance Fished (km)	2.86	2.75	2.83	2.82	2.92	2.74	2.77	2.85	2.82	2.91	2.91
Mid-Latitude (°N)	55.01117	55.00845	55.00719	54.98814	55.02	55.33971	55.33906	55.3414	55.33237	55.33482	55.34313
Mid-Longitude (°W)	-166.94968	-166.31214	-165.74993	-165.14797	-164.59	-167.55911	-166.97023	-166.33822	-165.79166	-165.1572	-164.56089
Bottom Depth (m)	156	142	129	110	62	147	141	131	120	112	102
Bottom Temperature (°C)	4.3	4.3	4.3	4.8	5.7	4.3	4.4	4.4	4.4	4.7	4.8
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	15,678	7,341	2,627	507	0	7,852	2,089	1,155	3,955	850	543
Mature males	1,430	2,515	525	434	0	714	799	243	1,084	1,243	1,019
Legal	715	1,699	394	290	0	357	614	182	447	1,112	747
Immature females	13,450	3,137	3,021	72	0	12,919	2,642	1,946	2,679	654	68
Mature females	18,830	14,903	328	72	0	2,213	2,519	122	2,998	131	68
Total weight (kg)	68.79	74.48	8.01	4.98	0.00	16.42	14.94	3.33	26.8	14.12	11.18
Opilio Tanner Crab											
Immature males	130	0	0	0	0	0	0	0	0	0	0
Mature males	0	68	0	0	0	71	61	61	0	0	0
Legal	65	68	0	0	0	71	61	61	0	0	0
Immature females	65	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.47	0.61	0.00	0.00	0.00	0.53	0.7	0.56	0.00	0.00	0.00
Hybrid Tanner Crab											
Immature males	65	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	184	0	128	0	0
Immature females	0	0	0	0	0	0	184	0	128	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.36	0.00	0.00	0.00	0.00	0.00	2.00	0.13	1.53	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	B-07	B-08	C-01	C-02	C-03	C-04	C-05	C-06	C-07	C-08	C-09
Start Date	6/18/2017	6/19/2017	6/30/2017	6/27/2017	6/26/2017	6/23/2017	6/24/2017	6/20/2017	6/18/2017	6/19/2017	6/10/2017
Duration (hour)	0.52	0.47	0.52	0.51	0.54	0.53	0.51	0.53	0.53	0.52	0.52
Distance Fished (km)	2.83	2.44	2.94	2.75	2.96	2.84	2.74	2.86	2.91	2.9	2.82
Mid-Latitude (°N)	55.33206	55.34074	55.6643	55.67909	55.66727	55.66107	55.66797	55.67	55.70059	55.66789	55.67052
Mid-Longitude (°W)	-164.03076	-163.42092	-167.58255	-166.98401	-166.38339	-165.80184	-165.17467	-164.59	-164.01577	-163.41562	-162.83091
Bottom Depth (m)	78	54	135	135	127	118	109	96	94	82	53
Bottom Temperature (°C)	4.7	3.3	4.5	4.3	4.2	4.5	4.2	3.1	2.4	2.3	3
Red King Crab											
Immature males	0	178	0	0	0	0	0	0	0	0	221
Mature males	0	444	0	0	0	0	0	0	0	68	294
Legal	0	355	0	0	0	0	0	0	0	68	221
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	1,155	0	0	0	0	0	0	0	68	1,914
Total weight (kg)	0.00	31.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.74	40.55
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	0	800	721	390	887	801	479	0	592	1,505	9,715
Mature males	217	1,244	262	130	946	308	1,164	0	724	3,625	7,875
Legal	217	800	131	0	710	185	1,027	0	658	2,530	5,667
Immature females	0	267	1,180	585	828	678	0	0	132	0	957
Mature females	0	89	66	65	2,661	308	137	0	132	205	1,546
Total weight (kg)	2.12	10.69	3.31	1.15	17.29	5.28	15.15	0.00	11.92	40.43	79.61
Opilio Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	197	0	0
Legal	0	0	0	0	0	0	0	0	197	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	62	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	1.85	0.00	0.00
Hybrid Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	68	0
Mature males	0	0	0	0	177	123	0	0	0	205	0
Immature females	0	0	0	0	177	123	0	0	0	274	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	1.92	1.64	0.00	0.00	0.00	1.76	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	C-18	D-01	D-02	D-03	D-04	D-05	D-06	D-07	D-08	D-09	D-10
Start Date	7/1/2017	6/30/2017	6/27/2017	6/26/2017	6/23/2017	6/24/2017	6/20/2017	6/18/2017	6/19/2017	6/10/2017	6/7/2017
Duration (hour)	0.52	0.52	0.52	0.51	0.54	0.53	0.58	0.54	0.52	0.53	0.51
Distance Fished (km)	2.92	2.74	2.79	2.74	2.93	2.97	3.15	2.9	2.93	2.79	2.8
Mid-Latitude (°N)	55.66886	56.00069	56.00461	56.00073	56.0021	56.00112	55.99036	55.99889	55.99506	55.98908	55.99764
Mid-Longitude (°W)	-168.18569	-167.62366	-167.01308	-166.39943	-165.78438	-165.1893	-164.58648	-164.03229	-163.41443	-162.8133	-162.24541
Bottom Depth (m)	135	133	134	125	108	96	92	91	87	80	71
Bottom Temperature (°C)	4.4	4.4	4.2	4.3	3.9	2.4	2.5	1.9	1.9	2	2.9
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	209	72
Mature males	0	0	0	0	0	0	62	0	0	279	145
Legal	0	0	0	0	0	0	62	0	0	279	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	1,254	289
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	2.40	0.00	0.00	33.88	10.78
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	6,069	557	1,976	1,600	1,594	514	62	67	731	348	362
Mature males	136	70	1,976	867	1,663	1,093	2,994	1,076	2,857	1,045	434
Legal	0	70	1,185	667	970	772	2,745	807	2,392	975	289
Immature females	10,092	70	724	1,333	346	0	0	0	66	70	0
Mature females	205	70	132	0	1,663	450	499	135	1,661	418	217
Total weight (kg)	5.12	0.98	18.98	8.90	24.22	14.43	34.70	12.26	36.98	12.30	5.92
Opilio Tanner Crab											
Immature males	68	70	66	0	277	0	0	0	0	0	0
Mature males	0	70	132	67	1,039	0	0	0	66	0	0
Legal	68	139	198	67	1,247	0	0	0	66	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	626	0	0	6,513	0	0	0	0	0	0
Total weight (kg)	0.24	1.83	1.96	0.80	22.04	0.00	0.00	0.00	0.57	0.00	0.00
Hybrid Tanner Crab											
Immature males	0	0	0	0	69	0	0	0	0	0	0
Mature males	0	0	198	67	831	0	125	0	66	0	0
Immature females	0	0	198	67	901	0	125	0	66	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	2.51	0.59	10.33	0.00	1.52	0.00	0.53	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	D-18	E-01	E-02	E-03	E-04	E-05	E-06	E-07	E-08	E-09	E-10
Start Date	7/1/2017	6/30/2017	6/27/2017	6/26/2017	6/24/2017	6/24/2017	6/20/2017	6/18/2017	6/19/2017	6/10/2017	6/10/2017
Duration (hour)	0.52	0.51	0.53	0.52	0.53	0.52	0.52	0.52	0.52	0.53	0.54
Distance Fished (km)	2.93	2.67	2.88	2.82	2.86	2.97	2.85	2.84	2.91	2.84	2.75
Mid-Latitude (°N)	56.01178	56.32944	56.33727	56.34714	56.32622	56.33151	56.3282	56.33439	56.30689	56.33369	56.32973
Mid-Longitude (°W)	-168.2284	-167.65304	-167.04023	-166.40911	-165.80249	-165.1917	-164.58263	-164.00874	-163.40872	-162.80445	-162.19615
Bottom Depth (m)	151	129	113	103	93	87	87	87	86	78	76
Bottom Temperature (°C)	4.5	4.2	3.7	2.8	2	1.7	1.6	1.5	1.3	1.1	2.3
<b>Red King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	70	0	357
Mature males	0	0	0	0	0	0	0	0	0	137	285
Legal	0	0	0	0	0	0	0	0	0	137	71
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	206	357
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	10.70	17.80
<b>Blue King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Bairdi Tanner Crab</b>											
Immature males	20,331	1,585	131	553	427	638	829	268	1,253	823	214
Mature males	900	936	1,771	1,037	853	1,468	1,519	1,340	3,967	3,907	2,211
Legal	692	864	1,509	899	711	1,085	1,105	804	3,201	2,810	1,926
Immature females	33,891	720	66	553	711	192	0	134	278	0	0
Mature females	0	0	1,246	346	142	894	207	402	1,949	1,234	1,070
Total weight (kg)	10.08	8.04	20.5	9.88	9.31	18.23	18.35	15.40	46.21	43.24	29.14
<b>Opilio Tanner Crab</b>											
Immature males	0	792	66	69	71	0	0	134	0	0	0
Mature males	346	216	525	138	498	483	0	67	0	0	0
Legal	346	720	525	207	569	483	0	134	0	0	0
Immature females	0	0	0	0	0	0	0	67	0	0	0
Mature females	0	72	6,183	0	0	0	0	0	0	0	0
Total weight (kg)	2.04	3.65	15.79	2.22	5.57	4.09	0.00	1.33	0.00	0.00	0.00
<b>Hybrid Tanner Crab</b>											
Immature males	0	72	0	0	0	0	138	0	0	0	0
Mature males	0	216	328	69	284	0	69	0	0	0	0
Immature females	0	216	328	69	284	0	69	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	2.05	3.01	0.74	2.36	0.00	0.83	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	E-11	E-12	E-18	E-19	E-20	E-21	E-22	F-01	F-02	F-03	F-04
Start Date	6/7/2017	6/6/2017	7/1/2017	7/17/2017	7/17/2017	7/17/2017	7/7/2017	6/29/2017	6/28/2017	6/25/2017	6/24/2017
Duration (hour)	0.52	0.52	0.52	0.52	0.52	0.51	0.52	0.52	0.52	0.52	0.53
Distance Fished (km)	2.91	2.8	2.74	2.81	2.9	2.8	2.85	2.81	2.89	2.77	2.8
Mid-Latitude (°N)	56.33847	56.34052	56.33459	56.33314	56.33742	56.33562	56.33316	56.66434	56.67877	56.67616	56.6677
Mid-Longitude (°W)	-161.61595	-160.98741	-168.24634	-168.87636	-169.31494	-170.07847	-170.67651	-167.68521	-167.06936	-166.4207	-165.83748
Bottom Depth (m)	66	53	154	129	137	110	121	102	95	83	78
Bottom Temperature (°C)	2.9	4	4.4	3.8	4	3.9	4.5	1.5	1.7	1.6	1.4
<b>Red King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	483	76	0	0	0	0	0	0	0	0	0
Total weight (kg)	8.66	1.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Blue King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Bairdi Tanner Crab</b>											
Immature males	276	379	6,156	2,264	5,978	1,440	6,247	135	884	290	589
Mature males	690	606	3,378	1,235	131	686	68	270	408	1,740	1,251
Legal	483	530	3,153	1,235	131	411	68	270	272	1,668	809
Immature females	0	76	11,186	4,253	6,503	1,303	6,043	337	1,292	0	74
Mature females	207	0	751	5,968	657	754	815	0	884	218	294
Total weight (kg)	9.03	6.89	29.06	22.82	3.35	10.3	7.49	2.14	5.74	16.44	14.86
<b>Opilio Tanner Crab</b>											
Immature males	0	0	526	960	66	137	0	540	136	290	147
Mature males	0	0	1,201	137	66	69	0	675	272	0	294
Legal	0	0	1,501	617	66	137	0	1,147	340	73	368
Immature females	0	0	0	0	0	343	0	0	0	0	0
Mature females	0	0	9,009	16,631	263	0	0	810	68	0	147
Total weight (kg)	0.00	0.00	20.55	25.38	0.95	0.87	0.00	9.33	2.45	0.63	2.56
<b>Hybrid Tanner Crab</b>											
Immature males	0	0	150	137	0	343	0	67	0	0	0
Mature males	0	0	676	0	0	0	0	202	136	0	221
Immature females	0	0	751	0	0	0	0	270	136	0	221
Mature females	0	0	0	0	0	343	0	0	0	0	0
Total weight (kg)	0.00	0.00	6.89	2.32	0.00	0.26	0.00	2.21	0.95	0.06	1.67

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	F-05	F-06	F-07	F-08	F-09	F-10	F-11	F-12	F-13	F-14	F-18
Start Date	6/25/2017	6/19/2017	6/18/2017	6/18/2017	6/11/2017	6/9/2017	6/7/2017	6/6/2017	6/6/2017	6/4/2017	7/1/2017
Duration (hour)	0.53	0.53	0.53	0.53	0.52	0.51	0.4	0.52	0.53	0.52	0.52
Distance Fished (km)	2.96	2.87	2.83	2.95	2.78	2.76	2.13	2.89	3.02	2.79	2.69
Mid-Latitude (°N)	56.66458	56.67226	56.66762	56.66712	56.67676	56.66206	56.67378	56.66297	56.66878	56.67225	56.66887
Mid-Longitude (°W)	-165.21383	-164.58064	-164.02263	-163.39269	-162.79117	-162.18894	-161.57331	-161.00008	-160.36712	-159.75542	-168.30229
Bottom Depth (m)	77	75	75	75	72	71	90	66	59	39	107
Bottom Temperature (°C)	1.3	1.4	0.4	0.8	1.6	1.4	1.8	2.9	3.4	4.8	2.2
<b>Red King Crab</b>											
Immature males	0	0	66	0	71	0	94	300	71	80	0
Mature males	325	145	132	0	141	373	94	375	71	80	0
Legal	325	72	66	0	141	373	94	375	71	80	0
Immature females	0	0	0	0	0	0	0	225	71	0	0
Mature females	0	0	0	135	353	2,164	1,321	1,349	141	80	0
Total weight (kg)	16.15	4.04	5.92	1.28	14.53	48.74	19.96	49.49	6.25	3.85	0.00
<b>Blue King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Bairdi Tanner Crab</b>											
Immature males	586	1,302	462	405	635	149	94	150	141	159	224
Mature males	1,172	4,197	1,781	1,688	1,552	821	2,076	1,124	424	319	2,390
Legal	976	2,605	1,188	810	1,411	597	2,076	899	354	239	1,942
Immature females	130	0	66	0	0	0	0	0	0	0	1,046
Mature females	521	1,085	1,122	473	212	75	1,227	899	141	0	0
Total weight (kg)	15.12	44.88	22.77	15.51	17.98	7.78	22.05	16.36	5.57	2.66	17.19
<b>Opilio Tanner Crab</b>											
Immature males	0	217	66	68	0	0	0	0	0	0	1,046
Mature males	0	434	264	68	0	0	0	0	0	0	1,494
Legal	0	651	264	135	0	0	0	0	0	0	2,316
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	57,692
Total weight (kg)	0.00	3.66	2.46	1.58	0.00	0.00	0.00	0.00	0.00	0.00	64.37
<b>Hybrid Tanner Crab</b>											
Immature males	0	72	0	0	0	0	0	0	0	0	75
Mature males	0	217	198	68	0	0	0	0	0	0	149
Immature females	0	289	198	68	0	0	0	0	0	0	224
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	1.48	1.93	0.29	0.00	0.00	0.00	0.00	0.00	0.00	2.28

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	F-19	F-20	F-21	F-22	F-23	F-24	F-25	G-01	G-02	G-03	G-04
Start Date	7/17/2017	7/17/2017	7/17/2017	7/7/2017	7/9/2017	7/18/2017	7/18/2017	6/29/2017	6/28/2017	6/25/2017	6/24/2017
Duration (hour)	0.52	0.52	0.51	0.52	0.52	0.51	0.49	0.52	0.53	0.53	0.53
Distance Fished (km)	2.81	2.9	2.8	2.9	2.8	2.74	2.67	2.9	2.94	2.84	2.88
Mid-Latitude (°N)	56.6673	56.67793	56.66921	56.6691	56.67147	56.66585	56.65838	56.99761	57.00722	57.00134	56.99075
Mid-Longitude (°W)	-168.91142	-169.49945	-170.09758	-170.73196	-171.35315	-171.97567	-172.55925	-167.69743	-167.09028	-166.47486	-165.86375
Bottom Depth (m)	100	79	95	114	120	126	139	78	74	73	72
Bottom Temperature (°C)	2.2	4.6	4	4.4	4.4	4.1	4.1	1.8	1.5	0.5	0.4
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	140
Legal	0	0	0	0	0	0	0	0	0	0	70
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.56
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	716	943	1,705	727	792	5,636	0	269	935	433	419
Mature males	5,373	1,886	4,120	1,124	216	289	0	3,633	863	938	280
Legal	4,729	1,813	3,481	925	144	145	0	3,363	719	722	140
Immature females	0	145	284	991	648	4,697	151	67	144	289	70
Mature females	4,084	0	4,262	198	144	3,107	0	471	288	361	70
Total weight (kg)	57.26	19.39	56.37	11.90	2.31	10.71	0.02	28.69	9.91	9.39	2.93
Opilio Tanner Crab											
Immature males	2,293	73	10,372	0	1,296	0	0	807	1,007	289	280
Mature males	716	0	995	0	216	289	0	404	431	72	0
Legal	1,863	73	4,547	0	792	289	0	673	863	217	140
Immature females	0	0	0	0	0	145	0	0	0	0	0
Mature females	22,824	0	0	0	54,089	0	0	0	72	72	0
Total weight (kg)	38.74	0.28	28.22	0.00	50.19	2.04	0.00	4.84	6.14	1.56	0.86
Hybrid Tanner Crab											
Immature males	143	0	0	0	0	723	0	67	144	72	0
Mature males	215	0	0	0	144	0	0	135	0	0	70
Immature females	287	0	0	0	144	0	0	202	72	72	70
Mature females	0	0	0	0	0	723	0	0	0	0	0
Total weight (kg)	4.44	0.00	0.00	0.00	1.88	0.10	0.00	1.16	0.39	0.33	0.52



Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	G-05	G-06	G-07	G-08	G-09	G-10	G-11	G-12	G-13	G-14	G-15
Start Date	6/25/2017	6/19/2017	6/19/2017	6/18/2017	6/11/2017	6/9/2017	6/7/2017	6/7/2017	6/6/2017	6/4/2017	6/4/2017
Duration (hour)	0.51	0.52	0.52	0.52	0.53	0.54	0.52	0.52	0.52	0.51	0.54
Distance Fished (km)	2.81	2.83	2.75	2.84	2.8	3.08	2.72	2.79	2.88	2.87	2.89
Mid-Latitude (°N)	57.00111	57.0023	56.98831	57.00203	56.99865	56.99109	57.00011	56.99676	56.99511	57.00057	57.00585
Mid-Longitude (°W)	-165.21457	-164.60565	-164.03053	-163.38627	-162.79754	-162.16731	-161.56483	-160.9497	-160.33839	-159.71553	-159.13143
Bottom Depth (m)	72	70	69	66	61	61	70	64	64	56	36
Bottom Temperature (°C)	0.4	0	-0.5	0.6	0.9	3	2	3.2	3.6	3.7	5.2
Red King Crab											
Immature males	0	0	0	143	142	330	365	0	223	73	0
Mature males	0	659	214	2,783	355	923	585	72	372	439	0
Legal	0	586	143	2,355	355	659	511	72	298	439	0
Immature females	0	0	0	0	0	132	0	0	0	0	0
Mature females	0	0	0	0	213	5,932	4,530	288	1,861	586	0
Total weight (kg)	0.00	28.06	7.42	85.49	18.34	141.24	98.48	8.82	46.82	30.86	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	841	1,098	1,570	357	569	330	146	144	74	439	75
Mature males	631	952	285	428	427	264	877	216	670	293	0
Legal	561	439	143	143	284	198	731	144	372	73	0
Immature females	0	0	357	0	213	66	0	0	0	0	0
Mature females	491	439	214	0	213	0	146	144	74	0	0
Total weight (kg)	10.48	12.79	5.88	3.95	6.80	3.29	9.08	3.86	6.32	4.52	0.45
Opilio Tanner Crab											
Immature males	0	0	214	0	71	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	143	0	71	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.74	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00
Hybrid Tanner Crab											
Immature males	0	0	143	71	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	71	0	0	0	0	0	0	0
Mature females	0	0	71	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.09	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	G-18	G-19	G-20	G-21	G-22	G-23	G-24	G-25	G-26	GF1918	GF2019
Start Date	7/2/2017	7/4/2017	7/4/2017	7/6/2017	7/7/2017	7/9/2017	7/9/2017	7/18/2017	7/18/2017	7/1/2017	7/4/2017
Duration (hour)	0.52	0.52	0.52	0.52	0.52	0.53	0.51	0.51	0.5	0.52	0.52
Distance Fished (km)	2.81	2.84	2.9	2.85	2.91	2.85	2.83	2.77	2.79	2.77	2.78
Mid-Latitude (°N)	57.00258	57.00077	57.00211	57.01885	56.99949	57.00054	56.99855	57.00193	56.99601	56.83862	56.83439
Mid-Longitude (°W)	-168.32137	-168.94606	-169.55124	-170.19337	-170.78659	-171.39904	-172.03894	-172.64299	-173.25164	-168.62078	-169.30764
Bottom Depth (m)	81	80	60	66	96	109	117	122	141	97	80
Bottom Temperature (°C)	2.3	2.8	3.9	4.9	3.9	4.4	4.4	4.4	4.4	2.3	4.1
Red King Crab											
Immature males	0	0	71	0	0	0	0	0	0	0	0
Mature males	0	0	71	72	0	0	0	0	0	0	0
Legal	0	0	71	72	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	640	72	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	16.64	5.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	284	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	4.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	145	1,363	995	644	1,663	842	144	210	705	296	377
Mature males	3,119	5,884	1,422	1,289	931	70	72	210	0	4,961	2,567
Legal	2,539	5,238	1,280	788	798	0	72	140	0	4,442	2,416
Immature females	0	0	498	143	266	491	288	210	1,058	0	0
Mature females	1,523	0	569	72	200	70	216	210	0	1,407	0
Total weight (kg)	25.68	46.06	26.02	9.58	10.81	1.45	1.11	2.20	0.41	41.99	20.68
Opilio Tanner Crab											
Immature males	0	2,321	502	569	0	1,474	4,537	140	0	3,702	151
Mature males	0	1,668	431	427	0	351	3,025	0	0	1,259	151
Legal	0	3,047	718	853	0	1,264	6,337	70	0	2,888	302
Immature females	0	0	0	0	0	0	0	0	0	0	75
Mature females	0	73	3,085	0	0	27,900	33,693	0	0	15,252	151
Total weight (kg)	0.00	16.80	6.47	3.29	0.00	35.91	65.73	0.32	0.00	36.40	1.70
Hybrid Tanner Crab											
Immature males	0	287	0	0	0	0	0	70	0	74	0
Mature males	363	0	0	0	0	0	0	0	0	592	0
Immature females	363	215	0	0	0	0	0	0	0	666	0
Mature females	0	0	0	0	0	0	0	70	0	0	0
Total weight (kg)	2.91	1.50	0.00	0.00	0.00	0.39	0.00	0.01	0.00	6.96	0.30

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	GF2120	GF2221	H-01	H-02	H-03	H-04	H-05	H-06	H-07	H-08	H-09
Start Date	7/4/2017	7/7/2017	6/29/2017	6/28/2017	6/25/2017	6/24/2017	6/25/2017	6/19/2017	6/19/2017	6/18/2017	6/11/2017
Duration (hour)	0.53	0.52	0.51	0.51	0.51	0.53	0.52	0.53	0.53	0.5	0.53
Distance Fished (km)	2.94	2.89	2.69	2.73	2.8	2.86	2.86	2.9	2.81	2.6	2.76
Mid-Latitude (°N)	56.83534	56.83722	57.33266	57.33757	57.335	57.3258	57.32825	57.33399	57.32568	57.33257	57.32991
Mid-Longitude (°W)	-169.89328	-170.47429	-167.73528	-167.12021	-166.49582	-165.86629	-165.23425	-164.61537	-163.9962	-163.38706	-162.75945
Bottom Depth (m)	72	101	74	71	70	67	68	65	62	53	50
Bottom Temperature (°C)	4.5	3.9	1.5	0.7	0.2	0.2	0.2	-0.2	0	1.6	2.6
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	80	222
Mature males	0	0	0	0	0	0	0	277	72	239	370
Legal	0	0	0	0	0	0	0	277	72	159	370
Immature females	0	0	0	0	0	0	0	0	0	0	74
Mature females	0	0	0	0	0	0	0	0	0	0	740
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.24	3.76	8.50	27.97
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	1,193	3,551	687	310	750	289	340	693	502	159	148
Mature males	1,896	2,747	1,373	232	826	72	68	277	72	80	148
Legal	1,545	2,345	687	155	450	72	0	208	72	0	148
Immature females	211	1,072	0	0	75	0	0	0	72	0	0
Mature females	70	1,139	534	0	0	72	68	69	0	80	0
Total weight (kg)	17.26	34.16	10.62	2.47	7.39	1.60	1.70	5.50	2.01	1.42	1.24
Opilio Tanner Crab											
Immature males	5,195	134	839	774	600	145	0	0	0	0	0
Mature males	2,317	536	76	0	0	0	0	0	0	0	0
Legal	6,178	603	305	310	75	72	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	24.69	3.62	2.43	2.00	1.27	0.36	0.00	0.00	0.00	0.00	0.00
Hybrid Tanner Crab											
Immature males	702	201	153	0	150	0	0	0	0	0	0
Mature males	351	201	76	0	75	72	0	0	0	0	0
Immature females	842	201	229	0	150	72	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	3.66	1.74	0.97	0.00	0.45	0.33	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	H-10	H-11	H-12	H-13	H-14	H-15	H-16	H-18	H-19	H-20	H-21
Start Date	6/9/2017	6/8/2017	6/6/2017	6/6/2017	6/4/2017	6/5/2017	6/4/2017	7/2/2017	7/3/2017	7/3/2017	7/3/2017
Duration (hour)	0.52	0.51	0.51	0.52	0.51	0.52	0.54	0.51	0.51	0.52	0.51
Distance Fished (km)	2.93	2.75	2.79	2.91	2.81	2.86	3.06	2.79	2.69	2.85	2.78
Mid-Latitude (°N)	57.33745	57.33285	57.34232	57.3348	57.32978	57.33855	57.34	57.33572	57.33322	57.3406	57.34
Mid-Longitude (°W)	-162.13204	-161.52867	-160.94289	-160.30253	-159.67039	-159.05564	-158.4	-168.36995	-168.9868	-169.60684	-170.23
Bottom Depth (m)	51	57	59	62	54	49	30	74	70	63	56
Bottom Temperature (°C)	3.5	3.2	3.3	3.6	3.4	3.8	5.4	2.3	2.5	3	5.9
Red King Crab											
Immature males	71	462	0	0	72	0	0	0	0	0	0
Mature males	212	77	0	351	1,015	78	0	0	0	73	0
Legal	71	77	0	281	870	78	0	0	0	73	0
Immature females	0	0	0	0	145	78	0	0	0	0	0
Mature females	635	231	0	632	1,232	156	0	0	0	219	0
Total weight (kg)	17.14	9.74	0.00	23.98	69.24	6.26	0.00	0.00	0.00	7.58	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	80	0	0
Legal	0	0	0	0	0	0	0	0	80	0	0
Immature females	0	0	0	0	0	0	0	0	80	0	0
Mature females	0	0	0	0	0	0	0	0	80	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.81	0.00	0.00
Bairdi Tanner Crab											
Immature males	212	308	73	140	0	78	0	525	719	1,096	0
Mature males	353	308	734	351	290	156	0	1,949	2,638	4,093	0
Legal	212	231	514	281	145	78	0	1,499	2,078	3,216	0
Immature females	0	0	0	0	0	0	0	0	0	146	0
Mature females	0	77	0	0	0	0	0	150	160	0	0
Total weight (kg)	2.92	4.03	6.67	4.00	3.18	1.58	0.00	13.53	18.64	33.94	0.00
Opilio Tanner Crab											
Immature males	0	0	0	0	0	0	0	600	160	2,558	0
Mature males	0	0	0	0	0	0	0	150	80	219	0
Legal	0	0	0	0	0	0	0	525	160	1,096	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	146	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.28	0.73	7.25	0.00
Hybrid Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	292	0
Mature males	0	0	0	0	0	0	0	0	80	658	0
Immature females	0	0	0	0	0	0	0	0	80	950	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	5.68	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	H-22	H-23	H-24	H-25	H-26	HG1918	HG2019	HG2120	HG2221	I-01	I-02
Start Date	7/7/2017	7/9/2017	7/9/2017	7/18/2017	7/18/2017	7/2/2017	7/3/2017	7/3/2017	7/6/2017	6/29/2017	6/28/2017
Duration (hour)	0.52	0.51	0.51	0.43	0.51	0.52	0.51	0.52	0.52	0.52	0.52
Distance Fished (km)	2.78	2.78	2.76	2.36	2.92	2.84	2.79	2.9	2.89	2.76	2.79
Mid-Latitude (°N)	57.33568	57.33466	57.33508	57.35549	57.33039	57.16497	57.16738	57.16626	57.11153	57.668	57.65899
Mid-Longitude (°W)	-170.85279	-171.46998	-172.10209	-172.80513	-173.32589	-168.62982	-169.31341	-169.88685	-170.46941	-167.76741	-167.13274
Bottom Depth (m)	83	101	108	118	122	76	73	50	47	69	69
Bottom Temperature (°C)	4.8	3.9	4.1	4.4	4.4	2.7	3	5.4	5.5	0.4	0.4
Red King Crab											
Immature males	0	0	0	0	0	0	0	73	0	0	0
Mature males	0	0	0	0	0	0	0	73	2,405	0	0
Legal	0	0	0	0	0	0	0	73	2,333	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	73	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.3	101.42	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	77	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	1.79	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	355	935	141	0	137	525	2,984	952	219	722	234
Mature males	2,912	10,432	71	0	0	1,876	10,100	659	437	433	390
Legal	2,699	9,856	71	0	0	1,651	6,580	440	364	217	312
Immature females	0	216	141	82	69	0	0	147	0	0	0
Mature females	710	5,612	0	0	0	75	0	0	0	72	78
Total weight (kg)	31.02	115.63	0.80	0.01	0.07	15.25	69.58	6.75	3.23	4.98	3.39
Opilio Tanner Crab											
Immature males	0	647	2,398	0	0	75	2,219	0	146	722	468
Mature males	0	144	2,398	0	0	0	459	0	0	144	0
Legal	0	504	4,303	0	0	0	1,377	0	146	505	78
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	144	77,009	0	0	0	3,367	0	0	72	0
Total weight (kg)	0.00	2.86	89.46	0.00	0.00	0.10	9.89	0.00	0.28	2.79	1.44
Hybrid Tanner Crab											
Immature males	0	144	0	0	0	0	306	0	0	361	156
Mature males	71	144	0	0	0	0	1,071	0	0	72	78
Immature females	71	288	0	0	0	0	1,224	0	0	289	234
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.24	2.75	1.05	0.00	0.00	0.00	6.46	0.00	0.00	0.93	0.94

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	I-03	I-04	I-05	I-06	I-07	I-08	I-09	I-10	I-11	I-12	I-13
Start Date	6/25/2017	6/24/2017	6/25/2017	6/26/2017	6/18/2017	6/18/2017	6/11/2017	6/9/2017	6/8/2017	6/6/2017	6/5/2017
Duration (hour)	0.52	0.52	0.52	0.51	0.52	0.53	0.53	0.52	0.52	0.52	0.52
Distance Fished (km)	2.87	2.86	2.98	2.92	2.85	2.89	2.76	2.97	2.92	2.91	2.83
Mid-Latitude (°N)	57.68482	57.6635	57.6654	57.66546	57.66833	57.65907	57.65009	57.66303	57.66359	57.66573	57.66228
Mid-Longitude (°W)	-166.50893	-165.88909	-165.26975	-164.62921	-163.99669	-163.38398	-162.77396	-162.12735	-161.5051	-160.90383	-160.25861
Bottom Depth (m)	67	64	61	54	52	46	44	48	54	56	53
Bottom Temperature (°C)	0.6	0.5	1.2	1.8	2.2	3.3	3.9	3.6	2.8	2.9	3.3
Red King Crab											
Immature males	0	0	0	0	0	218	74	207	428	0	0
Mature males	0	0	0	141	74	73	369	207	856	280	157
Legal	0	0	0	71	74	0	296	207	856	280	157
Immature females	0	0	0	0	0	0	148	621	214	0	0
Mature females	0	0	0	0	0	73	296	276	500	210	235
Total weight (kg)	0.00	0.00	0.00	3.65	3.23	3.74	19.84	19.61	49.33	10.48	12.24
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	426	299	66	989	296	145	0	69	71	140	157
Mature males	142	150	0	0	74	73	74	138	0	0	235
Legal	71	75	0	0	0	73	74	138	0	0	78
Immature females	0	0	66	212	296	73	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	2.39	1.90	0.05	2.94	0.93	0.95	0.55	1.88	0.35	0.89	2.50
Opilio Tanner Crab											
Immature males	71	299	66	0	0	0	0	0	0	0	0
Mature males	0	150	0	0	0	0	0	0	0	0	0
Legal	0	225	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.16	1.43	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hybrid Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	71	0	0	0	0	0	0	0	0	0	0
Immature females	71	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	I-14	I-15	I-16	I-18	I-19	I-20	I-21	I-22	I-23	I-24	I-25
Start Date	6/5/2017	6/5/2017	6/4/2017	7/2/2017	7/3/2017	7/3/2017	7/4/2017	7/4/2017	7/8/2017	7/8/2017	7/18/2017
Duration (hour)	0.52	0.52	0.53	0.51	0.51	0.51	0.42	0.52	0.52	0.51	0.52
Distance Fished (km)	2.96	2.82	3.03	2.75	2.73	2.84	2.34	2.88	2.77	2.68	2.76
Mid-Latitude (°N)	57.66619	57.66	57.66	57.67183	57.66809	57.66545	57.66687	57.6566	57.66526	57.66363	57.66453
Mid-Longitude (°W)	-159.6305	-159.01	-158.37	-168.39747	-169.02908	-169.65562	-170.27005	-170.90482	-171.55165	-172.16309	-172.78887
Bottom Depth (m)	49	48	34	71	69	70	73	85	100	107	119
Bottom Temperature (°C)	3.4	4	4.9	1.6	1.4	2	2.8	3.1	3.4	3.4	4.4
Red King Crab											
Immature males	0	0	0	0	0	73	91	0	0	0	0
Mature males	521	0	0	0	0	73	0	0	0	0	0
Legal	447	0	0	0	0	73	0	0	0	0	0
Immature females	74	0	0	0	0	0	0	0	0	0	0
Mature females	745	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	37.58	0.00	0.00	0.00	0.00	4.32	0.001	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	78	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.87	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	298	0	0	533	781	291	2,173	407	1,408	222	0
Mature males	0	0	0	229	1,328	1,601	1,358	3,591	5,112	0	0
Legal	0	0	0	152	781	1,237	996	3,456	4,371	0	0
Immature females	0	0	0	0	0	73	634	407	296	148	0
Mature females	0	0	0	76	0	0	181	136	7,705	0	0
Total weight (kg)	1.78	0.00	0.00	3.31	9.16	13.76	11.66	36.88	56.58	0.15	0.00
Opilio Tanner Crab											
Immature males	0	0	0	609	938	218	815	678	222	3,852	1,189
Mature males	0	0	0	0	0	146	181	0	519	2,074	140
Legal	0	0	0	381	78	218	362	474	519	4,075	699
Immature females	0	0	0	0	78	0	0	0	0	0	70
Mature females	0	0	0	0	0	0	0	0	370	34,393	21,973
Total weight (kg)	0.00	0.00	0.00	1.63	1.60	1.43	2.25	2.08	3.90	52.58	28.34
Hybrid Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	156	73	181	1,084	74	0	0
Immature females	0	0	0	0	156	73	181	1,084	74	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.90	0.49	1.48	8.32	0.73	0.73	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	I-26	IH1918	IH2019	IH2120	IH2221	J-01	J-02	J-03	J-04	J-05	J-06
Start Date	7/18/2017	7/2/2017	7/3/2017	7/3/2017	7/4/2017	6/29/2017	6/28/2017	6/26/2017	6/26/2017	6/26/2017	6/26/2017
Duration (hour)	0.5	0.51	0.28	0.52	0.52	0.52	0.53	0.52	0.51	0.52	0.52
Distance Fished (km)	2.82	2.81	1.5	2.82	2.87	2.68	2.87	3.01	2.96	2.92	3.04
Mid-Latitude (°N)	57.65227	57.50436	57.50013	57.50438	57.50373	58.00127	57.99206	57.99948	57.99693	58.0026	58.00343
Mid-Longitude (°W)	-173.37469	-168.75502	-169.36362	-169.99067	-170.59332	-167.80775	-167.17147	-166.53206	-165.90871	-165.25227	-164.61062
Bottom Depth (m)	143	71	70	68	75	67	64	61	56	51	46
Bottom Temperature (°C)	4.1	2.3	2.2	2.7	3.5	0.7	0.5	0.8	2.2	2.9	3.3
Red King Crab											
Immature males	0	0	0	150	0	0	0	0	0	0	0
Mature males	0	0	0	1,274	0	0	0	0	205	208	134
Legal	0	0	0	974	0	0	0	0	137	208	134
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	300	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	58.49	0.00	0.00	0.00	0.00	7.45	7.80	5.47
Blue King Crab											
Immature males	0	0	0	75	0	0	0	0	0	0	0
Mature males	0	0	139	75	0	0	0	0	0	0	0
Legal	0	0	139	75	0	0	0	0	0	0	0
Immature females	0	0	139	75	0	0	0	0	0	0	0
Mature females	0	0	557	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	7.14	6.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	274	299	1,115	600	346	1,700	217	464	274	139	67
Mature males	0	524	3,204	6,896	762	591	217	265	137	139	202
Legal	0	299	2,647	5,997	693	443	72	133	68	139	67
Immature females	343	0	279	0	0	0	0	133	0	139	0
Mature females	0	0	139	225	554	0	0	0	0	0	0
Total weight (kg)	0.43	4.25	14.76	57.70	10.68	7.12	1.98	2.49	1.93	1.96	2.01
Opilio Tanner Crab											
Immature males	0	225	139	825	69	0	290	0	0	0	0
Mature males	0	75	139	150	0	0	290	0	0	0	0
Legal	0	75	139	150	69	0	290	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.85	0.50	2.09	0.25	0.00	1.77	0.00	0.00	0.00	0.00
Hybrid Tanner Crab											
Immature males	0	0	0	225	0	0	72	0	0	0	0
Mature males	0	75	418	75	139	0	145	0	0	0	0
Immature females	0	75	418	150	139	0	217	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.43	1.61	1.06	1.16	0.00	0.94	0.00	0.00	0.00	0.00



Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	J-07	J-08	J-09	J-10	J-11	J-12	J-13	J-14	J-15	J-16	J-18
Start Date	6/17/2017	6/17/2017	6/11/2017	6/9/2017	6/8/2017	6/6/2017	6/5/2017	6/5/2017	6/5/2017	6/5/2017	7/2/2017
Duration (hour)	0.61	0.51	0.51	0.52	0.52	0.54	0.54	0.52	0.52	0.53	0.52
Distance Fished (km)	3.44	2.8	2.8	2.92	2.89	3.13	2.95	2.79	2.87	3.08	2.81
Mid-Latitude (°N)	57.99982	57.99994	57.99911	58.00375	58.00412	58.00483	57.98832	58.00803	58	57.99	57.99685
Mid-Longitude (°W)	-164.00974	-163.38033	-162.75567	-162.12176	-161.48232	-160.8639	-160.21878	-159.61794	-158.97	-158.31	-168.43656
Bottom Depth (m)	47	44	40	39	56	45	50	42	43	36	69
Bottom Temperature (°C)	3.5	4	3.9	3.7	3	3.2	3.3	4	4.9	5.2	1
Red King Crab											
Immature males	123	246	153	149	1079	330	401	329	0	0	0
Mature males	185	164	383	448	216	264	401	247	0	0	0
Legal	185	0	383	224	72	132	401	164	0	0	0
Immature females	0	246	0	149	647	0	80	164	0	0	0
Mature females	123	82	230	224	288	132	802	82	0	0	0
Total weight (kg)	10.83	6.79	15.84	15.01	18.21	13.17	32.44	7.86	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	123	82	0	0	216	0	241	247	0	0	508
Mature males	62	82	0	0	0	132	0	82	0	0	290
Legal	0	0	0	0	0	132	0	82	0	0	218
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.77	0.70	0.00	0.00	1.02	0.76	1.10	1.59	0.00	0.00	3.21
Opilio Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	1,089
Mature males	0	0	0	0	0	0	0	0	0	0	73
Legal	0	0	0	0	0	0	0	0	0	0	290
Immature females	0	0	0	0	0	0	0	0	0	0	73
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.32
Hybrid Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	145
Mature males	0	0	0	0	0	0	0	0	0	0	290
Immature females	0	0	0	0	0	0	0	0	0	0	435
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.07

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	J-19	J-20	J-21	J-22	J-23	J-24	J-25	J-26	J1918	J12019	J12120
Start Date	7/2/2017	7/2/2017	7/7/2017	7/7/2017	7/8/2017	7/8/2017	7/19/2017	7/19/2017	7/3/2017	7/2/2017	7/3/2017
Duration (hour)	0.51	0.51	0.52	0.52	0.51	0.51	0.51	0.51	0.51	0.52	0.51
Distance Fished (km)	2.76	2.75	2.81	2.87	2.75	2.74	2.74	2.75	2.69	2.81	2.81
Mid-Latitude (°N)	57.99941	58.00057	57.99418	57.99736	58.00176	57.99835	58.00076	57.98774	57.8316	57.84521	57.83769
Mid-Longitude (°W)	-169.05655	-169.69523	-170.35499	-170.96511	-171.59873	-172.23566	-172.87382	-173.49138	-168.73567	-169.36049	-169.98209
Bottom Depth (m)	70	70	75	87	98	105	109	118	71	67	72
Bottom Temperature (°C)	1	1.7	2.5	2.6	2.9	3.2	3.6	3.8	1.7	1.2	2.1
<b>Red King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Blue King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	204	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	136	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.70	0.00
<b>Bairdi Tanner Crab</b>											
Immature males	520	446	282	278	101	3,594	5,474	805	309	272	365
Mature males	594	446	141	278	609	0	0	0	77	408	657
Legal	297	298	141	278	507	0	0	0	77	272	292
Immature females	0	0	282	0	0	2,875	6,929	512	0	0	0
Mature females	0	0	0	0	731	216	0	146	0	0	0
Total weight (kg)	5.24	3.52	1.82	2.77	6.33	2.09	1.51	0.63	1.12	4.16	5.16
<b>Opilio Tanner Crab</b>											
Immature males	1,039	446	563	347	15,054	503	970	220	309	544	584
Mature males	74	0	0	139	1,900	431	1,178	220	0	204	0
Legal	148	74	70	208	8,769	647	1,871	366	0	272	146
Immature females	148	298	141	0	0	0	0	0	0	0	0
Mature females	74	74	70	0	261,262	791	2,979	0	0	68	146
Total weight (kg)	2.33	0.87	1.31	1.49	224.43	3.93	14.14	2.44	0.58	2.76	1.36
<b>Hybrid Tanner Crab</b>											
Immature males	74	0	70	0	73	0	0	0	0	136	0
Mature males	74	74	0	69	146	0	0	0	0	68	0
Immature females	74	74	70	69	219	0	0	0	0	136	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.46	0.53	0.24	0.53	1.73	0.00	0.00	0.00	0.00	0.68	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	J12221	K-01	K-02	K-03	K-04	K-05	K-06	K-07	K-08	K-09	K-10
Start Date	7/4/2017	6/29/2017	6/28/2017	6/27/2017	6/27/2017	6/16/2017	6/16/2017	6/17/2017	6/17/2017	6/12/2017	6/8/2017
Duration (hour)	0.53	0.53	0.52	0.52	0.52	0.53	0.53	0.52	0.52	0.53	0.53
Distance Fished (km)	2.92	2.85	2.81	2.9	3.07	2.98	2.95	2.83	2.9	3.05	2.94
Mid-Latitude (°N)	57.83383	58.33384	58.33715	58.33469	58.34291	58.33334	58.33422	58.33216	58.34	58.33703	58.32808
Mid-Longitude (°W)	-170.62469	-167.84554	-167.20327	-166.55722	-165.93433	-165.28879	-164.6245	-163.992	-163.38	-162.72899	-162.08187
Bottom Depth (m)	78	60	52	48	45	45	44	41	36	32	47
Bottom Temperature (°C)	2.7	0.9	2.1	3.2	3.7	2.7	3	4.1	4.8	5	4.9
Red King Crab											
Immature males	0	0	0	0	0	0	143	78	0	0	285
Mature males	0	72	72	0	473	0	72	78	0	71	71
Legal	0	72	72	0	473	0	72	78	0	71	0
Immature females	0	0	0	0	0	0	0	78	0	0	71
Mature females	0	0	0	72	0	281	72	78	0	71	0
Total weight (kg)	0.00	3.50	3.51	0.85	19.06	4.74	5.17	5.23	0.00	3.28	3.95
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	960	359	143	217	203	281	143	78	0	142	71
Mature males	1,440	0	72	145	203	70	0	0	0	0	142
Legal	686	0	72	145	203	70	0	0	0	0	71
Immature females	137	72	0	0	0	70	72	0	0	0	0
Mature females	0	72	0	0	0	0	0	0	0	0	0
Total weight (kg)	12.51	1.25	1.06	1.46	2.96	1.54	0.68	0.22	0.00	0.54	1.15
Opilio Tanner Crab											
Immature males	960	1,220	0	0	0	0	0	0	0	0	0
Mature males	274	502	0	0	0	0	0	0	0	0	0
Legal	892	861	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	137	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	4.78	4.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hybrid Tanner Crab											
Immature males	412	0	0	0	0	0	0	0	0	0	0
Mature males	137	502	0	0	0	0	0	0	0	0	0
Immature females	549	502	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	2.17	2.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	K-11	K-12	K-13	K-14	K-18	K-19	K-20	K-21	K-22	K-23	K-24
Start Date	6/8/2017	6/6/2017	6/6/2017	6/5/2017	7/2/2017	7/8/2017	7/8/2017	7/7/2017	7/7/2017	7/10/2017	7/10/2017
Duration (hour)	0.38	0.32	0.51	0.54	0.55	0.52	0.51	0.53	0.53	0.52	0.51
Distance Fished (km)	2.04	1.81	2.95	2.97	2.85	2.77	2.83	2.94	2.81	2.86	2.7
Mid-Latitude (°N)	58.22192	58.28478	58.27448	58.33	58.33555	58.33766	58.33586	58.34781	58.32613	58.33404	58.33522
Mid-Longitude (°W)	-161.54928	-160.80355	-159.96484	-159.55	-168.46227	-169.12582	-169.73145	-170.38723	-171.02152	-171.648	-172.30009
Bottom Depth (m)	40	31	42	24	65	68	69	74	84	96	103
Bottom Temperature (°C)	4.2	6.2	4.8	5.7	0.6	1	1.4	1.6	1.5	2.9	3.1
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	105	0	0	0	0	145	0	0	0	0	0
Legal	105	0	0	0	0	145	0	0	0	0	0
Immature females	0	0	69	0	0	0	0	0	0	0	0
Mature females	105	117	69	0	0	0	0	0	0	0	0
Total weight (kg)	5.91	1.02	1.35	0.00	0.00	5.10	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	0	0	0	0	216	436	434	349	69	1,865	5,098
Mature males	0	0	0	0	72	218	0	139	0	143	152
Legal	0	0	0	0	72	218	0	139	0	143	0
Immature females	0	0	0	0	0	0	0	0	69	1,219	4,413
Mature females	0	0	0	0	0	0	0	0	0	143	228
Total weight (kg)	0.00	0.00	0.00	0.00	1.06	2.96	1.38	2.00	0.20	2.80	6.75
Opilio Tanner Crab											
Immature males	0	0	0	0	22,055	7,266	36,413	13,385	485	3,156	10,957
Mature males	0	0	0	0	2,883	2,325	1,084	70	0	861	5,174
Legal	0	0	0	0	14,199	4,941	8,523	1,464	139	1,937	11,337
Immature females	0	0	0	0	72	73	1,229	1,520	0	1,004	7,389
Mature females	0	0	0	0	72	73	4,338	92,721	0	12,696	432,283
Total weight (kg)	0.00	0.00	0.00	0.00	61.15	24.91	86.72	104.98	0.95	20.99	317.8
Hybrid Tanner Crab											
Immature males	0	0	0	0	288	509	723	70	69	215	0
Mature males	0	0	0	0	288	1,308	145	70	0	72	0
Immature females	0	0	0	0	577	1,599	651	139	0	72	0
Mature females	0	0	0	0	0	0	0	0	0	72	1,065
Total weight (kg)	0.00	0.00	0.00	0.00	2.2	8.24	2.52	0.56	0.02	0.94	3.56

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	K-25	K-26	K-27	L-01	L-02	L-03	L-04	L-05	L-06	L-07	L-08
Start Date	7/19/2017	7/19/2017	7/19/2017	6/29/2017	6/28/2017	6/27/2017	6/27/2017	6/16/2017	6/16/2017	6/16/2017	6/12/2017
Duration (hour)	0.51	0.51	0.52	0.52	0.52	0.51	0.51	0.51	0.52	0.53	0.52
Distance Fished (km)	2.88	2.82	2.88	2.85	2.91	2.93	2.73	2.89	2.88	3.01	2.92
Mid-Latitude (°N)	58.33492	58.32141	58.33825	58.68389	58.66963	58.6666	58.66339	58.66171	58.66835	58.67	58.67624
Mid-Longitude (°W)	-172.93886	-173.56571	-174.30969	-167.87394	-167.21727	-166.56735	-165.93957	-165.30757	-164.65663	-164.01	-163.36081
Bottom Depth (m)	109	114	165	46	44	42	38	40	37	34	32
Bottom Temperature (°C)	3.5	4	3.5	3.7	4	4	5.1	3.2	4.4	5.5	4.9
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	296	138	73	78	0	0	0	0
Legal	0	0	0	296	138	73	78	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	74	69	0	78	156	75	0	0
Total weight (kg)	0.00	0.00	0.00	10.07	8.15	2.03	3.06	2.88	0.65	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	3,545	689	2,868	222	69	0	78	0	0	0	0
Mature males	67	0	0	0	0	0	0	0	0	0	73
Legal	67	0	0	0	0	0	0	0	0	0	73
Immature females	4,080	757	4,948	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	1.33	0.20	1.18	0.23	0.02	0.00	0.17	0.00	0.00	0.00	0.75
Opilio Tanner Crab											
Immature males	67	413	72	0	0	0	0	0	0	0	0
Mature males	2,809	964	72	0	0	0	0	0	0	0	0
Legal	2,876	1,308	143	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	134	620	72	0	0	0	0	0	0	0	0
Total weight (kg)	22.36	9.93	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hybrid Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	74	0	0	0	0	0	0	0
Immature females	0	0	0	74	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	L-09	L-18	L-19	L-20	L-21	L-22	L-23	L-24	L-25	L-26	L-27
Start Date	6/12/2017	7/1/2017	7/8/2017	7/11/2017	7/11/2017	7/11/2017	7/10/2017	7/10/2017	7/19/2017	7/19/2017	7/19/2017
Duration (hour)	0.55	0.52	0.52	0.51	0.5	0.52	0.53	0.52	0.53	0.52	0.51
Distance Fished (km)	3.28	2.88	2.82	2.75	2.76	2.79	2.84	2.79	2.9	2.86	2.85
Mid-Latitude (°N)	58.67204	58.67383	58.6658	58.66891	58.67735	58.66613	58.66913	58.67251	58.66925	58.66786	58.66353
Mid-Longitude (°W)	-162.70136	-168.47917	-169.15747	-169.80843	-170.43464	-171.08147	-171.71518	-172.37192	-172.98352	-173.63799	-174.27517
Bottom Depth (m)	23	53	62	66	73	83	92	101	112	127	158
Bottom Temperature (°C)	6.1	2.3	0.7	1	1.1	1.1	1.6	2.9	3.3	3.7	3.7
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	73	0	0	0	0	0	0	0	0	0
Legal	0	73	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	78	0	0	0	0	0	0	0
Total weight (kg)	0.00	5.02	0.00	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	77	0	717	543	74	140	282	437	4,697	1,099	19,005
Mature males	0	73	0	0	295	0	0	0	65	206	136
Legal	0	73	0	0	221	0	0	0	65	137	68
Immature females	0	0	0	78	0	0	71	437	4,436	1,168	20,283
Mature females	0	0	0	0	0	0	141	0	65	0	0
Total weight (kg)	0.42	0.44	1.58	1.16	1.96	0.16	0.40	0.43	1.91	2.12	8.63
Opilio Tanner Crab											
Immature males	0	73	45,148	31,362	21,145	3,284	12,274	146	391	206	0
Mature males	0	0	1,654	810	2,210	559	846	146	1,305	137	0
Legal	0	0	11,395	8,185	9,210	1,258	1,834	292	1,696	275	0
Immature females	0	0	359	1,800	516	0	682	0	65	0	0
Mature females	0	73	72	343	4,568	8,175	248,271	219	196	69	0
Total weight (kg)	0.00	0.16	79.11	55.72	52.14	16.20	191.39	1.30	12.22	2.13	0.00
Hybrid Tanner Crab											
Immature males	0	73	1,793	942	0	0	0	0	130	0	0
Mature males	0	73	287	171	0	0	0	0	65	0	0
Immature females	0	73	1,148	428	0	0	0	0	65	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.37	3.71	2.37	0.00	0.00	0.00	0.00	0.47	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	L-28	L-29	L-30	L-31	M-01	M-02	M-03	M-04	M-05	M-06	M-07
Start Date	7/26/2017	7/26/2017	7/27/2017	7/27/2017	6/29/2017	6/28/2017	6/27/2017	6/15/2017	6/15/2017	6/15/2017	6/12/2017
Duration (hour)	0.52	0.51	0.51	0.52	0.53	0.51	0.52	0.52	0.53	0.53	0.55
Distance Fished (km)	2.85	2.72	2.8	2.87	2.89	2.89	2.97	2.87	2.97	2.79	3.18
Mid-Latitude (°N)	58.6866	58.67918	58.6602	58.67534	59.00368	59.00282	59.01	59	59.001	59	59
Mid-Longitude (°W)	-174.92366	-175.53393	-176.15061	-176.82073	-167.8782	-167.22924	-166.59	-165.93	-165.29794	-164.66	-164.01
Bottom Depth (m)	195	135	142	135	43	41	34	30	28	28	29
Bottom Temperature (°C)	3.7	3.5	3.4	3.4	4.2	4.1	4.9	5.1	5.1	6	5.9
Red King Crab											
Immature males	0	0	0	0	75	0	0	0	0	0	0
Mature males	0	0	0	0	0	289	0	0	0	0	0
Legal	0	0	0	0	0	217	0	0	0	0	0
Immature females	0	0	0	0	75	0	0	0	0	0	0
Mature females	0	0	0	0	0	145	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	1.74	11.6	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	66	1,965	414	0	75	0	0	0	75	0	0
Mature males	0	1,965	69	0	0	0	0	0	0	0	0
Legal	0	1,263	69	0	0	0	0	0	0	0	0
Immature females	329	1,053	414	198	0	0	0	0	0	0	0
Mature females	0	4,492	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.04	27.85	0.59	0.03	0.28	0.00	0.00	0.00	0.20	0.00	0.00
Opilio Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	281	0	0	0	0	0	0	0	0	0
Legal	0	281	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	70	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hybrid Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	M-08	M-18	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27
Start Date	6/12/2017	7/1/2017	7/8/2017	7/11/2017	7/11/2017	7/11/2017	7/20/2017	7/19/2017	7/19/2017	7/20/2017	7/26/2017
Duration (hour)	0.54	0.53	0.52	0.51	0.51	0.52	0.51	0.52	0.51	0.5	0.52
Distance Fished (km)	2.8	2.93	2.79	2.87	2.71	2.69	2.76	2.86	2.75	2.75	2.78
Mid-Latitude (°N)	58.99	58.99324	58.99725	59.00478	58.99773	58.98945	58.99486	59.00339	59.00291	58.99964	59.00055
Mid-Longitude (°W)	-163.36	-168.53471	-169.17629	-169.83493	-170.48745	-171.12632	-171.7821	-172.42927	-173.07386	-173.72127	-174.36348
Bottom Depth (m)	23	46	54	63	72	78	87	98	107	117	128
Bottom Temperature (°C)	5.8	4	2.8	1	0.8	0.5	0.8	2.7	3	3.2	3.4
<b>Red King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	146	0	0	0	0	0	0	0	0	0
Legal	0	146	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	6.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Blue King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Bairdi Tanner Crab</b>											
Immature males	0	73	0	0	0	0	74	266	3,295	3,141	10,063
Mature males	0	0	0	0	0	0	0	0	69	205	68
Legal	0	0	0	0	0	0	0	0	69	137	68
Immature females	0	0	0	0	0	0	74	133	1,922	2,595	12,394
Mature females	0	0	0	0	0	0	0	0	0	68	68
Total weight (kg)	0.00	0.17	0.00	0.00	0.00	0.00	0.28	0.07	2.03	3.73	4.34
<b>Opilio Tanner Crab</b>											
Immature males	0	0	76	1,644	104,249	12,955	24,105	333	961	478	608
Mature males	0	0	0	598	887	1,230	2,559	0	961	3,209	270
Legal	0	0	0	971	5,767	4,415	8,753	133	1,785	3,687	878
Immature females	0	0	0	299	9,793	576	5,003	266	137	0	0
Mature females	0	0	0	0	8,971	40,347	158,385	0	206	68	68
Total weight (kg)	0.00	0.00	0.19	5.35	136.10	56.41	209.59	0.90	10.35	29.05	4.25
<b>Hybrid Tanner Crab</b>											
Immature males	0	0	0	0	1,645	0	74	0	0	0	0
Mature males	0	0	0	0	299	0	0	0	0	0	0
Immature females	0	0	0	0	673	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	4.15	0.00	0.22	0.00	0.00	0.00	0.00



Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	M-28	M-29	M-30	M-31	M-32	N-01	N-02	N-03	N-04	N-05	N-06
Start Date	7/26/2017	7/26/2017	7/26/2017	7/27/2017	7/27/2017	6/29/2017	6/28/2017	6/14/2017	6/15/2017	6/13/2017	6/13/2017
Duration (hour)	0.53	0.53	0.53	0.52	0.52	0.51	0.52	0.54	0.52	0.55	0.55
Distance Fished (km)	2.91	2.9	2.84	2.87	2.81	2.77	2.7	2.86	2.76	2.98	3.25
Mid-Latitude (°N)	59.00846	59.01072	59.0015	58.97676	59.00513	59.32218	59.33909	59.34	59.33	59.33	59.34
Mid-Longitude (°W)	-175.00263	-175.743	-176.31143	-176.98415	-177.53819	-167.91374	-167.27763	-166.6	-165.95	-165.3	-164.65
Bottom Depth (m)	130	134	135	134	134	41	32	28	24	22	23
Bottom Temperature (°C)	3.2	3	3.1	3.4	3.6	4.7	5.2	4.8	5.8	6.4	8.1
<b>Red King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	81	77	0	0	0	0
Legal	0	0	0	0	0	81	77	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	81	77	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	3.50	3.31	0.00	0.00	0.00	0.00
<b>Blue King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Bairdi Tanner Crab</b>											
Immature males	24,928	2,977	63	197	67	0	0	0	0	0	0
Mature males	63	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	31,482	2,914	0	263	67	0	0	0	0	0	0
Mature females	126	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	7.20	1.30	0.11	0.39	0.04	0.00	0.00	0.00	0.00	0.00	0.00
<b>Opilio Tanner Crab</b>											
Immature males	0	0	63	0	0	0	0	0	0	0	0
Mature males	63	0	0	0	67	0	0	0	0	0	0
Legal	63	0	63	0	67	0	0	0	0	0	0
Immature females	0	0	189	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.50	0.00	0.26	0.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00
<b>Hybrid Tanner Crab</b>											
Immature males	0	0	0	66	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	66	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	N-07	N-18	N-19	N-20	N-21	N-22	N-23	N-24	N-25	N-26	N-27
Start Date	6/13/2017	7/1/2017	7/8/2017	7/11/2017	7/11/2017	7/20/2017	7/20/2017	7/21/2017	7/21/2017	7/20/2017	7/25/2017
Duration (hour)	0.55	0.51	0.52	0.52	0.5	0.52	0.51	0.52	0.52	0.5	0.52
Distance Fished (km)	2.96	2.82	2.83	2.79	2.78	2.8	2.69	2.83	2.93	2.74	2.74
Mid-Latitude (°N)	59.34	59.33228	59.33	59.34159	59.3433	59.33445	59.33215	59.33115	59.33346	59.32878	59.3301
Mid-Longitude (°W)	-163.99	-168.58031	-169.24	-169.87209	-170.54433	-171.18722	-171.8462	-172.49296	-173.15883	-173.79472	-174.43491
Bottom Depth (m)	22	42	51	61	68	75	79	88	100	110	120
Bottom Temperature (°C)	8.2	4.6	3.7	1.3	0.4	-0.2	-0.5	1	2.4	2.8	3
<b>Red King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Blue King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Bairdi Tanner Crab</b>											
Immature males	0	81	0	0	79	0	0	0	0	367	2,383
Mature males	0	0	0	0	0	0	0	0	0	73	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	808	2,383
Mature females	0	0	0	0	0	0	0	0	0	0	68
Total weight (kg)	0.00	0.29	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.81	1.21
<b>Opilio Tanner Crab</b>											
Immature males	0	0	0	151	226,604	105,003	55,866	829	403	73	68
Mature males	0	0	0	151	2,834	1,119	1,095	69	537	2,351	272
Legal	0	0	0	227	18,753	14,575	4,382	138	806	2,425	340
Immature females	0	0	0	76	17,569	29,081	27,924	345	403	0	0
Mature females	0	0	0	0	32,714	132,375	76,883	553	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.9	335.28	257.6	139.35	1.74	5.83	20.44	1.95
<b>Hybrid Tanner Crab</b>											
Immature males	0	0	0	0	1,212	602	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	606	301	0	0	0	0	0
Mature females	0	0	0	0	606	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	2.48	1.08	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	N-28	N-29	N-30	N-31	O-01	O-02	O-03	O-04	O-18	O-19	O-20
Start Date	7/25/2017	7/28/2017	7/28/2017	7/28/2017	6/29/2017	6/28/2017	6/14/2017	6/15/2017	7/1/2017	7/9/2017	7/10/2017
Duration (hour)	0.51	0.53	0.51	0.51	0.52	0.52	0.55	0.54	0.51	0.52	0.5
Distance Fished (km)	2.77	2.94	2.77	2.8	2.82	2.85	3.12	3.19	2.89	2.85	2.7
Mid-Latitude (°N)	59.34609	59.33685	59.34262	59.3578	59.66104	59.67	59.67	59.65	59.66299	59.65523	59.67099
Mid-Longitude (°W)	-175.13118	-175.74397	-176.38859	-177.08144	-167.95442	-167.29	-166.65	-165.96	-168.61721	-169.27364	-169.92231
Bottom Depth (m)	133	137	136	151	36	31	28	23	40	48	57
Bottom Temperature (°C)	3.2	2.9	2.7	3.2	5.2	6.4	5.6	6.5	3.9	2.4	0.5
<b>Red King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	76	0	0
Mature males	0	0	0	0	236	0	0	0	76	227	0
Legal	0	0	0	0	0	0	0	0	76	227	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	79	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	6.07	0.00	0.00	0.00	2.74	11.64	0.00
<b>Blue King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Bairdi Tanner Crab</b>											
Immature males	1,589	1,131	211	423	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	898	754	0	493	0	0	0	0	0	0	0
Mature females	69	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.73	1.05	0.24	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Opilio Tanner Crab</b>											
Immature males	0	189	141	70	0	0	0	0	0	0	100,562
Mature males	0	0	0	0	0	0	0	0	0	0	241
Legal	0	63	0	0	0	0	0	0	0	0	3,208
Immature females	0	314	632	211	0	0	0	0	0	0	22,973
Mature females	346	0	0	0	0	0	0	0	0	0	840
Total weight (kg)	0.35	0.41	0.15	0.05	0.00	0.00	0.00	0.00	0.00	0.00	92.72
<b>Hybrid Tanner Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	1,121
Mature males	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.6

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	O-21	O-22	O-23	O-24	O-25	O-26	O-27	O-28	O-29	O-30	O-31
Start Date	7/10/2017	7/20/2017	7/20/2017	7/22/2017	7/21/2017	7/20/2017	7/25/2017	7/25/2017	7/28/2017	7/28/2017	7/28/2017
Duration (hour)	0.52	0.52	0.52	0.51	0.53	0.51	0.53	0.5	0.52	0.51	0.49
Distance Fished (km)	2.83	2.87	2.71	2.72	3.01	2.76	2.85	2.72	2.95	2.78	2.72
Mid-Latitude (°N)	59.66223	59.6717	59.66451	59.66626	59.6686	59.66321	59.66417	59.66266	59.67285	59.65553	59.6778
Mid-Longitude (°W)	-170.58385	-171.24449	-171.89398	-172.56224	-173.23837	-173.87824	-174.4602	-175.13331	-175.864	-176.55411	-177.11681
Bottom Depth (m)	67	73	78	84	95	104	115	125	138	136	166
Bottom Temperature (°C)	-0.2	-0.8	-0.3	0.6	1	2	2.6	2.6	3.1	2.7	3.1
<b>Red King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Blue King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	130	152	0	0	0	0	0
Legal	0	0	0	0	130	76	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	3.65	3.58	0.00	0.00	0.00	0.00	0.00
<b>Bairdi Tanner Crab</b>											
Immature males	0	0	0	0	0	76	0	0	191	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	228	0	0	191	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.12	0.00	0.00
<b>Opilio Tanner Crab</b>											
Immature males	87,470	15,534	71,937	76,889	975	761	3,033	3,798	64	70	71
Mature males	891	69	0	376	1,105	761	2,696	777	1,335	0	0
Legal	5,204	548	1,686	2,259	1,625	1,369	4,853	1,921	1,335	0	0
Immature females	31,417	39,390	55,701	108,653	260	152	0	0	318	141	0
Mature females	18,565	85,318	65,193	23,260	455	1,901	1,415	123,578	0	0	0
Total weight (kg)	143.06	97.05	125.39	122.70	10.00	9.02	29.96	128.10	13.41	0.05	0.01
<b>Hybrid Tanner Crab</b>											
Immature males	655	0	0	0	0	0	0	0	0	0	0
Mature males	74	0	0	0	0	0	0	0	0	0	0
Immature females	74	0	0	0	0	0	0	0	0	0	0
Mature females	328	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	1.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	ON2524	ON2625	P-01	P-18	P-19	P-20	P-21	P-22	P-23	P-24	P-25
Start Date	7/21/2017	7/20/2017	6/30/2017	6/30/2017	7/9/2017	7/10/2017	7/10/2017	7/23/2017	7/22/2017	7/22/2017	7/22/2017
Duration (hour)	0.53	0.5	0.53	0.51	0.51	0.5	0.51	0.52	0.52	0.5	0.4
Distance Fished (km)	2.94	2.76	2.91	2.8	2.81	2.78	2.82	2.91	2.8	2.77	2.24
Mid-Latitude (°N)	59.5015	59.49745	59.98857	60	59.99494	60.00248	59.9934	60.00283	59.98954	60.0046	59.99877
Mid-Longitude (°W)	-172.8889	-173.50613	-167.9912	-168.66	-169.3159	-169.96867	-170.63135	-171.28805	-171.94147	-172.60824	-173.33656
Bottom Depth (m)	93	102	27	39	47	55	65	70	66	65	75
Bottom Temperature (°C)	0.8	2	4.7	4.3	2.5	0.3	-0.9	-0.8	-0.5	-0.3	-0.2
Red King Crab											
Immature males	0	0	77	0	0	0	0	0	0	0	0
Mature males	0	0	77	0	154	0	0	0	0	0	0
Legal	0	0	77	0	77	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	3.22	0.00	4.74	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	86
Mature males	67	74	0	0	0	0	0	0	0	0	86
Legal	67	74	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	2.27	1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.62
Bairdi Tanner Crab											
Immature males	0	5,319	0	0	0	0	255	0	0	0	0
Mature males	67	0	0	0	0	0	0	0	0	0	0
Legal	67	0	0	0	0	0	0	0	0	0	0
Immature females	0	15,164	0	0	0	0	0	0	0	0	0
Mature females	0	74	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.69	1.30	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00
Opilio Tanner Crab											
Immature males	1,737	4,937	0	0	386	107,438	97,198	191,808	110,417	16,446	15,319
Mature males	2,004	811	0	0	0	155	294	65	0	0	86
Legal	2,873	884	0	0	0	2,328	2,279	5,706	148	375	1,027
Immature females	1,002	14,034	0	0	77	44,857	57,957	94,348	95,720	6,458	7,360
Mature females	3,808	442	0	0	0	2,243	11,709	45,832	23,851	1,051	8,815
Total weight (kg)	21.71	8.01	0.00	0.00	0.37	124.67	126.90	254.31	113.34	21.02	21.33
Hybrid Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	P-26	P-27	P-28	P-29	P-30	P-31	P-32	PO2423	PO2524	PO2625	PO2726
Start Date	7/21/2017	7/25/2017	7/25/2017	7/28/2017	7/28/2017	7/29/2017	7/29/2017	7/22/2017	7/22/2017	7/21/2017	7/20/2017
Duration (hour)	0.51	0.52	0.53	0.53	0.52	0.52	0.5	0.52	0.51	0.52	0.5
Distance Fished (km)	2.73	2.85	2.91	2.9	2.82	2.83	2.71	2.74	2.86	2.81	2.77
Mid-Latitude (°N)	59.99051	60.00463	60.00695	59.98614	59.99702	60.00166	59.99	59.83438	59.83035	59.83518	59.8355
Mid-Longitude (°W)	-173.94197	-174.60422	-175.25531	-175.91986	-176.70796	-177.26061	-177.9	-172.25559	-172.92197	-173.59114	-174.23115
Bottom Depth (m)	97	108	117	130	141	137	141	75	80	95	106
Bottom Temperature (°C)	1.2	1.9	2.2	2.9	2.6	2.5	2.7	-0.3	0.4	1.3	2
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	77	0	0	0	0	0	0	0	142	139	295
Legal	77	0	0	0	0	0	0	0	71	139	295
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	2.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.67	3.43	9.82
Bairdi Tanner Crab											
Immature males	0	0	869	64	0	0	0	0	0	0	0
Mature males	0	66	0	0	0	0	0	0	0	0	0
Legal	0	66	0	0	0	0	0	0	0	0	0
Immature females	0	0	497	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.60	0.20	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Opilio Tanner Crab											
Immature males	494,998	330	621	1,219	0	69	0	33,114	20,348	2,218	147
Mature males	5,868	396	372	2,760	67	69	0	219	1,565	1,802	295
Legal	49,207	594	683	3,594	67	69	0	1,242	5,194	3,118	369
Immature females	7,104	0	434	128	67	0	0	6,578	5,123	2,218	221
Mature females	589,653	0	124	0	0	0	0	6,285	56,574	1,039	0
Total weight (kg)	1148.67	4.31	4.86	27.13	0.79	0.82	0.00	44.57	95.19	21.59	2.12
Hybrid Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	Q-01	Q-02	Q-18	Q-19	Q-20	Q-21	Q-22	Q-23	Q-25	Q-26	Q-27
Start Date	6/30/2017	6/30/2017	6/30/2017	7/9/2017	7/9/2017	7/23/2017	7/23/2017	7/23/2017	7/21/2017	7/21/2017	7/25/2017
Duration (hour)	0.52	0.53	0.52	0.52	0.5	0.52	0.52	0.52	0.25	0.39	0.52
Distance Fished (km)	2.86	2.99	2.83	2.86	2.76	2.84	2.8	2.79	1.34	2.13	2.84
Mid-Latitude (°N)	60.34	60.34	60.33136	60.32	60.33115	60.32596	60.33999	60.33188	60.29833	60.33333	60.33111
Mid-Longitude (°W)	-167.99	-167.24	-168.67253	-169.33	-169.99027	-170.65344	-171.34534	-172.05691	-173.38045	-174.08797	-174.72752
Bottom Depth (m)	32	31	36	44	52	62	66	59	64	90	103
Bottom Temperature (°C)	6.6	7.7	5.1	4	0.2	-0.8	-1	-1.1	0.1	0.4	1.7
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	75	0	0	0	0	0	0	0	0
Legal	0	0	75	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	2.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	0	0	0	0	874	0	0	453	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.64	0.00	0.00	0.84	0.00	0.00	0.00
Opilio Tanner Crab											
Immature males	0	0	0	0	397,339	294,305	398,130	187,398	16,270	86,311	1,061
Mature males	0	0	0	0	158	0	2,520	0	291	2,694	332
Legal	0	0	0	0	1,030	0	2,520	0	291	4,202	398
Immature females	0	0	0	0	466,042	311,116	422,434	59,042	11,621	30,939	133
Mature females	0	0	0	0	871	14,605	50,420	28,115	2,324	152,485	1,989
Total weight (kg)	0.00	0.00	0.00	0.00	323.09	315.45	436.21	149.29	9.24	133.28	6.20
Hybrid Tanner Crab											
Immature males	0	0	0	0	0	200	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	Q-28	Q-29	Q-30	Q-31	QP2423	QP2524	QP2625	QP2726	R-22	R-23	R-24
Start Date	7/25/2017	7/29/2017	7/29/2017	7/29/2017	7/22/2017	7/22/2017	7/22/2017	7/21/2017	7/23/2017	7/23/2017	7/24/2017
Duration (hour)	0.51	0.52	0.53	0.51	0.53	0.52	0.5	0.5	0.52	0.51	0.52
Distance Fished (km)	2.81	2.91	2.73	2.77	2.94	2.85	2.78	2.7	2.81	2.82	2.83
Mid-Latitude (°N)	60.34664	60.33158	60.34254	60.31835	60	60.17716	60.12344	60.16427	60.66803	60.66249	60.66782
Mid-Longitude (°W)	-175.37653	-176.02647	-176.71457	-177.36047	-172	-173.02194	-173.76832	-174.36115	-171.42984	-172.11346	-172.74432
Bottom Depth (m)	111	121	137	147	58	59	88	100	63	61	46
Bottom Temperature (°C)	1.9	2.7	2.6	2.4	2.2	0.6	1	1	-1.2	-1.3	4
<b>Red King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Blue King Crab</b>											
Immature males	0	0	0	0	72	281	0	0	0	0	228
Mature males	0	0	0	0	72	70	0	0	0	0	1,520
Legal	0	0	0	0	0	70	0	0	0	0	988
Immature females	0	0	0	0	0	211	0	0	0	0	228
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	2.22	3.93	0.00	0.00	0.00	0.00	35.88
<b>Bairdi Tanner Crab</b>											
Immature males	0	317	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	190	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Opilio Tanner Crab</b>											
Immature males	563	381	206	142	0	632	108,644	1,199	172,831	159,475	4,408
Mature males	282	1,269	962	71	0	0	897	240	0	0	76
Legal	282	1,523	1,100	213	0	0	2,540	240	0	0	76
Immature females	493	571	0	71	0	281	76,093	0	142,726	104,823	2,508
Mature females	634	317	0	0	0	0	15,219	1,919	16,014	24,005	456
Total weight (kg)	2.93	12.93	8.92	1.02	0.00	0.42	161.26	3.60	151.40	135.76	4.19
<b>Hybrid Tanner Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	70	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	R-25	R-26	R-27	R-28	R-29	R-30	R-31	R-32	S-22	S-23	S-24
Start Date	7/24/2017	7/24/2017	7/25/2017	7/25/2017	7/29/2017	7/29/2017	7/29/2017	7/29/2017	7/23/2017	7/23/2017	7/24/2017
Duration (hour)	0.52	0.5	0.41	0.52	0.54	0.53	0.5	0.5	0.52	0.52	0.41
Distance Fished (km)	2.85	2.74	2.14	2.85	2.94	2.81	2.72	2.72	2.88	2.9	2.16
Mid-Latitude (°N)	60.678	60.6715	60.67069	60.66409	60.68274	60.66608	60.66262	60.65229	60.98681	61.00397	60.99789
Mid-Longitude (°W)	-173.45402	-174.12853	-174.79836	-175.46869	-176.21176	-176.79353	-177.50125	-178.16459	-171.49246	-172.15016	-172.78524
Bottom Depth (m)	66	86	98	108	119	130	147	160	59	63	67
Bottom Temperature (°C)	-0.2	0.2	0.7	1.5	2.3	2.5	2.4	2.8	-1.3	-1.4	-0.4
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	69	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	0	0	0	0	0	72	0	1,438	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	890	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.41	0.00	0.00	0.00
Opilio Tanner Crab											
Immature males	182,393	151,768	155,355	1,657	515	215	0	137	126,624	75,167	387,664
Mature males	0	586	3,552	3,589	1,804	1,433	72	0	0	0	0
Legal	0	1,612	6,812	3,658	2,319	1,433	72	0	0	0	0
Immature females	88,900	58,169	17,583	966	193	143	288	0	106,906	53,716	334,437
Mature females	21,055	235,207	776,278	759	129	143	0	0	8,651	8,611	79,624
Total weight (kg)	186.28	284.46	564.27	29.51	19.07	11.58	0.55	0.19	101.78	59.56	306.92
Hybrid Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	S-25	S-26	S-27	S-28	S-29	S-30	S-31	T-25	T-26	T-27	T-28
Start Date	7/24/2017	7/24/2017	7/24/2017	7/30/2017	7/29/2017	7/30/2017	7/30/2017	7/24/2017	7/24/2017	7/24/2017	7/30/2017
Duration (hour)	0.53	0.51	0.52	0.52	0.53	0.51	0.51	0.51	0.52	0.51	0.35
Distance Fished (km)	2.83	2.8	2.82	2.88	2.83	2.75	2.8	2.8	2.84	2.7	1.91
Mid-Latitude (°N)	60.99907	60.98571	60.99334	60.99689	61.00398	61.00992	60.98461	61.33153	61.33425	61.34522	61.3277
Mid-Longitude (°W)	-173.51201	-174.18266	-174.86197	-175.55575	-176.2804	-176.99192	-177.66312	-173.58716	-174.33992	-175.00445	-175.62913
Bottom Depth (m)	76	83	92	103	112	122	136	74	78	87	97
Bottom Temperature (°C)	-0.4	-0.2	0.6	1.4	1.9	2.3	2.3	-1.6	-1.6	0.1	0.8
<b>Red King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Blue King Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Bairdi Tanner Crab</b>											
Immature males	0	0	0	337	70	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	69	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.55	0.31	0.00	0.24	0.00	0.00	0.00	0.00
<b>Opilio Tanner Crab</b>											
Immature males	278,543	595,346	162,224	8,026	481,534	215	69	272,553	307,414	270,043	152,445
Mature males	0	148	1,375	7,554	7,807	3,150	208	136	200	766	1,354
Legal	1,797	1,334	2,387	9,443	16,219	3,364	278	272	267	1,532	1,740
Immature females	226,420	412,594	145,008	1,889	21,551	0	0	310,311	444,901	256,023	121,315
Mature females	75,272	192,167	59,148	2,698	343,020	72	0	48,433	56,398	72,493	49,502
Total weight (kg)	309.96	615.28	226.30	77.36	845.74	27.57	1.89	261.78	317.73	300.05	140.89
<b>Hybrid Tanner Crab</b>											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	72	0	0	0	0	0
Immature females	0	0	0	0	0	72	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	T-29	T-30	U-25	U-26	U-27	U-28	U-29	V-25	V-26	V-27	V-28
Start Date	7/30/2017	7/30/2017	7/31/2017	7/31/2017	7/30/2017	7/30/2017	7/31/2017	7/31/2017	7/31/2017	7/31/2017	7/31/2017
Duration (hour)	0.51	0.51	0.51	0.52	0.52	0.52	0.51	0.52	0.52	0.51	0.51
Distance Fished (km)	2.88	2.83	2.7	2.76	2.78	2.86	2.73	2.69	2.82	2.67	2.8
Mid-Latitude (°N)	61.33119	61.32375	61.66929	61.68018	61.68484	61.67748	61.64865	62.0047	61.99164	61.99858	61.99528
Mid-Longitude (°W)	-176.328	-176.95856	-173.66956	-174.42111	-175.08354	-175.75841	-176.47592	-173.73871	-174.49703	-175.1881	-175.88704
Bottom Depth (m)	107	117	70	77	85	95	105	62	73	81	93
Bottom Temperature (°C)	1.2	1.8	-1.5	-1.6	-0.4	0.5	0.7	-1.5	-1.6	-1.3	0.2
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	71	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00
Opilio Tanner Crab											
Immature males	3,935	5,732	446,656	180,183	173,207	71,704	50,492	353,033	14,595	125,878	112,252
Mature males	4,625	1,468	0	0	270	1,648	2,071	0	0	218	1,145
Legal	7,179	2,097	0	73	608	2,278	6,511	0	0	364	1,527
Immature females	207	2,866	374,102	128,793	219,563	70,337	24,913	287,564	7,729	186,012	142,978
Mature females	1,243	70	23,656	18,222	11,740	14,196	140,687	11,860	3,255	1,238	21,997
Total weight (kg)	49.46	26.72	220.12	103.47	155.06	124.16	208.55	152.06	14.78	68.56	223.74
Hybrid Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	73	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	Z-05	D-09	D-10	E-09	F-10	F-11	F-12	G-10	G-11	G-12	G-13
Start Date	6/23/2017	8/11/2017	8/11/2017	8/11/2017	8/12/2017	8/12/2017	8/12/2017	8/12/2017	8/12/2017	8/13/2017	8/13/2017
Duration (hour)	0.61	0.52	0.5	0.53	0.52	0.51	0.52	0.53	0.52	0.52	0.52
Distance Fished (km)	3.27	2.85	2.68	2.82	2.81	2.74	2.73	2.77	2.75	2.7	2.67
Mid-Latitude (°N)	54.69783	55.99699	55.99879	56.33407	56.66352	56.64969	56.66341	57.00241	56.99842	56.99955	57.00389
Mid-Longitude (°W)	-165.15024	-162.81605	-162.26074	-162.79977	-162.1808	-161.59291	-161.0238	-162.16726	-161.55005	-160.98217	-160.34472
Bottom Depth (m)	85	78	71	78	72	91	67	60	69	64	65
Bottom Temperature (°C)	6.1	3.3	5.3	1.9	3.3	3.4	5	4.1	3.8	4.4	5.5
Red King Crab											
Immature males	0	355	0	0	878	1,516	523	926	983	226	465
Mature males	0	567	83	214	1,391	1,061	75	71	1,135	226	78
Legal	0	213	83	214	1,098	985	0	0	1,059	151	78
Immature females	0	71	0	0	439	455	299	285	681	0	310
Mature females	0	1,986	1,743	71	3,293	1,516	971	4,488	1,210	528	931
Total weight (kg)	0.00	62.63	37.89	9.51	127.13	77.01	22.92	95.69	86.74	16.83	20.61
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab											
Immature males	587	355	249	712	439	152	75	214	303	75	155
Mature males	65	426	249	1,639	293	2,350	1,420	214	1,059	0	776
Legal	65	355	249	1,069	146	2,198	1,270	142	756	0	465
Immature females	587	0	83	0	0	76	0	0	0	0	0
Mature females	0	0	0	71	0	0	75	0	0	0	0
Total weight (kg)	0.73	7.16	3.79	19.2	5.56	30.02	15.58	2.34	12.10	0.40	7.62
Opilio Tanner Crab											
Immature males	0										
Mature males	0										
Legal	0										
Immature females	0										
Mature females	0										
Total weight (kg)	0.00										
Hybrid Tanner Crab											
Immature males	0										
Mature males	0										
Immature females	0										
Mature females	0										
Total weight (kg)	0.00										

Appendix: Tow details, crab density (number nmi<sup>-2</sup>), and catch weight at 2016 eastern Bering Sea bottom trawl survey stations.

Station	H-09	H-10	H-11	H-12	H-13	H-14	I-11	I-14	J-09	J-11
Start Date	8/14/2017	8/14/2017	8/14/2017	8/14/2017	8/13/2017	8/13/2017	8/15/2017	8/13/2017	8/10/2017	8/15/2017
Duration (hour)	0.51	0.52	0.51	0.52	0.52	0.51	0.51	0.52	0.51	0.52
Distance Fished (km)	2.67	2.64	2.77	2.87	2.91	2.78	2.81	2.83	2.86	2.83
Mid-Latitude (°N)	57.33199	57.33374	57.31429	57.32953	57.32494	57.33788	57.66527	57.66107	58.01648	57.99999
Mid-Longitude (°W)	-162.74024	-162.14618	-161.54654	-160.92817	-160.30889	-159.67453	-161.46251	-159.63394	-162.75043	-161.48364
Bottom Depth (m)	49	50	56	64	62	56	54	50	40	55
Bottom Temperature (°C)	5.4	5.7	4.4	4.7	5.7	6.8	5	7.8	7.8	6.9
Red King Crab										
Immature males	161	575	846	718	71	0	387	0	0	155
Mature males	161	739	461	790	214	0	387	0	75	155
Legal	161	739	461	718	143	0	232	0	75	155
Immature females	0	1067	461	144	71	0	77	0	0	0
Mature females	6352	5910	692	1580	998	757	1162	0	75	387
Total weight (kg)	126.20	140.71	40.55	69.13	26.66	14.68	31.76	0.00	5.85	14.68
Blue King Crab										
Immature males	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bairdi Tanner Crab										
Immature males	0	246	77	287	356	0	77	149	0	387
Mature males	0	492	385	574	428	151	77	0	75	309
Legal	0	410	231	574	285	151	0	0	75	155
Immature females	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	77
Total weight (kg)	0.00	5.30	4.16	8.58	6.05	1.21	1.00	0.81	0.87	4.46