

Regional Information Report No. 4K08-09

**Special Project Plan: 2008 Bottom trawl survey of
crab and groundfish: Kodiak, Chignik, South
Peninsula, and Eastern Aleutian Districts**

by

Kally Spalinger

August 2008

Alaska Department of Fish and Game

Division of Commercial Fisheries



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AND GROUND FISH: KODIAK, CHIGNIK, SOUTH PENINSULA, AND
EASTERN ALEUTIAN DISTRICTS**

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ABSTRACT

This report specifies the methods and procedures of special projects during the 2008 bottom trawl survey of crab and groundfish in the Kodiak, Chignik, South Peninsula, and Eastern Aleutian districts of the Westward Region. This special project plan is used in conjunction with the Standard Project Operational Plan (Spalinger and Cavin 2004), which describes the annual trawl survey sampling protocols. Special shellfish projects for 2008 include: a legal-size-male Tanner crab tagging project; multiple tows within selected offshore stations in the Kodiak District to assist in determining the variance of Tanner crab population estimates; hemolymph sample collection for genetic analysis to determine bitter crab disease presence; and collection of chela height measurements for male maturity analysis. Special groundfish projects for 2008 include: collection of stomachs from walleye pollock *Theragra chalcogramma*, Pacific cod *Gadus macrocephalus*, flathead sole *Hippoglossoides elassodon*, arrowtooth flounder *Atheresthes stomias*, Pacific halibut *Hippoglossus stenolepis*, northern rock sole *Lepidopsetta polyxystra*, and spiny dogfish *Squalus acanthias* for a National Marine Fisheries Service (NMFS) food habits study, as well as collection of whole specimens of Pacific ocean perch *Sebastes alutus* and Sablefish *Anoplopoma fimbria* for the Alaska Department of Environmental Conservation.

Key words: Tanner crab, shellfish, groundfish, trawl survey, Kodiak, Alaska Peninsula, Chignik, Eastern Aleutian Islands

INTRODUCTION

From June through September 2008, the Alaska Department of Fish and Game (ADF&G) will conduct a bottom-trawl survey in portions of the Westward Region (Figure 1). The survey will focus on waters of historic red king and Tanner crab abundance around Kodiak Island and the Alaska Peninsula from Cape Douglas to False Pass, as well as the Eastern Aleutian Islands. The survey results will be used to estimate the abundance of Tanner crab *Chionoecetes bairdi* and red king crab *Paralithodes camtschaticus* populations and to determine species composition and length frequencies of the groundfish catch by haul and area.

This report details the survey schedule, station maps, and sampling procedures for special projects during the 2008 Westward Region trawl survey. All standard sampling protocols that are used during the trawl survey are described in detail in the Standard Project Operational Plan (Spalinger and Cavin 2004). Any changes to standard procedures, or special projects incorporated into the 2008 survey are described in this document.

OBJECTIVES

Special shellfish objectives for the 2008 trawl survey are to tag legal-size-male Tanner crabs from the Northeast and Eastside sections of the Kodiak District, and the Eastern Aleutian District. Tag recovery will help determine migration occurring between the time of the survey and the winter commercial fishery and to help verify shell condition estimates. In addition to the standard collection of hemolymph smears in Alitak Bay to look for bitter crab disease (Spalinger and Cavin 2004) additional hemolymph samples will be collected, preserved, and used to look for the presence of genetic markers consistent with the parasitic dinoflagellate causing the disease. Finally, measurements of chela height collected from male Tanner crabs in Marmot Bay will be expanded to include the Eastside and Westside sections of the Kodiak District.

Special groundfish objectives are to collect whole stomachs and contents from walleye pollock *Theragra chalcogramma*, Pacific cod *Gadus macrocephalus*, flathead sole *Hippoglossoides elassodon*, arrowtooth flounder *Atheresthes stomias*, Pacific halibut *Hippoglossus stenolepis*, northern rock sole *Lepidopsetta polyxystra*, and spiny dogfish *Squalus acanthias* from Marmot

and Chiniak bays for the National Marine Fisheries Service (NMFS). We will also collect sablefish *Anoplopoma fimbria* and Pacific ocean perch *Sebastes alutus* for the Alaska Department of Environmental Conservation (ADEC). For the fifth year, the sex of each spiny dogfish and skate *Raja* and *Bathyraja* measured will be recorded. Multiple tows in selected stations in Marmot Bay and the Barnabas Gully of the Kodiak District will occur for the purpose of determining the accuracy of Tanner crab station population estimates.

METHODS

SURVEY AREA AND TRAWL PROCEDURES

The 27.4 m ADF&G research vessel *Resolution* will conduct survey trawl tows in areas of known king and Tanner crab habitat throughout the Kodiak, Chignik, South Peninsula, and Eastern Aleutian districts of the Westward Region (Figure 1, Appendices A1-15). Tows will be made using a 400-mesh eastern otter trawl.

Unalaska Bay, Makushin Bay, Pumicestone Bay, and Akutan Island in the Eastern Aleutian District will be included in the 2008 survey (Appendices A14, 15). All survey maps for 2008 can be found in Appendix A.

This year duplicate tows will occur in some of the large offshore stations in the Northeast and Eastside sections of the Kodiak District. Stations were selected based on large Tanner crab population estimates in previous surveys (Spalinger *in prep*, Spalinger 2007, Spalinger 2006, Spalinger 2005). Four stations in Marmot Bay (Appendix A2) and four stations in the Barnabas Gully (Appendix A3) have been divided into four quadrants. In addition to the traditional tow in these stations, which will be sampled according to the Standard Project Operational Plan (Spalinger and Cavin 2004), two to three additional tows, depending on time and weather, will be made in different quadrants of the stations. Stations with multiple tows will be surveyed in the following order of priority: Marmot Bay- 255, 283X, 256, and MONX (Appendix A2); Barnabas Gully- 621, 655, 696, and 588 (Appendix A3). Total catch from the extra tows will be weighed, but only Tanner crabs will be sorted and weighed individually. Crabs will be handled according to the Standard Project Operational Plan (Spalinger and Cavin 2004).

CRAB SAMPLING

Selected legal-size-male Tanner crabs captured from the Northeast and Eastside sections of the Kodiak District (Appendices A1-3), as well as from the Eastern Aleutian District (Appendices A14, 15), will be tagged. After all the crabs have been measured, preferred legal-size males without reflex impairment and with less than two missing limbs will be tagged using the following method. A small hole will be made in the right side of the carapace, above the lower, left corner of the branchial lobe (Figure 2). The hole can be made using either a handmade punch with a short nail attached that will not penetrate deeply into the body cavity, or a tagging gun with an epoxy stopper attached that limits the depth the needle can be inserted. Once the hole is made, a dart with a numbered disc tag attached will be inserted into the hole. The tag numbers, carapace width, and shell condition will be recorded on the Tanner crab tagging form (Appendix B1) and a dorsal and ventral photo of each crab should be taken if possible, with a label clearly indicating the tag number. The latitude and longitude of the location where the crabs are released should also be recorded on the tagging form. Tagged crabs will be recovered during the January 2009 commercial Tanner crab fishery if population estimates are sufficient for an opening. A detailed operational plan for this project is in development (Mattes *in pub.*).

Samples of hemolymph from Tanner crab in Alitak Bay will be preserved in ethanol for future genetic testing to identify parasite DNA. Samples for this test will be collected in conjunction with the standard hemolymph smears as described in the Standard Project Operational Plan (Spalinger and Cavin 2004). Information should be recorded on an ADF&G Crab Data Form (Appendix B2). After collection, the preserved samples will be stored in a dark location at room temperature until arrangements can be made to have them sent to a genetics laboratory for testing. Specific testing protocols are still being developed by NMFS Fisheries Resources Pathology program. Results from the genetic testing will be compared to results from the hemolymph smears to determine smear accuracy, and the feasibility of replacing the hemolymph smears with genetic testing in the future. Detailed instructions for collecting hemolymph for PCR testing are found in Appendix C1.

Chela height measurements from male Tanner crabs will be collected from the Eastside and Westside sections of the Kodiak District. Protocol for chela height measurements will follow the protocol in Spalinger and Cavin, 2004, with one exception. Measurements will be collected randomly from 50 male Tanner crab >50 mm in carapace width (CW) at each station. The cruise leader will have the option to adjust the sampling plan as needed to accommodate circumstances that may arise due to the high numbers of crabs encountered on the Eastside survey. For example, the cruise leader may choose to measure chela from only every third station, or modify the plan in other ways to still allow for timely return of the crabs captured to the water. The cruise leader should always keep detailed records of exactly how the sampling occurred so that the methods are repeatable and data analysis can be conducted accordingly.

GROUND FISH SAMPLING

During the Marmot and Chiniak Bay survey tows, stomach samples from walleye pollock, Pacific cod, flathead sole, arrowtooth flounder, Pacific halibut, northern rock sole, and spiny dogfish will be collected. Sample sizes are 20 stomachs per size group (Appendix D1), with a maximum number of 20 stomachs per species per haul. The goal is to sample two to three species from every haul. A precise outline of the sampling procedure is outlined in Appendix D1.

ADEC has requested 25 whole specimens of Pacific ocean perch from the South Peninsula and 20 sablefish from anywhere during the survey. Fish should be collected opportunistically from these areas as they are encountered, until the sampling goal has been reached. After the fish are brought from the water they should be placed individually into a plastic bag, numbered, and sealed with a plastic cable. Specific sampling protocol is found in Appendix E1. The sample collection form (Appendix B3) must be filled out completely and put into a bag inside a wetlock box containing the samples. Samples should be kept frozen, and shipped to ADEC in Palmer upon return to port.

In 2008, we will continue to determine the sex of each measured skate and spiny dogfish. Males are easily identified by the presence of claspers (Figure 3). Small, immature skates and dogfish may be difficult to sex, and in that case the sex will be recorded as unknown.

DATA FORMS AND SAMPLE CUSTODY

Completion and proper disposition of data and samples is the same for the special projects as for standard data. It is the responsibility of the cruise leader to ensure that all samples and forms are completed and removed from the boat after each survey leg. Forms are to be organized according to project and put into sequential order by tow, starting with the first tow on top. All data removed from the vessel is to be taken directly to the shellfish office and given to Kally

Spalinger, the lead trawl-survey biologist to prevent lost data. Frozen samples must be well labeled when removed from the R/V *Resolution* freezer and transferred to one of the freezers at the Kodiak Research Center, until they can be processed or shipped to their final destination. Samples preserved in formalin should be stored in a location with adequate ventilation until they are shipped. It is also important to inform the lead trawl-survey biologist of the location of all stored samples.

SURVEY EQUIPMENT CHECKLIST

Stomach sampling

- ✓ Specimen forms
- ✓ Specimen labels
- ✓ Five-gallon buckets with lids
- ✓ Formalin
- ✓ Stomach bags
- ✓ One-liter plastic bottles
- ✓ Baking soda
- ✓ Luggage tags
- ✓ 1/8 cup measuring cup
- ✓ Hazardous materials bucket

ADEC sampling

- ✓ ADEC fish sampling forms
- ✓ Food-grade plastic bags
- ✓ Sample tags
- ✓ Plastic cables
- ✓ Wetlock boxes

Tanner tagging

- ✓ Darts with Peterson disc tags
- ✓ Tagging guns with “stops”
- ✓ Handmade nail punch
- ✓ Tagging forms

Genetic hemolymph collection

- ✓ Deep-well plates (96 wells of 1.2 ml capacity)
- ✓ Rubber well caps
- ✓ Syringes
- ✓ ADF&G Crab Data forms

PERSONNEL AND SURVEY SCHEDULE

R/V Resolution crew – Captain Denis Cox Jr., Kurt Pederson, Gary Wilson

*Chiniak Bay –
June 12 and 13*

Kally Spalinger (cruise leader)
Dave Gilliland
Collin Hakkinen
Sherry Barker
Lee Hulbert
Dave Barnard

*Marmot Bay –
June 20-25*

Kally Spalinger (cruise leader)
Rachel Latham
Dave Gilliland
Collin Hakkinen
Sherry Barker
Philip Tschersich

*Eastside Kodiak –
June 28 to July 15*

Kally Spalinger (cruise leader)
Dave Gilliland
Collin Hakkinen
Sherry Barker
Nicholas Sagalkin (Alitak)
Kim Phillips (Alitak)

*South Alaska Peninsula, Chignik, and
The Eastern Aleutians -
July 21 to August 26*

Nicholas Sagalkin (cruise leader 1)
Kally Spalinger (cruise leader 2)

*Westside Kodiak and North Mainland –
September 6-16*

Nicholas Sagalkin (cruise leader)
Dave Gilliland

Dave Gilliland
Collin Hakkinen
Sherry Barker
Sonya El-Mejjati

Collin Hakkinen
Sherry Barker
Lee Hulbert

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FIGURES

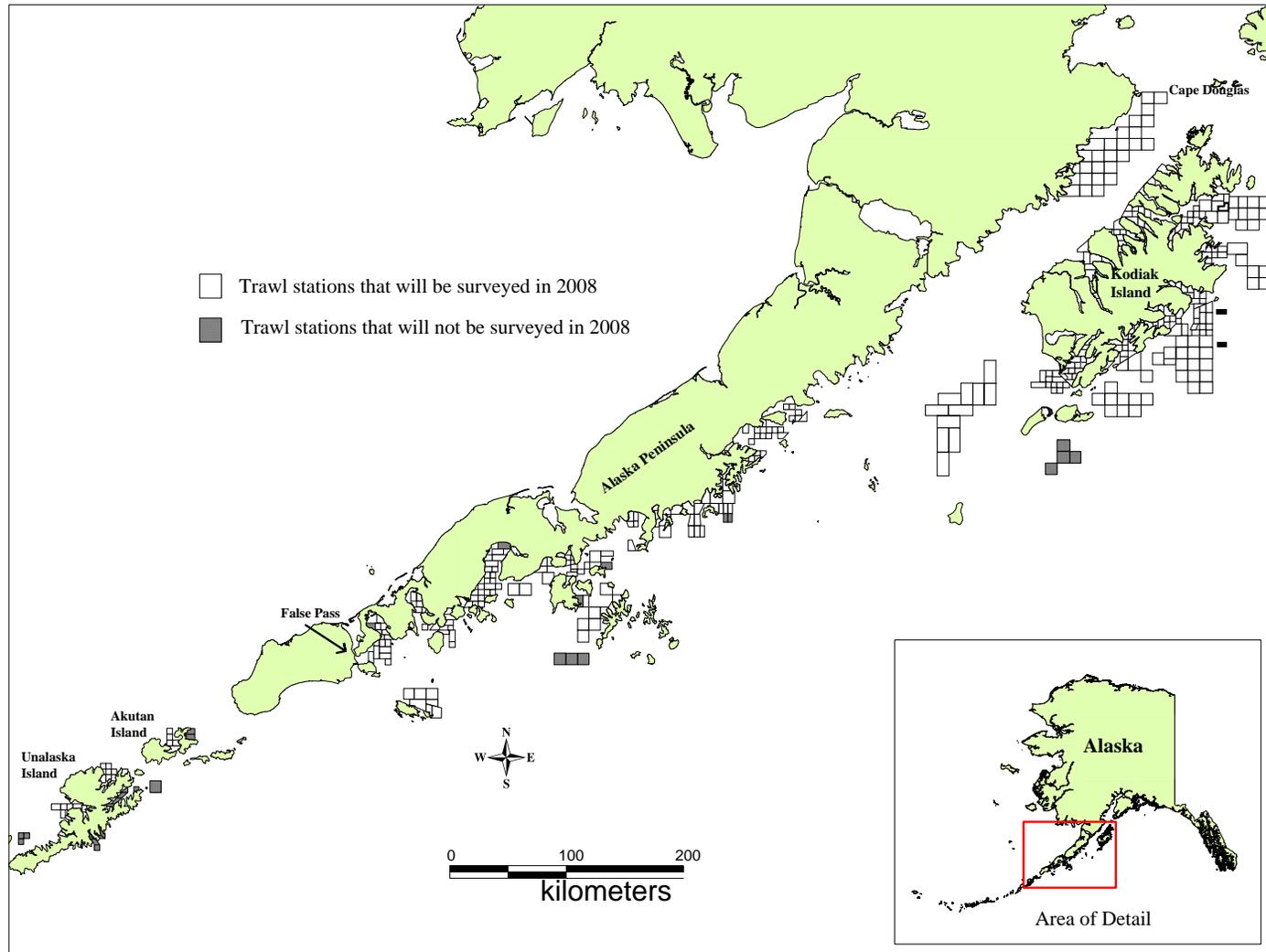


Figure 1.—Westward Region trawl survey area.

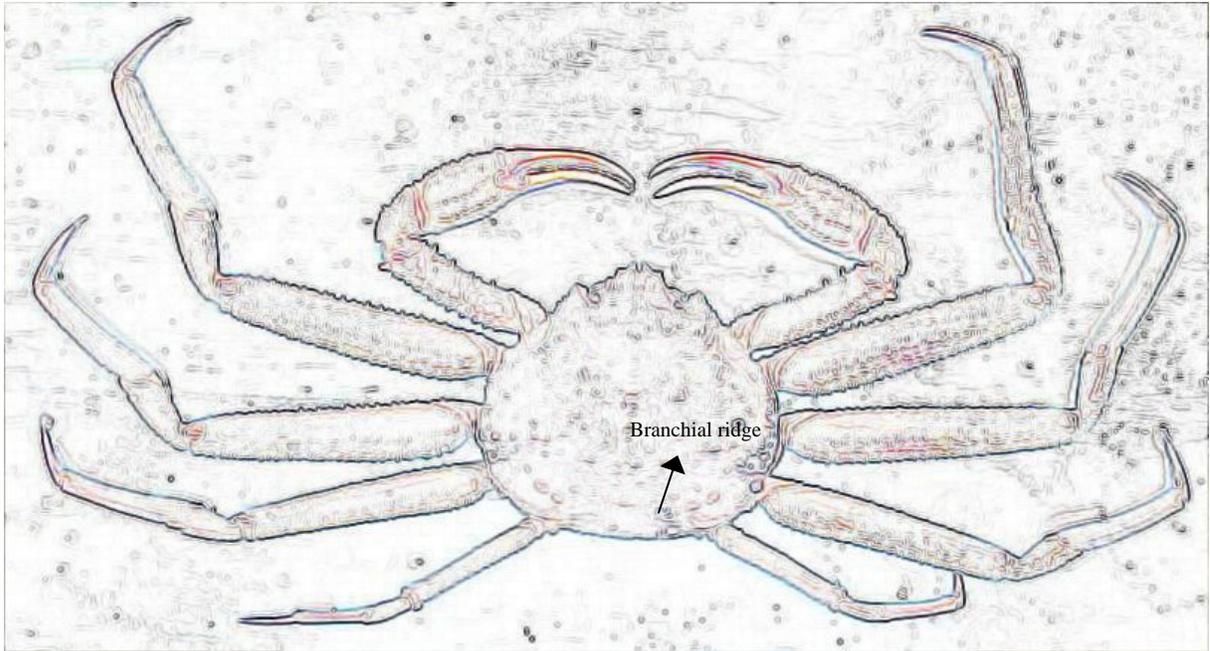


Figure 2.—Diagram of tag insertion location on Tanner crab. (Below branchial ridge)

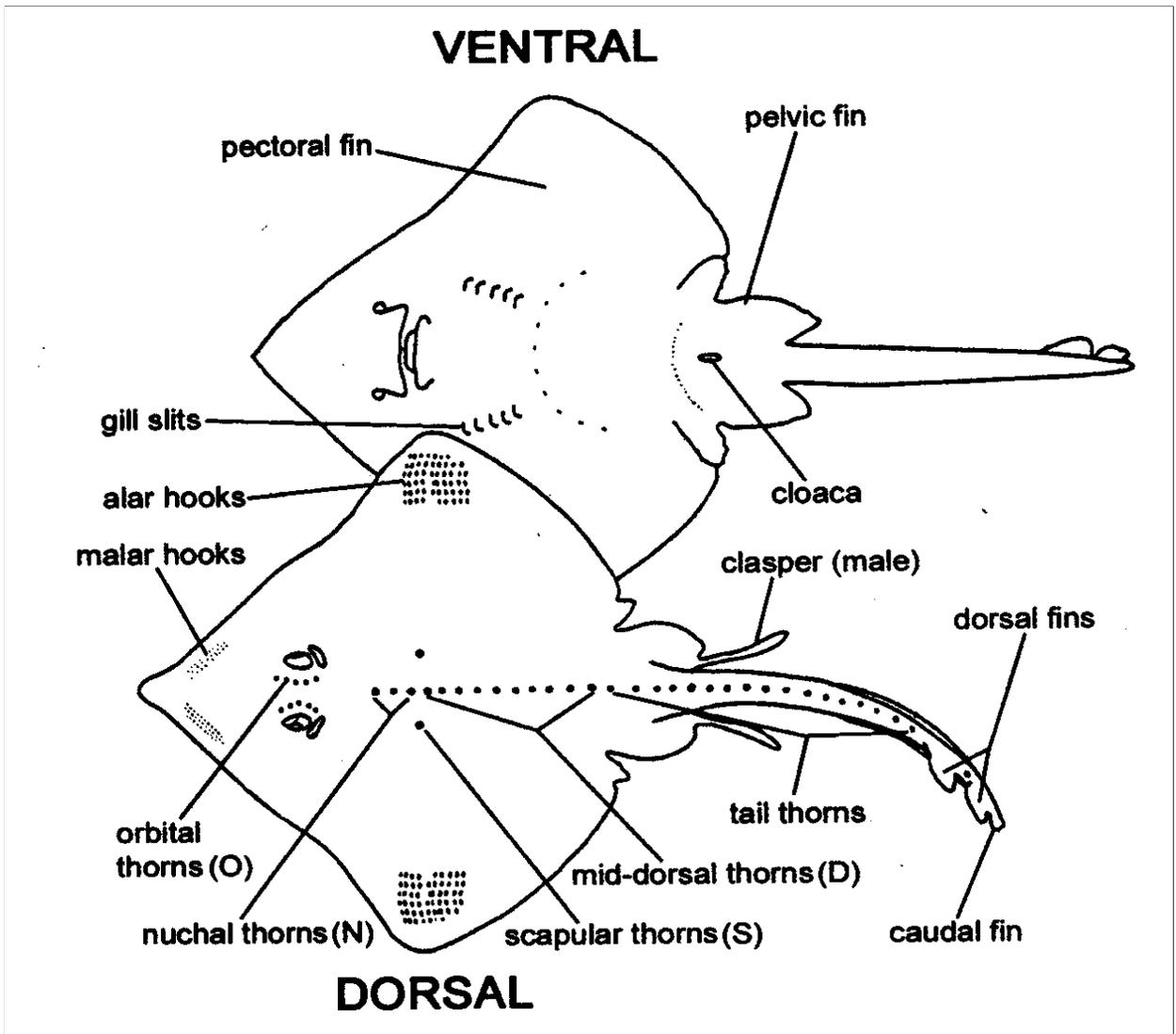
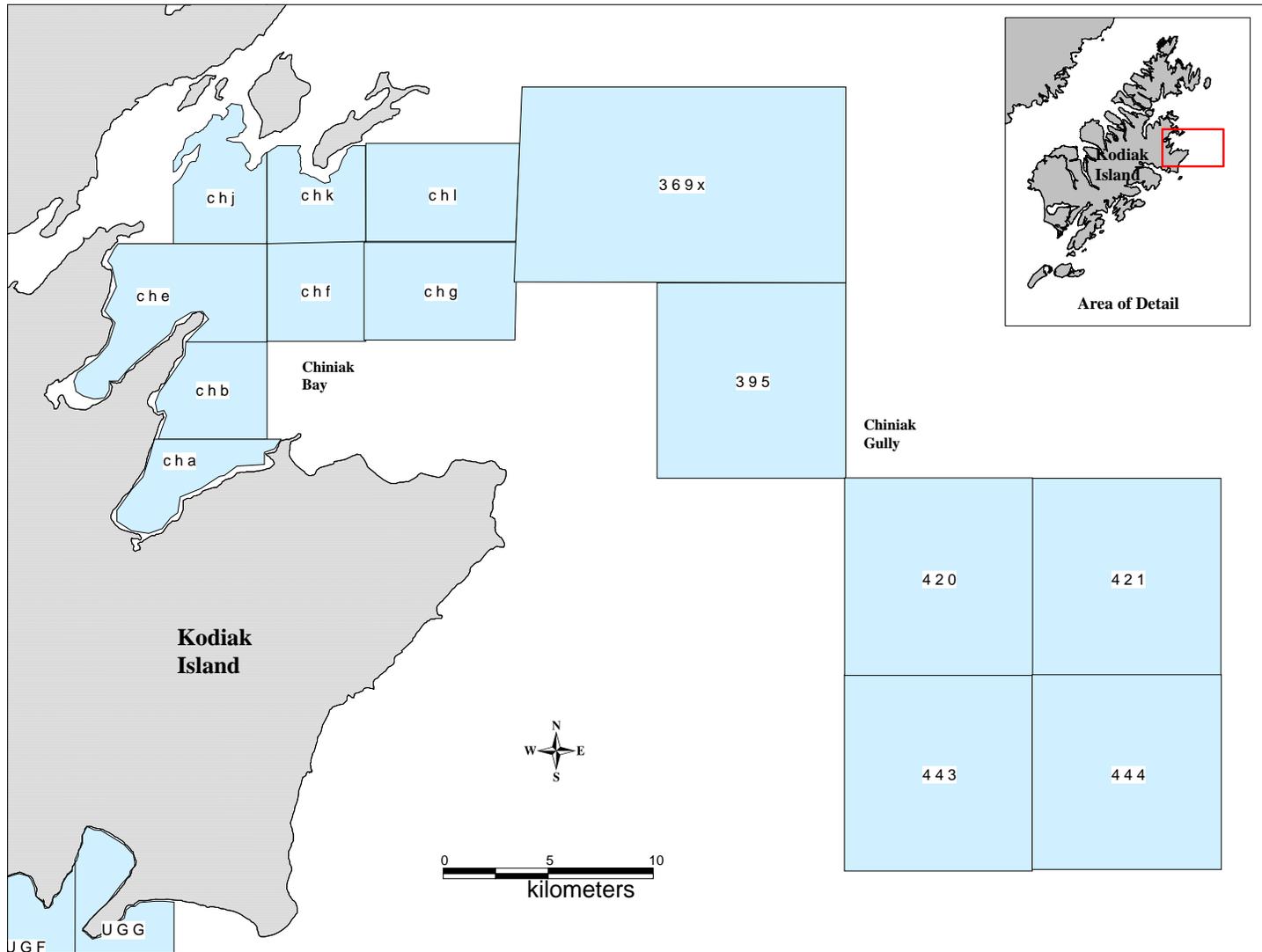


Figure 3.—Basic external skate anatomy

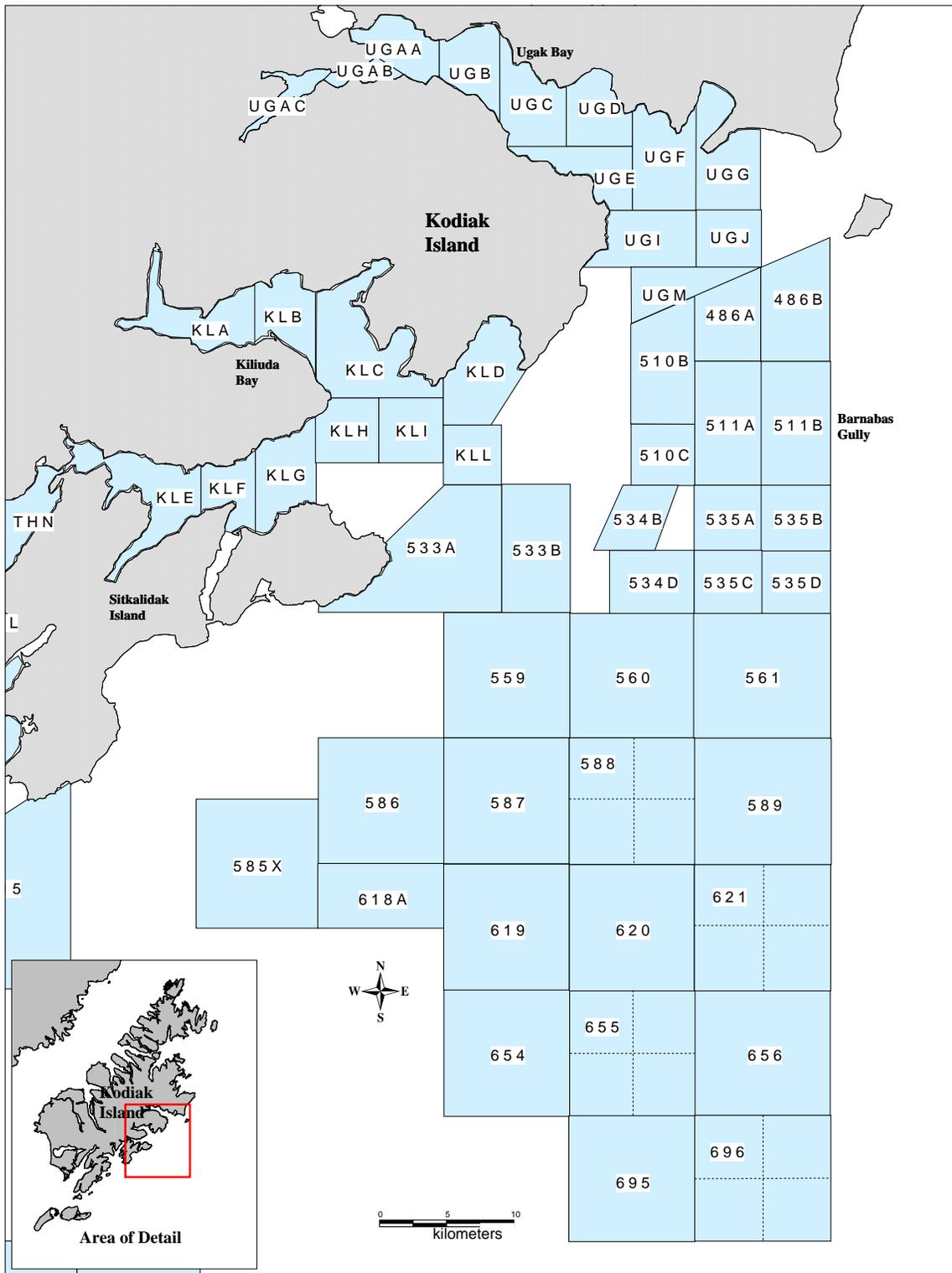
APPENDIX A: TRAVEL SURVEY STATION MAPS



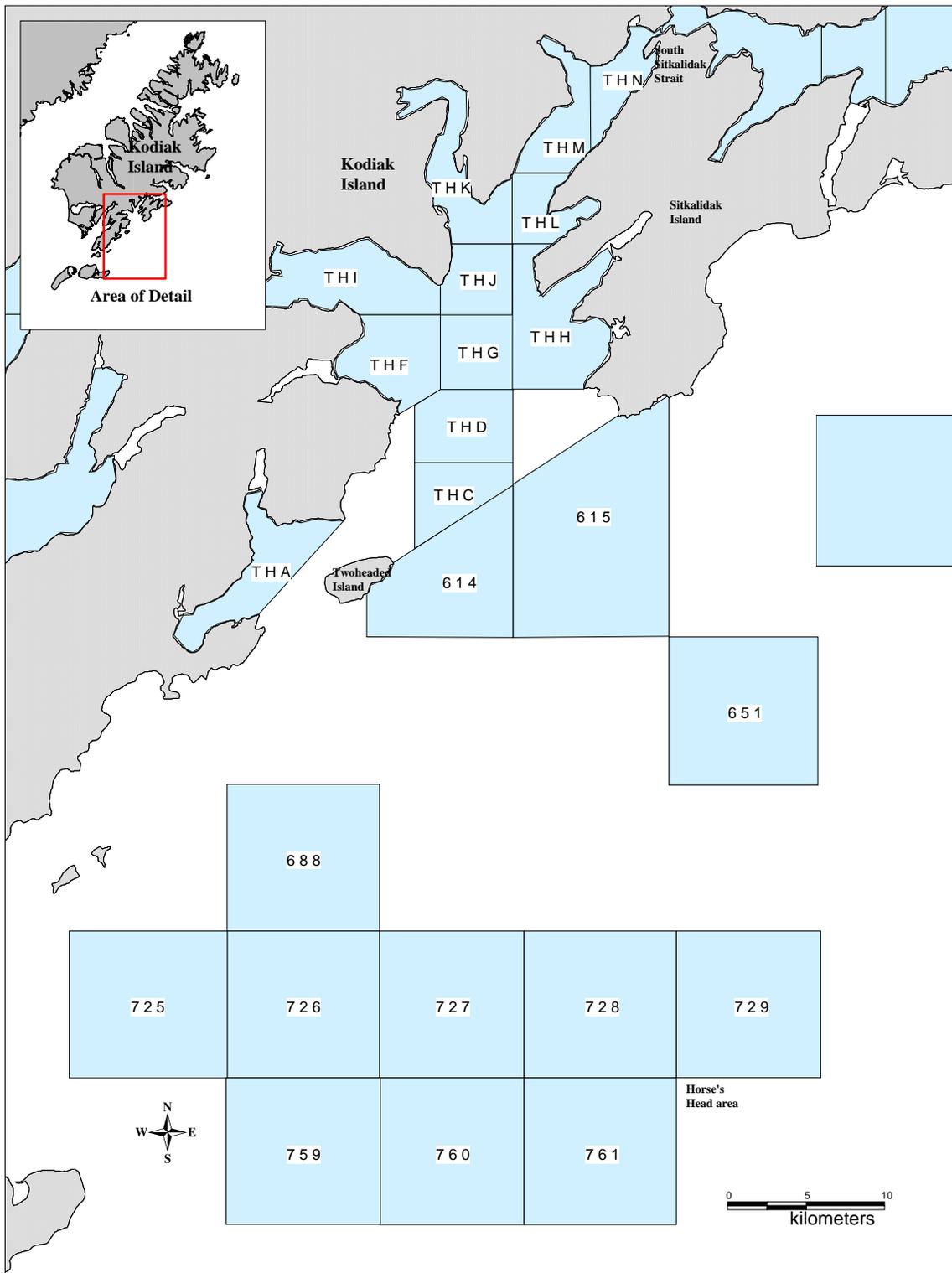
Appendix A1.—Station boundaries and names, Chiniak Bay and Chiniak Gully, 2008 Kodiak District trawl survey.



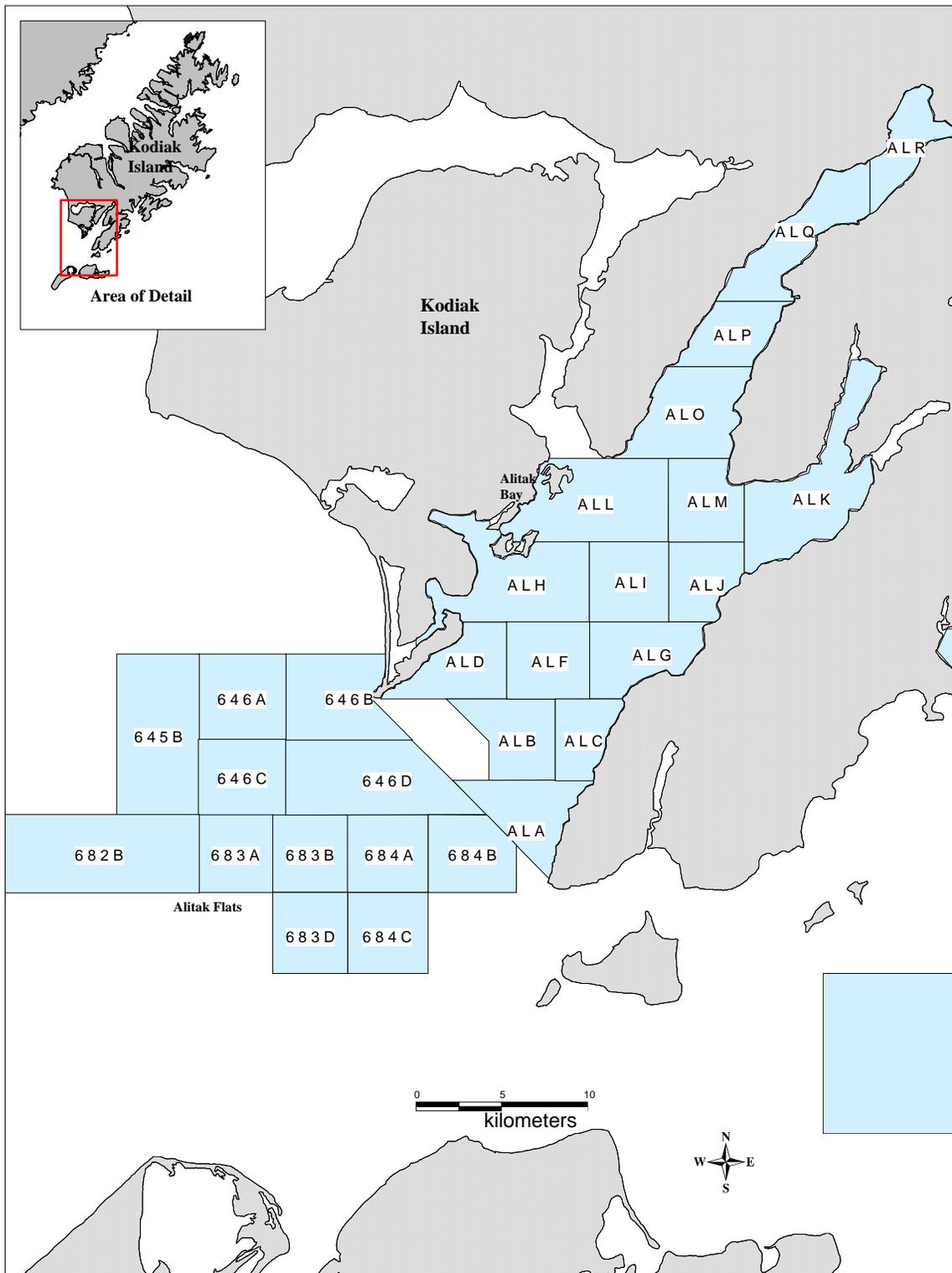
Appendix A2.—Station boundaries and names, Izhut, Kazakof, Kizhuyak, and Marmot Bays, 2008 Kodiak District trawl survey.



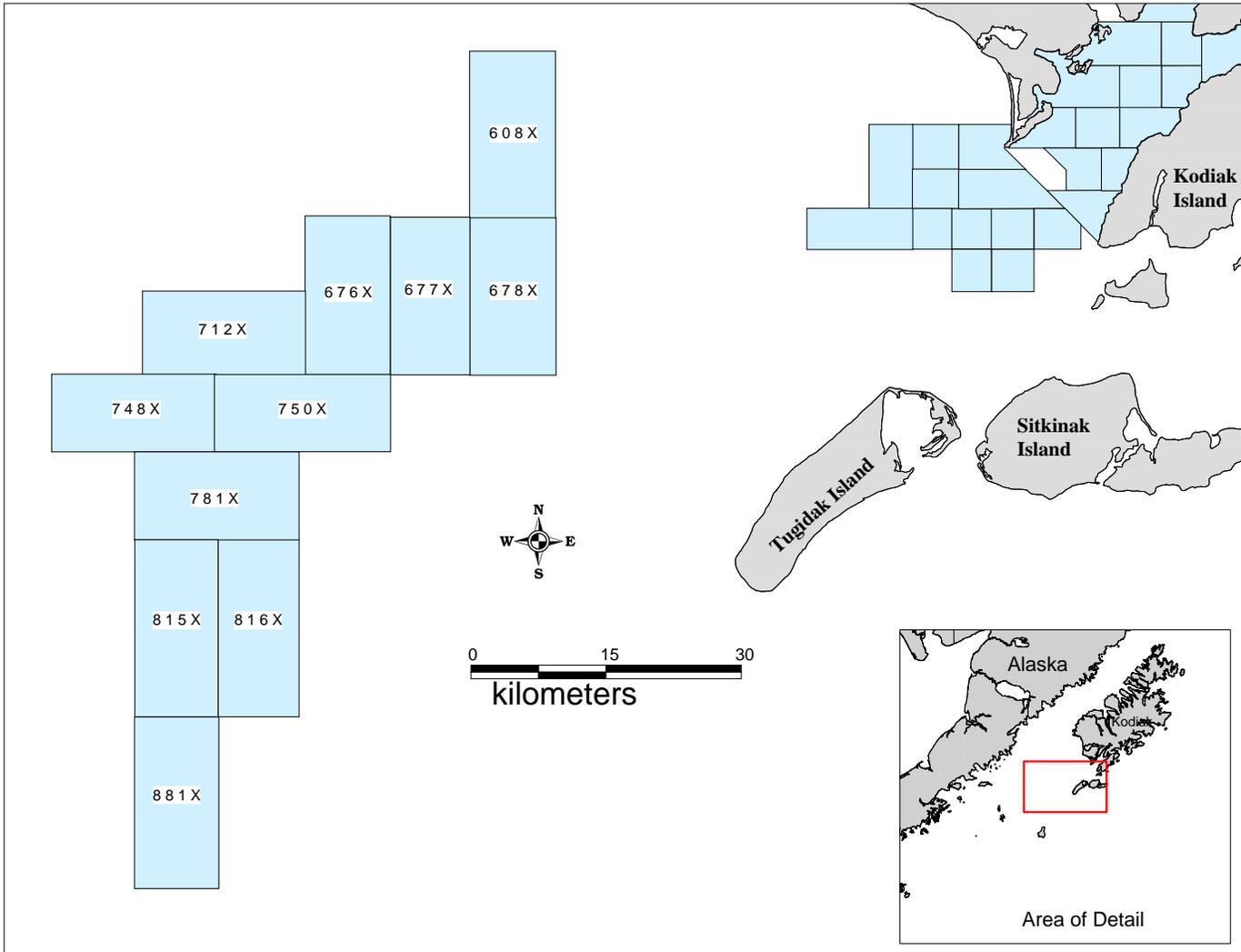
Appendix A3.—Station boundaries and names, Ugak Bay, Kiliuda Bay, and Barnabas Gully, 2008 Kodiak District trawl survey.



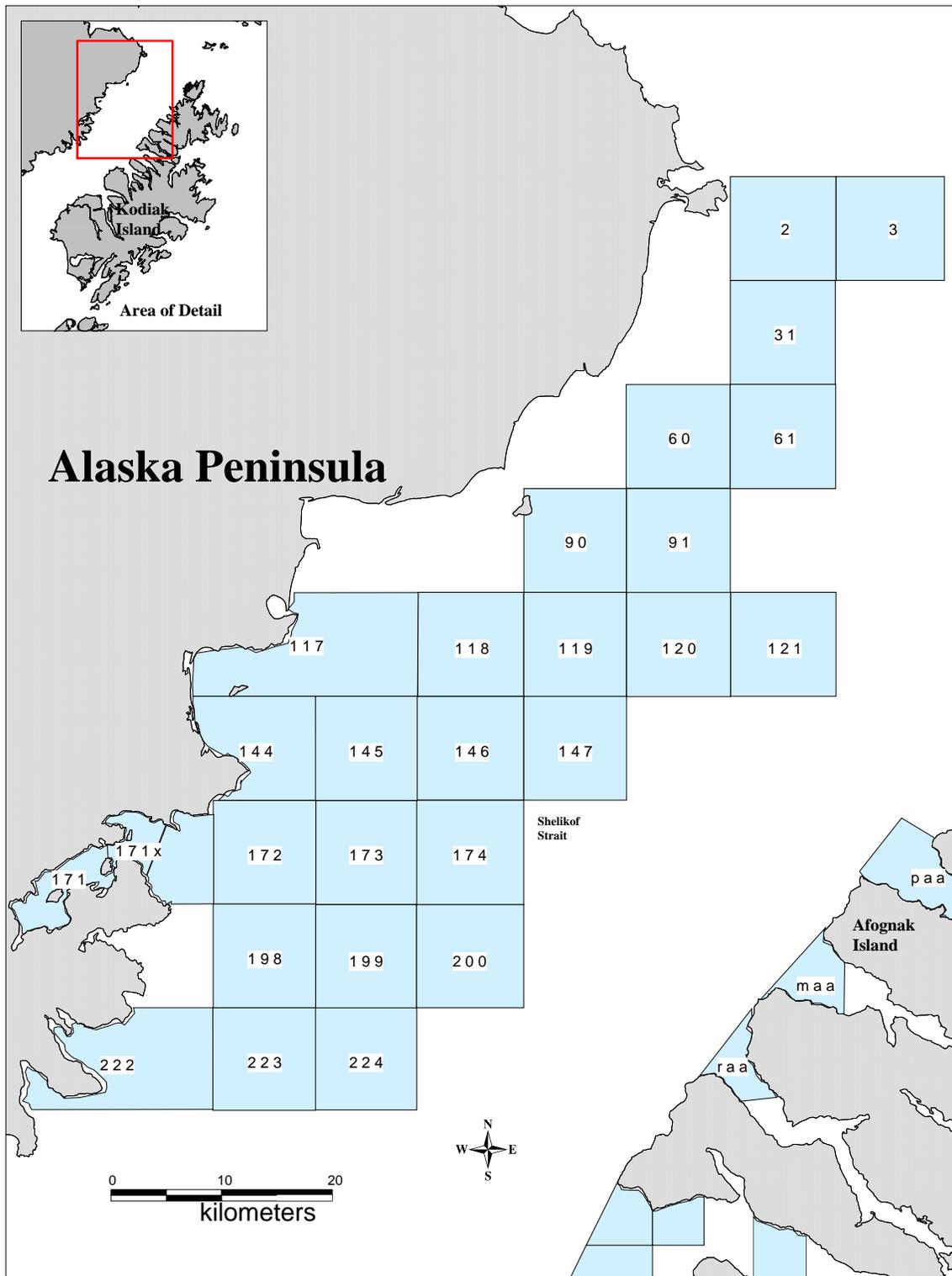
Appendix A4.—Station boundaries and names, South Sitkalidak Strait, Two Headed Island, and Horse’s Head area, 2008 Kodiak District trawl survey.



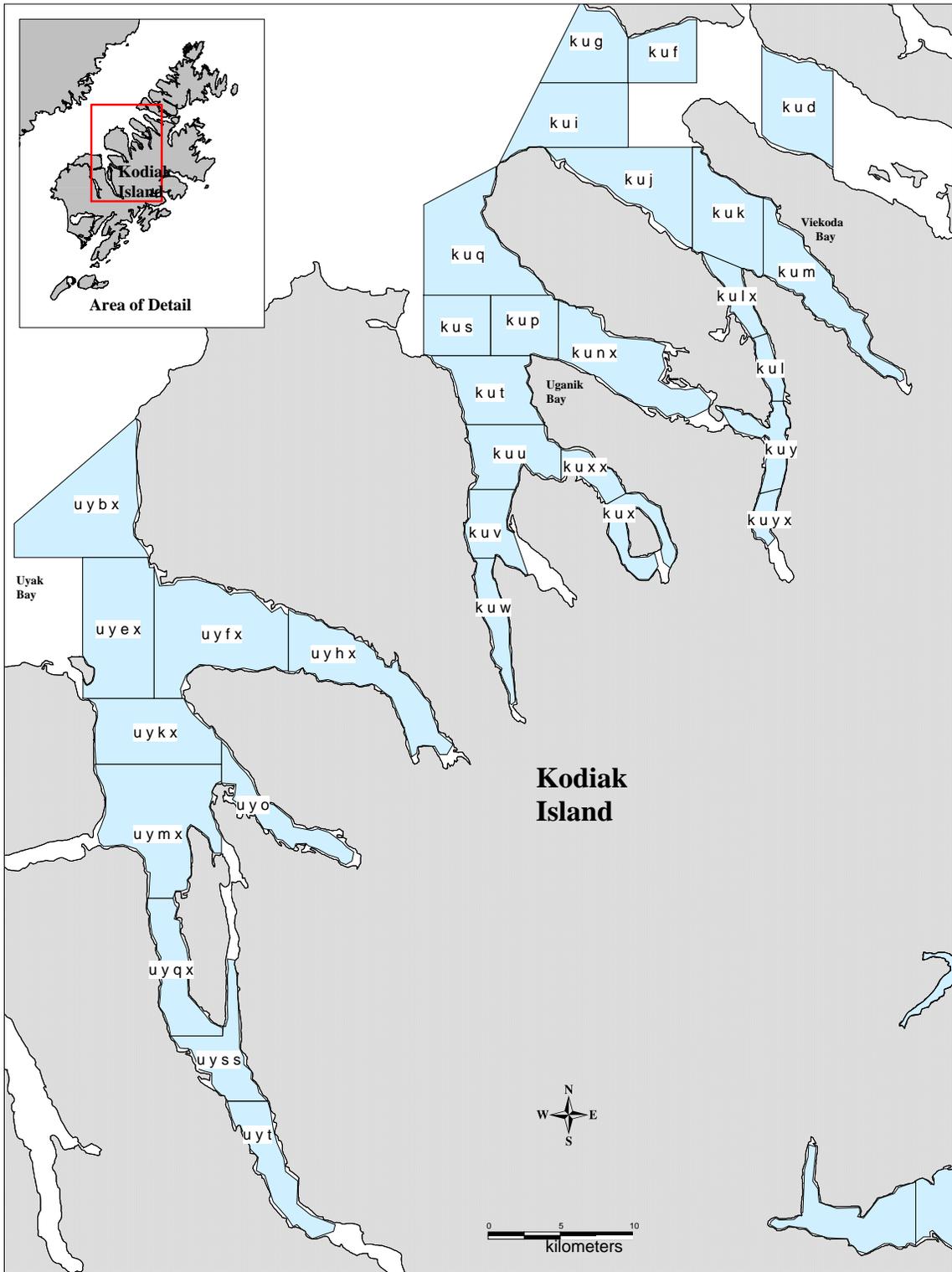
Appendix A5.—Station boundaries and names, Alitak Bay and Alitak Flats, 2008 Kodiak District trawl survey.



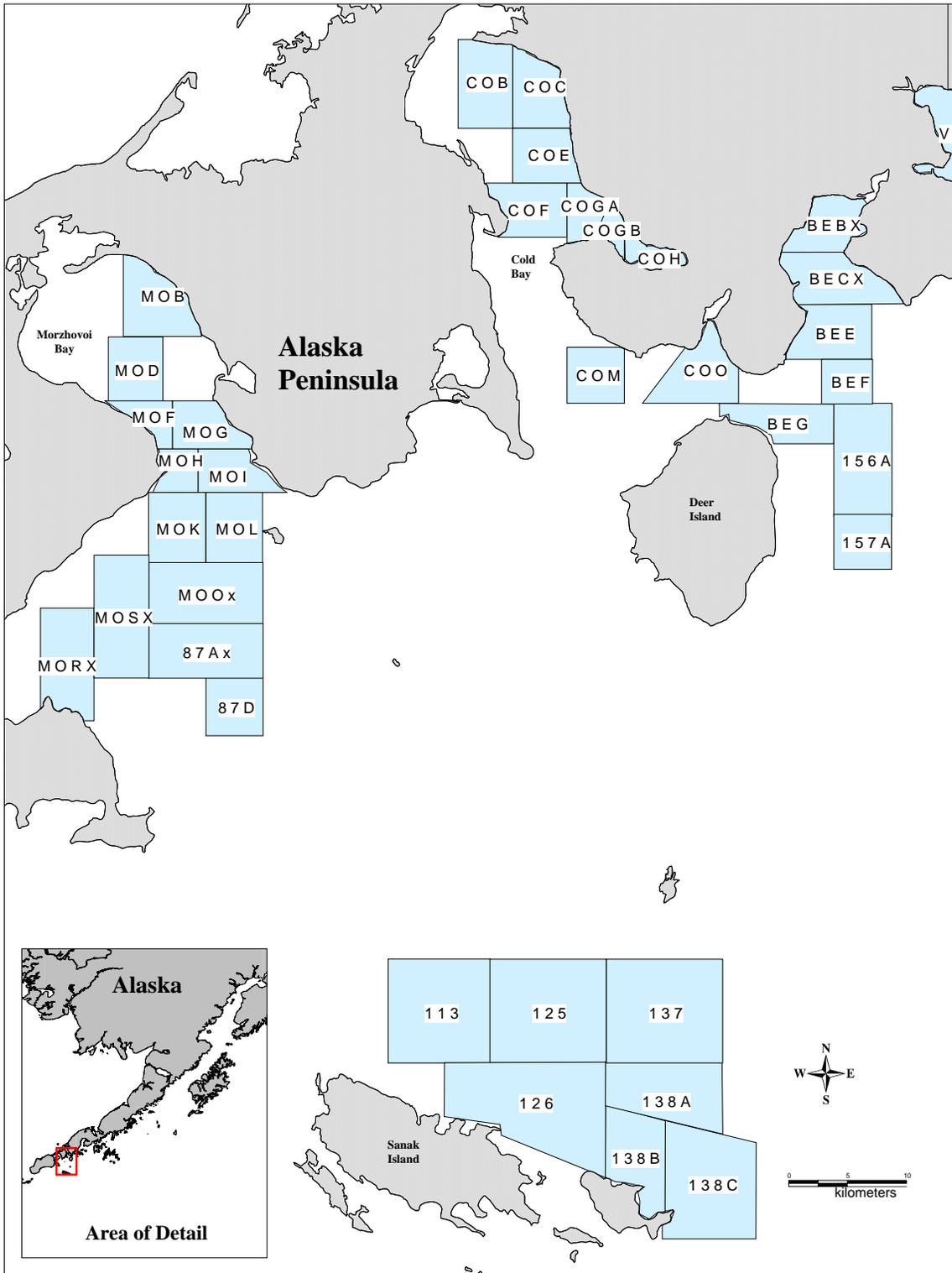
Appendix A6.—Station boundaries and names, Southwest Kodiak offshore, 2008 Kodiak District trawl survey.



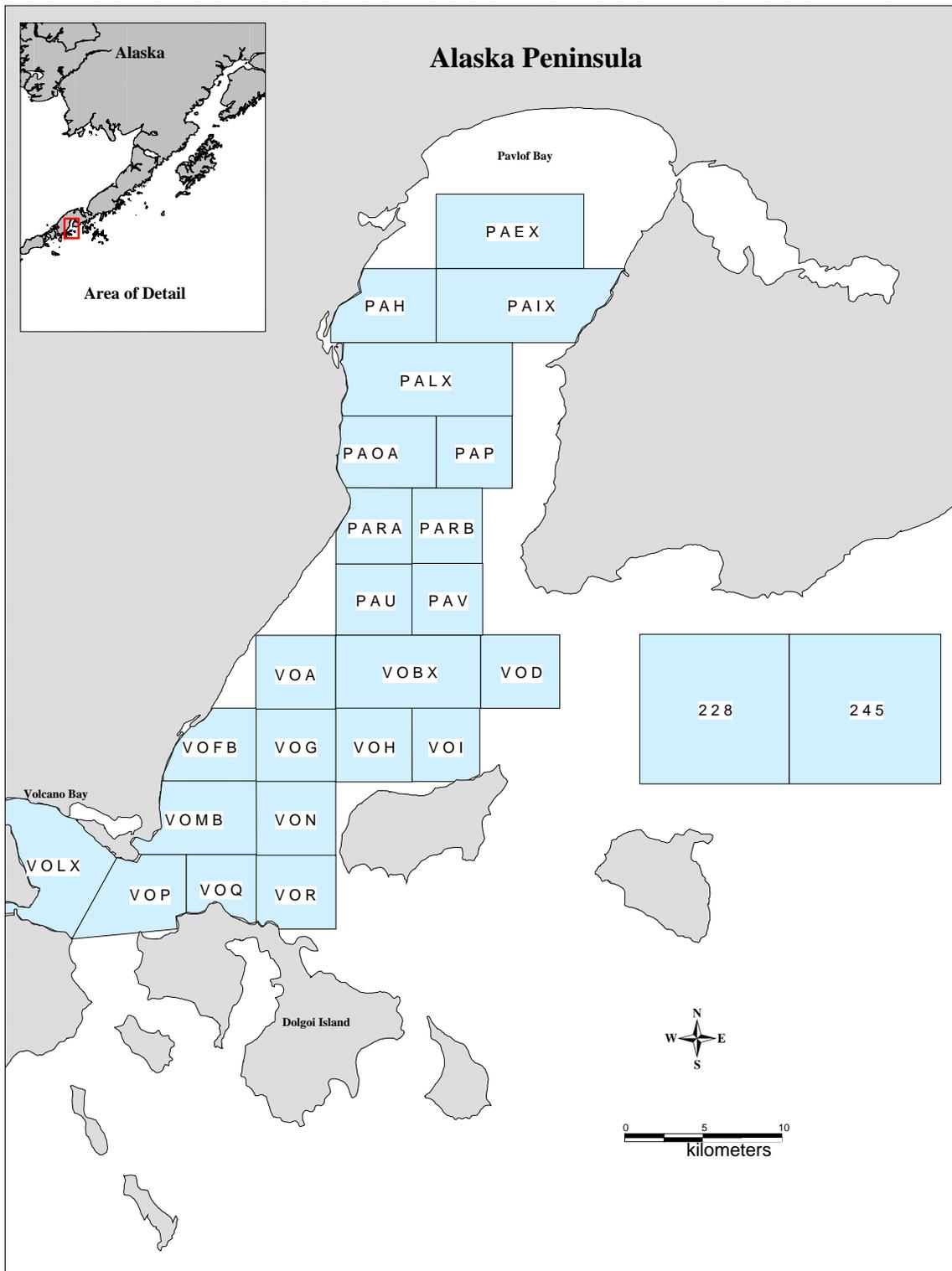
Appendix A7.—Station boundaries and names, Shelikof Strait, 2008 Kodiak District trawl survey.



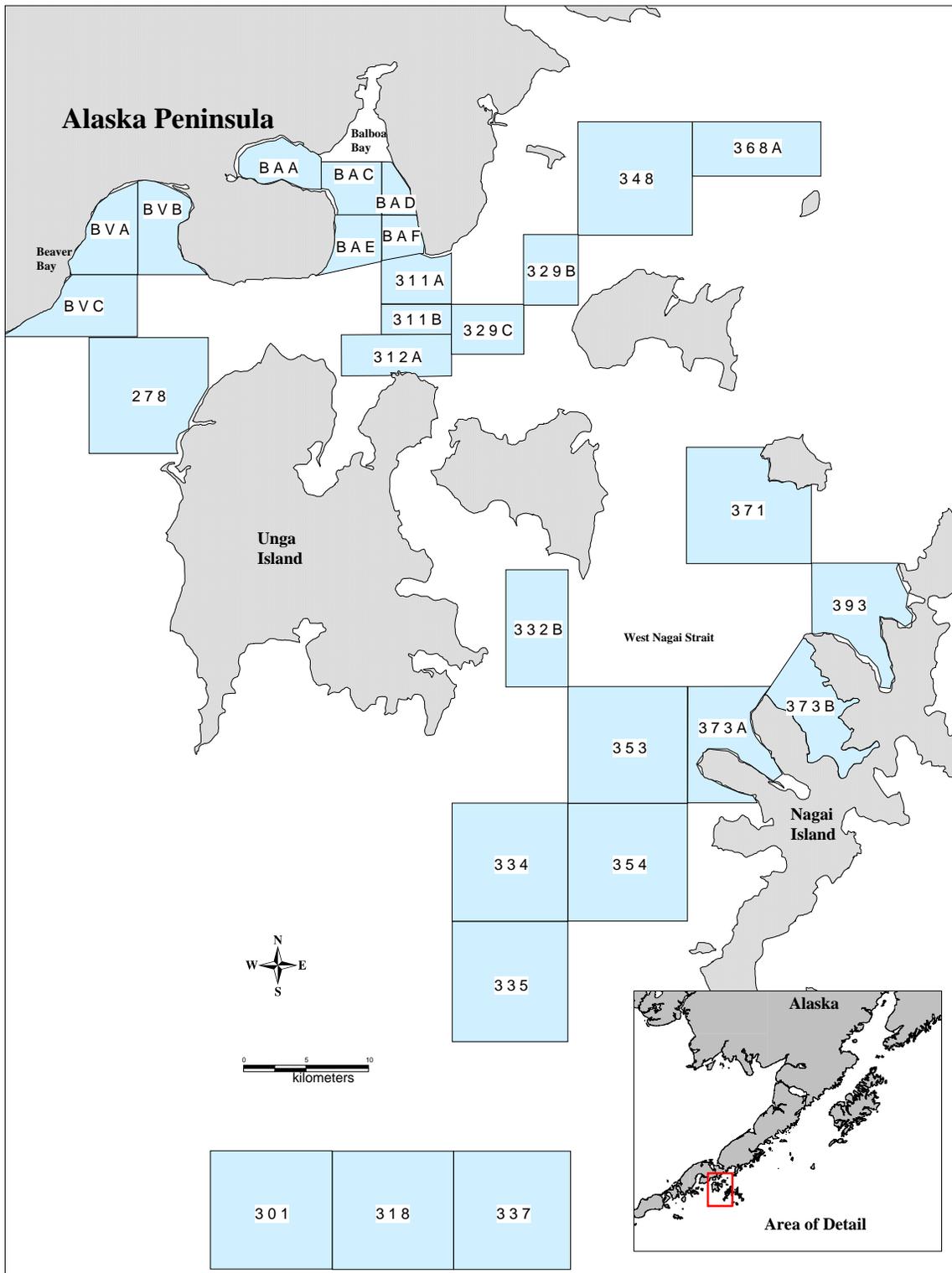
Appendix A8.—Station boundaries and names, Uyak, Uganik, and Viekada bays, 2008 Kodiak District trawl survey.



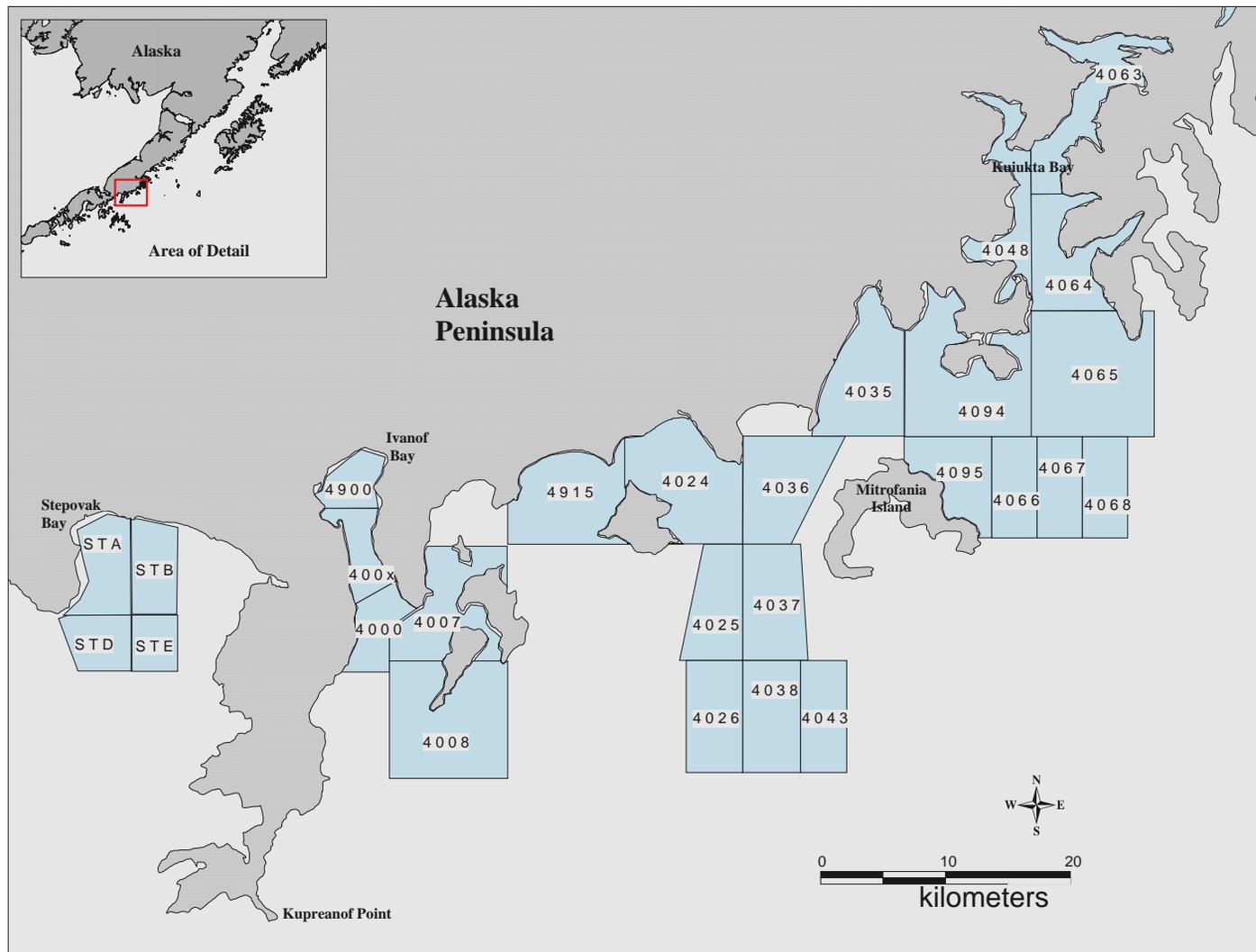
Appendix A9.—Station boundaries and names, Morzhovoi Bay, Cold Bay, Deer Island, and Sanak Island, 2008 South Peninsula District trawl survey.



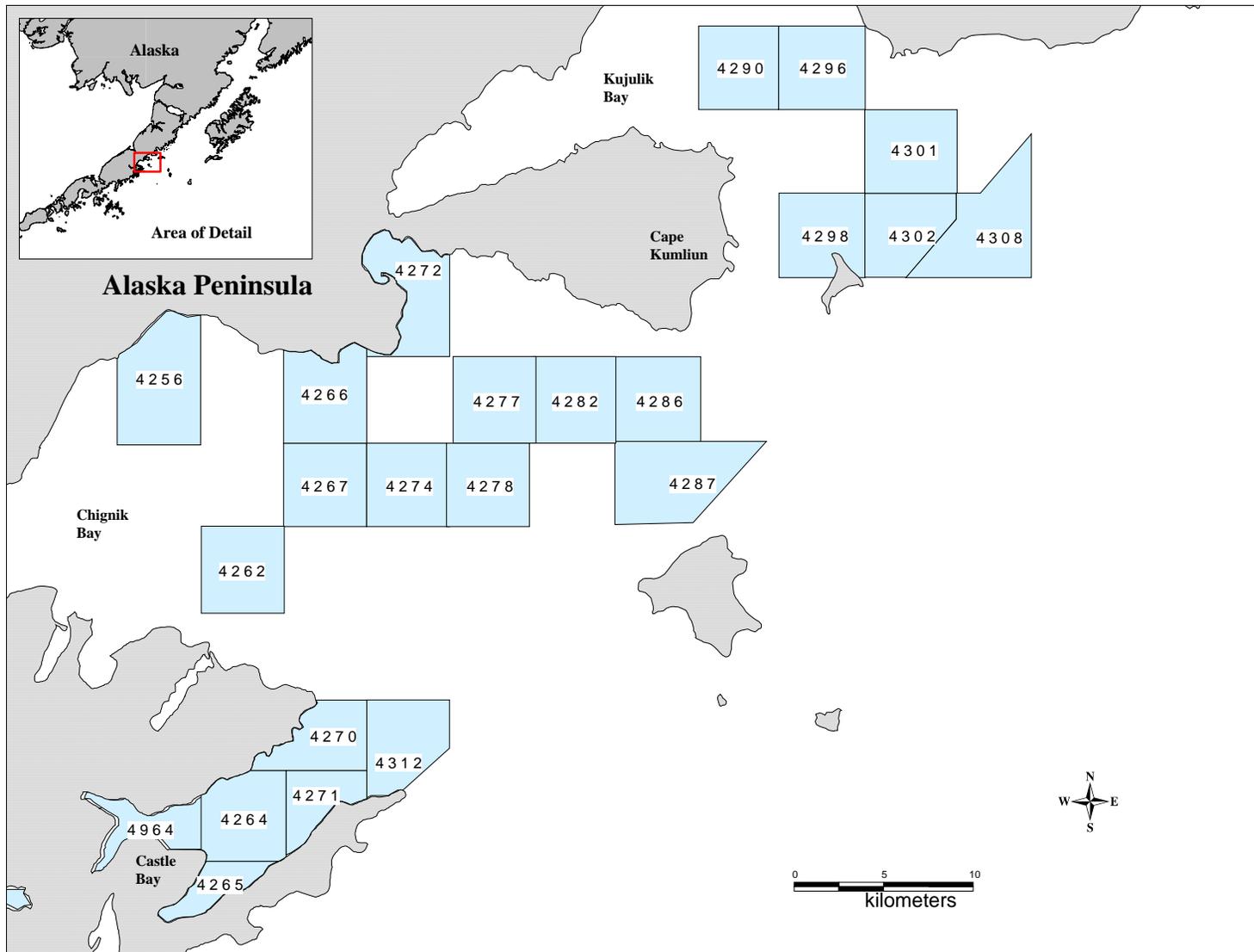
Appendix A10.—Station boundaries and names, Pavlof and Volcano bays, 2008 South Peninsula District trawl survey.



Appendix A11.—Station boundaries and names, Unga Strait, Beaver Bay, Balboa Bay, and West Nagai Strait, 2008 South Peninsula District trawl survey.



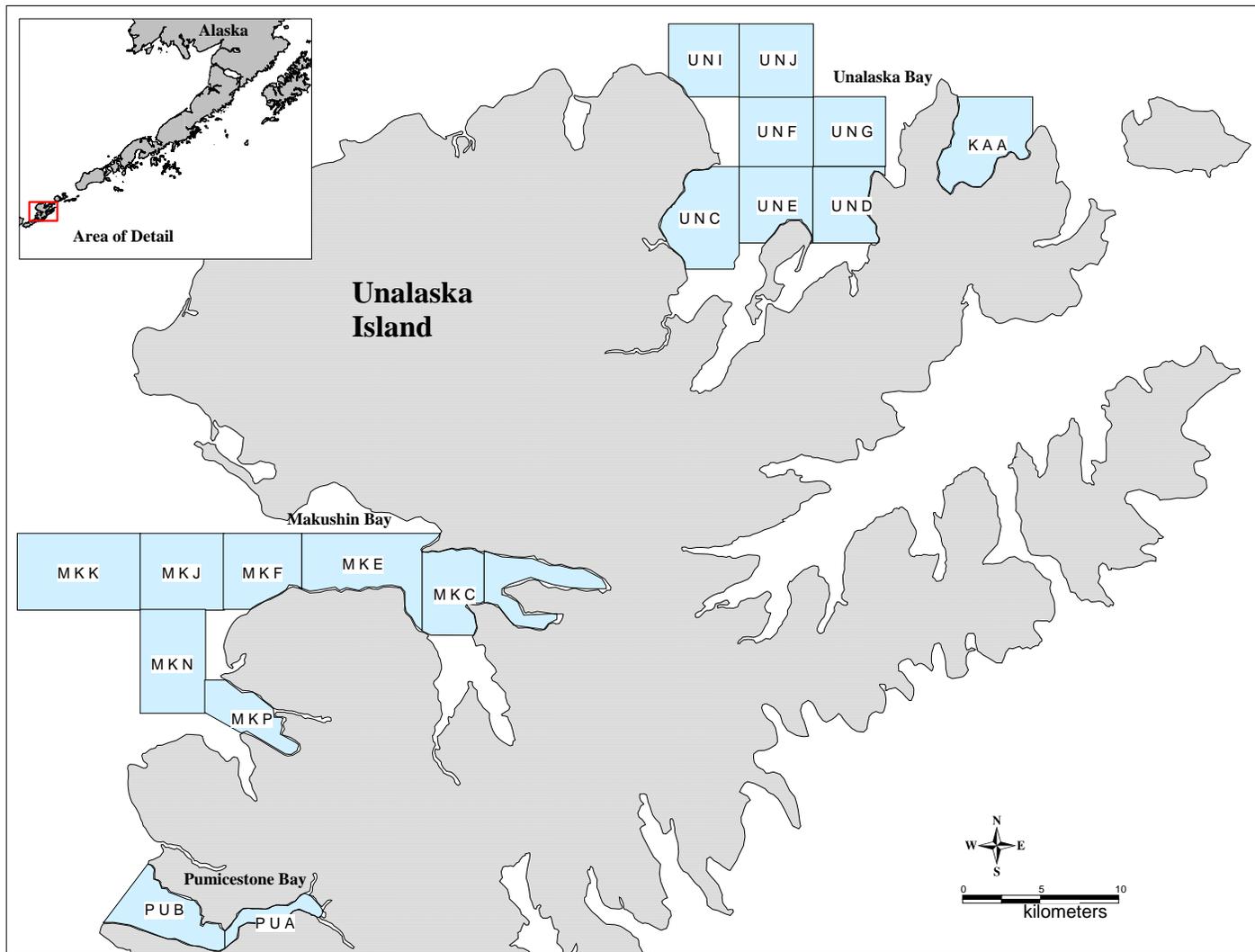
Appendix A12.—Station boundaries and names, Stepovak Bay, Ivanof Bay, Mitrofanina Island, and Kuiukta Bay, 2008 South Peninsula and Chignik District trawl survey.



Appendix A13.—Station boundaries and names, Kujulik, Chignik, and Castle bays, 2008 Chignik District trawl survey.



Appendix A14.—Station boundaries and names, Akutan Bay, 2008 Eastern Aleutian District trawl survey.



Appendix A15.—Station boundaries and names, Unalaska, Makushin, and Pumicestone bays, 2008 Eastern Aleutian District trawl survey.

APPENDIX B. DATA FORMS

Appendix B1.-Tanner crab tagging form and instructions.

Tanner Crab Tagging Form 2008 - Legals											
Beginning tag number = T 0											
TAG #	DATE	HAUL	CARAPACE WIDTH	SHELL CONDITION	RELEASE LOCATION	TAG #	DATE	HAUL	CARAPACE WIDTH	SHELL CONDITION	RELEASE LOCATION
01						26					
02						27					
03						28					
04						29					
05						30					
06						31					
07						32					
08						33					
09						34					
10						35					
11						36					
12						37					
13						38					
14						39					
15						40					
16						41					
17						42					
18						43					
19						44					
20						45					
21						46					
22						47					
23						48					
24						49					
25						50					

-continued-

Tanner crab tagging form

Beginning tag number Write in the thousand and hundred digit from the tag series to keep the sheets from becoming confused.
The tag numbers listed on the sheet only refer to the last two digits of the tag, so it is important to fill in this line.

Date Month and day.

Haul Fill in the haul number where the crabs were captured.

Carapace Width Distance across the carapace between spines, in mm.

Shell Condition 1=soft
2=new
3=old
4=very old

Release Area If the crabs are returned to the water at a location away from the haul site, please record the latitude/longitude of the release location.

Appendix B2.-Example of the ADF&G Crab Data Form.

AD-Form, prg

-SAMPLE DATA-

ADF&G CRAB DATA FORM

Page 1 of 2

SPECIES C. bairdi
 SEX mixed
 VESSEL Resolution
 DATE 07 10 08

STATION NUMBER		A	L	B
POT ORDER				
BUOY NUMBER				
TRAWL HAUL NUMBER		1	3	2
SAMPLING FACTOR		1		

ID	SPECIES	SEX CODE	CARAPACE LENGTH (MM)	CARAPACE WIDTH (MM)	SHELL	DISEASES	EGGS			COMMENTS
							% CLUTCH FULLNESS	DEVELOPMENT	CLUTCH	
1	G	1		121	2					Slide# 031 Per# A1
2	G	1		109	1					032 B1
3	G	1		62	1					033 C1
4	G	2		147	1					034 D1
5	G	1		138	2					035 E1
6	G	1		129	3					036 F1
7	G	2		139	1					037 G1
8	G	2		142	1					038 H1
9	G	2		151	1					039 A2
10	G	3		45	1					040 B2
11	G	1		108	1	2				041 C2
12	G	1		112	1	2				042 D2
13	G	1		120	3					043 E2
14	G	1		79	1					044 F2
15	G	1		62	1					045 G2
16	G	2		141	2					046 H2
17	G	1		135	1					047 A3
18	G	3		60	1	2				048 B3
19	G	3		48	1					049 C3
20	G	4		85	1		1/2	1 1		050 D3
21	G	3		45	1					051 E3
22	G	4		90	2		Full	1 1		052 F3
23	G	4		88	2		3/4	1 2		053 G3
24	G	1		110	1					054 H3
25	G	2		140	1					055 A4

TRA

CODE INSTRUCTIONS

- SPECIES**
- L. aequispina
 - P. Camtschatica
 - P. platypus
 - C. Bairdi
 - C. opilio
 - C. Magister

- SEX CODE**
- Sublegal male
 - Legal male
 - Juvenile female
 - Adult female

- SHELL CONDITION**
- Soft
 - New
 - Old
 - Very old

- DISEASE CODE**
- Black mat
 - Bitter crab syndrome
 - Nemertean worm
 - Parasitic barnacle

- EGG DEVELOPMENT**
- Uneyed eggs
 - Eyed eggs

- CLUTCH CONDITION**
- Dead eggs not apparent
 - Dead eggs < 20%
 - Dead eggs > 20%
 - Barren with clean "silky" setae
 - Barren with "matted" setae, Empty egg cases

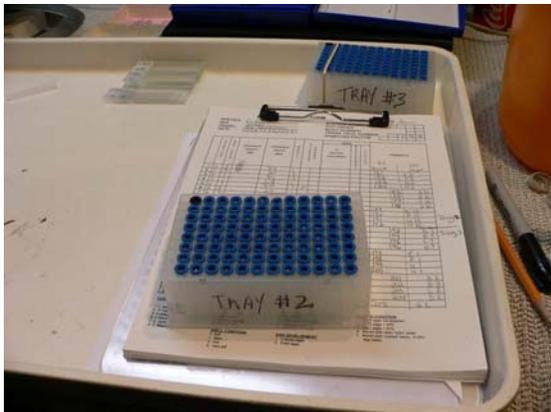
-SAMPLE DATA-

**APPENDIX C. TANNER CRAB HEMOLYMPH COLLECTION:
PROTOCOL FOR GENETIC SAMPLING**

Appendix C1.—Tanner crab hemolymph collection protocol for genetic samples.

Preparation

1. Pre-fill each well with 0.8 ml of biotech grade ethanol
2. Press the rubber caps onto each well
3. Label the plates and color code the top left corner - well A1 (with all trays oriented the same way) to denote the starting position



- a. The plates are labeled down one side with letters and across the top with numbers
4. Wrap a rubber band around the plate to move over one column at a time as you fill wells with samples
5. Completely fill out all applicable header information on the ADF&G Crab Data Form (Appendix B2).

- a. Species = *C. bairdi*
- b. Sex = Mixed
- c. Vessel = Resolution
- d. Date = Date of haul
- e. Page _ of _ = Can be filled in after completion of the sample, however if you will be sampling 30 crabs per haul, you will have 2 pages per haul
- f. Station number = You should know which station you were towing in to know if you need to sample for bitter crab or not
- g. Pot order = leave blank
- h. Buoy number = leave blank
- i. Trawl haul number = The haul number of the tow the crabs were from
- j. Sampling factor = leave blank for bitter crab sampling

Sample Collection

1. Arrange crab on table in way to facilitate sampling and reduce error.
 - a. Typically I will set up 5 crab at a time. It is easier to keep track of and a handy multiple of 30.
 - b. If you place the crabs carapace up, with their mouths facing right, it will expose the preferred sampling leg, the right cheliped.



2. Using a new syringe freshly out of its wrapper for each crab, draw hemolymph from the elbow joint of the right cheliped.

- a. Slightly raise stopper on syringe before inserting needle
- b. Wipe the membrane clean with a paper towel so extraneous material does not contaminate the sample.
- c. Being careful not to puncture yourself insert needle into joint, about halfway, or far enough to ensure angled hole in needle is inside crab tissue.
- d. Raise stopper just until you see semi-clear fluid being drawn into syringe. If you can

see it, you have enough. If the crab is heavily infested with BCS it may be more difficult to draw hemolymph.

- e. Small crabs may be more difficult. You may have to try drawing blood from a different leg, particularly if the preferred leg is injured.

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3. **With the syringe, inject 0.2 ml of hemolymph into each well** (one well per crab)
 - a. If you inject too much hemolymph, or a lot of air, the cap may pop off the well and spray hemolymph/ethanol over adjacent caps.
 - b. To mix the blood and ethanol, invert the plate once in a while
 4. **Complete the information on the ADF&G crab data form.**
 - a. Species = 6
 - b. Sex = Be sure to specify the maturity or legal status of the crab, do not just write down M or F.
 - c. Carapace width
 - d. Shell condition
 - e. Disease codes = enter applicable diseases; if BCS is obvious enter it here, this helps to ground truth the labwork
 - f. Clutch fullness = Use the fractional classifications implemented for the regular sampling
 - g. Development = eyed or uneyed, codes at bottom of form
 - h. Clutch condition = codes at bottom of form
 - i. Comments = Important to write down the PCR sample number here. (This should include both the tray number and the well number containing the sample from that crab.
 5. **Once you have double checked that all information has been recorded and that you have written down the correct sample number in the comments column you can discard the crab.**
 - a. Always check with the on-deck leader before discarding crab over the side.
 6. **At the end of the haul coordinate with the on-deck leader to determine how the data from crab sampled for BCS will be handled.**
 - a. If all crab in the haul were measured and counted (whole-hauled), then enter the data from the BCS sample forms into the crab database.
 1. The easiest way to do this is to use the on-deck computer
 - b. If crab were subsampled, The weight from the BCS sample should be removed from the on-deck form, and only those crab actually in the subsample should be included in the crab database.
 - c. If other sampling methods were used (i.e. %m/f) it is the cruise leaders responsibility to ensure that the crab being sampled for BCS are properly accounted for.
-

APPENDIX D. GROUND FISH STOMACH SAMPLING PROTOCOL

1. Species and numbers to be sampled:

Table 1. Number of stomachs to be collected in 2008 ADFG Chiniak, Marmot Bay SUMMER survey, by species, and size groups (cm)

Species	Number	Species	Number
Walleye pollock		Arrowtooth flounder	
< 30 cm	20	< 30 cm	40
30-44	20	30-49	40
45-54	40	≥ 50	40
≥ 55	40	subtotal	120
subtotal	120		
Pacific cod		Pacific halibut	
< 30 cm	20	< 40 cm	15
30-44	20	40-54	15
45-59	40	55-69	30
≥ 60	40	≥ 70	30
subtotal	120	subtotal	90
Flathead sole		Northern rock sole	
< 20 cm	20	< 20 cm	20
20-39	20	20-39	20
≥ 40	20	≥ 40	20
subtotal	60	subtotal	60
Spiny dogfish			
< 40 cm	20		
40-79	20		
≥ 80	20		
subtotal	60		
Total	630		

At every haul, after the catch has been dumped in the bin and the major species in the catch are evident, choose two to three species from Table 1 which are abundant enough for stomach sampling purposes (about one full basket). With the concurrence of the sorting crew, designate which specimens are to be set aside for stomach dissection after the baskets have been weighed. Set the baskets in a cool, shaded area until the rest of the catch has been processed.

2. Sampling procedures:

- (1) Collect fish that show **no** sign of either net feeding or regurgitation.
 - *Signs of net feeding and regurgitation (DO NOT KEEP THESE):
 - prey items in mouth or gill rakers
 - flaccid (loose and bloated) looking stomach
 - *Signs of "natural" stomachs (KEEP THESE!):
 - naturally empty stomachs appear tight and contracted
 - stomachs appear tight around any prey inside

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- (2) If the fish is determined to be collectable, measure the fork length, determine the sex and spawning condition, excise the stomach and place in a stomach bag with a label. Try to collect 5 specimens from each size group (e.g. collect 5 stomachs from each of the <30 cm, 30-44 cm, 45-54 cm, and \geq 55 cm pollock) in one haul. For small fish (\leq 20 cm), do not excise the stomach but instead make a slit in the body cavity to allow penetration of Formalin to the gut. Place the samples of whole fish in a large stomach bag with a label. Submerge samples in a bucket of 10% buffered Formalin. To make the Formalin solution, fill a 5-gallon bucket about half full with sea water, then add one liter 37% Formalin to the bucket. Add one rounded 1/8 cup of baking soda per bucket.
- (3) Each stomach bag should contain a specimen label which records the species, vessel, cruise, haul, specimen number, the fork length of the fish, sex, and the spawning condition (spawning=1 or not spawning=0).
- (4) For each species, start specimen number at “1” and assign a number consecutively until the end of the cruise.
- (5) A specimen form is also filled out for each species in each haul. The specimen form should record the species, vessel, cruise, haul, fork length, sex, spawning condition (spawning or non-spawning), date, and specimen number (individual fish weight does not have to be taken).
- (6) Use the broken lids to cover the bucket each time you add some stomach collections into it. Seal the bucket (by using the unbroken lid) only when the bucket is full or at the end of the cruise.
- (7) Put different species collections in different buckets. Use the permanent mark pen to write the species name, vessel, the address (National Marine Fisheries Service, Food Habits Lab, Bldg. 4, 7600 Sand Point Way NE, Seattle, WA 98115-0070) on the unbroken lid each time you seal a bucket.
- (8) When the cruise is over, please double-check that the lids are completely labeled and add a luggage tag to the bucket handle. The luggage tag should indicate ‘2008, Marmot Bay, pollock (species), Resolution (boat), and your name’.
- (9) Collect at least 20 stomachs per haul, and you can reach the goal.

End of the Cruise:

At the end of the cruise, the buckets (along with the specimen forms) and the remaining equipment should be taken off the vessel and delivered to NMFS, Kodiak Laboratory in Kodiak. Please inform Mei-Sun Yang or Geoff Lang and they will make arrangements to ship them to Seattle.

APPENDIX E. ADEC FISH COLLECTION PROTOCOL

Appendix E1.—ADEC Fish Collection Protocol

Sampling Protocol

We are trying to make this practical for the samplers in the field, and at the same time avoid exposure of the fish to any contaminants on board the boat or the collection site. Our goal is to avoid exposing the fish to any source of contamination while collecting the fish that would alter or interfere with the chemical analysis for PCBs, dioxins, furans, pesticides and heavy metals.

Fish may be collected by any normal means, including trawl, gill net, seine or hook and line. Ideally, when each fish is brought from the water, it is killed and placed in a food grade plastic fish sleeve by a sampler wearing new nitrile gloves. This procedure may be difficult for the largest fish, so do the best you can. We mostly want to avoid fish laying in bilge water or being exposed to fuel or exhaust as it is processed onboard.

Each fish sleeve should be labeled clearly with a marking pen: information should include sample number, date, and sampler. The top of the fish sleeve should be sealed with a tie-wrap after placing a fish in it. A second tie-wrap may be placed at the sealed end of the fish sleeve before use for larger fish, to maintain the integrity of the sleeve. All the fish samples should be placed in a lined wet-lock box and covered with ice or frozen. The sample form should be filled out completely, to include:

- 1) Location (including GPS coordinates), Time, Date
- 2) Collector's Name, signature, and affiliation
- 3) Method of collection (and haul # and vessel name if appropriate)
- 4) Species
- 5) Check off procedures under Protocol on sampling Form

Put the sample form in a zip-lock plastic bag in the wet-lock box with the fish samples. Call the Environmental Health Lab for shipping information. Ship the box to

Fish Monitoring Program
DEC Environmental Health Lab
5251 Hinkle Rd
Anchorage, AK 99507
Attn: George's Courier Service
(907) 344-3323

The shipping tags and tape are provided with the sampling materials and wet lock boxes. We would like the samples shipped in 24 hours after being harvested if on ice, or kept on ice till frozen then shipped when practical.
