

Regional Information Report No. 4K13-10

**Project Operational Plan for the 2011 Pribilof District
King Crab Survey**

by

Vicki Vanek

August 2013

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

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Weights and measures (metric)		General		Mathematics, statistics	
centimeter	cm	Alaska Administrative Code	AAC	<i>all standard mathematical signs, symbols and abbreviations</i>	
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	H_A
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
hectare	ha	at	@	catch per unit effort	CPUE
kilogram	kg	compass directions:		coefficient of variation	CV
kilometer	km	east	E	common test statistics	(F, t, χ^2 , etc.)
liter	L	north	N	confidence interval	CI
meter	m	south	S	correlation coefficient (multiple)	R
milliliter	mL	west	W	correlation coefficient (simple)	r
millimeter	mm	copyright	©	covariance	cov
		corporate suffixes:		degree (angular)	$^\circ$
		Company	Co.	degrees of freedom	df
Weights and measures (English)		Corporation	Corp.	expected value	E
cubic feet per second	ft ³ /s	Incorporated	Inc.	greater than	>
foot	ft	Limited	Ltd.	greater than or equal to	≥
gallon	gal	District of Columbia	D.C.	harvest per unit effort	HPUE
inch	in	et alii (and others)	et al.	less than	<
mile	mi	et cetera (and so forth)	etc.	less than or equal to	≤
nautical mile	nmi	exempli gratia (for example)	e.g.	logarithm (natural)	ln
ounce	oz	Federal Information Code	FIC	logarithm (base 10)	log
pound	lb	id est (that is)	i.e.	logarithm (specify base)	log ₂ , etc.
quart	qt	latitude or longitude	lat. or long.	minute (angular)	'
yard	yd	monetary symbols (U.S.)	\$, ¢	not significant	NS
		months (tables and figures): first three letters	Jan, ..., Dec	null hypothesis	H_0
Time and temperature		registered trademark	®	percent	%
day	d	trademark	™	probability	P
degrees Celsius	°C	United States (adjective)	U.S.	probability of a type I error (rejection of the null hypothesis when true)	α
degrees Fahrenheit	°F	United States of America (noun)	USA	probability of a type II error (acceptance of the null hypothesis when false)	β
degrees kelvin	K	U.S.C.	United States Code	second (angular)	"
hour	h	U.S. state	use two-letter abbreviations (e.g., AK, WA)	standard deviation	SD
minute	min			standard error	SE
second	s			variance	
				population sample	Var var
Physics and chemistry					
all atomic symbols					
alternating current	AC				
ampere	A				
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity (negative log of)	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

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**PROJECT OPERATIONAL PLAN FOR THE 2011 PRIBILOF DISTRICT
KING CRAB SURVEY**

by

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Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak

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Division of Sport Fish, Research and Technical Services
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ABSTRACT

This report provides the operational plan for the Alaska Department of Fish and Game (ADF&G) 2011 Pribilof District king crab pot survey on the distribution and relative abundance of red king crab *Paralithodes camtschaticus* and blue king crab *P. platypus* around the Pribilof Islands. Descriptions of the objectives, study area, survey design, sampling methods, data analysis, and reporting are given. ADF&G will conduct the survey aboard the chartered *F/V Scandies Rose* (a 39.6-m commercial crab-pot fishing vessel) in the Pribilof District of the Bering Sea king crab registration area (Area Q). Stations northeast of and surrounding St. Paul and St. George Islands will be sampled during the 29-day survey. Bottom water temperature and salinity data will be collected across the depth range of fished pots.

Keywords: Red king crab, *Paralithodes camtschaticus*, blue king crab, *P. platypus*, Bering Sea, Pribilof Islands, pot survey, relative abundance, distribution, bottom temperature, salinity

INTRODUCTION

The Pribilof District king crab fishery is managed under provisions of the Fishery Management Plan (FMP) for Bering Sea/Aleutian Islands King and Tanner Crab (NPFMC 2011), which establishes a state/federal cooperative management regime that defers crab fishery management to the State of Alaska with federal oversight. Historically, the Pribilof District king crab fishery was directed on blue king crab *Paralithodes platypus* with the first season occurring in 1973/74 (Bowers et al. 2011). Annual landings of blue king crab fluctuated widely and the fishery was closed due to low stock abundance during the 1988/89–1994/95 seasons. The Alaska Department of Fish and Game (ADF&G) first opened a directed fishery on Pribilof District red king crab *P. camtschaticus* in the 1993/94 season after results of the annual summer National Marine Fisheries Service (NMFS) eastern Bering Sea trawl survey (Chilton et al. 2011) in 1993 indicated a marked increase in abundance of red king crab around the Pribilof Islands. The Pribilof District king crab fishery was again opened only for red king crab in the 1994/95 season. However, after the 1995 NMFS trawl survey indicated an increase in blue king crab abundance and a continued harvestable level of red king crab in the Pribilof District, the fishery was opened concurrently for both red and blue king crabs in the 1995/96 season and was opened as a combined red and blue king crab fishery during the subsequent 1996/97–1998/99 seasons. Due to poor fishery performance for both red and blue king crab during the 1996/97–1998/99 seasons, a declining trend in the abundance of blue king crab estimated from the annual NMFS trawl survey data, and poor precision in the abundance estimates of red king crab the fishery was closed for both red and blue king crab in the 1999/00 season (Zheng and Kruse 1999) and has remained closed since then.

Results from the annual NMFS trawl survey showed a decline of Pribilof blue king crab in 2000 to a level below the threshold in the state harvest strategy for a fishery opening (Zheng and Kruse 2000) and a decline in 2002 to a level below the minimum stock size level (MSST) established in Amendment 7 of the FMP (NPFMC 1998), placing the stock in “overfished” status (NPFMC 2002). Although the Pribilof District king crab fishery has been closed since the end of the 1998/99 season, the Pribilof blue king crab stock has continued to decline and has shown no indication of rebuilding from overfished status (NPFMC 2010).

The Pribilof red king crab stock, on the other hand, has remained above MSST since the end of the 1998/99 season (NPFMC 2010) and was, in fact, estimated through 2008 to be above the maximum sustainable yield biomass stock level established in the FMP (NPFMC 2007, 2009). Hence, closure of the fishery for red king crab since 1999 has not been in response to low abundance estimates from the NMFS trawl survey results. Instead, closure of the fishery on red

king crab fishery has been due to conservation concerns resulting from two sources of uncertainty. The first source of uncertainty concerns the potential for bycatch of blue king crab during prosecution of the red king crab fishery. The blue king crab bycatch concerns have been difficult to substantiate due to the scant fishery observer data from historic Pribilof District king crab fisheries and the lack of detailed information on the distribution of either red or blue king crabs in the Pribilof District during the fall fishery season. Nonetheless, a large proportion of the annual harvest of both red and blue king crab during the 1993/94–1998/99 seasons occurred in a single statistical area (statistical area 695700; Figure 1) directly east of St. Paul Island (Morrison and Gish 1994, 1996, 1997a, 1997b; Morrison et al. 1998, 1999), suggesting that the potential for blue king crab bycatch in a directed red king crab fishery is significant. The second source of uncertainty is the reliability of population estimates for Pribilof red king crab afforded by the NMFS eastern Bering Sea trawl survey. Population estimates for this stock have low precision due to the low number of survey tows in which red king crab are captured in the Pribilof District (Rugolo et al. 2006; Vining and Zheng 2008; NPFMC 2010). The low precision of the Pribilof red king crab stock estimates raises concerns for management of both the red king crab stock and protection of the blue king crab stock; establishment of harvest levels for red king crab on the basis of low precision estimates could result in overfishing of the red king crab stock and in a prolonged fishery that would increase the exposure of the blue king crab stock to the effects of bycatch during the fishery.

In 2003, ADF&G conducted a fall pot survey of the Pribilof Islands area to supplement the NMFS summer trawl survey data by obtaining information on the distribution and relative abundance of red and blue king crab during the normal fishing season (Gish and Pengilly 2004). The survey was designed to provide denser spatial sampling than the NMFS trawl survey and to concentrate in the area of highest catch and effort during the 1993/94–1998/99 fishing seasons and the area of highest densities of red and blue king crab encountered during the summer trawl survey within the Pribilof District. The primary objective of the survey was to provide information pertaining to the two sources of uncertainty that have raised conservation concerns when considering an opening of a Pribilof red king crab fishery since 1999: the potential for blue king crab bycatch during a directed red king crab fishery and reliability of the red king crab population estimates provided by the NMFS summer trawl survey results. Results of the 2003 pot survey, coupled with the results of an ADF&G cost-recovery fishery on Pribilof red king crab that was performed concurrent with the survey (Byersdorfer 2004), confirmed the poor reliability of the summer trawl survey results for use in establishing harvest levels for Pribilof red king crab and the significant risk of blue king crab bycatch during a directed Pribilof red king crab fishery. ADF&G conducted a second Pribilof District king crab pot survey in 2005 (Gish 2006) and a third pot survey in 2008 (Gish 2010), both of which corroborated the continued depressed condition of the blue king crab stock and provided further insights into the spatial distribution of red and blue king crab on a finer spatial scale than is afforded by the NMFS trawl survey.

This report documents the project operational plan for a fourth Pribilof District king crab pot survey to be conducted by ADF&G in the fall of 2011.

OBJECTIVES

Prioritized objectives of the 2011 Pribilof District king crab survey are as follows:

1. Document distribution and relative abundance of red and blue king crabs in the Pribilof District of the Bering Sea, Area Q, just prior to the period that the commercial Pribilof District king crab fishery would normally occur.
2. Obtain biological data from all commercially important crab and fish species encountered during the survey.
3. Obtain measures of conductivity, temperature and depth concurrent with king crab catch per pot data over the range of depths fished.

METHODS

CHARTER ITINERARY

The 29-day survey will be conducted aboard the chartered vessel *F/V Scandies Rose* (a 39.6-m commercial crab-pot-fishing vessel) from approximately September 12 through October 10, 2011 in the Pribilof District of the Bering Sea Management Area Q. The charter will begin and end in Dutch Harbor. The captain, four vessel crew members, and four ADF&G staff biologists will be aboard the entire period of the charter. Details are provided in the Shipboard Instructions (Appendix A1).

KING CRAB DISTRIBUTION AND RELATIVE ABUNDANCE SURVEY

Survey Area and Design

The primary survey area (Figure 2) encompasses the Pribilof Islands and is bounded by 56° 30' N latitude to the south, 57° 30' N latitude to the north, 169° 00' W longitude to the east, and 171° 00' W longitude to the west. The primary survey area covers approximately 3,600 nmi² and includes the ADF&G shellfish statistical areas that accounted for 83% to 99% of the total annual Pribilof Islands red king crab harvests for the 1993 through 1998 seasons (Morrison and Gish 1994, 1996, 1997a, 1997b; Morrison et al. 1998, 1999). In particular, the survey area includes statistical area 695700 (bounded by 57° 00' N latitude, 57° 30' N latitude, 169° 00' W longitude, and 170° 00' W longitude) which accounted for the largest portion of the total Pribilof red king crab harvest during 1993-1998 (36%) and of the total Pribilof Islands blue king crab harvest during 1995-1998 (42%). Hence, the survey area includes the area of highest historical fishery production for the red king crab fishery and an area of potentially high blue king crab bycatch.

The standard survey station pattern was designed by first designating stations at the centers and corners of the stations established for the NMFS eastern Bering Sea trawl survey (Chilton et al. 2011) located within the primary survey area. Additional stations were added to achieve 5-nmi spacing between stations for a total of 164 stations in the primary survey area. One-hundred-eighteen secondary stations were added to the north and east of the primary stations, maintaining the 5-nmi spacing, for a total of 282 stations (Figure 2; Appendix B1). The target goal is for 168 standard stations to be fished during the pot survey, which will be selected based on results from the first three surveys and the results of the 2011 NMFS trawl survey.

A new double-density grid of stations has been established southwest and south of St. Paul, with additional stations added to achieve a spacing of 2.5-nmi between stations (Figure 3). This grid of

stations is in an area that has produced catches of red king crab, but no blue king crab, during the previous three pot surveys and which has also produced the highest catches of red king crab by the summer trawl survey within the Pribilof District in some years (e.g., during the 2002 survey; Stevens et al. 2002). If the target goal of 168 standard stations is reached, the remaining survey time will be used to fish the double-density grid beginning from the western section working towards the east.

Each station will consist of 4 pots spaced 0.125 nmi apart and arrayed in a north-south orientation with the center of the string at the station location. Each pot will measure 7' x 7' x 2.8', with 2.75" stretch mesh on all webbing, and have two opposing tunnel openings measuring 8" x 36". Stations will only be fished once during the survey. The goal is to fish a minimum of 6 stations a day. The target soak time interval for each pot will be 24 to 30 hours. Each pot will be baited with two 2-quart containers of chopped herring *Clupea pallasii* and one Pacific cod *Gadus macrocephalus* will be used as hanging bait.

The vessel will be able to transit to the next pot while the contents of each current pot are sampled, as there is no requirement to stay "on station" while the catch is sampled. Individual pot locations, set and pull dates and times, depth, bottom type, data logger number (if appropriate) and gear performance will be recorded by the vessel captain in the Pilot House Log (Appendix C1) for all fishing conducted during the survey.

Catch Sampling

Species composition will be determined for each pot fished during the survey, and all commercially important crab species will be enumerated to provide catch per pot data by size and sex. The fork or total length will be recorded for all commercially important fish species and all other fish and invertebrate species will be identified and enumerated. All crab and fish will be released alive after sampling except for those identified in the following "Ancillary Collections" section. Red and blue king crab catch per pot data, summarized by station, will be entered daily into a computer spreadsheet and reported to the Kodiak ADF&G office for the duration of the survey.

Commercially important crab. Each red and blue king crab and hair crab *Erimacrus isenbeckii* obtained from survey pots will be sexed and measured for carapace length to the nearest millimeter. Carapace length will be measured from the posterior margin of the right eye socket to the midpoint of the rear margin of the carapace (Donaldson and Byersdorfer 2005). Each snow crab *C. opilio* will be sexed and measured for carapace width (CW) to the nearest millimeter. Each Tanner crab *Chionoecetes bairdi* will be sexed and measured for CW, to the nearest tenth (0.1) of a millimeter for males and to the nearest millimeter for females. Carapace width will be measured 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). Additionally, the chela height, measured as the greatest height on the right chela excluding spines (Jadamec et al. 1999), of all male Tanner crab that show no evidence of regeneration will be recorded to the nearest tenth (0.1) of a millimeter. The fishery-legal status of male crab will be determined by the CW, including spines, relative to minimum legal size (6.5 inches for red and blue king crab, 3.25 inches for hair crab, 4.4 inches for Tanner crab, and 3.1 inches for snow crab).

The shell condition of each crab will be determined by examining the ventral side of the coxa (shoulders) of the pereopods (walking legs) for discoloration and deterioration from scratching

and other abrasive action attributable to prolonged contact of the crab's shell with the substrate. Although the following categories were developed for shell-condition assessment of red king crab, each can also be applied to other commercially important crab species encountered during the survey. Record shell condition for each crab sampled as follows:

- New-shell, pliable The exoskeleton is shiny, with few or no scratches or pits present. Carapace is easily punctured, torn, or damaged and with few or no epibionts present. Dactyls and spines are sharp with no wear present. Gills are translucent to light cream in color.
- New-shell Exoskeleton is usually hard and meri are not easily compressed by pinching; ventral surface has limited or no scratching. Legs are mostly full of meat and will crack if bent. Dorsally, the exoskeleton ranges in color from purple to brick red to yellowish-brown on dorsal surface (red king crab colors). Ventral surface of exoskeleton ranges from white to "dullish" white. Carapace is firm to hard, and mostly clean but may have slight fouling, including small barnacles, encrusting bryozoans, adult leeches and leech cocoons. Spines and dactyls are sharp but may show slight wear. Gills are light cream in color.
- Old-shell Exoskeleton, particularly the ventral surface, shows scratching, wear, and abrasions. Exoskeleton and chela are hard and cannot be indented by thumb pressure. Legs are full of meat, meri are not easily compressed when pinched. Chela tips are dull and "teeth" may be worn. Spines and dactyls are worn and typically dull at the tips. Distal portion of the ventral coxa is partially or totally covered with brown scratches or dots. Exoskeleton covered with light to moderate fouling, including barnacles, bryozoans, leeches, and leech cocoons. Barnacles and other epibionts are usually present. Gills are tan in color.
- Very old-shell Exoskeleton and chela are hard and cannot be indented by thumb pressure. Legs are full of meat and meri are not easily compressed when pinched. Carapace is hard, chela tips are dull and "teeth" are worn. Spines rounded with tips sometimes worn off, dactyls are worn, rounded, and black. Distal portion of the ventral coxa is covered with black scratches or dots. Exoskeleton, particularly the ventral surface, has numerous scratches, wear, and abrasions; it appears dark and dull, ranging from deep purple to brick red to yellowish-brown on dorsal surface. Gills are dark gray or gray-black in color.
- Very, very old-shell Exoskeleton and chela are generally hard and cannot be indented by thumb pressure, but some individuals may be decaying and the carapace may be spongy. Legs are full of meat and meri are not easily compressed when pinched. Carapace is hard or spongy with visible wear, chela tips are rounded and "teeth" are very worn. Spines rounded with tips often worn off, dactyls are worn, rounded or

flattened, and black. Distal portion of the ventral coxa is black. Exoskeleton, particularly the ventral surface, has numerous scratches, wear, and abrasions; it appears dark and dull.

Complete shell condition information for king crab is given in Donaldson and Byersdorfer (2005) and for Tanner and snow crab in Jadamec et al. (1999).

The reproductive condition of all female crab will be determined. If eggs are present, clutch fullness, clutch condition, egg development, and color of eggs will be recorded. Clutch fullness refers to the size of the clutch in reference to a full clutch and the abdominal flap. Clutch condition refers to the condition of the setae if eggs are absent, or the presence and amount of dead eggs when eggs are present. Egg development refers to the presence of uneyed or eyed eggs, and whether hatching is apparent. Other biological characteristics of crab including fresh injuries and the presence of disease or parasites will be documented. Record all required data on the Crab Measurement Form (Appendix C2) and the Species Composition Form (Appendix C3).

Subsampling of crab. A subsample of male and female crab for carapace length distribution, shell condition, and female reproductive data may be taken only when successive pots within a station contain such large numbers of crab that sampling the full pot contents would either impact crab vitality on deck or unnecessarily delay overall survey progress. Snow and Tanner crab will be the primary species subsampled. When subsampling, crab will first be separated by species (hybrid-legal *C. bairdi* and hybrid-legal *C. opilio* are considered separate species for these purposes) and each species will be separated into subcategories defined by female maturity and male legal status and size ranges. Subsampling will occur at the subcategory group level. If the subcategory group is less than approximately 50 crab, all the individuals will be measured; if greater, it will be considered for subsampling. The total count by sex and size category will be recorded on the Crab Subsampling Form (Appendix C4). See further details on subcategories in the instructions for the Crab Subsampling Form.

Fish and other invertebrates. All commercially important species such as Pacific cod *Gadus macrocephalus*, walleye pollock *Theragra chalcogramma*, sablefish *Anoplopoma fimbria*, Pacific halibut *Hippoglossus stenolepis*, Greenland turbot *Reinhardtius hippoglossoides*, yellowfin sole *Limanda aspera*, northern rock sole *Lepidopsetta polyxystra*, flathead sole *Hippoglossoides elassodon*, northern rockfish *Sebastes polyspinis*, Atka mackerel *Pleurogrammus monoptyerygius*, arrowtooth flounder *Artheresthes stomias*, and Kamchatka flounder *Artheresthes evermanni* will be measured and lengths recorded on the Fish Length Form (Appendix C5). All other captured fishes (not listed on the Fish Length Form) and invertebrates (not listed on the Crab Measurement Form or Crab Subsampling Form; Appendices C2 and C4) will be identified to species, if possible, and recorded on the Species Composition Form (Appendix C3).

Ancillary Collections

All snow crab with signs of bitter crab disease will be retained and frozen, and sent to National Marine Fisheries Service for testing and use in bitter crab disease research. Ad hoc collections of crab for an invertebrate reference collection may be collected as the appropriate species are encountered.

Oceanographic and Weather Data Collection

Data on temperature, depth, and salinity (conductivity) will be obtained from selected pots. Three submersible temperature (STR), eight temperature/depth (TDR), and seven conductivity/temperature/depth (CTD) data loggers will be deployed in a manner that provides coverage over the range of area and depths fished during the survey. No more than one data logger will be deployed at any single station. Continuous water temperature reference data will be obtained by the deployment of two additional STRs for the duration of the survey. Deployment of each data logger will be documented in the Pilot House Log (Appendix C1).

Weather observations will be made throughout the survey. The vessel captain will record these observations as each station is set and retrieved. Additional observations may be made by any personnel on the bridge at any time. All observations will be recorded on the Weather Observation Form (Appendix C6).

SCHEDULES AND PERSONNEL

The following tasks will be completed by the designated personnel by the dates listed below:

Month/Day	Personnel	Activity
02/01-09/01	Vanek and Pengilly	Project planning, vessel charter procurement, operational plan, shipboard instructions, gear and survey preparation
09/12-10/10	Vanek, Dela Cruz, Baer, and Wald	Conduct at-sea survey
10/17-11/30	Chisum	Enter survey data electronically
12/01-1/31	Vanek	Edit survey data

REPORTS

The following reports will be written by the designated authors by the dates listed below:

Month/Year	Author(s)	Report
08/11	Vanek	Project operational plan for the 2011 Pribilof District king crab project
11/11	Vanek	Memorandum on the 2011 Pribilof District king crab survey
06/12	Vanek	The 2011 Pribilof District king crab survey

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FIGURES

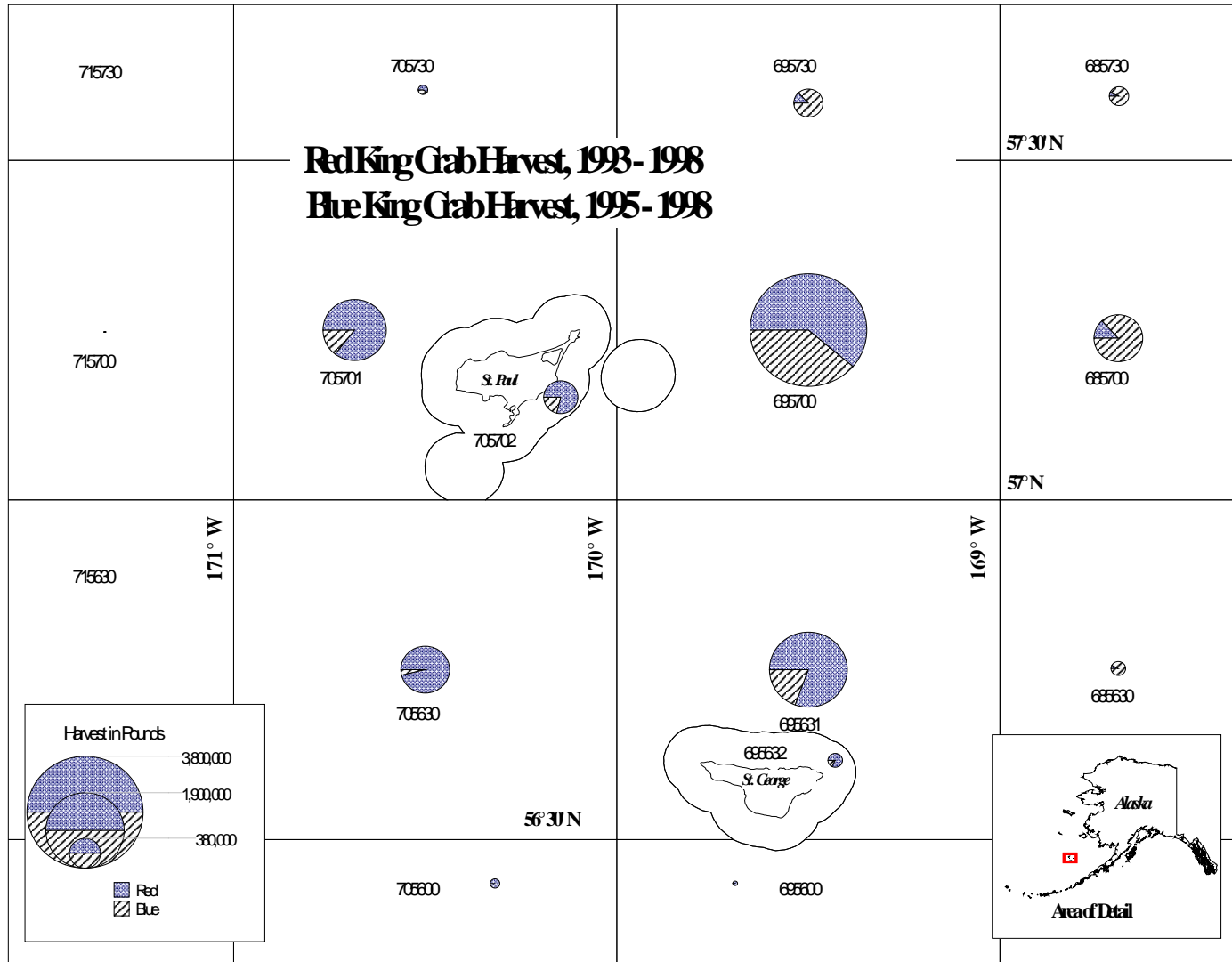


Figure 1.—Location and amount of king crab harvested in the 1993/94 to 1998/99 Pribilof District king crab fisheries.

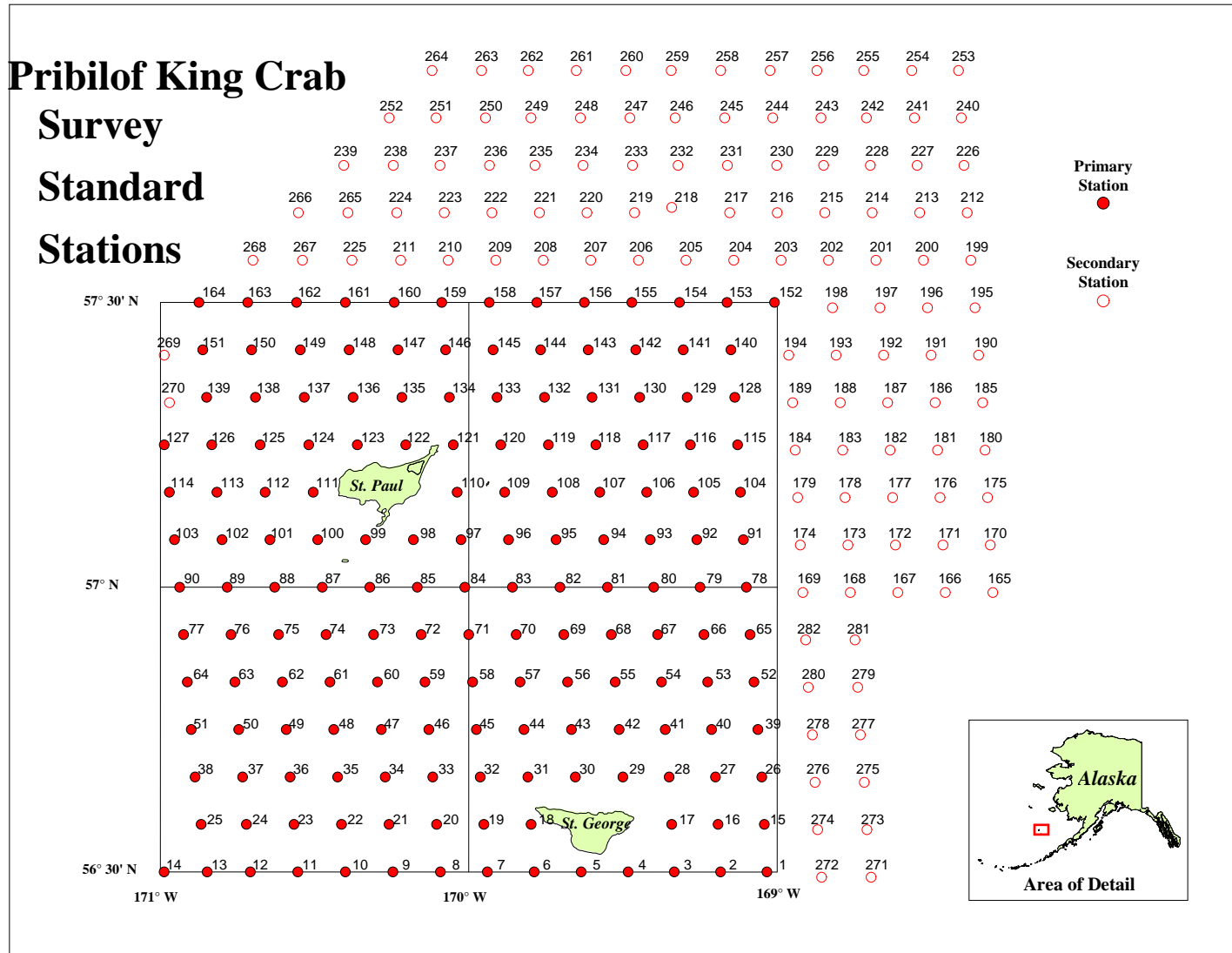


Figure 2.—Area of the Pribilof District king crab survey showing the location of the standard stations.

2011 Pribilof King Crab Survey Double Density Stations

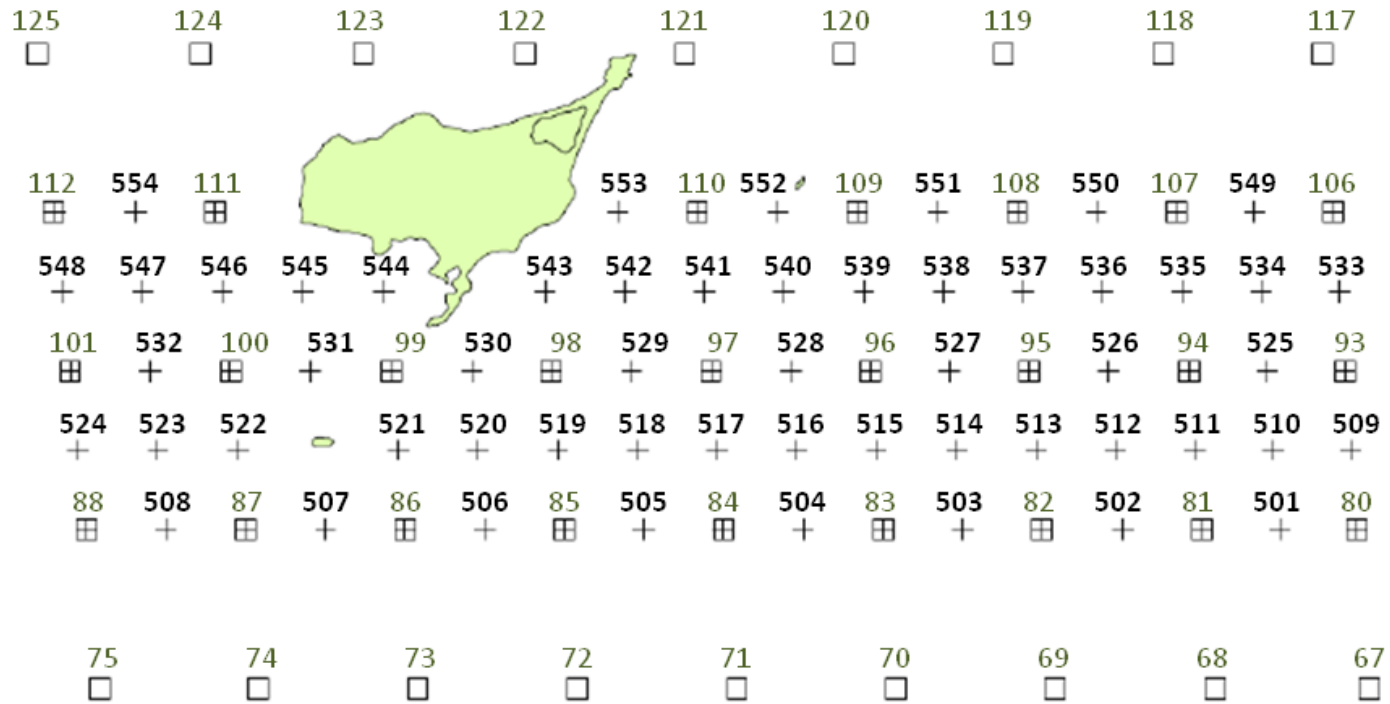


Figure 3.—Locations of double density stations for the 2011 Pribilof District king crab survey

**APPENDIX A. SHIPBOARD INSTRUCTIONS FOR THE 2011
PRIBILOF DISTRICT KING CRAB SURVEY**

Alaska Department of Fish and Game
Westward Region
211 Mission Road
Kodiak, Alaska 99615

September 2011

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GENERAL INFORMATION

The purpose of this manual is to provide additional information and instructions relating to the 2011 Pribilof District king crab survey. Refer to it for project objectives and sampling procedures. Expect standard methodologies but be prepared to accept changes to sampling procedures and protocols when circumstances warrant.

By regulation, ALL SURVEY DATA IS CONFIDENTIAL until the end of the Pribilof District king crab commercial fishery, which by regulation is from October 15, 2011 through February 1, 2012 (as this fishery has been closed since 1999 due to the overfished status of the blue king crab stock, it is likely that the fishery will be closed preseason). As data from snow and Bairdi crab will also be collected, ALL SURVEY DATA IS TO BE CONFIDENTIAL until the closure of the snow crab fishery which will be May 15, 2012. Maintaining confidentiality applies to and is required by all vessel and ADF&G personnel.

The survey will be aboard the charter vessel the F/V *Scandies Rose*, a 39.6-m pot-fishing vessel. The vessel and her crew have been contracted to provide service to ADF&G for a 30-day period, and the general itinerary is as follows:

Dates	Activity
September 11	Gear work and load gear
September 12	Travel to grounds, set gear
September 13 - October 8	Set/pull survey gear
October 9	Pull survey gear, depart grounds
October 10	Travel to port, offload gear

The following personnel are participating in the 2011 king crab charter:

ADF&G Crew	Vessel Crew
Vicki Vanek - crew leader	Dan Mattsen - captain
Dmitri DelaCruz - biologist	Peter Wilson, Jr. – engineer
Rob Baer - biologist	William Engstrom – first mate
Lily Wald - biologist	Landon Cheney - crewman
	George Kezek – crewman, cook

The crew leader is responsible for resolving any misunderstandings arising between the vessel crew and ADF&G biologists in regard to the charter service requirements; also, the crew leader will resolve any misunderstandings arising among the ADF&G biologists.

Insubordination to the crew leader or the vessel captain will result in immediate suspension from at-sea duties, and may result in the immediate return of that individual to port.

Safety Briefing

Prior to commencement of the survey, the captain will provide the ADF&G crew with a shipboard safety orientation which will include pulling the general alarm and the designation of emergency stations. Specific information will be provided for each of the following:

1. General safety orientation: The location of life rafts, life rings, fire stations, medical supplies, safety placards, emergency information, and safe/hazardous areas on deck.
2. Shipboard safety drill: Where personnel should be and what to do in emergency situations; the locations of survival suits and EPIRBs.
3. Abandon ship, man overboard and fire-fighting drills will be conducted in the presence of U.S.C.G. personnel prior to departure.

The safety and wellbeing of the ADF&G and boat crew, as well as the vessel itself, are the primary concern at all times during the charter. Obey the captain in this regard, as he is legally responsible for ensuring the safety of all onboard personnel. Do not go on the back deck or anywhere outside alone, especially when seas are rough. When gear is being worked, pay particular attention to buoy lines and trailers, pots, and slick decks. ADF&G personnel will not stack pots, operate hydraulics, chop bait, bait pots, or throw buoy lines. Be aware of the crane and hydraulic blocks at all times, particularly when pots are being moved. Retreat to a safe area while pots are being set, retrieved, moved, or stacked.

Specific information and/or vessel policies will be provided for each of the following: storage location for rain gear and boots, galley etiquette, water use policy (showers, laundry, dishes, bathroom), etc.

Prior to departure, it is the responsibility of each ADF&G crewmember to check their personal EPIRB, strobe light, and survival suit; also lubricate or wax the survival suit zipper to insure proper functioning. You should be able to put your survival suit on within 60 seconds. Practice before getting onboard. Rules concerning EPIRB testing may be obtained from the U. S. Coast Guard in Dutch Harbor (907-581-3466). Check date on strobe light battery, replace battery if dated or faulty. Tested EPIRBs, strobe lights, and the rescue laser flares are to be securely fastened to survival suits.

Miscellaneous Shipboard Rules and Information

During the charter, tasks and responsibilities will be delegated among the onboard ADF&G crew for the duration of the cruise. Any problems that arise should be channeled through the crew leader. Clean up all work areas used, including the galley table. All data should be kept organized and as dry as possible. Make sure deck paperwork tracks with the Pilot House Log; every pot will have a unique number that will enable cross-referencing on a pot by pot basis. Although it is the crew leader's responsibility to ensure data integrity, other ADF&G crew will be relied upon for assistance. Be sure to ask the crew leader about any unexpected changes in sampling protocols or anything else related to data collection when clarification is needed.

Completed data forms will be edited daily and cross-checked for accuracy. This practice ensures that the often-important short-term details of the day's events are not overlooked. There will be no compromise with regard to this responsibility. All spaces containing data need to be filled in with the appropriate code number, so that there are no ditto marks, arrows, or lines traveling down a data column to indicate the code number is the same as in an above space. The crab measurement and crab subsampling forms will be entered into a spreadsheet on a daily basis using the laptop computer, and checked for accuracy by a second person. If time permits, the vessel pilot house logs will also be entered into a spreadsheet.

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Prior to the vessel's departure from Dutch Harbor to the survey grounds, check off all items on the equipment list (Appendix E) including forms, sampling equipment, and any personal gear (e.g., seasick medications). Onboard, maintain all sampling equipment by ensuring it is cleaned and stored safely inside the vessel at the end of each day (calipers, clipboards, measuring sticks, etc.).

Keep a daily log of sampling activities, miscellaneous observations, Floy tag recoveries, sampling irregularities, etc. Included in the daily log should also be observations on conditions under which the survey was conducted, such as daily temperature, wind, and sea conditions. Problems that occur with survey/sampling procedures or ideas for the future should also be noted in the daily log. This log would also be appropriate for recording any photographs taken.

Offer assistance to the vessel crew whenever possible. ADF&G personnel are allowed to help out with some of the deck activities that are not inherently dangerous, such as filling bait containers. When time allows, offers to help the vessel crew wash dishes, make coffee, help with meal preparation, and general help with cleaning is greatly appreciated. A cooperative effort toward daily chores and maintaining living quarters on the vessel can be a great benefit to everyone's morale.

There will be no home packing of any animals captured during the survey by vessel or ADF&G crewmembers. All halibut (dead or alive) are to be placed overboard immediately. Authorization for the collection of crabs for display or other purposes will be by the crew leader only.

Additional Instructions and Reminders

1. Review project operational plan and charter itinerary.
2. Fill in and save Tears timesheets. Project coding of regular and premium sea pay must be reviewed by the crew leader prior to submission of the timesheet.

Pay Codes		
Personnel	Regular Pay	Sea/Hazard Pay
Vicki Vanek	11340665/11340665	11100841/11148763
Rob Baer	11340665/11340665	11100841/11148763
Dmitri DelaCruz	11340665/11340665	11100841/11148763
Lily Wald	11340665/11340665	11100041/11140763

3. Turn in all receipts for authorized purchases to the crew leader prior to September 10.
4. Check your survival suit, strobe light, and EPIRB prior to departure. Attach strobe light, rescue laser flare, and EPIRB to your survival suit.
5. All forms must be checked daily; complete every column in every form as required.

METHODS

Catch Reporting

A daily status report on charter activities will be transmitted via email to ADF&G in Kodiak. When daily reports are not feasible, a minimum of three status reports each week must be sent. The crew leader or the vessel captain will relay this status report. The report will contain the status or well being of the vessel and crew; the report may also contain the total number of pots sampled and the numbers of legal-sized male red and all blue king crabs by station. This report will be primarily by internet/Immarsat email.

Email will be our primary means of contact and reporting during this charter. Doug Pengilly will serve as the primary contact. If Doug is not available the report will be sent to Rachel Alinsunurin. Email addresses are doug.pengilly@alaska.gov and rachel.alinsunurin@alaska.gov. The information to be sent by email is listed above.

Prior to departure a shore-based contact for the F/V *Scandies Rose* will be established, and will be available as an additional contact method. This vessel contact information will be sent to Doug Pengilly (907) 486-1865.

Pilot House Log

The charter vessel captain will complete the Pilot House Log (Appendix C1) for each pot fished. Each pot will be assigned a Sequential Pot Number (SPN) in the order it is set, beginning with 1 and continuing throughout the charter. The SPNs are extremely important as they link pot locations, depths fished and soak time to the catch data. It is the responsibility of the crew leader to check the log to ensure it is correct and completely filled out at the end of each day.

Survey Design

Refer to the operational plan for a description of the survey pattern and pot deployment. The charter period is 30 days in length, approximately 29 days will be at sea.

Catch Sampling

The contents of each pot fished will be examined for species composition. Red and blue king crabs, hair crabs, Tanner crabs, and snow crabs from each pot will be fully enumerated to provide catch per pot by sex and size data. Record all required data on the Crab Measurement Form and Species Composition Form (Appendices C2 and C3). Record all data for each species according to protocols outlined below.

Prior to sampling each pot, the ADF&G biologists will ask the captain to convey (via the loud hailer) the appropriate SPN and record it on the Crab Measurement Form (Appendix C2). Sequential pot numbers for lost pots along with the words “LOST POT” will be recorded on a blank row on the Crab Measurement Form. Likewise, if a retrieved pot is unbaited, the SPN is still recorded and the words “NO BAIT” written on the Crab Measurement Form.

Recording Data. When sorting, divide all crabs by species, and if possible, subdivide by sex. Separate data sheets must be used for each pot. It is preferable to use separate data sheets for each species, however it is permissible to record separate species of the same sex on the same sheet but they must be delimited by skipping a few lines between each. Before sampling each pot, complete all header information (i. e. station number, date, buoy number, measurer, recorder) and record the SPN (obtained from the captain) on the survey data form. Once sampling has commenced, record the appropriate code for each data category using the choices provided at the bottom of the survey data form.

Morphometrics. Carapace length (CL) measurements to the nearest millimeter will be taken for all king crabs and hair crabs encountered. Carapace width (CW) measurements not including the spines will be taken to the nearest millimeter for snow crabs and female Tanner crabs, and to the nearest 0.1 millimeter for male Tanner crabs. Additionally, the chela height (CH) of all male Tanner crabs will be measured to the nearest 0.1 millimeter. Extra care should be taken to obtain accurate measurements.

Legal status will be determined for all male crabs encountered. Legal size is determined by measuring the carapace width including the spines. There is considerable size overlap of sublegal and legal-sized male red king crabs with the same CL; therefore, either a measuring stick or calipers should be used to verify the legal measurement of all king crabs less than 140-mm CL.

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LEGAL MALES

Species	Minimum CW (inches) (including spines)
Red King Crab	6.5
Blue King Crab	6.5
Tanner Crab	4.4
Snow Crab	3.1
Hair Crab	3.25

Shell Condition. The carapace or shell condition of each crab will be determined by examining the ventral side of the coxa (shoulders) of the walking legs (pereiopods) for discoloration and deterioration from scratching and other abrasive action attributable to prolonged contact of the crab's shell with the substrate. Record shell age for each crab sampled as follows:

Shell Age Category	Code
New-pliable	9
New	2
Old	3
Very Old	4
Very, very Old	5

Other biological characteristics of all crabs that should be given special attention during sampling include the following:

Egg color – normally appears purple (code # 8) or brown (code # 10) for uneyed eggs, or orange (code # 4) for eyed eggs.

Egg development – under the egg development column, uneyed eggs (code # 1) is the most common. However, it is of special interest if hatching embryos (code # 3) are encountered.

Diseases – shell disease (also known as torch or shell rust, code #8) is the most common disease seen, and small lesions may be the size of and resemble leech egg cases on king crab, so check carefully. Black mat (code # 5) and cottage cheese (code # 7) are also commonly occurring diseases in red king crabs. Bitter crab disease (code # 6) may be encountered in Tanner and snow crabs.

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Oceanographic Data Collection

The oceanographic parameters of temperature, conductivity (salinity), and depth will be obtained by the use of 7 conductivity/temperature/depth (CTD), 8 temperature/depth (TDR) and 5 temperature (STR) data loggers. The two yellow STR's will be deployed in two separate temperature reference pots for the length of the survey. The remaining loggers will be deployed with one logger at each station, in the second or third pot of the 4-pot string set at the station. Loggers will be secured inside the pots by a carabiner and two door hooks with rubbers or with three door hooks with rubbers in a manner that restricts movement during deployment. The logger should not be positioned next to a crossbar in the pot to prevent potential damage from the logger hitting against the bar during deployment. Each logger has an identification number visible and readable from outside the crab pot. Check after every deployment for any problems in position, legibility of logger number, or other performance issues. Record lost or damaged loggers, or additional data loggers on the data logger form (Appendix C10).

Photographic Documentation of Research Activities

Whenever time permits, all aspects of research activities including the handling and measuring of crabs, clutch size and egg development and various shell ages aboard the charter vessel should be documented with photographs or video. Edited video footage provides the best means of documenting the survey operation for future reference. Note: All photographs should be documented with a short written caption relevant to what is being filmed (i.e., date, time, location and subject).

Copies of all photos and videos **MUST** be given to the crew leader before departure from the boat or other arrangements agreed upon with the crew leader. This includes photos and videos taken on personal cameras. Ask the crew leader if you have questions.

In addition, no photos or videos may be posted on public spaces, without approval from the ADF&G crew leader. This includes those taken by the vessel crew, who are considered agents of the state during this charter.

**APPENDIX B. STATION LOCATIONS FOR THE 2011
PRIBILOF DISTRICT KING CRAB SURVEY**

Appendix B1.–Location of station centers for the 2011 Pribilof District king crab survey; each station consists of four pots arrayed in a north – south orientation. Pots will be spaced 0.125 nautical miles apart with the center of the string at the below station locations.

Station	Latitude		Longitude		Station	Latitude		Longitude	
	Degrees	Minutes	Degrees	Minutes		Degrees	Minutes	Degrees	Minutes
1	56	30.00	169	02.00	34	56	40.00	170	16.25
2	56	30.00	169	11.00	35	56	40.00	170	25.50
3	56	30.00	169	20.00	36	56	40.00	170	34.75
4	56	30.00	169	29.00	37	56	40.00	170	44.00
5	56	30.00	169	38.13	38	56	40.00	170	53.25
6	56	30.00	169	47.25	39	56	45.00	169	03.75
7	56	30.00	169	56.38	40	56	45.00	169	12.75
8	56	30.00	170	05.50	41	56	45.00	169	21.75
9	56	30.00	170	14.75	42	56	45.00	169	30.75
10	56	30.00	170	24.00	43	56	45.00	169	40.00
11	56	30.00	170	33.25	44	56	45.00	169	49.25
12	56	30.00	170	42.50	45	56	45.00	169	58.50
13	56	30.00	170	50.89	46	56	45.00	170	07.75
14	56	30.00	170	59.28	47	56	45.00	170	17.00
15	56	35.00	169	02.50	48	56	45.00	170	26.25
16	56	35.00	169	11.50	49	56	45.00	170	35.50
17	56	35.00	169	20.50	50	56	45.00	170	44.75
18	56	35.00	169	47.88	51	56	45.00	170	54.00
19	56	35.00	169	57.06	52	56	50.00	169	04.50
20	56	35.00	170	06.25	53	56	50.00	169	13.50
21	56	35.00	170	15.50	54	56	50.00	169	22.50
22	56	35.00	170	24.75	55	56	50.00	169	31.50
23	56	35.00	170	34.00	56	56	50.00	169	40.75
24	56	35.00	170	43.25	57	56	50.00	169	50.00
25	56	35.00	170	52.07	58	56	50.00	169	59.25
26	56	40.00	169	03.00	59	56	50.00	170	08.50
27	56	40.00	169	12.00	60	56	50.00	170	17.75
28	56	40.00	169	21.00	61	56	50.00	170	27.00
29	56	40.00	169	30.00	62	56	50.00	170	36.25
30	56	40.00	169	39.25	63	56	50.00	170	45.50
31	56	40.00	169	48.50	64	56	50.00	170	54.75
32	56	40.00	169	57.75	65	56	55.00	169	05.25
33	56	40.00	170	07.00	66	56	55.00	169	14.25

-continued-

Station	Latitude		Longitude		Station	Latitude		Longitude	
	Degrees	Minutes	Degrees	Minutes		Degrees	Minutes	Degrees	Minutes
67	56	55.00	169	23.25	101	57	5.00	170	38.69
68	56	55.00	169	32.25	102	57	5.00	170	48.00
69	56	55.00	169	41.50	103	57	5.00	170	57.25
70	56	55.00	169	50.75	104	57	10.00	169	07.12
71	56	55.00	170	00.00	105	57	10.00	169	16.25
72	56	55.00	170	09.25	106	57	10.00	169	25.37
73	56	55.00	170	18.50	107	57	10.00	169	34.50
74	56	55.00	170	27.75	108	57	10.00	169	43.75
75	56	55.00	170	37.00	109	57	10.00	169	53.00
76	56	55.00	170	46.25	110	57	10.00	170	02.25
77	56	55.00	170	55.50	111	57	10.00	170	30.25
78	57	0.00	169	06.00	112	57	10.00	170	39.62
79	57	0.00	169	15.00	113	57	10.00	170	49.00
80	57	0.00	169	24.00	114	57	10.00	170	58.25
81	57	0.00	169	33.00	115	57	15.00	169	07.69
82	57	0.00	169	42.25	116	57	15.00	169	16.87
83	57	0.00	169	51.50	117	57	15.00	169	26.06
84	57	0.00	170	00.75	118	57	15.00	169	35.25
85	57	0.00	170	10.00	119	57	15.00	169	44.50
86	57	0.00	170	19.25	120	57	15.00	169	53.75
87	57	0.00	170	28.50	121	57	15.00	170	03.00
88	57	0.00	170	37.75	122	57	15.00	170	12.25
89	57	0.00	170	47.00	123	57	15.00	170	21.69
90	57	0.00	170	56.25	124	57	15.00	170	31.13
91	57	5.00	169	06.56	125	57	15.00	170	40.56
92	57	5.00	169	15.62	126	57	15.00	170	50.00
93	57	5.00	169	24.69	127	57	15.00	170	59.25
94	57	5.00	169	33.75	128	57	20.00	169	08.25
95	57	5.00	169	43.00	129	57	20.00	169	17.50
96	57	5.00	169	52.25	130	57	20.00	169	26.75
97	57	5.00	170	01.50	131	57	20.00	169	36.00
98	57	5.00	170	10.75	132	57	20.00	169	45.25
99	57	5.00	170	20.06	133	57	20.00	169	54.50
100	57	5.00	170	29.38	134	57	20.00	170	03.75

-continued-

Primary Station	Latitude		Longitude		Primary Station	Latitude		Longitude	
	Degrees	Minutes	Degrees	Minutes		Degrees	Minutes	Degrees	Minutes
135	57	20.00	170	13.00	150	57	25.00	170	42.25
136	57	20.00	170	22.50	151	57	25.00	170	51.75
137	57	20.00	170	32.00	152	57	30.00	169	00.50
138	57	20.00	170	41.50	153	57	30.00	169	09.75
139	57	20.00	170	51.00	154	57	30.00	169	19.00
140	57	25.00	169	09.00	155	57	30.00	169	28.25
141	57	25.00	169	18.25	156	57	30.00	169	37.50
142	57	25.00	169	27.50	157	57	30.00	169	46.75
143	57	25.00	169	36.75	158	57	30.00	169	56.00
144	57	25.00	169	46.00	159	57	30.00	170	05.25
145	57	25.00	169	55.25	160	57	30.00	170	14.50
146	57	25.00	170	04.50	161	57	30.00	170	24.00
147	57	25.00	170	13.75	162	57	30.00	170	33.50
148	57	25.00	170	23.25	163	57	30.00	170	43.00
149	57	25.00	170	32.75	164	57	30.00	170	52.50

Secondary Station	Latitude		Longitude		Secondary Station	Latitude		Longitude	
	Degrees	Minutes	Degrees	Minutes		Degrees	Minutes	Degrees	Minutes
165	57	00.00	168	20.04	176	57	10.00	168	30.30
166	57	00.00	168	29.28	177	57	10.00	168	39.54
167	57	00.00	168	38.52	178	57	10.00	168	48.78
168	57	00.00	168	47.76	179	57	10.00	168	58.00
169	57	00.00	168	57.00	180	57	15.00	168	21.54
170	57	05.00	168	20.52	181	57	15.00	168	30.78
171	57	05.00	168	29.76	182	57	15.00	168	40.02
172	57	05.00	168	39.00	183	57	15.00	168	49.26
173	57	05.00	168	48.24	184	57	15.00	168	58.50
174	57	05.00	168	57.50	185	57	20.00	168	22.02
175	57	10.00	168	21.06	186	57	20.00	168	31.26

-continued-

Secondary Station	Latitude		Longitude		Secondary Station	Latitude		Longitude	
	Degrees	Minutes	Degrees	Minutes		Degrees	Minutes	Degrees	Minutes
187	57	20.00	168	40.50	221	57	40.00	169	48.25
188	57	20.00	168	49.74	222	57	40.00	169	57.50
189	57	20.00	168	59.00	223	57	40.00	170	06.75
190	57	25.00	168	22.80	224	57	40.00	170	16.00
191	57	25.00	168	32.04	225	57	35.00	170	24.73
192	57	25.00	168	41.28	226	57	45.00	168	25.67
193	57	25.00	168	50.52	227	57	45.00	168	34.77
194	57	25.00	168	59.75	228	57	45.00	168	43.87
195	57	30.00	168	23.52	229	57	45.00	168	52.97
196	57	30.00	168	32.76	230	57	45.00	169	02.07
197	57	30.00	168	42.00	231	57	45.00	169	11.69
198	57	30.00	168	51.24	232	57	45.00	169	21.31
199	57	35.00	168	24.30	233	57	45.00	169	30.15
200	57	35.00	168	33.54	234	57	45.00	169	39.77
201	57	35.00	168	42.78	235	57	45.00	169	49.13
202	57	35.00	168	52.02	236	57	45.00	169	57.97
203	57	35.00	169	01.25	237	57	45.00	170	07.59
204	57	35.00	169	10.44	238	57	45.00	170	16.69
205	57	35.00	169	19.75	239	57	45.00	170	26.31
206	57	35.00	169	29.00	240	57	50.00	168	26.19
207	57	35.00	169	38.25	241	57	50.00	168	35.29
208	57	35.00	169	47.50	242	57	50.00	168	44.65
209	57	35.00	169	56.75	243	57	50.00	168	53.49
210	57	35.00	170	06.00	244	57	50.00	169	02.85
211	57	35.00	170	15.25	245	57	50.00	169	12.21
212	57	40.00	168	25.02	246	57	50.00	169	21.83
213	57	40.00	168	34.26	247	57	50.00	169	30.67
214	57	40.00	168	43.50	248	57	50.00	169	40.29
215	57	40.00	168	52.74	249	57	50.00	169	49.91
216	57	40.00	169	02.00	250	57	50.00	169	58.75
217	57	40.00	169	11.25	251	57	50.00	170	08.37
218	57	40.00	169	20.50	252	57	50.00	170	17.47
219	57	40.00	169	29.75	253	57	55.00	168	26.71
220	57	40.00	169	39.00	254	57	55.00	168	35.81

-continued-

Secondary Station	Latitude		Longitude		Secondary Station	Latitude		Longitude	
	Degrees	Minutes	Degrees	Minutes		Degrees	Minutes	Degrees	Minutes
255	57	55.00	168	45.17	269	57	25.00	171	01.27
256	57	55.00	168	54.27	270	57	20.00	171	00.23
257	57	55.00	169	03.37	271	56	30.00	168	43.74
258	57	55.00	169	12.99	272	56	30.00	168	53.34
259	57	55.00	169	22.61	273	56	35.00	168	44.52
260	57	55.00	169	31.45	274	56	35.00	168	54.12
261	57	55.00	169	41.07	275	56	40.00	168	45.04
262	57	55.00	169	50.43	276	56	40.00	168	54.64
263	57	55.00	169	59.53	277	56	45.00	168	45.82
264	57	55.00	170	09.15	278	56	45.00	168	55.16
265	57	40.00	170	25.53	279	56	50.00	168	46.33
266	57	40.00	170	35.15	280	56	50.00	168	55.94
267	57	35.00	170	34.37	281	56	55.00	168	46.85
268	57	35.00	170	43.99	282	56	55.00	168	56.45

**APPENDIX C. SURVEY DATA FORMS AND
INSTRUCTIONS**

Survey Pilot House Log

Vessel Name: _____

Survey Code: _____

ADF&G Number: _____

Captain Name: _____

Page _____ of _____

SPN	STATION NUMBER	BUOY ID	SET GEAR		DEPTH (fathoms)	BOTTOM TYPE (see below)	LOCATION		LOGGER ID	LIFT GEAR		GEAR PERF. (see below)
			DATE (mm - dd - yy)	TIME (0000-2359)			LATITUDE (N) (dd° mm.mm)	LONGITUDE (ddd° mm.mm) E or W		DATE (mm - dd - yy)	TIME (0000-2359)	
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

BOTTOM TYPE:
 1 = rock 4 = mud
 2 = sand 5 = gravel
 3 = silt

GEAR PERFORMANCE:
 blank = good 41 = pot door bent or not tied
 40 = lost pot 42 = pot not baited
 43 = pot landed upside down
 44 = hole in pot

INSTRUCTIONS FOR SURVEY PILOT HOUSE LOG

This form is used to record fishing parameters for every pot that is set during the survey. It is the definitive table in the survey database and must be accurately completed each day gear is set or pulled.

Survey Code: PI11 (PI = Pribilof Islands, 11 = 2011).

ADF&G Number: 35318 (ADF&G number of the Scandies Rose)

Vessel Name: FV Scandies Rose for this survey.

Captain's Name: The name of the captain filling out the data forms.

Page ___ of ___ : The pages of this form will be numbered sequentially as they are generated over the course of the survey. When the last page is numbered, that number will be written in the 2nd blank on all the pages. For example: A total of 47 Pilot House Log pages were used during the survey. 'Page 1 of 47' would be on the first page, and 'Page 47 of 47' would be on the last page.

Sequential Pot Number (SPN): As pots are set, each pot is numbered beginning at '1' and each successive pot set is numbered sequentially over the course of the survey. Sequential pot numbers are unique and **will not** be reused if a pot is lost.

Station Number: The captain will record the station number for each sequential pot set. For our survey, there will be one station number per 4-pot string. If a station is resampled, the numeral 2 will precede the new station number in a 4-digit format. For example: station 6 has been reset and will be documented as station 2006. Similarly, station 141 has been reset and is identified as station 2141.

Buoy ID: The ID and/or letters marked on the trailer buoy of the pot buoy set-up will be recorded.

Set Gear

- **Date:** The captain will record the date the gear is set, in mm-dd-yy format.
- **Time:** The captain will record the time the gear is set, in local Alaska time and in 24-hour format (0000 – 2359). '0000' is midnight and denotes the beginning of the next day.

Depth: The captain will record depth in whole fathoms, or to the tenth of a fathom if electronically displayed.

-continued-

Bottom Type: Enter one of five bottom type codes as listed at the bottom of the form.

- 1 = rock
- 2 = sand
- 3 = silt
- 4 = mud
- 5 = gravel

Location - As the gear is set, the captain will record:

- **Latitude (N)** in degrees and decimal minutes - dd°mm.mm, and
- **Longitude (E or W)** in degrees and decimal minutes - ddd°mm.mm. All pots in this survey will be set in west longitude; circle the letter ‘W’ on each Pilot House Log. Latitude and longitude may be recorded in either of two ways, e.g., 52°15.77’ or as a string of numbers with symbols and decimal points omitted ‘521577’.

Logger ID: The temperature data logger ID number will be recorded in the same row as the sequential pot number in which it was deployed.

Lift Gear

Date: The captain will record the date the gear is pulled, in mm-dd-yy format.

Time: The captain will record the time the gear is pulled, in local Alaska time and in 24-hour format (0000 – 2359). ‘0000’ is midnight and denotes the beginning of the next day.

Gear Performance: Gear performance will be assessed for every pot pulled. Codes to be used are at the bottom of the form.

- Blank = good
- 40 = lost pot
- 41 = pot door bent or not tied
- 42 = pot not baited
- 43 = pot landed upside down
- 44 = hole in the pot

The “44” code is to be used for any unauthorized hole in the pot, such as a hole torn in the webbing, a biotwine that has come loose, etc. In this survey, any escape rings that are in the pots will be covered by twine to make them unusable to any crab; if an escape ring is open it should be recorded here. For this survey, make a note on deck of the nature of the hole and its size or the size of the open escape ring.

Appendix C2.-Crab measurement form.

Crab Measurement Form

Sample Date (mm-dd-yy): _____ - _____ - _____ Survey Code: _____ Recorder: _____
 Station Number: _____ Pot Start Time: _____ Measurer(s): _____
 SPN: _____ Buoy ID: _____ Pot End Time: _____ Logger ID: _____
 Page _____ of _____ (record times as 0000-2359) Tag Series: _____

SPECIES	CODE	SEX	CARAPACE SIZE (mm)	CHELA HEIGHT (mm)	LEGAL SIZE	SHELL CONDITION	FEMALE MATURITY	EGGS				CONDITION	PARASITES	TAG NUMBER	COMMENTS
								CLUTCH FULLNESS	EGG DEVELOPMENT	CLUTCH CONDITION	EGG COLOR				
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
21															
22															
23															
24															
25															

<p>SPECIES CODES:</p> <p>1 = golden king 2 = red king 3 = blue king 4 = hair crab 5 = DO NOT USE 6 = <i>C. bairdi</i> 7 = <i>C. opilio</i> 8 = <i>C. angulatus</i> 9 = Dungeness 10 = <i>L. cookei</i> 11 = <i>C. tanneri</i> 12 = <i>P. multispina</i> 13 = <i>P. ventri</i> 41 = hybrid, legal <i>C. bairdi</i> 42 = hybrid, legal <i>C. opilio</i></p>	<p>SEX:</p> <p>0 = unknown 1 = male 2 = female 3 = hermaphrodite</p> <p>LEGAL SIZE:</p> <p>0 = sublegal 1 = legal, retained 2 = legal, not retained</p> <p>IN THE BERING SEA DISTRICT: Legal <i>C. bairdi</i>: Both eyes completely red AND Two angular V-shaped notches in margin of upper lip (epistome) forming M shape Legal <i>C. opilio</i>: Does not have all of the above characteristics</p>	<p>SHELL CONDITION:</p> <p>0 = premolt / molting 1 = soft 9 = new, pliable 2 = new 3 = old 4 = very old 5 = very, very old</p>	<p>EGGS</p> <p>CLUTCH FULLNESS:</p> <p>0 = no eggs 1 = trace to 1/8 full 2 = 1/4 full 3 = 1/2 full 4 = 3/4 full 5 = 100% full</p> <p>EGG DEVELOPMENT:</p> <p>1 = uneyed eggs 2 = eyed eggs 3 = hatching</p> <p>CLUTCH CONDITION:</p> <p>1 = no dead eggs 2 = dead eggs < 20% 3 = dead eggs > 20% 4 = barren / clean setae 5 = barren / matted setae 6 = barren / no setae</p> <p>EGG COLOR:</p> <p>0 = other 1 = cream 2 = tan 3 = yellow 4 = orange 5 = dark orange 6 = pink 7 = reddish 8 = purple 9 = purple-brown 10 = brown 11 = brownish-black</p> <p>PARASITES:</p> <p>blank = not examined 0 = none 1 = <i>B. callosus</i> 2 = nemertean worms 3 = bitter crab 4 = other 5 = black mat 6 = torch 7 = cottage cheese 8 = turbellarian worms 9 = pepper crab 10 = snailfish eggs 12 = leatherback</p>	<p>FEMALE MATURITY:</p> <p>0 = unknown 1 = immature 2 = mature 3 = mature - primiparous 4 = mature - multiparous</p> <p>CONDITION:</p> <p>blank = uninjured 1 = fresh injury 2 = dead 3 = previously dead</p>
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-continued-

INSTRUCTIONS FOR CRAB MEASUREMENT FORM

This form is used to record selected crab species from sampled pots. At least one form will be filled out for every sequential pot number set. If a pot contains zero crab, make a large null symbol ‘Ø’ on the center of the form. If multiple sexes or species are sampled on the form, a blank line will separate those changes. Enter the Survey Code and fill in the Sample Date, Station Number, Sequential Pot Number, Buoy ID, and Logger ID fields as directed in the *Survey Pilot House Log* instructions.

Sample Date: Record the date that the pot was sampled, in mm-dd-yy format.

Recorder: Write the initials of the person recording the data.

Measurer(s): Write the initials of the person(s) measuring crabs.

Page ___ of ___ : The pages of this form will be numbered sequentially within each SPN sampled. When the last page of an SPN is completed, that number will be written in the 2nd blank on all the pages. For example: A total of 4 crab measurement pages were used to record data for an SPN. ‘Page 1 of 4’ would be on the first page, and ‘Page 4 of 4’ would be on the last page.

Species Code: Record the species code of the sampled crab from the list at the bottom of the form.

Sex: Record the sex of the crab as noted at the bottom of the form.

Carapace Size (mm): Record the carapace length of king and hair crabs in mm CL. For all *Chionoecetes* species and Dungeness, record the carapace width in mm CW. In this survey, we will measure all crab to the nearest mm, with the exception of male Tanner (*C. bairdi*) crab which will be measured to the nearest 0.1 mm.

Chela Height (mm): Record the chela height of the right chela of male Tanner (*C. bairdi*) crabs in mm CH. Measure to the nearest 0.1 mm. Measure only those chela that do not display evidence of regeneration. If you do not measure because of regeneration, note this in comments.

Legal Size: Record the legal size/retention status code of male crabs only; record code ‘0’ for sublegal males and code ‘2’ for all legal males sampled during the survey.

Shell Condition: Record the shell condition of each crab sampled as noted at the bottom of the form.

Female Maturity: Record the maturity status of each crab sampled. Codes 3 and 4 only apply to *Chionoecetes* crabs.

-continued-

Eggs – When mature female crabs are sampled, the following data fields will be completed using the codes listed at the bottom of the form.

- **Clutch Fullness:** Ranges as fractional percentage from no eggs (0%) to 100% full.
- **Egg Development:** Eggs will be eyed, uneyed, or hatching.
- **Clutch Condition:** Presence of dead eggs, and the percentage of dead eggs to good eggs OR presence of clean or matted setae, if there are no eggs.
- **Egg Color:** Egg color will be the closest match to colors displayed in the standard color chart.

Condition: The crab is uninjured (*blank*), newly-injured (e.g. cracked carapace, the fresh loss of limbs), dead, or previously dead.

Parasite(s): Record all codes that apply to the sampled crab. This field will be *blank* if a crab was not examined for parasites. Zero (0) will indicate it was examined and no parasites were present. Multiple parasites can be recorded, separated by commas (e.g., 1, 10).

For this survey, if shell disease (also known as torch) is present, note in comments:

- a) how many lesions are present
- b) relative size: small (about the size of leech egg cases, up to approx 1 cm in diameter), medium (approximately 2 cm in diameter), or large (approximately 3 or more cm in diameter).
- c) Also if time allows, note location seen (chela, carapace, 1st pair walking legs, etc).

Tag Series: N/A – No tagging of crab and not recorded during this survey.

Tag Number: N/A – No tagging of crab and not recorded during this survey.

Comments: Note items specific to the sampled crab e.g., severely injured, extensive bleeding, poor overall condition, and other observations not captured in required form fields. Use this for descriptions of shell disease lesions or other parasite or diseases. If photos were taken of this crab, note this in comments. If the space is not big enough, it is OK to write in margins of page but make sure it is obvious the comment belongs to what crab.

Species Composition Form

Sample Date (mm-dd-yy): _____ - _____ - _____ Vessel Name: _____
 Page _____ of _____ Survey Code: _____ Recorder: _____

SPN	STATION NUMBER	BUOY ID	SPECIES NAME	SPECIES CODE <small>(NMFS RACE codes)</small>	TOTAL NUMBER	COMMENTS
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

FREQUENTLY ENCOUNTERED SPECIES (Bering Sea & Aleutians in general):

471 = Alaska skate 472 = Aleutian skate 10115 = Greenland turbot (or Greenland halibut) 10120 = Pacific halibut 10210 = yellowfin sole 20510 = sablefish (or black cod) 21220 = Pacific grenadier 21347 = yellow Irish lord 21720 = Pacific cod 21921 = Atka mackerel 40011 = hydroid unident. 40500 = jellyfish unident. 68577 = Artic lyre crab (or circumboreal toad crab) 68578 = Pacific lyre crab	69060 = Aleutian hermit crab 69090 = Alaskan hermit crab 71500 = snail unident. 71820 = Pribilof neptune (or Pribilof whelk) 72500 = hairy triton (or Oregon triton) 72743 = angled buccinum (or angular whelk) 72752 = silky buccinum (or ladder whelk) 78403 = giant octopus 83000 = brittle star unident. 83320 = notched brittlestar 81742 = purple-orange sea star 82510 = green sea urchin 91000 = sponge unident.
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ADF&G SHELLFISH RESEARCH-REV. August 21, 2011

-continued-

INSTRUCTIONS FOR THE SPECIES COMPOSITION FORM

This form is used to record total numbers of all identified species from sampled pots, except for the crab species documented on the *Crab Measurement Form*. If there are no species other than measured crabs in the pot, make a null symbol ‘Ø’ in the Species Name column for that SPN.

Enter the Sample Date, Survey Code, Vessel Name, Sequential Pot Number, Station Number, Bouy ID, and page numbers as directed in the *Survey Pilot House Log* instructions. Record the name of the person that fills out this form.

Species Name: Write the common name, or if unavailable, the scientific name of each animal caught.

Species Code: Except as noted below, record the 5-digit NMFS RACE code of each identified animal. Commonly-encountered species in general in all of the Bering Sea and Aleutian Islands are listed at the bottom of the form; refer to the supplied 2011 NMFS Species Code Book for additional codes. **DO NOT DEPEND ON THIS LIST FOR IDENTIFYING. USE THE GUIDES IN THE SURVEY LIBRARY.**

If an animal cannot be identified to species at the time of sampling, note the genus or family name and write the corresponding code on the form. Save the animal in one of the totes with sea water for later identification and/or photos, if possible. When photographs or specimens are taken for later positive identification, note that in the Comments section (below).

Total Number: By species or taxon, record the total number of animals caught in each pot.

Comments: Anything related to individual species listed on the form (photograph taken, specimen collected, preliminary identification, etc.).

Crab Subsampling Form

Sample Date (mm-dd-yy): _____ - _____ - _____ Survey Code: _____ Recorder: _____
 Station Number: _____ Measurer(s): _____
 SPN: _____ Bouy ID: _____ Logger ID: _____
 Page _____ of _____

	SUBSAMPLING CATEGORY				NUMBER			COMMENTS
	SPECIES CODE	SEX	LEGAL SIZE	FEMALE MATURITY	MALE SIZE	NOT MEASURED	MEASURED	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

SPECIES CODES
 1 = golden king
 2 = red king
 3 = blue king
 4 = hair crab
 5 = DO NOT USE
 6 = *C. bairdi*
 7 = *C. opilio*
 8 = *C. angulatus*
 9 = Dungeness
 10 = *L. coveyi*
 11 = *C. tanneri*
 12 = *P. multispina*
 13 = *P. verilli*
 41 = hybrid, legal *C. bairdi*
 42 = hybrid, legal *C. opilio*

SEX
 0 = unknown
 1 = male
 2 = female
 3 = hermaphrodite
 99 = not separated by sex

LEGAL SIZE
 0 = sublegal
 1 = legal, retained
 2 = legal, not retained
 99 = males not separated by legality

FEMALE MATURITY
 0 = unknown
 1 = immature
 2 = mature
 3 = mature, primiparous
 4 = mature, multiparous
 99 = females not separated by maturity

IN BERING SEA DISTRICT:
 Legal *C. bairdi*:
 Both eyes completely red AND
 Two angular V-shaped notches in margin of upper lip (epistome) forming M shape
 Legal *C. opilio*:
 Does not have all of the above characteristics

MALE SIZE CATEGORY
BLUE & RED KING CRAB
 For sublegal male (Legal = 0):
 4 = Sublegal males < 120-mm CL
 5 = Sublegal males >= 120-mm CL
 For legal male (Legal = 2 or 1):
 0 = all legal males (will not separate into groups)

BLUE AND RED KING CRAB - Pribilof 2011

ADF&G SHELLFISH RESEARCH - Crab Subsampling Form Trip Specific (Rev. August 23, 2011)

Crab Subsampling Form

Sample Date (mm-dd-yy): _____ - _____ - _____

Survey Code: _____

Recorder: _____

Station Number: _____

Measurer(s): _____

SPN: _____ Bouy ID: _____

Logger ID: _____

Page _____ of _____

	SUBSAMPLING CATEGORY				NUMBER			COMMENTS
	SPECIES CODE	SEX	LEGAL SIZE	FEMALE MATURITY	MALE SIZE	NOT MEASURED	MEASURED	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

SPECIES CODES
 1 = golden king
 2 = red king
 3 = blue king
 4 = hair crab
 5 = DO NOT USE
 6 = *C. bairdi*
 7 = *C. opilio*
 8 = *C. angulatus*
 9 = Dungeness
 10 = *L. coveyi*
 11 = *C. tanneri*
 12 = *P. multispinna*
 13 = *P. verilli*
 41 = hybrid, legal *C. bairdi*
 42 = hybrid, legal *C. opilio*

SEX
 0 = unknown
 1 = male
 2 = female
 3 = hemaphrodite
 99 = not separated by sex

LEGAL SIZE
 0 = sublegal
 1 = legal, retained
 2 = legal, not retained
 99 = males not separated by legality

FEMALE MATURITY
 0 = unknown
 1 = immature
 2 = mature
 3 = mature, primiparous
 4 = mature, multiparous
 99 = females not separated by maturity

MALE SIZE CATEGORY

SNOW and HYBRID-LEGAL SNOW (*C. opilio*)

For sublegal male (Legal = 0):
 0 = all sublegal males
 (will not be separated into groups)

For legal male (Legal = 2 or 1):
 8 = CW < 4.0 inches, including spines
 9 = CW >= 4.0 inches, including spines

IN BERING SEA DISTRICT:
 Legal *C. bairdi*:
 Both eyes completely red AND
 Two angular V-shaped notches in margin of upper lip (epistome) forming M shape
 Legal *C. opilio*:
 Does not have all of the above characteristics

41

Crab Subsampling Form

Sample Date (mm-dd-yy): _____ - _____ - _____

Survey Code: _____

Recorder: _____

Station Number: _____

Measurer(s): _____

SPN: _____ Bouy ID: _____

Logger ID: _____

Page _____ of _____

	SUBSAMPLING CATEGORY				NUMBER			COMMENTS
	SPECIES CODE	SEX	LEGAL SIZE	FEMALE MATURITY	MALE SIZE	NOT MEASURED	MEASURED	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

SPECIES CODES
 1 = golden king
 2 = red king
 3 = blue king
 4 = hair crab
 5 = DO NOT USE
 6 = *C. bairdi*
 7 = *C. opilio*
 8 = *C. angulatus*
 9 = Dungeness
 10 = *L. coveyi*
 11 = *C. tanneri*
 12 = *P. multispina*
 13 = *P. verilli*
 41 = hybrid, legal *C. bairdi*
 42 = hybrid, legal *C. opilio*

SEX
 0 = unknown
 1 = male
 2 = female
 3 = hermaphrodite
 99 = not separated by sex

LEGAL SIZE
 0 = sublegal
 1 = legal, retained
 2 = legal, not retained
 99 = males not separated by legality

FEMALE MATURITY
 0 = unknown
 1 = immature
 2 = mature
 3 = mature, primiparous
 4 = mature, multiparous
 99 = females not separated by maturity

MALE SIZE CATEGORY
TANNER and HYBRID-LEGAL TANNER (*C. bairdi*)
 For sublegal male (Legal = 0):
 0 = all sublegal males
 (will not be separated into groups)
 For legal male (Legal = 2 or 1):
 8 = CW < 5.0 inches, including spines
 9 = CW >= 5.0 inches, including spines

IN BERING SEA DISTRICT:
 Legal *C. bairdi*:
 Both eyes completely red AND
 Two angular V-shaped notches in margin of upper lip (epistome) forming M shape
 Legal *C. opilio*:
 Does not have all of the above characteristics

INSTRUCTIONS FOR CRAB SUBSAMPLING FORM

NOTE: THERE ARE THREE DIFFERENT FORMS BASED ON THE CRAB SPECIES.

**** Use the appropriate form for each species. ****

This form is used to record the total number of crabs that have been subsampled at each pot by separate sex and size categories determined prior to conducting the survey. Measuring of crabs will not commence until crab counts for each subsampling category have been made and recorded.

Enter the **Sample Date**, **Survey Code**, **Station Number**, **Sequential Pot Number**, **Buoy ID** fields, and page numbers as directed in the *Survey Pilot House Log* instructions. Record the name of the person that fills out this form.

SUBSAMPLING CATEGORIES:

Record the **Species Code**, **Sex**, **Legal Size**, and **Female Maturity** columns as directed in the *Crab Measurement Form* instructions and as at the bottom of the form.

The additional code of “99” will be used when the crab were not separated by sex, legality, or female maturity. This will mean the crab count for that line will be a mix of that particular characteristic (e.g. if a crab species was separated by sex, but then males were not separated by legal status, the code “99” under legal size would mean the numbers on that line were a mix of legal and sublegal males).

Male Size Category: Enter one of the male size category codes at the bottom of the form. There is no “99” code for this column. For the 2011 Pribilof Islands king crab survey these are:

Blue and Red King Crab

0 = use for all legal males (unknown size cohorts)

4 = sublegal males < 120 mm CL

5 = sublegal males \geq 120 mm CL

-continued-

Tanner and Hybrid-Legal Tanner (*C. bairdi*) Crab

0 = use for all sublegal males (unknown size cohorts)

8 = legal male, CW < 5.0 inches, including spines

9 = legal male, CW ≥ 5.0 inches, including spines

Snow and Hybrid-Legal Snow (*C. opilio*) Crab

0 = use for all sublegal males (unknown size cohorts)

8 = legal male, CW < 4.0 inches, including spines

9 = legal male, CW ≥ 4.0 inches, including spines

NUMBER OF CRAB:

Number Not Measured (i.e., crabs counted and released to the sea): Tally the number of unmeasured crabs by the identified sex, legal size, female maturity, and male size categories recorded on the same line.

Number Measured (i.e., subsample of crabs that were measured): Tally the number of crabs measured by the identified sex, legal size, female maturity, and male size categories recorded on the same line.

NOTE: Measure crabs from each subcategory in multiples of 25, recording and filling up one entire crab measurement form for each 25 measured. If there is less than 25 in a subcategory, measure all the crab and do not subsample that subcategory.

Total Number: Add the number of measured and unmeasured crabs and record the total number of crabs caught by identified sex and size categories.

Comments: Anything related to the sampling or subsampling of sex and size categories will be noted.

Appendix C5.-Fish length form.

Fish Length Form

Sample Date (mm-dd-yy): _____ - _____ - _____

Vessel Name: _____

Survey Code: _____

Recorder: _____

Page: _____ of _____

Measurer(s): _____

SPN	SPECIES CODE	FISH LENGTH (cm)	SPECIES NAME	COMMENTS
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

FISH TO MEASURE:		
10285 = Alaska plaice	10112 = Kamchatka flounder	10200 = rex sole
10110 = arrowtooth flounder	21910 = lingcod	30050 = roughyeye rockfish
21921 = Atka mackerel	30420 = northern rockfish	20510 = sablefish
30330 = black rockfish	10261 = northern rock sole	10250 = sand sole
30400 = bocaccio	21720 = Pacific cod	30560 = sharpchin rockfish
10270 = butter sole	10120 = Pacific halibut	30020 = shortspine thornyhead
30151 = dark rockfish	21110 = Pacific herring	10262 = southern rock sole
30150 = dusky rockfish	30060 = Pacific ocean perch	10220 = starry flounder
10170 = English sole	21710 = Pacific tomcod	21740 = walleye pollock
10130 = flathead sioe	30475 = redbanded rockfish	30470 = yelloweye rockfish
10115 = greenland turbot	30430 = redstripe rockfish	10210 = yellowfin sole

Alaska Department of Fish and Game - Shellfish Research - Fish Length Form (Rev. August 21, 2011)

-continued-

INSTRUCTIONS FOR FISH LENGTH FORM

This form is used to record the measurements of commercially-important or other selected fish species from sampled pots. If there are no fish species measured from the pot, make a null symbol ‘Ø’ in the Species Name column for that SPN.

Enter the Sample Date, Survey Code, Vessel Name, Sequential Pot Number, and page numbers as directed in the *Survey Pilot House Log* instructions. Record the data recorder’s name and the name(s) of those who measured the fish.

Species Code: Record the 5-digit NMFS RACE code of each measured fish. Fish species to be measured are listed with their codes at the bottom of the form; refer to the supplied 2011 NMFS Species Code Book for additional codes. Fish species not listed on the form may be measured as determined by the crew leader. If in doubt, ask the crew leader.

Fish Length (cm): Record the total length or the fork length of the fish, in centimeters.

Fork length (FL) – Distance from the anteriormost point on the head to the innermost part of the fork of the tail fin.

Total length (TL) – the greatest length of a fish from the anteriormost point on the head to the tip of the tail.

Species Name: Write the common name, or if unavailable, the scientific name of each animal caught.

Comments: Anything related to the individual fish measured. If the fish was preserved or collected for identification, document that action in the Comments section.

BAIT FISHING NOTE:

During the 2011 Pribilof Survey, the boat is allowed to carry and set up to 10 cod pots for bait. Cod caught for bait and any other fish normally measured that are discarded from these pots while fishing for bait, will be measured and recorded separately from the survey pots using the fish length forms.

- There will be no sequential pot numbers. Instead, make a note on the location of the cod pots in the comments section (get the lat longs from the captain).
- At the top of the page write “FROM COD POTS – BAIT FISHING”
- These will be kept in a separate clipboard designated solely for keeping track of the bait fishing catches, and someone designated to be in charge of recording bait fishing catches.
- DO NOT MIX THESE WITH SURVEY POT CAUGHT FISH.

Weather Observation Form

Vessel Name: _____ Survey Code: _____ Page _____ of _____

STATION NUMBER	DATE (mm-dd-yy)	TIME (0000-2359)	CLOUD COVER	WIND		SWELL	BAROMETER (millibars)	COMMENTS
				SPEED	DIRECTION			
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

CLOUD COVER:

1 = Clear
 2 = 1/8 obscured
 3 = 1/4 obscured
 4 = 3/8 obscured
 5 = 1/2 obscured
 6 = 5/8 obscured
 7 = 3/4 obscured
 8 = 7/8 obscured
 9 = Completely overcast

WIND SPEED:

0 = Calm
 1 = Light Air
 2 = Light Breeze
 3 = Gentle Breeze
 4 = Moderate Breeze
 5 = Fresh Breeze
 6 = Strong Breeze
 7 = Near Gale
 8 = Gale
 9 = Strong (or Severe) Gale
 10 = Storm
 11 = Violent Storm
 12 = Hurricane

SWELL:

1 = 0 .. 2 feet
 2 = 2 .. 4 feet
 3 = 4 .. 6 feet
 4 = 6 .. 8 feet
 5 = 8 .. 10 feet
 6 = 10 .. 12 feet
 7 = 12 .. 14 feet
 8 = 14 .. 16 feet
 9 = more than 16 feet

INSTRUCTIONS FOR WEATHER OBSERVATION FORM

This form is used to document daily weather observations at stations fished during the charter, and will be completed at the time each station is set and picked (2 observations per station). If an observation is made at non-station locations, leave the station number blank.

Enter the Vessel Name, Survey Code, Page Number, Station Number, Date, and Time as directed in the *Survey Pilot House Log* instructions.

Record the appropriate *code* numbers for cloud cover, wind speed (see next page for wind speed code explanations) and direction, swell, and barometer reading. In the Comments section, note any other information pertinent to the weather observation.

CLOUD COVER CODES:

- 1 = clear
- 2 = 1/8 obscured
- 3 = 1/4 obscured
- 4 = 3/8 obscured
- 5 = 1/2 obscured
- 6 = 5/8 obscured
- 7 = 3/4 obscured
- 8 = 7/8 obscured
- 9 = completely overcast

CODES FOR SWELL:

- | | |
|-----------------|-----------------------|
| 1 = 0...2 feet | 6 = 10...12 feet |
| 2 = 2...4 feet | 7 = 12...14 feet |
| 3 = 4...6 feet | 8 = 14...16 feet |
| 4 = 6...8 feet | 9 = more than 16 feet |
| 5 = 8...10 feet | |

-continued-

WIND SPEED CODES:

Wind speed is a measure of wind velocity in knots and uses the Beaufort scale.

0 = Calm: Sea surface smooth and mirror-like. Wind speed approximately 0-1 knots (0-1 mph).

1 = Light Air: Ripples with the appearance of scales are formed, but without foam crests. Wind speed approximately 1-3 knots (1-3 mph).

2 = Light Breeze: Small wavelets, still short, but more pronounced. Crests have a glassy appearance and do not break. Wind speed approximately 4-6 knots (4-7 mph).

3 = Gentle Breeze: Large wavelets. Crests begin to break. Foam of glassy appearance. Perhaps scattered white horses. Wind speed approximately 7-10 knots (8-12 mph).

4 = Moderate Breeze: Small (1-4 ft) waves becoming larger; fairly frequent white horses. Wind speed approximately 11-16 knots (13-18 mph).

5 = Fresh Breeze: Moderate (4-8 ft) waves taking a more pronounced long form; many white horses are formed. Chance of some spray. Wind speed approximately 17-21 knots (19-24 mph).

6 = Strong Breeze: Large (8-13 ft) waves begin to form; the white foam crests are more extensive everywhere. Probably some spray. Wind speed approximately 22-27 knots (25-31 mph).

7 = Near Gale: Moderately high (13-20 ft) waves and white foam from breaking waves begins to be blown in streaks along the direction of the wind. Wind speed approximately 28-33 knots (32-38 mph).

8 = Gale: Moderately high (13-20 ft) waves of greater length; edges of crests begin to break into spindrift. The foam is blown in well-marked streaks along the direction of the wind. Wind speed approximately 34-40 knots (39-46 mph).

9 = Strong (or Severe) Gale: High (20 ft) waves. Dense streaks of foam along the direction of the wind. Crests of waves begin to topple, tumble and roll over. Spray may affect visibility. Wind speed approximately 41-47 knots (57-54 mph).

10 = Storm: Very high (20-30 ft) waves with long overhanging crests. The resulting foam, in great patches, is blown in dense white streaks along the direction of the wind. On the whole the surface of the sea takes on a white appearance. The 'tumbling' of the sea becomes heavy and shock-like. Visibility affected. Wind speed approximately 48-55 knots (55-63 mph).

11 = Violent Storm: Exceptionally high (30-45 ft) waves (small and medium-size ships might be for a time lost to view behind the waves). The sea is completely covered with long white patches of foam lying along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility affected. Wind speed approximately 56-63 knots (64-72 mph).

12 = Hurricane: The air is filled with foam and spray, waves over 45 ft. Sea completely white with driving spray; visibility very seriously affected. Wind speed approximately 64-71 knots (73-83 mph).

Tagged Crab Recovery Form

Vessel Name: _____ Processor Name: _____ Sampler Name: _____ Obs. ID ^a: _____ Packet Number ^a: _____
 Fishery Code: _____ Species Code: _____ ADF&G Number: _____ Sampler Type ^b: _____ Sample Date (mm/dd/yyyy): _____

C R A B N U M B E R	CAPTURE DATE (mm/dd/yyyy)	TAG		D I S P O	CARAPACE SIZE (mm)	SEX	L E G I Z E	S H E L L	F E M T	EGGS					C O N D	P A R A S I T E	LOCATION		DEPTH (Meters)	STAT AREA
		S E R I E S	N U M B E R							C L U T C H	D E V E L O P M E N T	C O N D I T I O N	C O L O R	L A T I T U D E (N) (dd°mm.mm)			L O N G I T U D E (ddd°mm.mm) E or W			
1																				
2																				
3																				
4																				
5																				

TAG DISPOSITION: 1 = tag removed from crab 2 = tag left on crab and released	SHELL CONDITION: 1 = soft 2 = new, pliable 3 = new 4 = very old	FEMALE MATURITY: 0 = unknown 1 = immature 2 = mature	CLUTCH FULLNESS: 0 = no eggs 1 = trace to 1/8 full 2 = 1/4 full 3 = 1/2 full 4 = 3/4 full 5 = 100% full	EGG DEVELOPMENT: 1 = uneyed eggs 2 = eyed eggs 3 = hatching eggs	EGGS: CLUTCH CONDITION: 1 = no dead eggs 2 = dead eggs < 20% 3 = dead eggs > 20% 4 = barren / clean setae 5 = barren / matted setae 6 = barren / no setae	EGG COLOR: 0 = other 1 = cream 2 = tan 3 = yellow 4 = orange 5 = dark orange 6 = pink 7 = reddish 8 = purple 9 = purple-brown 10 = brown 11 = brownish-black	CONDITION: blank = uninjured 1 = fresh injury 2 = dead 3 = previously dead	PARASITE(S): blank = none 1 = S. callosus 2 = nematode worms 3 = bitter crab 4 = other 5 = black mat 6 = leish 7 = cottage cheese 8 = tubiferian worms 9 = pepper crab 10 = smallish eggs 11 = leatherback
---	--	--	--	--	--	---	---	---

CRAB NUMBER	TAG OR TAGGED CRAB RECEIVED FROM: (name, address, city, state, zip)	LOCATION INFORMATION RECEIVED FROM: (name, address, city, state, zip)	COMMENTS
1	REWARD: ISSUED <input type="checkbox"/> NOT ISSUED <input type="checkbox"/>		
2	REWARD: ISSUED <input type="checkbox"/> NOT ISSUED <input type="checkbox"/>		
3	REWARD: ISSUED <input type="checkbox"/> NOT ISSUED <input type="checkbox"/>		
4	REWARD: ISSUED <input type="checkbox"/> NOT ISSUED <input type="checkbox"/>		
5	REWARD: ISSUED <input type="checkbox"/> NOT ISSUED <input type="checkbox"/>		

a Observer and fish ticket administrator use only
 b 1 = observer: catcher only vessel; 2 = observer: catcher processor; 3 = observer: floating processor; 4 = dockside sampler
 Alaska Department of Fish and Game - Tagged Crab Recovery Form (Rev. Dec. 27, 2007)

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Instructions for Tagged Crab Recovery Form

This form is used to record when a tagged crab is caught. This may be a crab tagged in previous years, by another research group, or be another species with a tag.

Vessel Name: Name of vessel that caught the tagged crab. This will be FV *Scandies Rose* if caught during this survey.

Fishery Code: N/A for this survey – leave blank. (A code used to identify a specific fishery)

Processor Name: N/A for this survey – leave blank.

Species Code: See Crab Species Code List (Appendix D1). Use the RACE code.

Sampler Name: Use this for the Recorder's name.

ADF&G Number: N/A for this survey – leave blank.

Sampler Type: N/A for this survey – leave blank.

Obs. ID: N/A for this survey – leave blank.

Sample Date: N/A for this survey – leave blank.

Packet Number: N/A for this survey – leave blank.

Capture Date: Mm/dd/yy tagged crab was recaptured. (Not the tagging date.)

Tag Series: Tag series letter preceding tag number, printed on both tag string and tab.

Tag Number: Record the tag number with leading zeros, excluding the series letter.

Tag Dispo: Tag disposition (codes also on form)

1 = tag removed from crab

2 = tag left on crab and crab released

Carapace Size: Record standard carapace measurement used for species of crab in mm.

Sex: Code that represents the sex of the crab (codes also on form).

0 = unknown

1 = male

2 = female

3 = hermaphrodite

Legal Size: Codes on form. A code that represents the legal size status of male crabs only. Leave blank if a female.

Shell Condition: Codes on form.

Female Maturity: Codes on form.

Clutch Fullness: Codes on form. Code represents the fractional amount of eggs present in relationship to abdomen size.

-continued-

Egg Development: Codes on form. Code represents the observed stage of egg maturity.

Clutch Condition: Codes on form. Code represents the general overall condition of the eggs and setae.

Egg Color: Codes on form. Code that represents the observed color of the eggs. Use color chart.

Condition: Codes on form. Code that represents the observed health of the animal. Ignore old injuries unless otherwise directed.

Parasite(s): Codes on form. Code(s) that represent any observed parasite and/or disease. Differentiate each parasite and/or disease by a comma. The code for 'other' is to be used to note the presence of a parasite or disease not on this list. If used, describe, photograph and retain the entire crab for further analysis. NOTE: These codes are the same as for the crab measurement form, with one exception. There is no zero listed. Put in a zero if the crab was examined and no parasites or disease found, as on the crab measurement form. Blank will mean crab not examined for parasites or disease.

Latitude (N): Latitude of the pot in which the tagged crab was caught in degrees and decimal minutes (dd°mm.mm).

Longitude: Longitude of the pot in which the tagged crab was caught; in degrees and decimal minutes (ddd°mm.mm). Circle E or W to indicate the appropriate hemisphere.

Depth: Depth of pot in which the tagged crab was caught, in whole fathoms.

Statistical Area: Six-digit number used to identify the area crab were caught. This can be determined from the ADF&G statistical charts.

Tag or Tagged Crab Received From: N/A for this survey – leave blank.

Location Information Received From: N/A for this survey – leave blank.

Comments: Use this space to write in the SPN (Sequential Pot Number) the tagged crab was recaptured in (e.g. “SPN=124”). Also record anything unusual related to the tag on the crab. If you run out of room, use empty space on the same line to record notes.

Data Logger Recording Form

Survey Dates: _____

Vessel Name: _____

Page _____ of _____

Survey Code _____

Recorder: _____

Deck ID	Model	Maximum Depth in Fathoms	Serial Number	Comments
219	XR-420-CTD	2,185	9643	
221	XR-420-CTD	2,185	9616	
223	TDR-2050	3,280	11880	
224	TDR-2050	3,280	11818	
225	TDR-2050	3,280	11808	
226	TR-1050	400	12570	
227	TR-1050	400	12569	
228	TR-1050	400	12176	
229	TDR-2050	3,280	11884	
230	TDR-2050	3,280	11885	
231	TDR-2050	3,280	11886	
232	XR-420-CTD	3,280	13166	
233	XR-420-CTD	3,280	13167	
234	XR-420-CTD	3,280	13168	
235	TR-1000	545	7209	
237	XR-420-CTD	3,280	13234	
238	XR-420-CTD	3,280	13235	
239	TR-1000	545	8816	

INSTRUCTIONS FOR DATA LOGGER FORM

This form is used to identify the unique logger ID number of the units that are deployed in survey pots. Enter the Sample Date, i.e., the date that the form was filled out and the Vessel Name and page numbers as directed in the *Survey Pilot House Log* instructions. Record the name of the person that fills out this form. If additional loggers are used, record all items as detailed above.

Comments: Anything related to the performance, deployment, and especially ‘not retrieved’ if a pot containing a logger is lost during the survey. Note buoy numbers used and when they were changed.

NOTE: Two additional TDR-2050’s with temporary logger numbers “009” and “012” will be used.

APPENDIX D. CRAB CODE DESCRIPTIONS

Appendix D1.–Crab code descriptions.

Many of the biological descriptions for king crabs are illustrated in Donaldson and Byersdorfer (2005) and in Jademec et al. (1999).

Crab Species Codes. Shorthand species codes (or deck codes) are recorded in on-deck survey forms.

Code	Common Name	RACE Code	Scientific Name
1	golden king crab	69310	<i>Lithodes aequispinus</i>
2	red king crab	69322	<i>Paralithodes camtschaticus</i>
3	blue king crab	69323	<i>Paralithodes platypus</i>
4	hair crab	69400	<i>Erimacrus isenbeckii</i>
5	Tanner hybrid	68590	<i>Chionoecetes bairdi</i> and <i>C. opilio</i> hybrid
6	Tanner crab	68560	<i>Chionoecetes bairdi</i>
7	snow crab	68580	<i>Chionoecetes opilio</i>
8	triangle Tanner crab	68570	<i>Chionoecetes angulatus</i>
9	Dungeness crab	68020	Cancer magister
10	scarlet king crab	69300	<i>Lithodes couesi</i>
11	grooved Tanner crab	68550	<i>Chionoecetes tanneri</i>
12	<i>Paralomis multispina</i>	69335	<i>Paralomis multispina</i>
13	<i>Paralomis verrilli</i>	69331	<i>Paralomis verrilli</i>
41	<i>C. bairdi</i> hybrid	n/a	-
42	<i>C. opilio</i> hybrid	n/a	-

Legal Size. Describes the size and fate of male crabs.

0 = Sublegal. Crab is too small to retain under any conditions.

1 = Legal, retained. A legal-sized crab that has been retained for market or study.

2 = Legal, not retained. A legal-sized crab that has been returned to the sea.

-continued-

Shell Condition. Shell condition codes are used to reflect the approximate time since a crab has last molted. Scratching on the ventral surface of the coxa, legs and carapace, shell color, epifaunal growth, and spine and dactyl wearing are all indicators of elapsed time since last molt.

0 = Premolt and molting. Crab is preparing to molt, exoskeleton is beginning to decalcify and soften.

1 = Soft. Crab has recently molted, exoskeleton is very soft, flaccid, and shapeless when out of the water. Exoskeleton texture is similar to wet leather or skin.

9 = New, pliable. Exoskeleton is firm yet flexible, few or no scratches, pits, or epibionts present. Ventral surface of the coxa is shiny, spines and dactyls are sharp.

2 = New. Coxa and ventral surface of the exoskeleton are dull, ranging from no-to-slight discoloration and no-to-limited scratching. Spines and dactyls may be slightly worn. Merus not easily compressed by pinching and will crack if bent. Adult female Tanner crabs rarely have grasping marks on the merus.

3 = Old. Characteristic exoskeleton is darker in coloration, and has significant scratching, wear, and abrasions. Carapace and chela are hard and cannot be indented by thumb pressure. Dactyls are worn and dull at the tips. Spines are worn or rounded. Barnacles and other epibionts are usually present. Adult female Tanner crabs that have been mated a second time usually show grasping marks on the merus.

4 = Very old. Distal portion of ventral coxa densely covered with dark scratching. Tips of dactyls are well worn, rounded, and dark. Carapace is frequently covered with epibionts to a greater extent than old-shell crabs. Adult female Tanner crabs that have been mated more than two times frequently have multiple grasping marks on the merus.

5 = Very, very old ('graveyard'). Exoskeleton characterized by being soft and spongy because of decay. Spines and dactyls are heavily worn and often worn through to muscle. Epibionts are always present and the shell appears brown to black dorsally and ventrally. Crabs of this shell age are usually listless upon capture.

Female Maturity. Maturity describes the relative reproductive stage of the animal.

0 = Unknown. The maturity of the crab was not determined.

1 = Immature. Juvenile animal too young to reproduce. In king crab, females with barren, clean setae

2 = Mature. Adult animal old enough to reproduce. In king crab, females with eggs or matted setae

3 = Mature, primiparous. New-shell adult female crab, without grasping marks, developing or having previously developed a single clutch.

4 = Mature, multiparous. Old, very old, or very, very old shell adult female crab, with one or more grasping marks, that has developed at least two clutches.

Eggs. Descriptions of the egg clutch or pleopodal setae.

Clutch Fullness. Describes the fractional amount of eggs present in relationship to the size of the abdomen; fullness is recorded as a visual estimation of the size of the clutch relative to an idealized full clutch (100%).

0 = No eggs present.

1 = Trace to 1/8th full. From 1 egg up to 1/8 of a full clutch; eggs not visible when the abdomen is closed.

2 = 1/4 full. Up to 1/4 (13% - 25%) of a full clutch; eggs not visible when the abdomen is closed.

3 = 1/2 full. Up to 1/2 (26% - 50%) of a full clutch; eggs just visible when the abdomen is closed.

4 = 3/4 full. Up to 3/4 (51% - 75%) of a full clutch; eggs are visible when the abdomen is closed.

5 = Full. A completely full clutch (76% - 100%); thickness of the egg mass is greatly pronounced.

Egg Development. Describes the observed stage of egg maturity. Eye slits or eye spots are visible as the egg develops. If empty egg cases are visible among viable eggs within the clutch, the eggs are in the hatching state. *For golden king crabs, newly-hatched zoeae may be visible to the naked eye.*

1 = Uneyed. Unfertilized or early development stage eggs with no visible eye spots.

2 = Eyed. Eye spots and/or prezoae visible in eggs.

3 = Hatching. Eggs are clearly in a visible state of hatching; empty egg cases are present.

Clutch Condition. Describes the general overall condition of the clutch, setae, and eggs observed during the examination of mature female crabs.

1 = No dead eggs. Eggs are present but none are visibly dead.

2 = Dead eggs (< 20%). Less than 20% of the visible eggs are dead; dead eggs appear opaque or off-color from the remainder of the clutch.

3 = Dead eggs (> 20%). More than 20% of the visible eggs are dead.

4 = Barren, clean setae. No visible eggs, pleopodal setae are clean, shiny, light in color and very fine.

5 = Barren, matted setae. No visible eggs, pleopodal setae are dirty in appearance and often have dead and/or empty egg cases attached.

6 = No visible setae on pleopods.

Egg Color. Use the *standard color chart* illustrations to match egg color.

0 = other; describe.

4 = orange

8 = purple

1 = cream

5 = dark orange

9 = purple-brown

2 = tan

6 = pink

10 = brown

3 = yellow

7 = reddish

11 = brownish-black

-continued-

Condition. Describes the apparent health of the animal.

- 0** = Uninjured. No visible fresh injuries. (NOTE: our forms use blank for uninjured)
- 1** = Fresh injury. The animal has been injured during/after gear retrieval.
- 2** = Dead. The animal died during/after gear retrieval.
- 3** = Previously dead. The animal died prior to gear retrieval.

Parasites and Diseases. Common parasites and diseases that have been observed during the course of routine field work are listed below. *Parasite and disease data is anecdotal unless otherwise noted (e.g., for special projects).*

- 0** = None. Animal was examined; no parasite or disease observed.
- 1** = *Briarosaccus callosus* externae or scars from previous externae present within abdominal flap.
- 2** = Nemertean worms present in egg clutch.
- 3** = Bitter crab. Crab afflicted with bitter crab syndrome.
- 4** = Other. Note the presence of a parasite or disease not described in this list.
- 5** = Black mat. Crab afflicted with black mat syndrome.
- 6** = Torch. Chitinoclastic bacteria presence evident on crab shell. (Also known as CCB)
- 7** = Cottage cheese. Crab afflicted with ‘cottage cheese’ disease.
- 8** = Turbellarian worms present in egg clutch.
- 9** = Pepper crab. Crab afflicted with pepper crab disease.
- 10** = Snailfish eggs. Snailfish eggs present under the carapace within the branchial chamber.
- 12** = Leatherback. A crab with a leathery or rubbery carapace, regardless of shell condition.

APPENDIX E. EQUIPMENT LIST

Personal Equipment

Immersion suit with EPIRB, strobe, and rescue laser flare
Rain gear, boots, gloves (6 pairs liners and 6 pairs rubber per person)
SOSpenders (approved Type V for use as a Type II) or vest Type V (one per person)
LED headlamps for use on deck, and headlamp or flashlight for emergency use

Deck and Sampling Equipment

aluminum sorting table, 4'x8' with 6 detachable legs
(12) thin, 3" hex head bolts and nuts; and appropriate sized socket wrench for table assembly
dump totes (4)
fish baskets (15 orange round and 5 yellow rectangular)
covered clipboards, aluminum or plastic (5), regular clipboards (4)
waterproof watch (1); timer (1)
counters (3)
calipers, nondigital large size with millimeter scale (4), small size (1)
 digital (2), extra batteries
measuring sticks: 6.5" for red and blue king crab (5)
 4.4" for legal *C. bairdi* Tanner crabs (4)
 5.0" for industry preferred *C. bairdi* Tanner crab (4)
 3.1" for legal snow crab (2)
 4.0" for industry preferred snow crab (4)
 3.25" for hair crab (3)
tape measures (cm) for fish measurements (3)
onion sacks for holding crabs, fish in tanks (6)
fish measuring board (1)
can WD-40 (3)
rolls electric tape (10)
plastic Rubbermaid dishpans (4)
assorted plastic bags: (3 doz.) gallon (freezer weight) and (100) quart zip-locks; (2 doz.) 25 gal.
 clear thick mil
liter of 100% formalin, with mixing jar (1)
alcohol – one (1) gallon
specimen jars (20)
dissecting kit (1)
Victorinox knives (12)
plastic toolbox for crab sampling equipment (2)
magnifying light (1)
magnifying lens (2), including (1) 4-inch diameter

Crab Pot Gear

ADFG Pots (80)
Shots – for 80 pots and extras
ADFG marked Bouys – for 80 pots and extras

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Fishing Pot Supplies

5-lb rolls #30 biodegradable cotton twine (2)
5-lb rolls #96 tarred seine twine (7)
5-lb rolls #84 tarred seine twine (5)
5-lb rolls 5-mm orange poly twine (12)
600-ft roll #32 groundline, for door ties (1)
door hooks (50)
door rubbers (50)
net mending needles (4), assorted sizes
hand-held propane torches (2)
propane cylinders (2)
zip-ties (500)(to tie down existing diagonal bridles on pot)
1200-ft roll line, for center bridles specific to *F/V Scandies Rose*

Forms

Survey Pilot House Log sheets – prenumbered (60)
Crab Measurement Forms (4,000 - rite-in-rain)
Station Catch Summary Forms: 1) King crab (80) 2) snow crab (80)
Crab Subsampling Forms: Blue and Red King (20, rite-in-rain)
Tanner and hybrid-legal Tanner (200, rite-in-rain)
Snow and hybrid-legal Snow (350, rite-in-rain)
Species Composition Forms (400, rite-in-rain)
Fish Length Forms (250, rite-in-rain)
Temperature Logger ID Forms (5, rite-in-rain)
Tagged Crab Recovery forms (15, rite-in-rain)
Weather Observation Forms (25)

Charts and Books

1. NOAA Chart: 16830 – Pribilof Islands
2. ADFG Groundfish/Shellfish Statistical Area Chart 3 – Bering Sea (showing NMFS Areas)
3. 2011 NMFS Species Codebook (2)
4. 2011-2012 Commercial King and Tanner Crab Fishing Regulations (2)
5. Checklist of Alaskan Crabs, B.G. Stevens 2002 (1)
6. Review of the Family Lithodidae, Zaklan 2002 (1)
7. Biological Field Techniques for Chionoecetes Crabs, Jadamec et al. 1999 (2)
8. Biological Field Techniques for Lithodid Crabs, Donaldson and Byersdorfer 2005 (2)
9. Alaska Saltwater Fishes and Other Sea Life, Kessler 1985 (2)
10. Guide to the Identification of some common eastern Bering Sea Snails, MacIntosh 1976 (2)
11. Common fish and inverts near Pribilof Islands - Byersdorfer 2004 (1)
12. Common fish and inverts near St. Matthew Island - Byersdorfer 2005 (1)
13. Field Guide to the Benthic Marine Invertebrates of Alaska's shelf and upper slope, Roger N. Clark, 2006 version, CD only.

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Charts and Books (continued)

14. Names of Decapod Crustaceans AFS #17, Williams et al. 1989 (1)
15. Names of Mollusks 2nd edition AFS #26, Turgeon et al. 1998 (1)
16. Fishes of Alaska, Mecklenburg et al. 2002 (1)
17. Guide to northeast Pacific Flatfishes, Kramer et al. 1995 (1)
18. Guide to northeast Pacific Rockfishes - 2003 edition, Kramer & O'Connell 1986 (1)
19. A Field Guide to Alaskan Corals, Wing and Barnard 2003 Draft (2)
20. Guide to Marine Mammals of Alaska – 3rd edition, Wynne 2007 (1)
21. Field Guide to Sharks, Skates, and Ratfish of Alaska, Stevenson et.al. 2007
22. Field Guide to Common Fishes and Invertebrates of Alaska, Byersdorfer and Watson 2010
23. Under Alaskan Seas, Barr and Barr 1983 (1)
24. A Field Guide to the Birds of North America, National Geographic – 4th edition 2002 (1)
25. Laminated color chart, ADF&G Shellfish Research 2006 (2)
26. Pacific Coast Crabs and Shrimps, Jensen 1995 (1)
27. Diseases of Wild and Cultured Shellfish in Alaska, Meyers and Burton 2009 (1)
28. Pacific Coast Fishes, Eschmeyer et al. 1983 (1)
29. Pacific Fishes of Canada, Hart 1973 (1)
30. Brittle Stars, Lambert and Austin 2007 (1)
31. Sea Stars, Lambert 2000 (1)
32. Sea Cucumbers, Lambert 1997 (1)
33. Field Guide to Squids and Octopods, Jorgensen 2009 (1)
34. Shell Condition for Chionoecetes Crabs Example Photographs
35. Trifold Pamphlet: Marine Mammals of the Eastern North Pacific 3rd ed., Sea Grant 2010
36. Laminated Sheet: North Pacific Albatrosses Identification, USFWS et.al.

Office Supplies

- Rite in Rain notebooks (5)
- Rite in Rain paper (500 sheets)
- small 3-ring binder for completed Pilot House Log forms (1)
- small 3-ring binder for completed Station Catch Summary forms (1)
- calculators (2)
- mechanical pencils (20)
- No. 2 regular pencils (2 boxes)
- ink pens (5)
- permanent markers (4)
- sheets plain paper (100)
- 3-ring hole punch (1)
- assorted. rubber bands (including large, for clipboards)
- assorted rubber bands (including large, for clipboards)
- roll Scotch tape (1); rolls duct tape (2); roll clear packing tape (1)
- assorted. paper and binder clips
- envelopes - data form filing (15)
- plastic file tote/lid (1) with hanging folders (15)

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Miscellaneous Supplies

- pairs earplugs (32)
- Paper towels (16 rolls)
- Small hair dryer
- LED waterproof flashlights (3)
- Chargers for rechargeable batteries (AA,AAA) (2)
- Rechargeable batteries (4 AA, 16 AAA)
- Extra regular batteries, AAA,AA (for head lamps, flashlights)
- SOSpenders recharge kit (2)

Computers

- laptop, with case (3)
- mouse and mouse pad, if desired (3)
- external keyboard, if desired (3)
- Memory card reader
- Portable external hard drive in case
- Jump drive (1)
- Burnable CD-R (6), DVD (24)
- power cord (2)
- Surge protector plugs (3)
- Power strips with surge protectors (2)

Cameras

- Waterproof Lumix DMC-TS3 (1)
 - Camera battery charger, extra battery
 - memory cards (2)

Data Loggers and Accessories

Loggers:

<u>Conductivity/Temp/Depth</u>		<u>Temperature/Depth</u>		<u>Temperature</u>	
<u>Model</u>	<u>Serial #</u>	<u>Model</u>	<u>Serial #</u>	<u>Model</u>	<u>Serial #</u>
XR-420-CTD	9616	TDR-2050	11808	TR-1050	12176
XR-420-CTD	9643	TDR-2050	11818	TR-1050	12569
XR-420-CTD	13166	TDR-2050	11880	TR-1050	12570
XR-420-CTD	13167	TDR-2050	11884		
XR-420-CTD	13168	TDR-2050	11885	TR-1000	7209
XR-420-CTD	13234	TDR-2050	11886	TR-1000	8816
XR-420-CTD	13235	TDR-2050	23904		
		TDR-2050	23905		

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Data Loggers and Accessories (continued)

Accessories:

RBR Submersible Data Logger User's Manual – 11/2010 edition

RBR software CD version 5.21, RS232 cable

RBR maintenance kit (lube, 'O'-rings, and O ring remover tool)

Hydraulic hose sleeves and steel attachment hardware (shackles, bolts, carabineers)

door hooks and rubbers for securing probes inside pots

3-volt batteries (lithium CR123A)

(XR-420-CTDs require 4; TDR-2050/2051 require 2; TR-1000/1050 require 2)

(Note: New batteries put in at start of survey.)
