Regional Operational Plan CF.1J.2019.02

Operational Plan: Southeast Alaska Red King Crab Pot Survey, 2018–2022

by

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February 2019

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

REGIONAL OPERATIONAL PLAN CF.1J.2019.02

OPERATIONAL PLAN: SOUTHEAST ALASKA RED KING CRAB POT SURVEY, 2018–2022

by

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Division of Commercial Fisheries

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SIGNATURE PAGE

Project Title:	Southeast Alaska Red King Crab Survey
Project leader(s):	Joe Stratman
Division, Region, and Area	Commercial Fisheries, Region I, Southeast Alaska
Period Covered	2018–2022
Field Dates:	June–August
Plan Type:	Category II

Approval

Title	Name	Signature	Date
Project leader	Joe Stratman		9/4/18
Biometrician	Katie Palof		9/4/18
Research Coordinator	Karla Bush		9/4/18

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PURPOSE

Southeast Alaska red king crab (RKC) stocks are assessed using a stratified random sampling design. The Southeast Alaska red king crab survey provides stock health and catch per unit of effort (CPUE) data. Survey CPUE data are modeled using a three-stage catch survey analysis to produce estimates of mature and legal male biomass which is used in managing the commercial fishery. Survey CPUE by size and sex class are compared to long-term average values to determine stock health.

Key words: Pot survey, Red king crab, Paralithodes camtschaticus, Southeast Alaska

OBJECTIVES

1. Capture and collect biological information on red king crab from eight specific survey areas throughout the northern portion of Southeast Alaska for model-based biomass estimation.
2. Capture and collect biological information on other commercial crab bycatch species, such as Tanner crab and Dungeness crab.
3. Maintain long-term data set on bottom temperature (from HOBO temperature tidbits) for future climate analysis and comparisons.
4. Use results from survey analysis to determine guideline harvest level for the following commercial RKC season, as well as setting personal use annual bag and possession limits for the region.
5. Tag male RKC to determine growth increments of different size classes and movement in Seymour Canal.

BACKGROUND

The survey is currently conducted in the northern part of Southeast Alaska in seven survey areas: Lynn Sisters, Juneau (including Barlow Cove), Pybus Bay, Gambier Bay, Seymour Canal, Peril Strait, and Excursion Inlet (Figure 1). Previously surveyed areas included Holkham Bay, and Port Frederick; these areas were excluded from the surveyed areas beginning in 2015.

A range of 28 to196 pots are set in each survey area, dependent on the size of the area and time needed to work the gear. Table 1 includes location codes for each survey area, including those areas no longer surveyed but included in the historical data set. Catch data of mature male crab are incorporated in a model to produce estimates of population size for each surveyed area. Population size is estimated using a three-stage catch survey analysis model that tracks three recruit categories (classified using size and shell condition; Tables 2 and 3) of male crabs over the range of survey years, which in most areas is from 1979 to present, to estimate the current abundance of mature and legal male crab in each area.

In addition to estimating abundance, other factors that contribute to the overall health of the population are examined including CPUE of juvenile male and female crab, egg condition, clutch fullness, size distributions, and other factors. Estimates of harvestable surplus are generated for each survey area and expanded using the mean proportion of harvest occurring in the surveyed areas to produce a regional guideline harvest level (GHL). The regional GHL is compared to a regulatory threshold of 200,000 pounds (5 AAC 34.113), which is the minimum level for the commercial fishery to open in November. Survey results are also used to set bag and

possession limits in the red king crab personal use fishery and to determine whether any survey area personal use closures are necessary.

METHODS

POT LOCATIONS

Pot locations are selected within five density strata through a stratified random sampling design. The number of pots within each stratum is determined using a Neyman allocation based on the variance of total crab CPUE estimates by strata from 2015–2017 survey data, which is updated using new data every three years (Cochran 1977). The allocation was updated for the 2018 survey season and the next update is scheduled for 2021. The total number of pots within each survey area is determined based on logistics and time that the crew can efficiently sample and set pots. The strata boundaries were based on past abundances of both male and female red king crab (Clark 2008). Exact pot locations for each area are determined using Geospatial Modeling Environment [1](http://www.spatialecology.com/gme/) software to assign randomly generated locations within each stratum in ArcGIS. Details of pot locations for each survey year are presented starting with the 2018 information in Appendix E. Extra pot locations are provided in the tables and figures, for each area, in the event there may be conflicts with gear from concurrent fisheries in the vicinity or if set locations are otherwise unattainable.

SETTING AND PULLING

Pots will be set between 12:00 and 18:00 hours and pulled between 07:00 and 13:00 hours. Soak times will range from 18–20 hours; pots with soak times greater than 20 hours will be dumped at the rail and not sampled. Setting and pulling times will be recorded for each pot on the Crab Pot Set Form (Appendix C1).

SOAK TIME

Currently, there is no catch-soak time curve information for RKC in Southeast Alaska. The current soak times are based on catch-soak time curves generated for RKC in the Bering Sea and have been adjusted to reflect local crab densities, which show large variations due to non-standard soak times. An analysis of past red king crab survey data indicates that decreasing soak time below 18 or increasing it above 20 hours did show a significant decrease or increase in mature male CPUE, respectively.

POT GEAR AND BAIT

Conical king crab pots with an 88-in diameter and no escape rings will be used for the survey. Pots will be baited with frozen, winter-caught Alaska bait herring (preferably caught the same year as the current survey) and chopped within 24-hours of use. Two bait containers, on opposite sides of the pot and loosely filled with chopped herring, will be used for each pot. The bait jar will be suspended so that the top of the bait jar is approximately the same height as the bottom of the pot cone and about halfway between the cone and the exterior webbing. The bio-twine (30-thread untreated cotton twine) will be replaced on all pots prior to setting gear on the first day of the Juneau Area and Barlow Cove survey (Leg I of the survey).

[1] Product names appearing in this operations plan are included for completeness and don't imply an endorsement by the Alaska Department of Fish and Game.

HOBO tidbit temperature loggers will be attached to all pots with zip ties prior to the first set on each leg of the survey. Tidbits should be attached to pots so that the tag number is facing out and visible to crew on deck. All tidbits should be removed from the pots and the information downloaded at the end of each survey leg. Temperature logger protocols are found in Appendix B.

Setting and pulling the gear is the responsibility of the vessel crew. Biologists are available to help work gear at the request of the deck supervisor.

At the end of each trip the biological crew will scrub and clean all survey gear including tables, bait chopper, bait jars, mats, and baskets. All gear removed from the supply tote will be cleaned and returned to the tote. The biological crew is urged to look around the boat before disembarking to assure that all personal belongings have been collected.

DATA COLLECTION

Pot Condition and Substrate:

When a pot is pulled, its condition and proper fishing status will be recorded using the Crab Specimen Form (Appendix C2). Any evidence that the pot was on its side, had holes, empty bait jars, errors in closing, and the sediment type, if any, found on the pot will be noted (Table 4). Holes or other features that would allow small crabs to escape will be repaired before the pot is used again. Pots will be emptied onto a sampling table. Commercially important bycatch species will be counted, numbers recorded, and then returned to the sea (Table 5). All king, Tanner, and Dungeness crabs will be retained for collection of biological information before being returned to the sea.

Biological Information:

The carapace length (CL) of all king crab and carapace widths (CW) of Tanner and Dungeness crabs will be measured with Vernier calipers to the nearest millimeter, using the standard biological measurement for that species (Figure 2). Shell condition of crabs will also be assessed (Table 2). Tanner crab with shell ages between three and four will be designated as shell four, due to the timing of this survey relative to the molt; these are skip molts and will be more observably shell four during the October Tanner crab survey.

All legal and pre-recruit sized RKC will be measured first and should be made priority above all other size/sex class and species. Male RKC measuring between 138 and 155 mm CL will be checked for legality using a seven-in crab gauge.

If there are pots with high numbers of crab, a maximum of approximately 100 crab (50 minimum for male crab) should be sampled. If there is high variability in clutch size, as many females as possible will be sampled. The scientific lead on each leg will determine if and at what rate to sub-sample using the following criteria:

- Tanner males and females will always be subsampled before subsampling RKC,
- female RKC will be sub-sampled first, please note that every effort must be made to separate juvenile females and mature females prior to subsampling, as this could affect analyses.
- small male RKC will be sub-sampled last.

For each crab, missing legs or abnormalities in the carapace will be noted (Table 6) Presence of any parasites or diseases will be noted for all species (Table 7). If *Briarosaccus callosus* is found on a specimen (Figure 3), do not release the live crab back into the water. Freeze or leave the infected crab out for a few days so that the parasite will be killed and not spread.

For all female crabs, the percent clutch fullness will be estimated in 10% increments and the development and condition of the eggs will be noted according to the reproductive codes in Table 8.

Chela heights of adult Tanner crab will be measured to monitor any changes in the size at functional maturity (point when mature males are "large clawed"). For each survey area, a total of 120 male Tanner crab are randomly sampled until target numbers are achieved within each of six size groups and measured for biological carapace width (to the nearest 1 mm) and right chela height, (also to the nearest 1 mm) using Vernier calipers (Jadamec et al, 1999) (Table 9, Figure 4, and Appendix C3).

Individual crab weights, for use in the length weight relationship for each area, were last measured in 2010 and will continue to not be measured to increase sampling efficiency.

DATA INTEGRITY

Data will be recorded on standard data sheets (B and C) and entered into the Zander database onboard the vessel by the survey biological staff. Once the data is entered, datasheets are marked with initials of person entering the data (EB: initials). The database is then re-checked against the datasheets for errors, preferably by a different biological staff, and datasheets are marked with initials of person verifying the data (VB: initials). This should be completed prior to disembarking from the vessel to ensure a time efficient analysis of the data. All data is housed in OceanAK, a relational database available via intranet to ADF&G researchers and managers statewide (subject area: Region 1–Invertebrates–Surveys–Crab). Raw datasheets are archived.

LOST POT PROTOCOL

If a pot is lost (buoy is not visible); a retrieval pot (with biotwine cut, escape rings opened, and tidbit removed) will be set next to the lost pot with a pot saver attached to the floating line just above the bridle. Extra line should be placed on the retrieval pot, depending on depth, to allow the vessel to adequately circle the lost pot a minimum of four times. The line from the retrieval pot should be left in the block and tied off to a cleat until four rotations are complete before the retrieval pot may be hauled. The skipper should make every attempt to keep the line at ninety degrees to the boat. This process should be repeated a second time if the pot is not retrieved on the first attempt, if time allows.

TAGGING MALE RED KING CRAB

Male RKC will be tagged to determine growth increments of different size classes and movement data in Seymour Canal. Male RKC from three recruit size classes (juvenile, pre-recruit, and recruit) will be tagged using a numbered double T-bar tag in the isthmus muscle. Tagging instructions are found in Appendix A.

VOLUNTEERS

Occasionally, volunteers such as graduate students or National Parks Service workers, join the crew for a portion of a RKC survey leg. They typically help with gear work and/or sorting crab

species once they have been briefed by both the boat and scientific crew. Prior to boarding the R/V Medeia, all volunteers must be approved by the Crab Group staff and complete the "Volunteer Agreement" form in Appendix C4.

VESSEL

The State of Alaska owned research vessel, R/V Medeia, is used to conduct the annual RKC survey. This 110-foot vessel was built in 1982 of iron, steel, and alloy, and has a net capacity of 246 tons. It currently resides at Harris Harbor in Juneau, Alaska. The vessel crew consists of four positions: Boat Officer IV, Boat Officer III, Boat Officer II, and a Boat Officer I.

DATA ANALYSIS

All data are entered in Zander and stored in OceanAK, the ADF&G Southeast Region's database. Most data analyses are done using the most updated version of R (verson 3.4.0, R Core Team 2017), while a few are still performed in JMP 12 (SAS 2016).

SURVEY CATCH PER UNIT OF EFFORT

Data, including sex and size, is collected for all red king crab in each pot. Based on the sex and size designations, crab are classified into recruit classes. Males are classified based on size and shell conditions according to Table 3. Females are classified as either large and mature or small and immature based on both size and presence of physical maturity (Donaldson & Byersdorfer 2005). A catch per unit effort (CPUE) is summarized for each recruit class in each pot, with the goal of calculating an average CPUE for each survey area. Only pots that are classified as "normal" are included in this analysis. Abnormal pots are removed to prevent bias (refer to Table 4 for abnormal pots designations).

Due to the stratified design of the survey the average area CPUE must be calculated as a weighted average, including both the number of pots sampled in each strata and the area of each strata. Catch in each pot is weighted by a multiplier of the area of each strata divided by the number of pots sampled in that strata in the current year. Once each pot's catch is weighted an average CPUE for each recruit class in computed for each survey area. Weighting the CPUE is essential due to the stratified design of the survey and differential sample size in each stratum.

STOCK HEALTH DETERMINATION

Historically the weighted CPUEs and survey data calculated for each recruit class have been used to help determine the overall stock health for each survey area. This is done by comparing the current year's data to long-term and short-term benchmarks (Siddon et al. 2009). This method for evaluating stock health is repeatable and objective; additionally it has been used for other crab species in Southeast Alaska. The following metrics are examined to evaluate stock health: mature female clutch fullness and catch rate (CPUE), juvenile female CPUE, prerecruit CPUE, recruit CPUE, and postrecruit CPUE. These metrics are each weighted equally but do provide a range of indicators for the population.

All the metrics, except mature female clutch fullness, are calculated using weighted CPUE from the survey. For the long-term trends the current year's metric is compared, using a t-test, to the long-term mean calculated from baseline years (1993–2007). This specific time-period, from 1993 to 2007, was established in 2008 and was found to characterize the best combination of the most representative data quality available (Siddon et al. 2009). If the current year is significantly

above the long-term mean it is scored +1, if not different from the mean it is scored 0, and if significantly lower than the mean it is scored -1. The short term trends are examined by performing a linear regression on the last four years of data for each metric. The significance of these regressions is then scored similarly to the long-term trends, with a positive trend having a score of 0.25, no trend having a score of 0, and a negative trend having a score of -0.25. The area scores sums all the long-term and short-term scores for each metric into one score for each area. Scores less -4.50 are considered poor, between -4.25 and -1.75 below average, between -1.50 and 1.50 moderate, between 1.75 and 4.25 above average, and above 4.50 healthy.

Mature female clutch fullness is evaluated differently by calculating the mean proportion of mature females in each pot with a clutch fullness of < 25% (i.e. very small clutches). The level allows for biologist error in assessing clutch fullness to the nearest 10 % on the survey, low clutches (<25%) are usually noticeably low.

STOCK ASSESSMENT

Red king crab biomass, both mature and legal, is estimated using a catch-survey analysis model (CSA) which relies on inputs from both the survey and the fishery (in years when the fishery was open).

Model inputs

Inputs from the survey data include: weighted CPUE of pre-recruit, recruit, and post-recruits by survey area, mid-date for the survey, and average weight (using the established length-weight relationships) of pre-recruit, recruit, and post-recruits. The mid-date for the survey is the middle date for the pots set in each survey area. If the area is surveyed an even number of days the date used would be the first day of the second half of the survey for that area. For example, if an area were surveyed for four days, the date used would be the date for day three.

The average weight of male crab in each survey year is calculated from the length composition collected on the survey using a survey area specific length-weight relationship. These relationships were established from both fishery and survey data (1996–2002) and are published in Clark et al. 2003. A summary of the relationships for each area is provided in Table 10.

Inputs from the fishery include catch in numbers and the mid-date of the fishery, both of which are obtained from the commercial fish ticket database. Additionally, personal use catches are obtained from the Juneau area personal use permit program and sport fishery surveys, conducted either from a mail-out survey or by the creel census program. Much of the personal use catch remains unreported prior to 2018; therefore, it was assumed the actual personal use harvest is considerably higher. Personal use permits and harvest reporting for all of Southeast Alaska are required starting July 1, 2018. The mid-date for the fishery is computed as the sum of the days in the season, the ratio of the catch for that day, divided by the total catch for the area and season (Clark et al. 2003).

The model

A CSA model is used to estimate mature and legal abundance of red king crab for each of the surveyed areas. This analysis type was initially developed by Collie and Sissenwine (1983) and adapted to crab abundance estimation in the 1990s (Kruse and Collie 1991, Collie and Kruse 1998, Zheng et al. 1997). Starting in 1994 a two-stage model was used to estimate abundance of

red king crab in Southeast Alaska (Woodby 1994), this evolved to a three-stage model (Collie and DeLong 1998) in 2002 (Clark et al. 2003), using prerecruits, recruits, and postrecruits.

This type of model estimates the abundance of a population by comparing the changes in survey catches to the number of crabs removed by the commercial and personal use effort. In a three-stage model prerecruits are estimated every year and recruits are related to the number of prerecruits that survive and molt to become recruits (Eq. 1). Postrecruits are estimated from the recruits and postrecruits in the previous year and the fishery removals that occur between the survey years (Eq. 2). Errors are associated with both survey and fishery catch and are assumed to be log-normally distributed (Eq. 3). A constant instantaneous natural mortality of 0.32 is used; this translates to an annual natural mortality of 27% (Woodby 1994).

Equations depicted below are modified from those already published in these documents (Woodby 1994, Clark et al. 2003).

These are the two processes described in the three-stage CSA model:

$$R_{yr+1} = \mu A_{yr} \quad (1)$$

$$P_{yr+1} = \left(R_{yr} + P_{yr}\right)e^{Mt_{yr}} - qC_{yr}e^{Ml_{yr}} \quad (2)$$

Where:

R_{yr+1} = relative abundance of recruit crab in year +1

A_{yr} = relative abundance of prerecruit crab in year yr

μ = proportional constant, a function of the relative catchability of prerecruit and recruit crab, along with the survival and probability of molting from prerecruit to recruit crab

P_{yr+1} = relative abundance of postrecruit crab in year +1

C_{yr} = total harvest (in number of crabs) in year *yr*

t_{yr} = time interval between surveys (in years)

l_{yr} = time lag between the midpoint of the fishery in year *yr* and the survey in year *yr +1*

q = catchability coefficient relating relative abundance measured as catch per pot in the survey to absolute abundance of crab in the area

M = instantaneous natural mortality coefficient

The observed catches in the survey are the relative abundances with lognormally distributed measurement error:

$$\tilde{A}_{yr} = A_{yr}e^{\tau_{yr}} \quad (3)$$

$$\tilde{R}_{yr} = R_{yr}e^{\upsilon_{yr}}$$

$$\tilde{P}_{yr} = P_{yr}e^{\omega_{yr}}$$

Where:

$\tau_{yr}, \upsilon_{yr,}$and ω_{yr} = normal deviates

The values of A_{yr}, R_{yr}, and P_{yr} are estimated by minimizing the squared deviation of the log of the estimated values and observed values. The squared deviations are weighted to take into account differences in survey methods throughout the years. This was established in 2002 (Clark et al. 2003) without much documentation and should be revisited in the future. Currently weightings are 1 for 1979 to 1985 (fixed station surveys), 2 for 1986 to 1991 (random station by sometimes mixed fall/summer surveys), and 4 for 1993 to present, unless significant changes have occurred since then (exceptions include the Juneau area and Peril Strait). Minimizing the sum of the weighted squared deviations was performed using the "optim" function in the most recent version of R (3.4.0, R Core Team 2017).

Model output

The CSA model computes an estimated relative index value for each of the three recruit classes (prerecruit, recruit, and postrecruit), which is then scaled (using q which is estimated in the model) to a number of male crab for each recruit class. The number of crab in each recruit class is converted to a biomass (lb) using the average weight of all three recruit classes from the survey (using the length-weight relationship established for each area). For each survey area the biomass of both legal (recruits and postrecruits) and mature (all three male recruit classes) is reported. These are summarized annually in the Southeast Alaska red king crab stock assessment memo prepared by the biometrics group.

REGIONAL ESTIMATION

Red king crab are managed regionally in Southeast Alaska, therefore the estimate of biomass from each surveyed area is summed together to produce a regional estimate of red king crab in surveyed areas. This is then extrapolated to those areas that are not surveyed, using previous catch data. The total regional biomass of legal and mature male red crab combines both the survey and non-survey biomass estimates. This is reported annually in the Southeast Alaska red king crab stock assessment memo, as well as being used for scenarios for setting guideline harvest levels.

STAFF AND RESPONSIBILITIES

- Joe Stratman, Fishery Biologist III (Lead Crab Biologist/Scientific Crew Lead)
- Adam Messmer, Fishery Biologist II (Scientific Crew Lead)
- April Rebert, Fishery Biologist II (Scientific Crew Lead)
- Tessa Bergmann, Fishery Biologist I (Scientific Crew Lead)
- Katie Palof, Biometrician II (Biometric Review

Logistics and Field Studies

Joe Stratman and Adam Messmer will have the primary responsibilities associated with logistics and field studies.

Database Integrity

Joe Stratman and Adam Messmer will have the primary responsibilities associated with data entry and database integrity queries and will be assisted by field crews.

Data Analysis

Katie Palof will have the primary responsibility for catch-survey modeling. Adam Messmer will assist with matrix analyses and weight calculations as needed.

Stock Assessment Memos

Katie Palof will have the primary responsibilities associated with writing the stock assessment memo and can be assisted by Joe Stratman or Adam Messmer as needed. There will be two separate memos associated with this project: one specific to Section 11-A that will be completed in July, and a second for the rest of the region that will be completed in August/September. Katie Palof will supply catch-survey analysis tables and contributes sections of the management memo (analysis methods and portions discussion and introduction).

Management Memo

Joe Stratman and Adam Messmer will have the primary responsibilities associated with writing the management memo. This memo will detail commercial fishery management strategies, if the 200,000 lb minimum threshold established in regulation is met, and any required actions for the personal use fisheries outside of Section 11-A. For Section 11-A, Region I crab group and Juneau Area management staff will consider stock assessment information and detail any fishery management actions for that area in a separate memo.

Calendar of Activities

Dates	Activity	Personnel
April/May	Define pot survey locations in ArcGIS	FB II's
May/June	Project and Operation Planning	FB II's
April to June	Purchase, prepare, and stage survey gear	FB II's
June to August	Conduct three legs of at-sea surveys	All
July to September	Compile and edit red king crab survey data and submit to biometrics for stock assessment report	Biometrician and FB II's
July	Review and determine bag and possession limits for 11-A personal use fishery.	All
August/September	Stock assessment analysis of catch survey data.	Biometrician
September	Review catch survey data and conduct commercial fishery management for season.	All
September	Management announces potential season and GHLs	Management staff

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TABLES AND FIGURES

Table 1.–Red king crab survey location codes.

Survey area	Location code
Barlow Cove	1
Deadman's Reach	4
Excursion Inlet	9
Gambier Bay	15
Juneau	23
Lynn Sisters	26
Pybus Bay	37
Seymour Canal	39

Table 2.–Shell age criteria for the Southeast red king crab survey (Donaldson and Byersdorfer 2005).

Shell condition	Shell age	Description
1, soft	0–2 weeks	Shells very soft and flaccid, lose shape when out of water. Similar in texture to wet leather. Lack of careful handling will cause shell to lose shape.
2, light	2–8 weeks	Shiny ventral surface of coax and exoskeleton. Few or no scratches, pits or epibionts presents. Dactyls and spines sharp with no wear present. Legs easily compressed when pinched because legs contain little muscle tissue. Merus flexible and does not crack when bent. Chela depressible.
3, new	2–20 months	Coxa and ventral surface of exoskeleton dull. Legs mostly full of muscle tissue, meri not easily compressed by pinching and will crack if bent. Spines and dactyls may show slight wear.
4, old	21–36 months	Skip molts. Distal portion of ventral coax partially or totally covered with grown scratching. Legs full of muscle tissue, meri not easily compressed. Epifauna almost always present.
5, very old	>36 months	Double skip molts. Distal portion of ventral coax densely covered with dark scratching. Legs full of muscle tissue, meri not easily compressed when pinched. Tips of dactyls worn, rounded and dark. Carapace frequently covered with fouling organism to greater extent than with old-shell crabs.

Table 3.–Male recruit class descriptions (McCaughran and Powell 1977).

Recruit Status	Carapace Length (CL)	Shell Condition
Juvenile	≤128 mm	Any
Pre-Recruit	Between 129 and 144 mm	Any
Recruit	Between 145 and 160 mm	1, 2, or 3
Post Recruit	If greater than 161 mm	1, 2, or 3
	If between 145 and 160 mm	4 or 5

Table 4.–Description of debris, substrate, pot condition, type, dimensions, escape device, and bait codes for the Southeast Alaska crab surveys. Pot weight is also recorded but is of continuous data type.

Code	Debris	Substrate	Pot condition	Pot type	Pot dimensions	Escape device	Bait
0	–	Unknown	–	–	–	–	–
1	Lg. Brn. kelp	Mud	Normal	Pyramid	4’ dia.	None/closed rings	No bait
2	Mussels	Mud/gravel	Not baited	Cone	5–5’11” dia.	King (4, 6 ¼-inch rings)	Jar & hanging
3	Shells	Mud/clay	Lost	Square	6–6’11” dia.	King (9-inch stretch mesh)	Jar only
4	Woody debris	Mud/shell	Door open	Dungeness	7–7’11” dia.	Tanner (4, 4 ¾-inch rings)	Hanging only
5	Hair kelp	Mud/soft	Broken webbing	–	7x7	Tanner (7-inch stretch mesh)	–
6	Barnacles	Mud/hard	Upside down	–	8x8	Dungeness (2, 4 ⅜-inch rings)	–
7	Sponges	Clay	Collapsed tunnel	–	9x9	–	–
8	–	Sand	Not on bottom	–	–	–	–
9	–	Gravel	Pot open/broken	–	–	–	–
10	–	Boulder	Lost pot contents	–	–	–	–
11	–	Cobble	–	–	–	–	–
12	–	Rock	–	–	–	–	–
13	–	Hard	–	–	–	–	–
14	–	Soft	–	–	–	–	–
15	–	Shell	–	–	–	–	–
16	–	Coral	–	–	–	–	–
17	–	Mixed	–	–	–	–	–
18	–	Silt	–	–	–	–	–
19	–	Barnacle	–	–	–	–	–
20	–	Mussels	–	–	–	–	–

Table 5.–Commercially important bycatch species code list for the red king crab survey.

Species code	Species	Species code	Species
110	Pacific cod	**850**	Scallop
127	Yellowfin Sole	**892**	Red sea urchin
129	Starry Flounder	**894**	California sea cucumber
130	Lingcod	**910**	Dungeness crab
145	Yelloweye rockfish	**921**	Red king crab
147	Quillback rockfish	**922**	Blue king crab
200	Halibut	**923**	Golden king crab
270	Pollock	**931**	Tanner crab
710	Sablefish	**964**	Coonstripe shrimp
870	Octopus	**965**	Spot shrimp
363	Neptunea sp.	–	–

Table 6.–Leg loss codes.

Code	Criteria
1	No legs missing or regenerated
2	1 leg missing or regenerated
3	2 or more legs missing or regenerated
4	Carapace damage
5	Combination of conditions

Table 7.–Parasite condition codes.

Code	Parasite
1	None
2	Briarosaccus, single scar
3	Briarosaccus, double scar
4	Briarosaccus, single externa
5	Briarosaccus, double externa
6	Bitter crab, *Hematodinium*
7	Microsporidian
8	Nemertean worms

Table 8.–Female reproductive condition codes used for the red king crab survey (Donaldson and Byersdorfer 2005).

Code	Clutch condition	Egg Development
1	Normal	Eyed eggs
2	<20% dead eggs in the clutch	Uneyed eggs
3	>20% dead eggs in the clutch	No eggs
4	Barren with silky setae	–
5	Barren with matted setae and empty egg cases	–

Table 9.–Sample goals by carapace width range category for male Tanner crab chela height measurements.

Carapace width	Sample goal
<106	25
106–114	25
115-122	25
123–131	25
132–152	25
>153	25

Table 10.–Coefficients for length-weight conversion formulas, Formals is Weight (lb) = exp[Intercept + slope*ln(carapace length)] *(2.2/1000).

Area	Intercept	Slope
Pybus Bay	-7.383	3.06
Gambier Bay	-6.695	2.921
Seymour Canal	-6.438	2.87
Peril Strait	-7.18	3.02
Juneau	-7.23	3.03
Lynn Sisters	-7.42	3.07
Excursion Inlet	-7.67	3.12

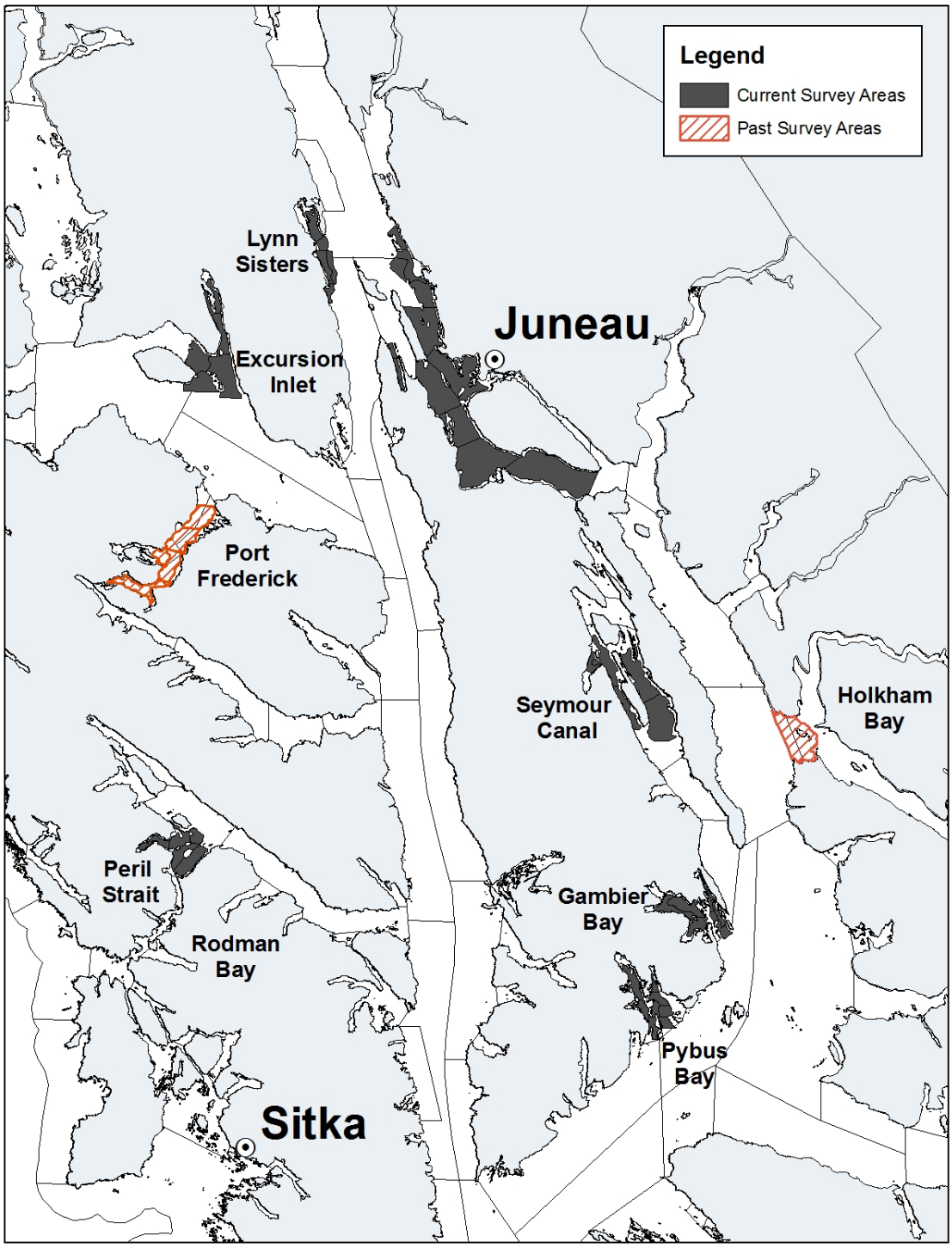


Figure 1.–Current and past surveyed areas in southeast Alaska for red king crab.

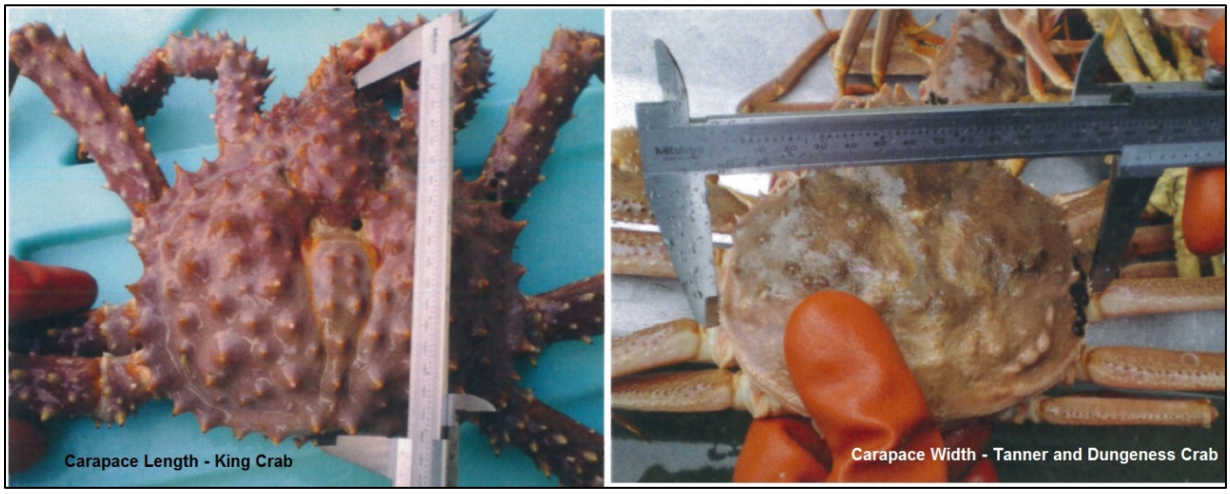


Figure 2.–Pictures showing both types of carapace measurements. Left: Measuring carapace length for all king crab. Right: Measuring carapace width for both Tanner and Dungeness crab.

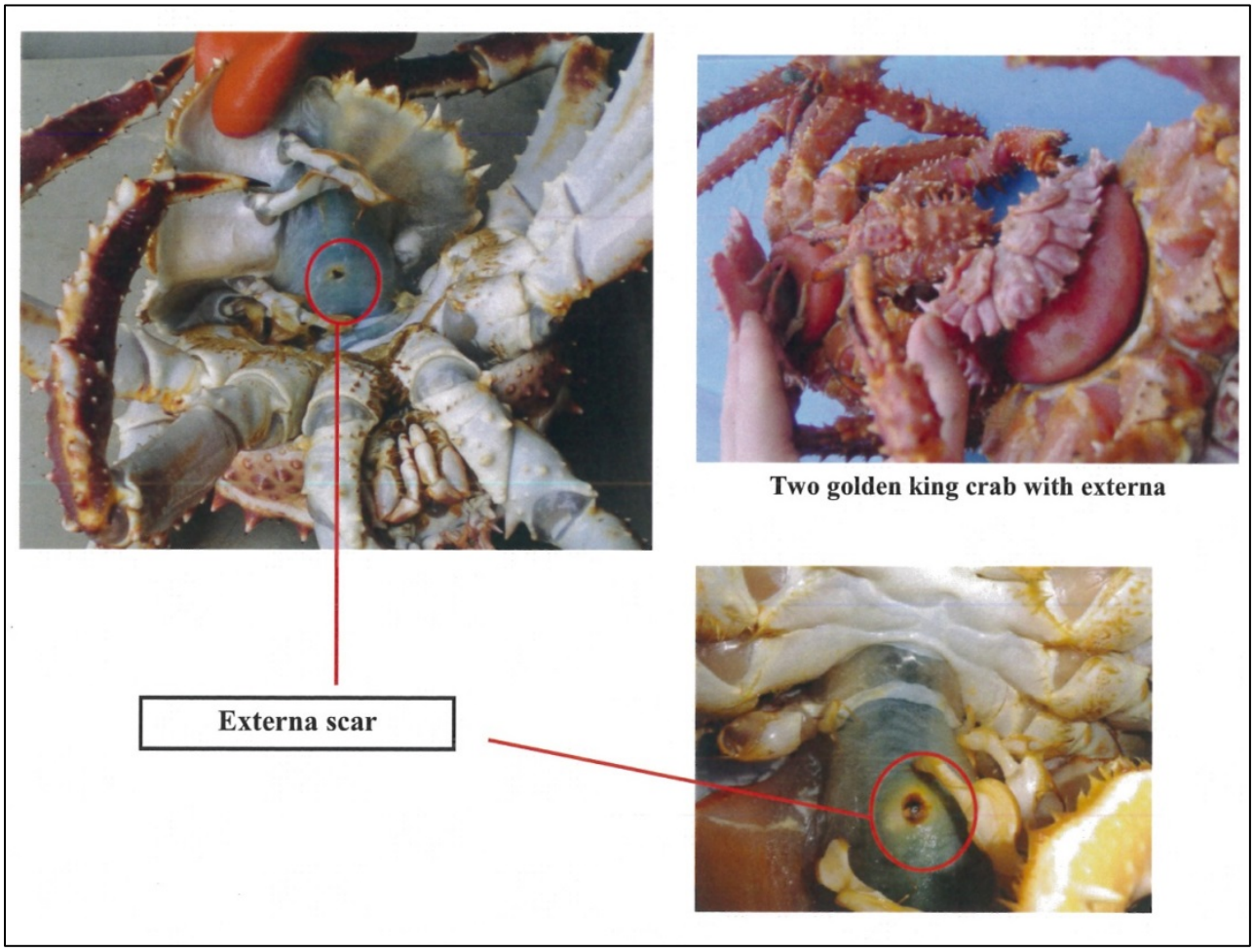


Figure 3.–Pictures of Briarosaccus externa and externa scars on golden king crab.

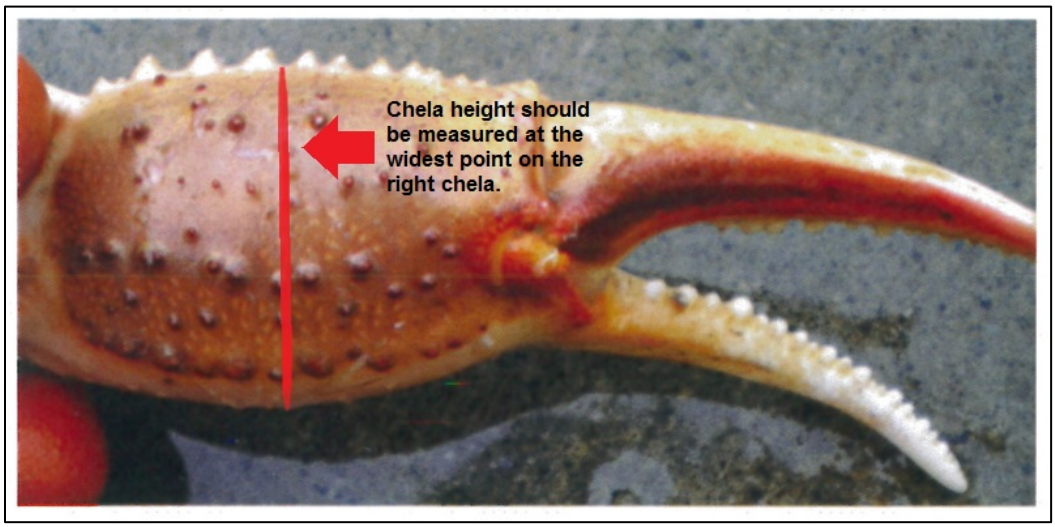


Figure 4.–Picture showing the approximate location in which chela height should be measured on the right chela of male Tanner crab.

APPENDIX A: INSTRUCTIONS FOR TAGGING RKC IN SEYMOUR CANAL

Appendix A1.–Instructions for Tagging RKC in Seymour Canal.

Male RKC will be tagged to determine growth increments of different size classes and movement data in Seymour Canal. Male RKC from three recruit size classes (juvenile, pre-recruit, and recruit) will be tagged using a numbered double T-bar tag in the isthmus muscle. These size classes include carapace lengths ranging from 107-160 mm. Tag numbers will be recorded on the specimen form (Appendix C) and if a crab previously tagged is recaptured in a pot, "recap" will be noted in the comments section of the form.

Survey area	Recruit status	Goal	Number tagged
Seymour	Juvenile <129mm	50	
	Pre-R 129–144mm	50	
	Legal (recruit & post) < 144mm	50	

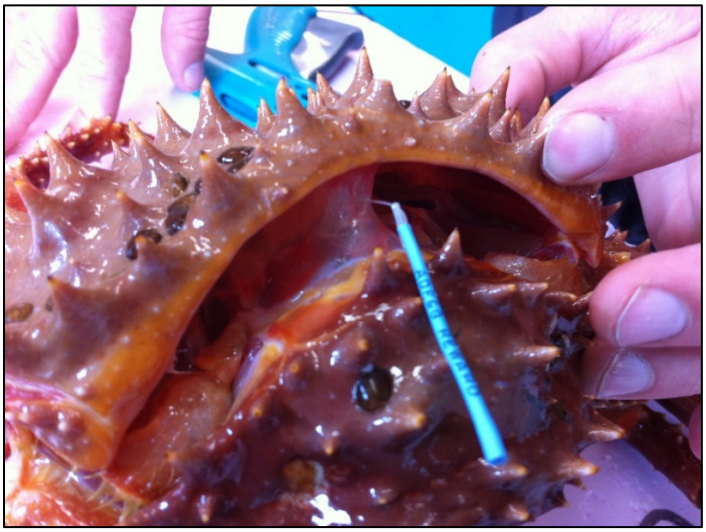
Instructions for Tagging RKC

Load tags vertically into the top of the tagging gun and make sure tags are not twisted together. Tags will need to be checked after each crab is tagged to ensure they will be properly released from the tagging gun.

Place the red king crab posteriorly facing you and gently lift the back of the carapace to expose the isthmus muscle, a white hollow pillar muscle. Insert the needle of the tag gun into the center of the isthmus muscle and punch the tag in. Gently pull on the double T-bar tag to ensure the tag is securely placed. If a crab is tagged in the wrong place and starts bleeding (white liquid) **do NOT** tag again, release and start over with a new specimen. Once a crab is tagged, the tag number is recorded on the crab specimen form and the crab is gently release the crab back into the water.

If a crab tag is recaptured during the survey, write the tag number and a note stating "recap" in the comments section of the crab specimen form.

Appendix A2.–Picture showing T-bar tag inserted into the isthmus muscle of a king crab specimen.

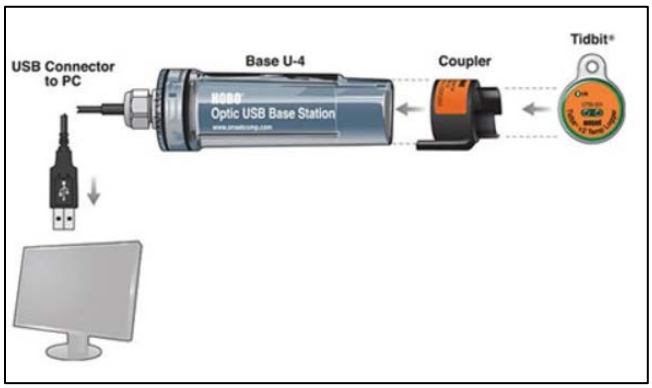


APPENDIX B: HOBO WATER TEMPERATURE DATA LOGGER INSTRUCTIONS

1) One logger for each pot (~20–28) will be deployed on the first day of setting per trip (Figure D1).

Appendix B2.–Picture of HOBO water temperature data logger device that will be attached to each deployed crab pot.

2) Activate logger using optical USB base station attached to computer(Figure D2),
   a. Name will be a unique number that matches buoy number of pot in which logger will be attached.
   b. Time interval: 1-hour.



Appendix B3.–Picture of optic USB base station attached to computer. This device is used to activate loggers.

3) One temperature logger will be placed on each deployed pot with a cable tie near the tunnel of the pot, and with the buoy number facing out.

-continued-

4) Write in comments column of skipper form, 'Tidbit # X' (where X is the number of the tidbit). This should be done by the crewmember in the wheelhouse documenting coordinates and associated data during the setting of pots each day.
5) Temperature loggers will be downloaded at the end of each leg, saved in Excel, and transferred to a file on the desktop of the F/V Medeia computer.
6) Files will be saved on a memory stick (or other media) aboard vessel; leave backup copy aboard Medeia computer
7) Files will be saved to: CF…Shellfish\Temperature\current year.
8) Detailed Data Download Instructions:

    a. Files will be saved using the .dtf format and subsequently exported to a .txt format.

    b. Export file:
        i. File → Export → Custom.
        ii. Date format: Month/Day/Year,
        iii. Date/Time Separator: Tab
        iv. Time Format: Hr:Min:Sec
        v. Data Separator: Tab
        vi. Highlight "Temperature (*C)" only.

    c. Save file as the tidbit number:
        i. For example Tidbit #8 should be saved as **8.txt**

    d. Open .txt file in Excel:
        i. File → Open (Do not double click the text file to open).
        ii. Select "Finish" on the import menu.

    e. To be done post survey:
        i. Delete all temperature data that does not correspond to time the pot was in the water
        ii. Do not include data that is within 15 minutes of pot set time (e.g., if pot is set at 1200hrs and there is a temperature reading at 1210hrs delete data point).
        iii. Query Alex for skipper data, cut and paste into "Temperature Database" file on desktop.
        iv. Cut and paste temperature data in columns next to skipper data.
        v. Copy down skipper data to match temperature data.
        vi. Copy next line of skipper data (i.e., next pot) into "Temperature Database"
        vii. Repeat steps i-vi until all temp data is entered.

    f. Return to step a and repeat for each Tidbit.

APPENDIX C: SURVEY DATA FORMS

Appendix C1.–Crab Pot Set Form.

CRAB POT SET FORM

Year________ Project________________________________ Trip #______ Vessel name______________________________________

* Pot type: **S** = Square (7x7) **C** = Cone **P** = Pyramid **D** = Dungeness Location name____ Location code______ Recorders name_____________________________________

Stratum	Pot # (order)	Pot type *	Buoy #	Depth (fathoms)	Set Gear			Lift Gear			Latitude/Longitude												Tidbit # (if used)	Comments
					Month	Date	Time (military)	Month	Date	Time (military)	Deg. N	Minutes to 1000th (Examples below)					Deg. W	Minutes to 1000th (Examples below)						
											55	2	0.	6	0	5	131	5	1.	2	7	0		

Appendix C2.–Crab Survey Specimen and Incidental Species Form.

CRAB SURVEY SPECIMEN **Date**_____ **Page**_____ **of**_____

Year_____ **Project**_____ **Trip #**_____ **Recorder**_____

Location_____ **Pot # (Order)**_____ **Buoy#**_____

Pot Condition	Substrate	Debris

Incidental Species

#				
Species				

Specimen #	Subsample Rate	910 Dung. 921 RKC 922 BKC 923 GKC 931 Bairdi Species Code			Sex	Size (mm)			Weight (gms)			Legal Size	Shell Condition	Leg Condition	Female Egg Data			Parasite	Blackmat 1= Present	Tag #					Comments
															% Clutch Fullness	Development	Condition								
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Appendix C3.–Tanner Crab Chela Height Size Category Tally Sheet.

Male Tanner crab chela heights: This tally sheet can be printed used to track the number of male Tanner crab of each size category to be sampled in the field. Throughout the day, collect chela height for carapace length categories listed below:

Carapace size	**<106**	**106-114**	**115-122**	**123-131**	**132-152**	**>153**
Sample number	**25**	**25**	**25**	**25**	**25**	**25**

Carapace size	**<106**	**106-114**	**115-122**	**123-131**	**132-152**	**>153**
Sample number	**25**	**25**	**25**	**25**	**25**	**25**

Appendix C4.–Volunteer Agreement Form.

VOLUNTEER AGREEMENT – Alaska Department of Fish & Game

This agreement is entered into between the State of Alaska Department of Fish and Game (State) whose address is

_____ and

Volunteer Name _____ Address _____ Phone _____

WHEREAS, the volunteer desires to participate as an unpaid worker alongside, but not displacing, state employees, as follows:

Division: _____ Region: _____

Location: _____ Dates: _____ to _____

Description of Project and Duties:

Questions marked with * are considered high risk and must be approved by the Division Director or Designee if 'Yes' is checked.**

****** Is the Volunteer a minor under the age of 18?*** ☐ Yes ☐ No

If 'Yes' is checked above, please state the age of the minor volunteer _____

Parent(s) of the minor volunteer have read/will comply with the department's SOP No. III-524 ☐ Yes ☐ No

****** Will activities require use or carrying of firearms and/or ammunition?*** ☐ Yes ☐ No

If 'Yes' is checked above, the volunteer MUST complete the State of Alaska Volunteer Qualification Inquiry - Firearm Possession form and attach it to this form. In accordance with the Federal Omnibus Consolidated Appropriations Act of 1997 (PL 104-208), anyone convicted of a misdemeanor crime of domestic violence may not perform duties that require the use of or access to firearms and/or ammunition.
Further, if 'Yes' is checked above, the volunteer MUST provide proof of training in firearm safety in the form of a certificate or other documentation reflecting completion of a formal class.

Will activities require travel in or operation of a state vehicle? ☐ Yes ☐ No
If 'Yes', indicate below:

Travel in: ☐ highway vehicle ☐ off-road vehicle ☐ small boat ☐ large boat ☐ aircraft*

****** Operate:*** ☐ highway vehicle* ☐ off-road vehicle* ☐ small boat*

Describe below the justification for and the limited circumstances under which the volunteer is authorized to operate a state vehicle or travel in a state aircraft:

*As a general rule, volunteers are *not* authorized to drive state vehicles, operate small boats, or travel in state aircraft. Under certain circumstances and with pre-approval, limited operation of state equipment or travel in state aircraft when necessary to further the volunteer's project/assignment may be allowable. Such use should be kept to a minimum and is allowable only if specified on this agreement form, approved by the regional supervisor (or equivalent), and only if the volunteer is properly licensed and trained to operate such vehicle/equipment. For additional details, see the following ADF&G Standard Operating Procedures: III-524, Volunteer Workers; III-004 Aircraft-Authorized Passengers; II-091 State-Owned Vehicles, Vessels, and Equipment.

SOP III-524 Form, Rev 5/15/2015 Page 1 of 2

-continued-

WHEREAS, the State desires to allow the volunteer to participate in said program.

NOW, THEREFORE, the parties agree as follows:

The Volunteer agrees to participate without compensation for his/her activities in the Program under the direct supervision of state employee _____ (ADF&G Supervisor).

- For the duration of the Volunteer's participation in the program, the State agrees to provide to the volunteer medical coverage and disability compensation, in amounts comparable to that afforded employees under the Alaska Workers' Compensation Act (AWCA), if the volunteer suffers injury, illness or death that arises out of, and occurs while acting within the course and scope of performance of his/her volunteer duties. It is agreed that weekly compensation for disability or death will be based on the minimum rate of compensation under AS 23.30.175. It is agreed that compensation or medical coverage will not be provided when the volunteer may be eligible for coverage by any other health or disability policy, insurance, payment or benefit, (inc. Medicaid, Medicare, Social Security, or pension) or workers' compensation coverage by another employer. Disputes regarding payment of compensation and medical benefits under this agreement are agreed to be decided by the Alaska Workers' Compensation Board without stipulating to the Board's jurisdiction. The State is not subject to AWCA penalty, interest, Second Injury Fund (SIF), or other payment in regard to the volunteer.
- The State agrees to defend, indemnify, and hold harmless the Volunteer in the same manner and to the same extent the State protects its employees from any claim, demand, suit for property damages or personal injury including death allegedly caused by the Volunteer's activities if the Volunteer: a) at the time of the occurrence was acting in good faith within the course and scope of his/her volunteer duties in accordance with the directions of the supervisor; b) the volunteer provides immediate notice to the State of any claim; and c) the volunteer cooperates in the defense and does not stipulate to any judgment or settlement without the State's approval.
- The volunteer understands the State does not insure loss or physical damage to its employee's personal vehicle, equipment, or other personal property used while performing state work; nor will the State provide property insurance coverage for loss or physical damage to any volunteer's personal vehicle, equipment, or other personal property used while performing his/her volunteer duties.
- In consideration of the benefits received from participation in the program and the protection offered by this agreement, the volunteer: 1) accepts the remedy provided by the State, and dispute resolution by the Alaska Workers' Compensation Board, as his/her sole legal remedy from the State if the volunteer suffers injury, illness or death arising out of, and occurring while acting within the course and scope of, his/her volunteer duties; 2) transfers his/her right to recover from others who may be responsible for the injury, illness, or death to the State and/or its assigns upon payment of compensation or medical expenses by the State; and 3) agrees to cooperate and to do everything necessary to enable the State and/or its assigns to enforce the right to recover from others.

The Agreement is effective on the day when signed by the person designated below as the Regional Supervisor and filed with the Division of Risk Management. The Alaska Department of Fish and Game agrees to provide transportation to/from _____ and _____. The following provisions (lodging, food, camp and sampling supplies, etc.) will be supplied:
_____.

The volunteer acknowledges he/she has read this agreement, understands it, and agrees to be bound by its terms.

Person to be notified in event of serious illness or accident:

Name	Address	Phone	Relationship
_____	_____	_____	_____

SIGNATURES:

Volunteer: _____ **Date** _____
(or parent of minor volunteer)

ADF&G Supervisor: _____ **Date** _____

Regional Supervisor: _____ **Date** _____

Questions marked with * on page 1 are considered high risk and must be approved by the Division Director or Designee if 'Yes' is checked.**

Division Director or Designee: _____ **Date** _____
(Designee must be equivalent to Assistant Director or Division Operations Manager)

When complete, send the form to divisional headquarters office for distribution as described below.

Original or email: State of Alaska (SOA) Division of Risk Management by e-mail; Copies: ADF&G divisional headquarters, Volunteer, DAS Director when Division Director approval is needed.

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Appendix C5.–Instructions for transferring pot coordinate data to R/V Medeia navigational computers.

Medeia computer

- Open “Site 200X.txt file.
- Open “Medeia template” file.
- Cut and paste lat/long into appropriate columns from text file to template file.
    - **The lat/long column order is reversed in the template file. Make sure “latitude” is before “longitude” in the template file or Maptech will not recognize it.**
- Cut and paste “strata” into “Notes/Strata” column.
- Enter name. This entry must start with 48sgw for Maptech to recognize it.
- Individually name each pot location an (e.g., 48sgwHolkham 1, 48sgwHolkham 2, 48sgwHolkham 3,….).
- Save as “marks32.txt” (This is the only file name Maptech recognizes).

Maptech

- Open Maptech (on Medeia wheelhouse computer).
- File> Import from File and browse for the folder where the “marks32” file is located.
- Select all marks for the site and import. It will give the number of marks imported successfully.
- Check the chart to make sure pot locations have in fact shown up in the appropriate spot.
- Repeat procedure for each site text file.
- Overwrite the “marks32” file each time.
- A detailed explanation of the Maptech import/export format in R:/>…… /Tanner pot location maps /Transfer to Medeia> Maptech export format explanation.

Maxsea

- Open Maxsea
- File> Import from File and browse for the folder where the “marks32” file is located
- Select import files
- Once locations are imported click the tab on the top of the screen to view marks.
- Go through each new mark and click the box at the left to lock the mark.

APPENDIX D: 2018 SURVEY INFORMATION

Appendix D1.–2018 RKC Survey Schedule.

The red king crab survey is composed of three legs conducted on the R/V Medeia. If any staffing changes occur mid-trip, due to illness or otherwise, the project leaders (Joe Stratman and Adam Messmer) must be notified immediately. Leg 1, conducted in early July, will survey the Juneau area and Barlow Cove. In late July, leg 2 will cover Deadman's Reach, Excursion Inlet, and St. James Bay. Leg 3 in August will cover Pybus Bay, Gambier Bay, and Seymour Canal. Detailed schedules are presented below.

Leg 1: Juneau Area and Barlow Cove (9 Days)
Dates: July 3–July 11, 2018
Vessel: R/V *Medeia*
Biologists: Joe Stratman (Lead), Karla Bush, Jane Sullivan, and Chris Siddon.

Date	Day	Morning task	Afternoon task	# of Pots
07/03	Tuesday	N/A	Set pots Barlow	28
07/04	Wednesday	Pull pots	Set pots Eagle River/ Upper Favorite Ch.	28
07/05	Thursday	Pull pots	Set pots Lower Favorite Ch.	28
07/06	Friday	Pull pots	Set pots Auke Bay/Portland Trench	28
07/07	Saturday	Pull pots	Set pots Outside Auke Bay/Portland Trench	28
07/08	Sunday	Pull pots	Set pots Outer Pt./Young's Bay	28
07/09	Monday	Pull pots	Set pots Young's Bay/Pt. Hilda	28
07/10	Tuesday	Pull pots	Set pots Oliver's Inlet	28
07/11	Wednesday	Pull pots	Run to Juneau	–

Leg 2: Deadman's Reach (Peril Strait), Excursion Inlet, and St. James Bay (9 Days)
Dates: July 14–22, 2018
Vessel: R/V *Medeia*
Biologists: Adam Messmer (Lead), Tessa Bergmann, Ben Williams, and Jocelyn Runnebaum.

Date	Day	Morning Task	Afternoon Task	# of Pots
07/14	Saturday	Run to Deadman's Reach	Run to Deadman's Reach	
07/15	Sunday	Run to Deadman's Reach	Set pots Deadman's Reach	28
07/16	Monday	Pull pots	Set pots Deadman's Reach	26
07/17	Tuesday	Pull pots	Run to Excursion	–
07/18	Wednesday	Run to Excursion	Set pots Excursion	28
07/19	Thursday	Pull pots	Set pots Excursion	28
07/20	Friday	Pull pots	Run to St. James	–
07/21	Saturday	Run St. James	Set pots St. James	28
07/22	Sunday	Pull pots	Run to Juneau	–

Leg 3: Pybus Bay, Gambier Bay, and Seymour Canal (7 Days)
Dates: August 8–August 14, 2018
Vessel: R/V *Medeia*
Biologists: Joe Stratman (Lead), Tessa Bergmann, Tanelle Olson, and Lee Hulbert.

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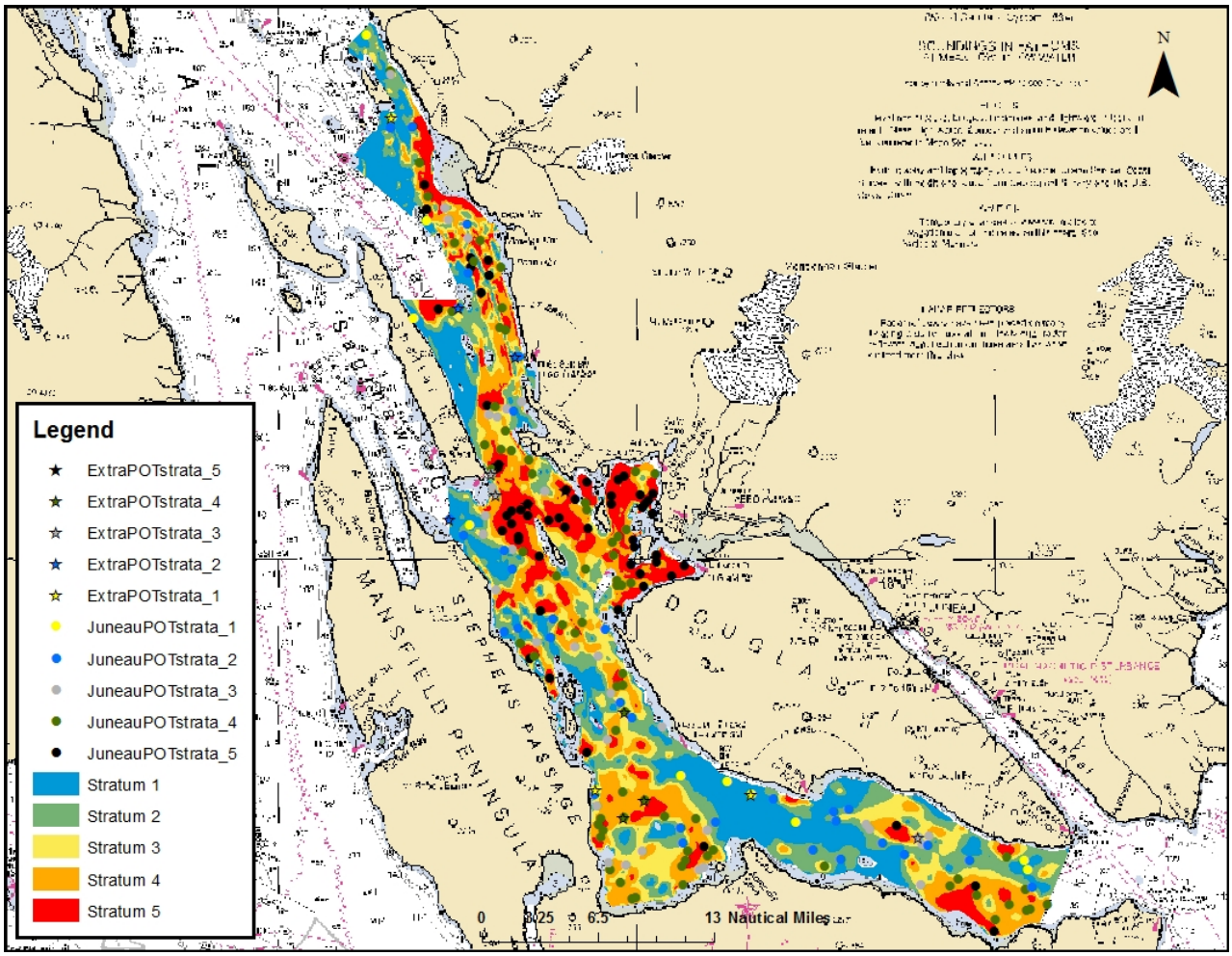
Date	Day of week	Morning task	Afternoon task	# of Pots
08/07	Wednesday	Run to Pybus Bay	Set pots Pybus Bay	18
08/08	Thursday	Pull pots	Set pots Pybus Bay	28
08/09	Friday	Pull pots	Set pots Gambier Bay	28
08/10	Saturday	Pull pots	Set pots Gambier Bay	25
08/11	Sunday	Pull pots	Set pots Seymour Canal	28
08/12	Monday	Pull pots	Set pots Seymour Canal	26
08/13	Tuesday	Pull pots	Run to Juneau	–

R/V Medeia Vessel Crew

Position	Title	Crew
Captain	Boat Officer IV	Jim DeLaBruere
First Mate	Boat Officer III	Cedar Stark
Engineer	Boat Officer II	Craig Conger
Cook/Mate	Boat Officer I	Max Schoenfeld

APPENDIX E: JUNEAU SURVEY AREA POT LOCATIONS

Appendix E1.–Red king crab 2018 pot locations for the Juneau survey area, including additional pots for each stratum (stars).



Appendix E2.–Coordinates for 2018 pot locations in Juneau survey area (196 primary pot locations, 15 extra pot locations).

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Juneau	1	-134.9170074	58.5890007	Primary
—	1	-134.3049927	58.1856995	Primary
—	1	-134.625	58.2274017	Primary
—	1	-134.8739929	58.4510002	Primary
—	1	-134.302002	58.1810989	Primary
—	1	-134.5169983	58.2046013	Primary
—	1	-134.8609924	58.4986992	Primary
—	1	-134.5809937	58.2247009	Primary
—	1	-134.8209991	58.350399	Primary
—	**1**	**-134.8939972**	**58.5488014**	**Extra**
—	**1**	**-134.5590057**	**58.2182007**	**Extra**
—	**1**	**-134.7030029**	**58.2205009**	**Extra**
—	2	-134.4369965	58.1944008	Primary
—	2	-134.826004	58.3452988	Primary
—	2	-134.4680023	58.2108994	Primary
—	2	-134.4799957	58.205101	Primary
—	2	-134.3950043	58.1930008	Primary
—	2	-134.7819977	58.328701	Primary
—	2	-134.7449951	58.2952003	Primary
—	2	-134.7890015	58.2983017	Primary
—	2	-134.5919952	58.2043991	Primary
—	2	-134.822998	58.4730988	Primary
—	2	-134.6809998	58.2631989	Primary
—	2	-134.3560028	58.1861	Primary
—	2	-134.6950073	58.299099	Primary
—	2	-134.5010071	58.1912003	Primary
—	2	-134.7429962	58.3041	Primary
—	2	-134.8950043	58.5438004	Primary
—	2	-134.5379944	58.2162018	Primary
—	2	-134.7039948	58.2186012	Primary
—	2	-134.7799988	58.405899	Primary
—	2	-134.7890015	58.3376999	Primary
—	2	-134.6230011	58.1941986	Primary
—	2	-134.625	58.2019005	Primary
—	2	-134.4759979	58.1864014	Primary
—	2	-134.875	58.5443993	Primary
—	2	-134.6699982	58.2560997	Primary
—	2	-134.7749939	58.4325981	Primary

-continued-

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Juneau–cont.	2	-134.776001	58.2994995	Primary
—	2	-134.2980042	58.1727982	Primary
—	2	-134.4160004	58.1889	Primary
—	2	-134.4819946	58.2094994	Primary
—	2	-134.822998	58.4972	Primary
—	**2**	**-134.8309937**	**58.456501**	**Extra**
—	**2**	**-134.8399963**	**58.353199**	**Extra**
—	**2**	**-134.7779999**	**58.4323006**	**Extra**
—	3	-134.6609955	58.1902008	Primary
—	3	-134.4490051	58.2013016	Primary
—	3	-134.7969971	58.3185005	Primary
—	3	-134.6750031	58.1837006	Primary
—	3	-134.7230072	58.2907982	Primary
—	3	-134.6419983	58.2515984	Primary
—	3	-134.8070068	58.3548012	Primary
—	3	-134.7510071	58.3665009	Primary
—	3	-134.8450012	58.5049019	Primary
—	3	-134.8029938	58.4043999	Primary
—	3	-134.7810059	58.3381996	Primary
—	3	-134.8220062	58.4901009	Primary
—	3	-134.798996	58.3684998	Primary
—	3	-134.7019958	58.2126999	Primary
—	3	-134.701004	58.2863007	Primary
—	3	-134.6000061	58.2005005	Primary
—	3	-134.8950043	58.5700989	Primary
—	3	-134.3999939	58.1939011	Primary
—	3	-134.7590027	58.2928009	Primary
—	3	-134.7870026	58.4071007	Primary
—	3	-134.6069946	58.1813011	Primary
—	3	-134.3930054	58.1977997	Primary
—	3	-134.4519958	58.2033997	Primary
—	3	-134.6929932	58.2448997	Primary
—	3	-134.4019928	58.174099	Primary
—	3	-134.8079987	58.3456993	Primary
—	3	-134.6900024	58.2677994	Primary
—	3	-134.7720032	58.4101982	Primary
—	3	-134.6029968	58.1827011	Primary
—	3	-134.8410034	58.4991989	Primary
—	3	-134.6909943	58.1848984	Primary

-continued-

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Juneau, cont.	3	-134.7949982	58.4031982	Primary
—	**3**	**-134.7969971**	**58.3650017**	**Extra**
—	**3**	**-134.4029999**	**58.1973**	**Extra**
—	**3**	**-134.8000031**	**58.3753014**	**Extra**
—	4	-134.6000061	58.1879997	Primary
—	4	-134.4909973	58.1832008	Primary
—	4	-134.6399994	58.2075996	Primary
—	4	-134.6490021	58.3753014	Primary
—	4	-134.6990051	58.1972008	Primary
—	4	-134.298996	58.1619987	Primary
—	4	-134.6670074	58.1677017	Primary
—	4	-134.5950012	58.1908989	Primary
—	4	-134.7910004	58.4561996	Primary
—	4	-134.8609924	58.5107002	Primary
—	4	-134.7920074	58.3871002	Primary
—	4	-134.7870026	58.4454994	Primary
—	4	-134.3029938	58.1612015	Primary
—	4	-134.7230072	58.297699	Primary
—	4	-134.6840057	58.3232994	Primary
—	4	-134.7830048	58.3865013	Primary
—	4	-134.3190002	58.1643982	Primary
—	4	-134.6829987	58.3446007	Primary
—	4	-134.6809998	58.1748009	Primary
—	4	-134.6719971	58.3218002	Primary
—	4	-134.6799927	58.3209991	Primary
—	4	-134.7879944	58.3964005	Primary
—	4	-134.6109924	58.2066002	Primary
—	4	-134.8950043	58.5713997	Primary
—	4	-134.6710052	58.167099	Primary
—	4	-134.7920074	58.4757996	Primary
—	4	-134.7630005	58.3750992	Primary
—	4	-134.3320007	58.156601	Primary
—	4	-134.7599945	58.2862015	Primary
—	4	-134.7740021	58.292099	Primary
—	4	-134.3220062	58.1876984	Primary
—	4	-134.6670074	58.3764	Primary
—	4	-134.7400055	58.3254013	Primary
—	4	-134.8070068	58.3897018	Primary
—	4	-134.8359985	58.4878998	Primary

-continued-

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Juneau, cont.	4	-134.6840057	58.2714005	Primary
—	4	-134.7140045	58.328701	Primary
—	4	-134.6869965	58.3353996	Primary
—	4	-134.6199951	58.1856995	Primary
—	4	-134.8119965	58.4889984	Primary
—	4	-134.6750031	58.3479996	Primary
—	4	-134.3049927	58.1716003	Primary
—	4	-134.6880035	58.3419991	Primary
—	4	-134.6790009	58.2192993	Primary
—	4	-134.6970062	58.2004013	Primary
—	4	-134.3739929	58.1730003	Primary
—	4	-134.6239929	58.1827011	Primary
—	4	-134.2839966	58.164299	Primary
—	4	-134.6840057	58.3209	Primary
—	4	-134.6849976	58.2494011	Primary
—	4	-134.621994	58.174099	Primary
—	4	-134.8679962	58.5270996	Primary
—	4	-134.7669983	58.3820992	Primary
—	4	-134.6790009	58.2719994	Primary
—	4	-134.7129974	58.3577995	Primary
—	4	-134.6179962	58.1901016	Primary
—	4	-134.6779938	58.2778015	Primary
—	4	-134.7720032	58.3370018	Primary
—	4	-134.701004	58.203701	Primary
—	4	-134.7350006	58.3014984	Primary
—	4	-134.6990051	58.206501	Primary
—	4	-134.8170013	58.4790001	Primary
—	4	-134.8370056	58.4543991	Primary
—	4	-134.6909943	58.1809998	Primary
—	4	-134.348999	58.1687012	Primary
—	4	-134.7980042	58.4079018	Primary
—	4	-134.7129974	58.3609009	Primary
—	4	-134.8009949	58.3773994	Primary
—	4	-134.3670044	58.1766014	Primary
—	4	-134.7160034	58.3026009	Primary
—	4	-134.7929993	58.4468994	Primary
—	4	-134.6000061	58.1879997	Primary
—	**4**	**-134.6580048**	**58.2154999**	**Extra**
—	**4**	**-134.6779938**	**58.2067986**	**Extra**

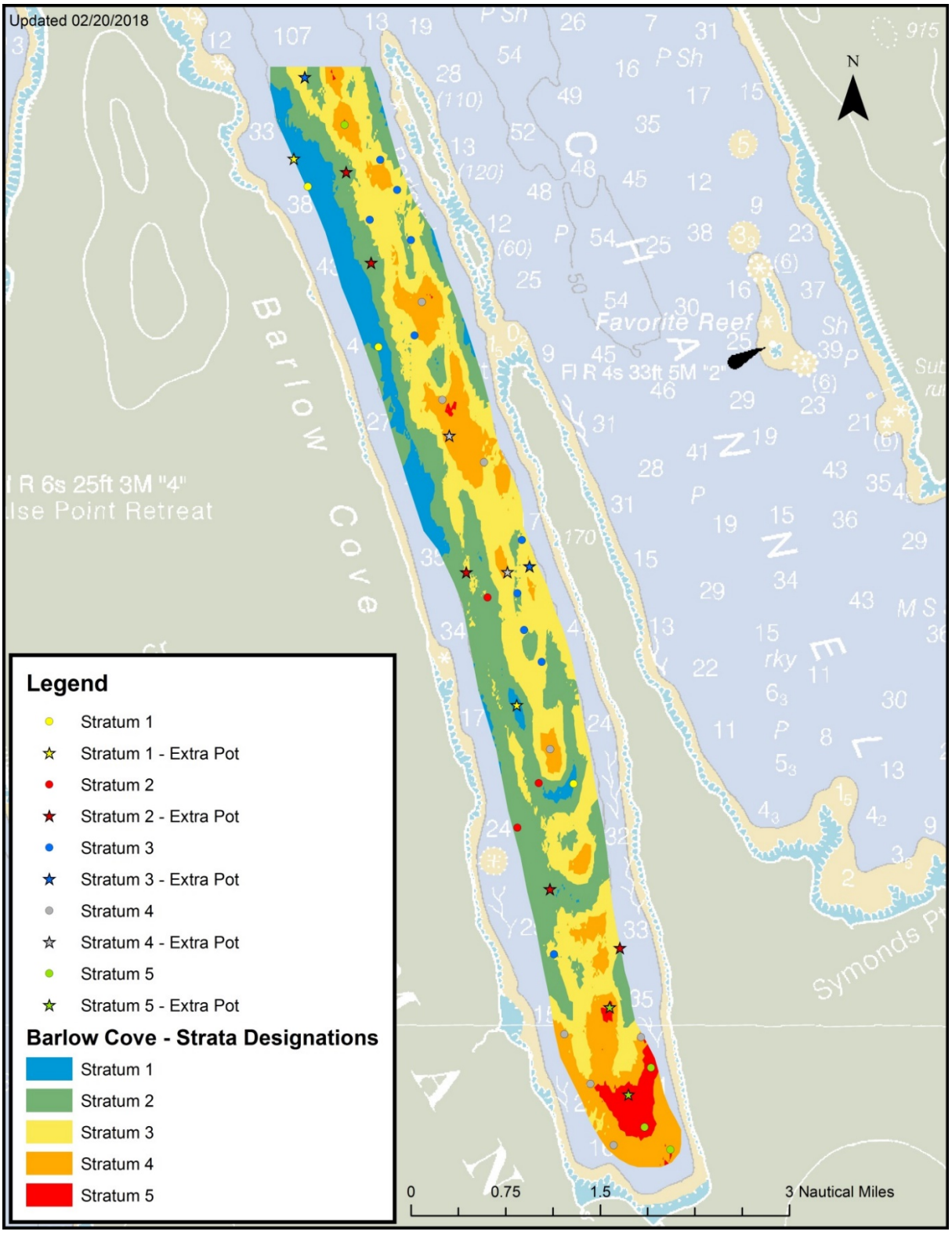
-continued-

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Juneau, cont.	**4**	**-134.677002**	**58.2585983**	**Extra**
—	5	-134.423996	58.2028008	Primary
—	5	-134.7669983	58.3550987	Primary
—	5	-134.6840057	58.3723984	Primary
—	5	-134.8029938	58.4723015	Primary
—	5	-134.3329926	58.1507988	Primary
—	5	-134.776001	58.3426018	Primary
—	5	-134.6629944	58.3647995	Primary
—	5	-134.3509979	58.1733017	Primary
—	5	-134.6549988	58.3620987	Primary
—	5	-134.6340027	58.3251991	Primary
—	5	-134.8110046	58.4636002	Primary
—	5	-134.7870026	58.3548012	Primary
—	5	-134.7120056	58.2389984	Primary
—	5	-134.647995	58.3320007	Primary
—	5	-134.6900024	58.3642006	Primary
—	5	-134.7120056	58.3713989	Primary
—	5	-134.6600037	58.3202019	Primary
—	5	-134.6779938	58.3742981	Primary
—	5	-134.8209991	58.4804001	Primary
—	5	-134.8049927	58.4085999	Primary
—	5	-134.7819977	58.3507004	Primary
—	5	-134.6829987	58.3089981	Primary
—	5	-134.8040009	58.4793015	Primary
—	5	-134.7740021	58.3577995	Primary
—	5	-134.7910004	58.3473015	Primary
—	5	-134.8609924	58.5046005	Primary
—	5	-134.6580048	58.360199	Primary
—	5	-134.7330017	58.3490982	Primary
—	5	-134.7649994	58.285099	Primary
—	5	-134.7480011	58.3526001	Primary
—	5	-134.6210022	58.3302994	Primary
—	5	-134.6679993	58.3392982	Primary
—	5	-134.6900024	58.3605003	Primary
—	5	-134.7230072	58.3628998	Primary
—	5	-134.6499939	58.365799	Primary
—	5	-134.8639984	58.5161018	Primary
—	5	-134.8209991	58.4762993	Primary
—	5	-134.7570038	58.3350983	Primary

-continued-

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Juneau, cont.	5	-134.7550049	58.3082008	Primary
—	5	-134.7109985	58.3484001	Primary
—	5	-134.651001	58.355999	Primary
—	5	-134.7830048	58.3572006	Primary
—	5	-134.6690063	58.3429985	Primary
—	5	-134.6470032	58.335701	Primary
—	5	-134.7380066	58.3535004	Primary
—	5	-134.8500061	58.4556007	Primary
—	5	-134.6719971	58.3311005	Primary
—	5	-134.776001	58.3445015	Primary
—	5	-134.7960052	58.3782005	Primary
—	5	-134.746994	58.2753983	Primary
—	5	-134.6629944	58.3266983	Primary
—	5	-134.6609955	58.3585014	Primary
—	5	-134.6029968	58.1926003	Primary
—	**5**	**-134.7949982**	**58.3800011**	**Extra**
—	**5**	**-134.7319946**	**58.3670998**	**Extra**
—	**5**	**-134.7669983**	**58.3605003**	**Extra**

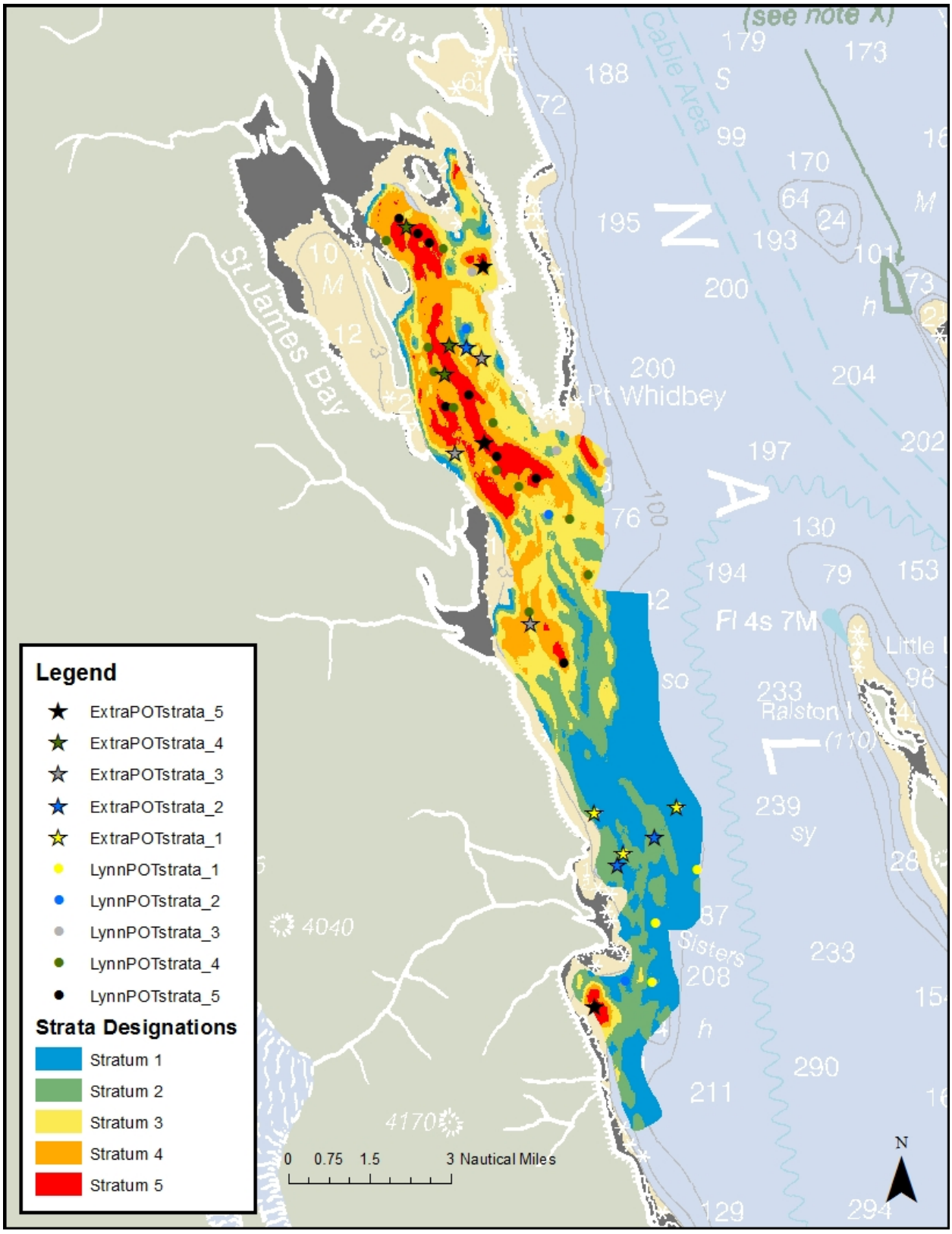
Appendix E3.–Barlow Cove survey area pot locations.



Appendix E4.–Coordinates for 2018 pot locations in Barlow Cove survey area (28 primary pot locations, 10 extra pot locations).

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Barlow Cove	1	-134.9171493	58.3846698	Good
—	1	-134.9176921	58.3882991	Good
—	1	-134.8962377	58.3559739	Good
—	**1**	**-134.9063945**	**58.3873420**	**Extra pot**
—	**1**	**-134.9209034**	**58.3913844**	**Extra pot**
—	2	-134.8955244	58.3471727	Good
—	2	-134.9092946	58.3863771	Good
—	2	-134.9053452	58.3727812	Good
—	**2**	**-134.8902174**	**58.3495761**	**Extra Pot**
—	**2**	**-134.9017489**	**58.3640622**	**Extra Pot**
—	3	-134.9252660	58.3989125	Good
—	3	-134.9105013	58.3904293	Good
—	3	-134.9158668	58.3965462	Good
—	3	-134.8975216	58.3675574	Good
—	3	-134.8897723	58.3375848	Good
—	3	-134.9159353	58.3988234	Good
—	3	-134.8905378	58.3444150	Good
—	3	-134.8803410	58.3315298	Good
—	3	-134.8990762	58.3720617	Good
—	3	-134.8973625	58.3641922	Good
—	**3**	**-134.9093099**	**58.3758838**	**Extra Pot**
—	**3**	**-134.9136506**	**58.3929435**	**Extra Pot**
—	4	-134.8869885	58.3298989	Good
—	4	-134.8895819	58.3323725	Good
—	4	-134.9084304	58.3810464	Good
—	4	-134.9067419	58.3842374	Good
—	4	-134.9190173	58.3994810	Good
—	4	-134.8841538	58.3334164	Good
—	4	-134.8836303	58.3410776	Good
—	4	-134.8981699	58.3656282	Good
—	**4**	**-134.8762992**	**58.3261986**	**Extra Pot**
—	**4**	**-134.9004689**	**58.3726709**	**Extra Pot**
—	5	-134.8820676	58.3281178	Good
—	5	-134.9037732	58.3760294	Good
—	5	-134.8780449	58.3274071	Good
—	5	-134.8773201	58.3298119	Good
—	**5**	**-134.8807640**	**58.3263481**	**Extra Pot**
—	**5**	**-134.8828329**	**58.3345166**	**Extra Pot**

Appendix E5.–Lynn Sister survey area pot locations.



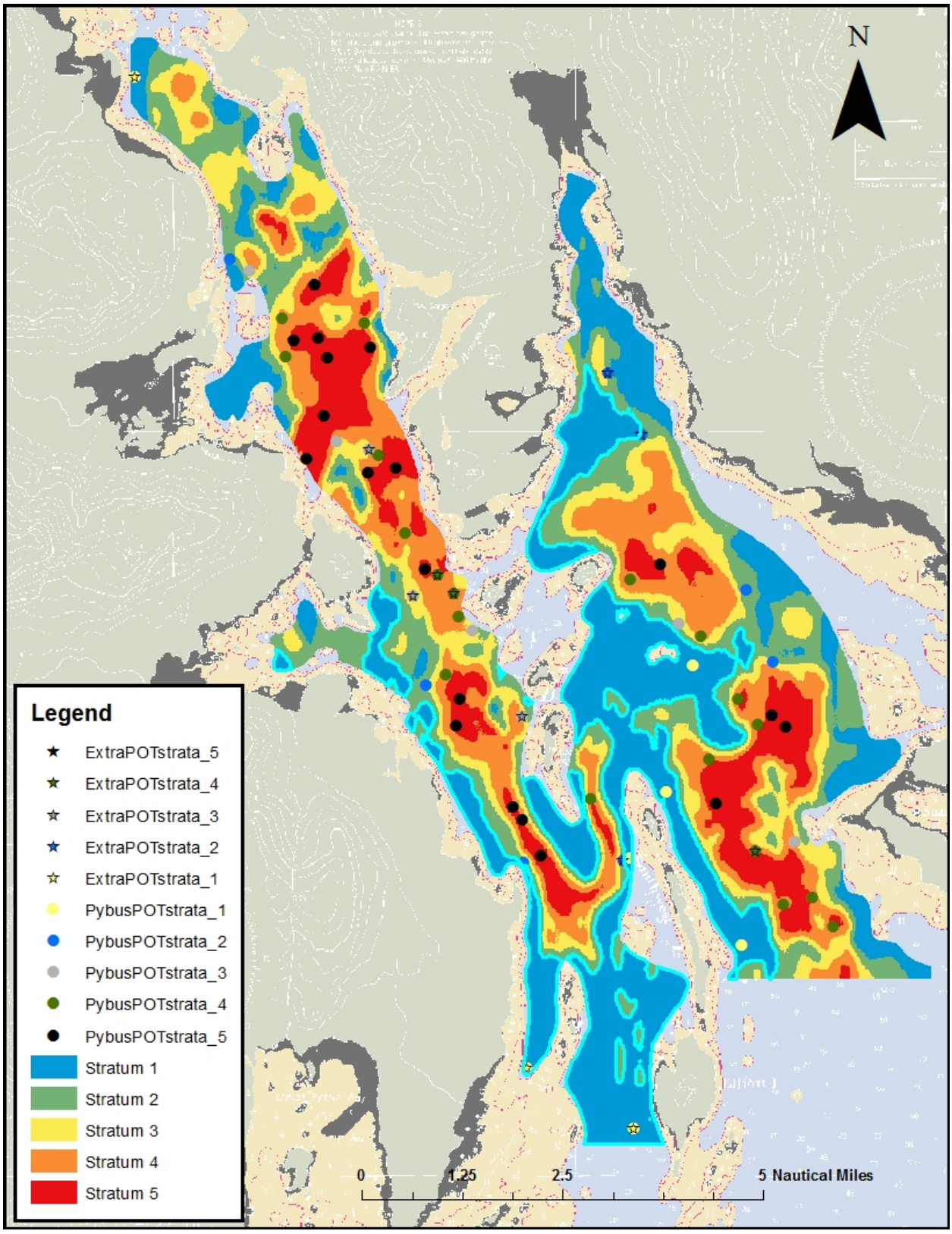
APPENDIX F: RED KING CRAB 2018 POT LOCATIONS IN THE LYNN SISTERS SURVEY AREA, INCLUDING ADDITIONAL POTS FOR EACH STRATUM

Appendix F1.–Coordinates for 2018 pot locations in Lynn Sisters survey area (28 primary pot locations, 15 extra pot locations).

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Lynn Sisters	1	-135.1089935	58.4970016	Primary
—	1	-135.095993	58.5056992	Primary
—	1	-135.1100006	58.4877014	Primary
—	**1**	**-135.1179962**	**58.5083008**	**Extra**
—	**1**	**-135.1269989**	**58.5149002**	**Extra**
—	**1**	**-135.102005**	**58.5158005**	**Extra**
—	2	-135.1670074	58.5926018	Primary
—	2	-135.1419983	58.5626984	Primary
—	2	-135.1179962	58.4878998	Primary
—	**2**	**-135.1199951**	**58.5065002**	**Extra**
—	**2**	**-135.1670074**	**58.5896988**	**Extra**
—	**2**	**-135.1089935**	**58.5108986**	**Extra**
—	3	-135.1390076	58.573101	Primary
—	3	-135.1649933	58.6016006	Primary
—	3	-135.1239929	58.5712013	Primary
—	**3**	**-135.1699982**	**58.5727005**	**Extra**
—	**3**	**-135.1620026**	**58.5878983**	**Extra**
—	**3**	**-135.1470032**	**58.5452003**	**Extra**
—	4	-135.1589966	58.5774994	Primary
—	4	-135.147995	58.5471001	Primary
—	4	-135.1710052	58.5798988	Primary
—	4	-135.151001	58.5671997	Primary
—	4	-135.1580048	58.5698013	Primary
—	4	-135.177002	58.585701	Primary
—	4	-135.1790009	58.5895996	Primary
—	4	-135.173996	58.6054001	Primary
—	4	-135.1349945	58.5620003	Primary
—	4	-135.1300049	58.5531998	Primary
—	4	-135.1909943	58.6068001	Primary
—	**4**	**-135.1849976**	**58.6090012**	**Extra**
—	**4**	**-135.1719971**	**58.589901**	**Extra**
—	**4**	**-135.173996**	**58.5852013**	**Extra**
—	5	-135.1880035	58.610199	Primary
—	5	-135.1459961	58.5685997	Primary
—	5	-135.1779938	58.6063004	Primary
—	5	-135.1730042	58.580101	Primary
—	5	-135.1820068	58.6078987	Primary
—	5	-135.1369934	58.5390015	Primary
—	5	-135.1580048	58.5719986	Primary
—	5	-135.1660004	58.5820007	Primary
—	**5**	**-135.128006**	**58.4836006**	**Extra**
—	**5**	**-135.1620026**	**58.6025009**	**Extra**
—	**5**	**-135.1609955**	**58.5741997**	**Extra**

APPENDIX G: PYBUS BAY SURVEY AREA POT LOCATIONS

Appendix G1.–Red king crab 2018 pot locations in the Pybus Bay survey area, including additional pots for each stratum (stars).



Appendix G2.–Coordinates for 2018 pot locations in Pybus Bay survey area (46 primary pot locations, 15 extra pot locations).

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Pybus Bay	1	-134.0590057	57.3073006	Primary
—	1	-134.048996	57.2759018	Primary
—	1	-134.0639954	57.2930984	Primary
—	1	-134.0720062	57.2858009	Primary
—	**1**	**-134.0930023**	**57.2621994**	**Extra**
—	**1**	**-134.0709991**	**57.2554016**	**Extra**
—	**1**	**-134.1750031**	**57.3731003**	**Extra**
—	2	-134.1139984	57.3050995	Primary
—	2	-134.0420074	57.3077011	Primary
—	2	-134.0480042	57.3157997	Primary
—	2	-134.0939941	57.2851982	Primary
—	2	-134.1549988	57.3527985	Primary
—	**2**	**-134.072998**	**57.2854004**	**Extra**
—	**2**	**-134.0700073**	**57.3331985**	**Extra**
—	**2**	**-134.0769958**	**57.3400993**	**Extra**
—	3	-134.1049957	57.3111992	Primary
—	3	-134.1329956	57.3324013	Primary
—	3	-134.151001	57.3515015	Primary
—	3	-134.0379944	57.2874985	Primary
—	3	-134.0619965	57.3120003	Primary
—	**3**	**-134.1260071**	**57.3314018**	**Extra**
—	**3**	**-134.1170044**	**57.3151016**	**Extra**
—	**3**	**-134.0939941**	**57.3016014**	**Extra**
—	4	-134.0800018	57.2923012	Primary
—	4	-134.1269989	57.3456993	Primary
—	4	-134.1069946	57.3126984	Primary
—	4	-134.1100006	57.3061981	Primary
—	4	-134.0570068	57.3105011	Primary
—	4	-134.1439972	57.346199	Primary
—	4	-134.1190033	57.3222008	Primary
—	4	-134.0720062	57.3167992	Primary
—	4	-134.0399933	57.2804985	Primary
—	4	-134.0559998	57.2966995	Primary
—	4	-134.0299988	57.2779999	Primary
—	4	-134.0500031	57.3035011	Primary
—	4	-134.1239929	57.3307991	Primary
—	4	-134.0460052	57.3005981	Primary
—	4	-134.0339966	57.2812996	Primary
—	4	-134.1430054	57.3418007	Primary
—	**4**	**-134.0460052**	**57.286499**	**Extra**
—	**4**	**-134.1089935**	**57.3153992**	**Extra**
	4	**-134.1119995**	**57.3174019**	**Extra**

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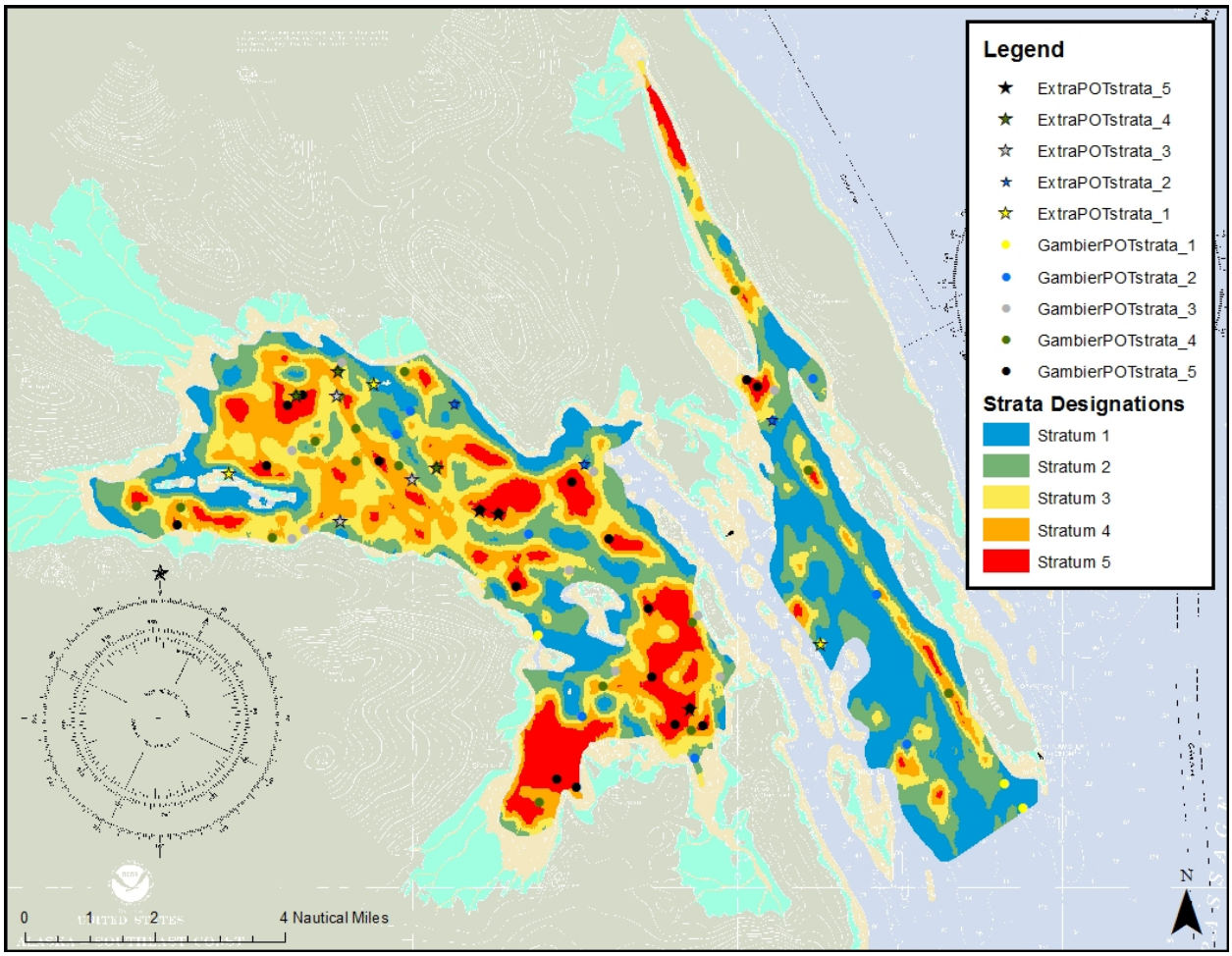
Appendix G2.–Page 2 of 2.

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Pybus Bay, cont.	5	-134.0939941	57.2900009	Primary
	5	-134.0540009	57.2918015	Primary
	5	-134.1360016	57.3438988	Primary
	5	-134.0659943	57.3185997	Primary
	5	-134.1349945	57.3417015	Primary
	5	-134.0899963	57.2859993	Primary
	5	-134.0399933	57.3003998	Primary
	5	-134.1210022	57.3292999	Primary
	5	-134.1349945	57.3353004	Primary
	5	-134.1390076	57.3303986	Primary
	5	-134.1139984	57.3181	Primary
	5	-134.1260071	57.3288002	Primary
	5	-134.1069946	57.3035011	Primary
	5	-134.1080017	57.3005981	Primary
	5	-134.095993	57.2914009	Primary
	5	-134.1260071	57.3428993	Primary
	5	**-134.1419983**	**57.3436012**	**Extra**
	5	**-134.0429993**	**57.3017006**	**Extra**
	5	**-134.1369934**	**57.3498993**	**Extra**

APPENDIX H: GAMBIER BAY SURVEY AREA POT LOCATIONS

Appendix H1.–Red king crab 2018 pot locations in the Gambier Bay survey area, including additional pots for each stratum (stars).



Appendix H2.–Coordinates for 2018 pot locations in Gambier Bay survey area (61 primary pot locations, 15 extra pot locations).

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Gambier Bay	1	-133.8430023	57.4277	Primary
—	1	-133.8480072	57.4310989	Primary
—	1	-133.9680023	57.4516983	Primary
—	**1**	**-133.8950043**	**57.4504013**	**Extra**
—	**1**	**-134.0099945**	**57.4864998**	**Extra**
—	**1**	**-134.0469971**	**57.4740982**	**Extra**
—	2	-133.8730011	57.4365997	Primary
—	2	-133.9570007	57.4403992	Primary
—	2	-134.0039978	57.4793015	Primary
—	2	-133.8809967	57.4572983	Primary
—	2	-133.9700012	57.4655991	Primary
—	2	-133.8970032	57.4869995	Primary
—	2	-134.0010071	57.4826012	Primary
—	2	-133.9279938	57.4347	Primary
—	**2**	**-133.9069977**	**57.4813004**	**Extra**
—	**2**	**-133.9559937**	**57.4752998**	**Extra**
—	**2**	**-133.9889984**	**57.4835014**	**Extra**
—	3	-134.0279999	57.466301	Primary
—	3	-134.0180054	57.4892998	Primary
—	3	-134.0310059	57.464901	Primary
—	3	-133.9210052	57.4458008	Primary
—	3	-133.9539948	57.4743004	Primary
—	3	-133.927002	57.4542999	Primary
—	3	-133.947998	57.4466019	Primary
—	3	-133.9600067	57.4606018	Primary
—	3	-134.0310059	57.4771004	Primary
—	**3**	**-134.0200043**	**57.4847984**	**Extra**
—	**3**	**-134.0189972**	**57.4674988**	**Extra**
—	**3**	**-134**	**57.4733009**	**Extra**
—	4	-134.0039978	57.4751015	Primary
—	4	-134.0599976	57.4692993	Primary
—	4	-133.9279938	57.4534988	Primary
—	4	-133.9170074	57.4992981	Primary
—	4	-134.0149994	57.4757004	Primary
—	4	-134.0149994	57.4802017	Primary
—	4	-133.9680023	57.4286003	Primary
—	4	-134.0189972	57.4846992	Primary
—	4	-134.0359955	57.4650993	Primary
—	4	-133.951004	57.4445992	Primary
—	4	-134.0249939	57.4784012	Primary
—	4	-133.8630066	57.4435997	Primary

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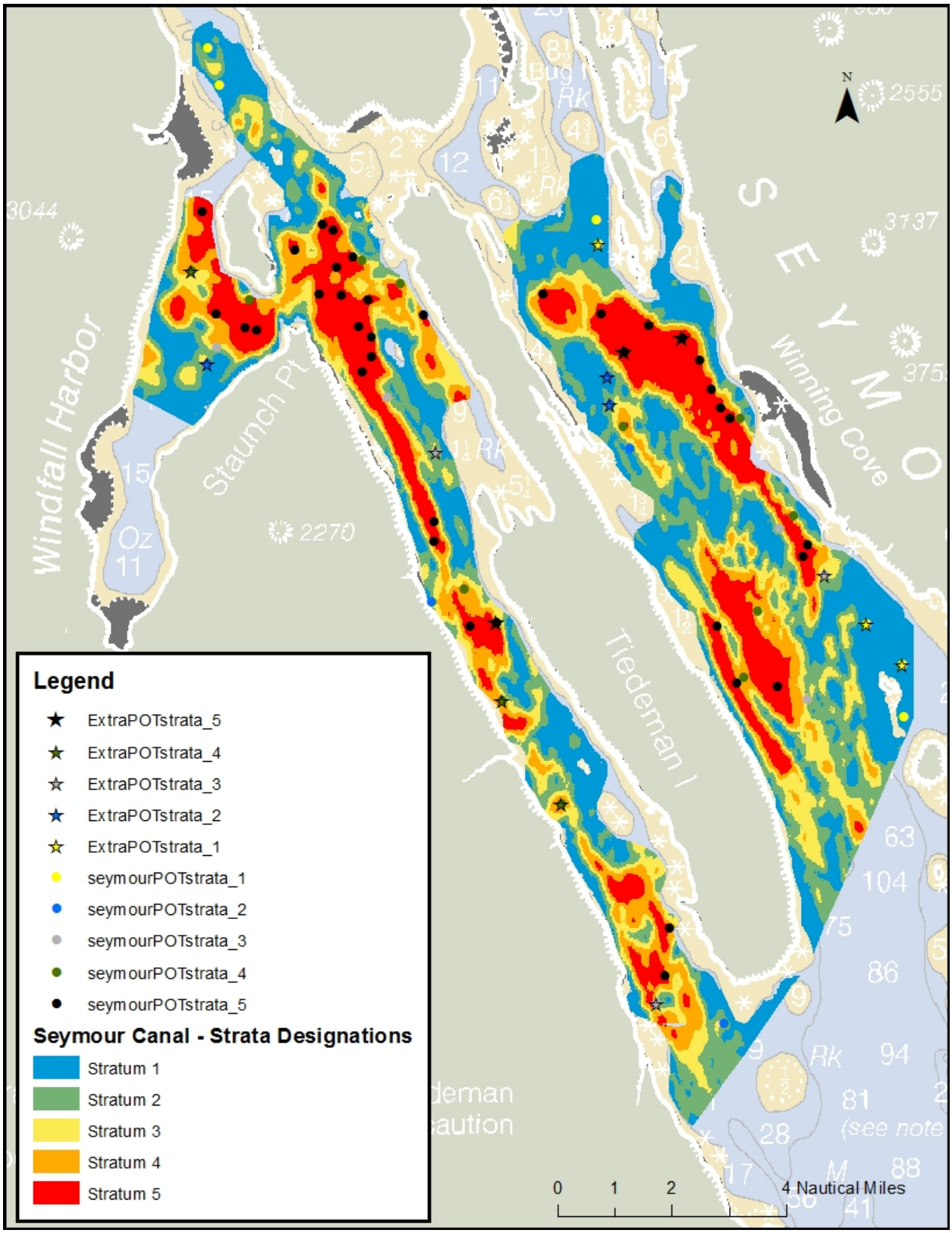
Appendix H2.–Page 2 of 2.

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Gambier Bay, cont.	4	-134.0019989	57.4880981	Primary
—	4	-133.9290009	57.4384995	Primary
—	4	-133.8990021	57.4743996	Primary
—	4	-134.0709991	57.4695015	Primary
—	**4**	**-134.0299988**	**57.4847984**	**Extra**
—	**4**	**-133.9940033**	**57.4749985**	**Extra**
—	**4**	**-134.0189972**	**57.4883003**	**Extra**
—	5	-134.0090027	57.4757996	Primary
—	5	-133.9629974	57.4317017	Primary
—	5	-133.9120026	57.4859009	Primary
—	5	-133.973999	57.4584007	Primary
—	5	-133.9140015	57.4869995	Primary
—	5	-133.9579926	57.4306984	Primary
—	5	-133.9259949	57.4390984	Primary
—	5	-133.9329987	57.4393005	Primary
—	5	-134.0279999	57.4847984	Primary
—	5	-133.9400024	57.4552994	Primary
—	5	-134.0319977	57.4833984	Primary
—	5	-134.0379944	57.4749985	Primary
—	5	-133.9589996	57.4726982	Primary
—	5	-134.0610046	57.4668007	Primary
—	5	-133.9389954	57.4458008	Primary
—	5	-133.9499969	57.4650002	Primary
—	**5**	**-133.9290009**	**57.4415016**	**Extra**
—	**5**	**-133.9830017**	**57.4690018**	**Extra**
—	**5**	**-133.9779968**	**57.468399**	**Extra**

APPENDIX I: SEYMOUR CANAL SURVEY AREA POT LOCATIONS

Appendix I1.–Red king crab 2018 pot locations in the Seymour Canal survey area, including additional pots for each stratum (stars).



Appendix I2.–Coordinates for 2018 pot locations in Seymour Canal survey area (54 primary pot locations, 14 extra pot locations).

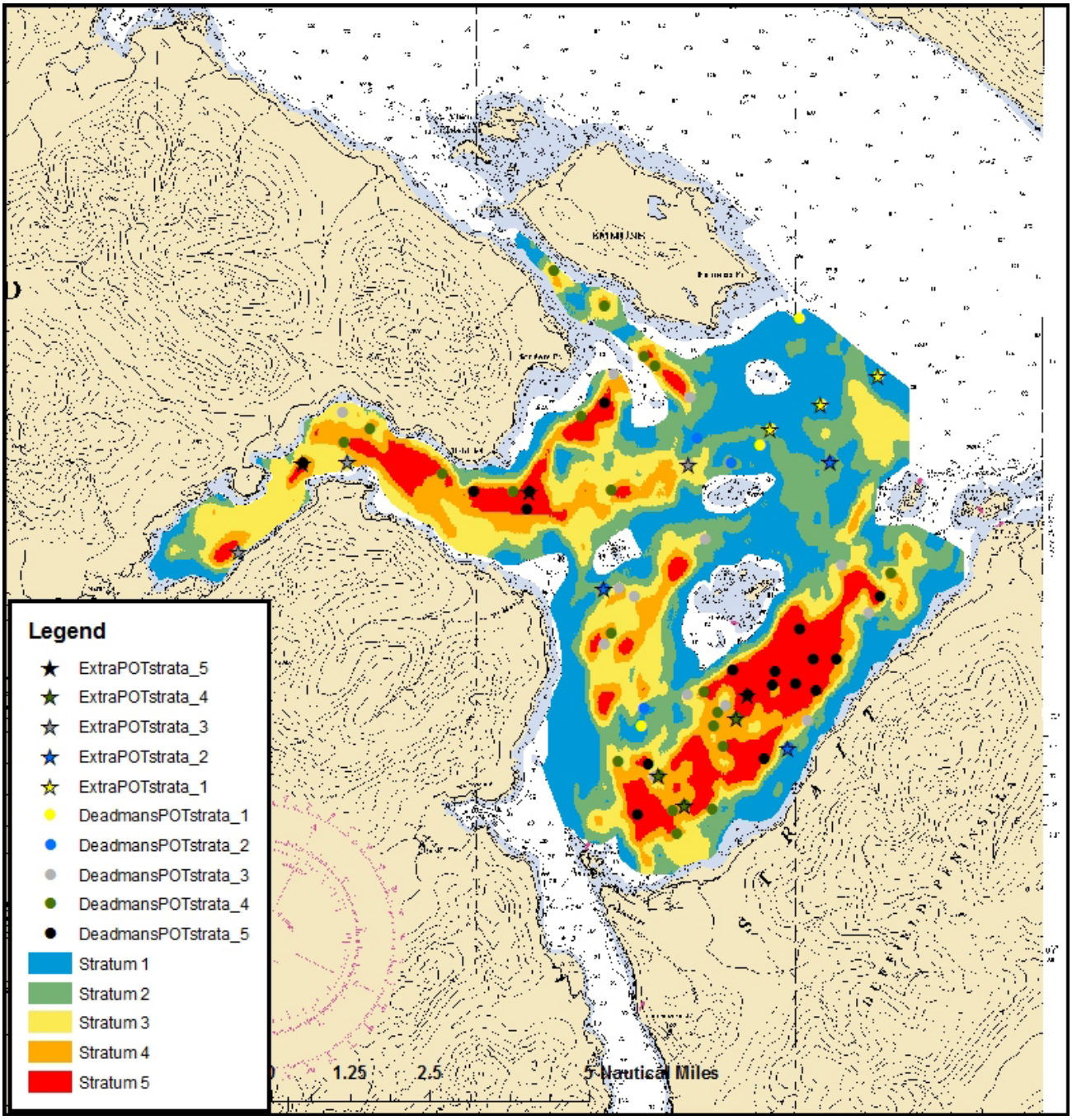
Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Seymour Canal	1	-134.2689972	57.9117012	Primary
—	1	-134.1589966	57.8908005	Primary
—	1	-134.0690002	57.8134995	Primary
—	1	-134.2720032	57.9174004	Primary
—	**1**	**-134.0700073**	**57.821701**	**Extra**
—	**1**	**-134.1589966**	**57.8869019**	**Extra**
—	**1**	**-134.0800018**	**57.8279991**	**Extra**
—	2	-134.2070007	57.831501	Primary
—	2	-134.121994	57.7658005	Primary
—	2	-134.1490021	57.8552017	Primary
—	**2**	**-134.1560059**	**57.8664017**	**Extra**
—	**2**	**-134.1549988**	**57.8620987**	**Extra**
—	**2**	**-134.272995**	**57.8684006**	**Extra**
—	3	-134.2200012	57.8630981	Primary
—	3	-134.1060028	57.8428001	Primary
—	3	-134.0970001	57.8162994	Primary
—	3	-134.2700043	57.8709984	Primary
—	**3**	**-134.0919952**	**57.8356018**	**Extra**
—	**3**	**-134.1419983**	**57.7687988**	**Extra**
—	**3**	**-134.2059937**	**57.8546982**	**Extra**
—	4	-134.2160034	57.8809013	Primary
—	4	-134.151001	57.8586998	Primary
—	4	-134.1159973	57.8195992	Primary
—	4	-134.197998	57.8334007	Primary
—	4	-134.1119995	57.8300018	Primary
—	4	-134.227005	57.8844986	Primary
—	4	-134.1170044	57.8599014	Primary
—	4	-134.102005	57.844799	Primary
—	4	-134.2599945	57.8783989	Primary
—	4	**-134.1690063**	**57.7999992**	**Extra**
—	**4**	**-134.2769928**	**57.8829002**	**Extra**
—	**4**	**-134.1869965**	**57.8160019**	**Extra**
—	5	-134.2700043	57.8760986	Primary
—	5	-134.2389984	57.8900986	Primary
—	5	-134.2100067	57.8760986	Primary
—	5	-134.2250061	57.8726006	Primary
—	5	-134.2279968	57.8741989	Primary
—	5	-134.2619934	57.8740005	Primary
—	5	-134.1380005	57.7804985	Primary
—	5	-134.1289978	57.8689995	Primary
—	5	-134.2259979	57.8783989	Primary
—	5	-134.2070007	57.8438988	Primary

-continued-

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Seymour Canal, cont.	5	-134.1179962	57.8188019	Primary
—	5	-134.0980072	57.8403015	Primary
—	5	-134.2070007	57.8408012	Primary
—	5	-134.1239929	57.8275986	Primary
—	5	-134.1580048	57.8760986	Primary
—	5	-134.1390076	57.773201	Primary
—	5	-134.2350006	57.8833008	Primary
—	5	-134.1959991	57.8277016	Primary
—	5	-134.098999	57.838501	Primary
—	5	-134.1260071	57.8642998	Primary
—	5	-134.2359924	57.8891983	Primary
—	5	-134.1199951	57.8599014	Primary
—	5	-134.1439972	57.8744011	Primary
—	5	-134.2400055	57.8792	Primary
—	5	-134.227005	57.8671989	Primary
—	5	-134.2339935	57.8790016	Primary
—	5	-134.2590027	57.8736	Primary
—	5	-134.2740021	57.8919983	Primary
—	5	-134.1230011	57.861599	Primary
—	5	-134.246994	57.8862	Primary
—	5	-134.1060028	57.8181992	Primary
—	5	-134.1750031	57.8792	Primary
—	5	-134.2299957	57.8851013	Primary
—	5	-134.2250061	57.8694992	Primary
—	**5**	**-134.1340027**	**57.8723984**	**Extra**
—	**5**	**-134.1880035**	**57.8282013**	**Extra**
—	**5**	**-134.151001**	**57.8702011**	**Extra**

APPENDIX J: PERIL STRAIT (DEADMAN'S REACH) SURVEY AREA POT LOCATIONS

Appendix J1.–Red king crab 2018 pot locations in the Deadman's Reach survey area, including additional pots for each stratum (stars).



Appendix J2.–Coordinates for 2018 pot locations in Deadman's Reach survey area (54 primary pot locations, 15 extra pot locations).

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Deadman's Reach	1	-135.5399933	57.5321007	Primary
—	1	-135.4989929	57.5892982	Primary
—	1	-135.5090027	57.5714989	Primary
—	**1**	**-135.5059967**	**57.5737991**	**Extra**
—	**1**	**-135.4929962**	**57.5770988**	**Extra**
—	**1**	**-135.4779968**	**57.5812988**	**Extra**
—	2	-135.5169983	57.5690002	Primary
—	2	-135.5390015	57.5344009	Primary
—	2	-135.5249939	57.5724983	Primary
—	**2**	**-135.4909973**	**57.5691986**	**Extra**
—	**2**	**-135.5500031**	**57.5513**	**Extra**
—	**2**	**-135.5019989**	**57.5289001**	**Extra**
—	3	-135.5180054	57.5349007	Primary
—	3	-135.5279999	57.5363998	Primary
—	3	-135.6179962	57.5760002	Primary
—	3	-135.5269928	57.5783005	Primary
—	3	-135.5370026	57.5248985	Primary
—	3	-135.4810028	57.5479012	Primary
—	3	-135.5500031	57.5435982	Primary
—	3	-135.5460052	57.5513992	Primary
—	3	-135.522995	57.5583	Primary
—	3	-135.5420074	57.5503006	Primary
—	3	-135.5469971	57.5814018	Primary
—	3	-135.496994	57.5327988	Primary
—	3	-135.4880066	57.5545006	Primary
—	**3**	**-135.6170044**	**57.5690994**	**Extra**
—	**3**	**-135.6450043**	**57.5564995**	**Extra**
—	**3**	**-135.5269928**	**57.5686989**	**Extra**
—	4	-135.4750061	57.5535011	Primary
—	4	-135.5919952	57.5674019	Primary
—	4	-135.5359955	57.5826988	Primary
—	4	-135.5310059	57.5168991	Primary
—	4	-135.6109924	57.5737	Primary
—	4	-135.5740051	57.5649986	Primary
—	4	-135.5630035	57.5959015	Primary
—	4	-135.5189972	57.5290985	Primary
—	4	-135.5390015	57.5839005	Primary
—	4	-135.5480042	57.5451012	Primary
—	4	-135.5209961	57.520401	Primary
—	4	-135.5209961	57.5320015	Primary
—	4	-135.5480042	57.5651016	Primary
—	4	-135.5559998	57.5755005	Primary

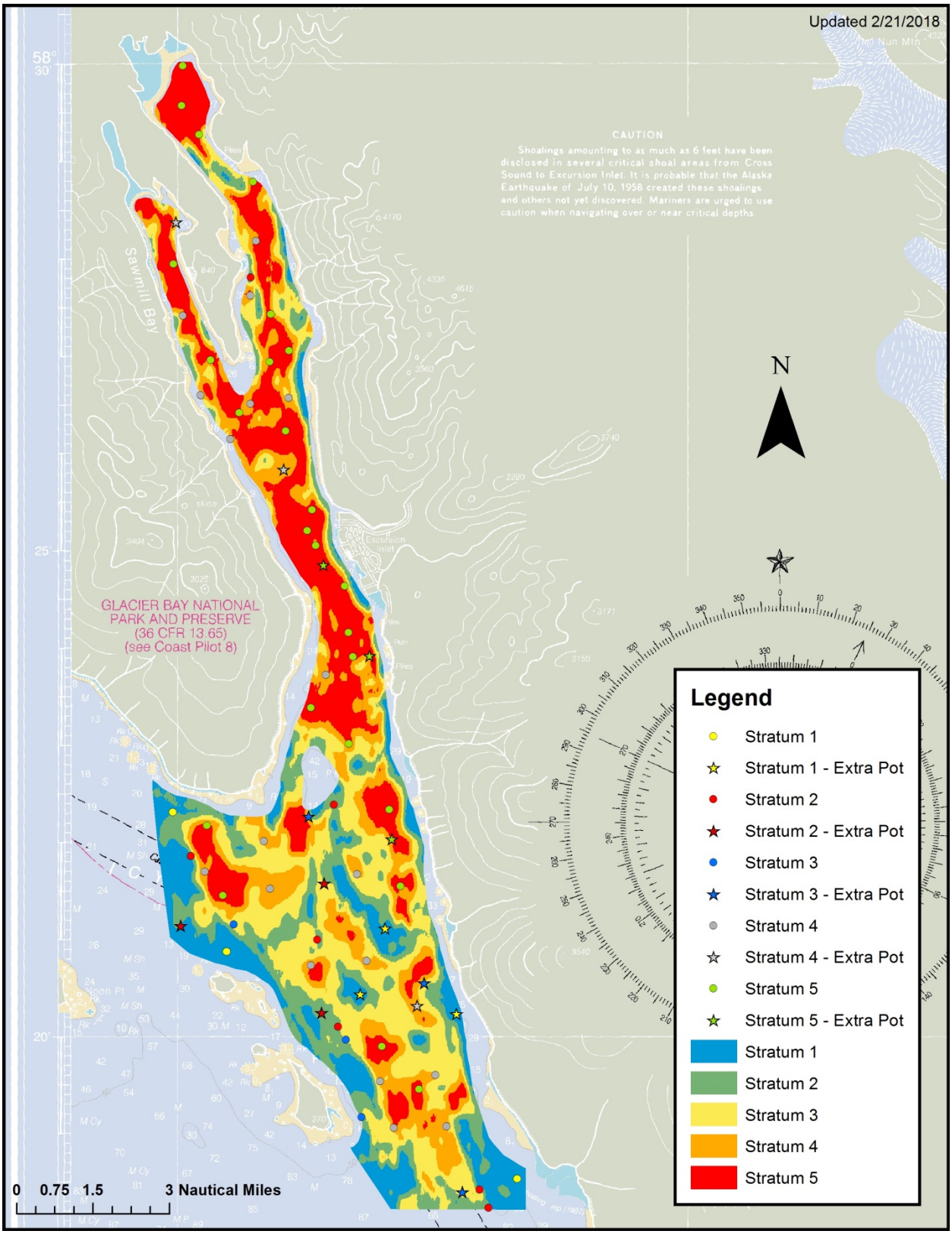
-continued-

Appendix J2.–Page 2 of 2.

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Deadman's Reach cont.	4	-135.5460052	57.5270996	Primary
—	**4**	**-135.529007**	**57.5209007**	**Extra**
—	**4**	**-135.5359955**	**57.5251007**	**Extra**
—	**4**	**-135.5149994**	**57.5331001**	**Extra**
—	5	-135.5160065	57.5399017	Primary
—	5	-135.5050049	57.5396996	Primary
—	5	-135.5379944	57.5265999	Primary
—	5	-135.5079956	57.5273018	Primary
—	5	-135.4940033	57.5368996	Primary
—	5	-135.4949951	57.5413017	Primary
—	5	-135.5500031	57.5774002	Primary
—	5	-135.5839996	57.5648994	Primary
—	5	-135.4989929	57.5457001	Primary
—	5	-135.5	57.5379982	Primary
—	5	-135.4889984	57.5414009	Primary
—	5	-135.5700073	57.5625	Primary
—	5	-135.5059967	57.5377007	Primary
—	5	-135.4779968	57.5503006	Primary
—	5	-135.5410004	57.5195999	Primary
—	**5**	**-135.5690002**	**57.5648994**	**Extra**
—	**5**	**-135.5119934**	**57.5363007**	**Extra**
—	**5**	**-135.6289978**	**57.5689011**	**Extra**

APPENDIX K: EXCURSION INLET SURVEY AREA POT LOCATIONS

Appendix K1.–Red king crab 2018 pot locations in the Excursion Inlet survey area, including additional pots for each stratum (stars).



Appendix K2.–Coordinates for 2018 pot locations in Excursion Inlet survey area (56 primary pot locations, 15 extra pot locations).

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Excursion Inlet	1	-135.389008	58.3088989	Primary
—	1	-135.483994	58.3479004	Primary
—	1	-135.501999	58.3717995	Primary
—	**1**	**-135.4320068**	**58.3518982**	**Extra**
—	**1**	**-135.4089966**	**58.3372002**	**Extra**
—	**1**	**-135.4400024**	**58.3405991**	**Extra**
—	2	-135.4470062	58.3349991	Primary
—	2	-135.3979950	58.3039017	Primary
—	2	-135.4490051	58.3731003	Primary
—	2	-135.4010010	58.3069992	Primary
—	2	-135.4759979	58.4634018	Primary
—	2	-135.4960022	58.3642998	Primary
—	2	-135.4539948	58.3498993	Primary
—	**2**	**-135.4530029**	**58.3373985**	**Extra**
—	**2**	**-135.4519958**	**58.3596001**	**Extra**
—	**2**	**-135.4989929**	**58.3524017**	**Extra**
—	3	-135.4400024	58.3195000	Primary
—	3	-135.4819946	58.3526001	Primary
—	3	-135.4450073	58.3328018	Primary
—	**3**	**-135.4199982**	**58.3424988**	**Extra**
—	**3**	**-135.4570007**	**58.3711014**	**Extra**
—	**3**	**-135.4069977**	**58.3065987**	**Extra**
—	4	-135.4380035	58.3462982	Primary
—	4	-135.4409943	58.3611984	Primary
—	4	-135.4290009	58.3176003	Primary
—	4	-135.4120026	58.3179016	Primary
—	4	-135.4759979	58.4602013	Primary
—	4	-135.4720001	58.3669014	Primary
—	4	-135.4980011	58.4567986	Primary
—	4	-135.4519958	58.3953018	Primary
—	4	-135.4340057	58.3255997	Primary
—	4	-135.4759979	58.4417992	Primary
—	4	-135.4160004	58.3266983	Primary
—	4	-135.4700012	58.3586006	Primary
—	4	-135.4739990	58.4696007	Primary
—	4	-135.4920044	58.4431992	Primary
—	4	-135.4830017	58.4356995	Primary
—	4	-135.4559937	58.3455009	Primary
—	4	-135.4909973	58.3615990	Primary
—	4	-135.4640045	58.4427986	Primary

-continued-

Appendix K2.–Page 2 of 2.

Location	RKC Density Strata	DD Longitude	DD Latitude	Location Status
Excursion Inlet cont.	**4**	**-135.5010071**	**58.4728012**	**Extra**
—	**4**	**-135.4219971**	**58.3386002**	**Extra**
—	**4**	**-135.4649963**	**58.4305992**	**Extra**
—	5	-135.4929962	58.4878006	Primary
—	5	-135.4700012	58.4488983	Primary
—	5	-135.4559937	58.3897018	Primary
—	5	-135.4329987	58.3316002	Primary
—	5	-135.4550018	58.4174995	Primary
—	5	-135.4429932	58.3983994	Primary
—	5	-135.4440002	58.3834991	Primary
—	5	-135.4980011	58.4995003	Primary
—	5	-135.5010071	58.4656982	Primary
—	5	-135.4989929	58.4926987	Primary
—	5	-135.4850006	58.3574982	Primary
—	5	-135.4579926	58.4201012	Primary
—	5	-135.4649963	58.4370995	Primary
—	5	-135.4799957	58.4402008	Primary
—	5	-135.4559937	58.4235992	Primary
—	5	-135.4689941	58.4570999	Primary
—	5	-135.4309998	58.3722000	Primary
—	5	-135.4750061	58.4796982	Primary
—	5	-135.4210052	58.3242989	Primary
—	5	-135.4900055	58.3694992	Primary
—	5	-135.4270020	58.3591003	Primary
—	5	-135.4450073	58.4104996	Primary
—	5	-135.4640045	58.4508018	Primary
—	5	-135.4889984	58.4492989	Primary
—	5	-135.4440002	58.4025993	Primary
—	**5**	**-135.4369965**	**58.3987007**	**Extra**
—	**5**	**-135.4299927**	**58.3671989**	**Extra**
—	**5**	**-135.4519958**	**58.4141998**	**Extra**