

Regional Information Report No. 4K09-10

**Project Operational Plan for the 2009 Petrel Bank
Red King Crab Survey**

by

Robert K. Gish

October 2009

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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

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ABSTRACT

This report describes the operational plan for the 2009 Petrel Bank red king crab survey on the distribution and relative abundance of red king crabs *Paralithodes camtschaticus* in the central Aleutian Islands waters of the Petrel Bank area during the fall fishing season. Descriptions of the objectives, study area, survey design, sampling methods, data analysis, and reporting are given. The Alaska Department of Fish and Game (ADF&G) will conduct the survey during November and early December aboard the chartered F/V Arctic Fury (a 43.8-m commercial crab-pot fishing vessel) on and around the Petrel Bank area in the Aleutian Islands king crab registration area.

Keywords: Red king crab, *Paralithodes camtschaticus*, Petrel Bank, Aleutian Islands, pot survey, distribution, relative abundance.

INTRODUCTION

The red king crab *Paralithodes camtschaticus* fishery in the Aleutian Islands area began in 1961; initially, the Aleutian Islands king crab resource was harvested in two registration areas. The Eastern Aleutians (Dutch Harbor) Registration Area, Area O, encompassed waters east of 172° W longitude, while the Mid Aleutians (Adak) Registration Area, Area R, consisted of those waters in the Aleutian Islands west of 172° W longitude (Schmidt 1973); the line separating Adak and Dutch Harbor areas was changed to 171° W longitude for the 1984/85 season (Griffin and Dunaway 1985). Originally, the fishery for red king crabs in the Adak area was for the most part around Adak Island and, as effort and harvest increased to reach a peak harvest of 21 million pounds in 1964/65, the fleet moved eastward to the waters around Atka and Amlia Islands and westward to the waters around Petrel Bank and Amchitka Island. A third registration area (Western Aleutian Registration Area, Area S) was created in 1967 for those waters around Petrel Bank, Amchitka Island and other islands of the Western Aleutians west of 179° 15' W longitude; the Mid-Aleutians Registration Area (Adak), Area R, at that time consisted of those waters in the Aleutian Islands between 172° W longitude and 179° 15' W longitude (ADF&G 1973). The Area S harvest was concentrated in the Petrel Bank area with occasional harvests near Amchitka, Kiska and Attu Islands; catches were sporadic and Area S was merged into Area R (as the Petrel Bank and Western Aleutian Districts) in 1978 (Tate and Nelson 1978). The Adak (Area R) red king crab fishery continued through the 1995/96 season; it was closed prior to the 1996/97 fishery due to the increase in poor fishery performance and to a recruitment failure as indicated by observer data (Gish 1997b). Prior to the closure in 1996/97, the western Aleutian Islands harvest statistics reflected a compression in the area supporting fishery harvests; the Attu Island area declined in the early to mid-1980s and the Atka-Amlia Islands area declined in the late 1980s. By the late 1980s and early-to-mid 1990s, the fishery was supported by the Petrel Bank area; however, by the 1995/96 season the Petrel Bank red king crab fishery had also declined (Gish et al. 1996).

To collect information regarding red king crabs around Semisopchnoi Island (the southern border of Petrel Bank) and Amchitka Island, a vessel was permitted to capture red king crabs using a limited number of single pots on the south side of that island and the north side of Amchitka Island during the 1996/97 and 1997/98 golden king crab *Lithodes aequispinus* fisheries (Bowers et al. 2002). The goal of that project was to document the industry-reported high densities of red king crabs encountered during the golden king crab fishery. Project objectives were to enumerate, tag, and collect biological data from all red king crabs captured in the permitted single pots and all red king crabs captured incidentally during the golden king crab fishery. While tagging provided some data on movement and distribution (Byersdorfer 1998); it was too limited to provide quantitative data for stock assessment and high densities of red king crabs over broad areas were not observed (Bowers et al. 2002).

The Alaska Department of Fish and Game (ADF&G) received requests from industry to provide for stock assessment of the red king crab population in the western Aleutian Islands by allowing a limited commercial fishery. The North Pacific Fishery Management Council's (NPFMC) Crab Plan Team (CPT) discussed Aleutian Islands red king crab stock status in September 1999. The recommendation of the CPT was for ADF&G to conduct a survey prior to allowing a commercial fishery because recent fishery-based assessments did not provide adequate data for fishery management and the potential existed for serial depletion at very low stock levels. Also, the CPT recommended the development of a survey plan with industry participation in the design and implementation. Although survey catch per unit of effort (CPUE, defined as number of legal crabs per pot lift) are not directly comparable to previous commercial fishery CPUE because pot lifts in prior commercial fisheries were not conducted in a systematic manner and may have occurred in different fishing locations, the survey results were to be compared to past fishery CPUE, size frequency, and prerecruit levels to help judge the current health of the stock. ADF&G conducted a survey of Petrel Bank utilizing the commercial fleet in early 2001 (Bowers et al. 2002). Due to budget constraints, the survey was designed so that fishermen could retain and sell all legal male red king crabs captured to cover survey expenses. The commissioner's permit specified stations to be fished, soak times and effort levels. However, because of low harvests of prerecruit males and females during this survey, a second survey was designed for November 2001; non-legal crabs had been documented by the commercial fishery during November and December in previous fisheries. Therefore, the survey area was assessed again during November to address concerns of survey timing on the results (Bowers et al. 2002). The two 2001 surveys in the Petrel Bank area produced a CPUE of 28 legal males per pot lift for the combined surveys, but few sublegal male and female red king crabs were captured during either of the two surveys (Bowers et al. 2002). Given the legal male CPUE, a limited commercial fishery on the Petrel Bank was re-opened during the 2002 and 2003 seasons with a 500,000 pounds guideline harvest level (GHL) and harvest strategy which included maintaining a minimum CPUE of 10 crabs per pot lift.

Shell-condition and size-composition data collected during surveys in 2001 and during the commercial fisheries in 2002 and 2003 indicated that primarily older post-recruit crabs had supported the Petrel Bank red king crab fishery (Neufeld and Barnard 2003; Barnard and Burt 2004; Burt and Barnard 2005). Few pre-recruit or recruit-sized crabs were caught in either the 2002 or 2003 commercial fisheries (Barnard and Burt 2004; Burt and Barnard 2005). Fishery performance and observer data indicated that recent harvests were largely supported by a single aging cohort of crabs and that there was little possibility of new recruitment to the legal size class in the next two years (Bush et al. 2005). The low numbers of sublegal and recruit-size crabs captured in 2002 and 2003 coincided with an increase in the average size and weight of landed crabs and a decrease in legal male CPUE; the legal male CPUE decreased 44% between the 2002 and 2003 seasons and 64% between the 2001 surveys and the 2003 fishery (Bush et al. 2005). The localized nature of the commercial harvest and the decrease in legal male CPUE indicated that the stock had declined; accordingly, the fishery was closed for a minimum 3-year period (i.e., through the 2006/07 season).

Data collected by observers during the 2003 commercial fishery indicated a mode of sublegal crabs centered between 86-mm and 90-mm carapace length (Burt and Barnard 2005). Those crabs should have begun to enter the legal size class in 2005; therefore, the department performed the first systematic pot survey of the red king crab stock in the Petrel Bank area in November of 2006 (Gish 2007), the third year after the closure. Results of the 2006 pot survey showed little to no recruitment to the stock and a more restricted geographical distribution and a

low relative abundance of legal male red king crabs on Petrel Bank compared to the 2001 surveys. Therefore, the fishery remained closed for the 2007/08 season (Bowers et al. 2008). An ADF&G pot survey was planned for 2007, but was it cancelled when no responsive bids were received from industry for the vessel charter. To verify the results of the 2006 survey, to further document the change in relative abundance and distribution, to provide information needed by fishery managers to consider a fishery opening, and to address the need discussed by the CPT for stock assessment data from the Adak red king crab stock during their September 2008 meeting (http://www.fakr.noaa.gov/npfmc/membership/plan_teams/CPT/908CPTminutes.pdf), ADF&G will survey the Petrel Bank area again in November of 2009.

OBJECTIVES

Prioritized objectives of the 2009 Petrel Bank red king crab test fish project are as follows:

1. Document the distribution and relative abundance of red king crabs in the Petrel Bank area of the Aleutian Islands, Area O, during the period that previous surveys were conducted and during which a commercial fishery for these crabs would normally occur, and obtain biological data from all commercially important crab and fish species encountered during the survey.
2. Document any areas of high concentrations of legal male red king crabs captured during this survey and their presence or absence in areas where previously encountered by simulated commercial fishing (“niche” fishing).
3. Obtain measures of temperature, depth and salinity concurrent with catch per pot data over the range of depths fished and weather observations throughout the survey and niche fishing.
4. Obtain data to map benthic habitat types for red king crabs around the Petrel Bank area and obtain a minimum of three sediment samples from each benthic habitat type as defined by data collected during the 2006 survey and niche fishing.
5. Obtain photographic documentation of all crab species and shell conditions, all fish and invertebrate species and all survey activities.

METHODS

CHARTER ITINERARY

The 35 day survey will be conducted aboard the chartered vessel *F/V Arctic Fury* (a 37.8-m commercial crab-pot-fishing vessel) from approximately November 1 to December 5, 2009 in the Petrel Bank waters of the Aleutian Islands Management Area O. The charter will begin and end in Dutch Harbor. The captain, five crewmembers and four ADF&G biologists will be aboard the entire period of the charter barring unforeseen circumstances.

RED KING CRAB DISTRIBUTION AND RELATIVE ABUNDANCE SURVEY

Survey Area and Design

The survey area encompasses Petrel Bank and around Semisopchnoi Island; it is bounded by 51° 50' N latitude to the south, 52° 47' N latitude to the north, 179° 18' W longitude to the east, and 179° 46' E longitude to the west. The survey area covers approximately 1,463 nmi² and includes the ADF&G shellfish statistical areas that accounted for 77% to 95% of the total annual

Adak red king crab harvests for the 1990/91 through 1995/96 seasons (Gish 1997a; Griffin and Ward 1992, 1994; Morrison and Gish 1994, 1996, 1997; Figure 1).

The 2009 survey design is the same as the 2006 survey. The 2006 survey was designed by using the grid pattern established for the November 2001 survey located within the Petrel Bank area (Bowers et al. 2002; Figure 2). Four survey stations were established within each grid unit with boundaries established by latitude and longitude and with stations approximately equidistant from each other and to those of adjoining units. Stations were extended to units where one or more of the sides were established by the 100-fathom contour using the same nautical mile spacing, resulting in 119 stations. Additional stations were established around Petrel Bank between 101 and 150 fathoms; stations outside of but within 0.5 nmi of the 150-fathom contour line were adjusted to be included in the survey which produced 48 more stations. Stations were also added to the northeast to cover the Petrel Spur area to the depth of 150 fathoms which added 26 stations. Established survey stations totaled 193 (Figure 2; Appendix A1). The stations of primary importance for the 2009 survey are the 170 stations that were fished during the 2006 survey. The minimum goal of this survey is to complete the primary stations; if time is available the remaining 23 stations (depicted as secondary stations in Figure 2) will be fished.

Each station will consist of 4 pots arrayed in a north-south orientation and each pot will be 0.125 nmi apart; the centers of each station will be approximately 2.5 nmi apart (Appendix A1). One data logger will be deployed at each station fished during the survey. The stations will be fished once during this survey. Each pot measures 7' x 7' x 2.8', is fitted with 2.75" stretch mesh on all webbing, and has two opposing tunnel openings measuring 8" x 36". 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 Pacific herring *Clupea pallasii* and one Pacific cod *Gadus macrocephalus* as hanging bait.

Survey activities are documented in the Shipboard Instructions for the 2009 Petrel Bank Red King Crab Survey (Appendix B1). Individual pot locations, set and pull dates and times, gear performance and, when needed, the data logger field identification number will be recorded by the charter vessel captain in the Pilot House Log (Appendix C1) for all fishing conducted during the survey. It is anticipated that a minimum of 680 pots (170 stations) will be sampled during this survey.

The goal during the survey is to sample a minimum of 9 stations (36 pots) per day. The number of stations attempted per day may be adjusted contingent upon existing conditions and constraints in order to maximize effort during the charter. The vessel will transit to the next pot while the contents of each current pot are sampled.

Catch Sampling

All commercially important crab species captured in each pot fished during the survey will be enumerated to provide catch data by size, sex and reproductive status. All required data will be recorded on the Crab Measurement Form (Appendix C2) and the catch data per pot of all red king crabs, golden king crabs, Tanner crabs *Chionoecetes bairdi* and hair crabs *Erimacrus isenbecki* will be entered daily into a computer spreadsheet application. The catch (number) of all other invertebrate and fish species will be determined for each pot fished during the survey and recorded on the Species Composition Form (Appendix C3). The fork or total length for all commercially important fish species will be recorded on the Fish Length Form (Appendix C4).

All crabs and fish will be released alive after sampling with the possible exceptions that some species of crabs may be retained for an invertebrate reference collection for the Division of Laboratory Animal Resources at the University of Pittsburg and some fish may be retained for the comparative skeletal reference collection at the Aleutian Campus of the University of Alaska, Fairbanks. All catch per pot data, summarized by station, will be entered daily in a computer spreadsheet during the survey.

Red king crab, golden king crab, hair crab and scarlet king crab *L. couesi* obtained from survey pots will be sexed and measured for carapace length (CL) 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 Tanner crab, grooved Tanner crab *C. tanneri* and triangle Tanner crab *C. angulatus* will be sexed and measured for carapace width (CW) to the nearest millimeter. 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). The fishery-legal status of male crabs will be determined by the CW, including spines, relative to minimum legal size (6.5 inches for red king crab, 6.0 inches for golden king crab, 5.5 inches for scarlet king crab, 3.25 inches for hair crab, 5.5 inches for Tanner crab, 5.0 inches for grooved Tanner crab, and 4.5 inches for triangle Tanner 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. The following categories were developed for shell-condition assessment of red king crabs; each can also be applied to other commercially important king crab species and hair crabs 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 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 (large leg segments) are not easily compressed by pinching, ventral surface with 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. 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.

King crab shell condition pictures and additional shell condition descriptions for king crabs are given in Donaldson and Byersdorfer (2005); *Chionoecetes* crab shell condition descriptions and pictures are provided (*unpublished* ADF&G Westward Region work group product, Robert Gish, ADF&G fisheries biologist, Kodiak, Alaska), also refer to Jadamec et al. (1999) and for additional Tanner crabs and other *Chionoecetes* crabs shell condition descriptions and pictures.

The reproductive condition of female crabs will be determined. If eggs are present, the percent clutch fullness, clutch condition, embryo development, and color of eggs will be recorded. Clutch condition refers to the presence or absence of dead embryos and the amount, if apparent. Embryo development refers to the presence or absence of eyed embryos, or if hatching, embryos are apparent. Other biological characteristics of crabs including loss of limbs and the presence of disease or parasites will be documented.

A subsample of male and female red king crabs for carapace length distribution, shell condition, and female reproductive data may be taken from pot catches only when successive pots within a station or during niche fishing contain a large number of crabs. Subsampling will only be done when sampling the full pot contents would either impact crab vitality on deck or unnecessarily delay overall survey progress. The subsample goal will be a minimum of 100 males and 100 females and will be randomly taken before non-measured crabs are counted and released. Catch sampling of the remaining crabs will consist of full enumeration of red king crabs by category. The categories of red king crab are legal male post recruits (all males ≥ 150 -mm CL), legal male recruits (new-shell legal males < 150 -mm CL), prerecruit ones (mature sublegal males ≥ 120 -mm CL), prerecruit twos (immature sublegal males < 120 -mm CL), mature female crabs (matted setae or eggs present), and immature females (clean setae). The total count by sex and size category will be recorded on the Crab Subsampling Form (Appendix C5).

Oceanographic and Weather Data Collection

The oceanographic parameters of temperature, depth and salinity (conductivity) will be obtained concurrent with red king crab CPUE data from selected pots. Pots selected for deployment of data loggers will be documented on the Data Logger Form (Appendix C8). Three submersible temperature (STR), seven 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 and niche fishing. 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 at yet to be determined locations for the duration of the survey and niche fishing; additionally, continuous air temperature reference data will be obtained by the deployment of one additional STR on deck for the duration of the survey and niche fishing. The deployment of each data logger will be documented by the vessel captain in the Pilot House Log (Appendix C1).

Weather observations will be made and recorded by the vessel captain as each station is set and retrieved and as each niche fishing string 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 C9).

Acquisition of Data for Benthic Habitat Mapping

Data on benthic habitat type, or seabed classification, will be obtained during this charter using QTC VIEW¹ methodology (Quester Tangent Corporation 2004b). It will consist of acquiring data from the ship's echo sounder, (the first return ping or waveform). This waveform varies according to the characteristic texture of the surficial seafloor sediment (the frequency distribution of grain sizes) or the immediate subsurface. These waveforms are then classified into groups; the groups correspond to different bottom types. The location of these bottom types are correlated with a dedicated DGPS/WAAS navigation system and using QTC IMPACT software to produce a color image of differing bottom types or benthic habitats (Quester Tangent Corporation 2004a). Computer files created by QTC View will be downloaded and recorded daily on the QTC VIEW Log (Appendix C6).

A minimum of three benthic sediment samples will be obtained from each bottom type to help ground-truth the echo sounder data returns. The sediment samples will be classified according to the percentage of mud, sand, and gravel contained in each sample (Folk 1954). Samples will be obtained using a Van Veen grab and recorded on the Benthic Sampling Log (Appendix C7).

“NICHE” FISHING

In addition to and concurrent with the survey, pots will also be fished at locations between survey stations (“niche” fishing). Niche fishing will occur in areas of current and previous high concentrations of legal male red king crab (CPUE ≥ 20 crabs per pot). Pots fished during niche fishing will be arrayed as “strings”, similar to the setting of pots during commercial fishing, with the pots within strings spaced approximately 0.25 nmi (0.46 km) apart. Choice of niche-fishing locations will be based on results from this current survey, the 2006 ADF&G survey, the November 2001 industry survey and the 20002 and 2003 commercial fisheries. The same pots, configuration of pots, and bait will be used during niche fishing as in the survey. Target soak time for niche-fishing pots will be 24 to 30 hours.

¹ Use of trade name does not constitute an endorsement by ADF&G.

Catch sampling during niche fishing will consist of all sampling activities described above for the survey. However, a subsample of male and female red king crabs for carapace length distribution, shell condition, and female reproductive data may be taken. Subsampling of pot catches will only be done when successive pots contain a large number of crabs and when sampling the full pot contents would either impact crab vitality on deck or unnecessarily delay overall survey progress. The subsample goal will be a minimum of 100 males and 100 females and will be randomly taken before non-measured crabs are counted and released. Catch sampling of the remaining crabs will consist of full enumeration of red king crabs by category. The categories of king crab are legal male post recruits (all males ≥ 150 -mm CL), legal male recruits (new-shell legal males < 150 -mm CL), prerecruit ones (mature sublegal males ≥ 120 -mm CL), prerecruit twos (immature sublegal males < 120 -mm CL), mature female crabs (matted setae or eggs present), and immature females (clean setae).

Benthic habitat mapping and sampling, as well as oceanographic data collection as described for the survey will occur during niche fishing. Individual pot locations, set and pull dates, and times will be recorded by the vessel captain in the Pilot House Log (Appendix C1) for all niche fishing conducted. All catch per pot data of red king crabs, golden king crabs, Tanner crabs and hair crabs will be entered into a spreadsheet application.

DATA ANALYSIS

Catch distribution and CPUE of legal male post recruits (all males ≥ 150 -mm CL), legal male recruits (new-shell legal males < 150 -mm CL), prerecruit ones (mature sublegal males ≥ 120 -mm CL), prerecruit twos (immature sublegal males < 120 -mm CL), and mature and immature female red king crabs captured during this survey and niche fishing will be analyzed relative to the November 2006 ADF&G survey and niche fishing, the November 2001 industry survey, and the 2002 and 2003 commercial fishery results. Additionally, the CPUE by station will be mapped to compare spatial distribution of legal red king crabs relative to the November 2006 ADF&G survey and to the November 2001 industry survey results. Frequency distributions of size (CL) by shell condition will be summarized and graphed for males and females separately.

Association of CPUE with depth and temperature will be investigated through exploratory graphical methods, the appropriate choice of which will depend on the data collected. Dependent upon ability to classify bottom habitat, distribution of red king crabs relative to habitat type will also be analyzed. Classified habitat types will be overlaid with the map of the survey area and that of red king crab distribution and CPUE during this survey.

SCHEDULES AND PERSONNEL

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

Month/Day	Personnel	Activity
07/01-10/15	Gish	Project planning, vessel charter procurement, operational plan, shipboard instructions
09/01-10/15	Alinsunurin and Shepard	Survey database design and application
11/01-12/05	Gish, Dela Cruz, MacIntosh and Mestre-Johnson	Conduct at-sea survey
12/15-01/15	Gish, Alinsunurin and DelaCruz	Compile survey data and initial edit
12/15-02/15	Murphy	Survey data entry
01/15-03/01	Gish, Alinsunurin and DelaCruz	Edit survey data entry
03/01-04/01	Gish	Final edit survey data

REPORTS

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

Month/Year	Author(s)	Report
10/09	Gish	Project operational plan for the 2009 Petrel Bank red king crab survey. Regional Information Report Series
12/09	Gish	Memorandum on distribution and relative abundance of Petrel Bank red king crab
06/10	Gish	The 2009 Petrel Bank red king crab survey. Fishery Management Report Series

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FIGURES

Adak Area Harvest, 1990/91 to 1995/96

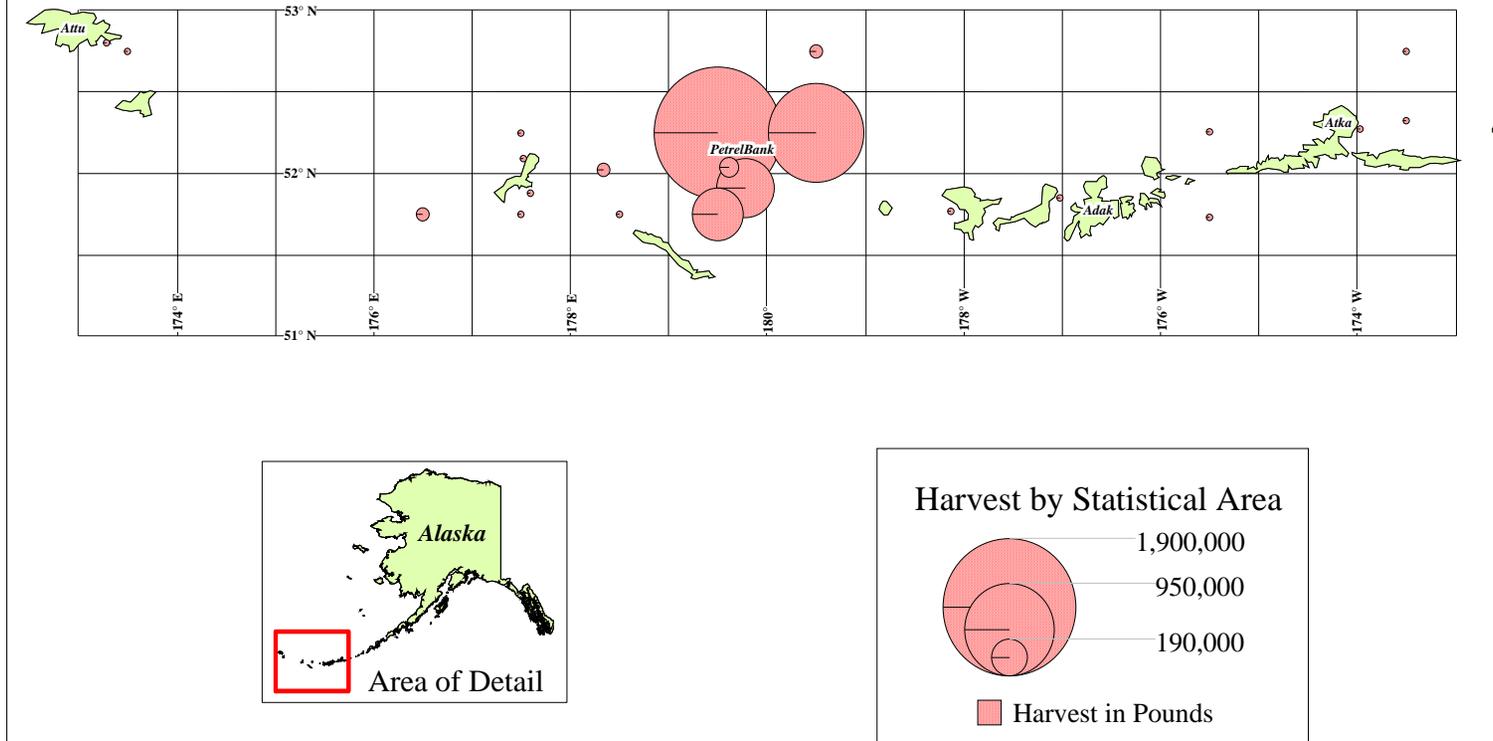


Figure 1.—Location and amount of red king crab harvest in the Adak area (Registration Area R), 1990/91 to 1995/96.

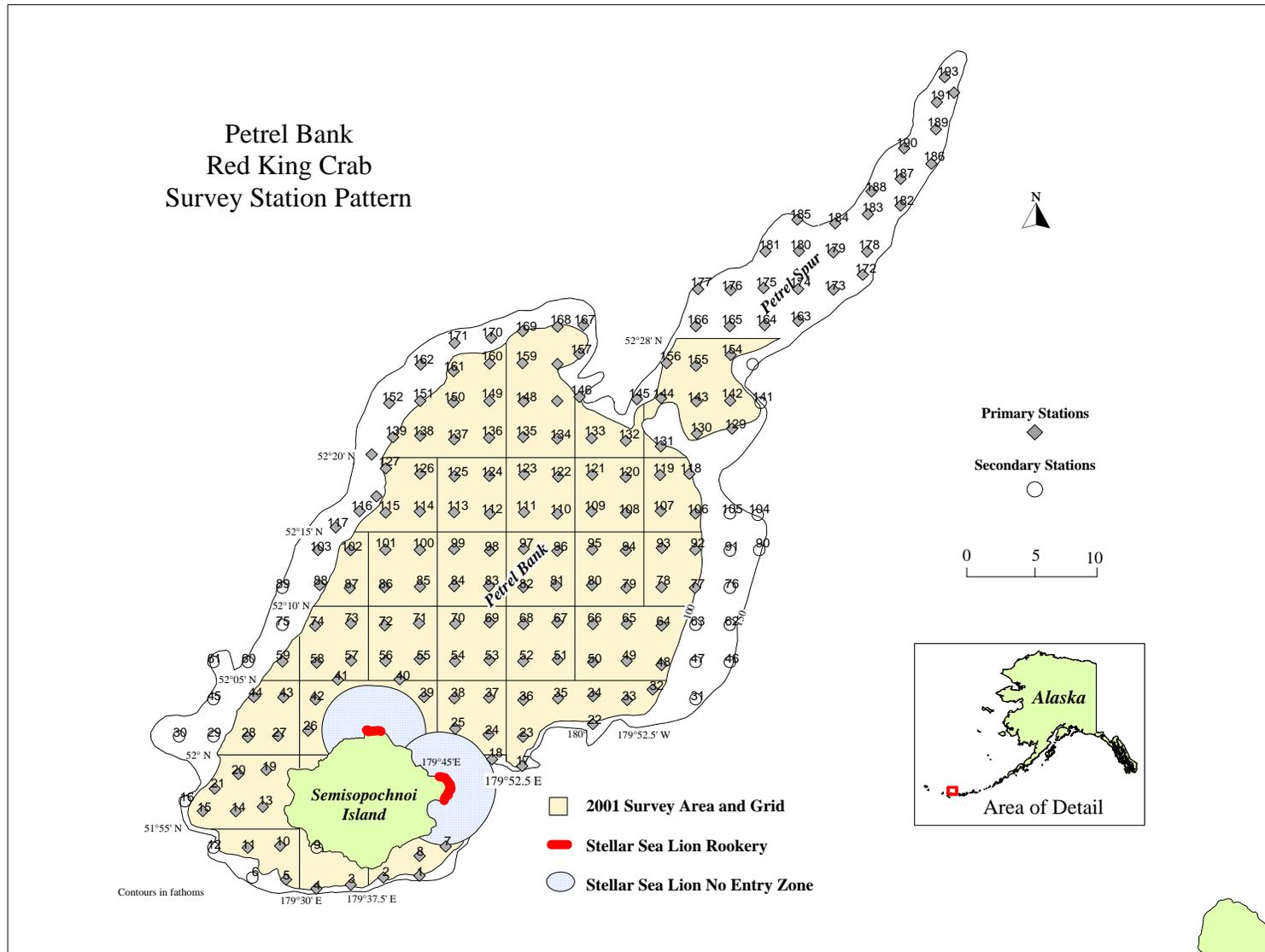


Figure 2.—Area of the 2009 Petrel Bank red king crab survey showing the location of each station.

**APPENDIX A. STATION LOCATIONS FOR THE 2009
PETREL BANK RED KING CRAB SURVEY**

Appendix A1.–Location of station centers for the 2009 Petrel Bank red king crab survey; each station consists of four pots arrayed in a north – south orientation.

Station	Latitude		Longitude		Station	Latitude		Longitude	
	Degrees	Minutes	Degrees	Minutes		Degrees	Minutes	Degrees	Minutes
Primary									
1	51	51.87	179	43.07 E	52	52	6.29	179	54.36 E
2	51	51.75	179	39.13 E	53	52	6.37	179	50.69 E
3	51	51.26	179	35.57 E	54	52	6.30	179	46.93 E
4	51	51.00	179	31.83 E	55	52	6.43	179	43.10 E
5	51	51.61	179	28.52 E	56	52	6.32	179	39.36 E
7	51	53.83	179	45.92 E	57	52	6.34	179	35.62 E
8	51	53.20	179	43.08 E	58	52	6.20	179	31.87 E
10	51	53.87	179	27.89 E	59	52	6.29	179	28.15 E
11	51	53.75	179	24.36 E	64	52	8.70	179	50.57 W
13	51	56.50	179	26.00 E	65	52	8.81	179	54.37 W
14	51	56.20	179	23.06 E	66	52	8.79	179	58.05 W
15	51	56.21	179	19.47 E	67	52	8.91	179	58.07 E
17	51	59.25	179	54.25 E	68	52	8.79	179	54.39 E
18	51	59.60	179	50.57 E	69	52	8.92	179	50.68 E
19	51	58.98	179	26.39 E	70	52	8.83	179	46.95 E
20	51	58.71	179	23.34 E	71	52	8.85	179	43.01 E
21	51	57.72	179	20.76 E	72	52	8.72	179	39.27 E
22	52	2.07	179	58.08 W	73	52	8.85	179	35.60 E
23	52	1.21	179	54.33 E	74	52	8.69	179	31.70 E
24	52	1.36	179	50.59 E	77	52	11.24	179	46.94 W
25	52	1.23	179	46.89 E	78	52	11.29	179	50.59 W
26	52	1.63	179	30.94 E	79	52	11.24	179	54.42 W
27	52	1.26	179	27.65 E	80	52	11.41	179	58.15 W
28	52	1.20	179	24.37 E	81	52	11.41	179	57.96 E
32	52	4.40	179	51.55 W	82	52	11.28	179	54.38 E
33	52	3.69	179	54.32 W	83	52	11.36	179	50.63 E
34	52	3.95	179	58.04 W	84	52	11.36	179	46.84 E
35	52	3.80	179	58.15 E	85	52	11.31	179	43.12 E
36	52	3.68	179	54.38 E	86	52	11.28	179	39.25 E
37	52	3.86	179	50.65 E	87	52	11.23	179	35.47 E
38	52	3.80	179	46.87 E	88	52	11.42	179	32.21 E
39	52	3.89	179	43.57 E	92	52	13.80	179	46.90 W
40	52	5.08	179	40.91 E	93	52	13.92	179	50.55 W
41	52	5.05	179	34.19 E	94	52	13.74	179	54.46 W
42	52	3.72	179	31.75 E	95	52	13.81	179	58.11 W
43	52	3.87	179	28.23 E	96	52	13.72	179	58.08 E
44	52	3.89	179	25.03 E	97	52	13.86	179	54.42 E
48	52	6.05	179	50.58 W	98	52	13.72	179	50.73 E
49	52	6.31	179	54.39 W	99	52	13.85	179	46.84 E
50	52	6.24	179	58.05 W	100	52	13.80	179	43.10 E
51	52	6.41	179	58.12 E	101	52	13.81	179	39.35 E

-continued-

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Station	Latitude		Longitude		Station	Latitude		Longitude	
	Degrees	Minutes	Degrees	Minutes		Degrees	Minutes	Degrees	Minutes
Primary (continued)									
102	52	13.77	179	35.54 E	147	52	23.81	179	58.07 E
103	52	13.79	179	32.00 E	148	52	23.79	179	54.41 E
106	52	16.24	179	46.87 W	149	52	23.81	179	50.68 E
107	52	16.41	179	50.66 W	150	52	23.73	179	46.76 E
108	52	16.29	179	54.45 W	151	52	23.82	179	43.15 E
109	52	16.40	179	58.18 W	152	52	23.66	179	39.77 E
110	52	16.23	179	58.09 E	154	52	26.92	179	43.04 W
111	52	16.33	179	54.44 E	155	52	26.19	179	46.83 W
112	52	16.22	179	50.74 E	156	52	26.36	179	50.03 W
113	52	16.32	179	46.83 E	157	52	26.99	179	59.55 W
114	52	16.38	179	43.11 E	158	52	26.30	179	58.09 E
115	52	16.31	179	39.37 E	159	52	26.37	179	54.28 E
116	52	16.41	179	36.53 E	160	52	26.33	179	50.70 E
117	52	15.32	179	33.94 E	161	52	25.83	179	46.78 E
118	52	18.92	179	47.54 W	162	52	26.26	179	43.21 E
119	52	18.83	179	50.74 W	163	52	29.20	179	35.68 W
120	52	18.70	179	54.49 W	164	52	28.92	179	39.35 W
121	52	18.85	179	58.13 W	165	52	28.85	179	43.14 W
122	52	18.73	179	58.16 E	166	52	28.86	179	46.84 W
123	52	18.87	179	54.47 E	167	52	28.91	179	59.09 W
124	52	18.77	179	50.67 E	168	52	28.82	179	58.10 E
125	52	18.75	179	46.87 E	169	52	28.52	179	54.30 E
126	52	18.92	179	43.14 E	170	52	28.07	179	50.88 E
127	52	19.27	179	39.40 E	171	52	27.72	179	46.89 E
128	52	17.40	179	38.38 E	172	52	32.32	179	28.67 W
129	52	23.61	179	44.10 W	173	52	31.31	179	31.86 W
130	52	21.62	179	46.73 W	174	52	31.35	179	35.70 W
131	52	20.77	179	50.65 W	175	52	31.42	179	39.45 W
132	52	21.14	179	54.47 W	176	52	31.28	179	43.04 W
133	52	21.31	179	58.19 W	177	52	31.34	179	46.60 W
134	52	21.28	179	58.07 E	178	52	33.87	179	28.19 W
135	52	21.39	179	54.36 E	179	52	33.82	179	31.88 W
136	52	21.34	179	50.65 E	180	52	33.91	179	35.61 W
137	52	21.22	179	46.84 E	181	52	33.89	179	39.26 W
138	52	21.47	179	43.15 E	182	52	36.97	179	24.55 W
139	52	21.38	179	40.19 E	183	52	36.39	179	28.11 W
140	52	20.22	179	37.85 E	184	52	35.49	179	31.93 W
142	52	23.83	179	43.10 W	185	52	36.02	179	35.77 W
143	52	23.79	179	46.77 W	186	52	39.78	179	21.19 W
144	52	24.01	179	50.63 W	187	52	38.76	179	24.53 W
145	52	23.89	179	54.53 W	188	52	37.92	179	27.71 W
146	52	24.09	179	59.52 W	189	52	41.91	179	20.70 W

-continued-

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Station	Latitude		Longitude		Station	Latitude		Longitude	
	Degrees	Minutes	Degrees	Minutes		Degrees	Minutes	Degrees	Minutes
Primary (continued)									
190	52	40.82	179	24.16 W	192	52	44.56	179	18.73 W
191	52	43.92	179	20.61 W	193	52	45.61	179	19.75 W
Secondary									
6	51	51.25	179	24.38 E	62	52	08.75	179	43.13 W
9	51	53.75	179	31.88 E	63	52	08.75	179	46.88 W
12	51	53.75	179	20.63 E	75	52	08.75	179	28.13 E
16	51	56.25	179	16.88 E	76	52	11.25	179	43.13 W
29	52	01.25	179	20.63 E	89	52	11.25	179	28.13 E
30	52	01.25	179	16.88 E	90	52	13.25	179	39.38 W
31	52	03.75	179	46.88 E	91	52	13.25	179	43.13 W
45	52	03.75	179	20.63 E	104	52	16.25	179	39.38 W
46	52	06.25	179	43.13 W	105	52	16.25	179	43.13 W
47	52	06.25	179	46.88 W	141	52	23.75	179	39..38 W
60	52	06.25	179	24.38 E	153	52	26.25	179	39.38 W
61	52	06.25	179	20.63 E					

**APPENDIX B. SHIPBOARD INSTRUCTIONS FOR THE
2009 PETREL BANK RED KING CRAB CHARTER**

SHIPBOARD INSTRUCTIONS FOR THE 2009 PETREL BANK RED KING CRAB CHARTER

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GENERAL INFORMATION

The purpose of this manual is to provide instructions and information relating to the 2009 Petrel Bank red king crab survey. Refer to it for project objectives and sampling procedures. Expect standard methodologies to remain constant, but be prepared to accept changes to sampling procedures/protocols when circumstances warrant.

By regulation, all survey data is confidential until the closure of the Petrel Bank red king crab commercial fishery, which by regulation would be from October 15, 2010 through February 1, 2011. This fishery has been closed since 2003 due to the low stock abundance.

The survey will be aboard the charter vessel the F/V *Arctic Fury*, a 37.8-m pot-fishing vessel. The vessel and her crew have been contracted to provide service to ADF&G for a 35-day period with an approximate starting date of November 1 and ending on December 5, 2009.

Dates	Activity
November 1 - 2	Install equipment, work and load gear
November 3 - 4	Travel to grounds, survey set gear
November 5 – December 2	Set/pull survey and/or niche gear
December 3	Pull survey or niche gear, depart grounds
December 4 - 5	Travel to port, offload equipment and gear

The cruise 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 cruise leader will resolve any misunderstandings arising among the ADF&G biologists.

Insubordination to the cruise 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.

Following is the list of personnel participating in the year’s red king crab survey:

ADF&G Crew	Vessel Crew
Skip Gish – Biologist, Cruise Leader	Svein Langaker - Master
Dmitri Dela Cruz - Biologist	Kyle Robertson - Mate/Deckhand
Rich MacIntosh - Biologist	Tom Barber - Engineer
Stacy Mestre-Johnson - Biological Technician	Ed van Spaandonk – 2 nd Engineer/Deckhand
-	Brian Alexander – Deck Bos’n
	Frank Mannes – Cook/Deckhand

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Safety Briefing

Prior to commencement of the survey, the captain will provide the ADF&G biologists with a shipboard safety orientation, which will at a minimum 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, 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 well being of the vessel crew and ADF&G biologists 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, trailers, pots, and slick decks. ADF&G biologists will not stack pots, operate hydraulics, 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 previously designated by the captain while pots are being set, retrieved, moved, or stacked.

Specific information and/or vessel policies will be provided by vessel personnel 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, each ADF&G biologists should check their survival suit; lubricate or wax the zipper to insure proper functioning. Personal EPIRBs and strobe lights should be tested. Rules concerning EPIRB testing may be obtained from the U. S. Coast Guard in Dutch Harbor (581-3466). Check date on strobe light battery; replace battery if dated or faulty. Tested EPIRBs and strobe lights should be securely fastened to survival suits.

Miscellaneous Shipboard Rules and Information

During the charter tasks and responsibilities will be delegated and shared amongst the onboard ADF&G biologists for the duration of the cruise. Any problems that arise should be channeled through the cruise 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 (SPN) that will enable cross-referencing on a pot by pot basis. Although it is the cruise leader's responsibility to ensure data integrity, other ADF&G biologists will be relied upon on for assistance. Be sure to ask the cruise leader about any unexpected changes in sampling protocols or anything else related to data collection.

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Completed data forms will be edited daily; it is incumbent upon the data recorder to check data forms to insure all entries are legible. This practice ensures that the often-important short-term details of the day’s event are not overlooked. There will be no compromise with regard to this responsibility. If time permits, the vessel pilot house log will be entered into a spreadsheet on a daily basis using the survey laptop computer.

Prior to the vessel’s departure from Dutch Harbor to the survey grounds, check off all items on the equipment list (Appendix D1) including forms, sampling equipment, and personal gear (e.g., seasick medications). Maintain all sampling equipment by insuring that all items are cleaned and stored safely inside the vessel at the end of each day (calipers, clipboards, measuring sticks, etc.).

Keep daily logs of sampling activities, miscellaneous observations, Floy tag recoveries, sampling problems and solutions, etc. Any problems or concerns with survey procedure should also be noted in the daily log. This log is also appropriate for recording any photographs taken.

Offer assistance to the vessel crew whenever possible. ADF&G biologists are allowed to help out with some of the deck activities that are not inherently dangerous, such as filling bait containers. When time allows, washing dishes, making coffee, cooking and general cleaning should be part of our daily routine.

The vessel crew will have a busier schedule than the ADF&G biologists; 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 crew or ADF&G biologists. All halibut (dead or alive) are to be placed overboard immediately. It is acceptable to consume cod, groundfish and mortally injured crabs while at sea. Authorization for the collection of crab or fish for display or other purposes will be by the cruise leader only.

Additional Instructions and Reminders

Review project operational plan and charter itinerary.

Leave timesheets with Kathleen Herring in Dutch Harbor; 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
Skip Gish	11340690/11340690	11340665/11340665
Dmitri Dela Cruz	11340690/11340690	11340665/11340665
Rich MacIntosh	11340665/11340665	11340665/11340665
Stacy Mestre-Johnson	11340665/11340665	11340665/11340665

-continued-

Turn in all receipts for purchases to the crew leader prior to November 2.

Check your survival suit, strobe light, and EPIRB prior to departure.

The Pilot House Logs must be completed daily; complete every column in every form as required.

METHODS

Status Report

A daily status report on charter activities will be transmitted by to ADF&G in Kodiak (or Dutch Harbor if necessary). The cruise leader, designated biologists, or the vessel captain will relay this status report. The report will contain, at a minimum, the status of vessel and all personnel (i. e., all ok, where vessel is at, etc.); additional information may be requested, be ready to report the station numbers fished, total number of pots sampled and the number of legal-sized male red king crab captured. This report will be sent by email to Doug Pengilly (doug.pengilly@alaska.gov); Rachel Alinsunurin (rachel.alinsunurin@alaska.gov) is the back-up contact if necessary.

Prior to departure a shore-based contact for the F/V *Arctic Fury* 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 and Rachel Alinsunurin (907) 581-1239.

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 cruise leader and/or the designated ADF&G biologists to insure the completion of this task. Check to ensure that the log is completely filled out at the end of each day. Gear performance will be assessed and recorded in the gear retrieval column of the Pilot House Log for each pot lift throughout the survey and niche fishing activities. Additionally, for any lost pots, the captain will record the appropriate code (40) in the gear performance column along with the words “LOST POT” in the lift gear columns of the Pilot House Log.

Survey Design

Refer to the operational plan for a description of the survey pattern and pot deployment. The charter period is 35 days in length, approximately 33 days will be at sea. The at-sea portion will consist of 2 components: the survey and niche fishing. It is anticipated that the survey portion of the charter will last approximately 26 days, including travel to the fishing grounds. Other activities, including niche fishing, equipment testing, travel to port, and loading and offloading gear, will encompass the remaining 9 days of the charter period.

-continued-

Catch Sampling

In addition to red and golden king crab, hair crab and Tanner crab, there exists the possibility that scarlet king crabs, grooved Tanner crabs, or triangle Tanner crabs will be encountered and, if so, they will be treated as described above. Record all data for each species according to the established protocols (Appendix C2). Prior to sampling each pot, the ADF&G biologists will ask the captain to convey (via the loud hailer) the appropriate SPN; it is essential the biological crew records the SPN on all of the on-deck forms. In addition to the sequential pot number and other header information (i. e. station number, date, buoy number, measurer, recorder) be sure to record the time pot breaks the water surface and the time when the last crab is returned to the sea. Lost pots along with the words “LOST POT” will be recorded on a blank row on all forms, likewise, if a retrieved pot is unbaited, the SPN is still recorded and the words “NO BAIT” written on the form.

All other captured fish and invertebrates will be identified to species, or to the lowest taxonomic level possible. Record fish of limited or no commercial importance and all invertebrates not noted above on the Species Composition Form (Appendix C3). Commercially important species of fish will be measured and lengths recorded on the Fish Length Form (Appendix C4). A complete list of fish to be measured can be found at the bottom of the form.

Recording Data. Record the SPN on the pertinent data form and complete all header information (i. e. station number, date, buoy number, measurer, recorder). When a pot comes aboard, divide all crabs by species and if possible subdivide by sex. Separate data sheets must be used for each pot when using the Crab Measurement Form, data from different pots may be combined on other forms as deemed necessary. When using the Crab Measurement Form 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 should be delimited by skipping a few lines between each; data may be combined on other data forms. Once sampling has commenced, record the appropriate code for each data category using the choices provided at the bottom of the data form. It is incumbent upon the data recorder to check data forms to insure all entries are legible, the data entry clerk is not to decipher any entries. All forms are to be verified each day and any discrepancies corrected immediately.

Morphometrics. Carapace length (CL) measurements to the nearest millimeter will be taken for all king crabs and hair crabs encountered. Carapace width (CW) measurements will be taken to the nearest millimeter for all Tanner crabs. 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 (which usually occurs between 130-mm CL and 140-mm CL, but may occur in a much wider range); therefore, either a measuring stick or calipers should verify the legal measurement of all red king crabs.

-continued-

Species	Minimum CW (inches)
Red King Crab	6.5
Golden King Crab	6.0
Scarlet King Crab	5.5
Tanner Crab	5.5
Grooved Tanner Crab	5.0
Triangle Tanner Crab	4.5
Hair Crab	3.25

Shell Condition. 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. Record shell condition for each crab sampled as follows:

Shell Condition Category	Code
New-pliable	9
New	2
Old	3
Very Old	4
Very Very-Old	5

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

Egg color – normally appears purple (code 8) purple-brown (code 9) or brown (code 10) for uneyed and eyed eggs, or orange (code 4) also may be encountered for eyed eggs in red king crabs. Tanner crab eggs normally appear orange for uneyed eggs and dark orange (code 5) or brown 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 – cottage cheese (code 7) and chitinoclastic bacterial infection or torch (code 6) are the most commonly occurring disease in red king crabs. Bitter crab disease (code 3) and black mat (code 5) may be encountered in Tanner crabs.

-continued-

Catch sampling during niche fishing will consist of, at a minimum, full enumeration of legal red king crabs and all blue king crabs by category (Appendix C4). The categories of blue king crab are: male blue king crab ≥ 120 -mm CL, male blue king crab < 120 -mm CL, mature female blue king crab, and immature female blue king crab. If there is sufficient time during niche fishing gear retrieval, all sampling activities described above for the survey portion will be performed and recorded on the appropriate form (Appendix C2 and Appendix C3).

Benthic Habitat Mapping and Sampling

Benthic Habitat Mapping. The QTC system needs a dedicated computer and DGPS, access to an echo sounder and transducer, and a power source protected with an UPS power supply. Refer to the QTC VIEW manual for installation instructions (Quester Tangent Corporation 2004a). The system will be installed in Dutch Harbor by Harris Electric and, if time allows, the system will be ground-truthed on Chelan Bank prior to departure. Data acquisition will commence when the vessel reaches the study area and will occur at all times the vessel is underway. Document all adjustments to settings on the QTC VIEW form (Appendix C6)

Benthic Sampling. A sediment sample will be taken by the use of a Van Veen grab. Each sample will be emptied into to a one-gallon zip-lock type bag, labeled with date, time, latitude and longitude, and placed into the bait freezer. The Van Veen grab will be operated at or near slack tide to ensure successful operation. Record all activity on the benthic sampling form (Appendix C7)

Oceanographic and Weather Data Collection

The oceanographic parameters of temperature, conductivity, and depth will be recorded throughout the charter in a manner to cover all areas and depths fished. Dates and times of data logger deployment and retrieval will be noted in the Pilot House Log (Appendix C1) and the retrieval will be noted on the Crab Measurement Form (Appendix C2) for future reference. Two STRs will be deployed to obtain continual water temperature references and one STR will be placed on deck where the pots are stacked overnight. for a continual air temperature reference Loggers will be secured inside the pots by a carabiner and two door hooks with rubbers in a manner that restricts movement during deployment. 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 various shell conditions, handling and measuring of crabs, clutch size and egg development while aboard the charter vessel should be documented with photographs and video. Edited video footage provides the best means of documenting the survey operation for future reference. A digital camera, 35-mm SLR camera and film, and an 8-mm format camcorder (with blank tapes) have been included in the survey equipment inventory. Note: All photographs should be documented with a short written caption relevant to the subject matter (i.e., date, time, location and subject).

-continued-

Niche Fishing

Niche fishing may occur during and/or after the survey depending on weather conditions and the progress of the survey. Unlike during the survey, the location of pots set during niche fishing will be determined by the vessel captain; this will be based on the individual's previous experience in the area, and may also include the results of the current survey, previous surveys and commercial fisheries in the area.

All details described for the survey including the status report, pilot house log, catch sampling, benthic habitat mapping and sampling, oceanographic and weather data collection, and photographic documentation will be conducted during all niche fishing activities depending on available time. ADF&G biologists need to be ready to subsample the contents of one or more successive pots retrieved during niche fishing primarily due to more pots deployed per day and the overall shorter distances between pots.

APPENDIX C. DATA FORMS AND INSTRUCTIONS

Appendix C1.-Pilot House Log.

Petrel Bank Pilot House Log

Vessel Name: _____
 Captain Name: _____

Survey Code: _____

ADF&G Number: _____
 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
 2 = sand
 3 = silt
 4 = mud
 5 = gravel

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

Alaska Department of Fish and Game - Shellfish Research - Pilot House Log (Rev. September 26, 2009)

-continued-

Instructions for the 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 Area: If not preprinted, enter the charter code PB09.

ADF&G Number: If not preprinted, enter the ADF&G number of the vessel.

Vessel Name: If not preprinted, enter the name of the vessel.

Captain's Name: If not preprinted, enter 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.

Recorded as the gear is set:

Sequential Pot Number (SPN): As pots are set, the captain will number them beginning at '1' and then number each successive pot 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 station number for each sequential pot set. For this 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 identifying numbers and/or letters marked on the trailer buoy of the pot buoy set-up.

Date: The date the gear is set, in mm/dd/yy format.

Time: 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 depth in whole fathoms, or to the tenth of a fathom if electronically displayed.

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

Location:

Latitude (N): record in degrees and decimal minutes - dd°mm.mm.

Longitude (E or W): record in degrees and decimal minutes - ddd°mm.mm. Careful attention must be paid to the E or W hemisphere designator as the 180° line of longitude runs through the center of the Petrel Bank area. If all pots on any particular form are all on the same side of the 180° line of longitude, circle the appropriate letter at the top of the column. If the pots on any particular form are set on both sides of the 180° line of longitude, indicate E or W for each pot individually.

-continued-

Logger ID: Recode the data logger deck ID number in the same row of the sequential pot number in which it was deployed. No more than one logger will be deployed in a station.

Recorded as the gear is lifted:

Date: The date the gear is lifted, in mm/dd/yy format.

Time: The time the gear is lifted, 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 lifted. Codes to be used are at the bottom of the form.

Appendix C2.-Crab Measurement Form.

Crab Measurement Form

Sample Date (mm/dd/yy): _____

Station Number: _____

SPN: _____ Buoy ID: _____

Page _____ of _____

Survey Code: _____

Recorder: _____

Measurer(s): _____

Logger ID: _____

Tag Series: _____

SPECIES	SEX	CARAPACE SIZE (mm)	CHELA HEIGHT (mm)	LEGAL SIZE	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														

SPECIES CODES:
 1 = golden king
 2 = red king
 3 = blue king
 4 = hair crab
 5 = hybrid, *C. bairdi* x *C. opilio*
 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, *C. bairdi*
 42 = hybrid, *C. opilio*

SEX:
 0 = unknown
 1 = male
 2 = female
 3 = hermaphrodite

SHELL CONDITION:
 0 = premolt/molting
 1 = soft
 2 = new, pliable
 3 = new
 4 = very old
 5 = very, very old

LEGAL SIZE:
 0 = sublegal
 1 = legal, retained
 2 = legal, not retained

FEMALE MATURITY:
 0 = unknown
 1 = immature
 2 = mature
 3 = mature, primiparous
 4 = mature, multiparous

CONDITION:
 blank = uninjured
 1 = fresh injury
 2 = dead
 3 = previously dead

EGGS

CLUTCH FULLNESS:
 0 = no eggs
 1 = trace to 1/8 full
 2 = 1/4 full
 3 = 1/5 full
 4 = 3/4 full
 5 = 100% full

EGG DEVELOPMENT:
 1 = uneyed eggs
 2 = eyed eggs
 3 = hatching

CLUTCH CONDITION:
 1 = no dead eggs
 2 = dead eggs < 20%
 3 = dead eggs > 20%
 4 = barren / clean setae
 5 = barren / matted setae
 6 = no setae

EGG COLOR:
 0 = other
 1 = cream
 2 = tan
 3 = yellow
 4 = orange
 5 = dark orange
 6 = pink
 7 = reddish
 8 = purple
 9 = black mat
 10 = snailfish eggs
 11 = brown
 12 = brownish-black

PARASITES:
 blank = not examined
 0 = none
 1 = *B. callosus*
 2 = nemertean worms
 3 = bitter crab
 4 = other
 5 = black mat
 6 = CCB
 7 = cottage cheese
 8 = turbellarian worms
 9 = pepper crab
 10 = snailfish eggs
 12 = leatherback

Instructions for the 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. Fill out Survey Area, Vessel Name, Station Number, and Buoy ID fields as directed in the *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 the number of the last page will be written in the 2nd blank on all the pages for that SPN. 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 Tanner and Dungeness, record the carapace width in mm CW.

Chela Height (mm): N/A – this field will not be recorded during this survey.

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

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

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

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, presence of clean, matted or no setae.

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, dead, or previously dead. If a 'leatherback' crab is sampled, code '4' will be entered, regardless of injury state or morbidity status.

-continued-

Parasite(s): Record all codes that apply to the sampled crab. This field will be *blank* if a crab was not examined for parasites. Multiple parasites can be recorded, separated by commas (e.g., 1, 10).

Tag Series: Leave blank; no tagging will occur.

Tag Number: Leave blank; no tagging will occur.

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.

Appendix C3.-Species Composition Form.

Species Composition Form

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

SPN	STATION NUMBER	BUOY ID	SPECIES NAME	SPECIES CODE (NMFS RACE codes)	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:	
472 - Aleutian skate	69060 - Aleutian hermit crab
10115 - Greenland turbot (or Greenland halibut)	71500 - snail unident.
10120 - Pacific halibut	71820 - Pribilof neptune (or Pribilof whelk)
10210 - yellowfin sole	72500 - hairy triton (or Oregon triton)
20510 - sablefish (or black cod)	72743 - angled buccinum (or angular whelk)
21220 - Pacific grenadier	72752 - silky buccinum (or ladder whelk)
21347 - yellow Irish lord	78403 - giant octopus
21720 - Pacific cod	83000 - brittle star unident.
21921 - Alka mackerel	83320 - notched brittlestar
40011 - hydroid unident.	81742 - purple-orange sea star
40500 - jellyfish unident.	82510 - green sea urchin
68578 - Pacific lyre crab	91000 - sponge unident.

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-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* and the fish species documented on the *Fish Length Form*. If there are no species other than measured crabs and fishes in the pot, make a null symbol ‘Ø’ in the Species Name column for that SPN.

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

Species Name: Write the common name, or where absent, the scientific name of each animal caught.

Species Code: Record the 5-digit NMFS RACE code of each identified animal. Commonly-encountered species are listed at the bottom of the form; refer to the supplied NMFS Species Code Book or the Clark CD for additional codes. 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. When photographs or specimens are taken for later positive identification, note in the Comments section

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

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

Fish Length Form

Sample Date (mm/dd/yy) : _____ Vessel Name: _____

Survey Code: _____ Recorder: _____

Page # _____ of _____ Measurer(s): _____

	SPN	SPECIES CODE	FISH LENGTH (mm)	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
10110 = arrowtooth flounder
21921 = Atka mackerel
30330 = black rockfish
30400 = bocaccio
10270 = butter sole
30151 = dark rockfish
30152 = dusky rockfish
10170 = English sole | 10130 = flathead sole
10115 = greenland turbot
10112 = Kamchatka founder
21910 = lingcod
30420 = northern rockfish
10261 = northern rock sole
21720 = Pacific cod
10120 = Pacific halibut
21110 = Pacific herring | 30060 = Pacific ocean perch
21710 = Pacific torncod
30475 = redbanded rockfish
30430 = redstripe rockfish
10200 = rex sole
30050 = rougheye rockfish
20510 = sable fish
10250 = sand sole
30560 = sharpchin rockfish | 30020 = shortspine thornyhead
10262 = southern rock sole
10220 = starry flounder
21740 = walleye Pollock
30470 = yelloweye rockfish
10210 = yellowfin sole |
|---|---|--|---|

-continued-

Instructions for the 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 *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 and coded at the bottom of the form

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

Appendix C5.-Crab Subsampling Form.

Crab Subsampling Form

Sample Date (mm/dd/yy): _____

Recorder: _____

Page: _____ of _____

Survey Code: _____

SPN	STATION NUMBER	BUOY ID	SPECIES CODE	SEX	LEGAL SIZE	FEMALE MATURITY	SPECIAL CATEGORY	NUMBER NOT MEASURED	COMMENTS
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

SPECIES CODES:
 1 = golden king 6 = *C. bairdi* 10 = *L. couesi*
 2 = red king 7 = *C. opilio* 11 = *C. tanneri*
 3 = blue king 8 = *C. angulatus* 12 = *P. multispina*
 4 = hair crab 9 = Dungeness 13 = *P. verilli*
 5 = hybrid, *C. bairdi* x *C. opilio*
 41 = hybrid, *C. bairdi* 42 = hybrid, *C. opilio*

SEX:
 0 = unknown
 1 = male
 2 = female
 3 = hermaphrodite

LEGAL SIZE:
 0 = sublegal
 1 = legal, retained
 2 = legal, not retained

FEMALE MATURITY:
 0 = unknown
 1 = immature
 2 = mature
 3 = mature - primiparous
 4 = mature - multiparous

SPECIAL CATEGORY (red king crabs only):
 1 = legal males >= 150 mm CL
 2 = legal males, new shell < 150 mm CL
 3 = sublegal males >= 120 mm CL
 4 = sublegal males < 120 mm CL
 5 = mature females (eggs or matted setae)
 6 = immature females (clean setae)

Instructions for the Crab Subsampling Form

This form is used to record the total number of crabs that have been counted (not measured) for each pot subsampled by separate subsampling categories. Measuring (sampling) of crabs may begin before counts for each subsampling category have been made and recorded.

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.

Page ___ of ___ : The pages of this form will be numbered sequentially within each SPN sampled. When the last page of an SPN is completed the number of the last page will be written in the 2nd blank on all the pages for that SPN. 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.

Survey Code: For this survey, the code is PB09.

Fill out Sequential Pot Number, Station Number, and Buoy ID columns as directed in the *Pilot House Log* instructions. Record the Species Code, Sex, Legal Size and Female Maturity columns as directed in the *Crab Measurement* form instructions.

Special Category: Record the code which represents the category of the subsampled crabs.

Number Not Measured: The total number of crabs not measured (only counted) by subsampling category.

Comments: Note anything related to sampling or subsampling.

Data Logger Recording Form

Survey Dates: _____ Vessel Name: _____

Page _____ of _____ Survey Code _____ Recorder: _____

Deck ID	Model	Maximum Depth in Fathoms	Serial Number	Deployments & Comments
219	XR-420-CTD	2,185	9643	
221	XR-420-CTD	2,185	9616	
222	TDR-2050	3,280	11879	
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	
236	TR-1000	545	8429	
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 *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: Record Buoy ID of pots the data logger in as they are deployed and anything related to the performance, deployment, and especially 'not retrieved' if a pot containing a logger is lost during the survey.

Weather Observation Form

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

STATION NUMBER	DATE (mm/dd/yy)	TIME (0000-2359)	CLOUD COVER	WIND		SWELL	BAROMETER (in/Bar)	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

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).

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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).

APPENDIX D. EQUIPMENT LIST

EQUIPMENT PROVIDED FOR EACH ADF&G BIOLOGISTS

1. Immersion suit with EPIRB and FireFly3 strobe
2. Rain gear, boots, gloves
3. Life vest, SOSpenders or other personal floatation coats or vests

DECK AND SAMPLING EQUIPMENT

1. One 4'x8' aluminum sorting table with 6 stands
2. Hex head bolts (6"), nuts and washers (12 each) for table assembly
3. Clipboards (4 plastic or cleaned regular)
4. Covered clipboards (4 aluminum or plastic)
5. Calipers (6 large size with millimeter scale)
6. Measuring sticks: (4) 6.0" for golden king; (2) 5.5" for *C. bairdi* and *L. couesi*; (1) 6.5" for red king
7. Tape measures (cms) for fish measurements (3)
8. Fish measuring board (1)
9. Cans of WD-40 (4)
10. Dump totes (4)
11. Fish baskets (25)
12. Plastic "Rubbermaid" dishpans (4)
13. Assorted plastic bags: (2 doz.) gallon & (100) quart zip-locks; (2 doz. 25 gal. clear thick mil)
14. Electric tape (10 rolls)
15. Formalin (100%) w/ mixing jar (1 L)
16. Alcohol (1 gal)
17. Specimen jars (10)
18. Dissecting kit (1)
19. Victorinox knives (6)
20. Plastic toolbox for crab sampling equipment
21. Plastic toolbox with appropriate tools for survey
22. Assorted magnifying glasses (2 or 3)
23. Biodegradable cotton twine (2 rolls)
24. #96 tarred seine twine (5 lbs)
25. 5mm poly orange twine (5 lbs)
26. Magnifying lamp

FORMS

- 50 Pilot House Log forms
- 4,000 Crab Measurement forms (rite-in-the-rain)
- 80 Station Catch Summary forms ***non-data entry***
- 200 Subsampling forms (rite-in-the-rain)
- 1,500 Species Composition forms (1,000 rite-in-the-rain; 500 regular paper)
- 1,500 Fish Length forms (rite-in-rain paper)
- 5 Temperature Probe forms (2 rite-in-the-rain; 3 regular paper)
- 5 Pot Type forms
- 10 Tagged Crab Recovery forms (5 rite-in-the-rain; 5 regular paper)
- 10 sheets specimen labels (rite-in-the-rain)

CHARTS AND BOOKS

1. NOAA Charts 16460, 16440 and 16012

2. 2008-2011 Commercial Shellfish Fishing Regulations (1)
3. NMFS Species Codebook (1)
4. Biological Field Techniques for Chionoecetes Crabs, Jadamec et al. 1999

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CHARTS AND BOOKS (continued)

5. Biological Field Techniques for Lithodid Crabs, Donaldson and Byersdorfer 2005
6. Checklist of Alaskan Crabs, B.G. Stevens 2002
7. A Field Guide to Alaskan Corals, Wing and Barnard 2004
8. Fishes of Alaska, Mecklenburg et al. 2002
9. Alaska Saltwater Fishes and Other Sea Life, Kessler 1985
10. Guide to the Identification of some Common eastern Bering Sea Snails, MacIntosh 1976
11. Field Guide to the Benthic Marine Invertebrates of Alaska's shelf and upper slope, Roger N. Clark, 2006, CD
12. Pacific Coast fishes, Eschmeyer et al. 1983
13. Guide to northeast Pacific Flatfishes, Kramer et al. 1995
14. Guide to northeast Pacific Rockfishes, 2003 Edition, Kramer & O'Connell 1986
15. Pacific Fishes of Canada, Hart 1973
16. Guide to Marine Mammals of Alaska, Wynne 1993
- 17.
- 18.

OFFICE AND MISC. SUPPLIES

3. Cruise leader notebooks (2)
4. Cruise leader ADF&G collecting permit (Gish)
5. Small 3-ring binder for completed Pilot House Log forms (1)
6. Calculators (2)
7. Mechanical pencils (20)
8. 'No. 2' regular pencils (12)
9. Ink pens (5)
10. Permanent markers (5)
11. Highlighting markers (5)
12. Plain paper (1 ream)
13. Rite-in-the-Rain paper (100 sheets)
14. Rite-in-rain field notebooks (5)
15. Earplugs (20 pairs)
16. 3-ring hole punch
17. Assorted rubber bands (including large, for clipboards)
18. Scotch tape (1 roll); duct tape (2 rolls)
19. Assorted paper and binder clips
20. Large envelopes (15)
21. North Star medical kit (1)
22. 25-ft extension cord (1)
23. 6-ft buss bar (2)

COMPUTERS

1. survey laptop, with case
2. power cord
3. mouse and mouse pad, if desired

4. external keyboard, if desired
5. CD-R (1 bundle)

Only the department-owned survey computer is listed here. It is highly suggested that at-sea staff bring their own computers if desired.

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CAMERAS

1. Olympus E-10

Only department-owned cameras are listed here. Be sure to have spare batteries available while on the survey. Staff are encouraged bring their own cameras and binoculars should they wish to take photographs and watch wildlife during the survey.

DATA LOGGERS

	MODEL	S/N
1.	XR-420-CTD	9616
2.	XR-420-CTD	9643
3.	XR-420-CTD	13166
4.	XR-420-CTD	13167
5.	XR-420-CTD	13168
6.	XR-420-CTD	13234
7.	XR-420-CTD	13235
8.	TDR-2050	11808
9.	TDR-2050	11818
10.	TDR-2050	11879
11.	TDR-2050	11880
12.	TDR-2050	11884
13.	TDR-2050	11885
14.	TDR-2050	11886
15.	TR-1050	12176
16.	TR-1050	12569
17.	TR-1050	12570
18.	TR-1000	7209
19.	TR-1000	8429
20.	TR-1000	8816

APPENDIX E. MANAGING QTC DATA WHILE ON THE CHARTER

Managing QTC Data While On The Charter

Each time data acquisition is started, or an automatic file break occurs (every 2 hours), a new data directory is created in the base directory. The directory names are derived from the date and time at which acquisition was started. The format for the directory name is D:\qtc\raw\qtc4\yyyymmdd\hhmmss.

For example, the data in the directory D:\qtc\raw\qtc4\20040217\101332 were created at 10:13:32 in the morning on Feb. 17, 2004.

There are several data files created in each data directory. The names and functions of each file are as follows:

qtc4_raw: Contains the amplitude time series for each trace acquired during logging. This is the primary data file that is imported into QTC IMPACT and used for bottom classification.

gps_raw: Contains the GPS NMEA strings acquired during logging. All NMEA strings are recorded, not just those used for parsing the navigation and time.

acquisition.log: This is a running status file used to record various real-time values generated during acquisition. The data in this file are used for debugging by QTC engineers and may also be used by operators in post processing to recall items of meta-data that are not recorded in the qtc4_raw file.

The memory space on the D: drive of the survey laptop computer is limited and therefore the data generated by QTC must be moved to the external hard drive every couple of days or so. If the D: drive gets too full, the drive will simply stop recording data.

Moving the data from the D: drive to the external hard drive:

Set up a new folder on the external hard drive to receive the daily QTC data folders. Name this folder QTCDataFromSurvey (for example, QTCDataFromStMatts2009).

Copy the data folder that QTC created for the day on the D: drive into the new folder on the external hard drive.

After verifying the data was successfully copied, delete that days data from the survey laptop D: drive.

Creating backups of the QTC data must also be done 2 or 3 times during a survey to ensure data is not lost in the event of a computer meltdown or something going wrong with the vessels electrical system. The safest and most effective way to create independent backups of this data on the external hard drive is to burn it to CD's.

To do this:

It is necessary to zip the data files in order to get the as much of the QTC data onto a CD as possible. Within the folder created above by moving the data from the D: drive to the external hard drive, select the data folder you want to zip, right click on it and move down to the ZipGenius option and select the "Create yyyymmdd.zip".

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A normal, 700mb recordable CD can hold about 10 to 12 days worth of zipped QTC data. Therefore, around days 10, 20 and 30 of the survey, a CD should be burned that will contain the previous 10 (or so) days worth of data. For example, the CD burned on day 10 would have the data from days 1-10, the CD burned on day 20 would have the data from days 11-20 and the CD burned on day 30 would have the data from days 21-30.

It works well to create a separate folder to store all this zipped data. Name this folder *ZippedQTCDataFromSurvey* (for example, *ZippedQTCDataFromStMatts2009*).

To reduce confusion as to which zipped files are to be (or have been) burned to a CD, it is helpful to create subfolders within the folder created above in step 3 to hold only the zipped files that are to be burned to the CD. Name these folders *CDBackupmm.ddtommm.dd*. For example, if the zipped QTC data files from August 2nd through August 11th fit onto a blank CD, name the folder *CDBackup8.2to8.11*.

Burn a CD when there is enough zipped data to comfortably fit onto a CD and clearly label it "Zipped QTC Data From *Survey*" and indicate the dates of the data "Data From *mm/dd/yy* to *mm/dd/yy*".

Another thing one could do to help reduce the possibility of losing data is to have the external hard drive plugged into the survey laptop **only** when you are actually using the external hard drive (when moving files from the D: drive, zipping files or burning a backup CD for example). Keeping it disconnected from the laptop while not in use reduces the possibility of something happening to the external hard drive in the event something goes wrong with the laptop or the vessel's electrical system.

**APPENDIX F. SPECIAL PROJECT: SNAILFISH EGG
COLLECTIONS**

1. Project Title: Snailfish Egg Collections

Principal Investigator (PI)/Point of Contact: Jay Orr/Dave Somerton

Affiliation: RACE Division

Address: AFSC, Sand Point Way, Seattle, WA 98115

Email: james.orr@noaa.gov

Phone: (206) 526-6318

2. General Description and Justification: We are requesting that all fish egg clusters found in crabs examined be preserved, half of each cluster in 95% ethanol and half in 10% formalin. We plan to analyze the ethanol-preserved eggs genetically to identify species depositing their eggs inside crabs and to analyze the formalin-preserved eggs for size and numbers of eggs in each cluster and morphological characters of the embryos and eggs. If time permits, we would also appreciate receiving any snailfishes collected, especially those in spawning condition. Jay will happily identify any and all that come back.

3. Detailed Collection Procedures:

a. Preserve about half of the cluster in a generous amount of 95% ethanol (no less than 2:1 ethanol:egg mass). Fluid from the clusters may be mixed, so for example, a holey bag for each cluster in a five-gallon bucket full of ethanol would be fine. Previously, we obtained good results with a 5 gallon bucket containing 100 clusters.

b. Preserve the other half of the cluster in a generous amount of 10% formalin (no less than 2:1 10% formalin:egg mass). Fluids may be mixed for these also.

c. Label each so that the halves can be matched up in the lab and with station data sufficient for retrieving position and depth. If eggs are collected from more than one species of crab, please note the species.

d. Whole snailfishes should be preserved in 10% formalin or, if necessary, frozen. If time permits, please collect a fin clip preserved in 95% ethanol. Fin clips can be preserved with the eggs.

4. List of supplies needed: 10% formalin, 95% ethanol, bags, labels

5. Other notes: All collections will be archived at the University of Washington Fish Collection for future use.