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Comparison of Escape Mechanisms and Their Ability to Reduce Catch of Sublegal Red King Crab in Norton Sound, Alaska

by

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October 2013

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

Symbols and Abbreviations

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Weights and measures (metric)

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

FISHERY DATA SERIES NO. 13-50

COMPARISON OF ESCAPE MECHANISMS AND THEIR ABILITY TO REDUCE CATCH OF SUBLEGAL RED KING CRAB IN NORTON SOUND, ALASKA

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ABSTRACT

Escape mechanisms, required on all commercial crab pots, may reduce catch of sublegal male red king crab in Norton Sound. Pots must be constructed with 4 escape rings with a minimum inside diameter of 4.5 in or one side panel of large mesh not less than 6.5-in stretched mesh. Despite being in regulation, the efficacy of different escape mechanisms to prevent or limit the capture of sublegal crab has not been evaluated in Norton Sound, where mature red king crab are smaller than in more southerly populations.

A total of 8 stations were used in the study. Gear deployed at each station consisted of 3 side-loading pyramid pots separated by approximately 0.25 nmi in a triangular configuration. Two pots at each station were equipped with either rings or large mesh and the third pot was a control. Pots were deployed and retrieved several times and all red king crab were measured and gender determined. Of 1,669 red king crab captured in this study, 684 were legal male, 893 were sublegal male, and 92 were female. The proportion of legal male red king crab captured was independent of transect, station and pot type. Similarly, the proportion of sublegal male crab captured was independent of transect, station and pot type. The results of this study suggest there was no difference in the abundance of non-target sublegal male red king crab in pots configured with different escape mechanisms. Because there were no difference in crab composition between pots configured with different escape mechanisms, handling was similar for both pot types as well.

Key words: Red king crab, *Paralithodes camtschaticus*, escape mechanism, Norton Sound, handling, sublegal red king crab

INTRODUCTION

Red king crab *Paralithodes camtschaticus* are found throughout most marine waters of Alaska. Within Norton Sound the red king crab fishery is one of the most lucrative fisheries in the Arctic, Kuskokwim, Yukon region. Norton Sound commercial fisheries for red king crab occur during summer (June through September) and winter (through the ice only, from December to May). In addition to commercial harvest, there is a longstanding subsistence red king crab fishery which accounts for the largest proportion of through the ice harvest.

Norton Sound adult male red king crab movement is typically inshore in the fall and winter for mating and offshore in the spring and summer for feeding and molting (Powell et al. 1983). Red king crab movement is coincident with sea ice formation and retreat and may be linked to an ontogenetic shift in salinity tolerance of adult crabs (Thomas and Rice 1992). As sea ice forms, nearshore waters become more saline and red king crab move inshore in preparation for mating. Conversely, melting sea ice results in an influx of fresh water which may force adult red king crab offshore where they continue to feed and molt. Juvenile red king crab may be more tolerant of lower salinities (Thomas and Rice 1992) and thus confer an advantage by staying nearshore throughout the summer such that this area may become a refuge for juvenile red king crab rearing (Brannian 1987).

Regulations have been implemented to ensure the sustainability of red king crab in Norton Sound including establishing a nearshore area closed to commercial fisheries, and requiring escape mechanisms on all commercial crab pots. A 15 mile nearshore closure area was established in 1981 (and modified in 2002) to reduce exploitation by commercial fishermen on nearshore crab targeted by subsistence users (Figure 1). Based on movement patterns, this closure area may also reduce juvenile red king crab bycatch in the commercial fisheries. In 2008, to minimize bycatch and handling of female and sublegal male red king crab, regulations were adopted requiring all crab pots to be fitted with either four escape rings with minimum inside diameter of 4.5 in or at least one-half of one side panel composed of not less than 6.5-in stretched mesh webbing. However, the efficacy of these escape mechanisms has not been evaluated with commercial crab pots within the Norton Sound summer red king crab fishery.

The purpose of this study is to evaluate the effectiveness of two different escape mechanisms at mitigating the capture of sublegal male red king crab. In June 2010 pots configured with escape mechanisms were deployed with control (no escape mechanism) pots and the numbers of legal and sublegal male red king crab captured were compared between pot types.

OBJECTIVES

1. Enumerate and compare red king crab by sex and legal size captured in crab pots configured with either escape rings or large mesh.
2. Evaluate handling, the number of red king crab handled to obtain legal red king crab, in crab pots configured with either escape rings or large mesh.

METHODS

SURVEY POT LOCATIONS AND SPECIFICATIONS

The study area covered approximately 240 km^2 offshore of Cape Nome. Survey pots were deployed perpendicular to shore along two transects, A and B, separated by 5 nmi. Each transect consisted of four stations extending from near to offshore at 8, 13, 18, and 23 nmi intervals. Gear deployed at each station consisted of 3 side-loading pyramidal pots separated by approximately 0.25 nmi in a triangular configuration (Figure 2). All pots were 5 ft x 5 ft x 2 ft with two opposing tunnel openings measuring 7 in x 21 in and covered with 3-in stretched mesh. At each station, there was one pot with one side panel of 6.5-in stretched mesh webbing and 5.5-in stretched mesh webbing on the remainder of the pot (large mesh pot), one pot with four 4.5-in escape rings embedded in the side panels and 5.5 inch stretched mesh webbing (escape ring pot), and one pot with 3.5-in stretched mesh webbing and no escape mechanism (control pot; Figure 3).

Over the course of the study pots were lost because of sea ice movement. After the second deployment, 9 pots were lost from the B transect (from stations B1–3). For the third deployment, the remaining 15 pots (A1–A4 and B4) were redistributed such that the nearshore station of transect A (A1) and the furthest offshore station of transect B (B4) were eliminated and stations B2 and B3 in the B transect were re-established. On the fourth deployment 3 pots were added to re-establish station B4. A total of 18 pots were checked and deployed and checked a fifth time (Table 1; Appendix A1).

Each pot was baited with eight pounds of chopped Pacific herring *Clupea pallasii* split into a 2.8 L net bag and a 0.9 L bait jar. Bait was changed at each deployment and pots were soaked for a minimum of 24 hours. Individual pot location and depth, set and pull dates and times were recorded (Appendix A1).

CRAB SAMPLING

All captured red king crab were retained for sampling following the methods outlined in Donaldson and Byersdorfer (2005). Each red king crab was measured for carapace length (CL) and carapace width (CW) and sex was determined. Additionally, reproductive condition was recorded for all females captured. All red king crab were returned alive to the water as the boat was transiting between crab pots; no effort was made to track the potential for recapture between pot checks.

DATA ANALYSIS

Due to lost pots and adjustments to study design, transect and station as well as pot type had to be considered. The number of legal and sublegal male, and female red king crab were totaled across all deployments by transect, station, and pot type. Because of low numbers per pot, female red king crab were used only for total number of red king crab in each pot and were not further evaluated. To address both study objectives, a 3-way analysis of variance (ANOVA, $\alpha = 0.05$) was used to describe differences in the proportion of legal and sublegal male red king crab composition using 3 factors: transect, station, and pot type. The Logit function was used to transform the proportions to meet normality assumptions as follows:

$$\text{Logit}(p_i) = \ln (p_i / 1 - p_i)$$

where p_i is either the proportion of legal or sublegal male red king crab per pot.

RESULTS

Pots were deployed and checked a total of 5 times from June 11 through June 25. Due to lost pots and reconfiguration the number of pot checks between stations was inconsistent however, within each station pots were checked the same number of times. There were 1,669 red king crab captured in 90 pot checks. Of those, 684 were legal male (CW >4.75 in), 893 were sublegal males and 92 were female (Table 2).

Based on the 3-way ANOVA, there was no difference detected in the proportion of legal red king crab captured by transect ($p = 0.093$), station ($p = 0.852$), and pot type ($p = 0.084$; Tables 2 and 3). Similarly there was no difference detected in the proportion of sublegal male red king crab captured by transect ($p = 0.588$), station ($p = 0.481$), and pot type ($p = 0.239$; Tables 2 and 4). Given these results handling, the number of red king crab handled to obtain legal red king crab, was not different between pot types. That is, both pot types had similar ratios of legal to sublegal red king crab.

DISCUSSION

The effectiveness of escape mechanisms has not been evaluated in the Norton Sound summer commercial red king crab fishery. Anecdotal accounts from commercial fishermen suggest under optimal soak times (36-72 hours) large-mesh webbing may be more effective than escape rings at releasing sublegal male red king crab from crab pots. The results of this study suggest there was no difference in the proportion of sublegal male red king crab captured in pots configured with escape rings versus large mesh. This also suggests there is no difference between pots with escape rings or large mesh in reducing handling of sublegal male red king crab.

Escape mechanisms are just one variable in determining the composition of catch in commercial crab pots. Among other variables, soak time and pot location should be considered when discussing catch composition and efficiency of harvest. A study evaluating the effects of soak time on red king crab catch in Bristol Bay, AK found increased soak time decreased the ratio of sublegal to legal crab (Pengilly and Tracy 1998). Soak time was not specifically addressed in this study thus statistical analysis is limited.

Pot location is another variable influencing catch composition. Crab pots in this study were placed along transects extending perpendicular offshore from Cape Nome (Figure 1), an area selected because previous studies (e.g., Brannian 1987; Brennan and Karpovich 2003; Soong and Banducci 2006; Soong 2008) suggested high crab abundance. However, in recent work, this area has been identified as an area high in abundance of sublegal male red king crab. Commercial fishermen generally caught more sublegal male red crab in the waters off Cape Nome then those fishermen fishing further east or west of Cape Nome (ADF&G unpublished data). While it was beyond the scope of this study to examine different locations and the impact of location on catch composition, evidence suggests it may be difficult to effectively quantify catch composition and handling of sublegal male red king crab because it may vary spatially over the entire commercial fishing area.

Efficiency of harvest is dependent not only on the number of legal crab in a pot but also on the number of non-target crab that must be handled to obtain the legal crab (Zhou and Kruse 2000). Trying to minimize the number of sublegal red king crab handled results in a complex interaction between escape mechanisms, soak time, and pot location. This study was a first attempt at trying to understand those relationships and should be viewed with caution. It was a small, single year project that likely did not thoroughly examine all variables affecting the size composition in crab pots. Soak time undoubtedly influences the composition of the pot and potentially the effectiveness of escape mechanisms yet this study was not designed to address variations in soak time specifically. Further, size structure of red king crab within Norton Sound may vary inter-annually with salinity and temperature. Future studies should encompass a larger study area and be conducted over multiple years to account for factors affecting size structure such as changes in environmental parameters, additional crab pot variables, and benthic habitat type.

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TABLES AND FIGURES

Table 1.–Number of pots deployed by date at each station along transects A and B, Norton Sound, AK, 2010.

Deployment Date	Transect and Station							
	A				B			
	1	2	3	4	1	2	3	4
6/12	3	3	3	3	3	3	3	3
6/16	3	3	3	3	0	0	0	3
6/21	0	3	3	3	0	3	3	0
6/23	0	3	3	3	0	3	3	3
6/25	0	3	3	3	0	3	3	3

Table 2.–Number of red king crab by escape mechanism: large mesh, rings, or control, 2010.

Pot Type	Pots	Total crabs	Sublegal crabs	Legal crabs	Female crabs
Large Mesh	30	475	247	215	13
Rings	30	459	213	230	16
Control	30	735	433	239	63
	90	1,669	893	684	92

Table 3.–Results of 3-way analysis of variance for the proportion of legal male red king crab.

Source	DF	Sum of Squares	Mean Square	F Value	Pr>F
Model	13	8.143245	0.62640346	1.02	0.4455
Error	60	36.87521743	0.61458696		
Corrected Total	73	45.01846243			

Source	DF	Type I SS	Mean Square	F Value	Pr>F
Station	2	0.19742237	0.09871118	0.16	0.852
Transect	1	1.79614653	1.79614653	2.92	0.0925
PT	2	3.18199928	1.59099964	2.59	0.0835
Transect*PT	2	1.36308257	0.68154128	1.11	0.3366
Transect*Station	2	0.53890078	0.26945039	0.44	0.6471
Station*PT	4	1.06569347	0.26642337	0.43	0.7839

Note: PT = pot type.

Table 4.–Results of 3-way analysis of variance for the proportion of sublegal male red king crab.

Source	DF	Sum of Squares	Mean Square	F Value	Pr>F
Model	13	4.97302205	0.38254016	0.68	0.7791
Error	60	33.9996966	0.56666161		
Corrected Total	73	38.9727187			

Source	DF	Type I SS	Mean Square	F Value	Pr>F
Station	2	0.60651129	0.30325565	0.54	0.5883
Transect	1	0.28561108	0.28561108	0.5	0.4805
PT	2	1.66112373	0.83056187	1.47	0.2391
Transect*PT	2	0.78662072	0.39331036	0.69	0.5035
Transect*Station	2	0.87285834	0.43642917	0.77	0.4675
Station*PT	4	0.76029689	0.19007422	0.34	0.853

Note: PT = pot type.

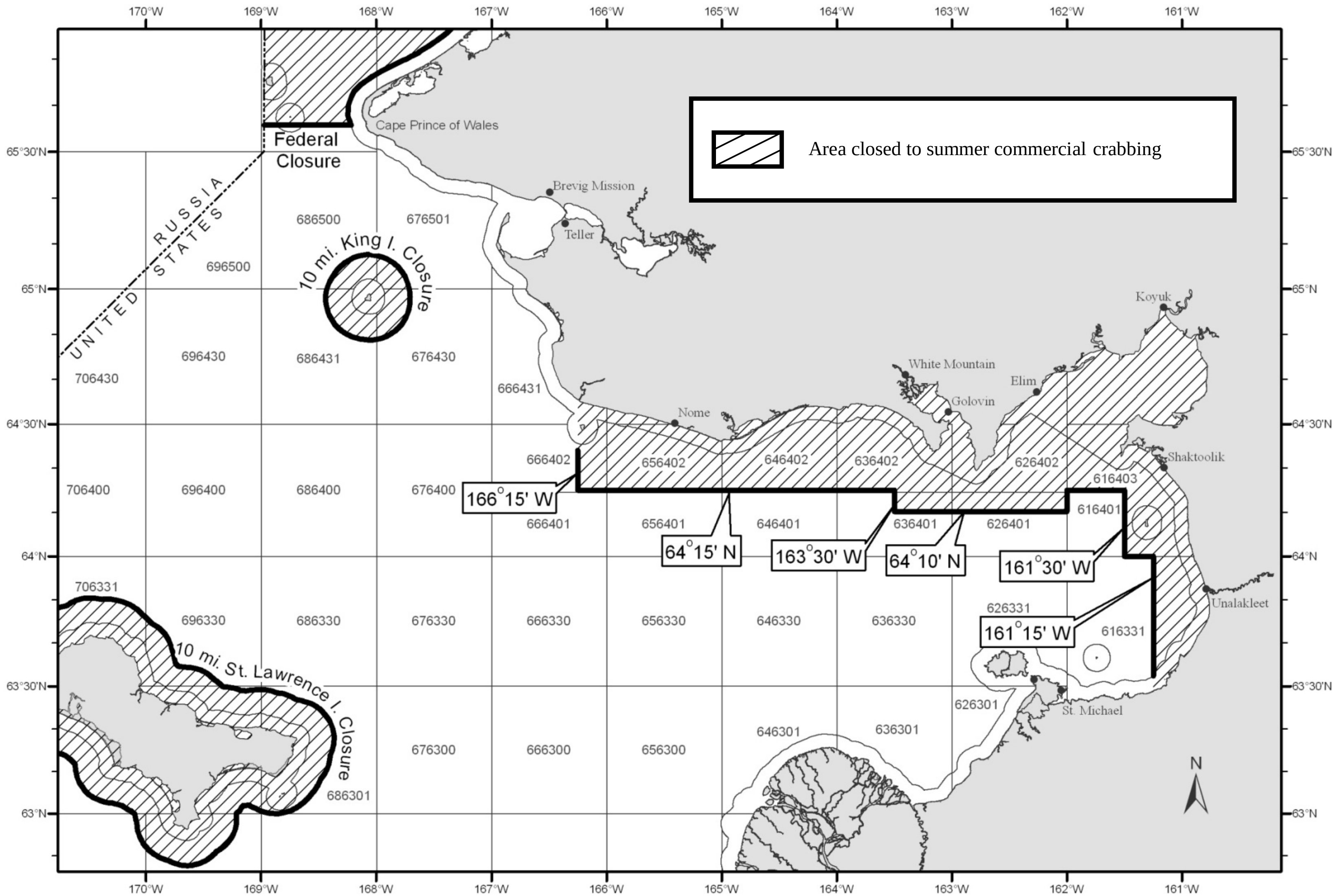

Figure 1.–Statistical and closed areas for red king crab commercial fishing in Norton Sound, Alaska

Note: After the second deployment, 9 pots (from stations B1-3) were lost from the B transect. For the third deployment, the remaining 15 pots were redistributed such that the nearshore station of transect A (A1) and the furthest offshore station of transect B (B4) were eliminated and stations B2 and B3 in the B transect were re-established. On the fourth deployment 3 pots were added to re-establish station B4. A total of 18 pots were checked and deployed and checked a fifth time.

Figure 2.–Crab pot locations.

Figure 3.–Side-loading pyramid crab pots configured with large mesh (top), rings (middle), and control (bottom).

APPENDIX A: POT DEPLOYMENT AND RETRIEVAL TIMES AND LOCATIONS

Appendix A1.–Pot deployment and retrieval times and locations, Norton Sound, 2010.

Station	Pot ID #	Pot Depth(ft)	Date Set	Time	Date Checked	Time	Latitude	Longitude	Female juvenile	Female adult	Male sublegal	Male legal	Male market legal	Total crab
A1	A1L	105	6/11/10	1940	6/12/10	1740	64˚21.18	165˚12.39	0	0	5	2	2	9
A1	A1R	100	6/11/10	1948	6/12/10	1752	64˚21.07	165˚12.77	0	0	3	2	2	7
A1	A1C	98	6/11/10	2000	6/12/10	1800	64˚20.96	165˚12.39	0	0	4	2	0	6
A2	A2L	60	6/11/10	2030	6/12/10	1843	64˚16.79	165˚12.48	1	0	16	0	8	25
A2	A2R	60	6/11/10	2045	6/12/10	1855	64˚16.68	165˚12.83	1	2	19	2	10	34
A2	A2C	61	6/11/10	2035	6/12/10	1905	64˚16.83	165˚12.89	1	2	25	1	10	39
A3	A3L	57	6/11/10	2115	6/12/10	1950	64˚12.59	165˚12.42	0	0	11	1	2	14
A3	A3R	58	6/11/10	2125	6/12/10	2000	64˚12.48	165˚12.74	0	0	3	1	1	5
A3	A3C	57	6/11/10	2120	6/12/10	2010	64˚12.37	165˚12.42	0	0	13	1	6	20
A4	A4L	59	6/11/10	2200	6/12/10	2050	64˚08.28	165˚12.26	0	1	17	1	4	23
A4	A4R	58	6/11/10	2210	6/12/10	2058	64˚08.16	165˚12.56	1	1	16	10	6	34
A4	A4C	59	6/11/10	2203	6/12/10	2110	64˚08.06	165˚12.26	1	0	30	5	10	46
B4	B4C	58	6/11/10	2300	6/12/10	2200	64˚06.00	165˚00.20	0	0	11	1	2	14
B4	B4R	58	6/11/10	2305	6/12/10	2212	64˚06.12	165˚00.61	0	0	10	5	1	16
B4	B4L	58	6/11/10	2255	6/12/10	2220	64˚06.22	165˚00.20	0	0	1	1	1	3
B3	B3C	55	6/11/10	2345	6/12/10	2300	64˚10.53	165˚00.20	1	0	18	3	4	26
B3	B3R	54	6/11/10	2350	6/12/10	2307	64˚10.64	165˚00.55	1	0	12	2	8	23
B3	B3L	54	6/11/10	2340	6/12/10	2320	64˚10.75	165˚00.20	0	0	7	1	2	10
B2	B2C	51	6/12/10	0025	6/12/10	2355	64˚14.74	165˚00.14	1	1	23	2	5	32
B2	B2R	51	6/12/10	0030	6/13/10	0003	64˚14.84	165˚00.55	0	0	22	4	7	33
B2	B2L	51	6/12/10	0020	6/13/10	0015	64˚14.96	165˚00.14	0	0	22	3	11	36
B1	B1C	83	6/12/10	0110	6/13/10	0050	64˚19.12	165˚59.98	0	0	0	0	0	0
B1	B1R	87	6/12/10	0115	6/13/10	0100	64˚19.22	165˚00.37	0	0	0	0	0	0
B1	B1L	90	6/12/10	0105	6/13/10	0110	64˚19.34	165˚59.98	0	0	0	0	2	2
A1	A1L	103	6/12/10	1740	6/16/10	1555	64˚21.18	165˚12.39	0	0	12	5	6	23
A1	A1R	98	6/12/10	1752	6/16/10	1610	64˚21.07	165˚12.77	0	0	5	1	7	13
A1	A1C	100	6/12/10	1800	6/16/10	1625	64˚20.96	165˚12.39	0	0	16	6	6	28
A2	A2L	62	6/12/10	1843	6/16/10	1710	64˚16.79	165˚12.48	1	1	29	3	10	44
A2	A2R	62	6/12/10	1855	6/16/10	1722	64˚16.68	165˚12.83	5	0	30	7	25	67
A2	A2C	62	6/12/10	1905	6/16/10	1735	64˚16.83	165˚12.89	21	2	67	3	22	115
A3	A3L	59	6/12/10	1950	6/16/10	1820	64˚12.59	165˚12.42	1	0	18	7	25	51
A3	A3R	59	6/12/10	2000	6/16/10	1835	64˚12.48	165˚12.74	0	1	7	7	18	33

-continued-

Appendix A1.–Page 2 of 3.

Station	Pot ID #	Pot Depth(ft)	Date Set	Time	Date Checked	Time	Latitude	Longitude	Female juvenile	Female adult	Male sublegal	Male legal	Male market legal	Total crab
A3	A3C	59	6/12/10	2010	6/16/10	1848	64˚12.37	165˚12.42	10	2	57	4	27	100
A4	A4L	60	6/12/10	2050	6/16/10	1935	64˚08.28	165˚12.26	0	0	11	10	15	36
A4	A4R	60	6/12/10	2058	6/16/10	1947	64˚08.16	165˚12.56	0	1	20	1	11	33
A4	A4C	60	6/12/10	2110	6/16/10	2000	64˚08.06	165˚12.26	4	4	47	4	16	75
B4	B4L	60	6/12/10	2220	6/16/10	2105	64˚06.22	165˚00.20	0	0	16	4	6	26
B4	B4R	60	6/12/10	2212	6/16/10	2116	64˚06.12	165˚00.61	0	0	14	5	7	26
B4	B4C	60	6/12/10	2200	6/16/10	2130	64˚06.00	165˚00.20	0	0	17	3	11	31
B3	B3L		6/12/10	2320	6/16/10	2215								
B3	B3R		6/12/10	2307	6/16/10	2230								
B3	B3C		6/12/10	2300	6/16/10	2240								
B2	B2L		6/12/10	0015	6/16/10	2300								
B2	B2R		6/12/10	0003	6/16/10	2300								
B2	B2C		6/12/10	2355	6/16/10	2300								
B1	B1L		6/12/10	0110	6/17/10	0200								
B1	B1R		6/12/10	0100	6/17/10	0200								
B1	B1C		6/12/10	0050	6/17/10	0200								
A2	A2L	61	6/19/10	1440	6/21/10	1440	64˚16.79	165˚12.48	3	0	8	0	5	16
A2	A2R	61	6/19/10	1450	6/21/10	1450	64˚16.68	165˚12.83	2	0	6	4	10	22
A2	A2C	62	6/19/10	1500	6/21/10	1500	64˚16.83	165˚12.89	2	0	8	2	3	15
A3	A3L	58	6/19/10	1540	6/21/10	1540	64˚12.59	165˚12.42	2	1	11	0	6	20
A3	A3R	58	6/19/10	1550	6/21/10	1550	64˚12.48	165˚12.74	0	0	7	0	7	14
A3	A3C	58	6/19/10	1600	6/21/10	1600	64˚12.37	165˚12.42	1	2	15	3	3	24
A4	A4L	59	6/19/10	1650	6/21/10	1640	64˚08.28	165˚12.26	0	0	12	1	2	15
A4	A4R	59	6/19/10	1655	6/21/10	1645	64˚08.16	165˚12.56	0	0	1	0	1	2
A4	A4C	59	6/19/10	1700	6/21/10	1650	64˚08.06	165˚12.26	1	0	15	1	4	21
B3	B3C	54	6/19/10	1740	6/21/10	1835	64˚10.53	165˚00.20	0	0	0	0	4	4
B3	B3R	54	6/19/10	1750	6/21/10	1847	64˚10.64	165˚00.55	0	0	5	2	2	9
B3	B3L	54	6/19/10	1800	6/21/10	1855	64˚10.75	165˚00.20	0	0	4	0	5	9
B2	B2C	51	6/19/10	1840	6/21/10	1940	64˚14.74	165˚00.14	1	0	8	1	6	16
B2	B2R	50	6/19/10	1850	6/21/10	1950	64˚14.84	165˚00.55	0	0	6	1	5	12
B2	B2L	50	6/19/10	1900	6/21/10	2000	64˚14.96	165˚00.14	0	0	8	4	4	16
A2	A2L	62	6/21/10	1440	6/23/10	1337	64˚16.79	165˚12.48	0	1	8	3	6	18
A2	A2R	62	6/21/10	1450	6/23/10	1345	64˚16.68	165˚12.83	0	0	3	2	11	16

-continued-

Appendix A1.–Page 3 of 3.

Station	Pot ID #	Pot Depth(ft)	Date Set	Time	Date Checked	Time	Latitude	Longitude	Female juvenile	Female adult	Male sublegal	Male legal	Male market legal	Total crab
A2	A2C	62	6/21/10	1500	6/23/10	1356	64˚16.83	165˚12.89	3	0	10	1	7	21
A3	A3L	58	6/21/10	1540	6/23/10	1438	64˚12.59	165˚12.42	0	0	0	0	0	0
A3	A3R	59	6/21/10	1550	6/23/10	1447	64˚12.48	165˚12.74	1	0	4	0	5	10
A3	A3C	59	6/21/10	1600	6/23/10	1455	64˚12.37	165˚12.42	0	1	11	1	7	20
A4	A4L	60	6/21/10	1640	6/23/10	1535	64˚08.28	165˚12.26	0	0	2	1	2	5
A4	A4R	60	6/21/10	1645	6/23/10	1545	64˚08.16	165˚12.56	0	0	4	0	2	6
A4	A4C	60	6/21/10	1650	6/23/10	1555	64˚08.06	165˚12.26	0	0	5	0	4	9
B4	B4C	58	6/21/10	1755	6/23/10	1645	64˚06.00	165˚00.20	0	0	1	0	4	5
B4	B4R	59	6/21/10	1750	6/23/10	1655	64˚06.12	165˚00.61	0	0	0	0	2	2
B4	B4L	58	6/21/10	1745	6/23/10	1705	64˚06.22	165˚00.20	0	0	5	1	3	9
B3	B3C	54	6/21/10	1835	6/23/10	1743	64˚10.53	165˚00.20	0	0	2	1	1	4
B3	B3R	54	6/21/10	1847	6/23/10	1751	64˚10.64	165˚00.55	0	0	2	1	2	5
B3	B3L	54	6/21/10	1855	6/23/10	1800	64˚10.75	165˚00.20	0	0	4	0	1	5
B2	B2C	52	6/21/10	1940	6/23/10	1838	64˚14.74	165˚00.14	0	0	1	0	2	3
B2	B2R	52	6/21/10	1950	6/23/10	1847	64˚14.84	165˚00.55	0	0	0	0	1	1
B2	B2L	52	6/21/10	2000	6/23/10	1900	64˚14.96	165˚00.14	0	0	0	0	0	0
A2	A2L	60	6/23/10	1337	6/25/10	1320	64˚16.79	165˚12.48	1	0	5	1	11	18
A2	A2R	60	6/23/10	1345	6/25/10	1330	64˚16.68	165˚12.83	0	0	4	0	6	10
A2	A2C	60	6/23/10	1356	6/25/10	1325	64˚16.83	165˚12.89	1	0	13	1	3	18
A3	A3L	58	6/23/10	1438	6/25/10	1405	64˚12.59	165˚12.42	0	0	3	2	5	10
A3	A3R	58	6/23/10	1447	6/25/10	1413	64˚12.48	165˚12.74	0	0	3	0	4	7
A3	A3C	58	6/23/10	1455	6/25/10	1420	64˚12.37	165˚12.42	0	1	3	2	6	12
A4	A4L	59	6/23/10	1535	6/25/10	1457	64˚08.28	165˚12.26	0	0	3	1	5	9
A5	A4R	58	6/23/10	1545	6/25/10	1506	64˚08.16	165˚12.56	0	0	5	2	1	8
A6	A4C	59	6/23/10	1555	6/25/10	1514	64˚08.06	165˚12.26	0	0	6	1	3	10
B4	B4C	58	6/23/10	1645	6/25/10	1609	64˚06.00	165˚00.20	0	0	2	2	3	7
B4	B4R	58	6/23/10	1655	6/25/10	1617	64˚06.12	165˚00.61	0	0	1	3	0	4
B4	B4L	58	6/23/10	1705	6/25/10	1627	64˚06.22	165˚00.21	0	0	3	0	0	3
B3	B3C	54	6/23/10	1743	6/25/10	1705	64˚10.53	165˚00.20	0	0	3	0	3	6
B3	B3R	54	6/23/10	1751	6/25/10	1715	64˚10.64	165˚00.55	0	0	1	3	3	7
B3	B3L	54	6/23/10	1800	6/25/10	1721	64˚10.75	165˚00.20	0	0	1	0	3	4
B2	B2C	51	6/23/10	1838	6/25/10	1757	64˚14.74	165˚00.14	0	0	2	2	4	8
B3	B2R	52	6/23/10	1847	6/25/10	1802	64˚14.84	165˚00.55	0	0	0	0	0	0
B4	B2L	52	6/23/10	1900	6/25/10	1810	64˚14.96	165˚00.14	0	0	5	6	5	16