

SPECIAL PROJECT PLAN
2004 BOTTOM TRAWL SURVEY OF CRAB AND GROUND FISH:
KODIAK, CHIGNIK, SOUTH PENINSULA, AND EASTERN ALEUTIAN DISTRICTS



by

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ABSTRACT

This report specifies the methods and procedures of special projects taking place during the 2004 trawl survey of the Kodiak, Chignik, South Peninsula, and Eastern Aleutian Districts of the Westward Region. It is to be used in conjunction with the Standard Project Operational Plan, which describes the annual trawl survey sampling protocols. Special shellfish projects for 2004 include collection of female Tanner crabs for a fecundity study, live male Tanner crabs for National Marine Fisheries Service (NMFS) laboratory use, and a legal-sized male Tanner crab tagging project. Special groundfish projects for 2004 are collection of starry flounder for the Bamfield Marine Sciences Center, walleye pollock, Pacific cod, Pacific ocean perch (POP) for the Alaska Department of Environmental Conservation (ADEC), and collection of stomachs from arrowtooth flounder, Pacific halibut, walleye pollock, and Pacific cod for a NMFS food habits study. Multiple tows for Tanner crabs will also be performed within selected offshore stations to assist in determining the accuracy of population estimates. Details on each 2004 special project are outlined within the text of this document.

KEY WORDS: shellfish, groundfish, trawl survey, Kodiak, Alaska Peninsula, Chignik, Eastern Aleutians

INTRODUCTION

During June through September, 2004 the Alaska Department of Fish and Game (ADF&G) will conduct a bottom trawl survey throughout portions of the Westward Region (Figure 1). The survey will focus on inshore waters around Kodiak Island and the Alaska Peninsula from Cape Douglas to False Pass, as well as the Eastern Aleutian Islands. A 400-mesh eastern otter trawl will be used to tow selected inshore and offshore stations. The survey results will be used to assess the abundance of Tanner crab *Chionoecetes bairdi* and red king crab *Paralithodes camtschaticus* populations and determine species composition and length frequencies of the groundfish catch by haul and area.

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

OBJECTIVES

Shellfish objectives for the 2004 trawl survey are to complete collection of female Tanner crabs for a fecundity study started in 2001, and to tag legal-sized male Tanner crabs from the Northeast, Eastside, and Southwest sections of the Kodiak District, as well as the Eastern Aleutian District. We also will collect live male Tanner crabs for the National Marine Fisheries Service (NMFS) which will be used for research purposes.

Groundfish objectives are to collect whole stomachs and contents from arrowtooth flounder, Pacific halibut, Pacific cod, and walleye pollock from Marmot and Chiniak Bays for NMFS, and to collect whole samples of starry flounder from Kiliuda Bay on the eastside of Kodiak and Morzhovoi Bay on the Alaska Peninsula for the Bamfield Marine Sciences Center in British Columbia, Canada. We will also collect walleye pollock, Pacific cod, and Pacific Ocean perch (POP) for the Alaska Department of Environmental Conservation (ADEC). This year the sex of each skate measured will be recorded.

Finally, we will be performing multiple tows in selected stations in Marmot and Barnabas Gullies of the Kodiak District for the purpose of determining the accuracy of Tanner crab population estimates over the entire station.

METHODS

Survey Area and Trawl Procedures

The 27.4 m ADF&G research vessel *Resolution* will conduct surveys in areas of known king and Tanner crab habitat throughout the Kodiak, Chignik, South Peninsula, and Eastern Aleutian Districts of the Westward Region.

During the 2004 survey, the areas known as Towers and Compass Rose located offshore in the Southeast and Southwest Sections of the Kodiak District will not be surveyed (Figure 1). Unalaska Bay, Makushin Bay, Pumicestone Bay, and Akutan Island in the Eastern Aleutian District will be included (Appendices 13,14). Survey maps for 2004 can be found in Appendices A.1-A.14.

This year duplicate tows will occur in some of the large offshore stations in the Northeast and Eastside sections. Number of tows made in each station will be dependent on time and weather. Stations were selected based on large Tanner crab population estimates in previous surveys (Spalinger *in press*, Spalinger 2003, Worton 2002). Four stations in Marmot Gully (Appendix A.1) and four stations in Barnabas Gully (Appendix A.3) have been divided in four quadrants. In addition to the traditional tow, which will be sampled according to the standard operational plan (Spalinger and Cavin *in press*), two to three additional tows will be made in separate quadrants of the station. Catch from the extra tows will be weighed, however only crabs will be sorted and weighed individually. Crabs will be handled according to the standard trawl survey operational plan (Spalinger and Cavin *in press*).

Crab Sampling

Legal-size male Tanner crab captured from the Northeast, Eastside, and Southwest Sections of the Kodiak District (Appendices A.1-3, 5), as well as from the Eastern Aleutian District (Appendices A.13,14), will be tagged with a 1.5 inch long double-T floy tag. Using a tagging gun, the tag will be inserted through the shell into the right side of the carapace, in the brachial lobe (Figure 2). To ensure the tagging needle does not penetrate too far into the body cavity an epoxy stopper has been adhered to the tagging gun to limit the depth the needle can be inserted. After all the crabs have been measured, legal-sized males will be tagged and tag number recorded on the Tanner crab tagging form (Appendix B.1). Record the latitude and longitude of the location where the crabs are released. Tagged crab will be recovered during the January 2005 commercial fishery if population estimates are sufficient for an opening.

Female Tanner crabs will be collected from the Eastside Section of the Kodiak District to determine clutch fullness and fecundity (Appendix A.3). The collection of 240 crabs, that began in 2001, will be completed during this survey. Nineteen crabs will be taken from Ugak Bay and 27 from Kiliuda Bay (Table 1). Individuals from three size classes (<90 mm, 90-100 mm, >100 mm) will be put into separate ziplock bags, labeled with date, haul number, size class, and then

frozen. In the lab, egg masses and spermathecae will be dissected, weighed, and processed for histological analysis.

During day trips in Chiniak Bay, between 250 and 300 male Tanner crabs with a carapace width greater than 100 mm will be collected. These crabs will be kept alive in a tote filled with seawater until the boat returns to Kodiak. At that time NMFS personnel will remove the crabs to be kept in the saltwater tanks located at the Kodiak Fisheries Research Center.

Groundfish Sampling

ADEC has requested whole specimens of walleye pollock, Pacific cod, and POP from known commercial harvest areas. Numbers of fish to be collected are as follows: 10 walleye pollock, 10 Pacific cod, and 20 POP. After the fish are brought from the water they should be placed individually into a plastic bag, numbered (1-20), and sealed with a plastic cable. Sample collection form (Appendix B.2) must be filled out with the date and haul number of each fish. The form is then put into a bag inside a wetlock box containing the samples and placed in the freezer until they are returned to Kodiak and shipped to ADEC in Palmer.

For the second year during the Marmot and Chiniak Bay legs of the survey, stomach samples of walleye pollock and arrowtooth flounder (group 1), and Pacific cod and Pacific halibut (group 2) will be collected. Sample sizes are 15 stomachs per group, with a maximum number of 30 stomachs per haul. The goal is to sample one species from each group every haul. For example, sample walleye pollock and Pacific cod from haul 10 and then sample arrowtooth flounder and Pacific halibut from haul 11. A precise outline of the sampling procedure is outlined in Appendix C.

Starry flounder specimens will be collected from two locations during the survey to assist with a study on body shape variation. Samples will be collected from the Kiliuda Bay on the eastside of Kodiak Island and Morzhovoi Bay on the Alaska Peninsula. Twenty-five whole fish will be collected from each location and labeled with date and haul number. They will then be frozen and returned to Kodiak for shipment to Seattle.

In 2004, sex of each skate will be determined for the first time in the survey history. Males are easily identified by the presence of claspers (Figure 3). Small, immature skates may be difficult to sex, and in that case they will be recorded as unknown.

Data Forms and Samples

It is the responsibility of the cruise leader to ensure that all the samples and forms are completed and removed from the boat after each leg of the trip. Forms are to be organized according to species, sex, 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 Kally Spalinger. This will prevent lost data. Frozen samples must be well labeled when removed from the *Resolution* freezer to one of the freezers at the lab, until they can be processed or shipped.

Samples preserved in formalin should be stored in a location with adequate ventilation until they are shipped.

SAMPLING EQUIPMENT CHECKLIST

Stomach sampling

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

Tanner tagging

- ✓ Double-T Floy tags
- ✓ Tagging guns with “stops”
- ✓ Tagging forms

ADEC sampling

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

PERSONNEL AND SURVEY SCHEDULE

Resolution crew – Captain Denis Cox Jr., Danny Wilson, Kurt Pederson

*Chiniak Bay –
June 21 and 22*

Kally Spalinger (cruise leader)
Mike Cavin
Tom Dinnocenzo
Dave Gilliland
Carl Peterson

*Marmot Bay –
June 23-27*

Mike Ruccio (cruise leader)
Kally Spalinger
Tom Dinnocenzo
Dave Gilliland
Carl Peterson
Dan Urban

*Eastside Kodiak –
June 28 to July 16*

Kally Spalinger (cruise leader)
Tom Dinnocenzo
Dave Gilliland
Carl Peterson

*South Alaska Peninsula, Chignik, and
The Eastern Aleutians -
July 22 to August 27*

Mike Ruccio (cruise leader)
Mike Cavin (cruise leader)
Tom Dinnocenzo
Dave Gilliland
Carl Peterson

*Westside Kodiak and North Mainland –
September 7-17*

Mike Cavin (cruise leader)
Tom Dinnocenzo
Dave Gilliland
Carl Peterson

LITERATURE CITED

- Spalinger, K. and M. E. Cavin Jr. *In press*. Standard project operational plan: bottom trawl survey of crab and groundfish: Kodiak, Chignik, South Alaska Peninsula, and Eastern Aleutian Areas. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report, Kodiak.
- Spalinger, K. *In press*. Bottom trawl survey of crab and groundfish: Kodiak, Chignik, South Peninsula, and Eastern Aleutians management districts, 2003. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report, Kodiak.
- Spalinger, K. 2003. Bottom trawl survey of crab and groundfish: Kodiak, Chignik, and South Peninsula management areas, 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K03-32, Kodiak.
- Worton, C. 2002. Bottom trawl survey of crab and groundfish: Kodiak, Chignik, and South Peninsula management areas, 2001. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K02-51, Kodiak.

Table 1. Sample sizes for female Tanner crab fecundity study.

Carapace Width (mm)	Sample size required for 2004	
	Kiliuda Bay	Ugak Bay
<90	0	2
90-100	8	0
>100	19	17
Total	27	19

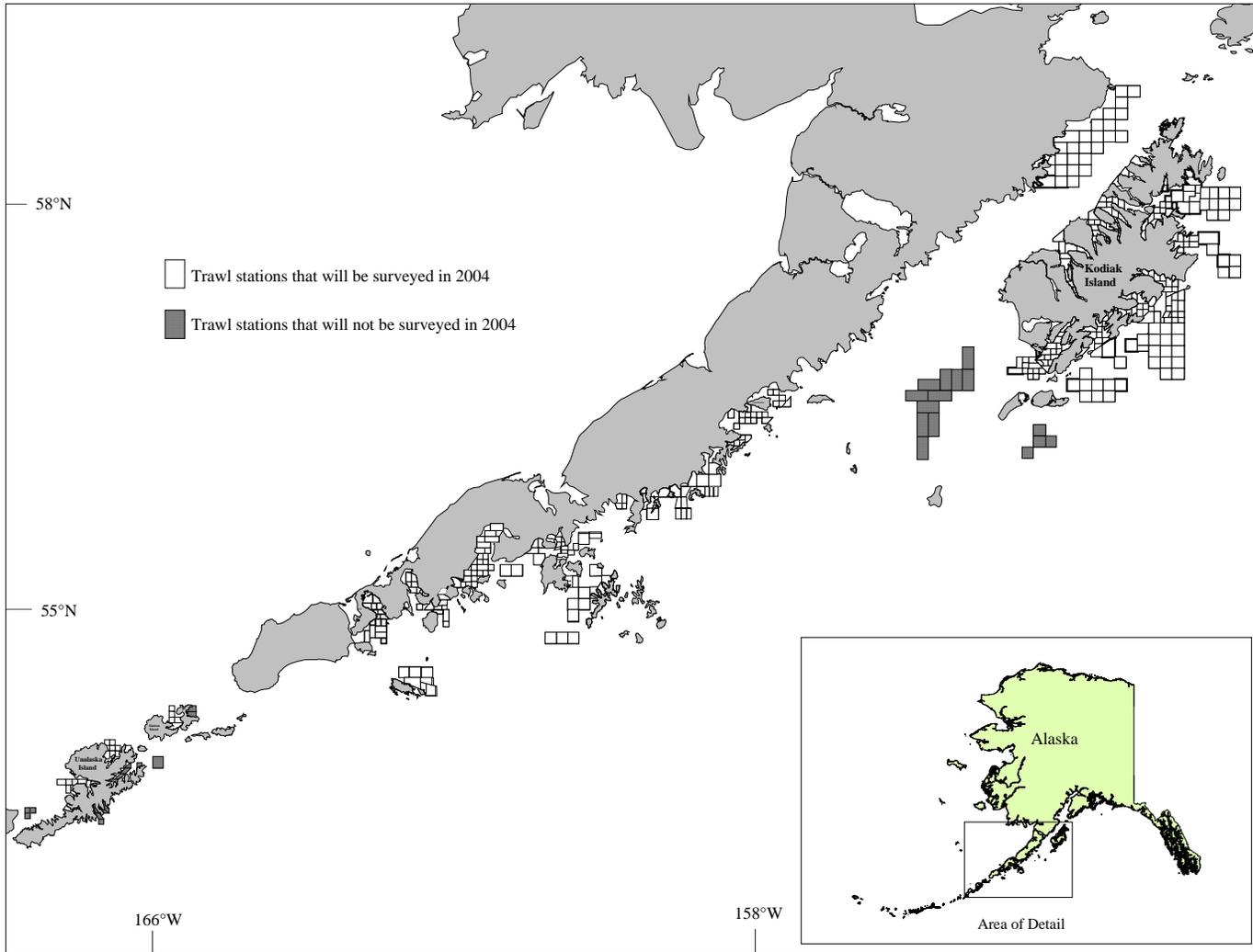


Figure 1. Westward Region trawl survey area.

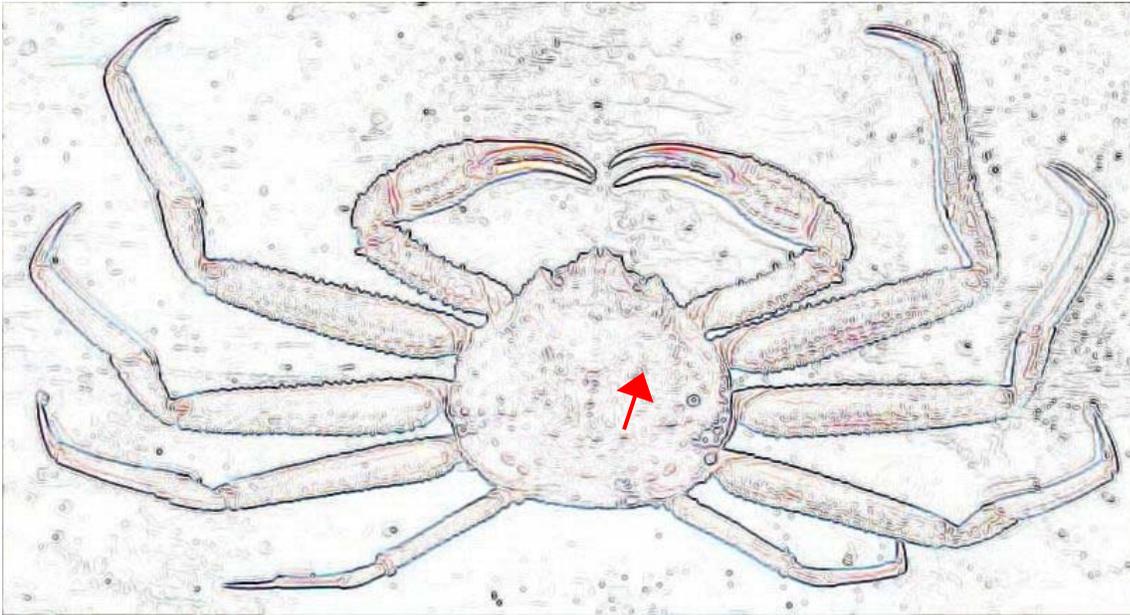


Figure 2. Diagram of floy-tag insertion location on Tanner crab.

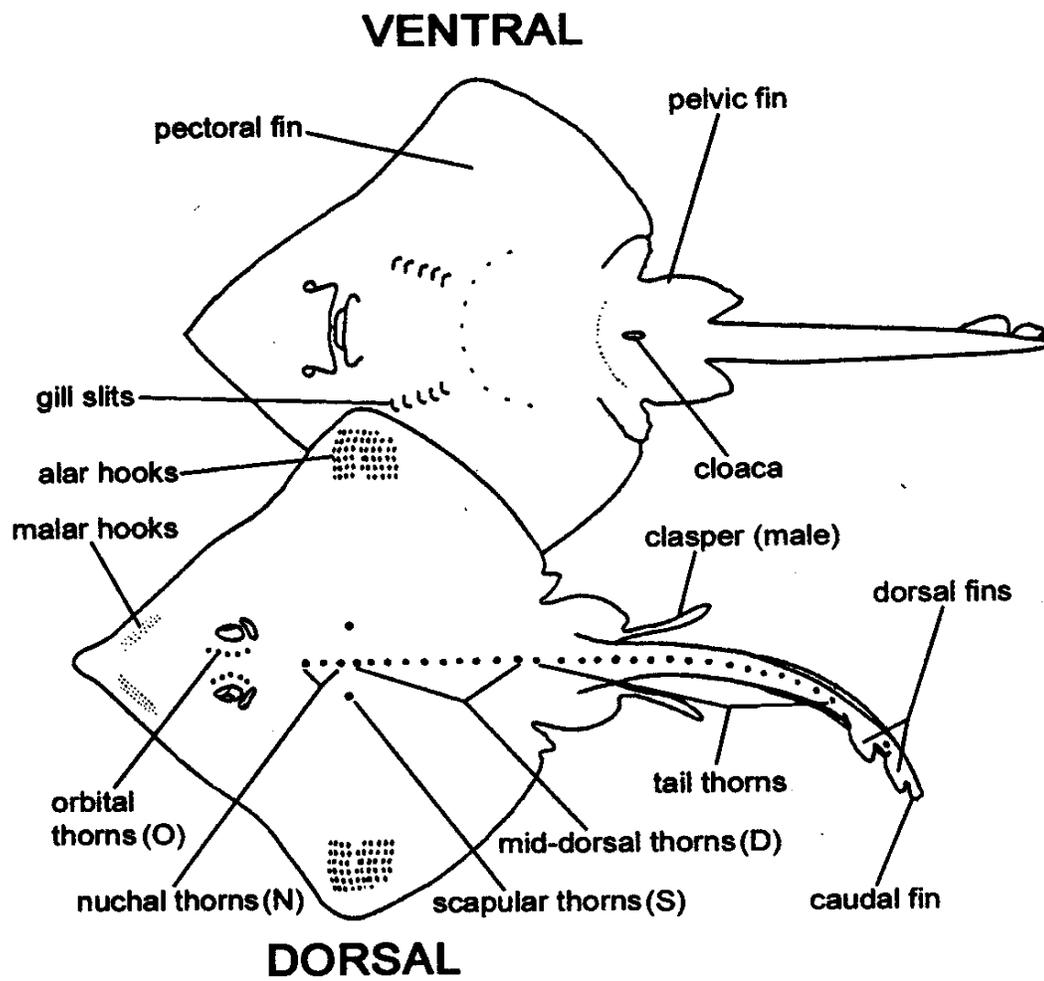
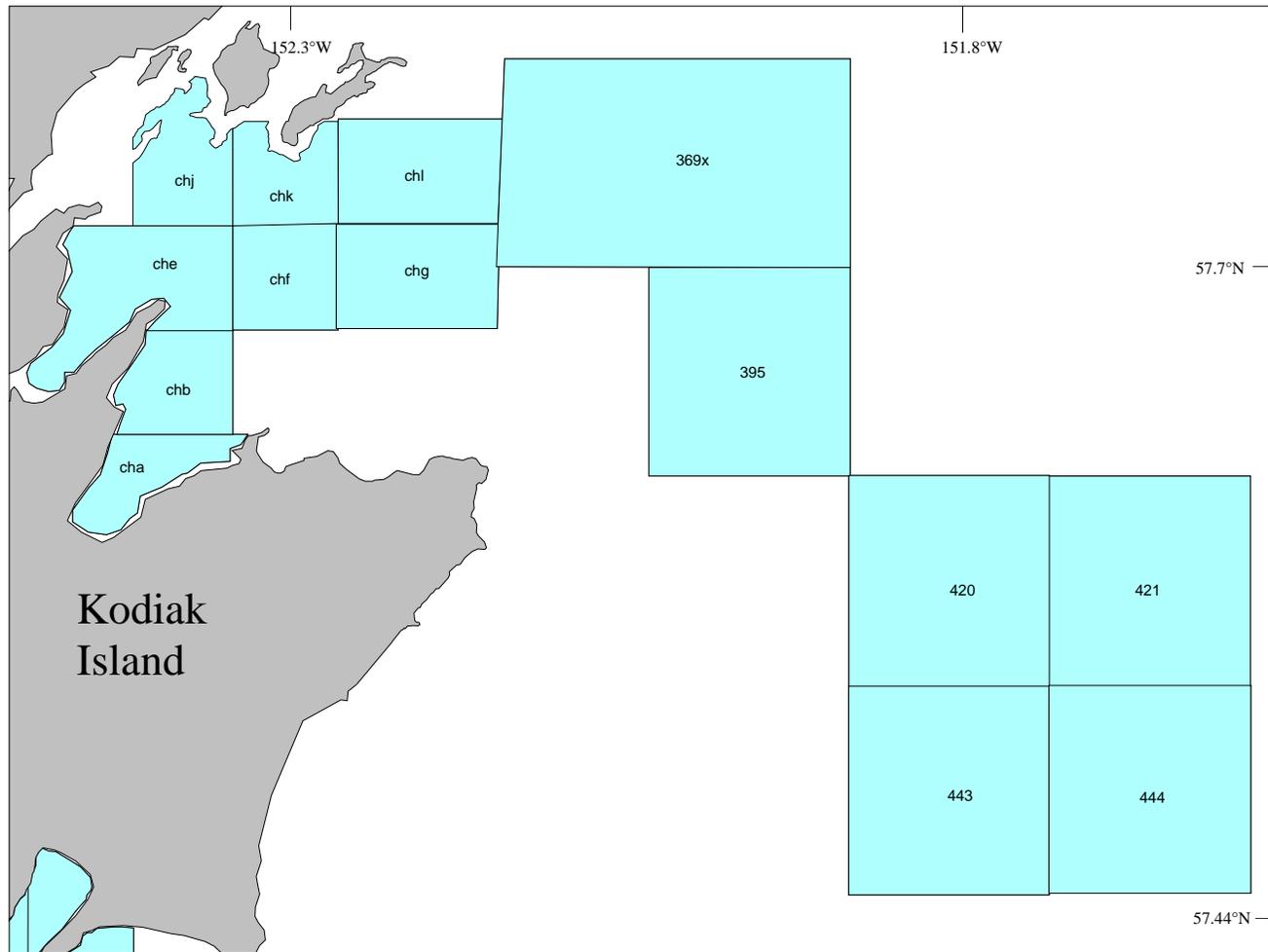
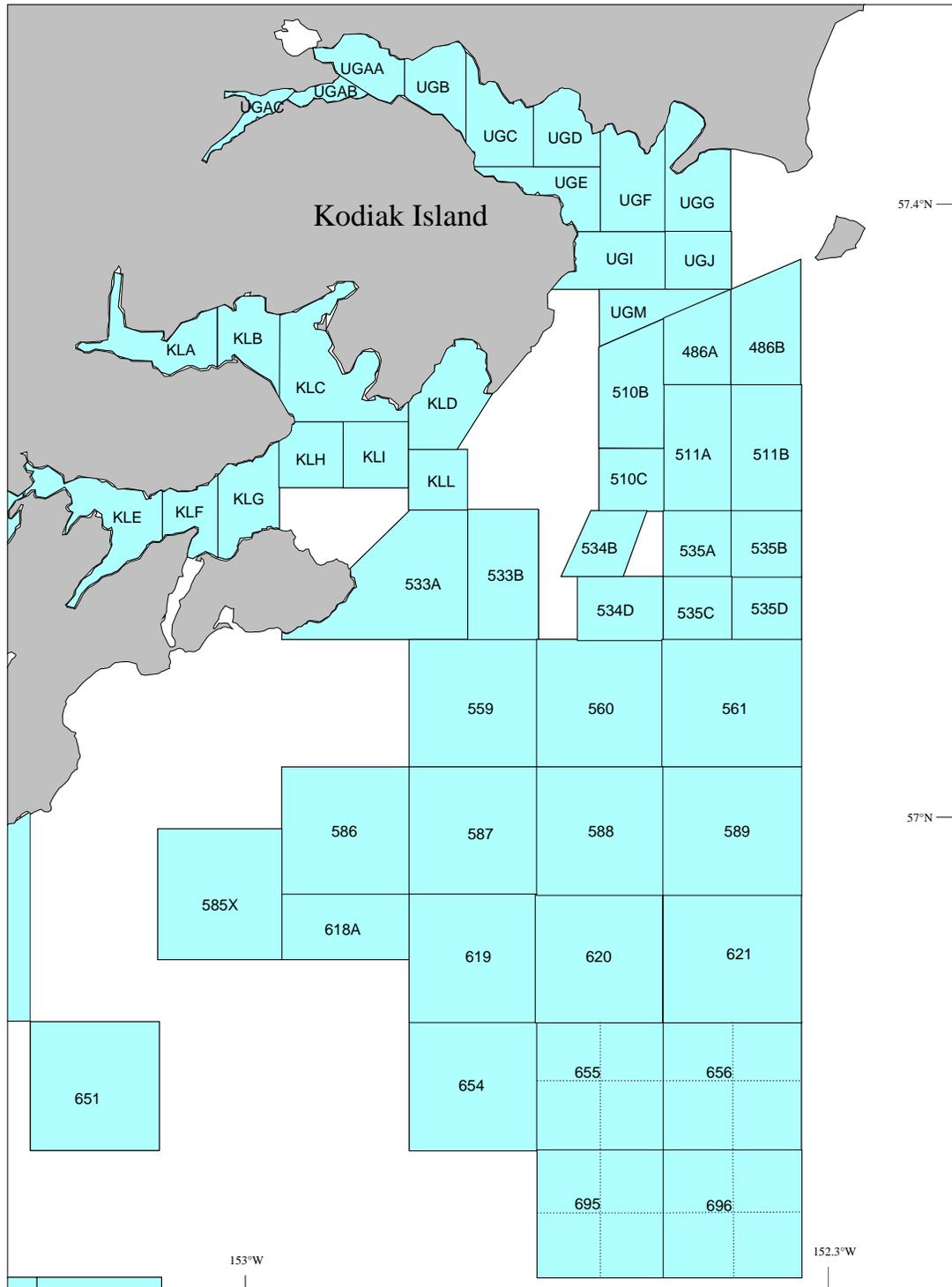


Figure 3. Basic skate anatomy

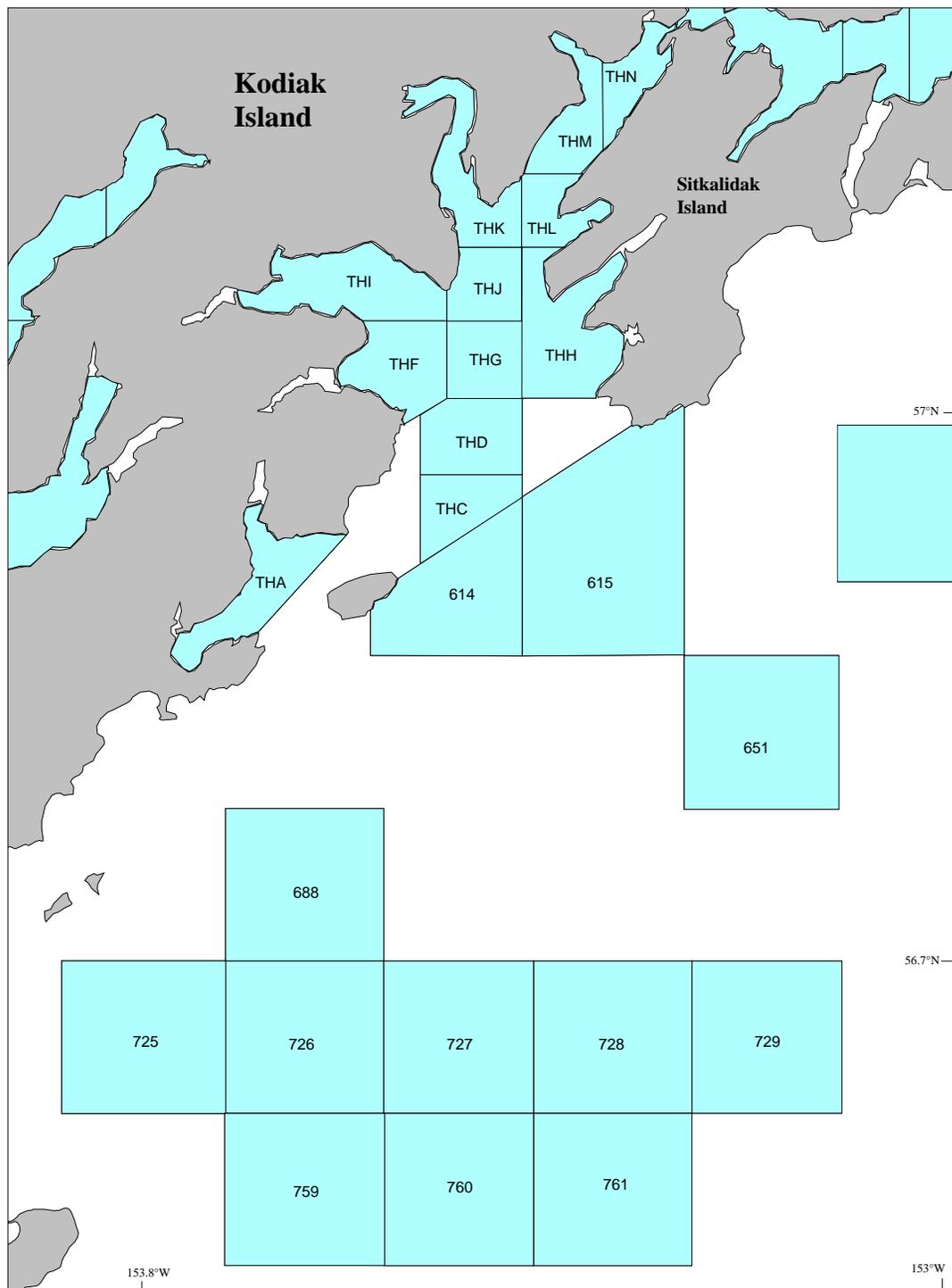
APPENDIX



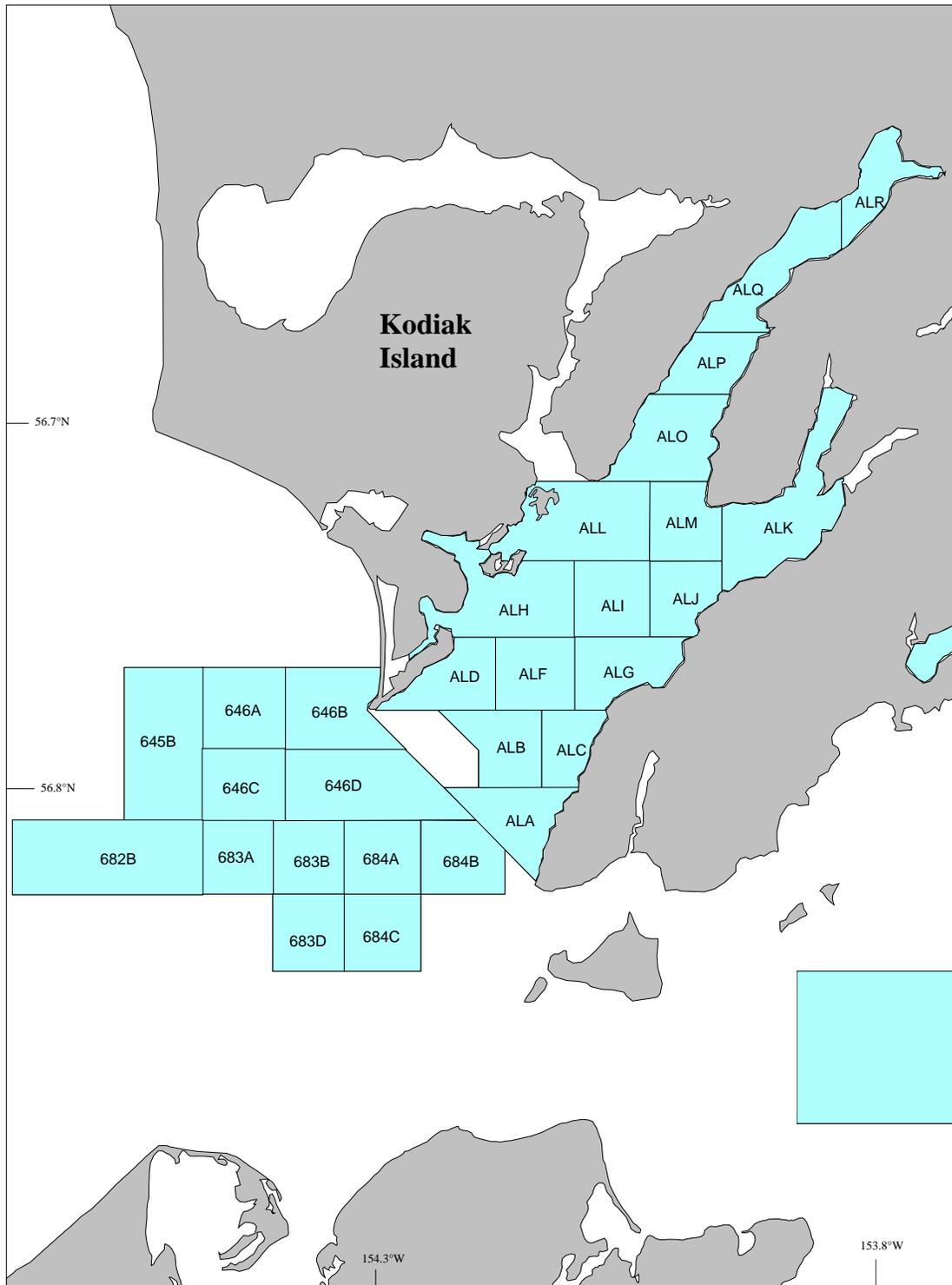
Appendix A.1. Station boundaries and names, Chiniak Bay and Chiniak Gully, 2004 Kodiak District trawl survey.



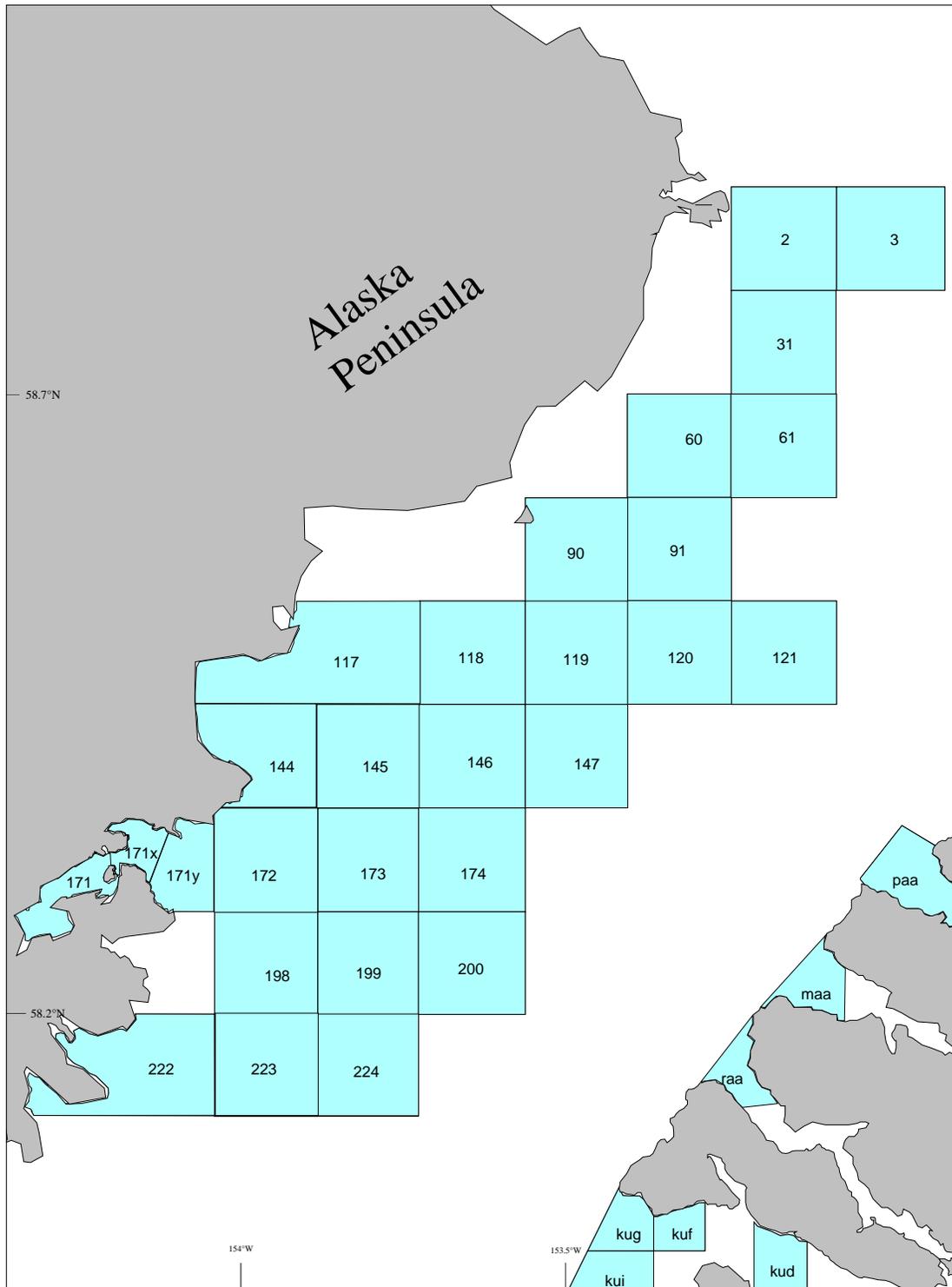
Appendix A.3. Station boundaries and names, Ugak Bay, Kiliuda Bay, and Barnabus Gully, 2004 Kodiak District trawl survey.



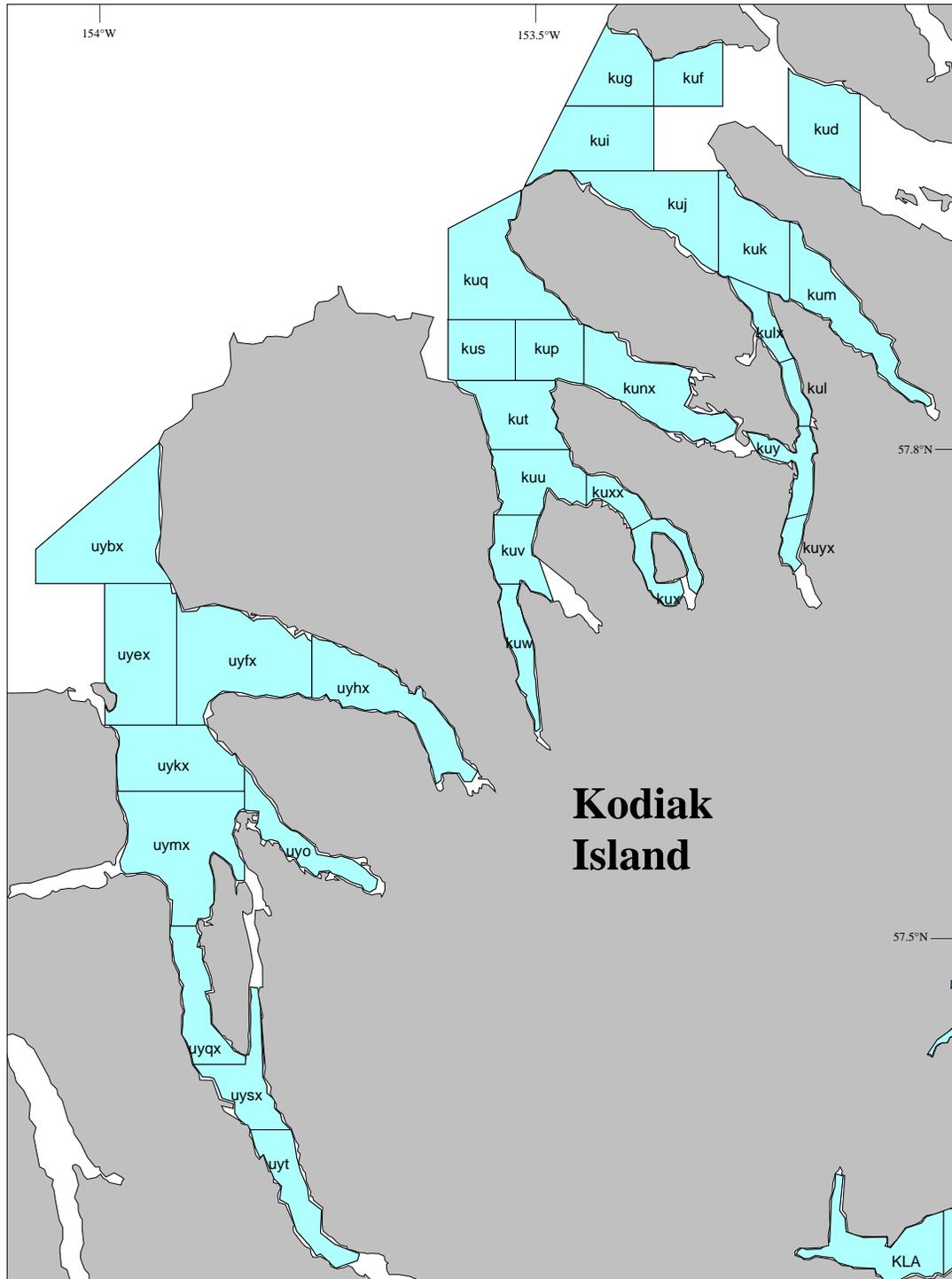
Appendix A.4. Station boundaries and names, South Sitkalidak Strait, Two Headed Island, and Horse's Head area, 2004 Kodiak District trawl survey.



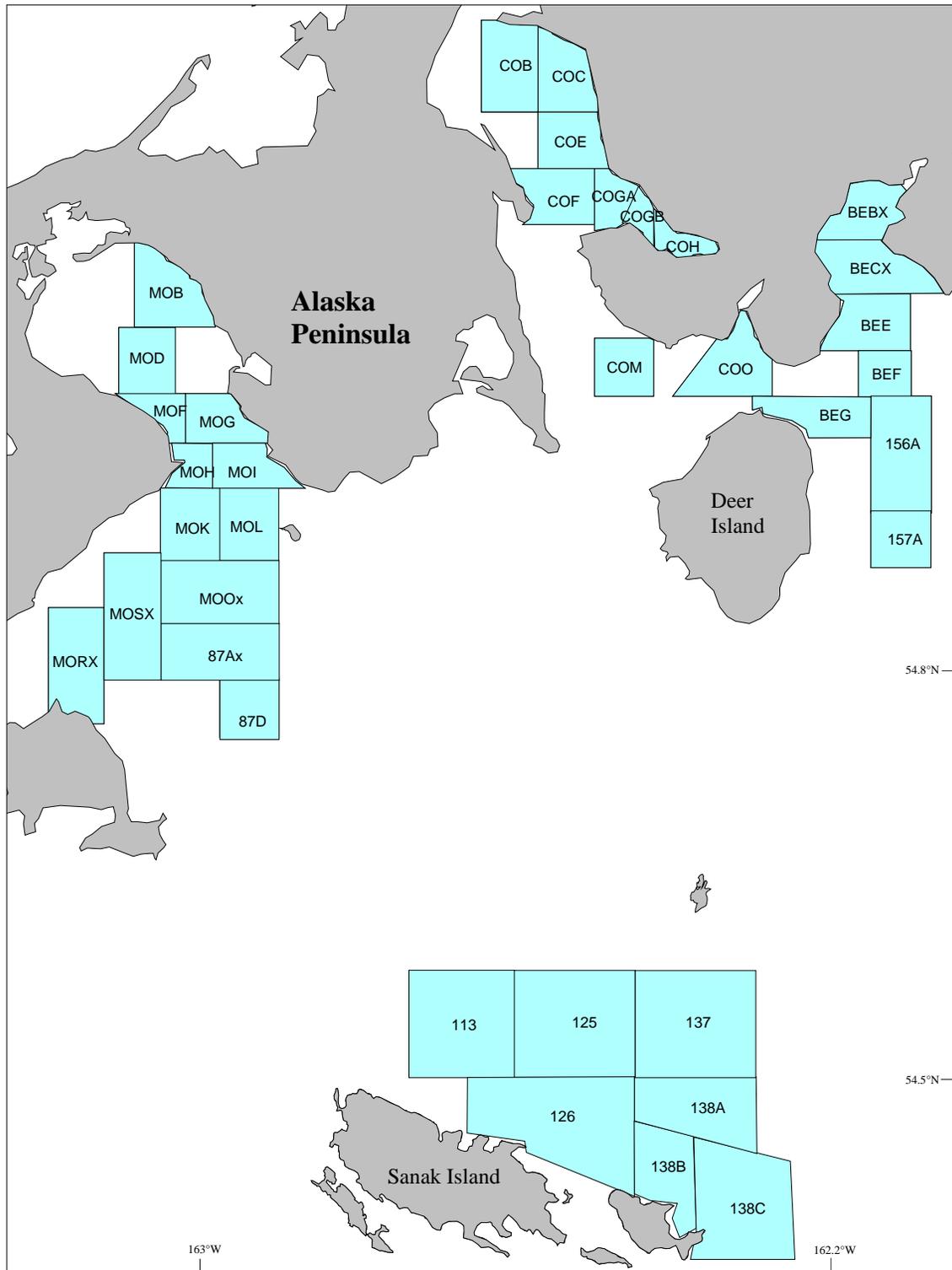
Appendix A.5. Station boundaries and names, Alitak Bay and Alitak Flats, 2004 Kodiak District trawl survey.



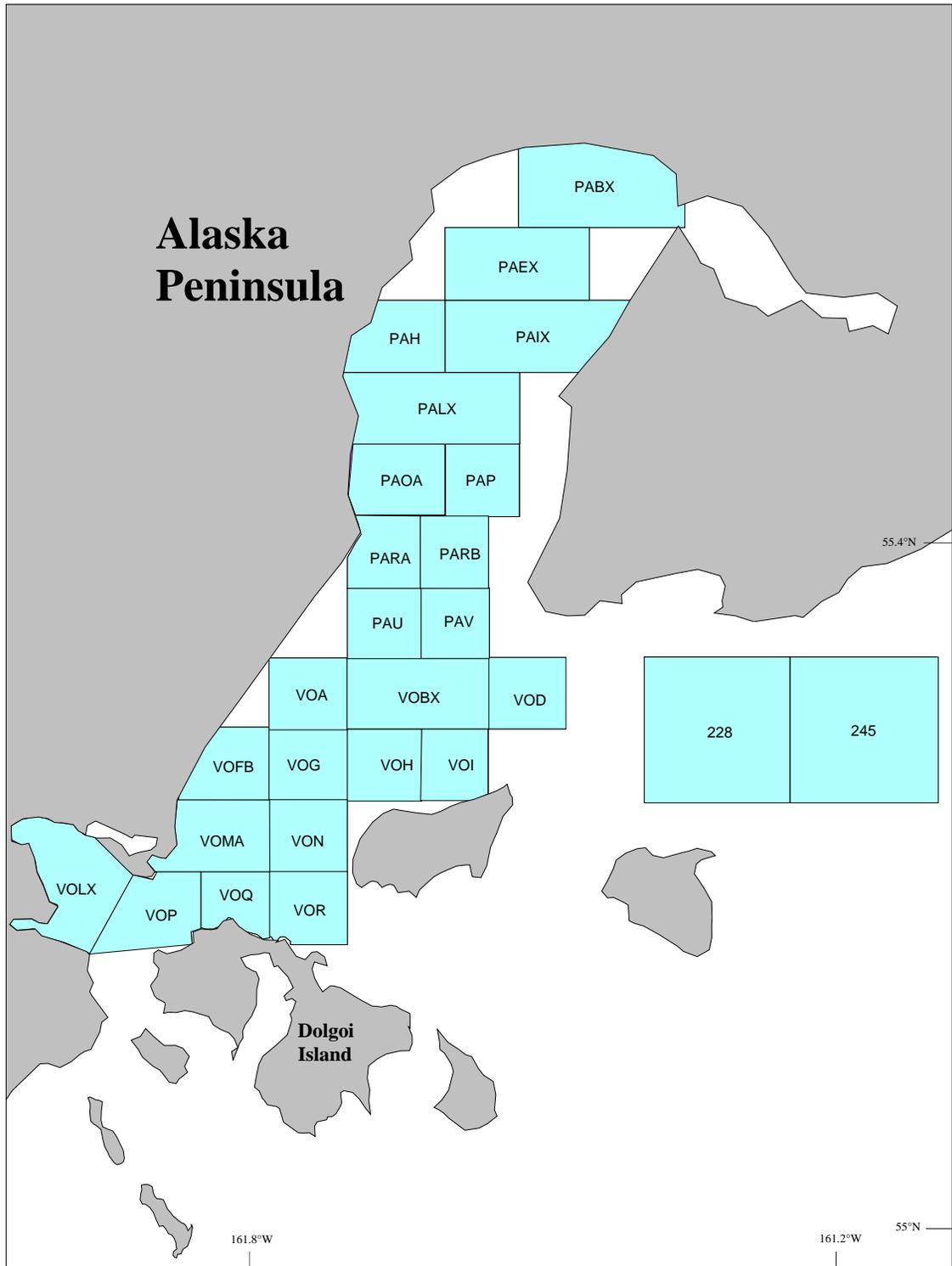
Appendix A.6. Station boundaries and names, Shelikof Strait, 2004 Kodiak District trawl survey.



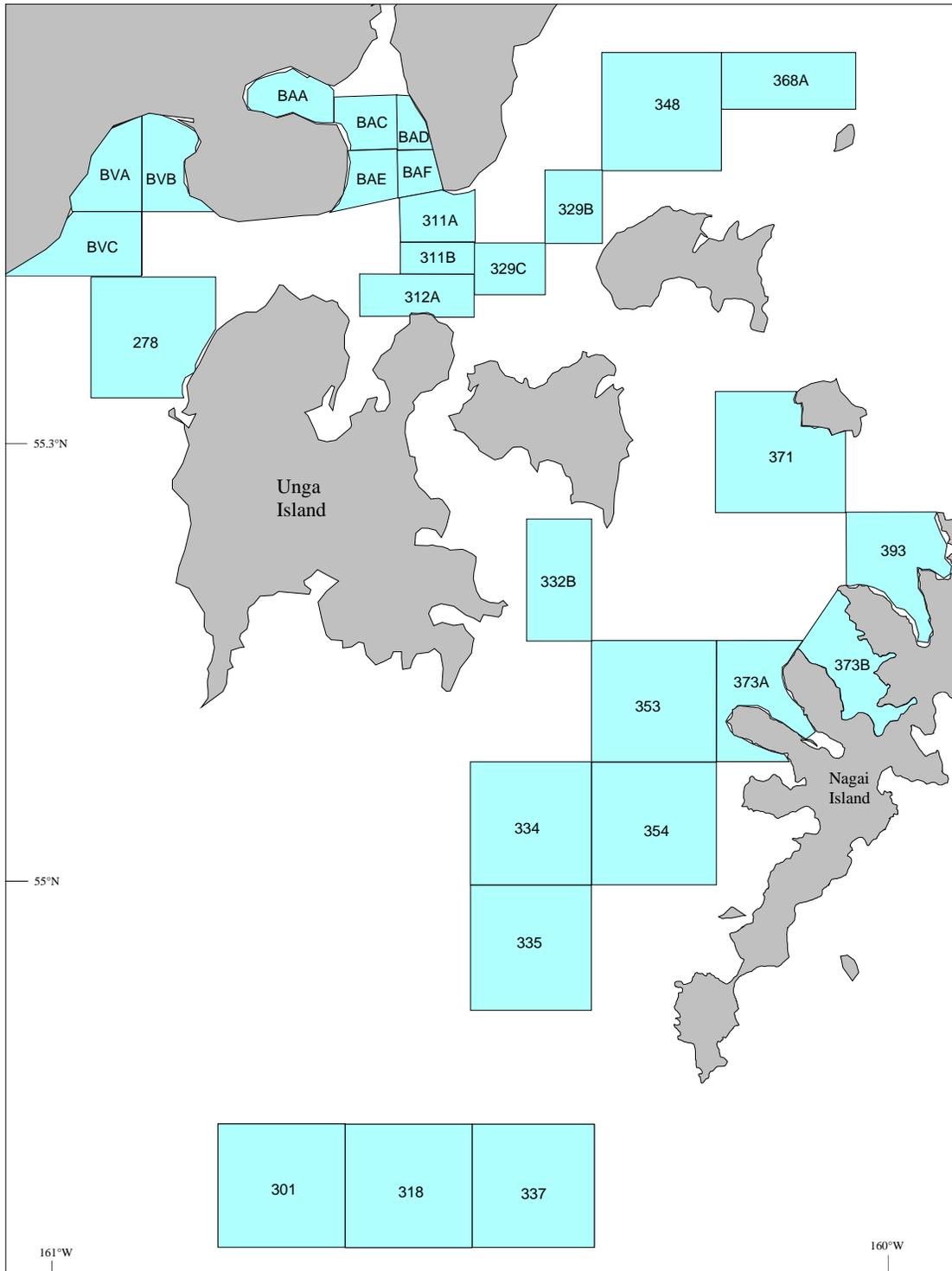
Appendix A.7. Station boundaries and names, Uyak, Uganik, and Viekoda Bays, 2004 Kodiak District trawl survey.



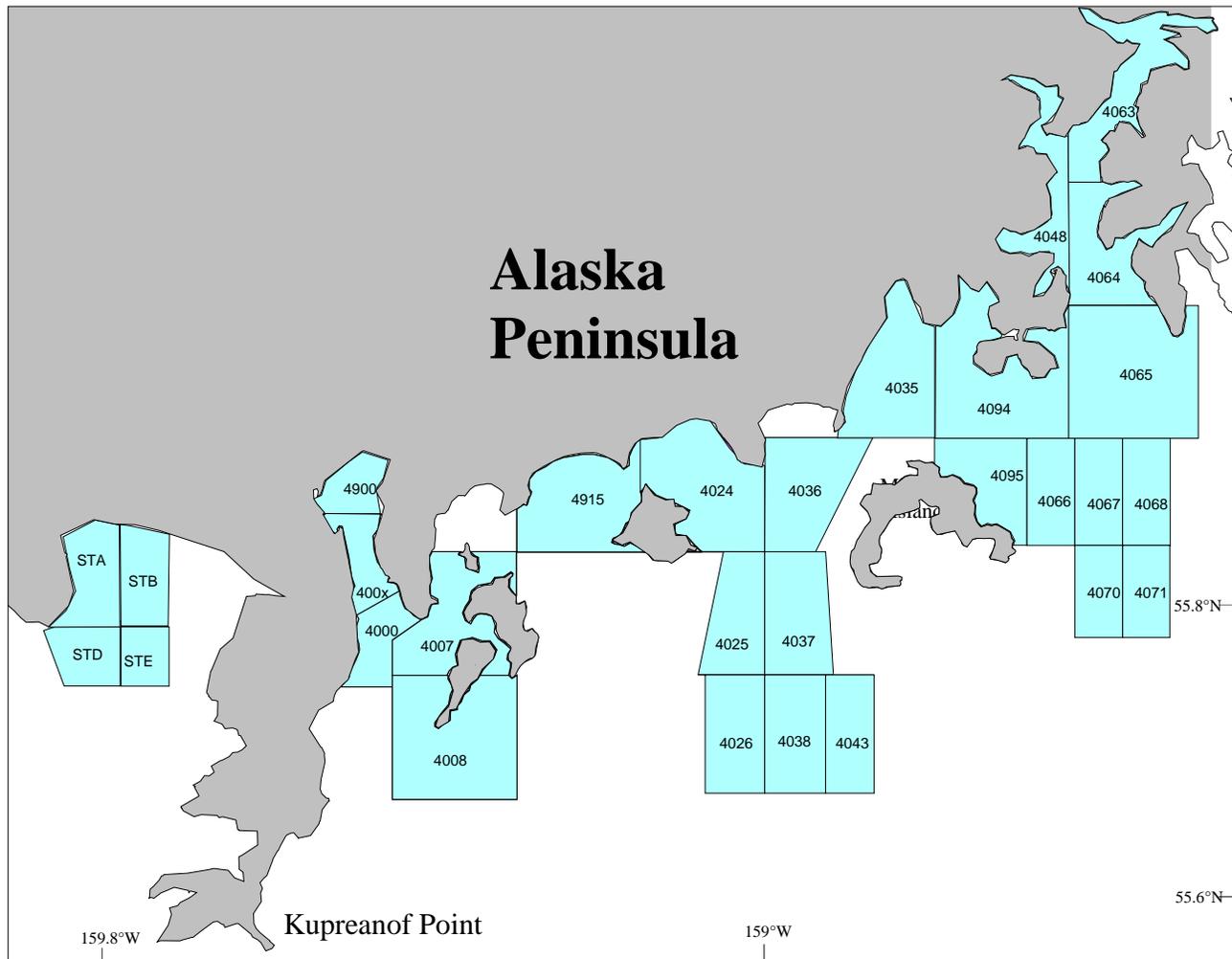
Appendix A.8. Station boundaries and names, Morzhovoi Bay, Cold Bay, Deer Island, and Sanak Island, 2004 South Peninsula District trawl survey.



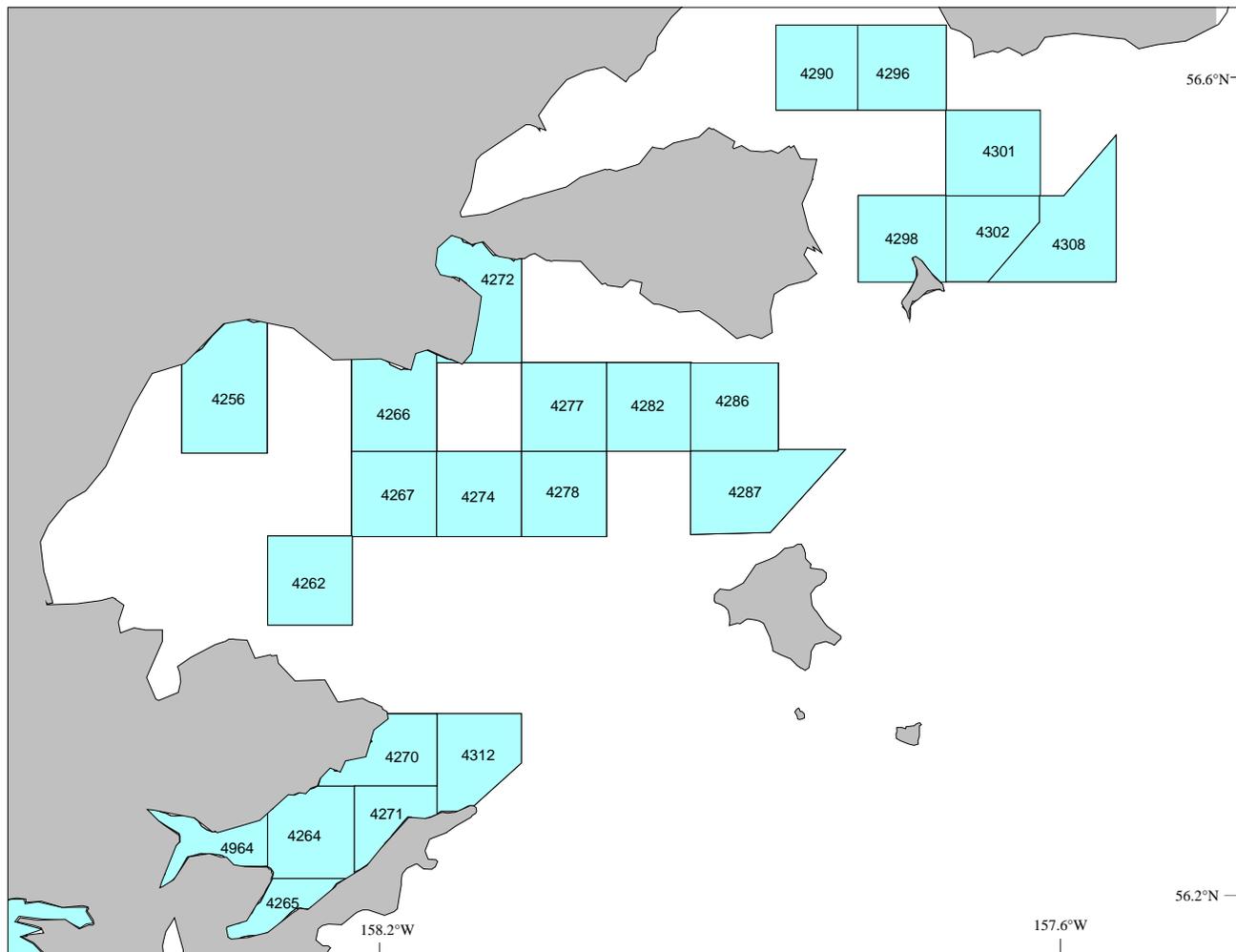
Appendix A.9. Station boundaries and names, Pavlof and Volcano Bays, 2004 South Peninsula District trawl survey.



Appendix A.10. Station boundaries and names, Unga Strait, Beaver Bay, Balboa Bay, and West Nagai Strait, 2004 South Peninsula District trawl survey.



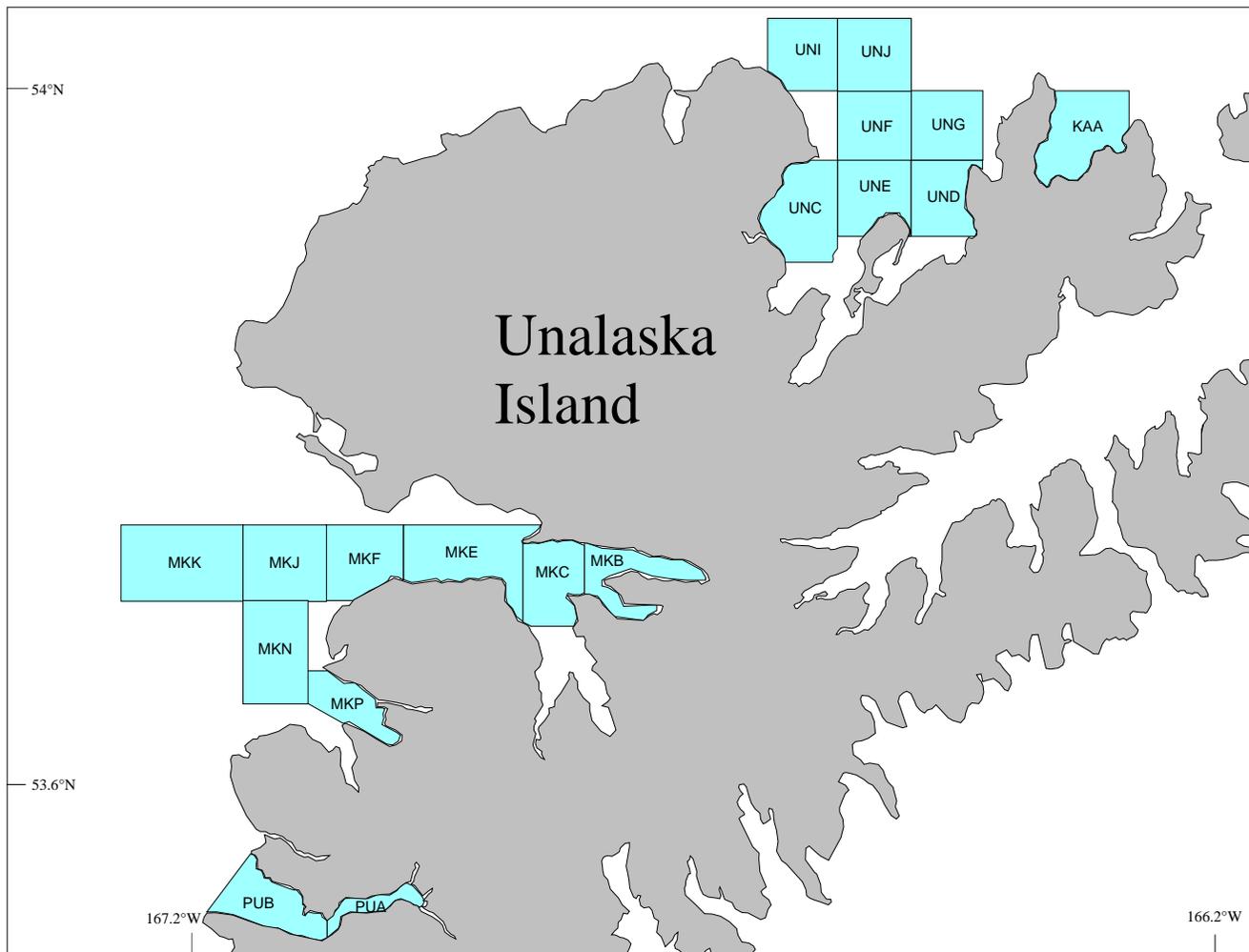
Appendix A.11. Station boundaries and names, Stepovak Bay, Ivanof Bay, Mitrofanina Island, and Kuiu Bay, 2004 Chignik District trawl survey.



Appendix A.12. Station boundaries and names, Kujulik, Chignik, and Castle Bays, 2004 Chignik District trawl survey.



Appendix A.13. Station boundaries and names, Akutan Bay, 2004 Eastern Aleutian District trawl survey.



Appendix A.14. Station boundaries and names, Unalaska, Makushin, and Pumicestone Bays, 2004 Eastern Aleutian District trawl survey.

Appendix B.1. Tanner crab tagging form and instructions.

Tanner Crab Tagging Form 2004 - Legals							
Beginning tag number =							
TAG	DATE	HAUL	RELEASE AREA	TAG	DATE	HAUL	RELEASE AREA
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 number listed on the sheet only refers to the last two digits of the tag, so it is important to fill in this section.
Date	Month and date.
Haul	Fill in the haul number where the crabs were captured.
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.

ADEC Fish Sampling Form 2004

Collector's Name: _____

Signature: _____

Coordinates: _____ Location: _____
(water body or area)

Vessel Name: _____

Species: _____

Fish #	Haul #	Date	Fish #	Haul#	Date
1	_____	_____	11	_____	_____
2	_____	_____	12	_____	_____
3	_____	_____	13	_____	_____
4	_____	_____	14	_____	_____
5	_____	_____	15	_____	_____
6	_____	_____	16	_____	_____
7	_____	_____	17	_____	_____
8	_____	_____	18	_____	_____
9	_____	_____	19	_____	_____
10	_____	_____	20	_____	_____

Notes: (e.g. morphological anomalies): _____

Sampling Protocol

- Collector wore a pair of nitrile gloves
- Fish was put in food-grade plastic bag provided
- Label sample (1 to 20) and seal with label tag or plastic cable
- Put Sample Collection Form in zip lock bag and put in wetlock box with samples
- Seal liner bag in wetlock box with plastic cable or tape
- Seal box, use address label and airbill to ship samples to ADEC Laboratory
- Fish was not exposed to exhaust or gas during sample collection

-Continued-

ADEC fish sampling form

Collector's name	Enter name of sampler.
Signature	Sign form to verify that the information is correct.
Coordinates	Leave this blank for now. It will be filled in at the end of the leg.
Location	Specific name of bay or trawl location.
Vessel name	R/V Resolution
Species	Walleye pollock, Pacific cod, or Pacific ocean perch. Each fish will have its own form.
Fish #	This is the consecutive sample number. The fish will need to be labeled with this number when it is put into a bag and frozen.
Haul #	Enter the haul number that the fish were taken from.
Date	Enter the date the fish were collected.
Notes:	Record any anomalies that the fish exhibit.

Appendix C. 2004 Marmot Bay stomach sampling protocol.

1. Species and numbers to be sampled:

Table 1. Number of stomachs to be collected in 2004 ADFG Kodiak SUMMER survey, by species, and size groups

Species	Number
Walleye pollock	
< 30 cm	40
30-44 cm	40
45-54 cm	40
≥ 55 cm	40
subtotal	160
Pacific cod	
< 30 cm	40
30-44 cm	40
45-59 cm	40
≥ 60 cm	40
subtotal	160
Arrowtooth flounder	
< 30 cm	40
30-49 cm	40
≥ 50 cm	40
subtotal	120
Pacific halibut	
< 40 cm	30
40-54 cm	30
55-69 cm	30
≥ 70 cm	30
subtotal	120
Total	560

At every haul, after the catch has been dumped in the bin and the major species in the catch are evident, choose 2-3 species from Table 1 above that are abundant enough for stomach sampling purposes (about 1 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 which 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

-Continued-

*Signs of "natural" stomachs (KEEP THESE!):

- naturally empty stomachs appear tight and contracted
- stomachs appear tight around any prey inside

- (2). If the fish is determined to be collectable, record the fork length, sex, and spawning condition. Excise the stomach and place in a stomach bag. 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 ≥ 55 cm pollock) in one haul. For small fish (≤ 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 and submerge these in a bucket of 10% buffered Formalin. (To make the Formalin solution, add seawater to the 5 gallon bucket until about half full, then add one liter 37% of 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 at specimen number 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 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 '2004, Marmot Bay, pollock (species), Resolution, and your name'.
 - (9). Collect at least 20 stomachs per haul, and you can reach the goal.
-

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