

**Fishery Management Report No. 07-44**

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# **The 2006 Petrel Bank Red King Crab Survey**

by

**Robert K. Gish**

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August 2007

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



## Symbols and Abbreviations

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<b>Weights and measures (metric)</b>		<b>General</b>		<b>Measures (fisheries)</b>	
centimeter	cm	Alaska Administrative		fork length	FL
deciliter	dL	Code	AAC	mid-eye-to-fork	MEF
gram	g	all commonly accepted		mid-eye-to-tail-fork	METF
hectare	ha	abbreviations	e.g., Mr., Mrs., AM, PM, etc.	standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.		
meter	m	at	@	<b>Mathematics, statistics</b>	
milliliter	mL	compass directions:		<i>all standard mathematical</i>	
millimeter	mm	east	E	<i>signs, symbols and</i>	
		north	N	<i>abbreviations</i>	
		south	S	alternate hypothesis	H <sub>A</sub>
		west	W	base of natural logarithm	<i>e</i>
		copyright	©	catch per unit effort	CPUE
		corporate suffixes:		coefficient of variation	CV
		Company	Co.	common test statistics	(F, t, $\chi^2$ , etc.)
		Corporation	Corp.	confidence interval	CI
		Incorporated	Inc.	correlation coefficient	
		Limited	Ltd.	(multiple)	R
		District of Columbia	D.C.	correlation coefficient	
		et alii (and others)	et al.	(simple)	r
		et cetera (and so forth)	etc.	covariance	cov
		exempli gratia		degree (angular)	°
		(for example)	e.g.	degrees of freedom	df
		Federal Information		expected value	<i>E</i>
		Code	FIC	greater than	>
		id est (that is)	i.e.	greater than or equal to	≥
		latitude or longitude	lat. or long.	harvest per unit effort	HPUE
		monetary symbols		less than	<
		(U.S.)	\$, ¢	less than or equal to	≤
		months (tables and		logarithm (natural)	ln
		figures): first three		logarithm (base 10)	log
		letters	Jan, ..., Dec	logarithm (specify base)	log <sub>2</sub> , etc.
		registered trademark	®	minute (angular)	'
		trademark	™	not significant	NS
		United States		null hypothesis	H <sub>0</sub>
		(adjective)	U.S.	percent	%
		United States of		probability	P
		America (noun)	USA	probability of a type I error	
		U.S.C.	United States	(rejection of the null	
			Code	hypothesis when true)	α
		U.S. state	use two-letter	probability of a type II error	
			abbreviations	(acceptance of the null	
			(e.g., AK, WA)	hypothesis when false)	β
				second (angular)	"
				standard deviation	SD
				standard error	SE
				variance	
				population	Var
				sample	var

### Weights and measures (English)

cubic feet per second	ft <sup>3</sup> /s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

### Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

### Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity	pH
(negative log of)	
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

***FISHERY MANAGEMENT REPORT NO. 07-44***

**THE 2006 PETREL BANK RED KING CRAB SURVEY**

by

Robert K. Gish,  
Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak

Alaska Department of Fish and Game  
Division of Sport Fish, Research and Technical Services  
333 Raspberry Road, Anchorage, Alaska, 99518-1565

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*Robert K. Gish,  
Alaska Department of Fish and Game, Division of Commercial Fisheries  
211 Mission Road, Kodiak, AK 99615, USA*

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## ABSTRACT

This report documents the methods and results of a pot (trap) survey of red king crabs *Paralithodes camtschaticus* conducted in the waters of the Petrel Bank area during November 2006. The primary purpose of the 2006 Petrel Bank survey was to provide information for considering an opening of the commercial red king crab fishery in the Petrel Bank area during the 2007/2008 season. The Alaska Department of Fish and Game (ADF&G) conducted the survey aboard the chartered *F/V Scandies Rose*, a 39.6-m commercial crab-pot-fishing vessel. Results on the catch, sex-size composition, and spatial distribution of red king crabs encountered during the survey, during fishing between the systematically-arrayed survey stations, and during a resurvey of 12 survey stations are presented. Catch of other commercial crab species encountered during the survey is also documented. Most of the red king crabs captured during the survey occurred in a limited portion of the surveyed area. The red king crabs captured during the survey were predominately larger, matured-sized crabs and the size distribution of captured males provided no expectations for significant recruitment of legal males prior to the 2007/2008 season. Comparison of results from the 2006 Petrel Bank survey with a survey performed with industry's participation in November 2001 and with data from past commercial red king crab fisheries prosecuted in the Petrel Bank area indicated that the distribution of red king crabs in the Petrel Bank area in November 2006 was more limited than it had been in prior years and that the abundance of legal males in November 2006 was substantially lower than it was in November of 2001.

Key words: Red king crab, *Paralithodes camtschaticus*, Petrel Bank, Aleutian Islands, pot/trap survey, distribution, relative abundance.

## INTRODUCTION

The red king crab *Paralithodes camtschaticus* fishery in the Aleutian Islands Area (Registration Area O) began in 1961 and attained its maximum season harvest of 38.7-million pounds in the 1966/67 season (Bush et al. 2005). Although the Aleutian Islands Area encompasses the waters of the Territorial Sea and Exclusive Economic Zone about the Aleutian Islands west of 164° 44' W longitude, since the 2000/01 season the Aleutian Islands Area has been opened for commercial red king crab fishing only in the waters between 179° W longitude and 179° E longitude and north of 51° 45' N latitude (the Petrel Bank area). Through the history of the fishery the current Aleutian Islands Area has been variously subdivided into two or three separate registration areas. Prior to the establishment of the current single registration area in 1996, the area was subdivided into the Adak Registration Area (the area west of 171° W longitude) and the Dutch Harbor Area (the area east of 171° W longitude). During 1961–1984 the Adak and Dutch Harbor Areas were separated at 172° W longitude and during 1967–1977 the waters about Petrel Bank and westward were separated from the Adak Area to create the Western Aleutians Area. Peak red king crab harvest in the Dutch Harbor Area was 32.9-million pounds and occurred in the 1966/67 season. By the 1982/83 season, the harvest from the Dutch Harbor Area had declined to 430-thousand pounds and the area east of 171° W longitude has remained closed to commercial fishing for red king crabs since the closure of the 1982/83 season. Peak red king crab harvest in the Adak Area was 21.2-million pounds and occurred in the 1964/65 season. Harvests from the Adak Area declined to 39-thousand pounds during the 1995/96 season, and the Aleutian Islands Area was closed to all commercial fishing for red king crabs during the 1996/97 and 1997/98 seasons.

Harvest statistics from the Adak Area red king crab fishery through the 1995/96 season showed a contraction of the geographic area supporting fishery harvests (Bowers et al. 2002). Harvests from the Attu Island area declined in the early to mid-1980s, followed by declines in the harvest from the Atka-Amlia Islands area in the late 1980s. During the 1990/91 through the 1995/96 seasons, the geographic area supporting fishery harvests was essentially reduced to the Petrel Bank area (Figure 1). However, by the 1995/96 season fishery performance in the Petrel Bank had also declined and observer data indicated recruitment failure in the area. To gain information

regarding red king crabs in the Petrel Bank area during the closed red king crab fishery seasons of 1996/97 and 1997/98, a vessel commercially fishing for golden king crabs *Lithodes aequispinus* with longlined pots was allowed to fish a limited number of single pots to capture, but not retain, red king crabs. An observer on the vessel enumerated, tagged, and collected biological data from all red king crabs captured by the single pots and all those incidentally captured during golden king crab fishing with longlined pots. The data collected on red king crabs from those efforts during the 1996/97 and 1997/98 provided no indications of high densities of red king crabs over broad areas and the Petrel Bank area remained closed to commercial red king crab fishing during the 1998/99 season. However, the areas east of 179° W longitude and west of 179° E longitude were opened for exploratory red king crab fishing during the 1998/99 season, with a guideline harvest level of 5,000 pounds for the eastern portion and 10,000 pounds for the western portion, and 5,900 pounds were harvested.

Subsequent to the closure of the 1998/99 season, the Aleutian Islands Area remained closed to commercial red king crab fishing through the 1999/2000 season. The department received requests from industry to allow for limited commercial fishing in the western Aleutians to provide information on red king crab stock status and, during their September 1999 meeting, the North Pacific Fishery Management Council's Crab Plan Team (CPT) discussed Aleutian Islands red king crab stock status. The CPT recommended that a survey be conducted prior to allowing a commercial fishery and that ADF&G develop a survey plan with industry participation. Survey results would be compared to past fishery catch per unit of effort (CPUE, defined as number of crabs per pot lift), size frequency, and prerecruit levels to help judge the health of the stock.

Following the recommendations of the CPT, the department conducted a pot survey of Petrel Bank utilizing the commercial fleet during January-February 2001 (Bowers et al. 2002). The survey was conducted as a fishery under provisions of a commissioner's permit so that fishers could retain and sell all legal male red king crabs captured during the survey. The commissioner's permit specified station areas to be fished, soak times of pots, and the number of pots fished per station area. Only one vessel participated in the survey and some design specifications, particularly those for soak time, were not adhered to. The CPUE of legal males during the January-February 2001 survey was 22.6 crabs per pot lift. The catch of prerecruit males and females relative to legal males during the January-February 2001 survey was low, however. There were also concerns expressed on the effects that the timing of January-February 2001 survey may have had on the comparability of results to data from past fisheries; the regulatory opening date of the fishery is November 1 and in past fisheries non-legal crabs apparently had been available to the commercial fishery during November and December. Accordingly, the survey area was assessed again during November 2001 to address concerns of survey timing on the results and other issues with the January-February 2001 industry survey. Like the January-February 2001 survey, the November 2001 survey also utilized commercial fishing vessels and was conducted as a fishery under the provisions of a commissioner's permit that specified station areas to be fished, the pots fished per station, and the pot soak time. However, the survey area was expanded relative to the previous industry survey, station areas were changed to a grid pattern, and a minimum size for the pot mesh used was established to address concerns on non-retention of non-legal crab. The CPUE of legal males during the November 2001 survey was, at 32.2 crabs per pot lift, higher than during the January-February 2001 survey. However, as in the January-February 2001 survey, relatively few sublegal male and female red king crabs were captured during the November 2001 survey.

Given the high CPUE of legal males during the two industry surveys of 2001, a limited commercial fishery on the Petrel Bank was re-opened during the 2002/03 and 2003/04 seasons with a 500,000 pounds guideline harvest level (GHL) and a minimum threshold CPUE of 10 crabs per pot lift (Bush et al. 2005). The harvest during the 2002/03 season was 506,642 pounds with a CPUE of 18 legal males per pot lift and 479,113 pounds were harvested during the 2003/04 season with a CPUE of 10 legal males per pot lift. Data collected during the two industry surveys in 2001 (Bowers et al. 2002; Neufeld and Barnard 2003) and data collected by observers during the subsequent commercial fisheries of 2002/03 season (Barnard and Burt 2004) and the 2003/04 season (Burt and Barnard 2005) showed that primarily post-recruit crabs supported the Petrel Bank red king crab fishery. As occurred during the two industry surveys of 2001, few recruit or prerecruit size crabs were present in the samples of red king crabs caught in either the 2002/03 or 2003/04 commercial fisheries. Fishery performance and observer data from the 2002/03 and 2003/04 commercial fisheries indicated that the harvests were largely supported by a single, aging cohort of crabs and that there was little possibility of new recruitment to the legal size class for the 2004/05 or 2005/06 seasons (Bush et al. 2005). The average size and weight of landed crabs increased from the 2001 industry surveys to the 2003/04 season, while the legal male CPUE decreased 44% between the 2002/03 and 2003/04 seasons and decreased 64% between the combined 2001 surveys and the 2003/04 fishery. The fishery was closed for the 2004/05 season due to the evidence of stock decline and the lack of evidence for recruitment (Granath 2004) and has remained closed through the 2006/07 season.

Data collected by observers during the 2003/04 Petrel Bank commercial red king crab fishery showed a mode in the male red king crab size frequency distribution centered at 86–90 mm carapace length (Burt and Barnard 2005), which is approximately three molts from legal size (Bush et al. 2005). Therefore the department adopted plans to survey the stock in the fall of 2006 to obtain information for evaluating the stock status, if adequate recruitment to the legal size class had occurred, and if a fishery harvest would not jeopardize the long-term health of the stock (Granath 2004; Bush et al. 2005). Accordingly, the department performed a systematic pot survey for red king crabs in the Petrel Bank area during November 2006 to provide information for considering an opening of the Petrel Bank red king crab fishery during the 2007/08 season.

This report documents the methods and results of the department's November 2006 Petrel Bank red king crab pot survey and of associated fishing during the survey charter. Results on the catch, sex-size composition, and spatial distribution of red king crabs encountered during the survey, during fishing between the systematically-arrayed survey stations, and during a resurvey of 12 stations are presented. The results are compared to the results from the November 2001 industry survey and are evaluated relative to data from recent and historic commercial red king crab fisheries prosecuted in the Petrel Bank area at the same time of the year. Additionally, this report also documents the catch of other commercial crab species encountered during the survey.

In accordance with AS 16.05.815 (c), data on catch by location obtained during the November 2006 survey or associated fishing cannot be released until the close of the fishing season for which the survey was conducted, the 2007/08 season for red king crab in the Petrel Bank area.

## METHODS

### SURVEY AREA AND DESIGN

The 2006 survey was designed to resample and expand the area sampled by the November 2001 industry survey for red king crabs (Bowers et al. 2002; Figure 2) and to sample from the principle areas fished during the 2002/03 and 2003/04 commercial Petrel Bank red king crab fisheries (Appendix B8 in Barnard and Burt 2004; Appendix B8 in Burt and Barnard 2005). The survey area encompassed Petrel Bank and waters adjacent to Semisopochnoi Island and was bounded by 51° 50' N latitude to the south, 52° 47' N latitude to the north, 179° 18' W longitude to the east, and 179° 46' E longitude to the west. The survey area encompassed the area that accounted for 77% to 95% of the total annual Adak red king crab harvests for the 1990/91 through 1995/96 seasons (Gish 1997; Griffin and Ward 1992, 1994; Morrison and Gish 1994, 1996, 1997; Figure 1).

Prior to the survey, a survey station grid in which station centers were spaced by 2.50' latitude (2.50 nmi, or 4.6 km) north-to-south and by 3.75' longitude (approximately 2.29 nmi, or 4.2 km) west-to-east was established within the survey area defined for the November 2001 industry survey (i.e., the Petrel Bank area within the 100-fathom, or 183-m, depth contour and Petrel Spur south of 52° 38' N latitude; Bowers et al. 2002; Figure 2). The resulting grid of 119 stations contained the stations with highest priority for sampling during this survey and provided for four or more survey stations within the majority of the 28 station areas defined for the November 2001 industry survey. The survey station grid was then extended with the same spacing of station centers into the area of Petrel Spur to depths of 150 fathoms (274 m) and north of 52° 28' N latitude to provide an additional 26 stations with secondary priority for sampling during this survey. Finally, 49 stations with tertiary priority for sampling were established by extending the survey station grid with the same spacing of station centers into the 101–150 fathom (185–274 m) depth zone surrounding Petrel Bank and to areas outside of, but within 0.5 nmi (0.9 km), of the 150-fathom (274-m) contour line. This design resulted in a total of 193 station locations covering an area of approximately 1,105 nmi<sup>2</sup> (3,782 km<sup>2</sup>; Figure 3).

The survey commenced on November 8, ended on November 28, and was conducted from aboard the chartered *F/V Scandies Rose*, a 39.6-m commercial crab-pot-fishing vessel. Of the 193 originally established stations, 170 stations, covering an area of approximately 1,160 nmi<sup>2</sup> (3,970 km<sup>2</sup>), were fished during the survey (Appendix A1; Figure 4). Locations of some stations had to be adjusted from the original design to avoid the Stellar sea lion no-entry zones, to stay within the depth zone targeted for the survey, and to adapt to restrictions set by currents or tides. Of the stations fished during the 2006 survey, 113 were within the boundaries of the November 2001 industry survey area and each of the 28 station areas established for the November 2001 industry survey was sampled by two or more stations during the 2006 survey (Table 1).

Each station fished during the survey consisted of four pots arrayed approximately 0.125 nmi (0.23 km) apart in a north-south orientation. Each pot measured 7-ft x 7-ft x 2.8-ft (2.1-m x 2.1-m x 0.9-m), was fitted with 2.75-in (70-mm) stretch mesh on all webbing, and had two opposing tunnel openings measuring 8-in x 36-in (0.2-m x 0.9-m). Each pot was baited with two 2-qt (1.9-L) containers of chopped Pacific herring *Clupea pallasii* and one Pacific cod *Gadus macrocephalus* as hanging bait. All 680 pots fished during the survey were successfully retrieved for catch sampling except for one pot lost at station 85. Soak times during the survey ranged from 24.2 to 44.6 hours and averaged 31.8 hours. Depth of stations (i.e., the mean depth of the

pots fished within a station) sampled during the survey ranged from 23 to 139 fathoms (42–254 m), with a mean of 74 fathoms (135 m); 32 of the stations sampled were at depths of 101 to 139 fathoms (185–254 m).

### **“NICHE” FISHING**

Pots were also fished at locations between the survey stations (“niche” fishing) during November 26–30. Pots fished during niche fishing were arrayed as “strings”, similar to the setting of pots during commercial fishing, with the pots within strings spaced by approximately 0.25 nmi (0.46 km). Choice of niche-fishing locations was based on results from the 2006 survey and the November 2001 industry survey; the vessel captain determined the spacing between pots within strings to maximize the catch of king crabs based on his knowledge obtained from previous commercial fishing in this area. Niche fishing was restricted to the northwest portion of Petrel Bank, the area which produced the highest catch of red king crabs during the 2006 survey. The specifications for pots fished and baiting methods were the same as those used during the survey.

One-hundred-sixty-five pots, deployed in seven separate strings (strings 1–7; Appendix A2, Figure 5), were fished during niche fishing within an approximately 95 nmi<sup>2</sup> (325 km<sup>2</sup>) area. Pots in string 1 (26 pots) were deployed in a straight, east-to-west, 6.2-nmi-long (11.5-km-long) line between the two rows of survey stations formed by survey stations 147–150 and 158–161. Pots in string 2 (36 pots) were set in a straight, east-to-west, 8.6-nmi-long (15.9-km-long) line between the two rows of survey stations formed by survey stations 134–137 and 147–150. Pots in string 3 (33 pots) were set in a straight, east-to-west, 8.1-nmi-long (15.0-km-long) line between the two rows of survey stations formed by survey stations 122–125 and 134–137. Pots in string 4 (16 pots) were set in a straight, southwest-to-northeast, 3.7-nmi-long (6.8-km-long) line between survey stations 113, 124, and 125. Pots in string 5 (25 pots) were set in a straight, north-to-south, 6.0-nmi-long (11.1-km-long) line between the two columns of survey stations formed by the stations 99, 100, 113, 114, 125, and 126. Pots in string 6 (18 pots) were set in a 4.0-nmi-long (7.4-km-long), “V-shaped” array between survey stations 100, 101, 114, and 115. Pots in string 7 (11 pots) were set in a straight, southwest-to-northeast, 2.5-nmi-long (4.6-km-long) line between survey stations 101 and 115.

The locations and deployment arrays of four of the strings of niche-fishing pots (strings 3, 4, 5, and 6) were based on the locations and deployment arrays of pots used to sample station areas 15, 16, 20, 21, 25, and 26 during the November 2001 industry survey (Figure 2; Appendix A3). The location of string 3 was based on locations of 16 pots used to sample the area designated as station 25 and 18 pots used to sample the area designated as station 26 during the November 2001 industry survey. Placement of string 4 was based on the location and array of a string of 18 pots used to sample the area designated as station 21 during the November 2001 industry survey. Placement of string 5 was based on locations of 13 pots used to sample the area designated as station 16, 24 pots used to sample the area designated as station 20, and 7 pots used to sample the area designated as station 21 during the November 2001 industry survey. The location and array of string 6 was based on that of 25 pots used to sample the area designated as station 15 during the November 2001 industry survey.

Soak times for niche-fishing pots ranged from 22.9 to 39.6 hours and averaged 33.2 hours. Depth of pots fished during niche fishing ranged from 59 to 105 fathoms (108–192 m) and averaged 72 fathoms (132 m).

## RESURVEY

Twelve stations (stations 123–125, 135–137, 148–150, and 159–161) located in the northern portion of Petrel Bank were resurveyed to assess the repeatability of the survey's data on the distribution and catch of red king crabs after a three-week lag (Figure 5; Appendix A1). The 12 stations were chosen for the resurvey because they were adjacent stations in a rectangular array within the area where red king crabs were captured at amongst the highest numbers during the survey. The specifications for pots fished, deployment of pots within stations, and baiting methods were the same as those used during the survey. Soak times for the resurvey pots ranged from 25.3 to 29.7 hours and averaged 27.0 hours. Depth of stations ranged from 60 to 108 fathoms (110–198 m), with a mean depth of 79 fathoms (144 m). The resurvey stations were set on November 29 and retrieved on November 30 and December 1.

## CATCH SAMPLING

Species composition was determined for each pot fished during the survey and all commercially important crab species were examined. The fork or total length was recorded for all commercially important fish species and all other fish and invertebrate species were enumerated. All red king crabs obtained from all survey, niche fishing, and resurvey pot lifts were enumerated and sampled for species, sex, size, shell condition, and reproductive condition (for females only). All golden king crabs, hair crabs *Erimacrus isenbeckii*, and Tanner crabs *Chionoecetes bairdi* captured in survey and resurvey pots were enumerated and sampled for species, sex, size, shell condition, and reproductive condition (for females only). Golden king crabs, hair crabs, and Tanner crabs captured in niche fishing pots were enumerated and sampled for species, sex, legal status, and reproductive condition (for females only), but were not sampled for size and shell condition.

Red and golden king crabs and hair crabs were measured for carapace length (CL) to the nearest whole mm from the posterior margin of the right eye socket to the midpoint of the rear margin of the carapace (Donaldson and Byersdorfer 2005). Tanner crabs were measured for carapace width (CW) as the greatest straight line distance (excluding spines) across the carapace at a right angle to a line midway between the eyes to the midpoint of the posterior margin of the carapace (Jadamec et al. 1999). The fishery-legal status of male crabs was determined by the CW including spines relative to minimum legal size;  $\geq 6.5$  in (165 mm) for red king crab,  $\geq 6.0$  in (152 mm) for golden king crab,  $\geq 3.25$  in (83 mm) for hair crab, and  $\geq 5.5$  in (140 mm) for Tanner crab). The shell condition of each crab was recorded as new-shell pliable, new shell, old shell or very-old shell according to the criteria provided in Donaldson and Byersdorfer (2005) for king and hair crabs, and in Jadamec et al. (1999) for Tanner crabs.

Females carrying a clutch of eggs were scored for clutch fullness (trace to  $\frac{1}{8}$  full,  $\frac{1}{4}$  full,  $\frac{1}{2}$  full,  $\frac{3}{4}$  full, and full), clutch condition (presence or absence of dead embryos), embryo development (uneyed, eyed, or hatching), and color of eggs. Females without egg clutches were scored as either barren with clean pleopods or as barren with matted pleopods.

The legal size for red king crabs in the Petrel Bank fishery is the same as in the Bristol Bay red king crab fishery and the size at which 50% of females are mature (SM50) that has been estimated for Adak female red king crabs (89-mm CL; Blau 1990) is the same as that estimated for Bristol Bay female red king crabs (88.8-mm CL; Otto et al. 1990). Accordingly, the shell condition and size classes used to identify new recruits to legal size, mature-sized males, and pre-recruits to legal size for management of the Bristol Bay red king crab fishery (Vining and

Zheng 2006) were used to summarize the data on size and shell condition of the male red king crabs captured in the Petrel Bank area during this survey:

- new recruits to legal size – those new-shell legal males <150-mm CL,
- mature-sized males – males  $\geq$ 120-mm CL,
- pre-recruits (one molt from legal size) – those sublegal males  $\geq$ 120-mm CL.

## **COMPARISONS WITH THE NOVEMBER 2001 INDUSTRY SURVEY**

Results on the catch and distribution of red king crabs during the 2006 survey and niche-fishing were compared with results from the November 2001 industry survey. Data on pot locations and catch of red king crabs during the November 2001 industry survey were obtained from Table 4 and Appendix D in Bowers et al. (2002). Methods used for the November 2001 industry survey and locations of pots fished and the catch of red king crabs during that survey are provided by Bowers et al. (2002)

To facilitate comparisons between the November 2001 industry survey and the data collected during the 2006 survey, the stations fished during the 2006 survey were grouped by location according to the station areas designated for the November 2001 industry survey (Table 1); borders of the station areas designated for the November 2001 industry survey are provided in Appendix B in Bowers et al. (2002). Results of niche fishing during 2006 from strings 3, 4, 5, and 6 were compared with results from station areas 15, 16, 20, 21, 25, and 26 during the November 2001 industry survey according to the correspondences provided in Appendix A3.

## **OCEANOGRAPHIC DATA COLLECTION**

Data on temperature, depth, and conductivity (salinity) were obtained by deploying six conductivity/temperature/depth (CTD), seven temperature/depth (TDR), and three submersible temperature (STR) data loggers in a total of 164 pots. One hundred-thirty-five of those pots were fished at 135 survey stations chosen to provide coverage over the range of area and depths fished during the survey. Additionally, 6 pots fished at 4 resurvey stations and 23 pots fished during niche fishing had data recorders (Figure 6). One additional STR was deployed, at 52° 18.88' N latitude and 179° 45.05' E longitude and another one remained on deck for the duration of the survey to serve as survey temperature references. Summaries of the oceanographic data recorded by location are provided in Appendix B.

## **BENTHIC HABITAT DATA**

Data on benthic habitat types were collected throughout the survey using a seabed classification system consisting of specialized hardware and associated software (QTC VIEW<sup>1</sup>) that acquires data from the survey vessel's echo sounder for benthic habitat classification. Echo-sounder data were acquired at all times that the vessel was traveling in the survey area. Analysis of that data is still in progress and results will not be presented here. However, at present, it appears that the problems encountered with receiving the echo return during the survey affected the reliability of much of the data that were acquired.

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<sup>1</sup> Product names used in this report are included for scientific completeness, but do not constitute a product endorsement.

## RESULTS

A total of 7,881 crabs of commercially important species were captured during the survey, niche fishing, and resurvey (Table 2). The most frequently captured species was red king crab at 67% of the catch, followed by golden king crab (17%), hair crab (8%) and Tanner crab (8%). A total of 1,922 commercially important fish from 14 different species (Table 2) and 17,020 fish and invertebrates representing 244 taxa that have limited or no commercial value or interest in Alaskan waters were also caught during the survey, niche fishing, and resurvey (Table 3).

### RED KING CRAB

#### Survey

Red king crabs were captured at 37 of the 170 stations fished during the survey (Figure 7; Appendix A1). Thirty of the stations at which red king crabs were captured were located on the northwest portion of the Petrel Bank within an area bounded by 52° 11.23' N latitude (station 87) to the south, 52° 26.37' N latitude (station 159) to the north, 179° 32.00' E longitude (station 103) to the west, and 179° 58.16' E longitude (station 122) to the east. Those 30 stations covered an area of approximately 185 nmi<sup>2</sup> (633 km<sup>2</sup>), or approximately 16% of the total area surveyed. Depths of those 30 stations ranged from 59 to 138 fathoms (108–252 m), with a mean of 94 fathoms (172 m). The remaining stations at which red king crabs were captured were located on Petrel Spur (stations 182, 187, and 188), northeast of Semisopochnoi Island (stations 49 and 64), and west of Semisopochnoi Island (stations 21 and 59). Legal males were captured at 35 stations, with 29 of those stations located in the northwest portion of the Petrel Bank area. Sublegal males were captured at 14 stations, all of which were stations where legal males had been captured and only two of which were outside of the northwest portion of the Petrel Bank area. Females were captured at 15 stations, 13 of which were stations at which legal males were captured and only two of which were outside of the northwest portion of the Petrel Bank area. Depths of the 37 stations at which red king crabs were captured ranged from 57 to 138 fathoms (104–252 m) with a mean of 91 fathoms (166 m). Depths of the 35 stations at which legal males were captured ranged from 57 to 138 fathoms (104–252 m) with a mean of 92 fathoms (168 m), whereas the 15 stations at which females were captured ranged in depth from 59 to 132 fathoms (108–241 m) with a mean of 83 fathoms (152 m). Although 29% (50) of all stations sampled had recorded depths of less than 57 fathoms (104 m; all located centrally on Petrel Bank and Petrel Spur or adjacent to Semisopochnoi Island), no red king crabs were captured at any of those stations. On the other hand, red king crabs were captured at 30% (26) of the 88 stations sampled at depths of 57 to 100 fathoms (104–183 m) and at 34% (11) of the remaining 32 stations sampled at depths of 101 to 139 fathoms (185–254 m).

A total of 1,094 red king crabs (955 males and 139 females) were captured during the survey (Table 4; Appendix A1). Most of that catch was concentrated in only a few stations. Ninety-eight percent (1,071) of the total red king crab catch occurred at 30 stations within the northwest portion of Petrel Bank, 90% (987) at 11 stations, and nearly one half (537) at three stations (stations 102, 125, and 159). Similarly, 90% (724) of the 804 legal males were captured at only 10 stations and 50% (400) were captured at only three stations (stations 125, 159, and 161). Depths fished at the 10 stations with the highest catches of legal males depths ranged from 62 to 132 fathoms (113–241 m); depths fished at the three stations with the highest catches of legal males ranged from 67 to 106 fathoms (123–194 m).



The survey-wide catch per unit of effort (CPUE) of legal male red king crabs was 1.2 crabs per pot lift and the CPUE of sublegal male crabs and of female crabs were both 0.2 crabs per pot lift (Table 4). The highest single-station CPUE of legal males was 45.0 crabs per pot lift (station 159), of sublegal males was 19.0 crabs per pot lift (station 102), and of females was 12.3 crabs per pot lift (station 123). Pooling all catch data from the 30 stations in the northwest portion of Petrel Bank where 98% of all red king crabs were captured during the survey, the CPUE of legal males was 6.6 crabs per pot lift. Pooling the 10 stations where 90% of all legal males were captured, the CPUE was 18.1 crabs per pot lift. In the three stations where 50% of all legal males were captured, the CPUE was 33.3 crabs per pot lift.

Males accounted for 87% of the total red king crab catch during the survey and ranged in size from 76-mm CL to 200-mm CL (mean = 152-mm CL,  $n = 955$ ). The size distribution of males displayed a trimodal distribution with a dominant peak at 152-mm CL and smaller peaks centered at 107-mm CL and 172-mm CL (Figure 8). Of the captured red king crab males, 84% (804) were of fishery-legal size. New recruits to legal size accounted for 31% (293) of the male red king crab catch and 36% of the catch of legal males. Ninety-one percent (866) of the males were mature-sized. Of the 151 sublegal males captured, 42% (63) were pre-recruits estimated to be one molt from legal size, resulting in a prerecruit:legal ratio of 0.08:1 (63:804). New-shell crabs predominated in the majority of male size classes, representing 73% of all captured males.

Females accounted for 13% of the total red king crab catch during the survey and ranged in size from 66-mm CL to 157-mm CL (mean = 126-mm CL,  $n = 139$ ). The female size distribution displayed a bimodal distribution with the primary peak at 147-mm CL and the other centered at 97-mm CL (Figure 9). Crabs scored as new-shell were dominant in the females <130-mm CL and crabs scored as old-shell were dominant in the females  $\geq$ 130-mm CL. Ninety-five percent (132) of the captured females were  $\geq$ 89-mm CL, the estimated SM50 for female red king crabs in the Adak area (Blau 1990), whereas 74% (103) were mature, as evidenced by the presence of eggs or empty egg cases. All mature females were  $\geq$ 96-mm CL and the size distributions of immature and mature females overlapped over the range of 96–108 mm CL. Of the mature females, 99% (102) carried eggs. The clutches in 73% (75) of the 102 ovigerous females were scored as three-quarters full and 5% (5) were scored as full.

## **Niche Fishing**

Red king crabs were caught in each of the seven strings and in 66% (109 of 165) of the total pots deployed during niche fishing (Appendix A2). Legal male crabs were captured in 108 of those pots (Figure 10), sublegal male crabs were present in 74 pots (Figure 11) and female crabs in 79 pots (Figure 12). Legal males, sublegal males, and females were captured in each of the seven strings in which the niche-fishing pots were deployed.

A total of 3,756 red king crabs (3,243 males and 513 females) were captured during niche fishing (Table 4; Appendix A2). Relative frequencies of males (86%) and females (14%) were almost identical to those seen in the catch of red king crabs during the survey and, as in the red king crabs captured during the survey, both the males and females were predominantly larger, mature-sized animals. The size of males captured during niche fishing averaged 147-mm CL and ranged 75-mm CL to 197-mm CL ( $n = 3,239$ ). The male size distribution was similar to that observed for males captured during the survey (Figure 8), displaying a trimodal distribution with a dominant peak at 152-mm CL and smaller peaks centered at 107-mm CL and 177-mm CL (Figure 13). Seventy-nine percent (2,574) of the captured red king crab males were of fishery-

legal size. New recruits to legal size accounted for 32% (1,027) of the male red king crab and 40% of the legal males. Eighty-nine percent of the males (2,879) were mature-sized. Of the 669 sublegal males captured, 46% (310) were pre-recruits estimated to be one molt from legal size resulting in prerecruit:legal ratio in the survey catch of 0.12:1 (310:2,574). New-shell crabs predominated in the majority of male size classes, representing 81% of the 3,239 for which shell condition was assessed.

Females ranged in size from 67-mm CL to 163-mm CL and averaged 118-mm CL ( $n = 512$ ). The female size frequency distribution displayed a bimodal distribution with the primary peak at 102-mm CL and the other centered at 142-mm CL (Figure 14). The bimodal feature of the female size frequency distribution was similar to that for females captured during the survey (Figure 9); however, unlike the size frequency distribution from the survey, the mode representing larger females was not the primary mode. Crabs scored as new-shell were dominant in all size classes; unlike the females captured during the survey, those scored as old-shell were scarce among the females  $\geq 130$ -mm CL. Ninety-seven percent (500) of the captured females were  $\geq 89$ -mm CL, the estimated SM50 for female red king crabs in the Adak area (Blau 1990), and 67% (343) were mature, as evidenced by the presence of eggs or empty egg cases. All mature females were  $\geq 91$ -mm CL and the size distributions of immature and mature females overlapped over the range of 91–113 mm CL. Of the mature females, 99% (339) carried eggs. The clutches in 81% (274) of the 339 oviparous females were scored as three-quarters full and 5% (17) were scored as full.

The CPUE of legal males over all 165 niche-fishing pots was 15.6 crabs per pot lift, whereas that of sublegal male crabs was 4.1 and that of female crabs was 3.1 crabs per pot lift (Table 4). The CPUE of each sex-size class varied markedly among strings, with the CPUEs for each sex-size classes in string 1 being more than 10 times greater than those for strings 2 and 4 (Table 5). The catch in string 1, the northern-most and deepest of the seven strings fished, accounted for 51% (1,324) of the legal males, 47% (316), of the sublegal males, and 43% (223) of the females captured during niche fishing. Accordingly, string 1 alone accounted for a large portion of the overall CPUE of red king crabs during niche-fishing. Excluding string 1, the CPUEs for legal males, sublegal males, and females in the remaining 139 pots fished during niche fishing were 9.0, 2.5, and 2.1 crabs per pot lift, respectively. As well as having the highest CPUE of red king crabs, string 1 was also the only string in which red king crabs were captured by every pot in the string. By contrast, red king crabs were captured by only 3 of the 18 pots fished in string 6.

Differences in catch of legal males varied among strings over relatively short distances. A comparison of the catch of legal males in strings 1 and 2, two strings that ran parallel to each other in east-to-west orientation separated by a north-to-south distance of 2.5 nmi (4.6 km), provides the most notable example of such variation in catch of legal males among strings. The CPUE of legal males in string 1 was 50.9 crabs per pot lift and all 26 pots in string 1 consistently captured legal males over the 6.2-nmi (11.5 km) length of the string at numbers ranging from 22 to 95 crabs per pot lift. On the other hand, the CPUE of legal males in string 2 was 4.3 crabs per pot lift, the highest catch of legal males in any pot within string 2 was 22 crabs, and 13 (36%) of the 36 pots in string 2 captured no legal males. Catch of legal males by pot also varied markedly over a short distance within some strings. The most notable example of such variation within strings was seen in string 5, which had the third highest CPUE of legal males (15.3 crabs per pot lift) among the seven strings and consisted of 25 pots arrayed in a straight, north-to-south, 6.0 nmi long (11.1 km long) line. Ninety-five percent (362) of all legal males captured in string 5

were captured in seven adjacent pots spanning 1.5 nmi (2.8 km; from 52° 16.96' to 52° 18.46' N latitude). However, only 15 legal males were captured in the three pots to the north of 52° 18.46' N latitude in string 5 and only five legal males were captured in the 15 pots south of 52° 16.96' N latitude in string 5; no legal males were captured in the 11 southern-most pots within string 5. Strings or pots within strings with highest catches of legal males were generally located adjacent to stations or groups of stations that captured legal males at the highest rates during the survey (Figure 15).

## **Resurvey**

A total of 458 red king crabs (344 legal males, 41 sublegal males, and 73 females) were captured at 11 of the 12 stations fished during the resurvey (Tables 4 and 6; Figure 16; Appendix A1). Legal males were captured at 11 stations, sublegal males were captured at two, and females were captured at eight. During the survey of the same 12 stations, 672 red king crabs (519 legal males, 60 sublegal males, and 93 females) were captured; legal males were captured at 10 stations and sublegal males and females were both captured at seven stations (Tables 4 and 6). No females were captured at the three northern-most resurveyed stations (stations 159–161) during either the survey or resurvey. Relative frequencies of males and females during the resurvey (84% males and 16% females) were close to those obtained from the same 12 stations during the survey (86% males and 14% females).

The catch of red king crabs, particularly of legal males, at these 12 stations during the survey was high relative to catch in the remainder of the surveyed area. During the survey, these 12 stations accounted for 61% (672) of the total survey catch of 1,094 red king crabs and 65% (519) of the total survey catch of 804 legal males and included the three stations (stations 125, 159, and 161) that accounted for 50% of the total survey catch of legal males. During the resurvey, the catch of legal males at these 12 stations was also high relative to catch at the majority stations fished during the survey. The catch of legal males at stations 125, 159, and 150 during the resurvey (150, 66, and 58 legal males, respectively; Table 6) exceeded the catch of legal males in 99% (169), 98% (167), and 97% (165), respectively, of the 170 stations fished during the survey (Appendix 1). Nonetheless, the resurvey of the 12 stations resulted in a CPUE of legal males (7.2 crabs per pot lift) that was 66% of that for the same 12 stations during the survey (10.8 crabs per pot lift; Table 6). Most of the difference between the survey and resurvey catch of legal males occurred in the northern-most row of resurveyed stations (stations 159–161). More legal males were captured at each of stations 159–161 during the survey than during the resurvey and the total catch of legal males at those three stations during the survey was 319 crabs as opposed to 78 crabs during the resurvey (Table 6). Although more legal males were captured during the resurvey (79 crabs) than during the survey (17) in the next row of stations to the south (stations 148–150), the difference was slight in comparison to the difference for stations 159–161. Catch of legal males in the southern-most row of resurveyed stations (stations 123–125) was nearly identical during the survey (158 crabs) and resurvey (162 crabs) and the exact same number of legal males (25 crabs) was captured during the resurvey as during the survey in the next row of stations to the north (stations 135–137). Despite the differences in catch of legal males observed between the survey and resurvey, the catch of legal male red king crabs at a station during the resurvey was significantly correlated with the catch of legal males at the same station during the survey ( $r = 0.605$ , Bartlett's chi-square = 4.333,  $P = 0.037$ ). Moreover, the mean of the within-station differences between the catch of legal males during the survey and during resurvey was

not significantly different from zero (mean difference = 14.6 crabs with a standard deviation of 47.44;  $t = 1.065$ ,  $df = 11$ ,  $P = 0.310$  for a pair-wise  $t$ -test).

The size-frequency distribution of the males captured during the resurvey was generally similar to that of the males captured during the survey at the same 12 stations (Figure 17). Males captured during the resurvey ranged in size from 58-mm CL to 193-mm CL, with a mean of 152-mm CL ( $n = 384$ ) and a dominant peak in the size-frequency distribution centered at 152-mm CL. Unlike that for the males captured during the survey at the 12 stations, the male size-frequency also showed a smaller, minor peak centered at 102-mm CL. Of the captured red king crab males, 89% (344) were of fishery-legal size, nearly identical to the percentage of legal-sized males among the males captured at the 12 stations during the survey (90%). New recruits to legal size accounted for 28% (106) of the male red king crab catch and 31% of the legal males captured. Ninety-three percent (358) of the males were mature-sized. Of the 41 sublegal males captured, 34% (14) were pre-recruits estimated to be one molt from legal size, resulting in prerecruit:legal ratio of 0.04:1 (14:344). New-shell crabs prevailed in the majority of size classes, representing 73% of the 384 for which shell condition was assessed.

The females captured during the resurvey showed some notable differences in size-frequency and shell-condition distributions from the females that were captured at the 12 stations during the survey (Figure 18). Although the size range of the females captured at the 12 stations during the resurvey (67-mm CL to 155-mm CL) was similar to that of the females captured at those stations during the survey, the size-frequency from the resurvey displayed a bimodal distribution with the co-dominant peaks centered at 102-mm CL and 142-mm CL, whereas the size-frequency from the survey was dominated by larger-sized crabs. Additionally, all females captured during the resurvey were scored as new-shell crabs, in contrast to the prevalence of crabs scored as old-shell among the larger females captured during the survey. Ninety-two percent (67) of the captured females were  $\geq 89$ -mm CL, the estimated SM50 for female red king crabs in the Adak area (Blau 1990), although only 49% (36) of the captured females were mature, as evidenced by the presence of eggs or empty egg cases. All mature females were  $\geq 100$ -mm CL and the size distributions of immature and mature females overlapped over the range of 100–105 mm CL. Of the mature females, 97% (35) carried eggs. The clutches in 77% (27) of the 35 ovigerous females were scored as three-quarters full and 3% (1) were scored as full.

### **Comparisons with the November 2001 Industry Survey**

During the 2006 survey, 451 pots were successfully fished within the November 2001 industry survey area (4 pots in each of 113 stations, with one pot lost during retrieval) and effort within the individual station areas designated for the November 2001 industry survey ranged from 8 pots to 24 pots (Table 7). That effort resulted in a catch of 842 red king crabs. By comparison, 26,362 red king crabs were captured by the 700 pots (usually 25 pots in each of the 28 station areas shown in Figure 2) that were fished during the November 2001 industry survey (Bowers et al. 2002; Table 7). Females accounted for 16% (137 crabs) of all red king crabs captured during the 2006 survey within the November 2001 industry survey area and sublegal males accounted for 20% (143) of the 705 males captured. During the November 2001 industry survey, only 9% (2,392) of all captured red king crabs were females and only 6% (1,409) of the 23,970 males that were captured were sublegal-sized.

Legal male red king crabs were captured during the 2006 survey in seven of the 28 station areas designated for the November 2001 industry survey; whereas legal males were captured within 21 of the 28 station areas during the November 2001 industry survey (Table 7). There were no station areas in which legal males were captured during the 2006 survey, but not during the November 2001 industry survey. Station areas in which legal males were captured during the November 2001 industry survey, but in which legal males were not captured during the 2006 survey, included station areas directly to the south (station areas 2 and 3), west (station areas 4 and 5), and north (station area 6) of Semisopochnoi Island. Four of the station areas in which legal males were captured during the November 2001 industry survey, but not during the 2006 survey, were located on the western portion of Petrel Bank between 52° 05' N latitude and 52° 15' N latitude (station areas 9, 10, 15, and 16). It should be noted, however, that legal males were captured during niche fishing within station area 15, primarily in the northwest corner of that station area, by three pots in string 6 and two pots in string 7 (Figure 15; Appendix A2). The remaining five station areas in which legal males were captured during the November 2001 industry survey, but not during the 2006 survey, were on the northeastern portion of Petrel Bank (station areas 19, 23, 24, 27, and 28).

The capture of 562 legal males by the pots fished within the November 2001 industry survey area during the 2006 survey (Table 7) corresponds to a CPUE of 1.2 crabs per pot lift. During the November 2001 industry survey, 22,561 legal males were captured for a CPUE of 32.2 legal males per pot lift. Ninety-eight percent (550) of the legal males captured during the 2006 survey by pots fished within the November 2001 industry survey area were captured by 80 pots fished within five of the station areas designated for the November 2001 industry survey (station areas 14, 20, 21, 25, and 26) and the CPUE of legal males for those 80 pots was 6.9 crabs per pot lift. During the November 2001 industry survey, 9,558 legal males were captured by 126 pots fished in those five station areas for a CPUE of legal males equal to 75.9 crabs per pot lift. Notably, no legal males were captured during the 2006 survey in the 75 pots fished within station areas 5, 6, 10, 15, or 27, although 8,900 legal males were captured by 125 pots fished within those station areas during the November 2001 industry survey for a CPUE equal to 71.2 crabs per pot lift.

Ninety-two pots were fished during the niche-fishing portion of the 2006 survey charter in the four strings that were based on arrays of pots fished during the November 2001 industry survey resulting in a catch of 1,315 red king crabs (Table 8). The 121 pots fished during the November 2001 industry survey that were in arrays corresponding with those strings captured 12,179 red king crabs. Females accounted for 14% (190) of the total catch of red king crabs and sublegal males accounted for 20% (228) of the total catch of males (1,125) in 2006, whereas females accounted for 10% (1,168) of the total catch of red king crabs and sublegal males accounted for 6% (666) of the total catch of males (11,011) during November 2001. The CPUE of legal males in those four niche-fishing strings during 2006 was 9.8 legal males per pot lift, whereas the CPUE of legal males in the corresponding 121 pots fished during the November 2001 industry survey was 85.5 legal males per pot lift. String 5 had the highest CPUE of legal males among those four strings fished in 2006, 15.3 legal males per pot lift; CPUE of legal males in the 44 corresponding pots fished during the November 2001 industry survey was 89.5 legal males per pot lift. String 4 had the lowest CPUE of legal males among those four strings fished in 2006, 3.8 legal males per pot lift; CPUE of legal males in the 18 corresponding pots fished during the November 2001 industry survey was 112.3 legal males per pot lift.

## **GOLDEN KING CRAB**

Golden king crabs were captured at 47 of the 170 stations fished during the survey (Figure 19; Appendix A1). Those stations were largely at the northern margins of the survey area and at depths greater than 100 fathoms. Legal males were captured at 44 stations, whereas sublegal males were present at 19 of those stations. Females were captured at 18 stations, with the highest catches occurring at stations on Petrel Spur and at stations deeper than 100 fathoms along the northwest portion of Petrel Bank. Golden king crabs captured during niche fishing and the resurvey were in pots and at stations along the northern tier of those fished (Appendices A1 and A2).

A total of 1,299 golden king crabs (731 males and 568 females) were captured during the survey, niche fishing, and resurvey (Table 4; Appendices A1 and A2). There were 709 males captured during the survey and resurvey, which ranged in size from 102-mm CL to 187-mm CL and averaged 156.6-mm CL ( $n = 708$ ). The male length frequency distribution displayed a single mode with the peak centered at 162-mm CL (Figure 20). The 22 male golden king crabs captured during niche fishing were assessed as to legal status, but were not measured for CL. Of all captured golden king crab males, 92% (671) were of fishery-legal size. New-shell crabs prevailed in all male size classes, representing 92% of all captured males. Five-hundred-sixty-seven females were captured during the survey and resurvey. Sizes of females ranged from 111 mm CL to 183-mm CL, averaged 145-mm CL ( $n = 559$ ), and had a frequency distribution centered at 142-mm CL (Figure 21). Additionally, 510 of the captured females were mature, as evidenced by the presence of eggs or empty egg cases. Of the mature females, over 98% carried eggs. New-shell crabs accounted for 94% of the females.

## **HAIR CRAB**

Hair crabs were captured at 69 of the 170 stations fished during the survey (Figure 22; Appendix A1). Male crabs occurred at 68 of those stations (legal-sized males at 63 stations and sublegal males at 42) and female crabs occurred at 22 stations. Most hair crabs were captured on the northern portion of Petrel Bank at depths greater than 50 fathoms and on Petrel Spur, with some hair crabs captured along the eastern and southeastern edge of Petrel Bank and just west of Semisopchnoi Island. Legal males were captured over a broader geographic range than sublegal males and females, which were primarily distributed on the northern portion of Petrel Bank. All hair crabs captured during niche fishing and the resurvey were contained within the area shown for the survey.

A total of 662 hair crabs (584 males, 75 females, and 3 for which sex was not ascertained) were captured during the survey, niche fishing, and the resurvey (Table 4; Appendices A1 and A2). There were 508 males captured during the survey and resurvey; they ranged in size from 40-mm CL to 105-mm CL and averaged 80-mm CL ( $n = 505$ ). Their length frequency distribution was bimodal with a dominant peak centered at 82-mm CL and a minor peak at 72-mm CL (Figure 23). The 76 male hair crabs captured during niche fishing were assessed as to legal status, but were not measured for CL. Of all captured hair crab males, 66% (387) were of fishery-legal size. New-shell crabs prevailed in all but one male size class, representing 69% of all captured males. Seventy-two females were caught during the survey and resurvey. They ranged in size from 46-mm CL to 88-mm CL and averaged 65-mm CL ( $n = 71$ ) and had a bimodal size frequency distribution with peaks centered at 57-mm CL and at 67-mm CL (Figure 24). New shell crabs were prevailed in most female size classes (69% of all females). Forty-two of the captured

females were mature, as evidenced by the presence of eggs or empty egg cases. Of the mature females, two carried eggs.

## **TANNER CRAB**

Tanner crabs were captured at 17 of the 170 stations fished during the survey, all at depths >50 fathoms (Figure 25, Appendix A1). Male crabs occurred at 10 of those locations and were distributed only on the northwest portion of Petrel Bank. Female Tanner crabs occurred at 14 locations and displayed a similar distribution. A total of 612 Tanner crabs (201 males, 408 females, and 3 for which sex was not ascertained) were caught during the survey, niche fishing, and the resurvey (Table 4; Appendices A1 and A2). Carapace width of the 89 males captured during the survey and resurvey ranged from 66-mm CW to 133-mm CW and averaged 97-mm CW ( $n = 88$ ). Their width frequency distribution was trimodal with a dominant peak centered at 97-mm CW and minor peaks at 87-mm CW and 77-mm CW (Figure 26). The 112 male Tanner crabs captured during niche fishing were assessed as to legal status, but were not measured for CL; all were sublegal-sized. Shell condition was recorded for the male Tanner crabs during the survey and resurvey, and 57% of those were in new-shell condition. Measured females ranged in size from 56-mm CW to 104-mm CW and averaged 83-mm CW ( $n = 138$ ) and had a bimodal size-frequency distribution with a dominant peak centered at 82-mm CW and a minor peak at 67-mm CW (Figure 27). Mature crabs accounted for 86% of the 222 females for which reproductive status was determined. Of the mature females examined, 98% were ovigerous. Shell condition was recorded for 138 female Tanner crabs, of which 18% were in new-shell condition.

## **DISCUSSION**

The last survey of red king crabs in the Petrel Bank area prior to the 2006 survey was performed with industry participation under provisions of a commissioner's permit in November 2001. That survey was intended to provide information for considering an opening of the Petrel Bank red king crab fishery in the subsequent season, the 2002/03 season. Based on the results of the November 2001 industry survey, the Petrel Bank area was opened to limited commercial red king crab fishing for the 2002/03 and 2003/04 seasons, during which 984,755 pounds were harvested. Similarly, the November 2006 Petrel Bank red king crab pot survey was designed and executed to provide information needed by fishery managers for their consideration of a reopening of the Petrel Bank red king crab fishery in the season to follow, the 2007/08 season. Of particular interest was the condition of the stock in November 2006 relative to its condition in November 2001, when legal males were at an abundance level capable of supporting limited commercial fisheries in the subsequent two seasons with little or no annual recruitment of legal males. The abundance of recruit-legal and sublegal males relative to legal males was also of interest, given the history of poor recruitment from November 2001 through the 2003/04 season and the indications from the 2003/04 observer data that new recruitment of legal males could occur prior to November 2006. Finally, the spatial distribution of red king crabs in the surveyed area relative of that during the November 2001 industry survey and past Petrel Bank fisheries was of interest. Spatial distribution is an important consideration in the context of the historical contraction in the distribution of the Aleutian Islands red king crab fishery and provides additional information to survey CPUE for judging condition of the stock in November 2006 relative to November 2001.

The following design features of the 2006 survey addressed those information needs. The area surveyed encompassed the area surveyed by industry in November 2001, the principal areas

fished during the 2002/03 and 2003/04 Petrel Bank red king crab commercial fisheries, and the area producing 77% to 95% of the annual harvest of red king crab in the Adak Area during the 1990/91–1995/96 seasons. The survey was timed to occur at the same time of the year as the November 2001 industry survey and at, or close to, the same time of the year that the 1990/91–1995/96 Adak Area fisheries and the 2002/03 and 2003/04 Petrel Bank fisheries were prosecuted. Survey pots were fit with a small mesh size (2.75-in, or 70-mm, stretched) on all webbing to increase the retention of sublegal-sized red king crabs relative to the gear used during commercial fisheries or the surveys performed by industry in 2001. The density of survey stations within the 2006 survey area was high relative to other surveys for red king crabs in the Bering Sea/Aleutian Islands. The spacing between survey sampling stations used in the 2006 Petrel Bank survey was approximately 2.5 nmi (4.6 kms) as compared to a spacing of approximately 5.0 nmi (9.3 km) used in the ADF&G Pribilof Island king crab pot survey (Gish 2006) and a spacing of approximately 20 nmi (37.0 km) used to survey red king crab in Bristol Bay by the National Marine Fisheries Service (NMFS) during the eastern Bering Sea (EBS) trawl survey (Rugolo et al. 2006). Because of the high density of stations used during the 2006 Petrel Bank pot survey, 170 systematically-spaced locations were sampled by four pot lifts each within an area of approximately 1,160 nmi<sup>2</sup> (3,970 km<sup>2</sup>), an area that would be sampled by at most three tows during the NMFS EBS trawl survey in Bristol Bay. Additionally, in association with the 2006 Petrel Bank survey, pots were fished between the systematically-spaced survey stations and a resurvey of 12 stations was performed to augment the survey results pertaining to distribution and relative abundance of red king crab, to provide information from some of the same locations fished during the November 2001 industry survey, and to assess the repeatability of the survey results.

Results of the 2006 Petrel Bank red king crab survey showed a distribution for red king crabs in the Petrel Bank area that was limited primarily to the northwest portion the surveyed area and indicate that the area of occurrence had decreased since November 2001. Ninety-eight percent of all red king crabs captured during the survey were captured in 30 stations within that northwest portion, an area of approximately 185 nmi<sup>2</sup> (633 km<sup>2</sup>) that represented only 16% of the total surveyed area. To provide a sense of scale, that area is only slightly larger than the area within statistical area 525733 (175 nmi<sup>2</sup>, or 599 km<sup>2</sup>), the state-waters statistical area encompassing Chiniak Bay and Cape Chiniak, Kodiak Island. Although indicating some redistribution of the red king crabs within that area over a three week period, the results of the resurvey of 12 stations within the northwest portion of Petrel Bank served to confirm the higher concentrations of red king crabs present within the northwest portion of Petrel Bank. Likewise, the niche fishing within the northwest portion of Petrel Bank also served to confirm the relatively high concentrations of red king crabs within the northwest portion of Petrel Bank. Red king crabs occurred only sparsely during the survey at a few stations southwest of that area or on the eastern bank and Petrel Spur. The November 2001 industry survey also captured red king crabs in the northwest area, but additionally captured red king crabs, primarily legal males, south of that area along the west side of Petrel Bank and areas west and south of Semisopochnoi Island (Bowers et al. 2002). Legal males were also captured along the northeastern portion of the bank during the November 2001 industry survey. Overall, red king crabs in 2006 appeared to be absent or at very low densities in areas where they were captured during the November 2001 industry survey.

Distribution of red king crabs during the 2006 survey was also restricted relative to the distribution during the last two commercial fisheries. During the commercial fisheries of 2002/03 and 2003/04, which were both prosecuted in late October, red king crabs were captured along the



west side of the bank (Granath et al. 2003; Granath and Bon 2004) and observer data from those fisheries also shows effort and catch spreading across the northern portion of the bank (at approximately 52° 20' N latitude) to the northeastern portion of the bank (Barnard and Burt 2004; Burt and Barnard 2005). The current restricted distribution of red king crabs in the Petrel Bank area may represent a large scale shift in distribution from that of the early 1990's. Unlike the data collected from the November 2001 and November 2006 surveys and the 2002/03 and 2003/04 fisheries, observer data from the 1990/91 commercial fishery season, most of which was prosecuted during November of 1990, shows that legal male, sublegal male, and female red king crabs were commonly captured on the eastern bank and on the shallower waters of the central bank (Figures 16–19 in Bowers et al. 2002). Red king crabs in 2006, particularly legal males, apparently were tending to occupy deeper waters than during the 1990/91 fishery season. The lack of catch of any red king crabs in any of the 50 stations fished shallower than 57 fathoms on the central bank during the 2006 survey contrasts markedly with the observer data collected from the 1990/91 commercial fishery. Fishing at depths >100 fathoms during the 2006 survey showed that legal red king crabs were present at such depths, occasionally at relatively high densities. Depths >100 fathoms were not, by design, sampled during the November 2001 industry survey (Bowers et al. 2002), were rarely fished during the 2002 commercial fishery (Barnard and Burt 2004), and were fished by 14% of the pots fished in the 2003 commercial fishery (Burt and Barnard 2005).

Due to differences in fishing practices, direct comparisons cannot be made between the CPUE of legal males obtained during this survey with that obtained during the November 2001 industry survey. Unlike the 2006 survey, fishing locations during the November 2001 industry survey were not regularly distributed over the Petrel Bank area and were limited to depths <100 fathoms. Rather than being provided precise, systematically-spaced locations for fishing survey pots, participants in the November 2001 industry survey were allowed to fish their 25 pots per station area anywhere within that station area with the restriction that pots be spaced apart by no less than 0.125 nmi (Bowers et al. 2002). Although participants in the November 2001 industry survey were instructed to use pot soak times of 24–48 hours, actual pot soak times ranged from 20 to 77 hours and the mean soak time for that survey (46 hours) was greater than the mean soak time for the 2006 survey (32 hours). More importantly, because participants were allowed to retain and sell legal male red king crabs that were captured during the November 2001 industry survey under provisions of a commissioner's permit, it is likely that participants set the survey pots within stations at locations that were expected to maximize catch of legal males. For similar reasons, direct comparisons cannot be made between the CPUE of legal males obtained during this survey with that obtained during the 2002/03 and 2003/04 commercial fisheries, making it difficult to make exact predictions from the 2006 survey data on the CPUE of legal males that could be anticipated during a future red king crab commercial fishery in the Petrel Bank area. On the other hand, the shorter soak times and the smaller mesh for the pots used during the 2006 survey would be expected to produce a larger catch of sublegal males relative to legal males than with the soak times and pots used during November 2001 industry survey. Although the pots used in the November 2001 industry survey were of comparable dimensions to those used in the 2006 survey, the pot mesh in the November 2001 industry survey was restricted to be no larger than 5-in stretched mesh rather than the 2.75-in stretched mesh used on the pots in the 2006 survey.

Recognizing the limitations in making direct comparisons of the CPUE of legal males between the 2006 survey and the November 2001 industry survey, the following observations on CPUE

of legal males during the 2006 survey and niche fishing relative to results of the November 2001 industry survey provide strong evidence that the abundance of legal red king crabs in the Petrel Bank area was substantially lower in November 2006 than in November 2001. Although the CPUE of legal males was only 1.2 crabs per pot lift over all 170 stations fished during the 2006 survey, it was demonstrated that higher catch rates were possible in limited areas of concentration. When only considering the three stations with the highest catches of legal male red king crabs during the 2006 survey could an aggregate CPUE of legal males (33.3 crabs per pot lift) be achieved that was comparable to the CPUE of legal males for the entire November 2001 industry survey (32.2 crabs per pot lift). The highest CPUE of legal males for any single four-pot station fished during the 2006 survey was 45.0 crabs per pot lift and the highest for any of the seven niche fishing strings fished was 50.9 crabs per pot lift over 26 pots. By comparison, a CPUE of legal males in excess of 70 crabs per pot lift could be maintained during the November 2001 industry survey in 251 pots that were fished in 10 station areas. The 80 pots fished during the 2006 survey that were within five station areas that produced a CPUE of legal males equal to 75.9 crabs per pot lift during the November 2001 industry survey captured legal males at a rate of 6.9 crabs per pot lift. Another 75 pots fished during the 2006 survey that were within five other station areas that produced a CPUE of legal males in excess of 71.2 crabs per pot lift during the November 2001 industry survey captured no legal males. During niche fishing of pots in arrays similar to those used in commercial fishing and within areas anticipated to catch legal males at high rates, the CPUE of legal males was 15.6 crabs per pot lift. Nonetheless, niche fishing also revealed the patchiness of distribution of red king crabs within the area of highest abundance; 50% of the catch of legal males occurred in one string that represented only 16% of the niche fishing pots and catches were observed to vary markedly between adjacent strings and among pots within the same string. Moreover, in the four strings of niche fishing pots that were set to repeat arrays of pots fished during the November 2001 industry survey, the CPUE of legal males in each string was consistently lower than in the corresponding pots fished during the November 2001 industry survey and the CPUE of legal males for the 92 niche fishing pots in all four of those strings (9.8 crabs per pot lift) was 11% of that for the corresponding 121 pots fished during the November 2001 industry survey (85.5 crabs per pot lift).

Males that were estimated to be new recruits to legal size accounted for 36% of the legal male red king crabs captured during the 2006 survey, 40% of the legal males captured during associated niche fishing, and 31% of the legal males captured during the resurvey of 12 stations. By comparison, 15% of the legal males captured during the November 2001 industry survey, 12% of the legal males captured during the 2002/03 fishery, and 3% of the legal males captured during the 2003/04 fishery were in the size-shell category to be considered recruits (Table 5 in Bowers et al. 2002; Table 15 in Barnard and Burt 2004; Table 15 in Burt and Barnard 2005). The recruit-sized legal male red king crabs captured during in the 2006 survey may represent the progression of the size-frequency mode centered at 86-90 mm CL that had been identified in the male red king crab data collected by observers during the 2003/04 fishery (Burt and Barnard 2005; Bush et al. 2005). However, the recruitment that occurred between the closure of the 2003/04 season and November 2006 was apparently insufficient to replenish legal male abundance to a level approaching that of November 2001.

Comparing the number of males estimated to be one molt from legal size that were captured during the 2006 survey to the number of legal-sized males that were captured resulted in a prerecruit:legal ratio of 0.08:1; the ratios obtained from the catch during niche fishing and resurvey of 12 stations were similarly low. Despite a minor peak in the male size frequency

centered at 107-mm CL, the 2006 survey results provided no basis for expecting sufficient recruitment of males to legal size to significantly increase legal male abundance prior to the 2007/08 fishery season. As in the November 2001 industry survey and the 2002/03 and 2003/04 commercial fisheries, the majority of male red king crabs captured during the 2006 survey were legal-sized. The relative frequency of sublegal males in the catch of male red king crabs (16%) during the 2006 survey was higher than that for the November 2001 industry survey (6%; Bowers et al. 2002), the 2002/03 commercial fishery (4%; Barnard and Burt 2004), or the 2003/04 commercial fishery (8%; Burt and Barnard 2005). The relative frequency of sublegal males in the males captured during niche fishing was slightly higher than during the 2006 survey (21%). However, the representation of sublegal males during the survey and niche-fishing in 2006 were both poor in comparison to what is typically seen in observer data from recent Bristol Bay red king crab fishery seasons (where the catch of sublegal males is frequently greater than the catch of legal males; Figures 5 and 7 in Barnard and Burt 2007) and to what was seen in observer data collected from historic red king crab fisheries on Petrel Bank. Sublegal-sized crabs dominated the catch of the male red king crabs in pots sampled by observers during the 1990/91 red king crab fishery on the Petrel Bank (Figure 13 in Bowers et al. 2002), although by the 1993/94 fishery the representation of sublegal males had greatly diminished (Figure 14 in Bowers et al. 2002). Observer data on relative frequency of sublegal males that were collected during two commercial fishing trips for red king crabs on Petrel bank during the late 1960s and early 1970s are available (Blau 1993) and they also show a higher representation of sublegal males in the catch than has been seen in the more recent fisheries or surveys; sublegal males accounted for 40% of the males captured during a commercial fishing trip conducted during November 1969 and 55% of the males captured during a commercial fishing trip conducted during December 1972.

Given the configuration of the pots fished, the spatial distribution and density of survey stations, and the range of depths fished during the 2006 survey, the representation of females in the red king crab catch was surprisingly low. The relative frequency of females in the catch of red king crabs (13%) was within the range of that seen during the November 2001 industry survey (9%; Bowers et al. 2002), the 2002/03 commercial fishery (11%; Barnard and Burt 2004), and the 2003/04 commercial fishery (18%; Burt and Barnard 2005). For comparison, in red king crab pot surveys conducted by the department in the Dutch Harbor management area during 1975–1984, the Alaska Peninsula management area during 1974–1984, the Kodiak management area during 1972–1984, and the Cook Inlet management area during 1974–1984, females accounted for no less than 27% of the total annual red king crab survey CPUE and usually accounted for 40% or more (Blau 1985). It remains uncertain if the poor representation of females in the 2006 survey's red king crab catch was due to a strong male bias in the sex ratio of the mature-sized crabs in the surveyed area or to problems with the survey's design, gear, or timing in adequately assessing the female population in this area. If there were problems with the survey's design in adequately assessing the female population, it is not clear what those problems were. The 2.75-in stretched mesh used on the pots fished during the survey, niche fishing, and resurvey was smaller than the escape mesh used on pots fished in the commercial Bristol Bay red king crab fishery (minimum 9-in stretched mesh by regulation; 5 AAC 34.825 (c)), which have been shown to catch female red king crabs when present (Figure 7 in Barnard and Burt 2007). Results of the 2006 survey showed no localized areas with significant densities of females outside of the area where male crabs were captured and no spatial trends in catch that would indicate significant densities of females existed outside of the margins of the surveyed area. Neither the resurvey of

12 stations nor the niche fishing that were conducted in association with the 2006 survey resulted in a notably larger representation of females in the red king crab catch relative to the 2006 survey. Additionally, there was no indication that the survey gear was insufficient to capture female golden king crabs; 45% of the golden king crabs captured during the 2006 survey were females.

Ninety-five percent of the red king crab females captured during the 2006 survey were at or above the SM50 that has been estimated for female red king crabs in the Adak management area (89-mm CL; Blau 1990). However, the percentage of females that actually were mature, as indicated by the presence of eggs or empty egg cases, was lower than that at 74%. Results from niche fishing and the resurvey of 12 stations were similar in that regard. The smallest mature female captured during the 2006 survey and associated niche fishing and resurvey was 91-mm CL and the size distributions of immature and mature females overlapped over the range of 91 – 113 mm CL. Although female SM50 can vary annually within red king crab populations due to demographic effects (Pengilly et al. 2002), these results indicate the need to reevaluate the applicability of 89-mm CL as the size at 50% maturity for female red king crabs in the Petrel Bank area.

The 2006 survey reported on here is the only systematic survey of red king crabs in the Petrel Bank area that has been performed. Therefore, to continue to ascertain the status of this stock, the department will conduct another systematic pot survey of red king crabs in the Petrel Bank area during the fall of 2007.

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## **TABLES AND FIGURES**

**Table 1.**—Correspondence of survey stations fished during the 2006 Petrel Bank red king crab survey with the survey station areas established for the November 2001 industry survey<sup>a</sup>: number and list of stations fished during the 2006 survey within each of the station areas established for the November 2001 industry survey.

November 2001 Industry Survey Station Area	2006 Survey Stations	
	Number of Stations	List of Stations
1	4	1, 2, 7, 8
2	2	3, 4
3	3	5, 10, 11
4	6	13, 14, 15, 19, 20, 21
5	4	27, 28, 43, 44
6	5	26, 39, 40, 41, 42
7	4	24, 25, 37, 38
8	6	23, 32, 33, 34, 35, 36
9	4	57, 58, 73, 74
10	4	55, 56, 71, 72
11	4	53, 54, 69, 70
12	4	51, 52, 67, 68
13	6	48, 49, 50, 64, 65, 66
14	2	87, 102
15	4	85, 86, 100, 101
16	4	83, 84, 98, 99
17	4	81, 82, 96, 97
18	4	79, 80, 94, 95
19	3	78, 92, 93
20	3	114, 115, 126
21	4	112, 113, 124, 125
22	4	110, 111, 122, 123
23	4	108, 109, 120, 121
24	2	107, 119
25	6	136, 137, 138, 149, 150,
26	5	134, 135, 147, 148, 159
27	2	132, 133
28	6	129, 142, 143, 144, 155,

<sup>a</sup> Correspondence was determined by the average latitude, longitude, and depth of each station fished during the 2006 survey (Appendix A1) relative to the latitudinal, longitudinal, and depth-contour boundaries used to define the survey station areas established for the November 2001 industry survey (Appendix B in Bowers et al. 2002).



**Table 2.**—Catches of crabs and fish of commercial importance, ranked by number of occurrences, captured during the 2006 Petrel Bank red king crab pot survey, niche fishing and resurvey.

<b>Scientific Name</b>	<b>Common Name</b>	<b>Total</b>
<b>Commercial Crab</b>		
<i>Paralithodes camtschaticus</i>	Red King Crab	5,308
<i>Lithodes aequispinus</i>	Golden King Crab	1,299
<i>Erimacrus isenbeckii</i>	Hair Crab	662
<i>Chionoecetes bairdi</i>	Tanner Crab	612
		<u>7,881</u>
<b>Commercial Fish</b>		
<i>Pleurogrammus monopterygius</i>	Atka Mackerel	1,101
<i>Sebastes polyspinis</i>	Northern Rockfish	553
<i>Theragra chalcogramma</i>	Walleye Pollock	160
<i>Gadus macrocephalus</i>	Pacific Cod	43
<i>Sebastes varibilis</i>	Light Dusky Rockfish	32
<i>Hippoglossus stenolepis</i>	Pacific Halibut	5
<i>Reinhardtius hippoglossoides</i>	Greenland Turbot	5
<i>Sebastes zacentrus</i>	Sharpchin Rockfish	5
<i>Atheresthes stomias</i>	Arrowtooth Flounder	4
<i>Sebastes aleutianus</i>	Rougeye Rockfish	4
<i>Sebastes alutus</i>	Pacific Ocean Perch	4
<i>Lepidopsetta</i> sp.	Rock Sole unidentified	3
<i>Sebastolobus alascanus</i>	Shortspine Thornyhead	2
<i>Atheresthes evermanni</i>	Kamchatka Flounder	1
		<u>1,922</u>

**Table 3.**—Miscellaneous fish and invertebrates captured during the 2006 Petrel Bank red king crab pot survey, niche fishing and resurvey, ranked by number of occurrences. Miscellaneous fish and invertebrates are those species which are of limited or no commercial interest in Alaska waters.

Scientific Name	Common Name	Total
<b>Fish</b>		
<i>Hemilepidotus jordani</i>	yellow Irish lord	4,227
<i>Malacocottus zonurus</i>	darkfin sculpin	1,881
<i>Bathymaster signatus</i>	searcher	203
<i>Careproctus rastrinus</i>	salmon snailfish	118
<i>Bathyraja aleutica</i>	Aleutian skate	24
Family Rajidae	skate unidentified	17
<i>Bathyraja maculata</i>	whiteblotched skate	8
<i>Zaprora silenus</i>	prowfish	8
<i>Hemilepidotus hemilepidotus</i>	red Irish lord	6
<i>Hexagrammos decagrammus</i>	kelp greenling	6
<i>Bathyraja parmifera</i>	Alaska skate	4
<i>Podothecus (or Agonus) acipenserinus</i>	sturgeon poacher	4
<i>Myoxocephalus polyacanthocephalus</i>	great sculpin	3
<i>Hemitripterus bolini</i>	bigmouth sculpin	3
Family Liparidae	snailfish unidentified	2
skate egg case unidentified	skate egg case unidentified	2
<i>Hexagrammos octogrammus</i>	masked greenling	2
<i>Hexagrammos lagocephalus</i>	rock greenling	2
<i>Hypsogonus quadricornis</i>	fourhorn poacher	1
Family Cottidae	sculpin unidentified	1
<i>Gymnocephalus galeatus</i>	armorhead sculpin	1
<i>Myoxocephalus verrucosus</i>	warty sculpin	1
<i>Enophrys lucasi</i>	leister sculpin	1
<i>Liparis gibbus</i>	variegated snailfish	1
	fish unidentified	1
		6,527
<b>Invertebrates</b>		
<i>Hyas lyratus</i>	Pacific lyre crab	3,774
<i>Fusitriton oregonensis</i>	hairy triton (or Oregon triton)	2,516
<i>Elassochirus cavimanus</i>	purple hermit crab	659
<i>Strongylocentrotus polyacanthus</i>	Aleutian urchin	516
<i>Lebbeus groenlandicus</i>	spiny lebbeid	323
<i>Strongylocentrotus droebachiensis</i>	green sea urchin	290
<i>Octopus dofleini</i>	giant octopus	267
<i>Buccinum eugrammatum</i>	lirate whelk	239

-continued-

Table 3.–Page 2 of 7.

Scientific Name	Common Name	Total
<b>Invertebrates</b>		
<i>Buccinum</i> sp. E	Buccinum welk unidentified	174
Phylum Porifera	sponge unidentified	146
<i>Placetron wosnessenskii</i>	scaled crab	92
<i>Chlamys behringiana</i>	Iceland scallop	78
<i>Aequorea</i> sp.	bubble jelly	62
<i>Crossaster papposus</i>	rose sea star	62
<i>Pagurus confragosus</i>	knobbyhand hermit crab	60
<i>Suberites montinger</i>	peach sponge	54
<i>Latrunculia</i> sp. A	green papillate sponge	43
<i>Asbestopluma</i> sp. A	fuzzy sponge	40
<i>Ophiopholis aculeata</i>	ubiquitous brittle star	35
Order Hydroida		33
<i>Gorgonocephalus eucnemis</i>	basket star	33
<i>Chrysaora melanaster</i>	sunrise jelly	29
<i>Stylaster</i> sp.		29
<i>Oregonia gracilis</i>	graceful decorator crab	29
<i>Amphilaphis</i> sp.	Amphilaphis coral unidentified	25
<i>Suberites ficus</i>	hermit sponge	24
<i>Ophiura sarsi</i>	notched brittlestar	23
<i>Boltenia ovifera</i>	sea onion	23
<i>Alcyonium</i> sp. A	pink orange mushroom coral	22
<i>Ophiura lutkini</i>		22
<i>Myxilla incrustans</i>	scallop sponge	18
Class Ophiuroidea	brittle star unidentified	17
<i>Neoesperiopsis rigida</i>	soft finger sponge	17
<i>Stelodoryx alaskensis</i>	Alaskan lobed sponge	16
<i>Abietinaria</i> sp. A (Clark 2006)	white tangled hydroid	15
<i>Dendrobeatia</i> sp.	fan bryozoan	15
<i>Pagurus brandti</i>	sponge hermit crab	14
<i>Distaplia occidentalis</i>		14
<i>Lethasterias nanimensis</i>	blackspined sea star	13
<i>Cheiraster (=Luidiaster) dawsoni</i>	fragile sea star	13
Phylum Porifera	ginseng sponge	13
<i>Craniella spinosa</i>	furry ball sponge	13
<i>Henricia</i> sp.	blood star unidentified	13
<i>Errinopora</i> sp.	Errinopora coral unidentified	12
<i>Halichondria panicea</i>	barrel sponge	12
<i>Gersemia</i> sp.	sea raspberry	11

-continued-

Table 3.–Page 3 of 7.

Scientific Name	Common Name	Total
<b>Invertebrates</b>		
<i>Errinopora nanneca</i>		11
<i>Beringius</i> sp.	Beringuis whelk unidentified	11
<i>Leptasterias trunculenta</i>		11
<i>Geodia mesotriaena</i>	soccer ball sponge	11
<i>Syringella amphiscula</i>	firm finger sponge	11
<i>Hippodiplosia insculpta</i>	fluted bryozoan	11
<i>Thouarella</i> sp.	Thouarella coral unidentified	10
<i>Florometra</i> sp.	feather star	10
<i>Bugula californica</i>	spiral bryozoan	10
<i>Tethya</i> sp.	ball sponge	9
<i>Plakina tanaga</i>	white convoluted sponge	9
<i>Microporina borealis</i>	jointed bryozoan	9
<i>Astrochele laevis</i>		8
<i>Polymastia</i> sp. B	orange nipple ball sponge	8
<i>Cliona</i> sp. A	rough bread crumb sponge	8
<i>Isodictya palmata</i>	prickly pear sponge	8
<i>Craniella cranium</i>	baseball sponge	8
<i>Tetilla sigmoanchoratum</i>	spiny ball sponge	8
<i>Abietinaria greenei</i>	bushy white hydroid	7
Class Scyphozoa	jellyfish unidentified	7
<i>Plumarella</i> sp.	Plumarella coral unidentified	7
<i>Ophiopholis aculeata japonica</i>	Japanese daisy brittle star	7
Phylum Bryozoa	bryozoan unidentified	7
<i>Clavularia incrustans</i>		6
<i>Mycale</i> sp.	Mycale sponge	6
Phylum Porifera	club sponge	6
<i>Neoesperiopsis digitata</i>	glove sponge	6
<i>Polymastia fluegeli</i>	Flugel's nipples sponge	6
<i>Scypha ciliata</i>	hairy urn sponge	6
<i>Halocynthia aurantium</i>	sea peach	6
<i>Thouarella superba</i>	deep-sea octocooral	6
<i>Ptilosarcus</i> sp.	sea pen unidentified	5
Class Asteroidea	starfish unidentified	5
<i>Ceramaster patagonicus</i>	orange bat sea star	5
<i>Heterozonias alternatus</i>	canonball sun star	5
<i>Leptychaster arcticus</i>	North Pacific sea star	5
<i>Aphrocallistes vastus</i>	clay pipe sponge	5
<i>Mycale loveni</i>	tree sponge	5

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Table 3.–Page 4 of 7.

Scientific Name	Common Name	Total
<b>Invertebrates</b>		
<i>Leieschara orientalis</i>	eastern fork branched bryozoan	5
<i>Solaster</i> sp. C	beautiful sun star	5
<i>Eunoe</i> sp.	scale worm unidentified	4
<i>Hapalogaster grebnitzkii</i>	soft crab	4
<i>Placiphorella pacifica</i>	white veiled chiton	4
<i>Henricia aspera</i>	ridged blood star	4
<i>Odontohenricia fisheri</i>	Fisher's toothed blood star	4
<i>Ceramaster japonicus</i>	red bat star	4
<i>Stegophiura (=Amphiophiura) ponderosa</i>	great armored brittle star	4
<i>Weberella bursa</i>	pale mammilated sponge	4
<i>Alcyonidium pedunculatum</i>	smooth leather bryozoan	4
Class Ascidiacea	tunicate unidentified	4
<i>Aplidium</i> sp.	sea glob	4
<i>Polymastia</i> sp.	spud sponge	4
	calcareous finger sponge	4
<i>Aglaophenia</i> sp.	Ostrich-plume hydroid	3
<i>Calcigorgia spiculifera</i>	pink sea fan	3
<i>Clavularia incrustans</i>	encrusting stolen coral	3
Order Actiniaria	sea anemone unidentified	3
<i>Caryophyllia</i> sp.	cup coral unidentified	3
<i>Muriceides nigra</i>	purple sea fan	3
<i>Rocinella angusta</i>		3
<i>Lepidozona beringiana</i>	Bering chiton	3
<i>Pododesmus macrochisma</i>	Alaska falsejingle	3
<i>Henricia multispina</i>	spiny blood star	3
<i>Solaster hypothrissus</i>	white sun star	3
<i>Solaster</i> sp. G	sun star unidentified	3
<i>Lophaster furcilliger</i>	crested sea star	3
<i>Ophiacantha enneactis</i>	nine-armed brittle star	3
<i>Ophiolebes pachbracta</i>		3
Class Holothuroidea	sea cucumber unidentified	3
<i>Cucumaria fallax</i>	sea football	3
<i>Polymastia robusta</i>	long nipples sponge	3
<i>Echinoclathria</i> sp. A	fuzzy tree sponge	3
<i>Staurocalyptus</i> sp.	yellow Picasso sponge	3
<i>Aulosaccus schulzei</i>	vase sponge	3
Phylum Porifera	nipple sponge unidentified	3
<i>Cyclohelina lamellata</i>		2

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Table 3.–Page 5 of 7.

Scientific Name	Common Name	Total
<b>Invertebrates</b>		
<i>Thouarella</i> sp. 2	Thouarella coral unidentified	2
<i>Amphilaphis</i> sp. 2	pinnate amphilaphis coral	2
<i>Amphilaphis</i> sp. 3	loose-branched amphilaphis coral	2
<i>Plumarella</i> sp. 2	Plumarella coral unidentified	2
<i>Eunice valens</i>		2
Order Isopoda	isopod unidentified	2
<i>Chorilia longipes</i>	longhorned decorator crab	2
<i>Pagurus aleuticus</i>	Aleutian hermit crab	2
<i>Pagurus kennerlyi</i>	bluespine hermit crab	2
<i>Elassochirus tenuimanus</i>	widehand hermit crab	2
<i>Tritonia</i> sp.	Tritonia nudibranch unidentified	2
<i>Neptunea</i> sp. C	Neptune snail unidentified	2
<i>Colus</i> sp. A	Colus snail unidentified	2
<i>Odontohenricia</i> sp.	Odontohenricia blood star unidentified	2
<i>Odontohenricia</i> sp. B	Odontohenricia blood star unidentified	2
<i>Hippasteria</i> sp. A	spiny star unidentified	2
<i>Solaster</i> sp.	sun star unidentified	2
<i>Pteraster</i> sp. C	slime star unidentified	2
<i>Ophiacantha cataleimmoidea</i>		2
<i>Bathyploetes</i> sp.	sea cucumber unidentified	2
<i>Suberites domuncula</i>	hermit crab sponge	2
<i>Acanthascus</i> sp.	sponge unidentified	2
<i>Leucandra heathi</i>	spiny vase sponge	2
<i>Leucosolenia blanca</i>	yellow leafy sponge	2
<i>Mycalecarmia lobata</i>	cotton ball sponge	2
<i>Flustra serrulata</i>	leafy bryozoan	2
<i>Rhamphostomella costata</i>	ribbed bryozoan	2
<i>Tubiporella</i> sp.	bryozoan unidentified	2
	neon yellow Ascidian	2
Hydroid sp. A	champagne flute hydroid	1
<i>Alcyonium</i> sp. B	medusa bryozoan unidentified	1
<i>Swiftia simplex</i>		1
<i>Paragorgia</i> sp.	octocoral unidentified	1
<i>Paragorgia pacifica</i>		1
<i>Crispatotrochus foxi</i>		1
Family Stylasteridae	hydrocoral unidentified	1
<i>Thouarella</i> sp. 1	Thouarella coral unidentified	1
<i>Errinopora</i> sp. B	Errinopora coral unidentified	1

-continued-

Table 3.–Page 6 of 7.

Scientific Name	Common Name	Total
<b>Invertebrates</b>		
<i>Errinopora zarhyncha</i>		1
<i>Fanellia</i> sp.	Fanellia coral unidentified	1
<i>Fanellia compressa</i>	Fanellia compressa	1
<i>Muriceides</i> sp.	Muriceides coral unidentified	1
<i>Eunoe nodosa</i>	giant scale worm	1
Order Amphipoda	amphipod unidentified	1
<i>Eusirus cuspidatus</i>		1
<i>Caprella</i> sp.	caprellid amphipod unidentified	1
<i>Arcturus</i> sp. 2	spiny arcturid isopod	1
<i>Gnorimosphaeroma</i> sp.	isopod unidentified	1
Order Thoracica	barnacle unidentified	1
<i>Balanus</i> sp.	barnacle unidentified	1
<i>Scalpellum cornutum</i>	eared barnacle	1
Order Decapoda	shrimp unidentified	1
Family Crangonidae	crangonid shrimp unidentified	1
<i>Acantholithodes hispidus</i>	fuzzy crab	1
Class Pycnogonida	sea spider unidentified	1
gastropod eggs	snail eggs	1
<i>Diaulula</i> sp. A	nudibranch unidentified	1
<i>Cranopsis major</i>	great puncturella	1
<i>Plicifusus</i> (=Colus) sp.	whelk unidentified	1
<i>Arctomelon tamikoae</i>	ribbed volute	1
Family Mytilidae	mussel unidentified	1
<i>Chlamys rubida</i>	Hind's scallop (or reddish scallop)	1
<i>Serripes</i> sp.	Serripes cockle unidentified	1
<i>Henricia</i> sp. C	Henricia blood star unidentified	1
<i>Henricia longispina</i>	long-spined blood star	1
<i>Odontohenricia</i> sp. C	Odontohenricia blood star unidentified	1
<i>Hippasteria kurilensis</i>	Kurile spiny star	1
<i>Crossaster borealis</i>	grooved sea star	1
<i>Lophaster vexator</i>	crested star	1
<i>Asthenactis fisheri</i>	Tessellated slime star	1
<i>Diplopteraster multipes</i>	pincushion sea star	1
Class Echinoidea	sea urchin unidentified	1
<i>Ophiura quadraspina</i>		1
<i>Ophiolebes paucispina</i>		1
<i>Ophiolebes</i> sp. B	Ophiolebes brittle star unidentified	1
<i>Ophiolebes</i> sp. C	Ophiolebes brittle star unidentified	1

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Table 3.–Page 7 of 7.

Scientific Name	Common Name	Total
<b>Invertebrates</b>		
<i>Ophiolebes</i> sp. E	Ophiolebes brittle star unidentified	1
<i>Psolus japonicus</i>	red-orange armored sea cucumber	1
<i>Suberites</i> sp. A	wax sponge	1
Phylum Porifera	brain sponge	1
Phylum Porifera	scapula sponge	1
<i>Myxilla lacunosa</i>	soft green sponge	1
Phylum Porifera	mushroom sponge	1
<i>Polymastia</i> sp. A	prolific nipple sponge	1
<i>Vulcanella</i> sp. 1	fuzzy cratered sponge	1
<i>Tentorium semisuberites</i>	two nipple sponge	1
<i>Oscarella lobularis</i>	stalked ball sponge	1
<i>Stylocordyla eous</i>	slender stalked sponge	1
<i>Axinella</i> sp.	firm gray sponge	1
<i>Phakellia cribrosa</i>	funnel sponge	1
<i>Tubulanus polymorphus</i>		1
<i>Styela rustica</i>	sea potato	1
<i>Pyula haustor</i>		1
<i>Botryllus schlosseri</i>	star ascidian	1
<i>Tetilla</i> sp. A (Clark 2006)	spiky ball sponge	1
<i>Tetilla</i> sp. B (Clark 2006)	knobby ball sponge	1
<i>Craniella</i> sp.	puffball sponges	1
		10,493



**Table 4.**—Crabs of commercial importance captured during the 2006 Petrel Bank red king crab survey, niche fishing and resurvey.

	Survey		Niche Fishing		Resurvey	
	Number	CPUE	Number	CPUE	Number	CPUE
<b>Red King Crab</b>						
Legal Males	804	1.18	2,574	15.58	344	7.17
Sublegal Males	151	0.22	669	4.08	41	0.85
Females	139	0.20	513	3.11	73	1.52
Total	<u>1,094</u>		<u>3,756</u>		<u>458</u>	
<b>Golden King Crab</b>						
Legal Males	632	0.93	22	0.13	17	0.35
Sublegal Males	60	0.09	0	0.00	0	0.00
Females	565	0.83	1	0.01	2	0.04
Total	<u>1,257</u>		<u>23</u>		<u>19</u>	
<b>Hair Crab</b>						
Legal Males	321	0.47	48	0.29	18	0.38
Sublegal Males	160	0.24	28	0.17	9	0.19
Females	69	0.10	3	0.02	3	0.06
Total	<u>553</u> <sup>a</sup>		<u>79</u>		<u>30</u>	
<b>Tanner Crab</b>						
Legal Males	0	0.00	0	0.00	0	0.00
Sublegal Males	82	0.12	112	0.68	7	0.15
Females	216	0.20	186	1.62	6	0.13
Total	<u>300</u> <sup>b</sup>		<u>299</u> <sup>c</sup>		<u>13</u>	

<sup>a</sup> Total includes 3 hair crabs for which sex was not ascertained.

<sup>b</sup> Total includes 2 Tanner crabs for which sex was not ascertained.

<sup>c</sup> Total includes 1 Tanner crabs for which sex was not ascertained.

**Table 5.**—Number of niche pots fished, mean depth, and catch per unit of effort (CPUE, catch per pot lift) by string of legal male, sublegal male and female red king crabs during the 2006 Petrel Bank red king crab charter.

String	Number of Pots Fished	Mean Depth (fm)	Legal Males	Sublegal Males	Females
1	26	91.2	50.9	12	8.6
2	36	75.7	4.3	0.5	0.8
3	33	66.2	10.4	4.8	3.5
4	16	62.6	3.8	0.2	0.7
5	25	64.4	15.3	1.9	2.3
6	18	66.0	6.2	1.0	0.2
7	11	76.3	18.2	9.8	6.4
Total	165	72.2	15.6	4.1	3.1

**Table 6.**—Comparison of catch by station, total catch, and total catch per pot lift (CPUE) of legal male, sublegal male, and female red king crabs at twelve stations during the 2006 Petrel Bank red king crab survey with the catch during a resurvey of the same stations approximately three weeks later.

Station	Legal Males		Sublegal Males		Females		Total	
	Survey	Resurvey	Survey	Resurvey	Survey	Resurvey	Survey	Resurvey
123	4	12	0	0	49	17	53	29
124	34	0	7	0	11	0	52	0
125	120	150	28	16	22	16	170	182
135	0	2	0	0	1	2	1	5
136	25	21	0	0	0	1	25	22
137	0	2	0	0	0	1	0	2
148	2	11	1	0	6	2	9	13
149	3	10	0	0	1	1	4	11
150	12	58	1	25	3	33	16	116
159	180	66	19	0	0	0	199	66
160	39	6	1	0	0	0	40	6
161	100	6	3	0	0	0	103	6
Total	519	344	60	41	93	73	672	458
CPUE	10.8	7.2	1.3	0.9	1.9	1.5	14	9.5

**Table 7.**—Number of pots fished within station areas designated for the November 2001 industry survey for red king crabs on Petrel Bank and number of legal male, sublegal male, and female red king crabs captured within station areas during the 2006 Petrel Bank red king crab survey and the November 2001 industry survey for red king crabs on Petrel Bank; results for the November 2001 industry survey are from Table 4 in Bowers et al. 2002.

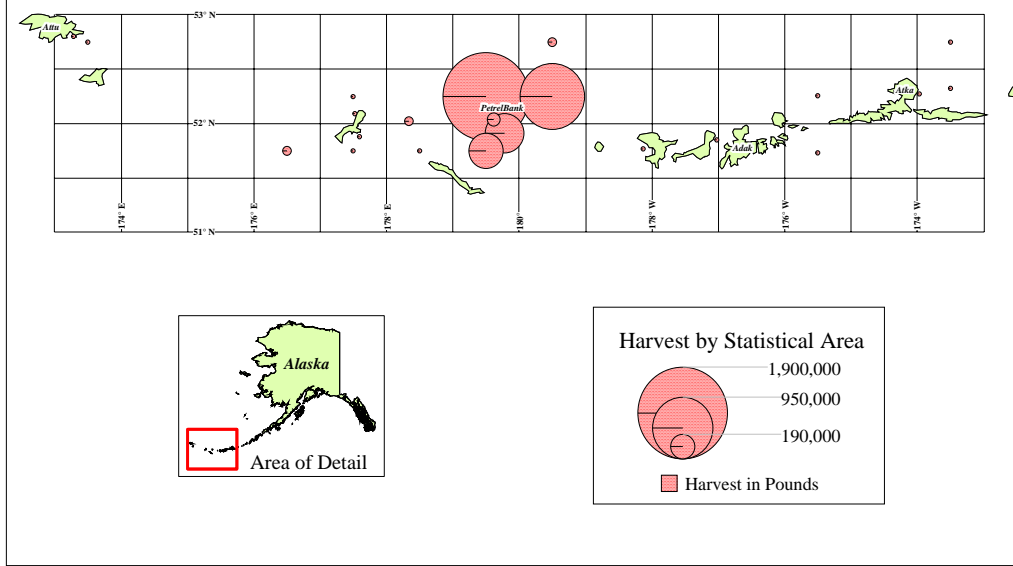
Station Area <sup>a</sup>	2006 Survey				November 2001 Industry Survey			
	Pots Fished	Legal Males	Sublegal Males	Females	Pots Fished	Legal Males	Sublegal Males	Females
1	16	0	0	0	25	0	0	0
2	8	0	0	0	25	271	0	0
3	12	0	0	0	25	75	1	2
4	24	0	0	1	25	320	0	1
5	16	0	0	0	25	1,765	5	1
6	20	0	0	0	25	1,424	25	0
7	16	0	0	0	24	0	0	0
8	24	0	0	0	25	0	0	0
9	16	0	0	0	25	419	2	2
10	16	0	0	0	25	1,723	135	9
11	16	0	0	0	25	0	0	0
12	16	0	0	0	25	0	0	1
13	24	7	6	3	25	49	0	0
14	8	62	76	31	25	1,312	30	6
15	15	0	0	0	25	2,648	106	207
16	16	0	0	0	25	275	10	149
17	16	0	0	0	25	0	0	0
18	16	0	0	0	25	0	0	0
19	12	0	0	0	25	38	0	0
20	12	67	4	9	25	3,227	189	197
21	16	154	35	33	26	2,674	216	353
22	16	5	0	49	25	2,541	451	1,040
23	16	0	0	0	25	22	0	0
24	8	0	0	0	25	54	0	0
25	24	80	2	4	25	1,147	13	3
26	20	187	20	7	25	1,198	206	403
27	8	0	0	0	25	1,340	19	17
28	24	0	0	0	25	39	1	1
Total	451	562	143	137	700	22,561	1,409	2,392

<sup>a</sup> Station areas are illustrated in Figure 2 of this report and described in Appendix B of Bowers et al. (2002).

**Table 8.**—Number of pots fished within four niche-fishing strings during the 2006 Petrel Bank red king crab survey charter and catch of legal male, sublegal male, and female red king crabs compared with number of pots corresponding to those strings that were fished during the November 2001 industry survey for red king crabs on Petrel Bank and catch of legal male, sublegal male, and female red king crabs; see Appendix A3 for correspondence between the pots fished during the November 2001 industry survey and the strings of niche-fishing pots fished during the 2006 survey charter.

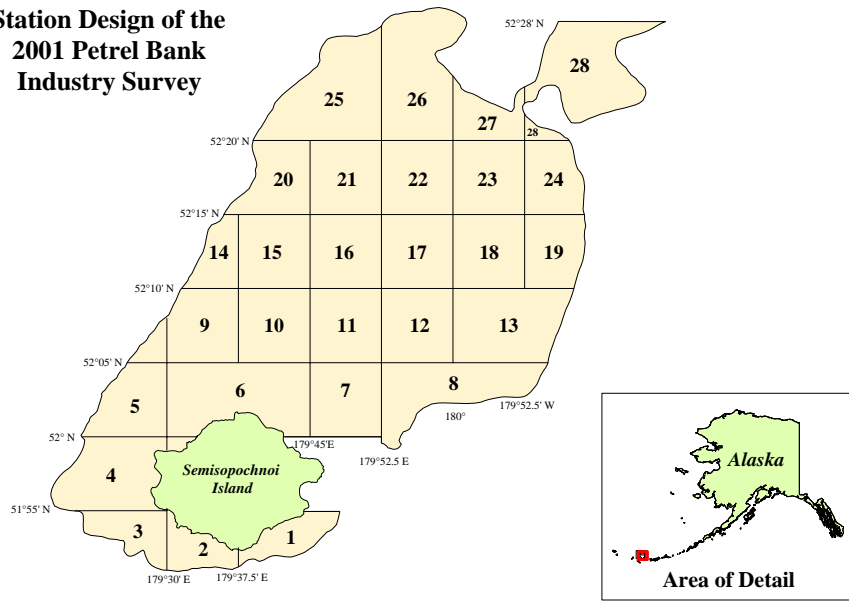
String	2006 Survey Charter				November 2001 Industry Survey			
	Pots Fished	Legal Males	Sublegal Males	Females	Pots Fished	Legal Males	Sublegal Males	Females
3	33	344	159	117	34	1,739	150	307
4	16	60	3	11	18	2,021	188	84
5	25	382	48	58	44	3,937	222	570
6	18	111	18	4	25	2,648	106	207
Total	92	897	228	190	121	10,345	666	1,168

### Adak Area Harvest, 1990/91 to 1995/96

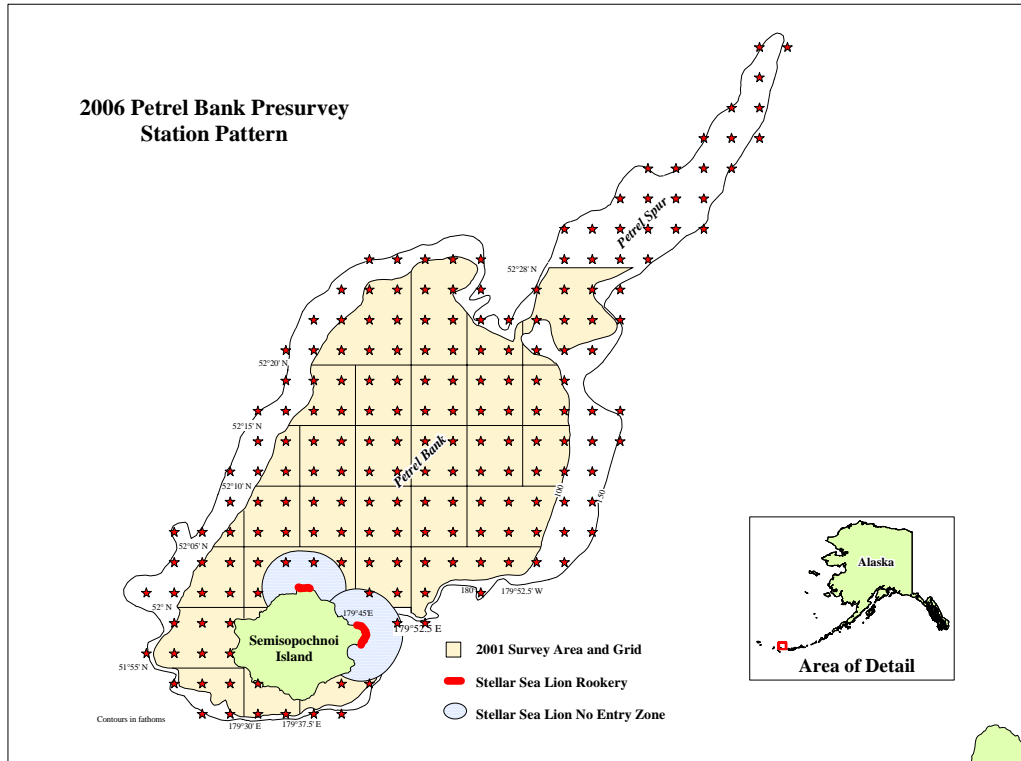


**Figure 1.**—Catch of red king crabs in Adak, Area R, from the 1990/91 to the 1995/96 fisheries.

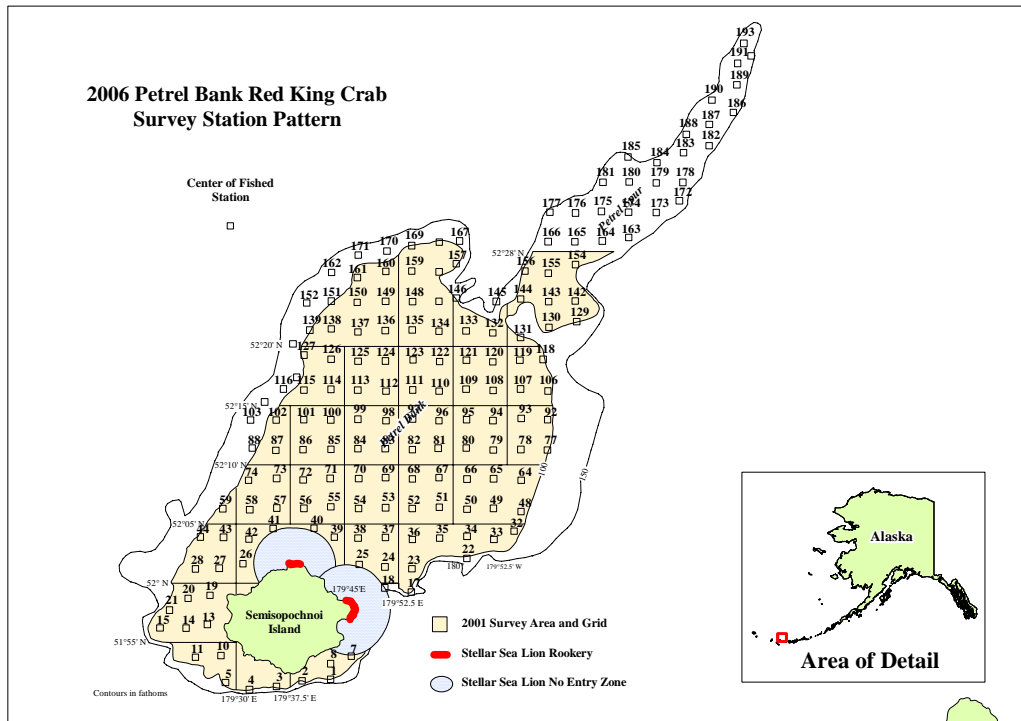
### Station Design of the 2001 Petrel Bank Industry Survey



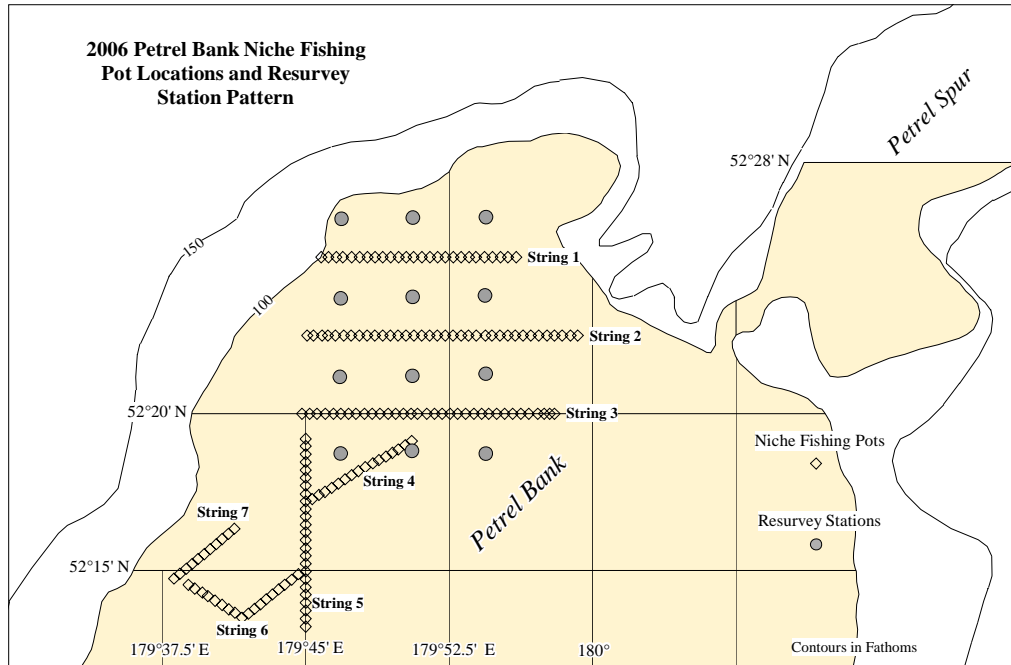
**Figure 2.**—Survey area and grid design for the November 2001 industry survey.



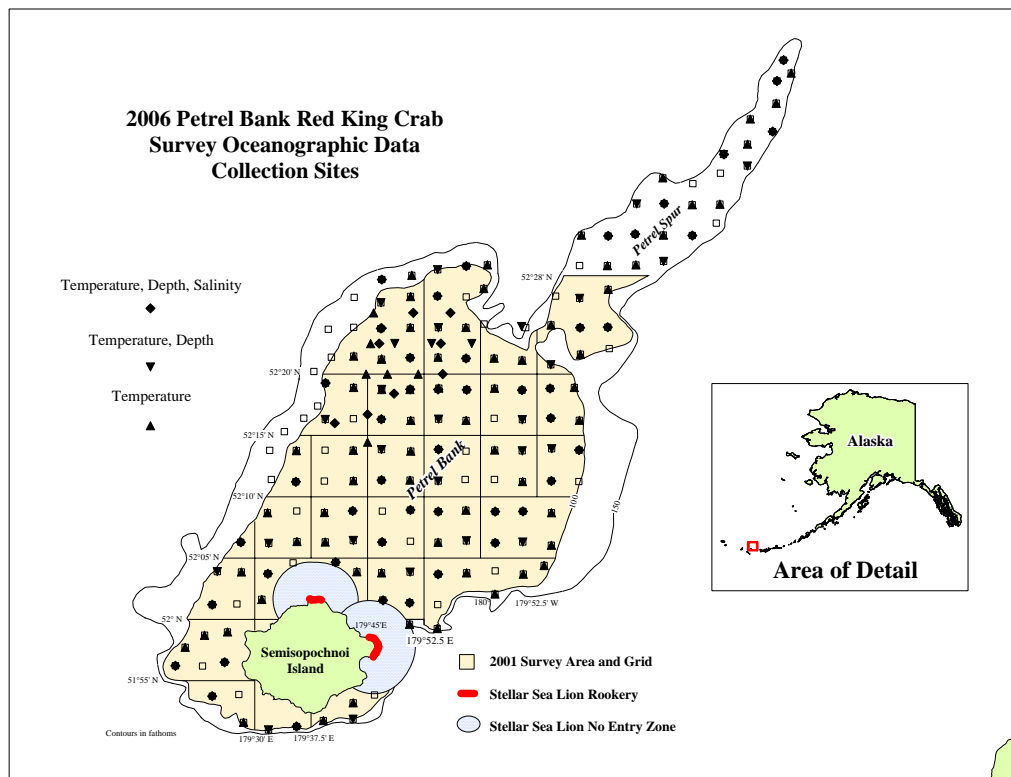
**Figure 3.**—The initial presurvey station pattern for the 2006 Petrel Bank red king crab survey.



**Figure 4.**—Station pattern and numbers of those fished during the 2006 Petrel Bank red king crab survey.

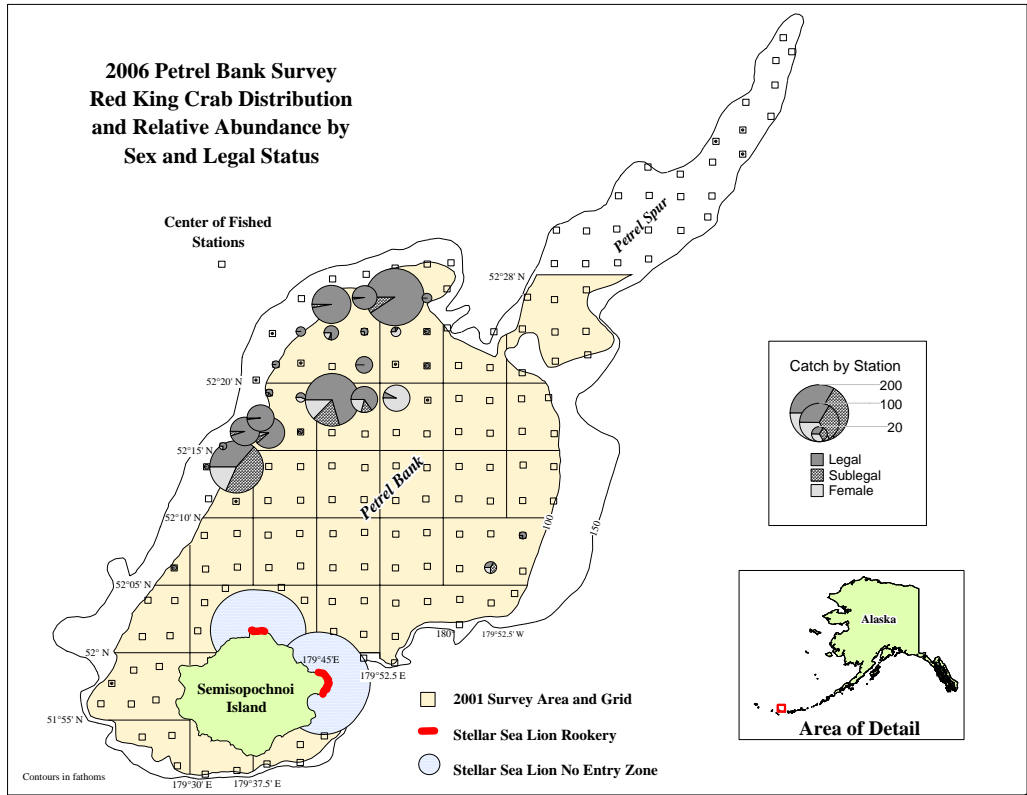


**Figure 5.**—Niche fishing pot locations and the resurvey station pattern during the 2006 Petrel Bank red king crab survey.

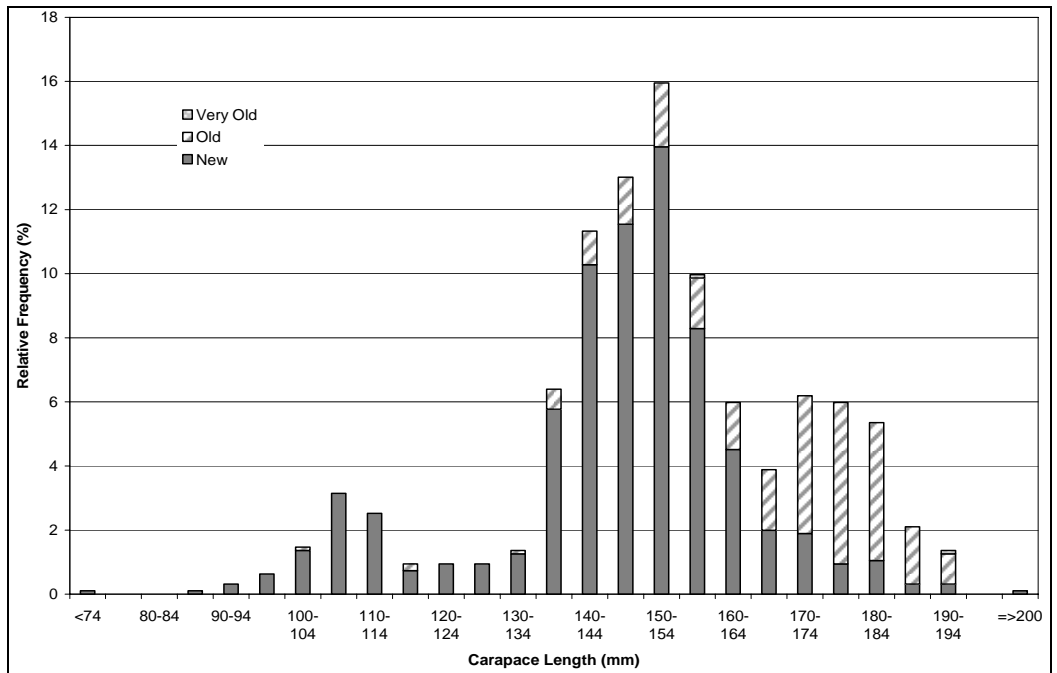


**Figure 6.**—Oceanographic data collection sites sampled during the 2006 Petrel Bank red king crab survey.

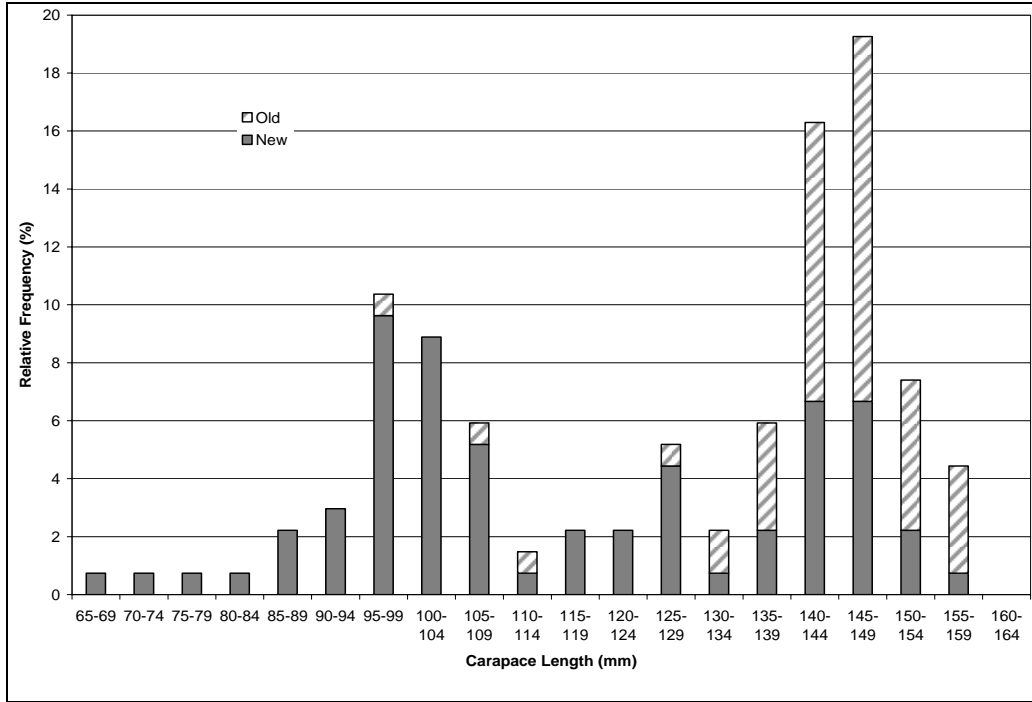




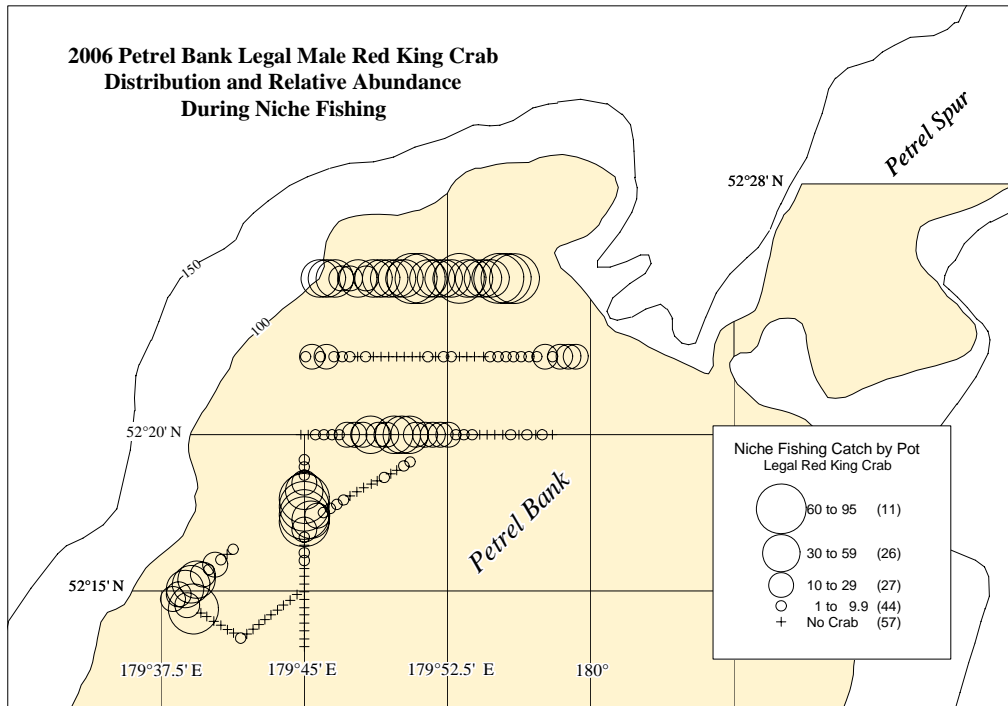
**Figure 7.**—Distribution and relative abundance by sex and legal status of red king crabs captured during the 2006 Petrel Bank red king crab survey.



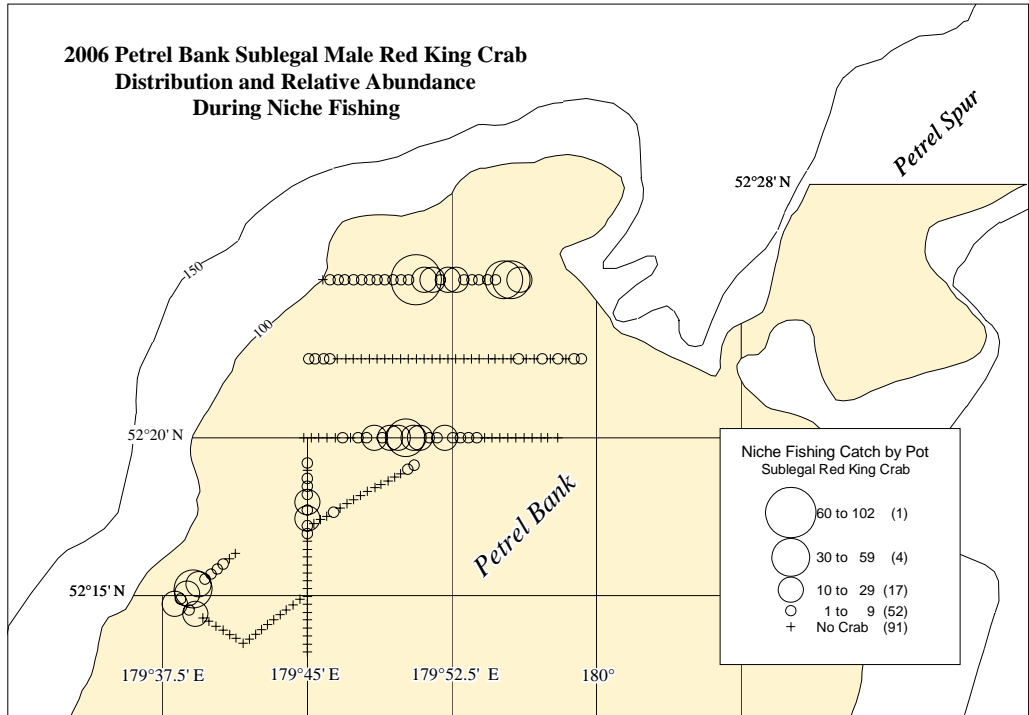
**Figure 8.**—Male red king crab length frequency during the survey, by 5-mm size classes, showing shell condition categories ( $n = 955$ ).



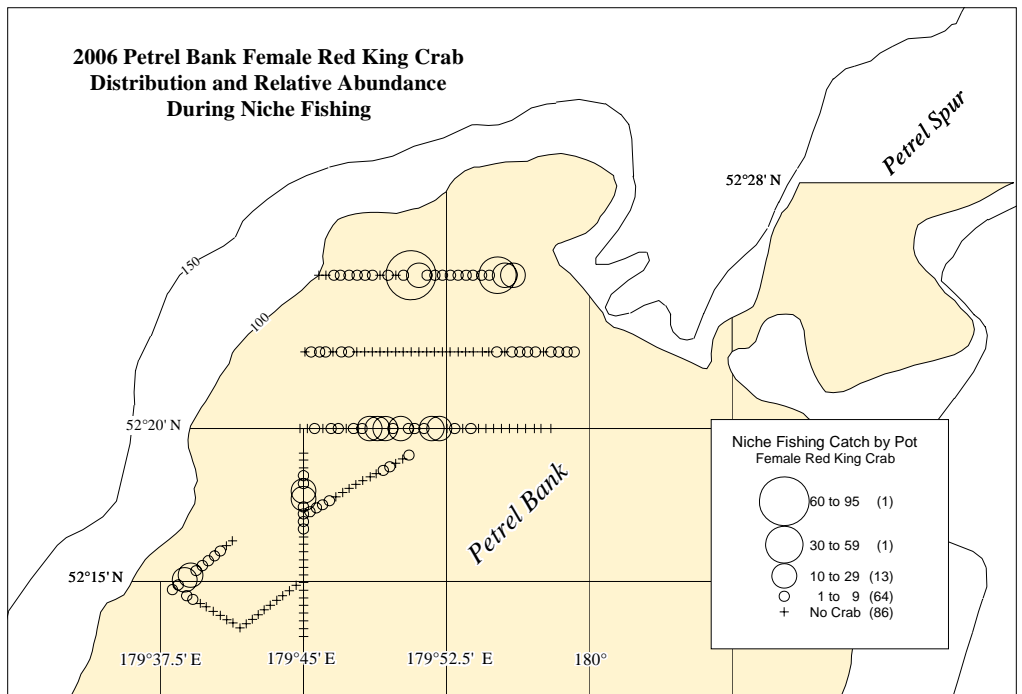
**Figure 9.**—Female red king crab length frequency during the survey, by 5-mm size classes, showing shell condition categories ( $n = 139$ ).



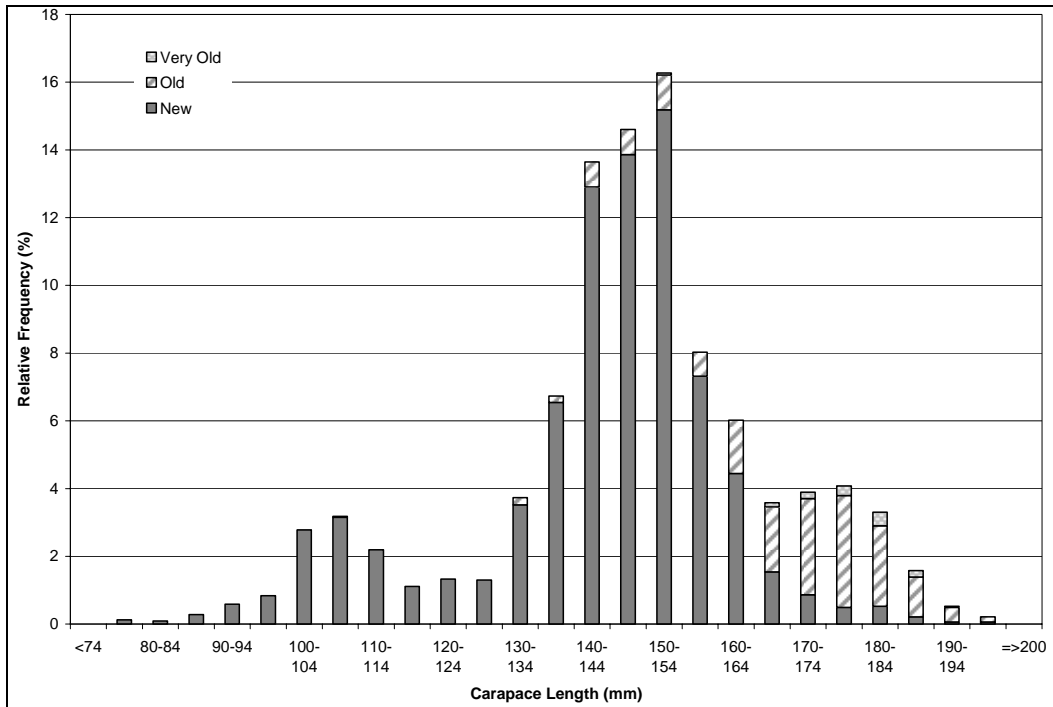
**Figure 10.**—Legal male red king crab catch by pot during niche fishing on the 2006 Petrel Bank red king crab charter.



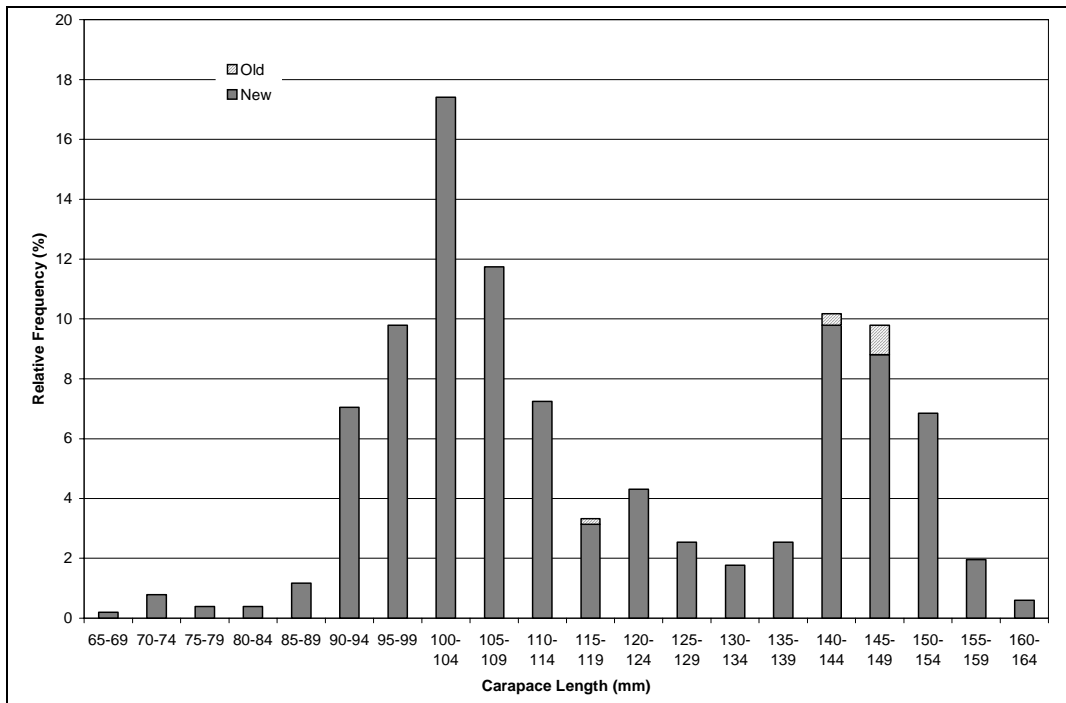
**Figure 11.**—Sublegal male red king crab catch by pot during niche fishing on the 2006 Petrel Bank red king crab charter.



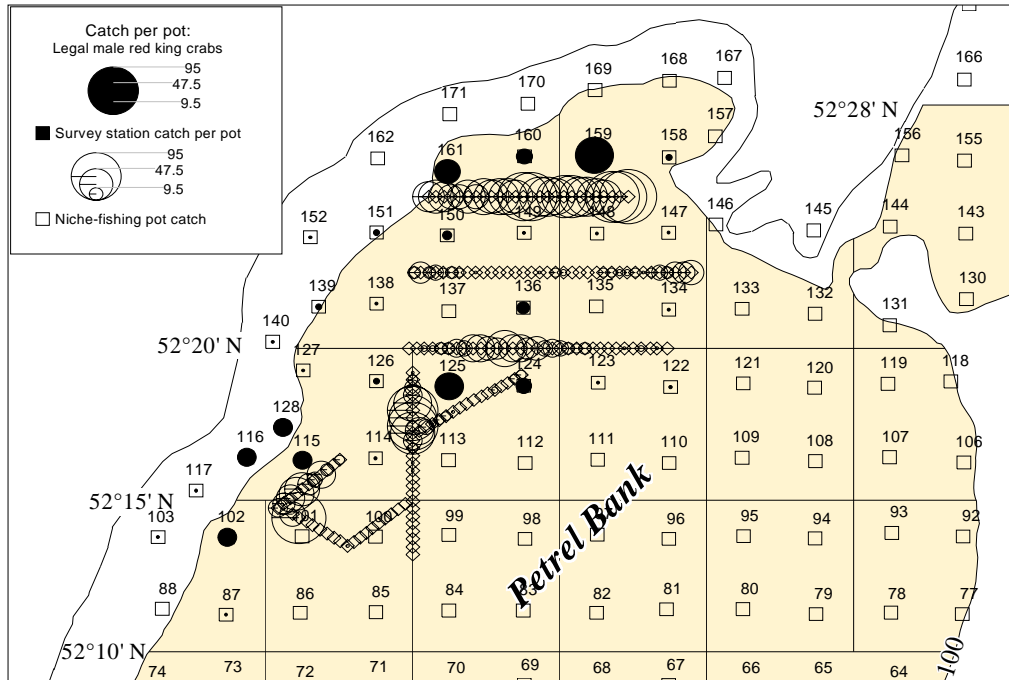
**Figure 12.**—Female red king crab catch by pot during niche fishing on the 2006 Petrel Bank red king crab charter.



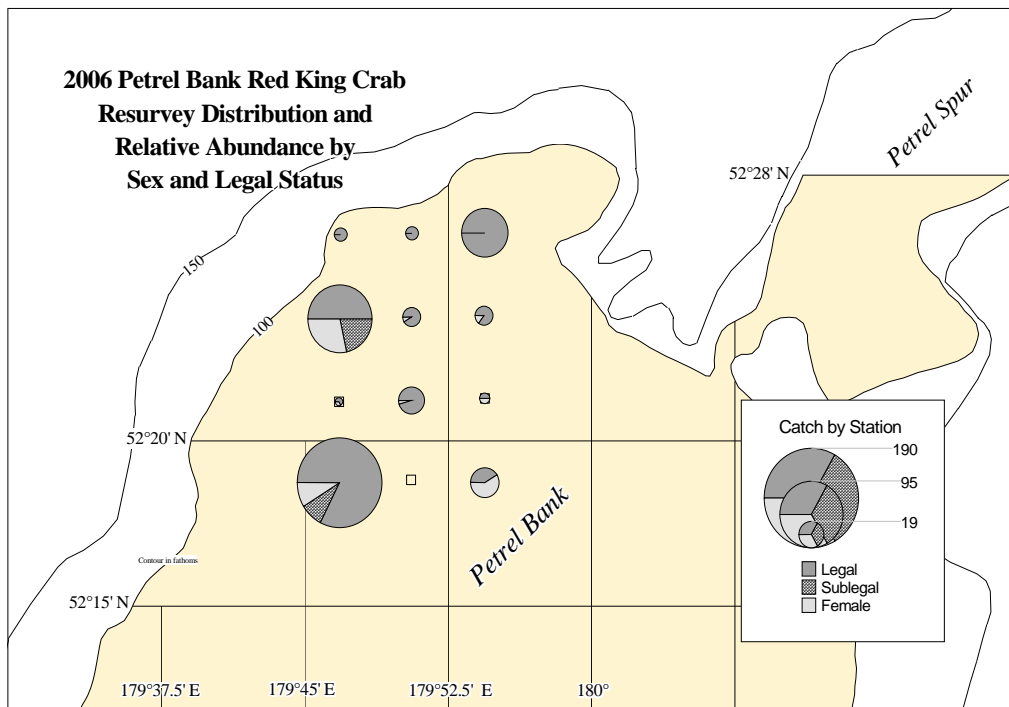
**Figure 13.**—Male red king crab length frequency during niche fishing, by 5-mm size classes, showing shell condition categories ( $n = 3,239$ ).



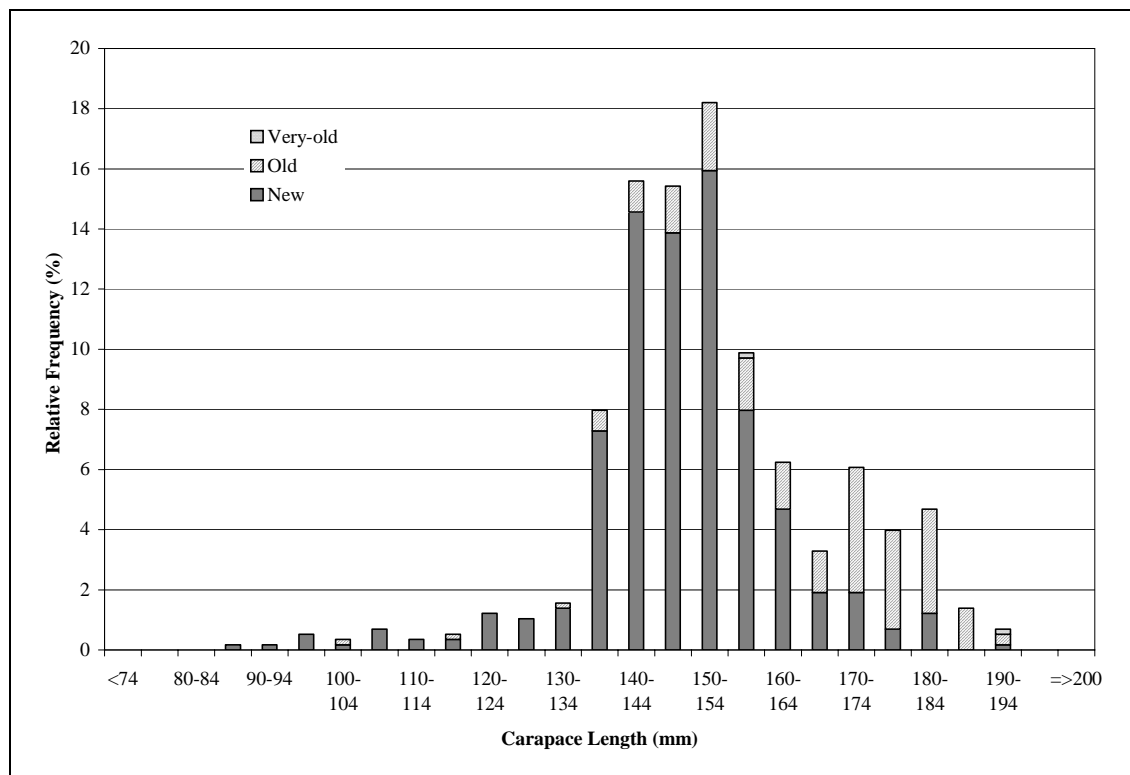
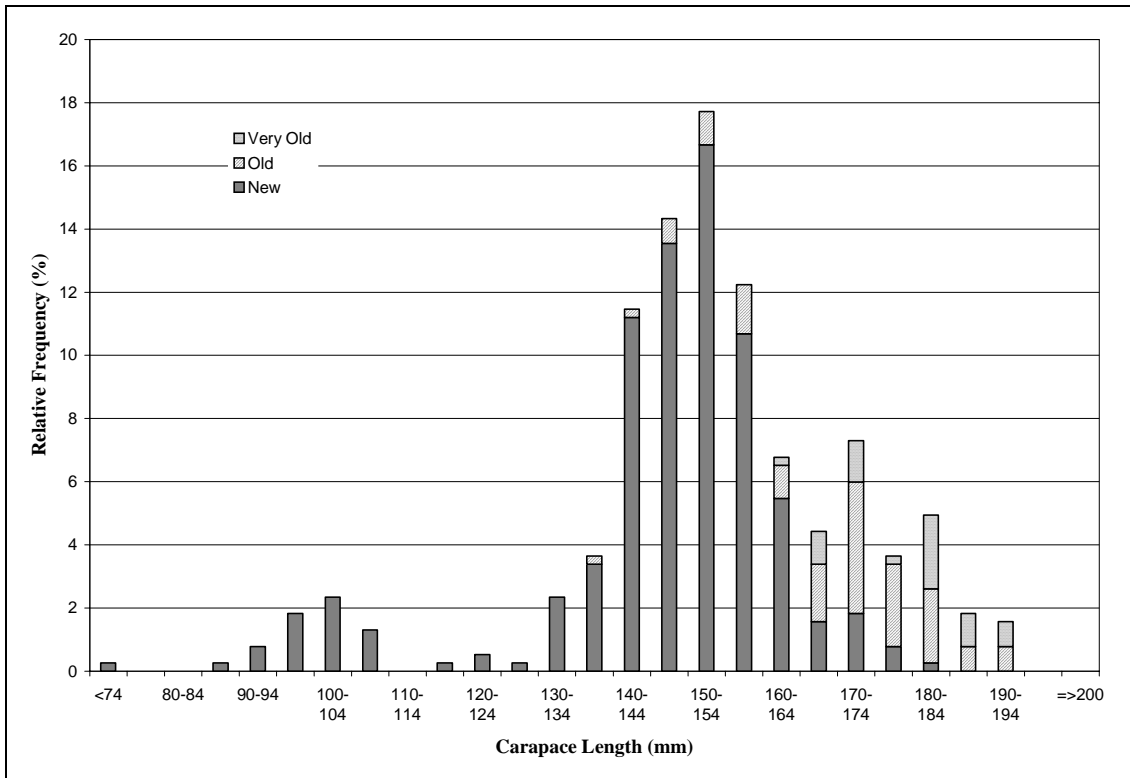
**Figure 14.**—Female red king crab length frequency during niche fishing, by 5-mm size classes, showing shell condition categories ( $n = 512$ ).



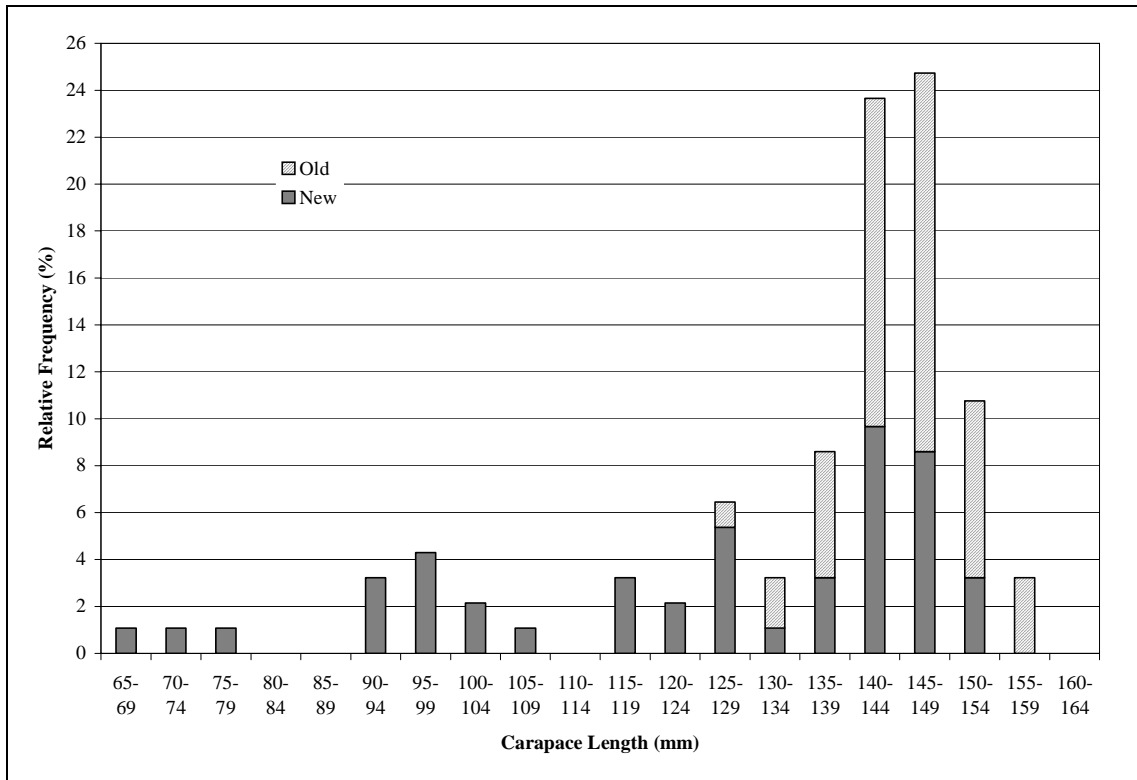
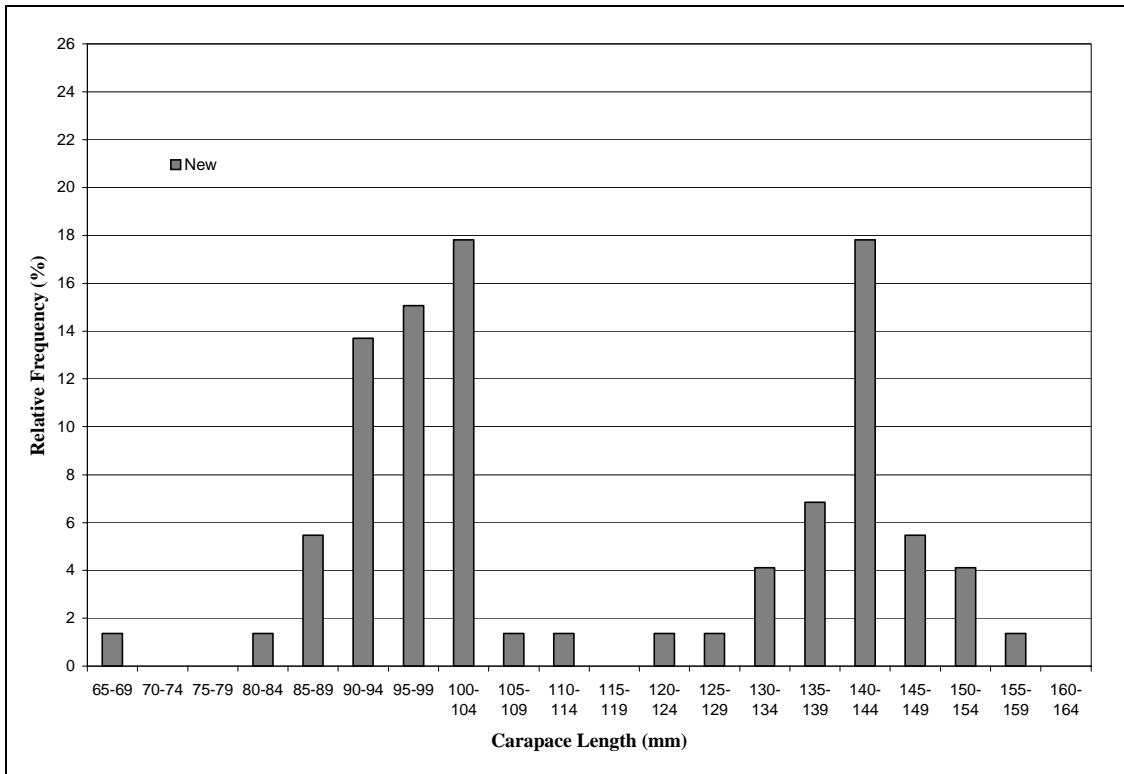
**Figure 15.**—Comparison of catch of legal male red king crabs per pot lift by station during the 2006 Petrel Bank red king crab survey in the northern portion of Petrel Bank with the catch of legal male red king crabs by pot during niche fishing; locations of survey station centers are denoted by squares and identified by station number, whereas locations of niche fishing pots are denoted by diamonds.



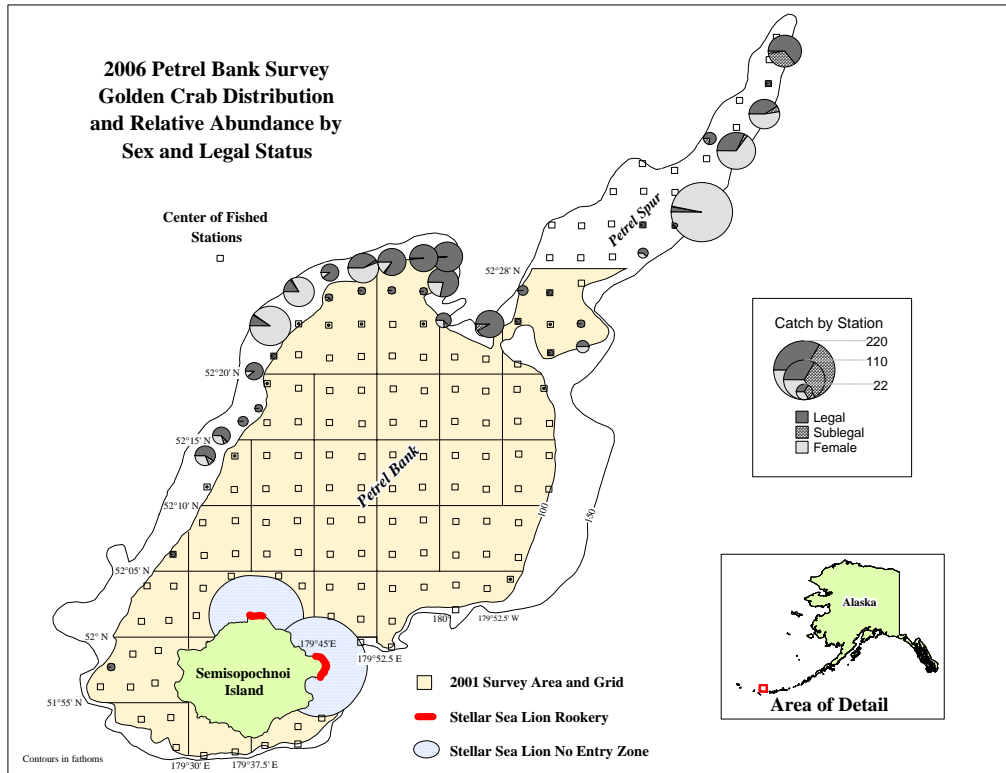
**Figure 16.**—Distribution and relative abundance by sex and legal status of red king crabs captured during the 2006 Petrel Bank red king crab resurvey.



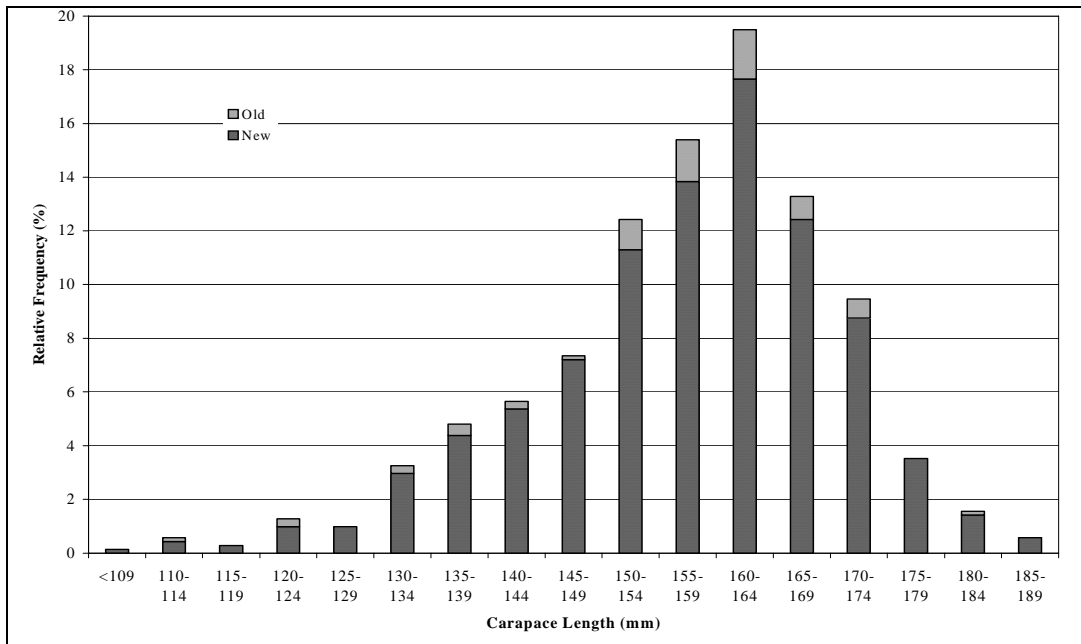
**Figure 17.**—Male red king crab length frequency during the resurvey (top panel) and the same 12 stations during the survey (bottom panel), by 5-mm size classes, showing shell condition categories (resurvey  $n = 384$ , survey  $n = 577$ ).



**Figure 18.**—Female red king crab length frequency during the resurvey (top panel) and the same 12 stations during the survey (bottom panel), by 5-mm size classes, showing shell condition categories (resurvey  $n = 73$ , survey  $n = 93$ ).

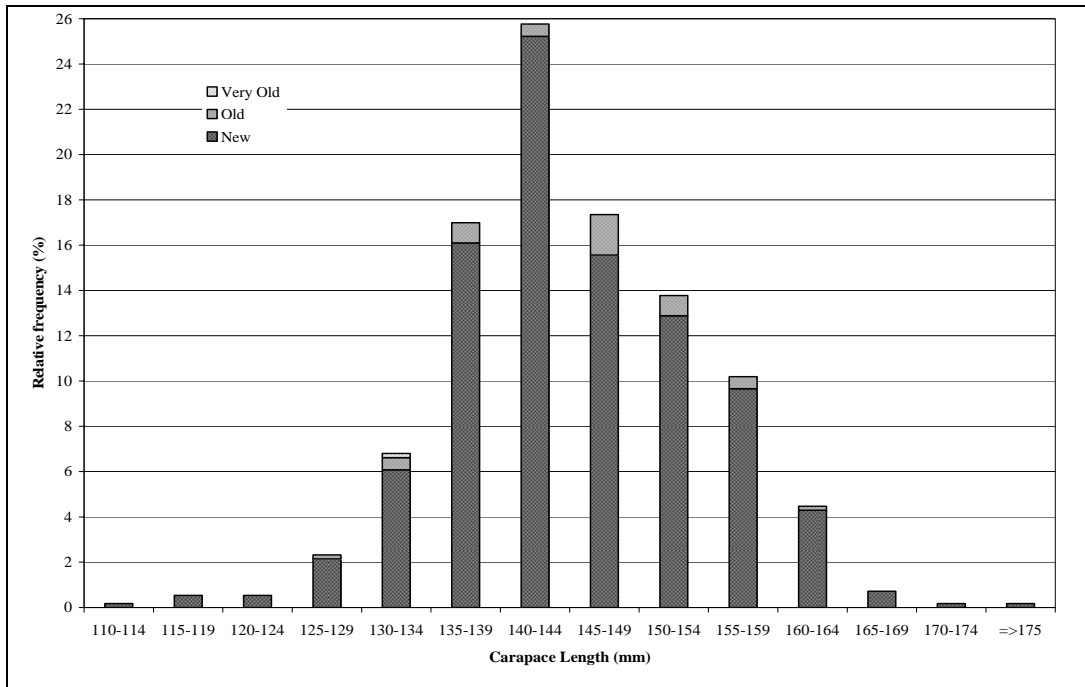


**Figure 19.**—Distribution and relative abundance by sex and legal status of golden king crabs captured during the 2006 Petrel Bank red king crab survey.

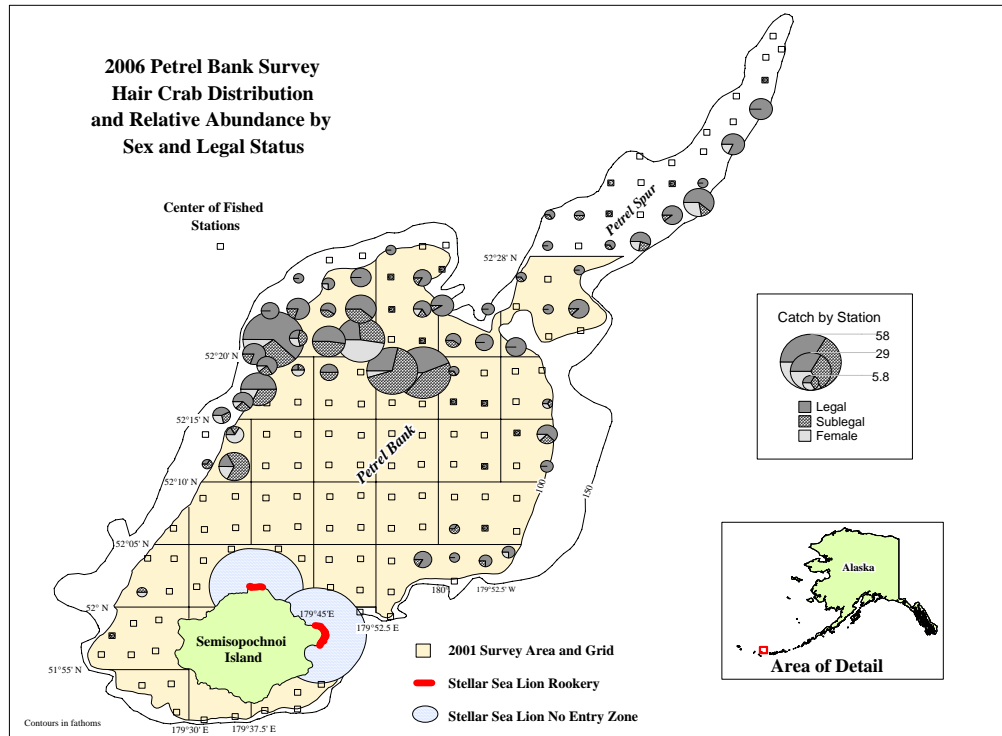


**Figure 20.**—Male golden king crab length frequency during the survey, by 5-mm size classes, showing shell condition categories ( $n = 708$ ).

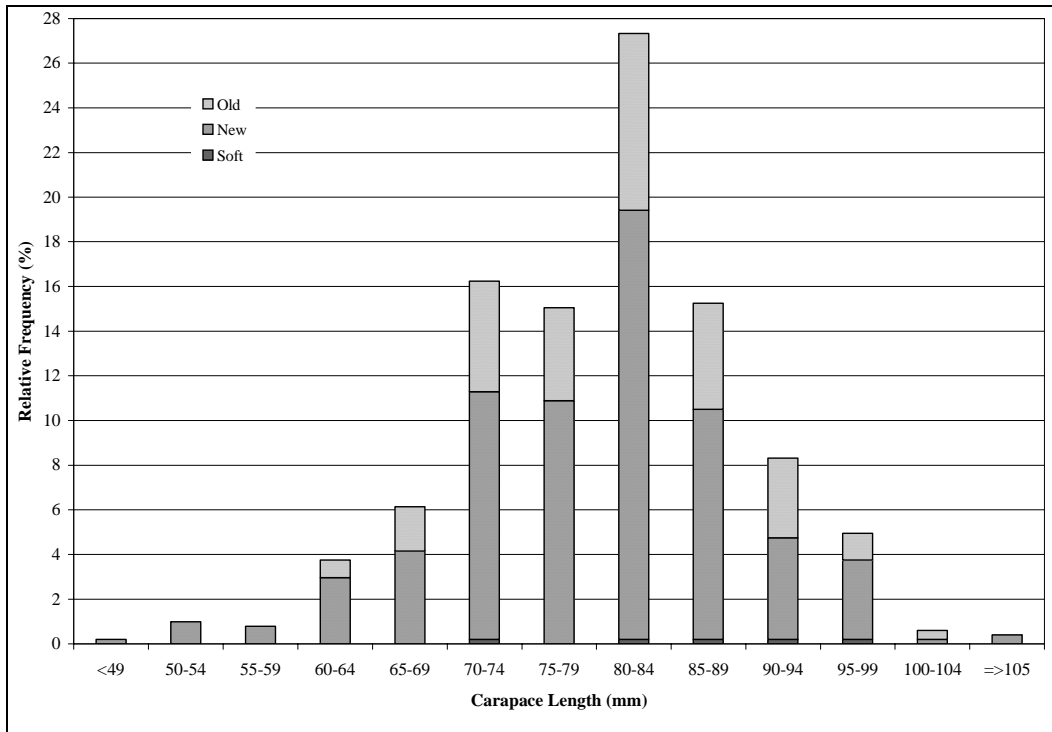




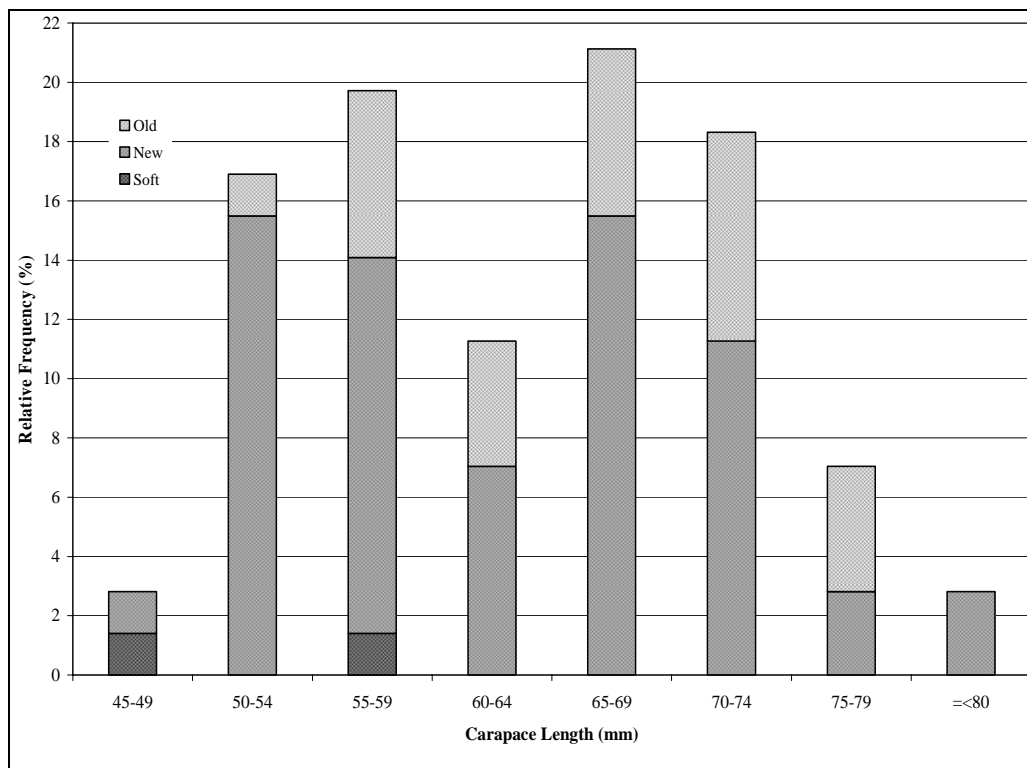
**Figure 21.**—Female golden king crab length frequency during the survey, by 5-mm size classes, showing shell condition categories ( $n = 559$ ).



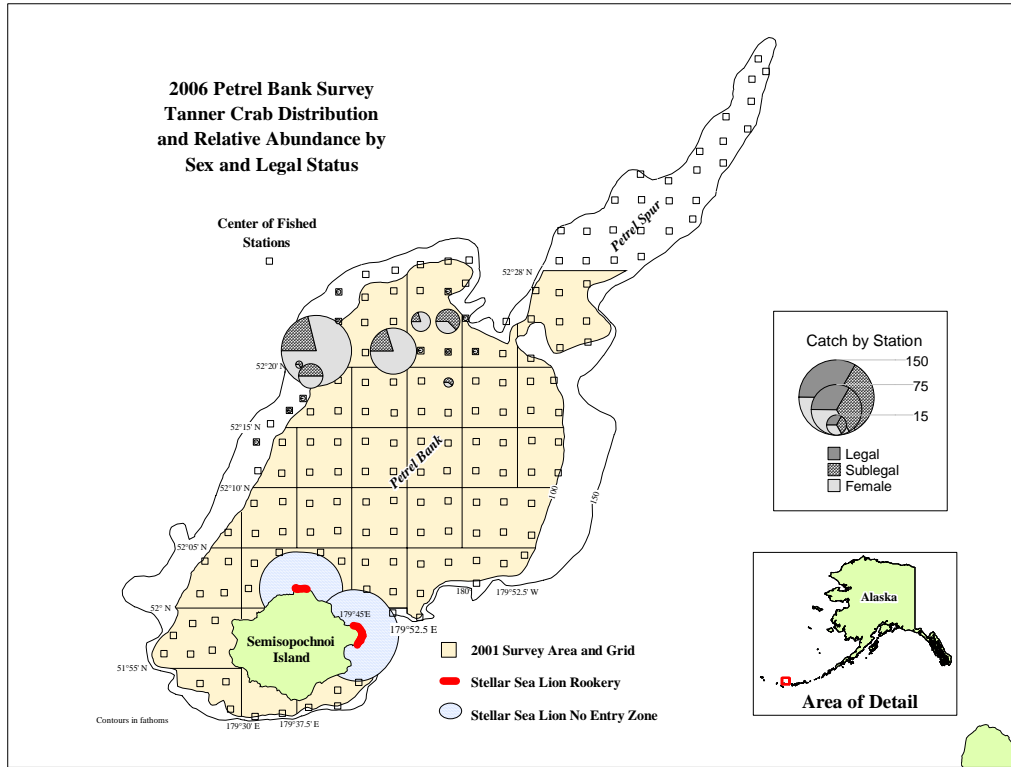
**Figure 22.**—Distribution and relative abundance by sex and legal status of hair crabs captured during the 2006 Petrel Bank red king crab survey.



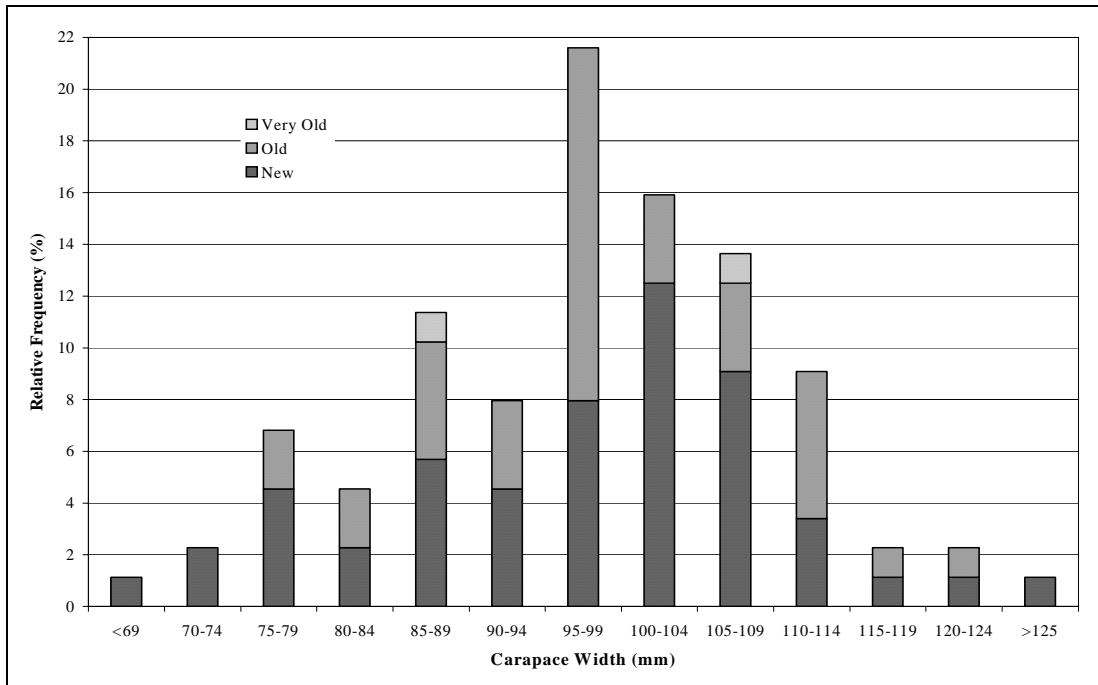
**Figure 23.**—Male hair crab length frequency during the survey, by 5-mm size classes, showing shell condition categories ( $n = 505$ ).



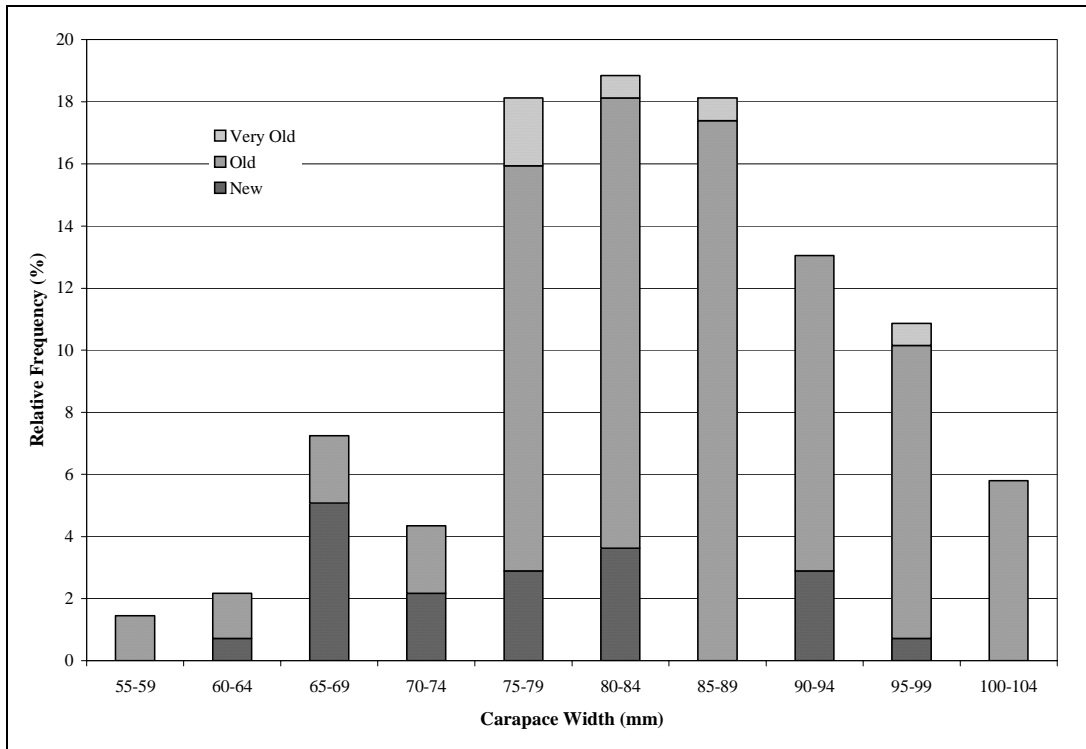
**Figure 24.**—Female hair crab length frequency during the survey, by 5-mm size classes, showing shell condition categories ( $n = 71$ ).



**Figure 25.**—Distribution and relative abundance by sex and legal status of Tanner crabs captured during the 2006 Petrel Bank red king crab survey.



**Figure 26.**—Male Tanner crab width frequency during the survey, by 5-mm size classes, showing shell condition categories ( $n = 88$ ).



**Figure 27.**—Female Tanner crab width frequency during the survey, by 5-mm size classes, showing shell condition categories ( $n = 138$ ).

## **APPENDIX A: CRAB CATCH DATA**

**Appendix A1.**—Catch by station of red king crabs, golden king crabs, hair crabs and Tanner crabs during the 2006 Petrel Bank red king crab survey and resurvey. All stations consisted of 4 pots except for station 85 which consisted of only 3 pots.

Station	Date	Depth (fm)	Latitude		Longitude			Red King Crab			Golden King Crab		Hair Crab <sup>a</sup>		Tanner Crab <sup>b</sup>				
			Degrees	Minutes	Degrees	Minutes	Minutes	Males	Females	Males	Females	Males	Females	Males	Females				
			Legal		Sublegal		Legal		Sublegal		Legal		Sublegal		Legal		Sublegal		
Survey																			
1	11/16	77	51	51.87	179	43.07	E	0	0	0	0	0	0	0	0	0	0	0	0
2	11/16	79	51	51.75	179	39.13	E	0	0	0	0	0	0	0	0	0	0	0	0
3	11/16	83	51	51.26	179	35.57	E	0	0	0	0	0	0	0	0	0	0	0	0
4	11/16	79	51	51.00	179	31.83	E	0	0	0	0	0	0	0	0	0	0	0	0
5	11/16	71	51	51.61	179	28.52	E	0	0	0	0	0	0	0	0	0	0	0	0
7	11/16	63	51	53.83	179	45.92	E	0	0	0	0	0	0	0	0	0	0	0	0
8	11/16	43	51	53.20	179	43.08	E	0	0	0	0	0	0	0	0	0	0	0	0
10	11/16	36	51	53.87	179	27.89	E	0	0	0	0	0	0	0	0	0	0	0	0
11	11/16	71	51	53.75	179	24.36	E	0	0	0	0	0	0	0	0	0	0	0	0
13	11/15	47	51	56.50	179	26.00	E	0	0	0	0	0	0	0	0	0	0	0	0
14	11/15	74	51	56.20	179	23.06	E	0	0	0	0	0	0	0	0	0	0	0	0
15	11/15	87	51	56.21	179	19.47	E	0	0	0	0	0	0	0	0	0	0	0	0
17	11/17	102	51	59.25	179	54.25	E	0	0	0	0	0	0	0	0	0	0	0	0
18	11/17	81	51	59.60	179	50.57	E	0	0	0	0	0	0	0	0	0	0	0	0
19	11/15	54	51	58.98	179	26.39	E	0	0	0	0	0	0	0	0	0	0	0	0
20	11/15	76	51	58.71	179	23.34	E	0	0	0	0	0	0	0	0	0	0	0	0
21	11/15	99	51	57.72	179	20.76	E	0	0	1	6	0	0	0	1	0	0	0	0
22	11/17	111	52	2.07	179	58.08	W	0	0	0	0	0	0	0	0	0	0	0	0
23	11/17	75	52	1.21	179	54.33	E	0	0	0	0	0	0	0	0	0	0	0	0
24	11/17	57	52	1.36	179	50.59	E	0	0	0	0	0	0	0	0	0	0	0	0
25	11/17	46	52	1.23	179	46.89	E	0	0	0	0	0	0	0	0	0	0	0	0
26	11/15	23	52	1.63	179	30.94	E	0	0	0	0	0	0	0	0	0	0	0	0
27	11/15	47	52	1.26	179	27.65	E	0	0	0	0	0	0	0	0	0	0	0	0
28	11/15	86	52	1.20	179	24.37	E	0	0	0	0	0	0	0	1	1	0	0	0
32	11/19	108	52	4.40	179	51.55	W	0	0	0	0	1	0	3	0	1	0	0	0

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Station	Date	Depth (fm)	Latitude		Longitude		Red King Crab			Golden King Crab			Hair Crab <sup>a</sup>		Tanner Crab <sup>b</sup>				
			Degrees	Minutes	Degrees	Minutes	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	
Survey																			
33	11/19	102	52	3.69	179	54.32	W	0	0	0	0	0	0	3	1	0	0	0	0
34	11/19	90	52	3.95	179	58.04	W	0	0	0	0	0	0	3	0	0	0	0	0
35	11/17	74	52	3.80	179	58.15	E	0	0	0	0	0	0	5	1	0	0	0	0
36	11/17	59	52	3.68	179	54.38	E	0	0	0	0	0	0	0	0	0	0	0	0
37	11/17	61	52	3.86	179	50.65	E	0	0	0	0	0	0	0	0	0	0	0	0
38	11/13	47	52	3.80	179	46.87	E	0	0	0	0	0	0	0	0	0	0	0	0
39	11/14	36	52	3.89	179	43.57	E	0	0	0	0	0	0	0	0	0	0	0	0
40	11/15	42	52	5.08	179	40.91	E	0	0	0	0	0	0	0	0	0	0	0	0
41	11/14	58	52	5.05	179	34.19	E	0	0	0	0	0	0	0	0	0	0	0	0
42	11/14	53	52	3.72	179	31.75	E	0	0	0	0	0	0	0	0	0	0	0	0
43	11/14	61	52	3.87	179	28.23	E	0	0	0	0	0	0	0	0	0	0	0	0
44	11/14	99	52	3.89	179	25.03	E	0	0	0	0	0	0	0	0	0	0	0	0
48	11/19	107	52	6.05	179	50.58	W	0	0	0	0	0	0	0	0	0	0	0	0
49	11/19	73	52	6.31	179	54.39	W	4	5	3	0	0	0	1	0	0	0	0	0
50	11/19	68	52	6.24	179	58.05	W	0	0	0	0	0	0	1	2	0	0	0	0
51	11/18	56	52	6.41	179	58.12	E	0	0	0	0	0	0	0	0	0	0	0	0
52	11/18	52	52	6.29	179	54.36	E	0	0	0	0	0	0	0	0	0	0	0	0
53	11/18	48	52	6.37	179	50.69	E	0	0	0	0	0	0	0	0	0	0	0	0
54	11/13	44	52	6.30	179	46.93	E	0	0	0	0	0	0	0	0	0	0	0	0
55	11/14	41	52	6.43	179	43.10	E	0	0	0	0	0	0	0	0	0	0	0	0
56	11/15	54	52	6.32	179	39.36	E	0	0	0	0	0	0	0	0	0	0	0	0
57	11/14	57	52	6.34	179	35.62	E	0	0	0	0	0	0	0	0	0	0	0	0
58	11/14	67	52	6.20	179	31.87	E	0	0	0	0	0	0	0	0	0	0	0	0
59	11/14	99	52	6.29	179	28.15	E	3	0	0	2	0	0	0	0	0	0	0	0
64	11/19	80	52	8.70	179	50.57	W	3	1	0	0	0	0	0	0	0	0	0	0
65	11/19	65	52	8.81	179	54.37	W	0	0	0	0	0	0	0	0	0	0	0	0

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Station	Date	Depth (fm)	Latitude		Longitude		Red King Crab			Golden King Crab			Hair Crab <sup>a</sup>		Tanner Crab <sup>b</sup>				
			Degrees	Minutes	Degrees	Minutes	Males	Females	Legal Sublegal	Males	Females	Legal Sublegal	Males	Females	Legal Sublegal	Males	Females	Legal Sublegal	
Survey																			
66	11/19	56	52	8.79	179	58.05	W	0	0	0	0	0	0	0	0	0	0	0	0
67	11/18	48	52	8.91	179	58.07	E	0	0	0	0	0	0	0	0	0	0	0	0
68	11/18	36	52	8.79	179	54.39	E	0	0	0	0	0	0	0	0	0	0	0	0
69	11/18	35	52	8.92	179	50.68	E	0	0	0	0	0	0	0	0	0	0	0	0
70	11/13	42	52	8.83	179	46.95	E	0	0	0	0	0	0	0	0	0	0	0	0
71	11/14	50	52	8.85	179	43.01	E	0	0	0	0	0	0	0	0	0	0	0	0
72	11/15	58	52	8.72	179	39.27	E	0	0	0	0	0	0	0	0	0	0	0	0
73	11/14	68	52	8.85	179	35.60	E	0	0	0	0	0	0	0	0	0	0	0	0
74	11/14	99	52	8.69	179	31.70	E	0	0	0	0	0	0	0	0	0	0	0	0
77	11/20	108	52	11.24	179	46.94	W	0	0	0	0	0	4	0	0	0	0	0	0
78	11/20	64	52	11.29	179	50.59	W	0	0	0	0	0	0	0	0	0	0	0	0
79	11/20	66	52	11.24	179	54.42	W	0	0	0	0	0	1	0	0	0	0	0	0
80	11/20	52	52	11.41	179	58.15	W	0	0	0	0	0	0	0	0	0	0	0	0
81	11/18	41	52	11.41	179	57.96	E	0	0	0	0	0	0	0	0	0	0	0	0
82	11/18	33	52	11.28	179	54.38	E	0	0	0	0	0	0	0	0	0	0	0	0
83	11/18	40	52	11.36	179	50.63	E	0	0	0	0	0	0	0	0	0	0	0	0
84	11/12	42	52	11.36	179	46.84	E	0	0	0	0	0	0	0	0	0	0	0	0
85	11/12	53	52	11.31	179	43.12	E	0	0	0	0	0	0	0	0	0	0	0	0
86	11/12	64	52	11.28	179	39.25	E	0	0	0	0	0	0	0	0	0	0	0	0
87	11/12	84	52	11.23	179	35.47	E	1	0	0	0	0	3	11	3	0	0	0	0
88	11/28	115	52	11.42	179	32.21	E	0	0	0	1	0	0	1	2	0	0	0	0
92	11/20	97	52	13.80	179	46.90	W	0	0	0	0	0	5	2	1	0	0	0	0
93	11/20	65	52	13.92	179	50.55	W	0	0	0	0	0	0	1	0	0	0	0	0
94	11/20	56	52	13.74	179	54.46	W	0	0	0	0	0	0	0	0	0	0	0	0
95	11/20	44	52	13.81	179	58.11	W	0	0	0	0	0	0	0	0	0	0	0	0
96	11/11	33	52	13.72	179	58.08	E	0	0	0	0	0	0	0	0	0	0	0	0

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-continued-



Station	Date	Depth (fm)	Latitude		Longitude			Red King Crab			Golden King Crab			Hair Crab <sup>a</sup>		Tanner Crab <sup>b</sup>			
			Degrees	Minutes	Degrees	Minutes	E	Males	Females	Males	Females	Males	Females	Males	Females				
								Legal	Sublegal	Legal	Sublegal	Legal	Sublegal	Legal	Sublegal				
Survey																			
97	11/11	28	52	13.86	179	54.42	E	0	0	0	0	0	0	0	0	0	0	0	0
98	11/11	38	52	13.72	179	50.73	E	0	0	0	0	0	0	0	0	0	0	0	0
99	11/12	56	52	13.85	179	46.84	E	0	0	0	0	0	0	0	0	0	0	0	0
100	11/12	63	52	13.80	179	43.10	E	0	0	0	0	0	0	0	0	0	0	0	0
101	11/12	71	52	13.81	179	39.35	E	0	0	0	0	0	0	0	0	0	0	0	0
102	11/12	99	52	13.77	179	35.54	E	61	76	31	0	1	0	1	1	4	0	0	0
103	11/28	138	52	13.79	179	32.00	E	2	0	0	17	3	9	0	0	0	0	0	1
106	11/20	101	52	16.24	179	46.87	W	0	0	0	0	0	0	1	1	1	0	0	0
107	11/21	66	52	16.41	179	50.66	W	0	0	0	0	0	0	0	0	0	0	0	0
108	11/21	51	52	16.29	179	54.45	W	0	0	0	0	0	0	1	0	0	0	0	0
109	11/21	48	52	16.40	179	58.18	W	0	0	0	0	0	0	1	0	0	0	0	0
110	11/11	40	52	16.23	179	58.09	E	0	0	0	0	0	0	0	0	0	0	0	0
111	11/11	53	52	16.33	179	54.44	E	0	0	0	0	0	0	0	0	0	0	0	0
112	11/11	44	52	16.22	179	50.74	E	0	0	0	0	0	0	0	0	0	0	0	0
113	11/10	61	52	16.32	179	46.83	E	0	0	0	0	0	0	0	0	0	0	0	0
114	11/10	67	52	16.38	179	43.11	E	2	0	1	0	0	0	0	0	0	0	0	0
115	11/12	86	52	16.31	179	39.37	E	60	4	4	0	0	0	0	0	0	0	0	0
116	11/28	128	52	16.41	179	36.53	E	55	3	0	8	0	0	5	2	1	0	1	0
117	11/28	132	52	15.32	179	33.94	E	3	0	1	17	2	8	3	2	2	0	0	0
118	11/21	106	52	18.92	179	47.54	W	0	0	0	1	0	0	0	0	0	0	0	0
119	11/21	67	52	18.83	179	50.74	W	0	0	0	0	0	0	0	0	0	0	0	0
120	11/21	59	52	18.70	179	54.49	W	0	0	0	0	0	0	0	0	0	0	0	0
121	11/21	67	52	18.85	179	58.13	W	0	0	0	0	0	0	2	1	0	0	0	0
122	11/11	62	52	18.73	179	58.16	E	1	0	0	0	0	0	21	20	7	0	3	2
123	11/11	59	52	18.87	179	54.47	E	4	0	49	0	0	0	12	28	2	0	0	0
124	11/11	62	52	18.77	179	50.67	E	34	7	11	0	0	0	0	0	0	0	0	0

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Station	Date	Depth (fm)	Latitude		Longitude			Red King Crab			Golden King Crab			Hair Crab <sup>a</sup>		Tanner Crab <sup>b</sup>			
			Degrees	Minutes	Degrees	Minutes	E	Males	Females	Legal Sublegal	Males	Females	Legal Sublegal	Males	Females	Legal Sublegal	Males	Females	Legal Sublegal
								Legal Sublegal	Legal Sublegal		Legal Sublegal	Legal Sublegal							
Survey																			
125	11/10	67	52	18.75	179	46.87	E	120	28	22	0	0	0	3	3	0	0	0	0
126	11/10	76	52	18.92	179	43.14	E	5	0	4	0	0	0	1	1	2	0	0	0
127	11/10	102	52	19.27	179	39.40	E	4	1	1	1	0	0	6	2	1	0	11	11
128	11/28	131	52	17.40	179	38.38	E	50	1	0	5	0	0	11	7	4	0	0	1
129	11/22	97	52	23.61	179	44.10	W	0	0	0	6	0	6	0	0	0	0	0	0
130	11/22	104	52	21.62	179	46.73	W	0	0	0	2	0	0	0	0	0	0	0	0
131	11/22	110	52	20.77	179	50.65	W	0	0	0	0	0	0	8	0	0	0	0	0
132	11/21	84	52	21.14	179	54.47	W	0	0	0	0	0	0	6	0	0	0	0	0
133	11/21	73	52	21.31	179	58.19	W	0	0	0	0	0	0	3	2		0	0	2
134	11/9	70	52	21.28	179	58.07	E	2	0	0	0	0	0	1	0	0	0	1	0
135	11/9	70	52	21.39	179	54.36	E	0	0	1	0	0	0	0	0	0	0	0	2
136	11/9	72	52	21.34	179	50.65	E	25	0	0	0	0	0	9	11	18	0	14	55
137	11/10	74	52	21.22	179	46.84	E	0	0	0	0	0	0	11	10	0	0	0	0
138	11/10	81	52	21.47	179	43.15	E	1	0	0	0	0	0	2	3	2	0	0	0
139	11/28	114	52	21.38	179	40.19	E	5	0	0	2	0	0	36	16	6	0	31	116
140	11/28	127	52	20.22	179	37.85	E	1	0	0	23	0	3	8	2	0	0	2	1
142	11/22	96	52	23.83	179	43.10	W	0	0	0	5	0	0	7	1	0	0	0	0
143	11/22	83	52	23.79	179	46.77	W	0	0	0	0	1	0	3	0	0	0	0	0
144	11/22	100	52	24.01	179	50.63	W	0	0	0	3	0	0	0	0	0	0	0	0
145	11/26	120	52	23.89	179	54.53	W	0	0	0	52	5	0	4	0	0	0	0	0
146	11/26	131	52	24.09	179	59.52	W	0	0	0	12	2	5	10	1	0	0	0	1
147	11/9	91	52	23.81	179	58.07	E	3	0	0	1	0	0	4	1	1	0	15	9
148	11/9	80	52	23.79	179	54.41	E	2	1	6	0	0	0		1	0	0	3	12
149	11/9	80	52	23.81	179	50.68	E	3	0	1	1	0	0	11	7	0	0	0	0
150	11/10	88	52	23.73	179	46.76	E	12	1	3	1	0	0	3	2	0	0	0	0
151	11/28	112	52	23.82	179	43.15	E	7	0	0	1	0	0	8	2	0	0	1	0

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Station	Date	Depth (fm)	Latitude		Longitude			Red King Crab			Golden King Crab			Hair Crab <sup>a</sup>		Tanner Crab <sup>b</sup>			
			Degrees	Minutes	Degrees	Minutes	E	Males	Females	Legal Sublegal	Males	Females	Legal Sublegal	Males	Females	Legal Sublegal	Males	Females	Legal Sublegal
Survey																			
152	11/28	138	52	23.66	179	39.77	E	1	0	0	10	1	99	7	0	0	0	0	0
154	11/22	103	52	26.92	179	43.04	W	0	0	0	4	0	0	3	0	0	0	0	0
155	11/22	52	52	26.19	179	46.83	W	0	0	0	0	0	0		0	0	0	0	0
156	11/22	73	52	26.36	179	50.03	W	0	0	0	8	0	0	2	1	0	0	0	0
157	11/26	114	52	26.99	179	59.55	W	0	0	0	54	0	15	1	0	0	0	0	0
158	11/9	101	52	26.30	179	58.09	E	8	0	0	7	0	0	5	1	0	0	0	2
159	11/9	94	52	26.37	179	54.28	E	180	19	0	6	0	0	1	0	0	0	0	0
160	11/9	97	52	26.33	179	50.70	E	39	1	0	7	0	0	8	0	0	0	0	0
161	11/10	106	52	25.83	179	46.78	E	100	3	0	4	1	1	3	0	1	0	0	0
162	11/27	139	52	26.26	179	43.21	E	0	0	0	10	1	54	3	0	0	0	0	1
163	11/23	85	52	29.20	179	35.68	W	0	0	0	5	0	3	5	2	2	0	0	0
164	11/23	71	52	28.92	179	39.35	W	0	0	0	0	0	0	2	1	0	0	0	0
165	11/23	55	52	28.85	179	43.14	W	0	0	0	0	0	0	0	0	0	0	0	0
166	11/23	52	52	28.86	179	46.84	W	0	0	0	0	0	0	2	0	0	0	0	0
167	11/26	119	52	28.91	179	59.09	W	0	0	0	65	1	0	0	0	0	0	0	0
168	11/26	110	52	28.82	179	58.10	E	0	0	0	58	0	1	0	0	0	0	0	0
169	11/26	112	52	28.52	179	54.30	E	0	0	0	45	1	8	2	0	0	0	0	0
170	11/26	130	52	28.07	179	50.88	E	0	0	0	27	2	37	0	0	0	0	0	0
171	11/27	134	52	27.72	179	46.89	E	0	0	0	24	0	3	0	0	0	0	0	0
172	11/24	79	52	32.32	179	28.67	W	0	0	0	6	1	212	11	2	5	0	0	0
173	11/23	67	52	31.31	179	31.86	W	0	0	0	3	1	0	8	1	0	0	0	0
174	11/23	53	52	31.35	179	35.70	W	0	0	0	0	0	0	0	0	0	0	0	0
175	11/23	52	52	31.42	179	39.45	W	0	0	0	0	0	0	0	1	0	0	0	0
176	11/23	52	52	31.28	179	43.04	W	0	0	0	0	0	0	1	1	0	0	0	0
177	11/23	69	52	31.34	179	46.60	W	0	0	0	0	0	0	2	1	0	0	0	0
178	11/24	70	52	33.87	179	28.19	W	0	0	0	4	0	0	2	0	0	0	0	0

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Station	Date	Depth (fm)	Latitude		Longitude		Red King Crab			Golden King Crab			Hair Crab <sup>a</sup>		Tanner Crab <sup>b</sup>				
			Degrees	Minutes	Degrees	Minutes	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	
							Legal Sublegal			Legal Sublegal			Legal Sublegal		Legal Sublegal				
Survey																			
179	11/24	55	52	33.82	179	31.88	W	0	0	0	0	0	0	1	0	0	0	0	0
180	11/24	52	52	33.91	179	35.61	W	0	0	0	0	0	0	0	0	0	0	0	0
181	11/24	54	52	33.89	179	39.26	W	0	0	0	0	0	0	0	0	1	0	0	0
182	11/24	86	52	36.97	179	24.55	W	1	0	0	32	3	65	9	0	2	0	0	0
183	11/24	60	52	36.39	179	28.11	W	0	0	0	0	0	0	0	0	0	0	0	0
184	11/24	60	52	35.49	179	31.93	W	0	0	0	0	0	0	0	0	0	0	0	0
185	11/24	60	52	36.02	179	35.77	W	0	0	0	0	0	0	0	0	0	0	0	0
186	11/25	89	52	39.78	179	21.19	W	0	0	0	25	4	32	11	0	0	0	0	0
187	11/25	57	52	38.76	179	24.53	W	1	0	0	0	0	0	0	0	0	0	0	0
188	11/25	77	52	37.92	179	27.71	W	1	0	0	10	3	0	0	0	0	0	0	0
189	11/25	68	52	41.91	179	20.70	W	0	0	0	2	0	0	1	0	0	0	0	0
190	11/25	64	52	40.82	179	24.16	W	0	0	0	0	0	0	0	0	0	0	0	0
191	11/25	60	52	43.92	179	20.61	W	0	0	0	0	0	0	0	0	0	0	0	0
192	11/25	92	52	44.56	179	18.73	W	0	0	0	51	26	2	0	0	0	0	0	0
193	11/25	76	52	45.61	179	19.75	W	0	0	0	0	0	0	0	0	0	0	0	0
								804	151	139	632	60	565	322	160	68	0	82	216
Resurvey																			
123	12/1	60	52	18.73	179	54.41	E	12	0	17	0	0	0	3	5	2	0	0	0
124	12/1	62	52	18.82	179	50.55	E	0	0	0	0	0	0	0	0	0	0	0	0
125	11/30	68	52	18.73	179	46.82	E	150	16	16	0	0	0	0	0	0	0	0	0
135	12/1	71	52	21.28	179	54.41	E	2	0	2	0	0	0	2	1	0	0	1	1
136	12/1	71	52	21.21	179	50.58	E	21	0	1	0	0	0	2	0	0	0	2	3
137	11/30	74	52	21.18	179	46.78	E	2	0	1	0	0	0	0	1	0	0	0	0
148	12/1	81	52	23.78	179	54.37	E	11	0	2	0	0	0	1	1	0	0	4	2
149	11/30	79	52	23.74	179	50.59	E	10	0	1	0	0	0	4	1	0	0	0	0

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Appendix A1.–Page 8 of 8.

Station	Date	Depth (fm)	Latitude		Longitude			Red King Crab			Golden King Crab			Hair Crab <sup>a</sup>		Tanner Crab <sup>b</sup>			
			Degrees	Minutes	Degrees	Minutes	E	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal
Resurvey																			
150	11/30	88	52	23.69	179	46.83	E	58	25	33	0	0	0	0	0	0	0	0	0
159	12/1	95	52	26.28	179	54.42	E	66	0	0	8	0	0	1	0	0	0	0	0
160	11/30	97	52	26.26	179	50.60	E	6	0	0	1	0	0	4	0	0	0	0	0
161	11/30	108	52	26.23	179	46.87	E	6	0	0	8	0	2	1	0	1	0	0	0
								344	41	73	17	0	2	18	9	3	0	7	6

<sup>a</sup> Totals do not include 3 hair crabs for which sex was not ascertained.

<sup>b</sup> Totals do not include 2 Tanner crabs for which sex was not ascertained.

**Appendix A2.**—Catch by pot of red king crabs, golden king crabs, hair crabs and Tanner crabs by strings (see Figure 5) during niche fishing on the 2006 Petrel Bank red king crab charter.

SPN	Date	Depth (fm)	Latitude		Longitude		Red King Crab			Golden King Crab			Hair Crab		Tanner Crab <sup>a</sup>				
			Degrees	Minutes	Degrees	Minutes	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	
String 1																			
678	11/27	87	52	25.00	179	56.00	E	95	26	10	1	0	0	0	1	0	0	0	0
679	11/27	87	52	25.00	179	55.57	E	84	30	12	0	0	0	0	0	0	0	0	0
680	11/27	87	52	25.00	179	55.19	E	89	32	38	0	0	0	2	0	0	0	2	0
681	11/27	86	52	25.00	179	54.76	E	42	6	9	1	0	0	1	1	0	0	1	0
682	11/27	86	52	25.00	179	54.35	E	44	7	7	1	0	0	0	0	0	0	0	0
683	11/27	86	52	25.00	179	53.90	E	54	4	7	2	0	0	2	2	0	0	1	0
684	11/27	86	52	25.00	179	53.54	E	52	3	1	1	0	0	0	0	0	0	0	0
685	11/27	86	52	25.00	179	53.12	E	60	6	1	0	0	0	0	0	0	0	0	0
686	11/27	86	52	25.00	179	52.71	E	58	11	1	0	0	0	0	0	0	0	2	1
687	11/27	87	52	25.00	179	52.30	E	49	10	3	0	0	0	2	0	1	0	16	7
688	11/27	87	52	25.00	179	51.90	E	57	4	5	0	0	0	0	1	0	0	1	2
689	11/27	87	52	25.00	179	51.49	E	56	10	9	0	0	0	0	0	0	0	6	3
690	11/27	87	52	25.00	179	51.07	E	75	16	16	2	0	0	1	0	0	0	1	1
691	11/27	88	52	25.00	179	50.64	E	78	102	77	0	0	0	0	0	0	0	0	0
692	11/27	88	52	25.00	179	50.25	E	40	5	9	1	0	0	2	0	0	0	1	1
693	11/27	89	52	25.00	179	49.86	E	45	4	0	0	0	0	1	0	0	0	1	1
694	11/27	90	52	25.00	179	49.44	E	44	3	3	0	0	0	1	0	0	0	0	0
695	11/27	93	52	25.00	179	49.02	E	37	5	0	2	0	1	1	0	0	0	0	0
696	11/27	94	52	25.00	179	48.62	E	50	7	2	0	0	0	0	0	0	0	0	0
697	11/27	96	52	25.00	179	48.23	E	24	7	2	1	0	0	6	0	0	0	1	1
698	11/27	98	52	25.00	179	47.82	E	42	4	3	0	0	0	0	0	0	0	0	0
699	11/27	99	52	25.00	179	47.40	E	24	5	4	1	0	0	1	1	0	0	0	0
700	11/27	100	52	25.00	179	46.94	E	22	2	1	0	0	0	0	0	0	0	3	0
701	11/27	102	52	25.00	179	46.60	E	34	3	3	4	0	0	4	1	0	0	2	0

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SPN	Date	Depth (fm)	Latitude		Longitude		Red King Crab			Golden King Crab			Hair Crab		Tanner Crab <sup>a</sup>				
			Degrees	Minutes	Degrees	Minutes	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	
String 1, continued																			
702	11/27	104	52	25.00	179	46.18	E	37	4	0	1	0	0	1	0	0	0	1	0
703	11/27	105	52	25.00	179	45.81	E	32	0	0	1	0	0	3	0	0	0	1	0
Total, String 1								1,324	316	223	19	0	1	28	7	1	0	40	17
String 2																			
799	11/30	81	52	22.50	179	45.07	E	6	1	0	0	0	0	1	0	0	0	0	0
800	11/30	81	52	22.50	179	45.40	E	16	4	1	0	0	0	0	0	0	0	0	0
801	11/30	80	52	22.50	179	45.85	E	6	2	2	0	0	0	0	0	0	0	0	0
802	11/30	80	52	22.50	179	46.16	E	10	2	1	1	0	0	0	0	0	0	0	0
803	11/30	79	52	22.50	179	46.55	E	4	0	0	0	0	0	2	0	1	0	0	0
804	11/30	78	52	22.50	179	46.99	E	7	0	2	0	0	0	0	0	0	0	0	0
805	11/30	77	52	22.50	179	47.38	E	3	0	1	0	0	0	0	0	0	0	0	0
806	11/30	76	52	22.50	179	47.80	E	0	0	0	0	0	0	0	1	0	0	0	0
807	11/30	76	52	22.50	179	48.21	E	1	0	0	0	0	0	0	0	0	0	0	0
808	11/30	75	52	22.50	179	48.61	E	0	0	0	0	0	0	0	0	0	0	0	0
809	11/30	75	52	22.50	179	49.02	E	0	0	0	0	0	0	0	0	0	0	0	0
810	11/30	74	52	22.50	179	49.42	E	0	0	0	0	0	0	0	0	0	0	0	0
811	11/30	74	52	22.50	179	49.83	E	0	0	0	0	0	0	0	0	0	0	0	0
812	11/30	74	52	22.50	179	50.24	E	0	0	0	0	0	0	0	0	0	0	0	0
813	11/30	75	52	22.50	179	50.65	E	0	0	0	0	0	0	1	0	0	0	0	0
814	11/30	75	52	22.50	179	51.06	E	0	0	0	0	0	0	1	0	0	0	0	0
815	11/30	75	52	22.50	179	51.47	E	1	0	0	0	0	0	0	1	0	0	0	0
816	11/30	75	52	22.50	179	51.87	E	0	0	0	0	0	0	0	1	0	0	2	1
817	11/30	75	52	22.50	179	52.29	E	4	0	0	0	0	0	0	0	0	0	1	1
818	11/30	73	52	22.50	179	52.70	E	2	0	0	0	0	0	0	0	0	0	1	0
819	11/30	68	52	22.50	179	53.13	E	0	0	0	0	0	0	0	0	0	0	0	0
820	11/30	70	52	22.50	179	53.51	E	0	0	0	0	0	0	0	0	0	0	0	0

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SPN	Date	Depth (fm)	Latitude		Longitude		Red King Crab			Golden King Crab			Hair Crab		Tanner Crab <sup>a</sup>				
			Degrees	Minutes	Degrees	Minutes	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	
String 2, continued																			
821	11/30	68	52	22.50	179	53.92	E	0	0	0	0	0	0	0	0	0	0	0	0
822	11/30	70	52	22.50	179	54.39	E	0	0	0	0	0	0	0	0	0	0	3	12
823	11/30	73	52	22.50	179	54.73	E	3	0	0	0	0	0	1	0	0	0	6	26
824	11/30	74	52	22.50	179	55.15	E	4	0	2	0	0	0	0	0	0	0	5	57
825	11/30	75	52	22.50	179	55.56	E	2	0	0	0	0	0	0	0	0	0	12	32
826	11/30	75	52	22.50	179	55.95	E	2	1	2	0	0	0	1	0	0	0	11	19
827	11/30	76	52	22.50	179	56.36	E	3	0	4	0	0	0	0	0	0	0	9	5
828	11/30	76	52	22.50	179	56.77	E	1	0	1	0	0	0	0	0	0	0	8	4
829	11/30	77	52	22.50	179	57.18	E	3	1	3	1	0	0	0	0	0	0	4	3
830	11/30	77	52	22.50	179	57.61	E	11	0	0	0	0	0	1	1	1	0	2	0
831	11/30	78	52	22.50	179	58.00	E	8	2	2	0	0	0	1	0	0	0	1	2
832	11/30	79	52	22.50	179	58.40	E	17	0	3	0	0	0	0	0	0	0	0	0
833	11/30	80	52	22.50	179	58.84	E	17	4	4	0	0	0	0	0	0	0	6	2
834	11/30	81	52	22.50	179	59.22	E	22	1	2	0	0	0	0	0	0	0	1	1
Total, String 2								153	18	30	2	0	0	9	4	2	0	72	165
String 3																			
645	11/27	63	52	20.00	179	58.00	E	0	0	0	0	0	0	1	0	0	0	0	0
646	11/27	63	52	20.00	179	57.46	E	1	0	0	0	0	0	0	0	0	0	0	0
647	11/27	63	52	20.00	179	57.13	E	0	0	0	0	0	0	0	0	0	0	0	0
648	11/27	62	52	20.00	179	56.66	E	2	0	0	0	0	0	0	0	0	0	0	0
649	11/27	62	52	20.00	179	56.25	E	0	0	0	0	0	0	0	0	0	0	0	0
650	11/27	62	52	20.00	179	55.81	E	1	0	0	0	0	0	0	0	0	0	0	0
651	11/27	60	52	20.00	179	55.39	E	0	0	0	0	0	0	0	0	0	0	0	0
652	11/27	59	52	20.00	179	54.98	E	0	0	0	0	0	0	0	0	0	0	0	0
653	11/27	59	52	20.00	179	54.57	E	0	0	0	0	0	0	0	0	0	0	0	0
654	11/27	59	52	20.00	179	54.20	E	0	0	0	0	0	0	0	0	0	0	0	0

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SPN	Date	Depth (fm)	Latitude		Longitude		Red King Crab			Golden King Crab			Hair Crab		Tanner Crab <sup>a</sup>				
			Degrees	Minutes	Degrees	Minutes	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	
String 3, continued																			
655	11/27	64	52	20.00	179	53.79	E	8	2	3	0	0	0	0	1	0	0	0	0
656	11/27	65	52	20.00	179	53.36	E	3	5	0	0	0	0	0	0	0	0	0	0
657	11/27	65	52	20.00	179	52.94	E	7	1	3	0	0	0	0	0	0	0	0	0
658	11/27	65	52	20.00	179	52.54	E	10	9	0	0	0	0	1	0	0	0	0	0
659	11/27	66	52	20.00	179	52.13	E	14	10	12	0	0	0	0	0	0	0	0	0
660	11/27	66	52	20.00	179	51.73	E	10	6	11	0	0	0	0	1	0	0	0	0
661	11/27	66	52	20.00	179	51.33	E	22	9	5	0	0	0	0	0	0	0	0	0
662	11/27	66	52	20.00	179	50.84	E	20	11	8	0	0	0	0	1	0	0	0	0
663	11/27	66	52	20.00	179	50.51	E	30	18	6	0	0	0	0	0	0	0	0	0
664	11/27	67	52	20.00	179	50.11	E	30	31	11	0	0	0	0	0	0	0	0	0
665	11/27	68	52	20.00	179	49.70	E	46	19	9	0	0	0	0	0	0	0	0	0
666	11/27	68	52	20.00	179	49.30	E	17	11	11	0	0	0	2	0	0	0	0	0
667	11/27	69	52	20.00	179	48.88	E	25	8	16	0	0	0	0	0	0	0	0	0
668	11/27	69	52	20.00	179	48.47	E	30	13	13	0	0	0	1	0	0	0	0	0
669	11/27	70	52	20.00	179	48.07	E	26	4	4	0	0	0	0	0	0	0	0	0
670	11/27	70	52	20.00	179	47.63	E	11	2	1	0	0	0	0	0	0	0	0	0
671	11/27	70	52	20.00	179	47.24	E	13	0	0	0	0	0	0	0	0	0	0	0
672	11/27	71	52	20.00	179	46.83	E	8	0	2	0	0	0	0	0	0	0	0	4
673	11/27	71	52	20.00	179	46.45	E	6	0	1	0	0	0	1	0	0	0	0	0
674	11/27	72	52	20.00	179	46.02	E	2	0	0	0	0	0	5	7	0	0	0	0
675	11/27	73	52	20.00	179	45.58	E	2	0	1	0	0	0	0	0	0	0	0	0
676	11/27	73	52	20.00	179	45.21	E	0	0	0	1	0	0	0	0	0	0	0	0
677	11/27	74	52	20.00	179	44.81	E	0	0	0	0	0	0	0	1	0	0	0	0
Total, String 3								344	159	117	1	0	0	10	12	0	0	0	4
String 4																			
740	11/29	62	52	19.13	179	50.54	E	4	1	1	0	0	0	0	0	0	0	0	0

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SPN	Date	Depth (fm)	Latitude		Longitude		Red King Crab			Golden King Crab			Hair Crab		Tanner Crab <sup>a</sup>			
			Degrees	Minutes	Degrees	Minutes	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal
String 4, continued																		
741	11/29	62	52	19.00	179	50.21	E	4	1	0	0	0	0	0	0	0	0	0
742	11/29	62	52	18.86	179	49.84	E	0	0	0	0	0	0	0	0	0	0	0
743	11/29	62	52	18.75	179	49.53	E	0	0	1	0	0	0	0	1	0	0	0
744	11/29	62	52	18.63	179	49.19	E	2	0	1	0	0	0	0	0	0	0	0
745	11/29	62	52	18.52	179	48.82	E	0	0	0	0	0	0	0	0	0	0	0
746	11/29	62	52	18.42	179	48.51	E	0	0	0	0	0	0	0	0	0	0	0
747	11/29	62	52	18.30	179	48.11	E	0	0	0	0	0	0	0	0	0	0	0
748	11/29	62	52	18.17	179	47.75	E	0	0	0	0	0	0	0	0	0	0	0
749	11/29	62	52	18.04	179	47.40	E	0	0	0	0	0	0	0	1	0	0	0
750	11/29	63	52	17.91	179	47.06	E	1	0	0	0	0	0	0	0	0	0	0
751	11/29	63	52	17.77	179	46.70	E	3	0	0	0	0	0	0	0	0	0	0
752	11/29	63	52	17.64	179	46.36	E	4	1	2	0	0	0	0	0	0	0	0
753	11/29	64	52	17.51	179	46.00	E	2	0	2	0	0	0	0	0	0	0	0
754	11/29	64	52	17.41	179	45.68	E	10	0	1	0	0	0	0	0	0	0	0
755	11/29	65	52	17.28	179	45.34	E	30	0	3	0	0	0	0	0	0	0	0
Total, String 4								60	3	11	0	0	0	0	2	0	0	0
String 5																		
756	11/29	72	52	19.20	179	45.00	E	1	1	0	0	0	0	0	0	0	0	0
757	11/29	71	52	18.97	179	45.00	E	5	0	0	0	0	0	0	0	0	0	0
758	11/29	71	52	18.71	179	45.00	E	9	1	0	0	0	0	0	0	0	0	0
759	11/29	69	52	18.46	179	45.00	E	14	1	8	0	0	0	0	1	0	0	0
760	11/29	69	52	18.20	179	45.00	E	45	9	8	0	0	0	0	0	0	0	0
761	11/29	68	52	17.96	179	45.00	E	75	10	13	0	0	0	0	1	0	0	0
762	11/29	67	52	17.71	179	45.00	E	73	8	12	0	0	0	0	0	0	0	0
763	11/29	66	52	17.44	179	45.00	E	79	15	8	0	0	0	0	0	0	0	0
764	11/29	65	52	17.21	179	45.00	E	64	1	5	0	0	0	0	0	0	0	0

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SPN	Date	Depth (fm)	Latitude		Longitude		Red King Crab			Golden King Crab			Hair Crab		Tanner Crab <sup>a</sup>				
			Degrees	Minutes	Degrees	Minutes	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	
String 5, continued																			
765	11/29	64	52	16.96	179	45.00	E	12	1	2	0	0	0	0	0	0	0	0	0
766	11/29	63	52	16.72	179	45.00	E	3	0	2	0	0	0	0	0	0	0	0	0
767	11/29	62	52	16.46	179	45.00	E	0	0	0	0	0	0	0	0	0	0	0	0
768	11/29	62	52	16.22	179	45.00	E	1	0	0	0	0	0	0	1	0	0	0	0
769	11/29	62	52	15.97	179	45.00	E	1	0	0	0	0	0	0	0	0	0	0	0
770	11/29	64	52	15.71	179	45.00	E	0	0	0	0	0	0	0	0	0	0	0	0
771	11/29	63	52	15.47	179	45.00	E	0	0	0	0	0	0	0	0	0	0	0	0
772	11/29	63	52	15.22	179	45.00	E	0	0	0	0	0	0	0	0	0	0	0	0
773	11/29	62	52	14.97	179	45.00	E	0	0	0	0	0	0	0	0	0	0	0	0
774	11/29	62	52	14.72	179	45.00	E	0	0	0	0	0	0	0	0	0	0	0	0
775	11/29	61	52	14.46	179	45.00	E	0	0	0	0	0	0	0	0	0	0	0	0
776	11/29	61	52	14.23	179	45.00	E	0	0	0	0	0	0	0	0	0	0	0	0
777	11/29	61	52	13.97	179	45.00	E	0	0	0	0	0	0	0	0	0	0	0	0
778	11/29	61	52	13.72	179	45.00	E	0	0	0	0	0	0	0	0	0	0	0	0
779	11/29	61	52	13.46	179	45.00	E	0	0	0	0	0	0	0	0	0	0	0	0
780	11/29	60	52	13.21	179	45.00	E	0	0	0	0	0	0	0	0	0	0	0	0
Total, String 5								382	47	58	0	0	0	0	3	0	0	0	0
String 6																			
781	11/29	63	52	14.88	179	44.62	E	0	0	0	0	0	0	0	0	0	0	0	0
782	11/29	63	52	14.70	179	44.26	E	0	0	0	0	0	0	0	0	0	0	0	0
783	11/29	63	52	14.54	179	43.90	E	0	0	0	0	0	0	0	0	0	0	0	0
784	11/29	63	52	14.39	179	43.59	E	0	0	0	0	0	0	0	0	0	0	0	0
785	11/29	63	52	14.23	179	43.26	E	0	0	0	0	0	0	0	0	0	0	0	0
786	11/29	63	52	14.08	179	42.94	E	0	0	0	0	0	0	0	0	0	0	0	0
787	11/29	63	52	13.92	179	42.63	E	0	0	0	0	0	0	0	0	0	0	0	0
788	11/29	63	52	13.77	179	42.32	E	0	0	0	0	0	0	0	0	0	0	0	0

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SPN	Date	Depth (fm)	Latitude		Longitude		Red King Crab			Golden King Crab			Hair Crab		Tanner Crab <sup>a</sup>				
			Degrees	Minutes	Degrees	Minutes	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	Males	Females	Legal	Sublegal	
String 6, continued																			
789	11/29	63	52	13.62	179	42.00	E	0	0	0	0	0	0	0	0	0	0	0	0
790	11/29	63	52	13.49	179	41.67	E	1	0	0	0	0	0	0	0	0	0	0	0
791	11/29	64	52	13.65	179	41.30	E	0	0	0	0	0	0	0	0	0	0	0	0
792	11/29	66	52	13.76	179	40.98	E	0	0	0	0	0	0	0	0	0	0	0	0
793	11/29	68	52	13.90	179	40.63	E	0	0	0	0	0	0	0	0	0	0	0	0
794	11/29	70	52	14.03	179	40.26	E	0	0	0	0	0	0	0	0	0	0	0	0
795	11/29	71	52	14.18	179	39.88	E	0	0	0	0	0	0	0	0	0	0	0	0
796	11/29	72	52	14.29	179	39.59	E	0	0	0	0	0	0	0	0	0	0	0	0
797	11/29	73	52	14.42	179	39.19	E	86	13	2	0	0	0	0	0	0	0	0	0
798	11/29	74	52	14.54	179	38.87	E	24	5	2	0	0	0	0	0	0	0	0	0
Total, String 6								111	18	4	0	0	0	0	0	0	0	0	0
String 7																			
835	11/30	84	52	14.74	179	38.12	E	12	10	3	0	0	0	0	0	0	0	0	0
836	11/30	81	52	14.89	179	38.42	E	16	7	3	0	0	0	0	0	0	0	0	0
837	11/30	79	52	15.06	179	38.76	E	30	27	15	0	0	0	0	0	0	0	0	0
838	11/30	77	52	15.21	179	39.07	E	39	32	18	0	0	0	0	0	0	0	0	0
839	11/30	76	52	15.36	179	39.36	E	38	17	9	0	0	0	0	0	0	0	0	0
840	11/30	75	52	15.52	179	39.69	E	18	4	5	0	0	0	0	0	0	0	0	0
841	11/30	75	52	15.68	179	40.00	E	9	4	7	0	0	0	1	0	0	0	0	0
842	11/30	74	52	15.84	179	40.33	E	28	5	9	0	0	0	0	0	0	0	0	0
843	11/30	73	52	16.00	179	40.63	E	7	2	1	0	0	0	0	0	0	0	0	0
844	11/30	73	52	16.17	179	40.96	E	0	0	0	0	0	0	0	0	0	0	0	0
845	11/30	72	52	16.33	179	41.27	E	3	0	0	0	0	0	0	0	0	0	0	0
Total, String 7								200	108	70	0	0	0	1	0	0	0	0	0
Total, Strings 1-7								2,574	669	513	22	0	1	48	28	3	0	112	186

<sup>a</sup>Totals do not include 1 Tanner Crab for which sex was not ascertained.

**Appendix A3.**—Depth, buoy identification, latitude, longitude, and catch of legal male, sublegal male, and female red king crabs for pots fished in station areas 15, 16, 20, 21, 25, and 26 during the November 2001 industry survey of Petrel Bank red king crab, with correspondence to niche-fishing strings fished during the 2006 Petrel Bank red king crab charter; adapted from Appendix D in Bowers, et al. 2002; see Figure 2 for the station designations used for the November 2001 industry survey.

Station Area <sup>a</sup>	Depth (fm)	Buoy	Latitude		Longitude		Males		Females
			Degrees	Minutes	Degrees	Minutes	Legal	Sublegal	
15 <sup>b</sup>	76	284	52	14.56	179	38.94 E	105	1	0
15 <sup>b</sup>	74	214	52	14.41	179	39.30 E	98	0	0
15 <sup>b</sup>	72	326	52	14.30	179	39.63 E	51	0	0
15 <sup>b</sup>	68	277	52	14.12	179	40.10 E	79	5	0
15 <sup>b</sup>	68	274	52	14.00	179	40.41 E	117	10	0
15 <sup>b</sup>	66	53	52	13.84	179	40.80 E	128	12	0
15 <sup>b</sup>	65	185	52	13.70	179	41.18 E	86	2	0
15 <sup>b</sup>	65	153	52	13.62	179	41.70 E	98	1	0
15 <sup>b</sup>	63	14	52	13.96	179	41.96 E	119	5	0
15 <sup>b</sup>	63	236	52	13.90	179	42.25 E	148	8	0
15 <sup>b</sup>	63	209	52	13.57	179	42.36 E	80	1	0
15 <sup>b</sup>	63	284	52	13.66	179	42.49 E	79	0	0
15 <sup>b</sup>	63	281	52	14.04	179	42.58 E	161	1	0
15 <sup>b</sup>	63	277	52	13.81	179	42.65 E	93	1	0
15 <sup>b</sup>	62	53	52	13.94	179	42.78 E	91	2	0
15 <sup>b</sup>	62	214	52	14.09	179	42.92 E	96	2	0
15 <sup>b</sup>	63	99	52	14.20	179	42.93 E	132	2	1
15 <sup>b</sup>	62	328	52	14.18	179	43.02 E	104	4	1
15 <sup>b</sup>	62	274	52	14.34	179	43.18 E	88	4	3
15 <sup>b</sup>	62	185	52	14.45	179	43.29 E	107	4	6
15 <sup>b</sup>	62	153	52	14.58	179	43.43 E	111	1	28
15 <sup>b</sup>	63	14	52	14.69	179	43.54 E	86	6	62
15 <sup>b</sup>	63	236	52	14.81	179	43.66 E	139	10	42
15 <sup>b</sup>	64	281	52	14.92	179	43.78 E	155	15	32
15 <sup>b</sup>	64	99	52	15.00	179	43.88 E	97	9	32
16	62	S5	52	14.94	179	45.42 E	35	N/A	N/A
16 <sup>c</sup>	63	HF	52	14.92	179	45.09 E	37	1	74
16 <sup>c</sup>	63	EO	52	14.85	179	45.07 E	27	4	42
16	62	1T	52	14.80	179	45.42 E	35	2	16
16 <sup>c</sup>	63	E9	52	14.74	179	45.07 E	55	1	16
16	62	9F	52	14.68	179	45.41 E	18	1	N/A
16 <sup>c</sup>	62	K4	52	14.60	179	45.08 E	42	1	1

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Station Area <sup>a</sup>	Depth (fm)	Buoy	Latitude		Longitude		Males		Females
			Degrees	Minutes	Degrees	Minutes	Legal	Sublegal	
16 <sup>c</sup>	62	B6	52	14.45	179	45.08 E	20	0	0
16 <sup>c</sup>	61	1P	52	14.30	179	45.09 E	0	0	0
16	60	1L	52	14.30	179	45.41 E	0	0	0
16 <sup>c</sup>	60	2C	52	14.15	179	45.11 E	0	0	0
16	60	S1	52	14.10	179	45.41 E	0	0	0
16 <sup>c</sup>	61	61	52	14.01	179	45.11 E	0	0	0
16	61	Q6	52	13.95	179	45.41 E	0	0	0
16 <sup>c</sup>	61	PN	52	13.86	179	45.11 E	0	0	0
16	61	TU	52	13.80	179	45.42 E	0	0	0
16 <sup>c</sup>	62	X6	52	13.74	179	45.12 E	0	0	0
16	62	BV	52	13.65	179	45.43 E	0	0	0
16 <sup>c</sup>	62	HC	52	13.60	179	45.12 E	0	0	0
16	61	G6	52	13.55	179	45.41 E	2	0	0
16	60	8	52	13.50	179	45.42 E	0	0	0
16	61	8A	52	13.43	179	45.41 E	4	0	0
16 <sup>c</sup>	61	YX	52	13.38	179	45.12 E	0	0	0
16	60	XN	52	13.35	179	45.42 E	0	0	0
16 <sup>c</sup>	60	3S	52	13.24	179	45.11 E	0	0	0
20 <sup>c</sup>	71	1	52	18.99	179	44.84 E	58	0	0
20 <sup>c</sup>	70	10	52	18.82	179	44.86 E	55	0	0
20 <sup>c</sup>	69	404	52	18.61	179	44.89 E	22	0	0
20 <sup>c</sup>	69	21	52	18.44	179	44.89 E	84	0	0
20 <sup>c</sup>	69	20	52	18.28	179	44.89 E	107	1	0
20 <sup>c</sup>	68	717	52	18.11	179	44.90 E	135	2	0
20 <sup>c</sup>	68	64	52	17.96	179	44.90 E	135	8	0
20 <sup>c</sup>	67	80	52	17.81	179	44.90 E	146	4	0
20 <sup>c</sup>	67	622	52	17.64	179	44.89 E	134	4	0
20 <sup>c</sup>	66	56	52	17.47	179	44.87 E	148	12	0
20 <sup>c</sup>	65	76	52	17.32	179	44.87 E	194	3	2
20 <sup>c</sup>	65	44	52	17.13	179	44.87 E	163	16	0
20 <sup>c</sup>	64	80	52	16.97	179	44.88 E	154	9	1
20 <sup>c</sup>	63	339	52	16.80	179	44.88 E	186	12	1
20 <sup>c</sup>	62	8	52	16.65	179	44.88 E	164	14	4
20 <sup>c</sup>	62	596	52	16.50	179	44.88 E	192	8	1
20 <sup>c</sup>	62	406	52	16.34	179	44.88 E	156	10	0
20 <sup>c</sup>	62	29	52	16.18	179	44.88 E	166	14	0

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Station Area <sup>a</sup>	Depth (fm)	Buoy	Latitude		Longitude		Males		Females
			Degrees	Minutes	Degrees	Minutes	Legal	Sublegal	
20 <sup>c</sup>	62	923	52	15.98	179	44.87 E	183	22	5
20 <sup>c</sup>	62	34	52	15.82	179	44.87 E	179	17	17
20 <sup>c</sup>	63	4	52	15.68	179	44.86 E	182	17	27
20 <sup>c</sup>	64	719	52	15.55	179	44.85 E	11	4	5
20 <sup>c</sup>	63	10	52	15.39	179	44.85 E	41	4	49
20 <sup>c</sup>	62	21	52	15.21	179	44.85 E	108	6	56
20	62	188	52	15.04	179	44.66 E	124	2	29
21 <sup>d</sup>	64	522	52	19.37	179	50.49 E	100	19	2
21 <sup>d</sup>	64	507	52	19.22	179	50.07 E	93	21	0
21 <sup>d</sup>	64	51	52	19.06	179	49.60 E	94	12	0
21 <sup>d</sup>	64	518	52	18.95	179	49.25 E	115	12	0
21 <sup>d</sup>	65	24	52	18.85	179	48.57 E	70	6	0
21 <sup>d</sup>	64	24	52	18.72	179	48.93 E	105	13	29
21 <sup>d</sup>	65	512	52	18.67	179	47.77 E	118	10	0
21 <sup>d</sup>	65	39	52	18.66	179	48.33 E	119	11	2
21 <sup>d</sup>	64	9	52	18.38	179	47.76 E	145	10	0
21 <sup>d</sup>	65	5	52	18.28	179	47.42 E	143	12	2
21 <sup>d</sup>	66	39	52	18.13	179	46.79 E	123	11	7
21 <sup>d</sup>	64	5	52	18.07	179	47.21 E	113	10	2
21 <sup>d</sup>	64	312	52	17.94	179	46.72 E	129	11	5
21 <sup>d</sup>	65	522	52	17.83	179	46.07 E	125	8	2
21 <sup>d</sup>	64	9	52	17.72	179	46.48 E	145	8	2
21 <sup>d</sup>	64	24	52	17.53	179	46.05 E	68	8	15
21 <sup>d</sup>	65	63	52	17.49	179	45.70 E	112	2	8
21 <sup>d</sup>	64	nn	52	17.17	179	45.30 E	104	4	8
21 <sup>c</sup>	63	24	52	16.36	179	45.11 E	109	6	14
21 <sup>c</sup>	63	518	52	16.17	179	45.24 E	110	13	45
21 <sup>c</sup>	64	51	52	15.87	179	45.11 E	126	5	40
21 <sup>c</sup>	64	511	52	15.63	179	45.09 E	94	3	##
21 <sup>c</sup>	63	524	52	15.39	179	45.08 E	89	0	62
21 <sup>c</sup>	62	57	52	15.24	179	45.00 E	104	1	7
21 <sup>c</sup>	63	316	52	15.08	179	45.13 E	21	0	0
21	61.9	33	52	15.04	179	45.39 E	N/A	N/A	N/A
25	74	6	52	20.80	179	46.23 E	19	0	0
25	73	144	52	20.55	179	46.86 E	3	0	0
25	72	266	52	20.30	179	47.50 E	13	0	0

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Station Area <sup>a</sup>	Depth (fm)	Buoy	Latitude		Longitude		Males		Females
			Degrees	Minutes	Degrees	Minutes	Legal	Sublegal	
25 <sup>e</sup>	70	285	52	20.05	179	48.11 E	50	0	0
25 <sup>e</sup>	70	63	52	20.07	179	48.72 E	23	0	0
25 <sup>e</sup>	69	238	52	20.07	179	49.23 E	69	0	0
25 <sup>e</sup>	68	263	52	20.08	179	49.68 E	30	0	0
25 <sup>e</sup>	68	230	52	20.08	179	50.15 E	81	2	1
25 <sup>e</sup>	67	121	52	20.07	179	50.59 E	86	1	0
25 <sup>e</sup>	66	62	52	20.09	179	51.04 E	64	1	0
25 <sup>e</sup>	66	118	52	20.1	179	51.50 E	66	0	0
25 <sup>e</sup>	66	310	52	20.03	179	51.79 E	49	0	0
25 <sup>e</sup>	66	313	52	20.11	179	51.98 E	85	3	0
25 <sup>e</sup>	66	118	52	20.02	179	52.04 E	60	0	0
25	68	144	52	20.88	179	52.30 E	N/A	0	0
25	67	6	52	21.03	179	52.33 E	7	0	0
25	69	266	52	20.81	179	52.34 E	22	0	0
25	63	135	52	20.63	179	52.34 E	21	0	0
25	67	63	52	20.49	179	52.36 E	36	0	0
25	67	238	52	20.39	179	52.39 E	44	0	0
25 <sup>e</sup>	66	263	52	20.25	179	52.42 E	48	0	1
25 <sup>e</sup>	65	121	52	20.10	179	52.49 E	53	1	0
25 <sup>e</sup>	65	230	52	20.00	179	52.54 E	74	3	0
25 <sup>e</sup>	65	62	52	20.02	179	52.62 E	49	0	1
25 <sup>e</sup>	67	209	52	20.13	179	52.89 E	95	2	0
26 <sup>e</sup>	68	AA	52	20.20	179	52.66 E	53	3	0
26 <sup>e</sup>	68	N9	52	20.19	179	53.02 E	56	0	1
26 <sup>e</sup>	67	85	52	20.18	179	53.32 E	63	1	0
26 <sup>e</sup>	67	V5	52	20.19	179	53.76 E	79	1	0
26 <sup>e</sup>	67	F5	52	20.19	179	54.08 E	66	1	0
26 <sup>e</sup>	65	82	52	20.19	179	54.37 E	17	0	0
26 <sup>e</sup>	64	PU	52	20.19	179	54.70 E	11	3	2
26 <sup>e</sup>	64	C7	52	20.19	179	54.99 E	6	5	1
26 <sup>e</sup>	64	9B	52	20.19	179	55.38 E	21	4	3
26 <sup>e</sup>	64	71	52	20.19	179	55.64 E	42	2	2
26 <sup>e</sup>	64	2Z	52	20.19	179	55.95 E	60	3	1
26 <sup>e</sup>	64	MR	52	20.19	179	56.26 E	54	6	6
26 <sup>e</sup>	64	2P	52	20.19	179	56.55 E	51	9	6
26 <sup>e</sup>	64	PD	52	20.19	179	56.84 E	35	28	45

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Station Area <sup>a</sup>	Depth (fm)	Buoy	Latitude		Longitude		Males		Females
			Degrees	Minutes	Degrees	Minutes	Legal	Sublegal	
26 <sup>e</sup>	65	2i	52	20.19	179	57.15 E	41	16	68
26 <sup>e</sup>	65	V3	52	20.20	179	57.45 E	23	27	33
26 <sup>e</sup>	65	VP	52	20.19	179	57.78 E	38	14	75
26 <sup>e</sup>	66	XL	52	20.20	179	58.11 E	41	14	61
26	66	XT	52	20.19	179	58.41 E	47	17	45
26	66	DF	52	20.20	179	58.72 E	45	15	40
26	66	NS	52	20.20	179	59.03 E	58	21	12
26	66	6Y	52	20.20	179	59.35 E	54	7	2
26	64	RS	52	20.31	179	59.67 E	72	5	0
26	64	K8	52	20.53	179	59.68 E	88	3	0
26	68	17	52	20.76	179	59.68 E	77	1	0

<sup>a</sup> Station area and number as designated and established for the November 2001 industry survey.

<sup>b</sup> Pot sample location during the November 2001 industry survey that was deployed within array repeated by niche fishing string 6 during the 2006 Petrel Bank red king crab charter.

<sup>c</sup> Pot sample location during the November 2001 industry survey that was within 0.25 nmi of a pot fished within niche fishing string 5 during the 2006 Petrel Bank red king crab charter.

<sup>d</sup> Pot sample location during the November 2001 industry survey that was deployed within array repeated by niche fishing string 4 during the 2006 Petrel Bank red king crab charter.

<sup>e</sup> Pot sample location during the November 2001 industry survey that was within 0.25 nmi of a pot fished within niche fishing string 3 during the 2006 Petrel Bank red king crab charter.



## **APPENDIX B: OCEANOGRAPHIC DATA**

**Appendix B1.**—Oceanographic data obtained by station (except where noted) during the 2006 Petrel Bank red king crab survey, resurvey and niche fishing; ND represents no data available for that parameter.

Station	Latitude		Longitude			Number of Observations	Deployed		Retrieved		Temperature °C			Depth	Salinity
	Degrees	Minutes	Degrees	Minutes			Date	Time	Date	Time	Max	Min	Mean	Fathoms	PSU
Survey															
1	51	51.87	179	43.07	E	129	11/15	9:12	11/16	17:31	5.2	4.1	4.7	ND	ND
2	51	51.75	179	39.13	E	128	11/15	8:53	11/16	16:54	5.2	4.3	4.9	91.5	ND
3	51	51.26	179	35.57	E	127	11/15	8:35	11/16	16:23	5.2	4.1	4.8	113.8	34.7
4	51	51.00	179	31.83	E	122	11/15	8:15	11/16	14:52	5.1	4.5	4.9	ND	ND
5	51	51.61	179	28.52	E	122	11/15	7:48	11/16	14:18	5.2	4.5	5.0	81.2	ND
8	51	53.20	179	43.08	E	130	11/15	9:22	11/16	17:58	5.2	4.8	5.1	46.8	ND
11	51	53.75	179	24.36	E	121	11/15	7:24	11/16	13:38	5.1	4.6	4.9	69.9	33.6
13	51	56.50	179	26.00	E	123	11/14	7:52	11/15	14:37	5.2	4.9	5.1	45.4	33.5
15	51	56.21	179	19.47	E	123	11/14	8:31	11/15	15:23	5.1	4.2	4.5	85.1	33.8
17	51	59.25	179	54.25	E	102	11/16	7:02	11/17	8:30	5.1	4.2	4.6	106.0	ND
18	51	59.60	179	50.57	E	102	11/16	7:27	11/17	9:03	5.3	4.3	4.7	107.0	ND
19	51	58.98	179	26.39	E	121	11/14	7:34	11/15	13:50	5.3	4.7	5.1	56.2	ND
20	51	58.71	179	23.34	E	132	11/14	9:02	11/15	18:01	5.2	4.6	4.9	71.4	ND
21	51	57.72	179	20.76	E	135	11/14	8:44	11/15	18:31	5.1	4.3	4.7	95.5	ND
22	52	02.07	179	58.08	W	105	11/16	10:17	11/17	12:30	4.8	4.2	4.5	114.1	ND
24	52	01.36	179	50.59	E	103	11/16	8:48	11/17	10:35	5.3	4.5	4.9	55.4	33.7
25	52	01.23	179	46.89	E	102	11/16	8:02	11/17	9:50	5.3	4.6	4.9	47.2	34.8
26	52	01.63	179	30.94	E	121	11/14	7:02	11/15	13:21	5.3	5.1	5.2	22.3	ND
27	52	01.26	179	27.65	E	126	11/14	9:36	11/15	17:08	5.2	5.1	5.2	ND	ND
28	52	01.20	179	24.37	E	129	11/14	9:18	11/15	17:24	5.2	4.5	4.9	84.2	34.9
32	52	04.40	179	51.55	W	115	11/18	6:17	11/19	11:02	4.5	4.3	4.5	105.9	ND
33	52	03.69	179	54.32	W	115	11/18	5:55	11/19	10:29	4.6	4.4	4.5	101.3	ND
35	52	03.80	179	58.15	E	105	11/16	9:52	11/17	12:07	5.3	4.6	5.0	71.7	ND
36	52	03.68	179	54.38	E	103	11/16	9:30	11/17	11:25	5.4	4.7	5.1	58.9	33.6
37	52	03.86	179	50.65	E	106	11/16	8:30	11/17	11:07	5.4	4.8	5.1	ND	ND
38	52	03.80	179	46.87	E	112	11/12	9:12	11/13	13:00	5.4	4.5	5.1	45.0	ND

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Station	Latitude		Longitude			Number of Observations	Deployed		Retrieved		Temperature °C			Depth Fathoms	Salinity PSU
	Degrees	Minutes	Degrees	Minutes			Date	Time	Date	Time	Max	Min	Mean		
Survey															
39	52	03.89	179	43.57	E	112	11/12	8:53	11/13	12:42	5.4	5.0	5.2	35.6	ND
40	52	05.08	179	40.91	E	113	11/12	7:15	11/13	11:25	5.4	5.0	5.2	41.8	34.7
42	52	03.72	179	31.75	E	148	11/13	8:15	11/14	21:26	5.3	5.0	5.1	50.9	33.6
43	52	03.87	179	28.23	E	149	11/13	7:52	11/14	21:09	5.2	5.0	5.1	63.1	ND
44	52	03.89	179	25.03	E	149	11/13	7:04	11/14	20:18	5.1	4.2	4.8	ND	ND
48	52	06.05	179	50.58	W	116	11/18	6:32	11/19	11:35	4.6	4.4	4.5	104.5	ND
49	52	06.31	179	54.39	W	119	11/18	7:30	11/19	13:20	4.9	4.5	4.6	ND	ND
50	52	06.24	179	58.05	W	139	11/18	7:52	11/19	18:36	5.2	4.6	4.8	67.0	33.7
51	52	06.41	179	58.12	E	116	11/17	5:40	11/18	10:38	5.4	4.8	5.1	ND	ND
52	52	06.29	179	54.36	E	114	11/17	6:01	11/18	10:56	5.4	4.9	5.2	53.2	ND
54	52	06.30	179	46.93	E	112	11/12	9:29	11/13	13:40	5.4	5.0	5.2	43.9	33.6
55	52	06.43	179	43.10	E	129	11/12	8:31	11/13	16:51	5.4	4.9	5.2	ND	ND
56	52	06.32	179	39.36	E	142	11/12	7:30	11/13	19:02	5.4	4.9	5.1	51.9	ND
57	52	06.34	179	35.62	E	130	11/13	9:35	11/14	18:11	5.2	4.9	5.0	57.0	ND
58	52	06.20	179	31.87	E	136	11/13	8:32	11/14	18:28	5.2	4.9	5.0	ND	ND
59	52	06.29	179	28.15	E	145	11/13	7:24	11/14	19:47	5.1	4.2	4.8	106.8	34.8
64	52	08.70	179	50.57	W	117	11/18	6:51	11/19	12:11	4.8	4.5	4.6	83.7	ND
65	52	08.81	179	54.37	W	119	11/18	7:12	11/19	12:55	5.0	4.5	4.8	63.6	33.6
66	52	08.79	179	58.05	W	139	11/18	8:14	11/19	19:04	5.3	4.8	5.1	57.5	34.8
67	52	08.91	179	58.07	E	115	11/17	5:22	11/18	10:05	5.4	4.9	5.2	45.3	ND
68	52	08.79	179	54.39	E	116	11/17	6:20	11/18	11:28	5.4	5.1	5.3	38.3	ND
69	52	08.92	179	50.68	E	120	11/17	7:20	11/18	13:19	5.4	5.2	5.3	34.5	33.5
71	52	08.85	179	43.01	E	134	11/12	8:07	11/13	18:05	5.4	4.8	5.1	49.6	33.5
72	52	08.72	179	39.27	E	138	11/12	7:45	11/13	18:23	5.4	4.8	5.0	58.1	ND
74	52	08.69	179	31.70	E	137	11/13	8:49	11/14	19:00	5.0	4.3	4.8	95.1	ND
78	52	11.29	179	50.59	W	118	11/19	6:35	11/20	12:10	5.2	4.8	5.0	63.7	34.6
79	52	11.24	179	54.42	W	117	11/19	6:59	11/20	12:27	5.3	4.9	5.1	65.4	ND

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Station	Latitude		Longitude			Number of Observations	Deployed		Retrieved		Temperature °C			Depth Fathoms	Salinity PSU
	Degrees	Minutes	Degrees	Minutes			Date	Time	Date	Time	Max	Min	Mean		
Survey															
82	52	11.28	179	54.38	E	117	11/17	6:40	11/18	11:58	5.4	5.2	5.3	ND	ND
83	52	11.36	179	50.63	E	118	11/17	7:03	11/18	12:42	5.4	5.3	5.3	39.6	ND
84	52	11.36	179	46.84	E	134	11/11	10:57	11/12	19:16	5.5	4.9	5.1	41.6	33.6
86	52	11.28	179	39.25	E	142	11/11	8:35	11/12	20:16	5.5	4.7	5.0	64.6	ND
87	52	11.23	179	35.47	E	131	11/11	7:02	11/12	15:50	5.5	4.5	4.9	83.6	34.8
92	52	13.80	179	46.90	W	115	11/19	5:26	11/20	10:07	5.0	4.7	4.9	94.3	33.7
93	52	13.92	179	50.55	W	117	11/19	6:17	11/20	11:31	5.2	4.9	5.1	ND	ND
94	52	13.74	179	54.46	W	119	11/19	7:17	11/20	13:03	5.3	5.0	5.2	ND	ND
95	52	13.81	179	58.11	W	126	11/19	7:41	11/20	14:58	5.3	5.1	5.3	42.0	ND
97	52	13.86	179	54.42	E	134	11/10	8:42	11/11	18:08	5.5	5.0	5.3	28.6	33.4
98	52	13.72	179	50.73	E	133	11/10	9:10	11/11	18:25	5.5	4.9	5.2	38.4	ND
99	52	13.85	179	46.84	E	132	11/11	9:35	11/12	18:42	5.5	4.8	5.1	ND	ND
100	52	13.80	179	43.10	E	130	11/11	9:14	11/12	17:59	5.5	4.8	5.0	60.6	ND
102	52	13.77	179	35.54	E	133	11/11	7:20	11/12	16:32	5.4	4.4	4.8	96.0	ND
106	52	16.24	179	46.87	W	115	11/19	5:47	11/20	10:38	5.0	4.8	4.9	99.9	ND
107	52	16.41	179	50.66	W	141	11/20	5:44	11/21	17:09	5.3	4.9	5.1	64.7	33.6
108	52	16.29	179	54.45	W	137	11/20	6:07	11/21	16:19	5.3	5.0	5.2	ND	ND
110	52	16.23	179	58.09	E	129	11/10	7:20	11/11	15:38	5.5	5.1	5.4	42.0	ND
111	52	16.33	179	54.44	E	133	11/10	8:21	11/11	17:30	5.5	4.9	5.2	ND	ND
112	52	16.22	179	50.74	E	134	11/10	9:26	11/11	18:56	5.5	4.8	5.1	43.6	ND
113	52	16.32	179	46.83	E	133	11/9	5:58	11/10	15:21	5.7	4.8	5.1	59.4	33.6
115	52	16.31	179	39.37	E	151	11/11	7:48	11/12	21:28	5.4	4.4	4.9	ND	ND
118	52	18.92	179	47.54	W	147	11/20	5:05	11/21	18:09	5.0	4.2	4.8	107.4	ND
119	52	18.83	179	50.74	W	145	11/20	5:24	11/21	17:38	5.2	4.9	5.0	68.2	34.9
120	52	18.70	179	54.49	W	133	11/20	6:23	11/21	15:37	5.3	5.0	5.1	50.2	33.6
121	52	18.85	179	58.13	W	123	11/20	7:20	11/21	13:59	5.3	5.0	5.2	65.9	ND
122	52	18.73	179	58.16	E	130	11/10	7:37	11/11	16:10	5.5	5.0	5.2	60.5	33.5

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Appendix B1.–Page 4 of 7.

Station	Latitude		Longitude			Number of Observations	Deployed		Retrieved		Temperature °C			Depth Fathoms	Salinity PSU
	Degrees	Minutes	Degrees	Minutes			Date	Time	Date	Time	Max	Min	Mean		
Survey															
123	52	18.87	179	54.47	E	130	11/10	8:01	11/11	16:42	5.6	4.9	5.2	58.7	ND
124	52	18.77	179	50.67	E	135	11/10	9:46	11/11	19:30	5.6	4.8	5.1	60.4	34.8
125	52	18.75	179	46.87	E	134	11/9	6:19	11/10	15:53	5.6	4.6	5.0	ND	ND
126	52	18.92	179	43.14	E	140	11/9	9:07	11/10	20:06	5.6	4.4	4.8	76.1	ND
127	52	19.27	179	39.40	E	139	11/9	8:44	11/10	19:13	5.5	3.8	4.6	99.3	1.0
130	52	21.62	179	46.73	W	111	11/21	7:29	11/22	11:15	5.2	4.3	4.7	108.4	ND
131	52	20.77	179	50.65	W	134	11/21	7:00	11/22	16:38	5.2	4.4	4.9	ND	ND
132	52	21.14	179	54.47	W	129	11/20	6:40	11/21	14:56	5.1	4.7	5.0	82.5	ND
133	52	21.31	179	58.19	W	126	11/20	7:02	11/21	14:33	5.2	5.0	5.0	71.7	ND
134	52	21.28	179	58.07	E	137	11/8	8:47	11/9	18:58	5.8	4.9	5.3	66.5	33.5
135	52	21.39	179	54.36	E	137	11/8	8:22	11/9	18:41	5.7	4.8	5.2	69.6	ND
136	52	21.34	179	50.65	E	134	11/8	6:10	11/9	15:55	5.7	4.8	5.1	71.6	34.8
137	52	21.22	179	46.84	E	136	11/9	6:40	11/10	16:35	5.6	4.6	4.9	71.0	ND
138	52	21.47	179	43.15	E	139	11/9	8:08	11/10	18:46	5.4	4.4	4.9	81.4	ND
142	52	23.83	179	43.10	W	115	11/21	9:02	11/22	13:53	5.1	4.0	4.5	92.6	33.9
143	52	23.79	179	46.77	W	112	11/21	7:46	11/22	11:46	5.2	4.1	4.7	82.0	34.7
144	52	24.01	179	50.63	W	111	11/21	6:29	11/22	10:18	5.0	4.6	4.8	94.7	ND
145	52	23.89	179	54.53	W	118	11/25	5:05	11/26	10:32	4.6	4.1	4.4	ND	ND
147	52	23.81	179	58.07	E	136	11/8	9:20	11/9	19:27	5.6	4.9	5.2	87.4	ND
148	52	23.79	179	54.41	E	135	11/8	7:59	11/9	17:58	5.5	4.8	5.1	ND	ND
149	52	23.81	179	50.68	E	134	11/8	6:32	11/9	16:11	5.5	4.8	5.0	76.1	ND
154	52	26.92	179	43.04	W	113	11/21	8:29	11/22	12:50	5.2	4.2	4.6	109.4	ND
155	52	26.19	179	46.83	W	113	11/21	8:04	11/22	12:16	5.2	5.0	5.1	ND	ND
157	52	26.99	179	59.55	W	153	11/25	6:17	11/26	20:38	4.5	4.1	4.3	108.2	ND
159	52	26.37	179	54.28	E	135	11/8	7:34	11/9	17:22	5.3	4.7	5.0	93.1	33.6
160	52	26.33	179	50.70	E	136	11/8	7:02	11/9	17:03	5.3	4.7	4.9	96.0	ND
161	52	25.83	179	46.78	E	137	11/9	7:22	11/10	17:35	5.2	4.4	4.8	ND	ND

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Station	Latitude		Longitude			Number of Observations	Deployed		Retrieved		Temperature °C			Depth	Salinity
	Degrees	Minutes	Degrees	Minutes			Date	Time	Date	Time	Max	Min	Mean	Fathoms	PSU
Survey															
163	52	29.20	179	35.68	W	114	11/22	6:11	11/23	10:51	5.1	4.3	4.7	ND	ND
164	52	28.92	179	39.35	W	118	11/22	7:10	11/23	12:36	5.2	4.4	4.8	67.2	ND
165	52	28.85	179	43.14	W	117	11/22	7:33	11/23	12:55	5.2	4.7	5.0	55.5	ND
167	52	28.91	179	59.09	W	154	11/25	6:39	11/26	21:11	4.5	4.1	4.3	117.9	ND
168	52	28.82	179	58.10	E	155	11/25	7:00	11/26	21:29	5.0	4.1	4.3	112.1	34.8
169	52	28.52	179	54.30	E	155	11/25	7:23	11/26	22:03	4.5	4.1	4.3	ND	ND
170	52	28.07	179	50.88	E	155	11/25	7:45	11/26	22:36	4.5	4.1	4.3	140.0	ND
171	52	27.72	179	46.89	E	179	11/25	8:13	11/27	4:50	4.5	4.1	4.2	135.7	34.0
173	52	31.31	179	31.86	W	113	11/22	5:39	11/23	9:55	5.1	4.4	4.8	63.4	34.9
174	52	31.35	179	35.70	W	116	11/22	6:27	11/23	11:24	5.2	4.6	4.9	53.0	ND
175	52	31.42	179	39.45	W	117	11/22	6:49	11/23	12:00	5.1	4.7	5.0	49.8	33.6
176	52	31.28	179	43.04	W	118	11/22	7:50	11/23	13:27	5.2	4.9	5.0	50.2	33.6
177	52	31.34	179	46.60	W	119	11/22	8:17	11/23	14:11	5.2	4.6	5.0	90.8	ND
178	52	33.87	179	28.19	W	134	11/23	8:10	11/24	17:39	5.2	4.7	4.9	68.5	ND
179	52	33.82	179	31.88	W	133	11/23	7:50	11/24	17:02	5.2	4.8	5.0	54.5	ND
180	52	33.91	179	35.61	W	130	11/23	7:32	11/24	16:12	5.1	4.9	5.0	52.5	ND
181	52	33.89	179	39.26	W	130	11/23	7:13	11/24	15:32	5.2	4.9	5.0	ND	ND
182	52	36.97	179	24.55	W	111	11/23	5:30	11/24	19:16	5.1	4.6	4.8	ND	ND
184	52	35.49	179	31.93	W	129	11/23	6:20	11/24	14:32	5.2	4.7	5.0	60.7	33.7
185	52	36.02	179	35.77	W	129	11/23	6:45	11/24	15:06	5.2	4.8	5.0	65.2	ND
186	52	39.78	179	21.19	W	150	11/24	7:11	11/25	20:32	5.2	4.7	4.9	83.3	33.6
187	52	38.76	179	24.53	W	150	11/24	7:35	11/25	21:08	5.2	4.8	5.0	57.7	ND
188	52	37.92	179	27.71	W	150	11/24	7:57	11/25	21:42	5.3	4.8	5.0	ND	ND
189	52	41.91	179	20.70	W	147	11/24	6:30	11/25	19:27	5.1	4.8	4.9	63.3	ND
190	52	40.82	179	24.16	W	148	11/24	6:53	11/25	19:57	5.1	4.8	4.9	71.5	ND
191	52	43.92	179	20.61	W	125	11/24	6:14	11/25	13:19	5.3	4.7	4.9	61.0	33.6
192	52	44.56	179	18.73	W	148	11/24	5:50	11/25	18:51	5.1	4.5	4.9	100.1	ND

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Station	Latitude		Longitude			Number of Observations	Deployed		Retrieved		Temperature °C			Depth	Salinity
	Degrees	Minutes	Degrees	Minutes			Date	Time	Date	Time	Max	Min	Mean	Fathoms	PSU
Survey															
193	52	45.61	179	19.75	W	141	11/24	5:29	11/25	16:54	5.2	4.6	4.8	83.4	34.9
Resurvey															
125	52	18.73	179	46.82	E	102	11/29	18:57	11/30	20:20	5.2	4.7	4.9	66.9	ND
137	52	21.18	179	46.78	E	102	11/29	19:20	11/30	21:08	5.1	4.7	4.9	71.5	ND
150	52	23.50	179	46.82	E	103	11/29	19:35	11/30	21:30	5.0	4.7	4.8	85.5	34.9
150	52	23.63	179	46.83	E	104	11/29	19:41	11/30	21:48	5.0	4.7	4.8	84.7	ND
Niche Fishing by Pot															
652	52	20.00	179	54.98	E	143	11/26	5:54	11/27	17:34	5.3	4.7	5.0	57.7	33.6
660	52	20.00	179	51.73	E	144	11/26	6:07	11/27	18:11	5.2	4.8	5.0	64.9	ND
670	52	20.00	179	47.63	E	147	11/26	6:24	11/27	19:04	5.2	4.6	4.9	70.2	ND
677	52	20.00	179	44.81	E	148	11/26	6:38	11/27	19:35	5.2	4.4	4.8	72.2	ND
678	52	25.00	179	56.00	E	149	11/26	7:32	11/27	20:57	4.8	4.4	4.6	86.2	33.7
690	52	25.00	179	51.07	E	153	11/26	8:12	11/27	22:25	4.9	4.4	4.6	86.9	35.0
703	52	25.00	179	45.81	E	157	11/26	8:52	11/27	23:59	4.7	4.2	4.4	102.6	ND
740	52	19.13	179	50.54	E	119	11/28	8:05	11/29	13:53	5.2	5.0	5.1	60.6	ND
746	52	18.42	179	48.51	E	121	11/28	8:17	11/29	14:19	5.2	5.0	5.1	62.7	34.7
766	52	16.72	179	45.00	E	108	11/28	9:22	11/29	12:21	5.2	4.8	5.0	61.2	33.6
775	52	14.46	179	45.00	E	104	11/28	9:42	11/29	11:33	5.3	4.8	5.0	59.3	ND
784	52	14.39	179	43.59	E	122	11/28	10:12	11/29	16:44	5.3	4.8	5.0	60.8	ND
789	52	13.62	179	42.00	E	123	11/28	10:22	11/29	17:09	5.3	4.7	4.9	62.9	ND
793	52	13.90	179	40.63	E	124	11/28	10:29	11/29	17:27	5.2	4.7	4.9	62.7	33.7
800	52	22.50	179	45.40	E	159	11/28	20:12	11/30	11:40	5.0	4.7	4.8	78.9	ND
803	52	22.50	179	46.55	E	156	11/28	20:18	11/30	11:24	5.0	4.7	4.8	74.9	33.7
808	52	22.50	179	48.61	E	137	11/28	20:28	11/30	10:55	4.9	4.6	4.7	ND	ND
814	52	22.50	179	51.06	E	148	11/28	20:41	11/30	9:09	5.0	4.7	4.8	73.5	ND

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**Appendix B1.**–Page 7 of 7.

Station	Latitude		Longitude		Number of Observations	Deployed		Retrieved		Temperature °C			Depth Fathoms	Salinity PSU	
	Degrees	Minutes	Degrees	Minutes		Date	Time	Date	Time	Max	Min	Mean			
Niche Fishing by Pot															
820	52	22.50	179	53.51	E	146	11/28	20:53	11/30	9:34	5.0	4.7	4.8	ND	ND
821	52	22.50	179	53.92	E	145	11/28	20:56	11/30	9:04	5.0	4.7	4.8	66.7	ND
823	52	22.50	179	54.73	E	143	11/28	21:00	11/30	8:54	5.0	4.7	4.8	73.1	34.7
833	52	22.50	179	58.84	E	138	11/28	21:19	11/30	8:08	4.9	4.6	4.7	ND	ND
843	52	16.00	179	40.63	E	93	11/29	18:24	11/30	17:39	4.9	4.6	4.8	71.9	33.7