NOAA Technical Memorandum NMFS-AFSC-278

Results of the 2012 Chukchi Sea Bottom Trawl Survey of Bottomfishes, Crabs, and Other Demersal Macrofauna

by
P. Goddard, R. Lauth, and C. Armistead

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Alaska Fisheries Science Center

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ABSTRACT

The results of the 2012 Chukchi Sea bottom trawl survey of bottomfishes, crabs, and other dermersal macrofauna are presented. The 2012 survey was only the fourth Chukchi Sea survey conducted by the National Marine Fisheries Service or its predecessor, the Bureau of Commercial Fisheries, since 1959.

Seventy-one survey stations were successfully completed during the bottom trawl survey. The survey area extended north and east from the Bering Strait to Barrow Canyon, bounded to the west by the U.S.-Russia Maritime Boundary and east to the 10-m bathymetry limit along the Alaska coastline. Demersal populations were sampled by trawling at stations centered within 55.56 × 55.56 km (30 × 30 nautical miles) grid cells covering the survey area.

Survey results presented in this report include biomass in metric tons (t), abundance numbers, and catch-per-unit-effort (CPUE; kg/ha and no./ha) for all taxa identified during the survey. Size composition and CPUE distribution plots are presented for the most abundant fish and invertebrate species. Appendices provide station data, summarized catch data by station, species listings, and biomass and population data for the sampled populations.

Funding for this survey was provided in part by the Bureau of Ocean Energy Management (BOEM) Arctic Ecosystem Integrated Survey (Arctic Eis) contract agreement number M12PG00018.

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INTRODUCTION

As part of an interagency agreement between the Bureau of Ocean Energy Management (BOEM), University of Alaska Fairbanks (UAF) and National Oceanic and Atmospheric Administration (NOAA)/National Marine Fisheries Service (NMFS), the Alaska Fisheries Science Center's (AFSC) Resource Assessment and Conservation Engineering Division (RACE) conducted a bottom trawl survey of the Chukchi Sea to assess the distribution of bottomfishes, crabs, and other demersal macrofauna from 9 August to 24 September 2012.

Prior to 2012, demersal trawl surveys of the Chukchi Sea region were conducted by the Bureau of Ocean Fisheries in 1959 and the NMFS in 1976 and 1990. Results from previous surveys are summarized in: Alverson and Wilimovsky (1966); Wolotira et al. (1977); and Barber et al. (1994). The 2012 survey was the first of these surveys to use standard AFSC/RACE bottom trawl survey techniques (Stauffer 2004) to conduct a basin-wide systematic survey of the Chukchi Sea within U.S. territorial waters. Moreover, it was part of a much larger multidisciplinary survey, the Arctic Ecosystem Integrated Survey (Arctic Eis), that involved government and university scientists. The primary objective of Arctic Eis was to gather baseline scientific data (e.g., oceanography, plankton, fish, and larval distributions) as a foundation for responsibly guiding and mitigating future economic development activities in the Arctic region and for long-term monitoring of climate change effects to the Arctic marine ecosystem.

METHODS

Standard trawl operations and catch sampling procedures were based on the RACE eastern Bering Sea bottom trawl survey methods described in detail by Wakabayashi et al. (1985) and Stauffer (2004). A brief summary of these procedures is described below.

Survey Area and Station Selection

The 2012 Chukchi Sea bottom trawl survey region extended north of the Bering Strait to Barrow Canyon and the 100 m isobath, bounded to the west by the U.S.-Russia Maritime Boundary and to the east by the 10 m isobath along the Alaska coastline (Fig. 1). A systematic sampling design was based on a 55.6 km (30 nautical mile (nmi)) square grid pattern with the planned trawl stations located at the approximate center of each grid cell, resulting in a total of 73 sampling locations.

Vessel

Survey efforts were conducted aboard the 43.5 m FV *Alaska Knight*, a twin-engine, house-forward, commercial stern trawler with Kort nozzles allowing for suitable control of the vessel at slow trawling speeds (3.0 knots).

Net Design

The bottom trawl used for sampling was an 83-112 Eastern trawl, which has a 25.3 m (83 ft) headrope and a 34.1 m (112 ft) footrope (Fig. 2a). Survey trawls were towed behind 816 kg, 1.8 × 2.7 m, steel V-doors and 54.9 m (30 fathoms) paired bridles (Fig. 2b). Each lower bridle had a 61 cm chain extension connected to the lower wing edge to improve bottom-tending characteristics. The footrope was fished without roller gear and consisted of a wrapped 0.8 cm (5/16 in.) chain to maximize bottom contact (Fig. 2a). The body of the net was constructed from nylon with stretched mesh sizes 10.2 cm (4 in.) in the wings and body and 8.9 cm (3.5 in.) in the intermediate and codend. The codend also had a liner of 3.2 cm (1.25 in.) mesh. Survey nets used by the AFSC are constructed in rigorous compliance with the regional protocols detailed in Stauffer (2004).

Scientific Equipment

Surface and bottom water temperatures, as well as temperature and depth profiles, were recorded at 3-second intervals at each station using a Sea-Bird SBE-39 datalogger (Sea-Bird Electronics Inc., Bellevue, WA) attached to the headrope of the trawl.

A bottom contact sensor (inclinometer/accelerometer) provided data used to assess the bottom tending performance of the net and to determine when the footrope was in contact with the seafloor.

Marport Deep Sea Technologies, Inc. acoustic net mensuration sensors were used to monitor and record net height and net width during fishing operations for bottom depth and area swept calculations. Net width was measured as the distance between two sensors attached immediately forward of the connection of the upper breastline to the bridle, and net height was measured from the headrope to the seafloor bottom. Bottom depth was obtained by adding net height to the depth of the headrope. Trawl warps (wire out) were determined by the standardized scope table for the eastern Bering Sea shelf bottom trawl survey (Stauffer 2004) using painted marks on wires that were calibrated with an Olympic Model 750-N cable meter.

Table 1 lists the specific models, versions, serial numbers, and RACE numbers for sampling and data recording equipment used on the survey.

Trawl Operations

Samples were collected by bottom trawling at each station for a target fishing time of 15 minutes at a speed of 1.54 $msec^{-1}$ (3 knots). When possible, the tow was conducted near the center of a 55.6 × 55.6 km grid cell, and the vessel maintained a constant heading during the tow.

If the seafloor appeared to be untrawlable at the specified location, the area was surveyed for a trawlable site within the same grid square. Any hauls that sustained significant gear damage or contained excessive mud were re-sampled immediately following the unsuccessful haul.

Catch Sampling Procedures

Total catches weighing less than 1,150 kg (2,500 lb) were placed directly onto a sorting table and the catch was sorted and enumerated in its entirety. Larger catches were weighed in aggregate and subsampled before sorting.

Catches were sorted to the lowest taxonomic level practicable (Stevenson and Hoff 2009; Mecklenburg et al. 2002). Fishes and invertebrates that could not be identified at sea were preserved and brought to Seattle for further identification. Catch weights and numbers by taxon were either obtained directly or by subsampling and extrapolating the proportion in the subsample to that of the entire catch weight. Unusual fish or invertebrate species (e.g., large skates, large sculpins, sharks, or octopus) were completely sorted from the catch. All *Chionoecetes* and *Paralithodes* species were sorted, weighed and enumerated. Carapace length or carapace width, sex, maturity, shell condition, and egg condition were recorded from a representative sample of each of these crab species.

Random subsamples of each fish species retained for length measurements were chosen to represent the sex and size composition in the catch. The greater the size range of a fish species in the sample, the greater the number of individuals retained in the random subsample for length measurements, up to a maximum of 300 specimens per species per haul. The sex of each fish was determined and then fish were measured to the nearest centimeter (fork or total length).

Catch Data Analysis

The catch sampling data were used to estimate: 1) catch per unit effort (CPUE); 2) biomass; 3) population abundance, and 4) population abundance by size class. A brief description of the procedures used for these analyses follows, for a detailed description see Wakabayashi et al. (1985).

Catch per unit effort was calculated for every species at each station where it occurred by dividing the catch weight (kg) or catch number by the area swept; area swept (hectares) was computed as the distance towed multiplied by the mean net width (Alverson and Pereyra 1969).

Mean catch per unit effort (CPUE) for each species was calculated in kilograms per hectare (1 ha = 10,000 m^2) and number of fish per hectare for the survey area. Biomass and

population abundance were derived by multiplying the mean CPUE by the total survey area (216,015 km^2).

For estimated population abundance by size class, the proportion of fish at each length interval, weighted by CPUE, was expanded to the survey population.

Scientific Personnel

Table 2 lists the scientific personnel participating in the survey and their professional affiliations.

Additional Research Projects

A gear comparison study was conducted to evaluate the catch and size composition of bottom fishes, crabs, and other epibenthic macrofauna caught in the 83-112 Eastern trawl and the plumb staff beam trawl (PSBT) (Britt et al. 2013). The results indicate the 83-112 Eastern trawl is ideal for broader basin-wide surveys monitoring changes of larger and more mobile or patchily distributed fishes and crabs. Likewise, the PSBT is better suited for monitoring changes of small sized or juvenile fishes and crabs, as well as superficial benthic infauna, within and between localized areas.

In addition to the standard data, samples were collected for other researchers from AFSC, University of Alaska (UAF), Alaska Sea Grant (ASG), Pacific Marine Environmental Laboratory (PMEL), and North Slope Borough (NSB) (Table 3). For more information on the status of samples collected please contact the Principal Investigator listed in the table.

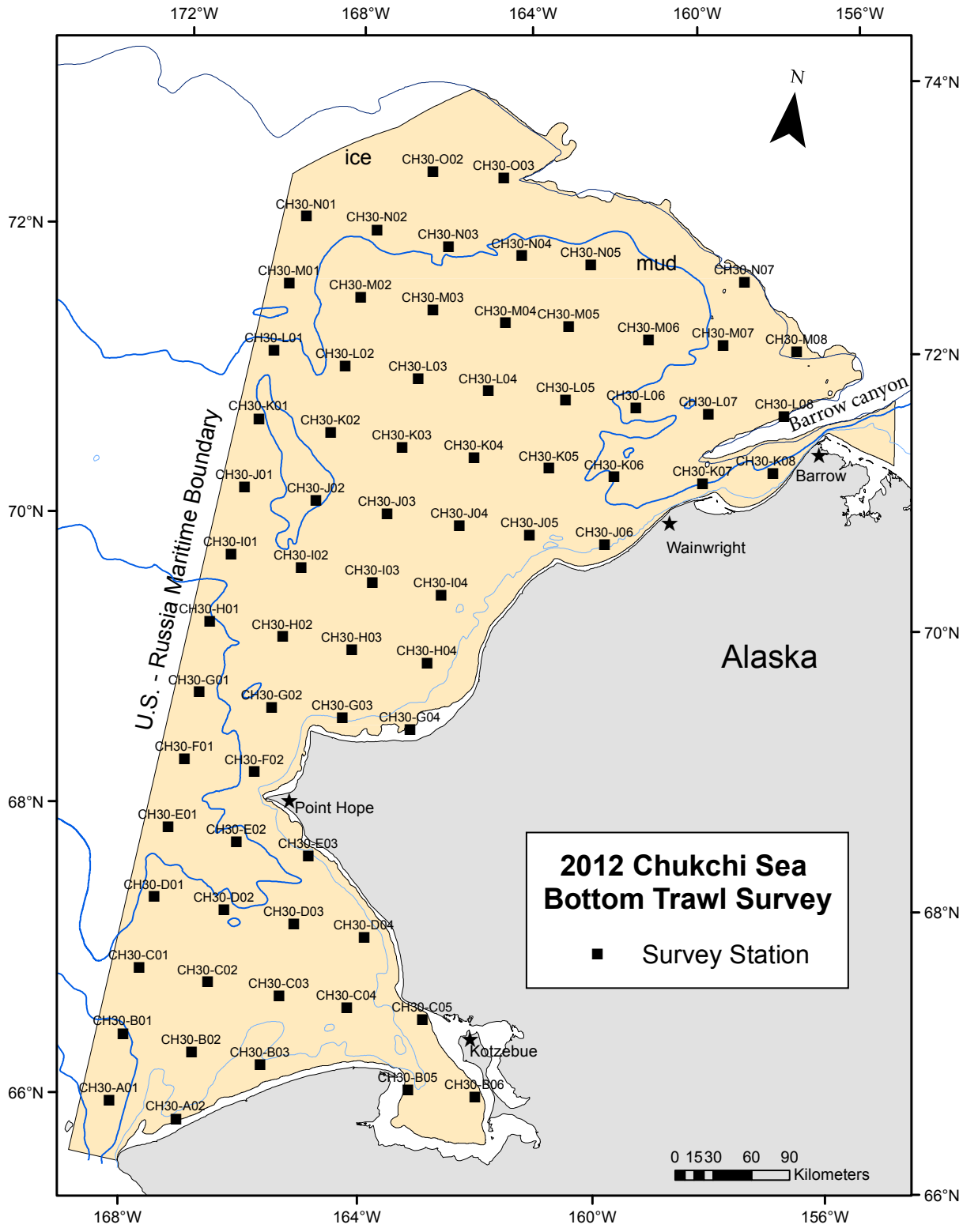


Figure 1.--Station locations for the 2012 Chukchi Sea bottom trawl survey.

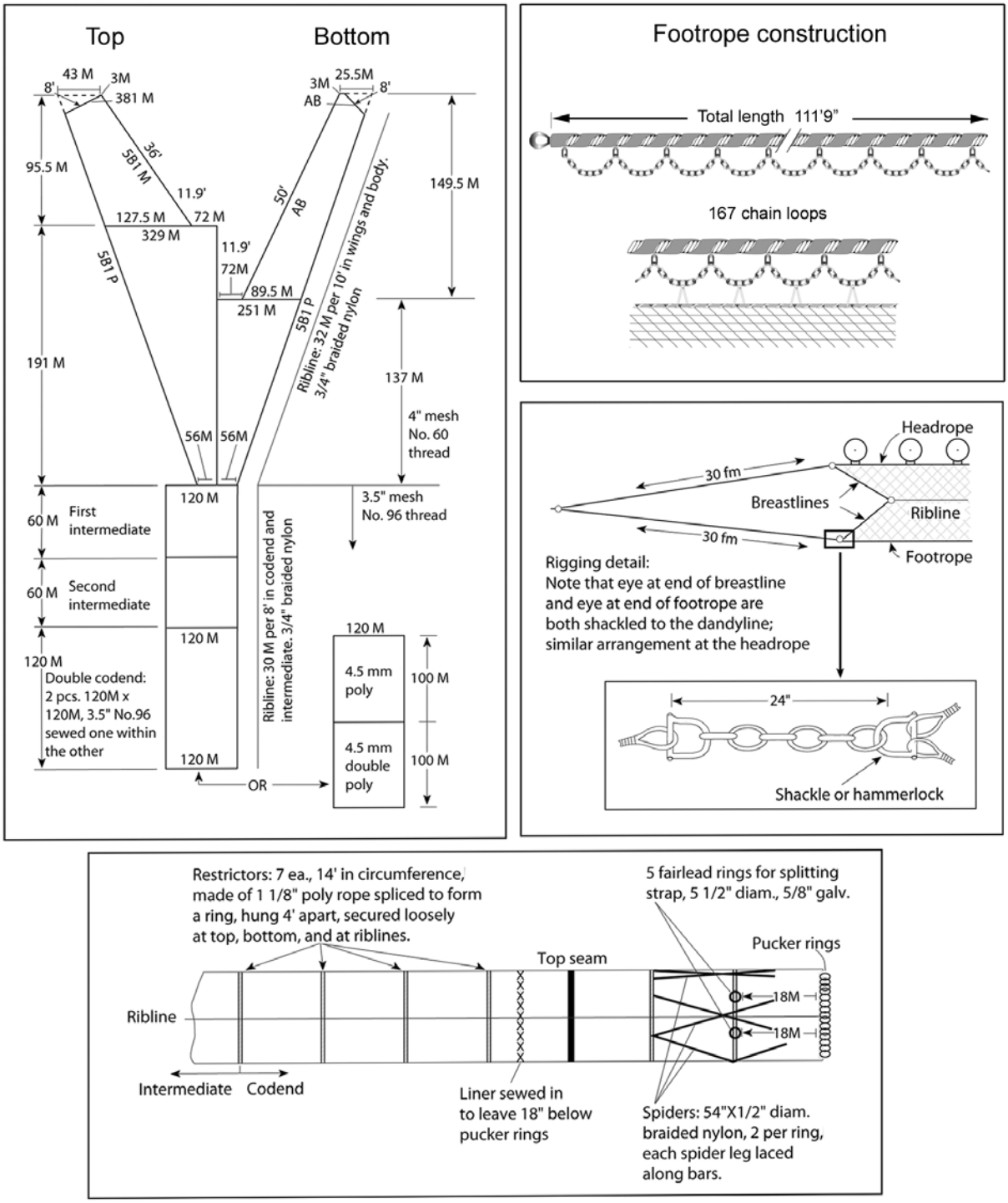


Figure 2a.--Schematic diagram of the 83-112 Eastern trawl gear used during the 2012 Chukchi Sea bottom trawl survey.

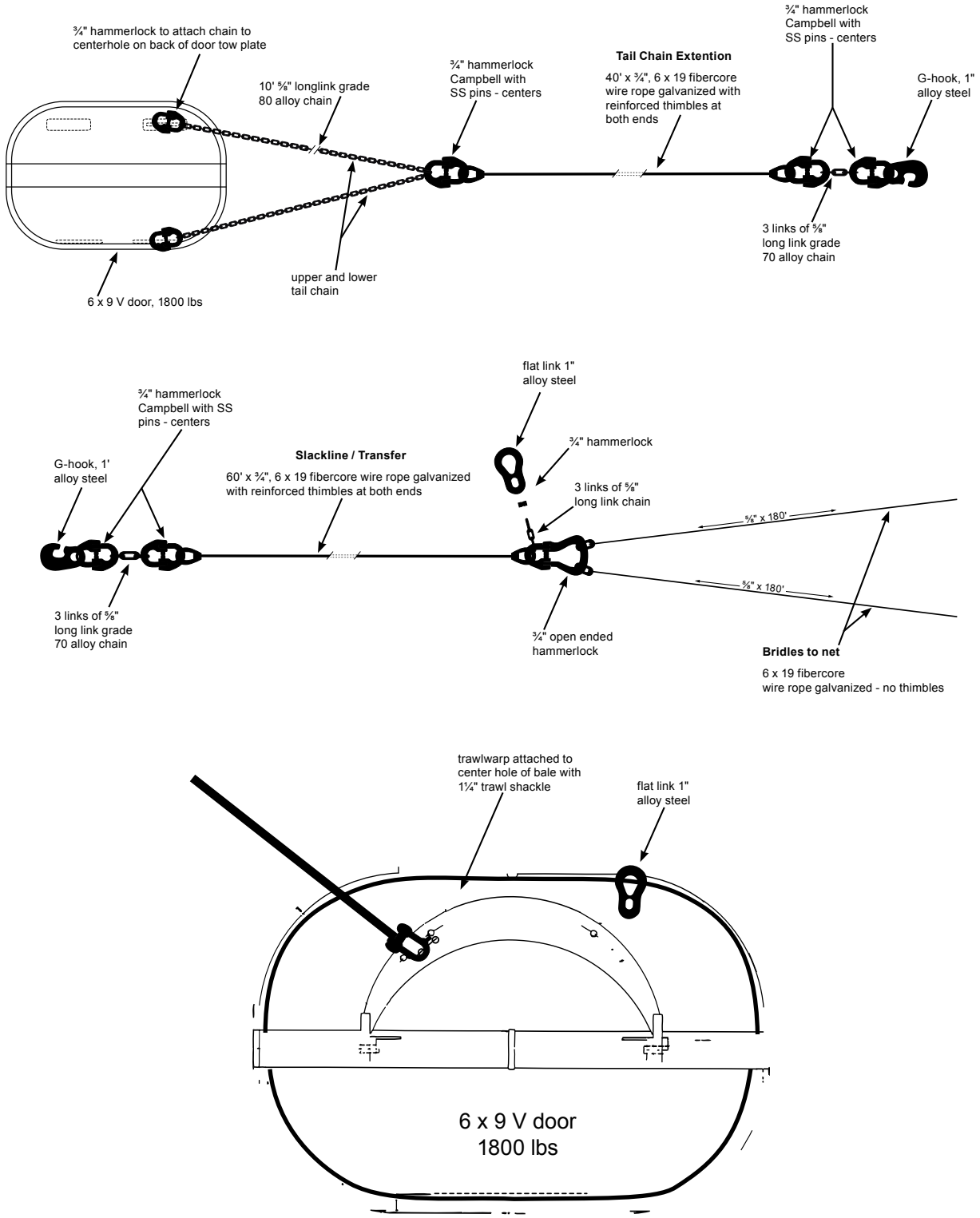


Figure 2b.--Detailed diagram of door rigging, slackline, and bridle configuration of the 83-112 Eastern trawl gear used during the 2012 Chukchi Sea bottom trawl survey.

Table 1.--Details of sampling and data recording gear used on the FV Alaska Knight during the 2012 Chukchi Sea survey.

Net & mensuration gear	Data type/function	Model/version/serial #
83/112 Eastern bottom trawl	research sampling tool	Net #38 Hauls 1- 38 Net #34 Hauls 40-45 Net #33 Hauls 48-78 Net #40 Hauls 82-120
Doors	spread the net	76, 732
Plumb staff beam trawl	research sampling tool	Supplied by University of Alaska Fairbanks
Vessel skipper and trawl master	conduct trawling operations	Hauls 1-65 Jim Hampton, Hauls 66-121 Vidar Ljung
Marport height sensor	measure net height	Marport serial #'s A1081000
Marport slave spread sensor	measure net spread	Marport serial #1135006
Marport master spread sensor	measure net spread	Marport serial # 1138002, offset 0m, speed of sound 1,500m/s
Marport receiver cabinets	spread and height signal	Marport Mark II acoustic receiver
Marport program	records data input from net mensuration gear	Software Version 3.5.1
Vessel depth sounder	record depth soundings	Simrad ES60 software 1.5.2.77 1998
U.S. GlobalSat Mr-350 GPS	determine latitude and longitude	Serial #001376
SeaBird SBE-39 V1.8	depth and water temperature	Serial # 859, 3766
Bottom contact sensor (HOBO Pendandt G accelorometer)	record footrope bottom contact	Serial #2243739
Olympic wire counter	measure trawl cable	Model # 750-N
Catch processing	**Data type/function**	**Model/version/serial #**
Marel basket scale	weigh baskets of catch	Model # M100
Marel specimen scale	weigh individual specimens	Type M2000 Model 2030, 6643
Measurement Systems International (MSI) load cell	weigh cod end with catch	Model # 9300
Catch data entry program	onboard catch database	Written in Access 2003 AFSC version no. 20090324
Juniper systems LS 600 Polycorder	record fish length data	Models 3333, 3227, P60-5482, P60-5400
Ichthystick	record fish length data	GF-36-003, GF-36-005
Dell computer	data recording	Dell Models 5067,05357
Laser printers	produce hard copy of data	HP 1670, 1671, 1675, VND2509
Digital camera	photograph specimens	Optio W60, Serial #9307182
Federal Scientific Research Permit	allows research sampling	SRP # 2012-15
State of Alaska Research Permit	allows research sampling	CF-12-098
Northwest Arctic Burough Title 9 Permit	allows research sampling	Title 9 Minor Use Permit #: 118-03-12

Species identification guides

Clark, R.N. 2006. *Field Guide to the Benthic Marine Invertebrates of Alaska's Shelf and Upper Slope.* AFSC unpublished manuscript.

Jorgenson, E.M. 2009. *Field Guide to the Squids and Octopods of the Eastern North Pacific and Bering Sea.* Alaska Sea Grant College Program. University of Alaska Fairbanks, 100 p.

Kessler, D. 2006. *A Working Field Guide to Trawl Caught Animals.* AFSC unpublished manuscript.

Mecklenburg, C.W., T.A. Mecklenburg, and L.K. Thorsteinson. 2002. *Fishes of Alaska.* American Fisheries Society, 1037 p.

Orr, J.W., M.A. Brown and D. Baker. 2000. *Guide to rockfishes (Scorpaenidae) of the genera Sebastes, Sebastolobus, and Adelosebastes of the Northeast Pacific Ocean.* 2nd Edition NOAA Tech. Memo. NMFS-AFSC-117, 47 p.

Stevenson, D.E., J.W. Orr, G.R. Hoff and J.D. McEachran. 2007. *Field Guide to Sharks, Skates, and Ratfish of Alaska.* Alaska Sea Grant College Program. University of Alaska Fairbanks, 77 p.

Table 2.--Vessel itinerary and scientists participating in the 2012 Chukchi Sea bottom trawl survey.

Name	Survey Position	Affiliation
Leg 1: August 9- 31		
Bob Lauth	Chief Scientist	AFSC[1]
Lyle Britt	Deck Lead	AFSC
Roger Clark	Invertebrate Taxonomy	AFSC Contractor
Dan Urban	Crab Biologist	AFSC
Ben Gray	Biologist	UAF[2]
Dave Drumm	Food Web Ecology	AFSC
Leg 2: September 1-24		
Lyle Britt	Chief Scientist	AFSC
Jay Orr	Deck Lead	AFSC
Roger Clark	Invertebrate Taxonomy	AFSC Contractor
Jan Haaga	Crab Biologist	AFSC
Lauren Divine	Biologist	UAF
Andy Whitehouse	Food Web Ecology	UW/JISAO[3]

[1]Alaska Fisheries Science Center
[2]University of Alaska Fairbanks, School of Fisheries and Ocean Sciences, Fairbanks, AK.
[3]University of Washington, Joint Institute for the Study of the Atmosphere and Ocean

Table 3.--Summary of special project collections from the 2012 Chukchi bottom trawl survey.

Project Title	PI	Agency	Contact Information
Saffron cod genetics	A. J. Gharrett	UAF[1]	a.gharrett@alaska.edu
Age and growth of Arctic cod, saffron cod, and capelin	Tom Helser	AFSC[2]	thomas.helser@noaa.gov
Snow crab life history and diet studies	Katrin Iken	UAF	kbiken@alaska.edu
Diet comparison of six demersal fishes inhabiting the Beaufort and Chukchi Seas	Ben Gray Brenda Norcross	UAF UAF	bpgray@alaska.edu bnorcross@alaska.edu
Fish trophic interactions	Troy Buckley Kerim Aydin	AFSC AFSC	troy.buckley@noaa.gov kerim.aydin@noaa.gov
Spatial and temporal variability in the trophic roles of the Chukchi Sea fishes using N and C stable isotopes	Jen Marsh Franz Mueter	UAF UAF	jmmarsh@alaska.edu fmueter@alaska.edu
Plumb staff beam trawl catch comparison to the 83-112 eastern bottom trawl	Brenda Norcross Bob Lauth	UAF AFSC	bnorcross@alaska.edu bob.lauth@noaa.gov
Stock composition of salmon, Arctic cod, and capelin	Jeff Guyon	AFSC	jeff.guyon@noaa.gov
Fish energetics and nutritional condition	Ron Heintz Johanna Vollenweider	AFSC AFSC	ron.heintz@noaa.gov johanna.vollenweider@noaa.gov
Assessing the role of light on the vertical distribution of fishes	Stan Kotwicki	AFSC	stan.kotwicki@noaa.gov
Taxonomic investigation of northern populations of wattled eelpouts	Duane Stevenson	AFSC	duane.stevenson@noaa.gov
Snailfish taxonomy and systematics	James Orr	AFSC	james.orr@noaa.gov
Bitter crab syndrome in snow crabs	Frank Morado	AFSC	jfmorado99@gmail.com
Gadiformes fish photos for Sea Grant book	Gerald Hoff	AFSC	jerry.hoff@noaa.go
Flathead sole and Bering flounder genetics in the Arctic	James Orr	AFSC	james.orr@noaa.gov
Develop a marine paleoclimate proxy time series from Arctic surfclam	Tom Helser	AFSC	thomas.helser@noaa.gov
Develop a marine paleoclimate proxy time series part B	Tom Helser	AFSC	thomas.helser@noaa.gov
Digital photos of fishes and invertebrates.	Gay Sheffield	UAF/ASG[3]	gay.sheffield@alaska.edu
Conductivity, temperature, depth (CTD) profile data	Ned Cokelet	PMEL[4]	cokelet@pmel.noaa.gov
Prey library for marine mammals.	Robert Suydam Heather Smith	NSB[5] NSB	robert.suydam@north-slope.org heathersmith.r@gmail.com

[1]University of Alaska, Fairbanks (UAF)

[2]NOAA-Alaska Fisheries Science Center (AFSC)

[3]Alaska Sea Grant, Nome, AK (ASG)

[4]NOAA-Pacific Marine Environmental Laboratory (PMEL)

[5]North Slope Borough-Department of Wildlife Management (NSB)

RESULTS

Seventy-one of the 73 stations were successfully completed during the 2012 Chukchi Sea survey (Fig. 1). Two stations were determined to be untrawlable. Station CH30-O01 was covered in ice, therefore no attempt was made to sample the station. Two attempts were made to sample station CH30-N06, but due to excessive mud in the catch sample, the station was abandoned. Summarized haul and catch data at each station can be found in Appendix A.

Mean bottom depths by station ranged from 12 m at Station CH30-G04 in Ledyard Bay to 90 m at Station CH30-L08 along the northern boundary of the survey area at the edge of Barrow Canyon. Mean bottom depth for all stations was 42 m. Mean bottom temperatures by station ranged from -1.7 to 10.7°C with a combined mean of 2.7°C (Figs. 3 and 4). The coldest bottom temperatures were in the north with the exception of station CH30-B06, in Kotzebue Sound, where the bottom temperature was -0.4°C, the coldest temperature recorded south of Wainwright. Warmer bottom temperatures were generally in the shallowest waters along the coast. Surface temperature ranged from -0.5 to 11.2°C with a mean of 5.2°C (Figs. 3 and 5). The warmest surface temperatures were observed close to the coastline while the coldest temperatures were observed at the northernmost stations.

A total of 56 fish and 277 invertebrate taxa were identified during the 2012 Chukchi Sea survey. See Appendix B for a descending rank of all organisms caught. Lists of all fishes and invertebrates caught on the survey can be found in Tables 7 and 8 and Appendices C and D.

Fishes accounted for 4.6% of the total survey CPUE (kg/ha) (Fig. 6; Tables 4 and 7) compared to 95.4% for invertebrates (Fig. 7; Tables 5 and 8). The 15 most abundant fish species accounted for 96% of the total fish CPUE (kg/ha). Fish lengths were collected from 48 species (Table 6). Maps of CPUE by station and plots of estimated abundance-at-length for the top 15 fish species and *Gadus chalcogrammus* (walleye pollock) are presented in Figs. 8-38. *Boreogadus saida* (Arctic cod) was the most abundant fish species by weight and number, and was the only fish or invertebrate taxon observed at 70 of 71 stations. *Eleginus gracilis* (saffron cod) was the second most abundant fish species with the largest abundance occurring south of Point Hope in Kotzebue Sound.

Invertebrates dominated the catches and accounted for 95.4% of the total survey CPUE (kg/ha). Maps with CPUE by station for the top 15 species are presented in Figures 39-54. *Strongylocentrotus droebachiensis* (green sea urchin) was the dominant species by weight and number (Table 8). Although *S. droebachiensis* was the most abundant invertebrate species, it only occurred at 38 of 71 stations. *Pagurus trigonocheirus* (fuzzy hermit) and *Hyas coarctatus* (circumboreal toad crab) were the most frequently observed invertebrates, occurring at 65 stations each. *Labidochirus splendescens* (splendid hermit crab) and *Argis lar* (kuro argid shrimp) occurred at 64 and 63 stations, respectively.

Three commercially important crab species were identified, *Chionoecetes opilio* (snow crab), *Paralithodes camtschaticus* (red king crab), and *Paralithodes platypus* (blue king crab; Figs. 55-60; Table 9). Over 28,000 *C. opilio* were caught at 63 stations. Of the 28,000 caught, only 29 were legal males (carapace width ≥78 mm). A total of 34 *P. platypus* occurred in eight hauls (Fig. 59; Appendix D), while only two *P. camtschaticus* (red king crab) occurred in two hauls (Fig. 60; Appendix D).

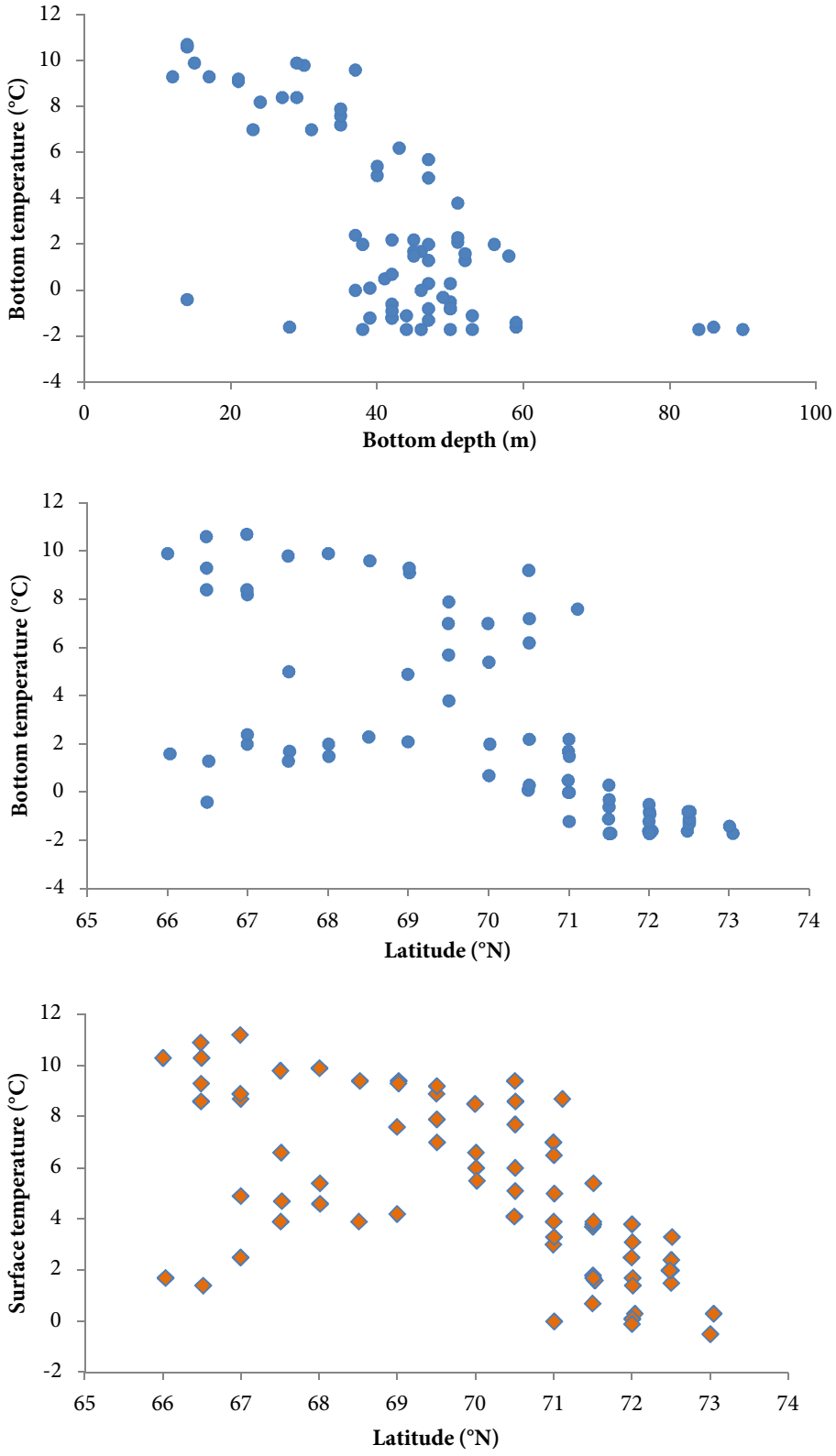


Figure 3.--Relationship between bottom temperature (°C), bottom depth (m), and latitude (°N) collected during the 2012 Chukchi Sea bottom trawl survey.

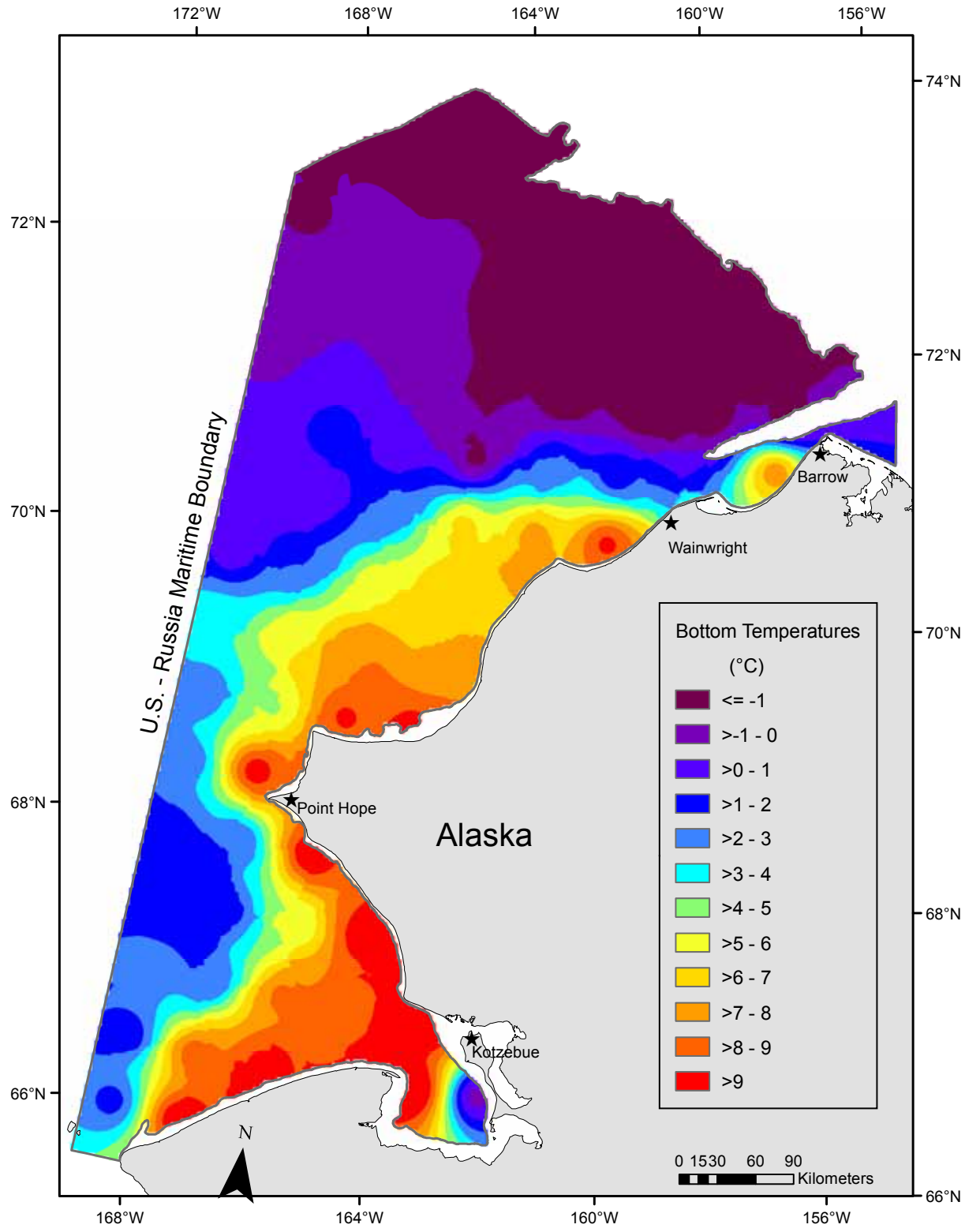


Figure 4.--Map of bottom temperatures (°C) collected during the 2012 Chukchi Sea bottom trawl survey.

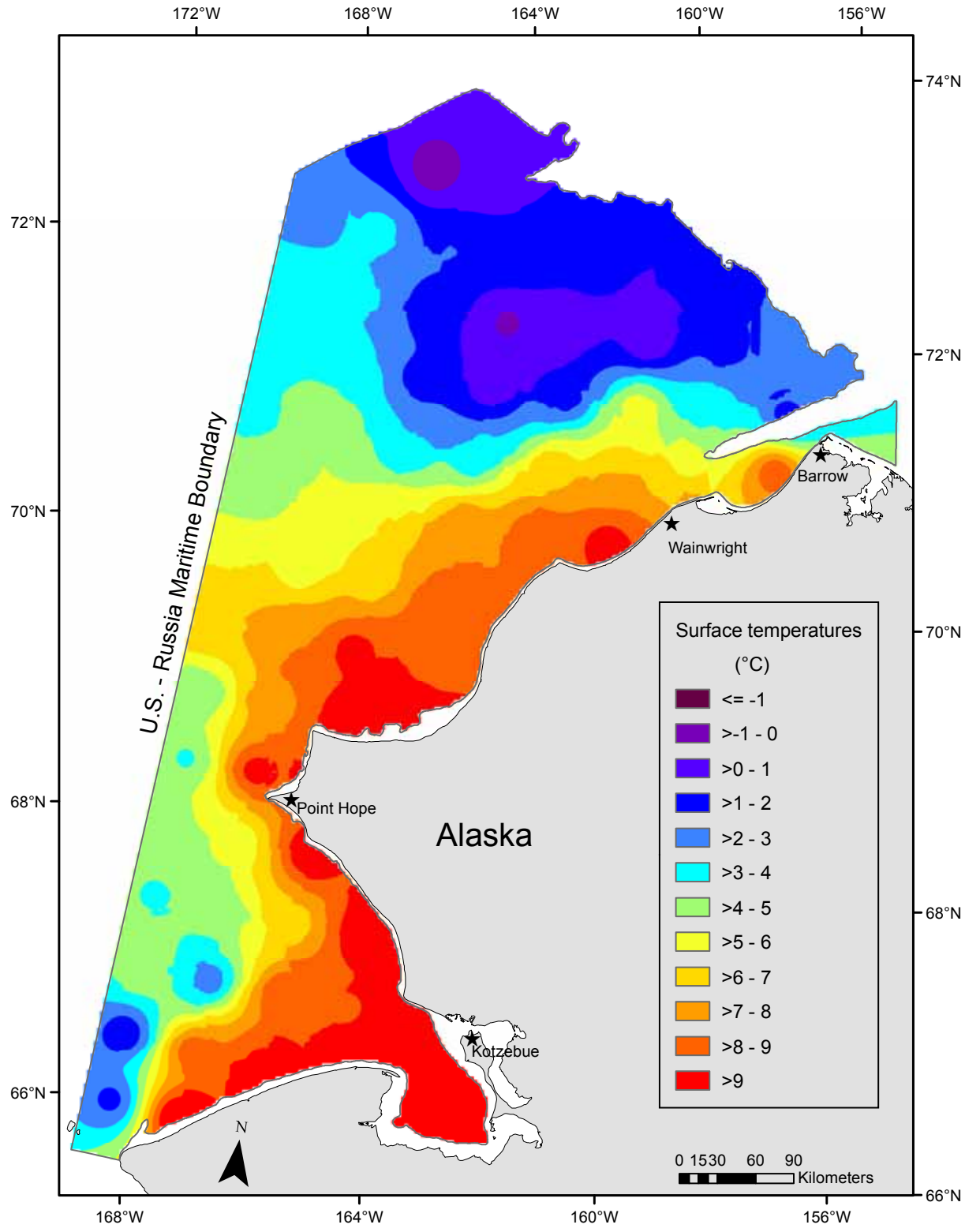


Figure 5.--Map of surface temperatures (°C) collected during the 2012 Chukchi Sea bottom trawl survey.

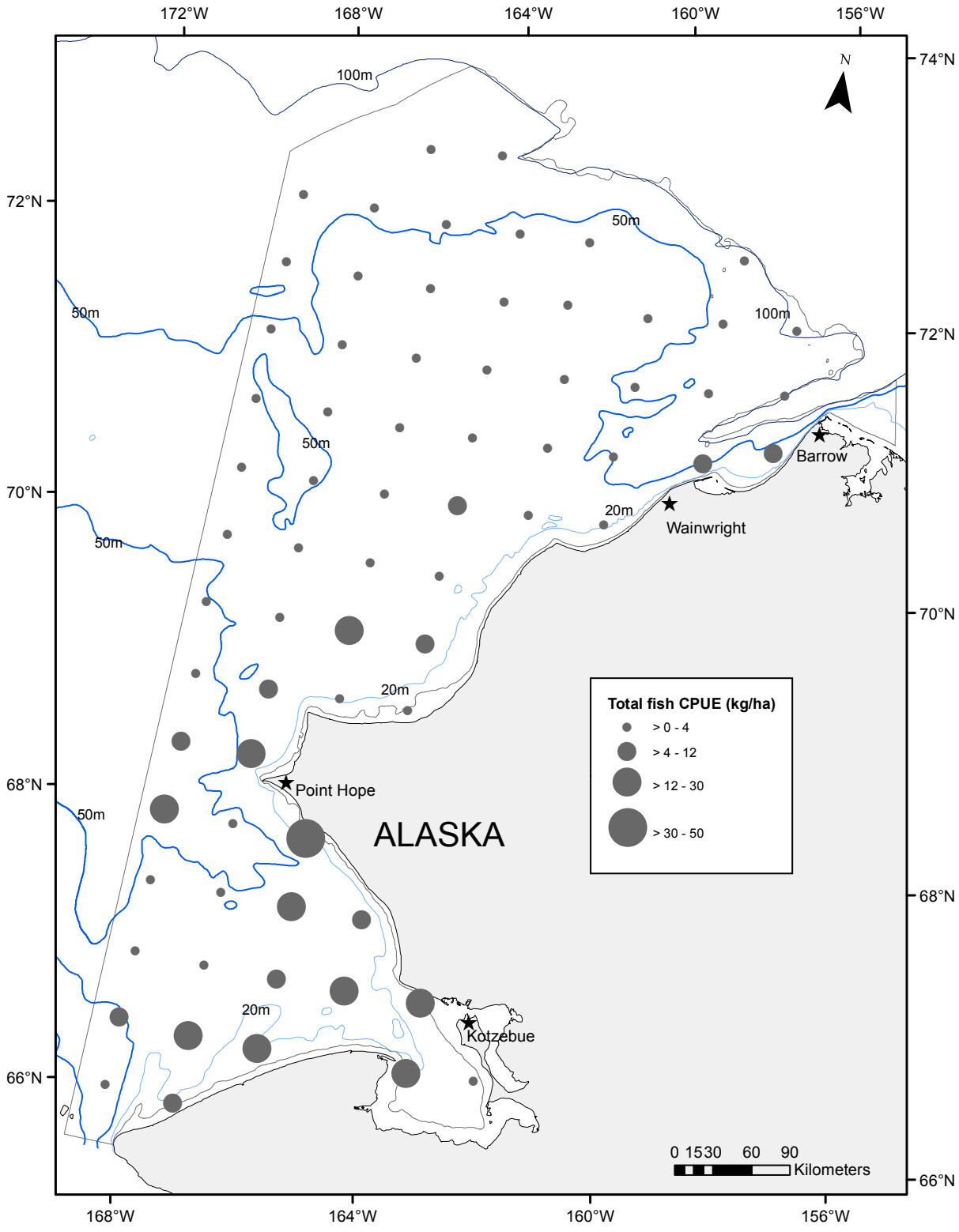


Figure 6.--Total fish catch per unit effort (CPUE kg/ha) at each station from the 2012 Chukchi Sea bottom trawl survey.

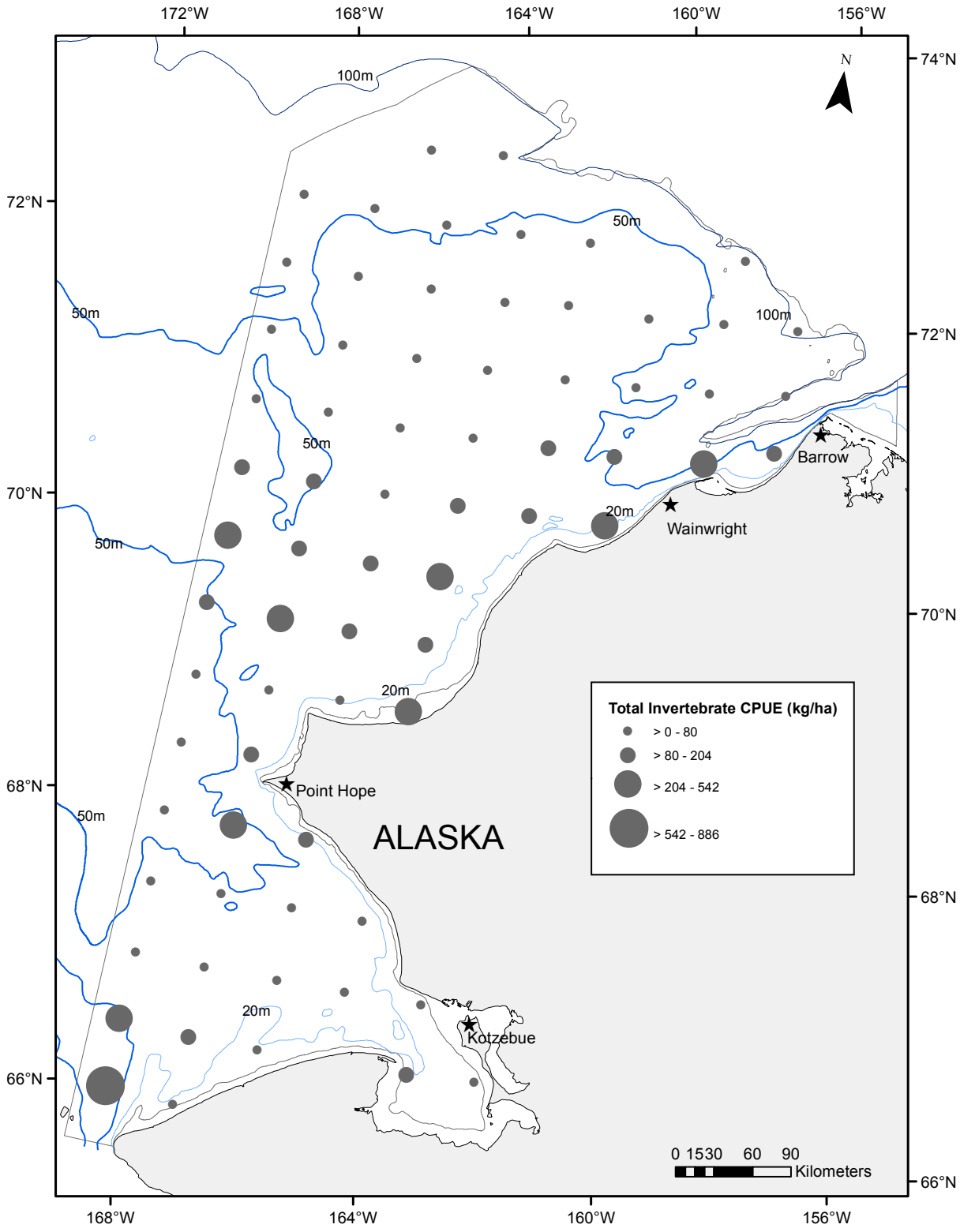


Figure 7.--Total invertebrate catch per unit effort (CPUE kg/ha) at each station from the 2012 Chukchi Sea bottom trawl survey.

Table 4.--Mean catch per unit effort (CPUE), estimated biomass (t), estimated population, and standard error for the 25 most abundant fish species, ranked by weight (kg/ha), caught during the 2012 Chukchi Sea bottom trawl survey.

Scientifc name	Common name	Mean CPUE (kg/ha)	Standard error mean CPUE (kg/ha)	Mean CPUE (no./ha)	Standard error mean CPUE (no./ha)	Estimated biomass (t)	Standard error estimated biomass (t)	Estimated population	Standard error estimated population
Boreogadus saida	Arctic cod	1.46	0.31	119.73	24.17	31,536.62	210,914.00	2,586,433,070	522,118,492
Eleginus gracilis	saffron cod	1.08	0.58	12.05	5.04	23,332.74	397,569.00	260,274,268	108,916,425
Clupea pallasi	Pacific herring	0.83	0.30	7.45	2.79	17,940.01	208,042.78	160,995,341	60,270,866
Limanda aspera	yellowfin sole	0.33	0.11	7.97	3.32	7,164.00	78,231.02	172,066,672	71,678,375
Platichthys stellatus	starry flounder	0.25	0.10	0.40	0.15	5,480.63	66,094.65	8,553,103	3,340,924
Myoxocephalus verrucosus	warty sculpin	0.14	0.05	4.56	1.67	3,090.69	32,667.29	98,397,326	36,008,960
Osmerus mordax	rainbow smelt	0.13	0.05	2.53	0.97	2,841.54	37,322.59	54,715,205	21,003,265
Lycodes turneri	polar eelpout	0.10	0.06	0.65	0.49	2,201.19	44,358.71	14,128,022	10,516,616
Hippoglossoides robustus	Bering flounder	0.10	0.03	2.54	0.57	2,057.88	17,557.43	54,969,124	12,213,997
Gymnocanthus tricuspis	Arctic staghorn sculpin	0.08	0.02	7.22	2.65	1,794.99	12,540.88	155,874,337	57,234,160
Pleuronectes quadrituberculatus	Alaska plaice	0.08	0.03	0.77	0.31	1,674.86	17,965.64	16,531,168	6,796,991
Liparis gibbus	variegated snailfish	0.07	0.03	0.86	0.28	1,565.68	17,119.45	18,613,728	6,104,642
Bathyraja parmifera	Alaska skate	0.05	0.05	0.01	0.01	1,158.86	36,646.22	167,465	167,465
Lycodes palearis	wattled eelpout	0.03	0.01	0.66	0.24	620.77	7,980.03	14,263,997	5,168,052
Lumpenus fabricii	slender eelblenny	0.03	0.01	3.80	1.06	595.97	7,190.31	82,146,461	22,984,398
Lycodes raridens	marbled eelpout	0.02	0.01	0.31	0.11	508.69	8,476.06	6,674,000	2,442,822
Limanda proboscidea	longhead dab	0.02	0.02	0.48	0.35	483.62	10,983.84	10,382,734	7,572,021
Liparis tunicatus	kelp snailfish	0.02	0.01	1.33	0.39	448.97	4,694.45	28,731,221	8,322,915
Enophrys diceraus	antlered sculpin	0.02	0.01	0.31	0.13	419.80	5,882.60	6,748,470	2,782,499
Myoxocephalus jaok	plain sculpin	0.02	0.01	0.63	0.34	357.30	5,740.79	13,594,925	7,337,139
Mallotus villosus	capelin	0.01	0.01	1.82	0.59	299.95	3,797.64	39,207,490	12,681,879
Lycodes polaris	Canadian eelpout	0.01	0.01	0.30	0.13	280.75	4,082.44	6,374,722	2,705,565
Myoxocephalus quadricornis	fourhorn sculpin	0.01	0.01	0.05	0.03	145.18	3,460.52	1,025,804	562,408
Gymnocanthus pistilliger	threaded sculpin	0.01	0.01	0.26	0.25	132.19	4,013.02	5,634,930	5,358,111
Gadus chalcogrammus	walleye pollock	0.01	<0.01	0.79	0.29	117.02	1,368.92	17,035,608	6,332,279

Table 5.--Mean catch per unit effort (CPUE), estimated biomass (t), estimated population, and standard error for the 25 most abundant invertebrate species, ranked by weight (kg/ha), caught during the 2012 Chukchi Sea bottom trawl survey.

Scientific name	Common name	Mean CPUE (kg/ha)	Standard error mean CPUE (kg/ha)	Mean CPUE (no./ha)	Standard error mean CPUE (no./ha)	Estimated biomass (t)	Standard error estimated biomass (t)	Estimated population	Standard error estimated population
Strongylocentrotus droebachiensis	green sea urchin	15.89	6.93	387	214	343,264.78	4,733,302.98	8,363,427,230	4,620,317,923
Asterias amurensis	purple-orange sea star	8.80	3.39	236	127	190,112.57	2,318,259.99	5,105,542,392	2,749,230,382
Pagurus trigonocheirus	fuzzy hermit crab	7.87	1.67	162	28	170,038.63	1,141,284.36	3,506,792,235	594,813,754
Chionoecetes opilio	snow crab	7.45	2.58	212	76	160,948.33	1,759,425.92	4,590,286,550	1,644,327,579
Psolus fabricii	brownscaled sea cucumber	5.54	2.45	157	72	119,752.10	1,676,834.22	3,389,893,515	1,561,295,023
Neptunea heros		4.48	1.18	45	11	96,776.13	807,652.93	981,091,430	243,536,410
Boltenia ovifera		4.17	3.32	2	1	89,984.17	2,268,204.83	37,001,397	18,375,188
Leptasterias polaris		3.99	0.94	40	9	86,216.35	642,623.77	870,489,225	189,236,796
Gorgonocephalus sp. cf. *arcticus*		3.59	1.51	37	14	77,582.90	1,031,207.71	808,280,790	295,779,859
	empty gastropod shells	3.55	1.14	-	-	76,773.87	779,824.17	-	-
Halichondria sp.		3.30	3.17	-	-	71,372.01	2,163,710.73	-	-
Styela rustica	sea potato	2.42	1.16	1	1	52,329.23	794,959.05	23,858,086	13,020,864
Chrysaora melanaster		2.27	0.42	2	1	48,965.31	287,109.11	53,136,528	11,725,802
Urticina crassicornis	mottled anemone	1.93	0.60	44	15	41,724.11	412,167.97	945,383,652	314,279,895
Halichondria sitiens	black papillate sponge	1.77	1.24	-	-	38,167.84	846,783.82	-	-
Halocynthia aurantium	sea peach	1.65	0.96	5	5	35,684.96	657,765.18	116,610,358	103,051,984
Gorgonocephalus eucnemis	basketstar	1.58	1.23	10	6	34,110.16	841,309.73	211,917,234	140,045,115
Cyanea capillata	lion's mane	1.45	0.43	12	4	31,351.39	294,510.54	266,826,663	91,615,179
Hyas coarctatus	circumboreal toad crab	1.34	0.49	44	14	28,886.35	331,865.29	948,592,151	306,878,461
Neptunea ventricosa	fat whelk	1.33	0.73	15	8	28,817.77	495,693.01	330,555,670	170,793,503
	empty bivalve shells	1.16	0.74	0	0	25,162.10	507,151.14	216,766	216,766
Urasterias lincki		1.15	0.47	8	4	24,948.01	320,169.45	179,609,454	82,245,717
Ascidiacea	tunicate unident.	1.12	0.65	3	3	24,150.04	444,385.11	70,218,674	56,909,782
Solaster arcticus		0.98	0.86	1	1	21,242.08	585,942.19	26,820,402	13,835,244
Telmessus cheiragonus	helmet crab	0.89	0.36	12	6	19,159.74	244,774.04	263,889,573	120,357,593

Table 6.--Fish species with length data from the 2012 Chukchi Sea bottom trawl survey.

Scientific name	Common name	Number of lengths	Minimum length (cm)	Maximum length (cm)	Mean length (cm)
Boreogadus saida	Arctic cod	3,839	4	25	11.9
Gymnocanthus tricuspis	Arctic staghorn sculpin	698	3	41	10.0
Limanda aspera	yellowfin sole	591	4	29	15.3
Eleginus gracilis	saffron cod	565	4	36	18.7
Lumpenus fabricii	slender eelblenny	480	5	29	13.9
Clupea pallasi	Pacific herring	458	11	29	21.5
Myoxocephalus verrucosus	warty sculpin	413	5	29	13.2
Hippoglossoides robustus	Bering flounder	358	4	29	14.2
Osmerus mordax	rainbow smelt	281	10	30	18.9
Mallotus villosus	capelin	186	6	16	10.6
Liparis tunicatus	kelp snailfish	155	3	16	9.2
Liparis gibbus	variegated snailfish	116	8	31	16.8
Pleuronectes quadrituberculatus	Alaska plaice	112	11	31	19.1
Gadus chalcogrammus	walleye pollock	106	6	16	9.9
Myoxocephalus jaok	plain sculpin	94	6	23	13.5
Lycodes palearis	wattled eelpout	90	9	32	20.7
Artediellus scaber	hamecon	78	2	9	6.5
Limanda proboscidea	longhead dab	70	10	23	15.3
Triglops pingeli	ribbed sculpin	68	4	15	9.9
Lycodes turneri	polar eelpout	63	11	78	26.3
Platichthys stellatus	starry flounder	58	19	59	33.4
Ulcina olrikii	Arctic alligatorfish	47	4	6	4.8
Podothecus veternus	veteran poacher	46	6	17	11.8
Enophrys diceraus	antlered sculpin	42	8	19	13.4
Lycodes polaris	Canadian eelpout	40	11	45	17.8
Lycodes raridens	marbled eelpout	38	7	38	20.8
Ammodytes hexapterus	Pacific sand lance	26	5	13	9.2
Liopsetta glacialis	Arctic flounder	25	10	21	13.1
Limanda sakhalinensis	Sakhalin sole	21	7	17	13.7
Acantholumpenus mackayi	pighead prickleback	15	21	39	30.6
Liparis marmoratus	festive snailfish	15	3	12	8.7
Hexagrammos stelleri	whitespotted greenling	13	12	19	14.3
Lumpenus medius	stout eelblenny	10	6	14	11.3
Nautichthys pribilovius	eyeshade sculpin	10	5	8	6.5
Hemilepidotus papilio	butterfly sculpin	9	6	17	10.3
Icelus spatula	spatulate sculpin	9	5	11	8.0
Stichaeus punctatus	Arctic shanny	6	8	15	10.5

Table 6.--Continued.

Scientific name	Common name	Number of lengths	Minimum length (cm)	Maximum length (cm)	Mean length (cm)
Myoxocephalus polyacanthocephalus	great sculpin	5	9	10	9.5
Lycodes mucosus	saddled eelpout	4	13	26	18.0
Myoxocephalus quadricornis	fourhorn sculpin	4	11	21	16.3
Gadus macrocephalus	Pacific cod	4	10	13	11.0
Pallasina barbata	tubenose poacher	4	9	12	10.5
Lumpenus maculatus	daubed shanny	2	8	9	8.5
Bathyraja parmifera	Alaska skate	1	95	95	95.0
Myoxocephalus scorpioides	Arctic sculpin	1	15	15	15.0
Blepsias bilobus	crested sculpin	1	14	14	14.0
Reinhardtius hippoglossoides	Greenland turbot	1	10	10	10.0
Liparis fabricii	gelatinous seasnail	1	10	10	10.0

Table 7.--Mean and standard error of catch per unit effort (kg/ha and no./ha) for fish species caught during the 2012 Chukchi Sea bottom trawl survey.

Scientific name	Common name	Mean CPUE (kg/ha)	Standard error CPUE (kg/ha)	Mean CPUE (no./ha)	Standard error CPUE (no./ha)
Boreogadus saida	Arctic cod	1.46	0.31	119.73	24.17
Eleginus gracilis	saffron cod	1.08	0.58	12.05	5.04
Clupea pallasi	Pacific herring	0.83	0.30	7.45	2.79
Limanda aspera	yellowfin sole	0.33	0.11	7.97	3.32
Platichthys stellatus	starry flounder	0.25	0.10	0.40	0.15
Myoxocephalus verrucosus	warty sculpin	0.14	0.05	4.56	1.67
Osmerus mordax	rainbow smelt	0.13	0.05	2.53	0.97
Lycodes turneri	polar eelpout	0.10	0.06	0.65	0.49
Hippoglossoides robustus	Bering flounder	0.10	0.03	2.54	0.57
Gymnocanthus tricuspis	Arctic staghorn sculpin	0.08	0.02	7.22	2.65
Pleuronectes quadrituberculatus	Alaska plaice	0.08	0.03	0.77	0.31
Liparis gibbus	variegated snailfish	0.07	0.03	0.86	0.28
Bathyraja parmifera	Alaska skate	0.05	0.05	0.01	0.01
Lycodes palearis	wattled eelpout	0.03	0.01	0.66	0.24
Lumpenus fabricii	slender eelblenny	0.03	0.01	3.80	1.06
Lycodes raridens	marbled eelpout	0.02	0.01	0.31	0.11
Limanda proboscidea	longhead dab	0.02	0.02	0.48	0.35
Liparis tunicatus	kelp snailfish	0.02	0.01	1.33	0.39
Enophrys diceraus	antlered sculpin	0.02	0.01	0.31	0.13
Myoxocephalus jaok	plain sculpin	0.02	0.01	0.63	0.34
Mallotus villosus	capelin	0.01	0.01	1.82	0.59
Lycodes polaris	Canadian eelpout	0.01	0.01	0.30	0.13
Myoxocephalus quadricornis	fourhorn sculpin	0.01	0.01	0.05	0.03
Gymnocanthus pistilliger	threaded sculpin	0.01	0.01	0.26	0.25
Gadus chalcogrammus	walleye pollock	0.01	<0.01	0.79	0.29
Acantholumpenus mackayi	pighead prickleback	0.01	0.01	0.10	0.10
Liopsetta glacialis	Arctic flounder	<0.01	<0.01	0.17	0.16
Triglops pingeli	ribbed sculpin	<0.01	<0.01	0.63	0.30
Podothecus veternus	veteran poacher	<0.01	<0.01	0.43	0.14
Limanda sakhalinensis	Sakhalin sole	<0.01	<0.01	0.15	0.09
Artediellus scaber	hamecon	<0.01	<0.01	0.71	0.26
Enophrys lucasi	leister sculpin	<0.01	<0.01	0.05	0.03
Hexagrammos stelleri	whitespotted greenling	<0.01	<0.01	0.08	0.06
Chirolophis snyderi	bearded warbonnet	<0.01	<0.01	0.05	0.05

Table 7.--Continued.

Scientific name	Common name	Mean CPUE (kg/ha)	Standard error CPUE (kg/ha)	Mean CPUE (no./ha)	Standard error CPUE (no./ha)
Liparis marmoratus	festive snailfish	<0.01	<0.01	0.11	0.03
Lycodes mucosus	saddled eelpout	<0.01	<0.01	0.03	0.02
Blepsias bilobus	crested sculpin	<0.01	<0.01	0.01	0.01
Hemilepidotus papilio	butterfly sculpin	<0.01	<0.01	0.07	0.03
Megalocottus platycephalus	belligerent sculpin	<0.01	<0.01	0.01	0.01
Myoxocephalus scorpioides	Arctic sculpin	<0.01	<0.01	0.01	0.01
Icelus spatula	spatulate sculpin	<0.01	<0.01	0.07	0.05
Nautichthys pribilovius	eyeshade sculpin	<0.01	<0.01	0.12	0.05
Ulcina olrikii	Arctic alligatorfish	<0.01	<0.01	0.39	0.14
Pleuronectiformes	flatfish unident.	<0.01	<0.01	0.01	0.01
Myoxocephalus polyacanthocephalus	great sculpin	<0.01	<0.01	0.04	0.03
Lumpenus medius	stout eelblenny	<0.01	<0.01	0.10	0.08
Ammodytes hexapterus	Pacific sand lance	<0.01	<0.01	0.19	0.14
Gadus macrocephalus	Pacific cod	<0.01	<0.01	0.03	0.02
Stichaeus punctatus	Arctic shanny	<0.01	<0.01	0.04	0.03
Liparis sp.	snailfish unident.	<0.01	<0.01	0.02	0.01
Liparis fabricii	gelatinous seasnail	<0.01	<0.01	0.01	0.01
Pallasina barbata	tubenose poacher	<0.01	<0.01	0.05	0.03
Lumpenus maculatus	daubed shanny	<0.01	<0.01	0.02	0.02
Reinhardtius hippoglossoides	Greenland turbot	<0.01	<0.01	0.01	0.01

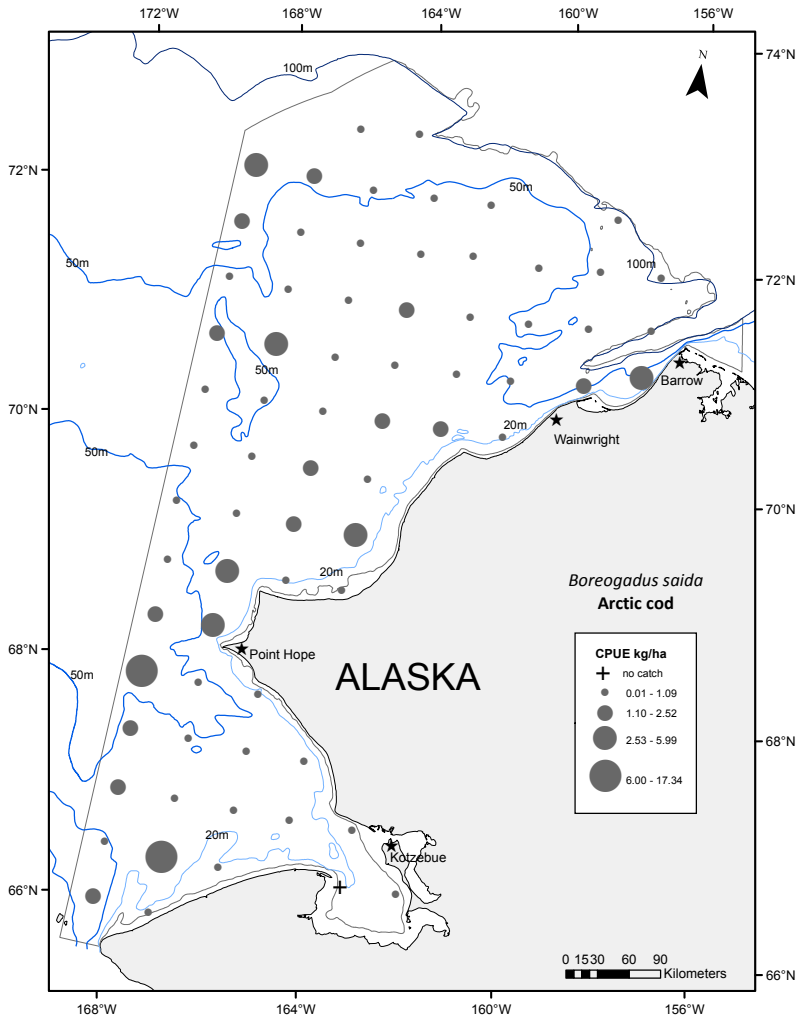


Figure 8.--Distribution and relative abundance (CPUE kg/ha) of *Boreogadus saida* (Arctic cod) for the 2012 Chukchi Sea bottom trawl survey.

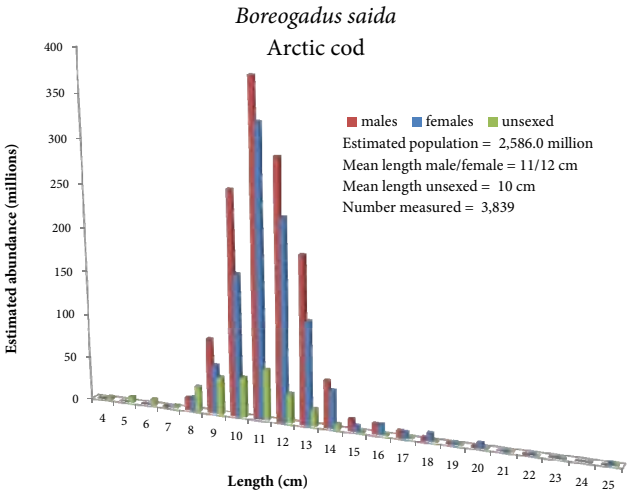


Figure 9.--Estimated abundance at length by sex of *Boreogadus saida* (Arctic cod) for the 2012 Chukchi Sea bottom trawl survey.

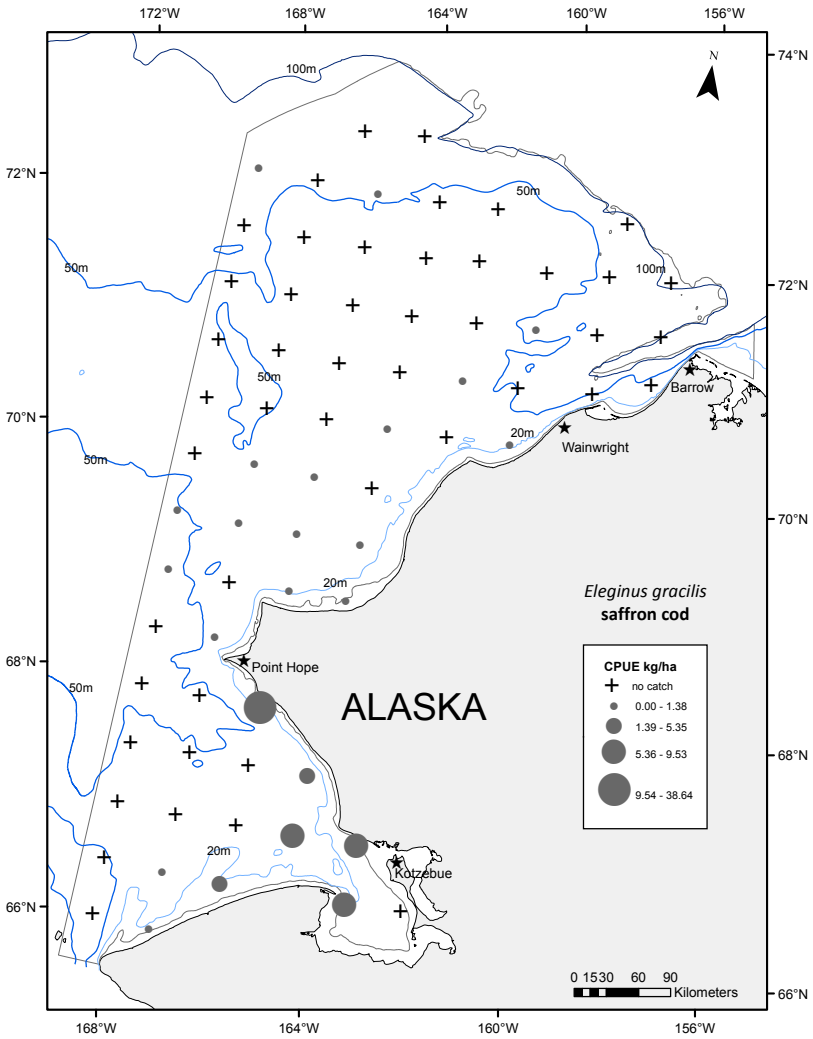


Figure 10.--Distribution and relative abundance (CPUE kg/ha) of *Eleginus gracilis* (saffron cod) for the 2012 Chukchi Sea bottom trawl survey.

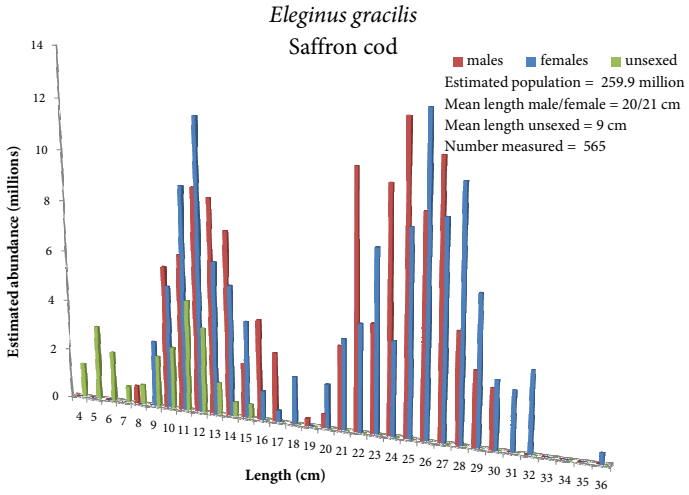


Figure 11.--Estimated abundance at length by sex of *Eleginus gracilis* (saffron cod) for the 2012 Chukchi Sea bottom trawl survey.

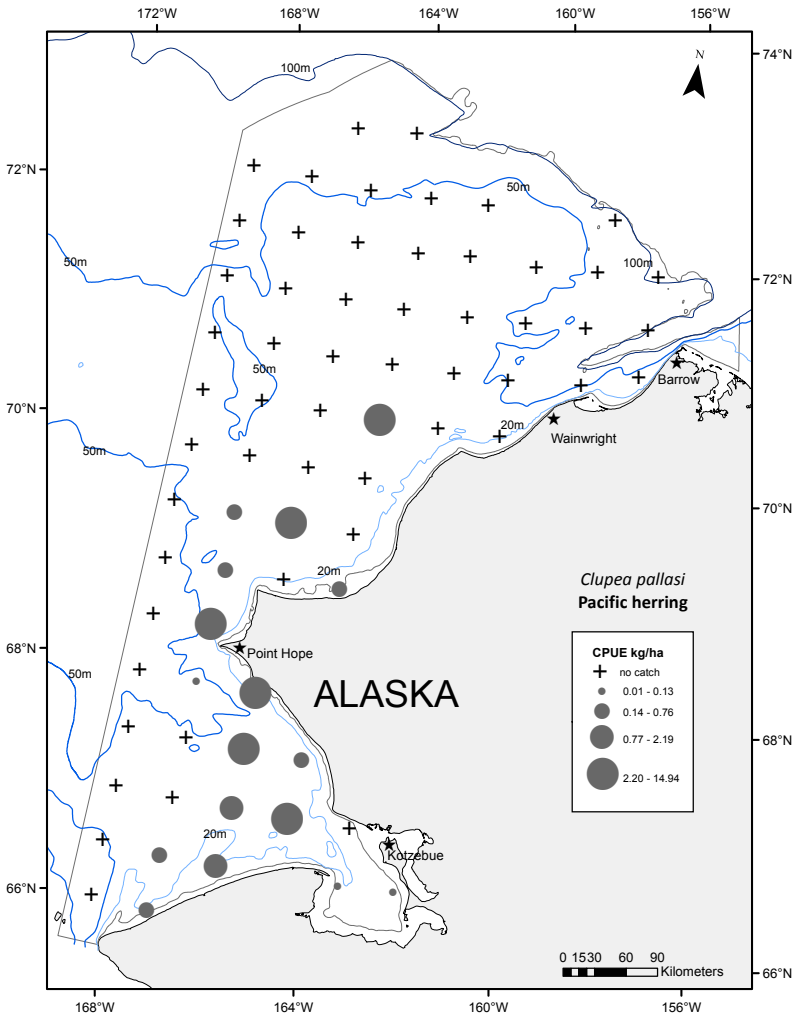


Figure 12.--Distribution and relative abundance (CPUE kg/ha) of *Clupea pallasi* (Pacific herring) for the 2012 Chukchi Sea bottom trawl survey.

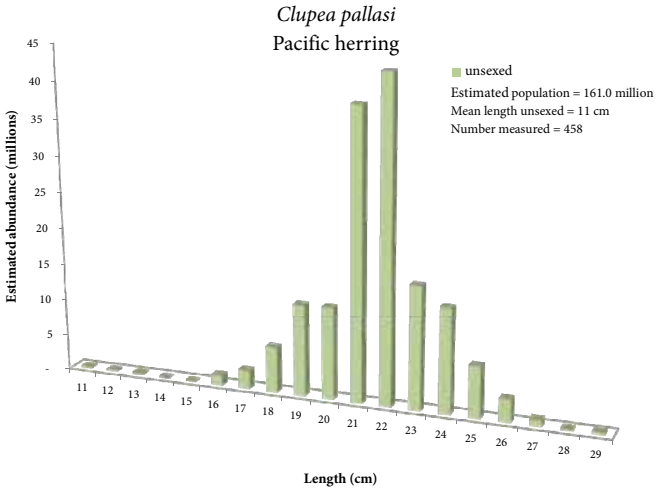


Figure 13.--Estimated abundance at length by sex of *Clupea pallasi* (Pacific herring) for the 2012 Chukchi Sea bottom trawl survey.

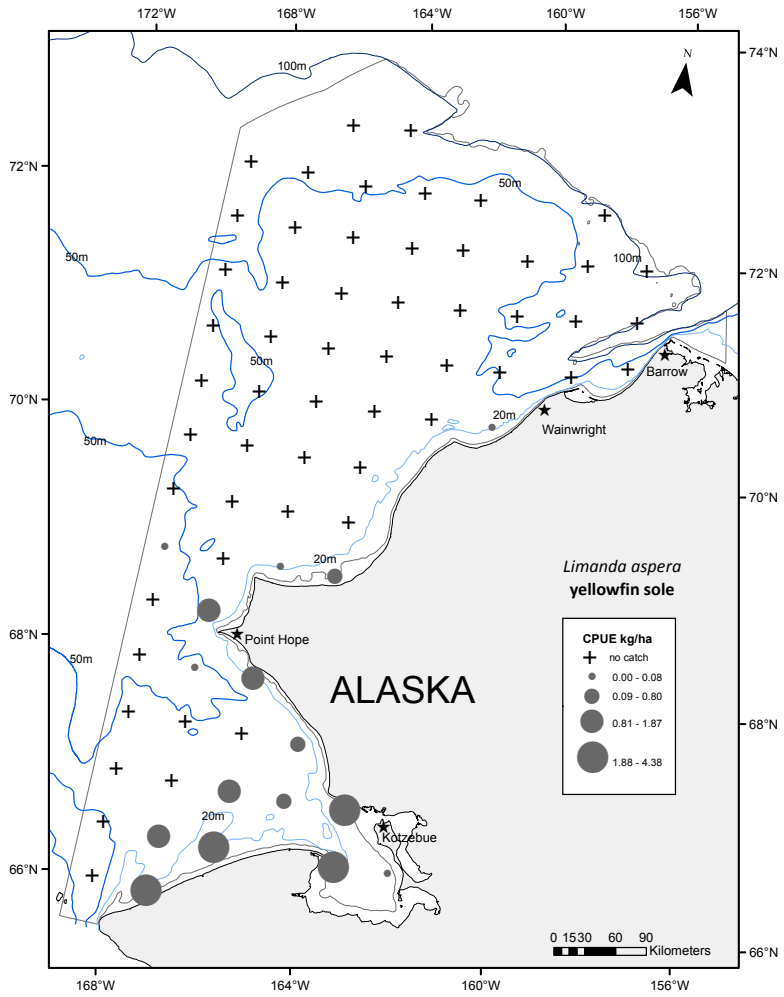


Figure 14.--Distribution and relative abundance (CPUE kg/ha) of *Limanda aspera* (yellowfin sole) for the 2012 Chukchi Sea bottom trawl survey.

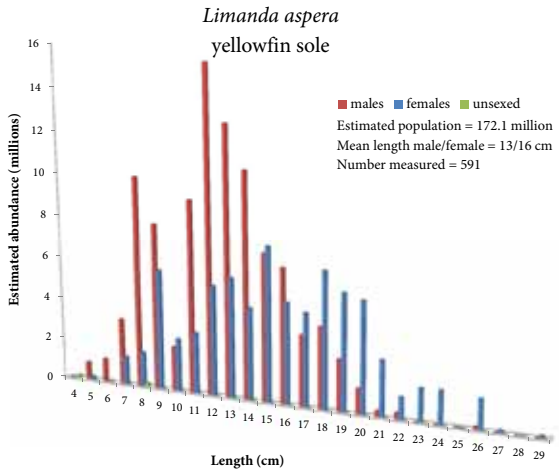


Figure 15.--Estimated abundance at length by sex of *Limanda aspera* (yellowfin sole) for the 2012 Chukchi Sea bottom trawl survey.

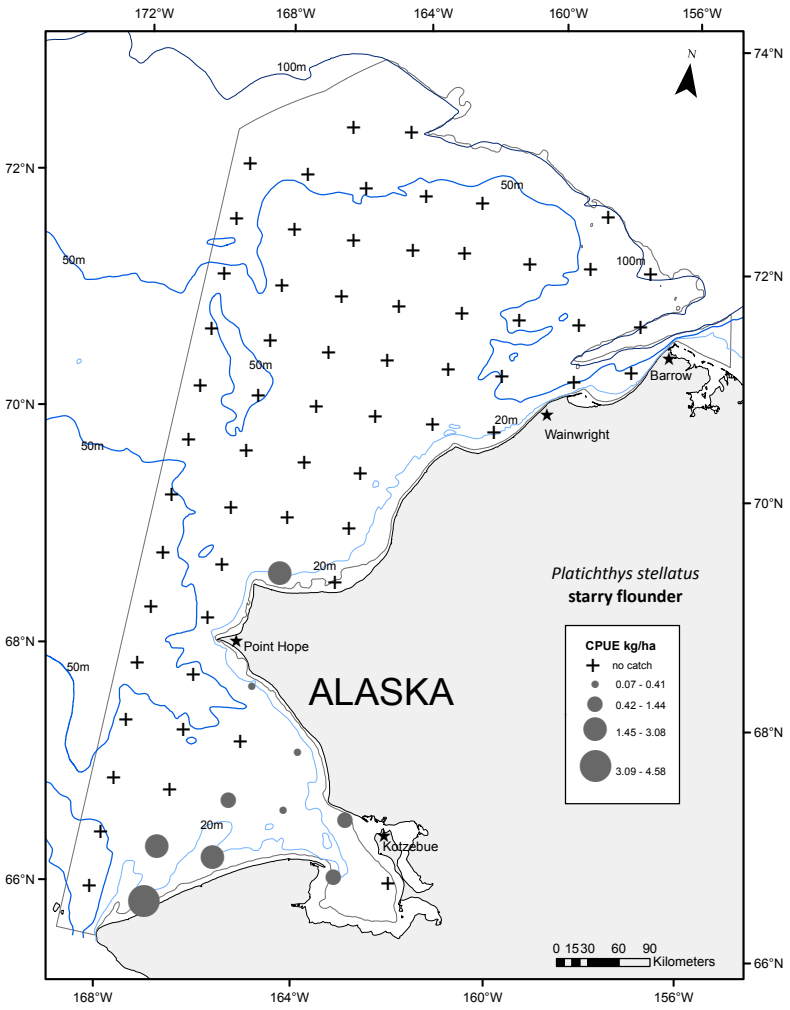


Figure 16.--Distribution and relative abundance (CPUE kg/ha) of *Platichthys stellatus* (starry flounder) for the 2012 Chukchi Sea bottom trawl survey.

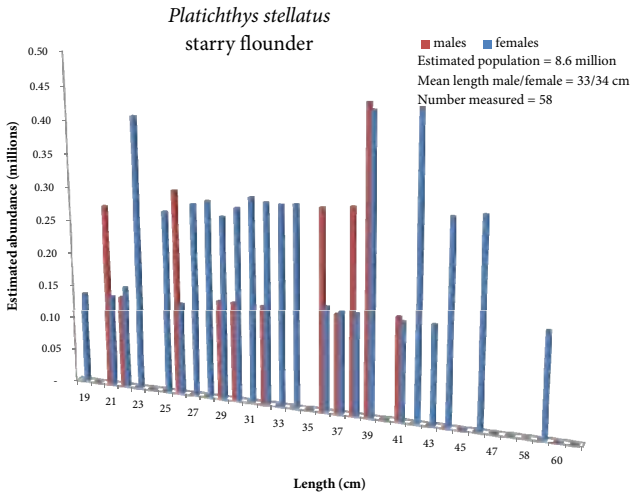


Figure 17.--Estimated abundance at length by sex of *Platichthys stellatus* (starry flounder) for the 2012 Chukchi Sea bottom trawl survey.

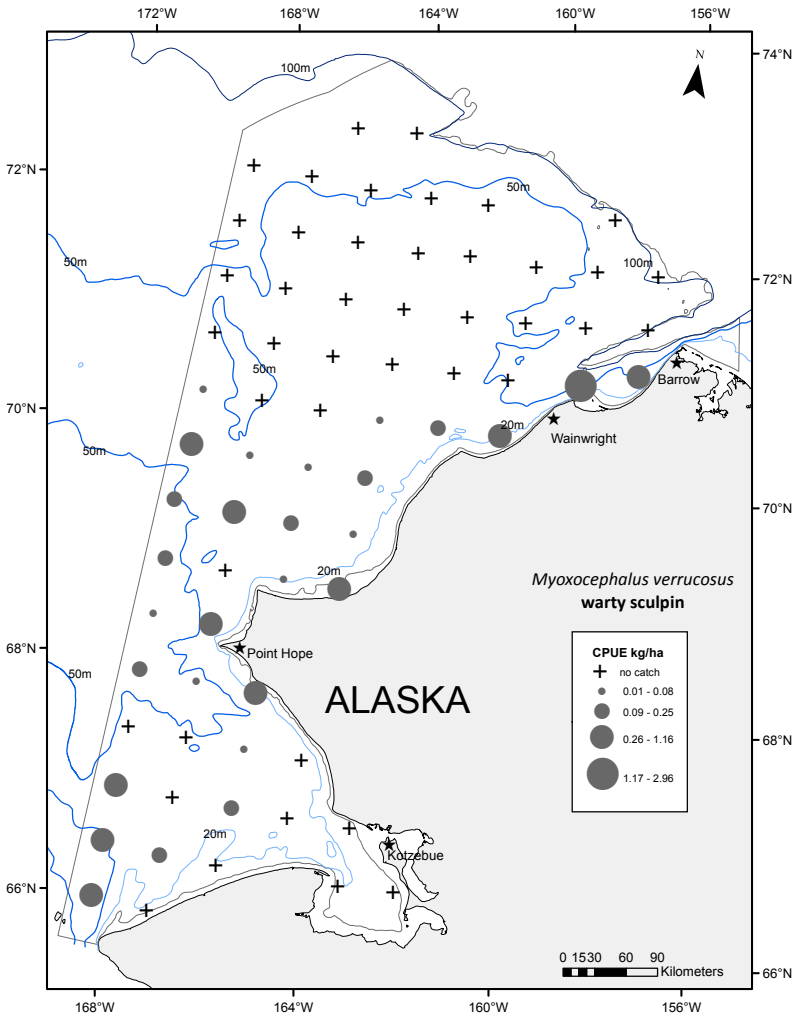


Figure 18.--Distribution and relative abundance (CPUE kg/ha) of *Myoxocephalus verrucosus* (warty sculpin) for the 2012 Chukchi Sea bottom trawl survey.

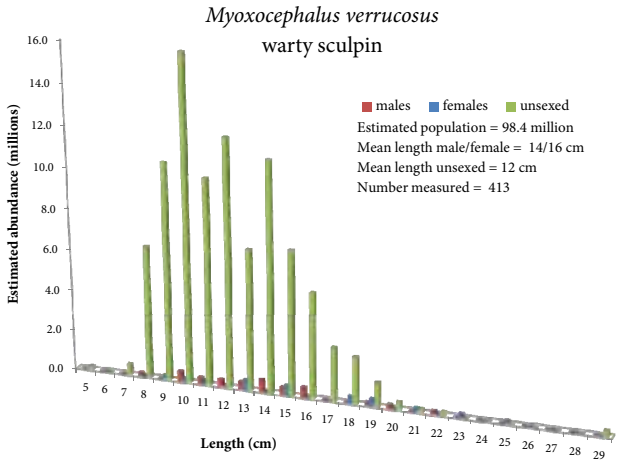


Figure 19.--Estimated abundance at length by sex of *Myoxocephalus verrucosus* (warty sculpin) for the 2012 Chukchi Sea bottom trawl survey.

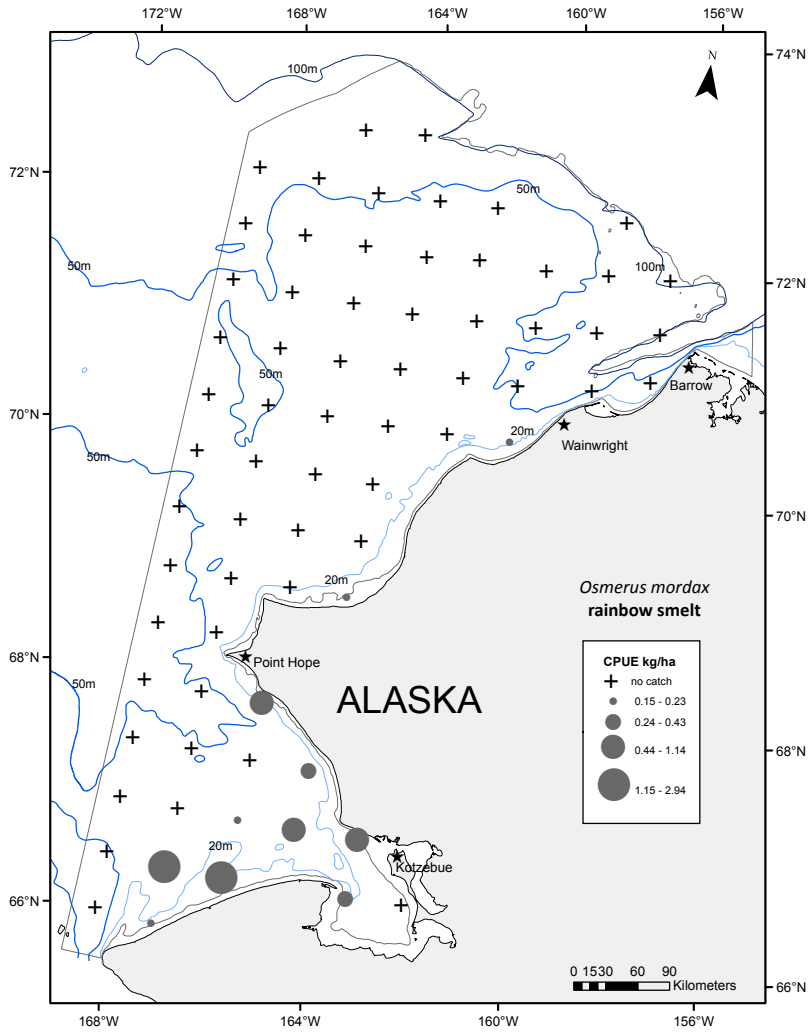


Figure 20.--Distribution and relative abundance (CPUE kg/ha) of *Osmerus mordax* (rainbow smelt) for the 2012 Chukchi Sea bottom trawl survey.

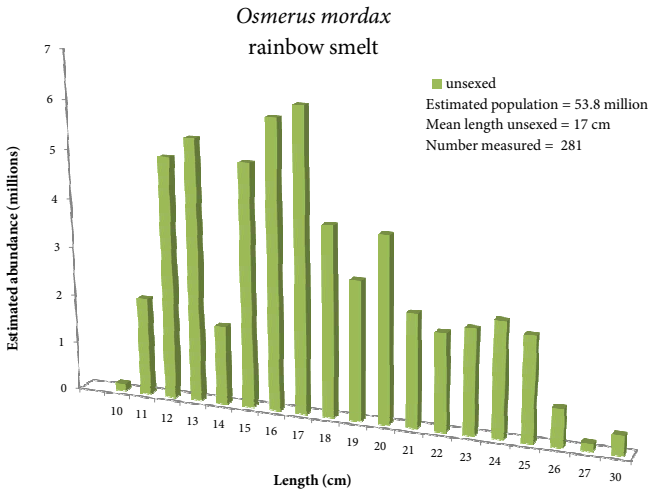


Figure 21.--Estimated abundance at length by sex of *Osmerus mordax* (rainbow smelt) for the 2012 Chukchi Sea bottom trawl survey.

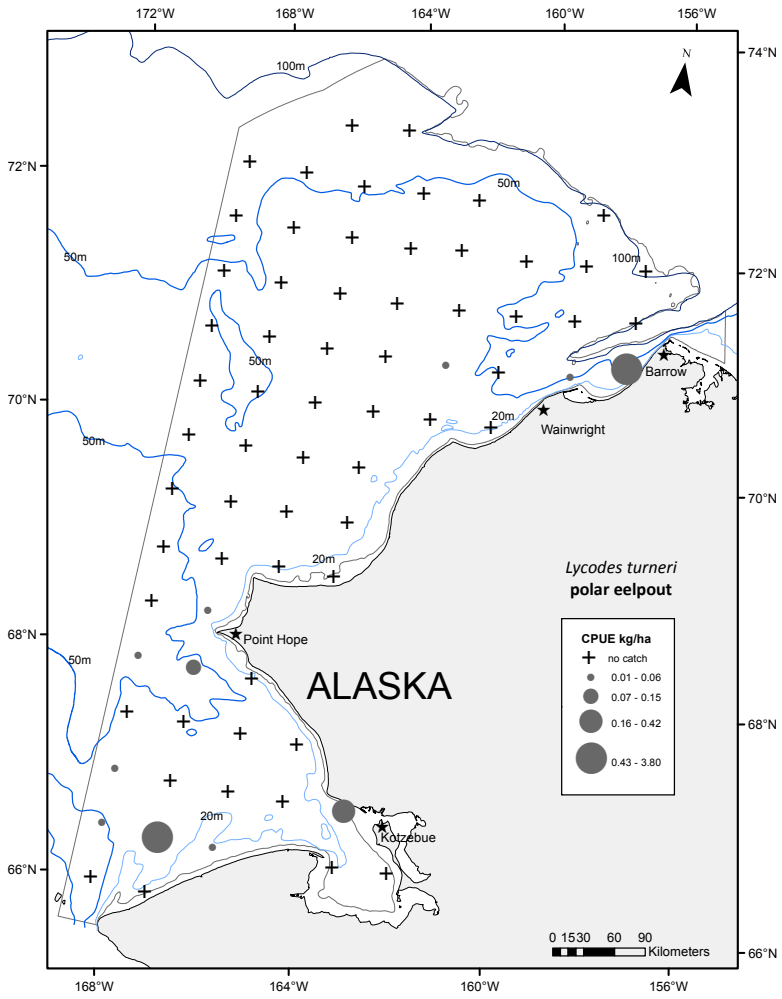


Figure 22.--Distribution and relative abundance (CPUE kg/ha) of *Lycodes turneri* (polar eelpout) for the 2012 Chukchi Sea bottom trawl survey.

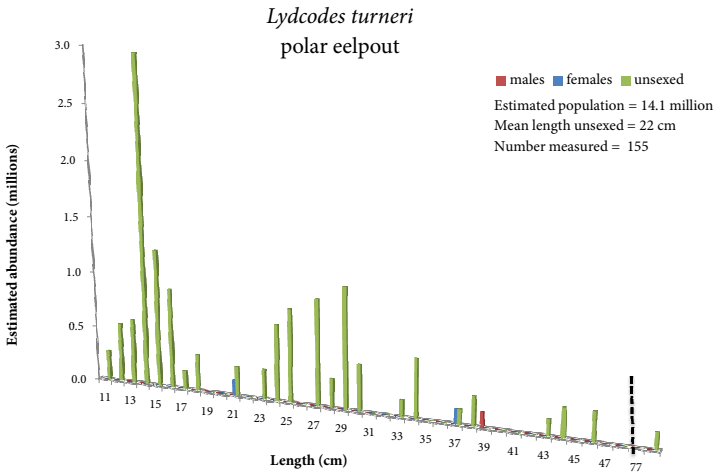


Figure 23.--Estimated abundance at length by sex of *Lycodes turneri* (polar eelpout) for the 2012 Chukchi Sea bottom trawl survey.

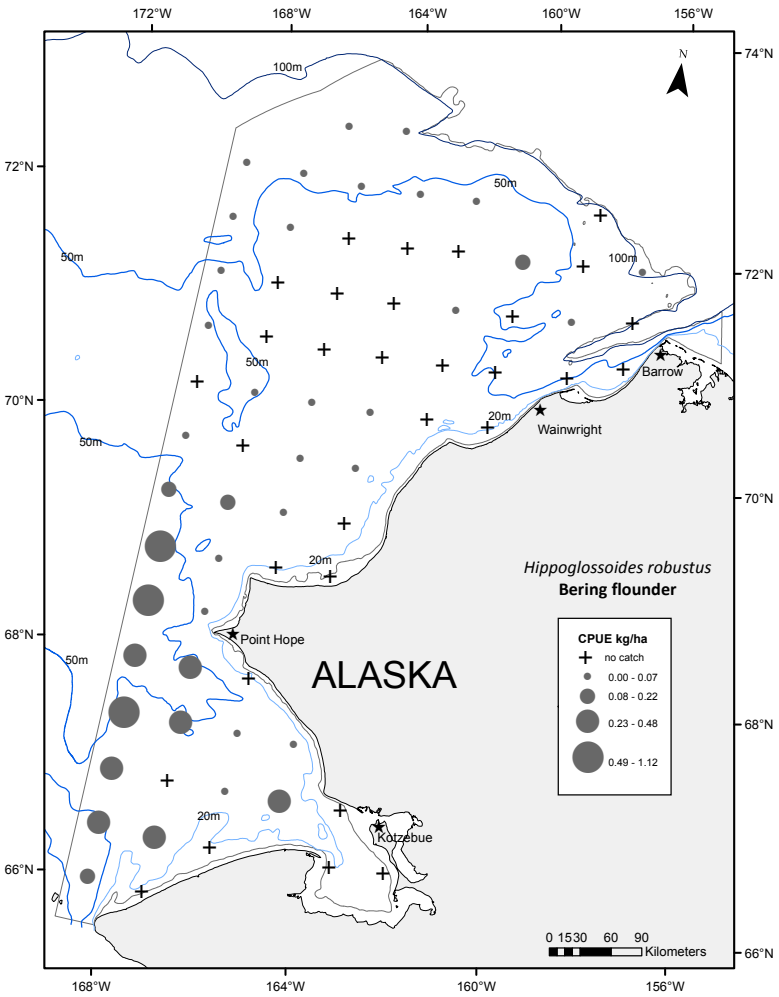


Figure 24.--Distribution and relative abundance (CPUE kg/ha) of *Hippoglossoides robustus* (Bering flounder) for the 2012 Chukchi Sea bottom trawl survey.

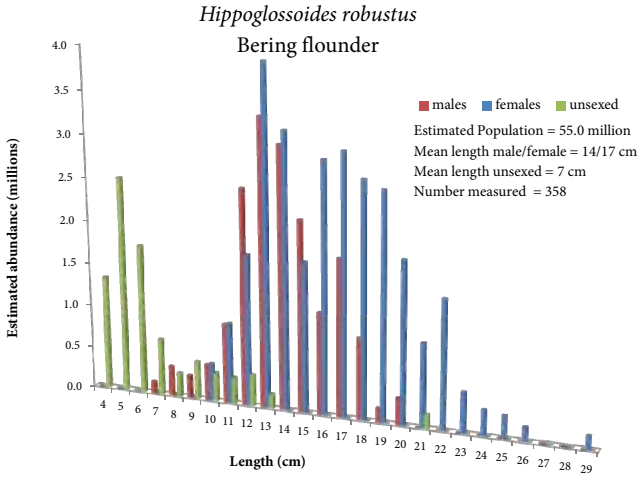


Figure 25.--Estimated abundance at length by sex of *Hippoglossoides robustus* (Bering flounder) for the 2012 Chukchi Sea bottom trawl survey.

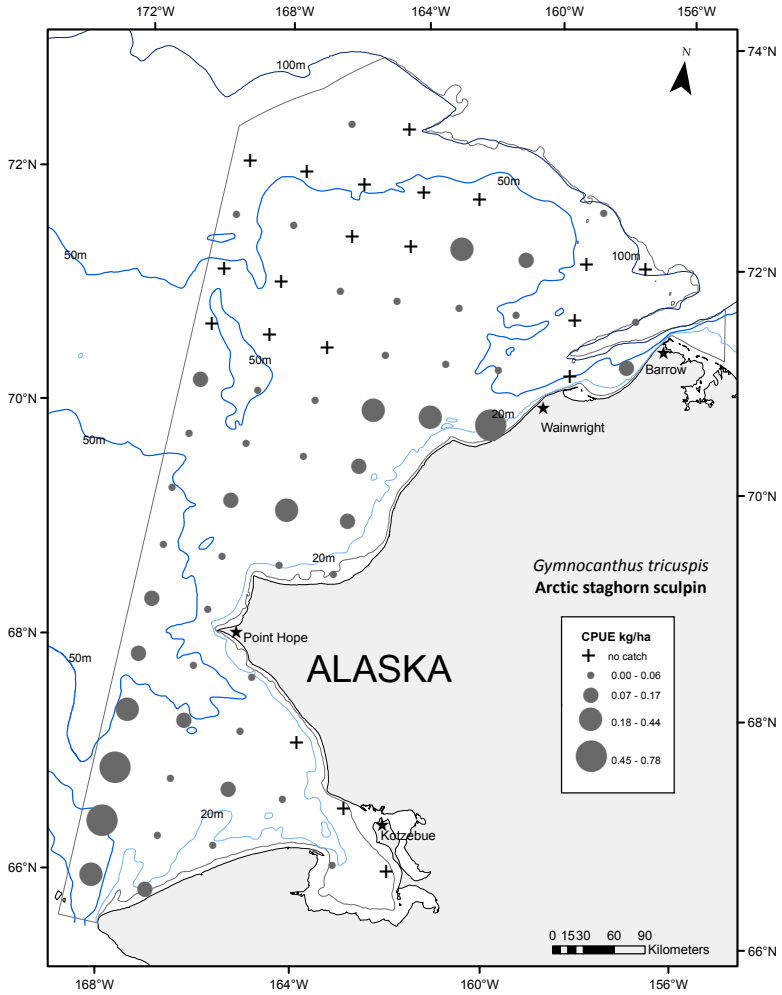


Figure 26.--Distribution and relative abundance (CPUE kg/ha) of *Gymnocanthus tricuspis* (Arctic staghorn sculpin) for the 2012 Chukchi Sea bottom trawl survey.

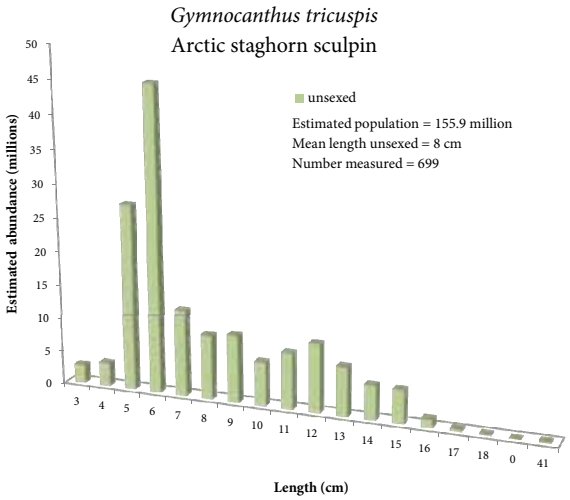


Figure 27.--Estimated abundance at length by sex of *Gymnocanthus tricuspis* (Arctic staghorn sculpin) for the 2012 Chukchi Sea bottom trawl survey.

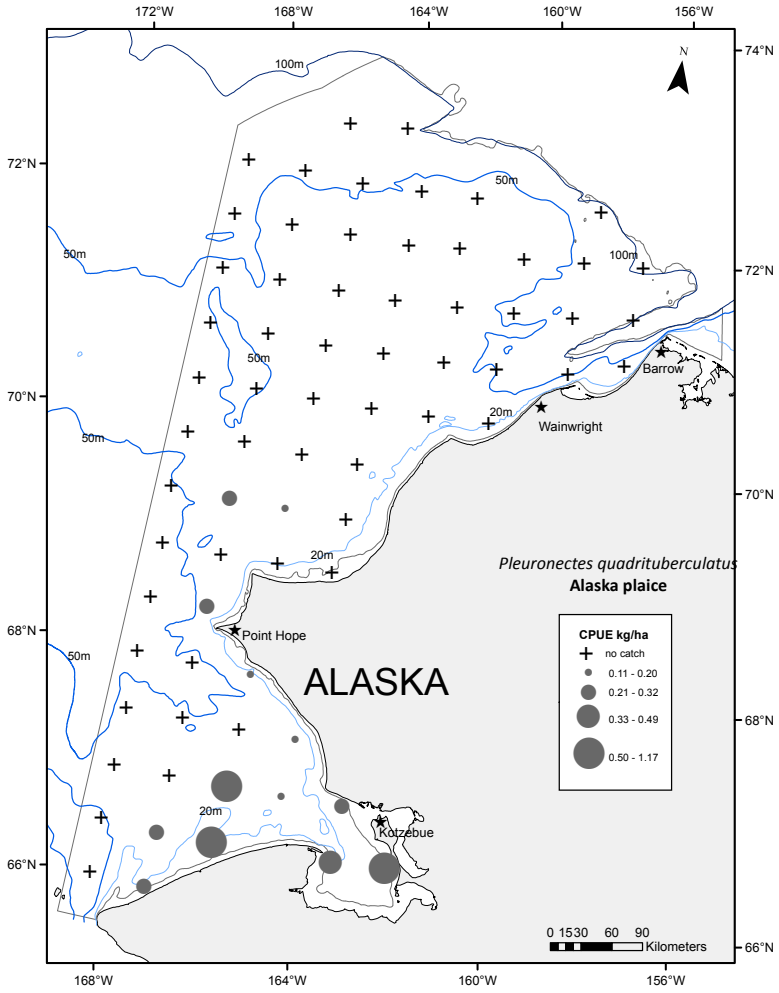


Figure 28.--Distribution and relative abundance (CPUE kg/ha) of *Pleuronectes quadrituberculatus* (Alaska plaice) for the 2012 Chukchi Sea bottom trawl survey.

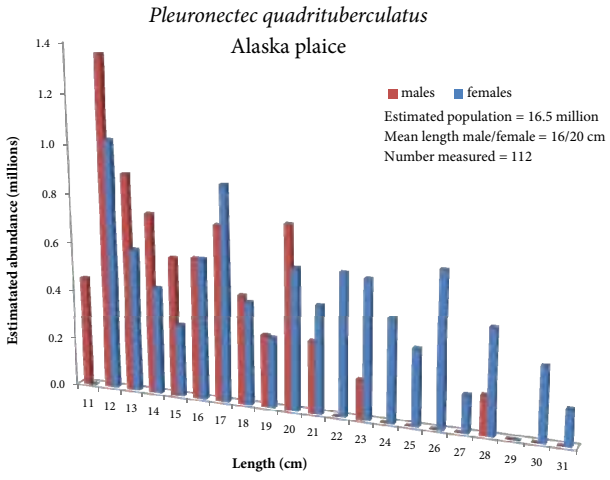


Figure 29.--Estimated abundance at length by sex of *Pleuronectes quadrituberculatus* (Alaska plaice) for the 2012 Chukchi Sea bottom trawl survey.

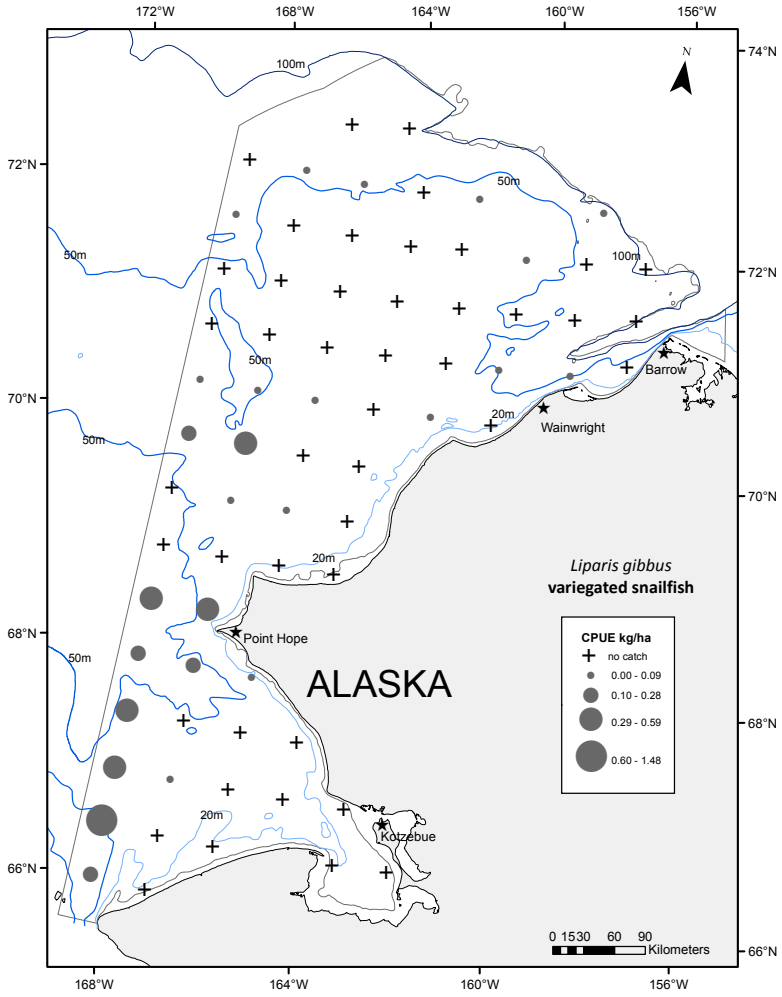


Figure 30.--Distribution and relative abundance (CPUE kg/ha) of *Liparis gibbus* (variegated snailfish) for the 2012 Chukchi Sea bottom trawl survey.

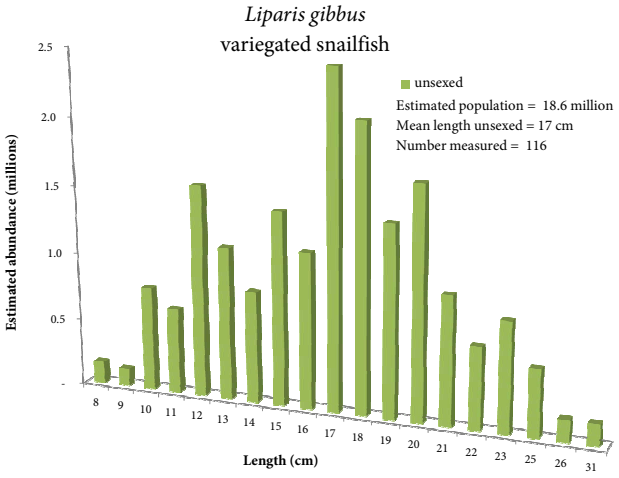


Figure 31.--Estimated abundance at length by sex of *Liparis gibbus* (variegated snailfish) for the 2012 Chukchi Sea bottom trawl survey.

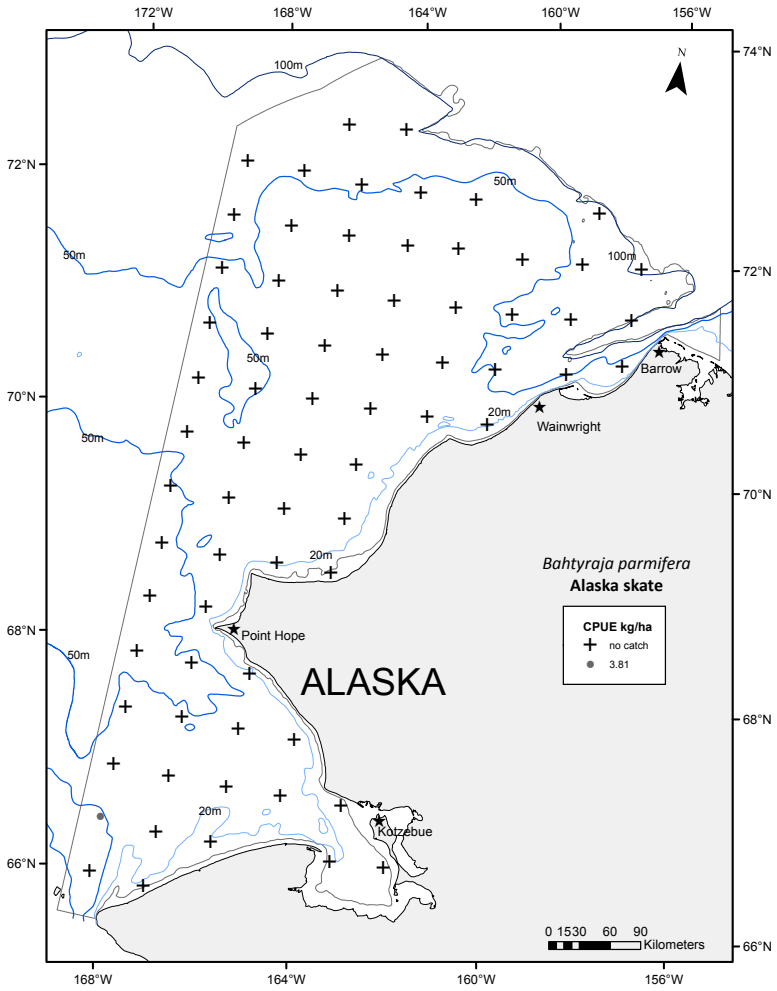


Figure 32.--Distribution and relative abundance (CPUE kg/ha) of *Bathyraja parmifera* (Alaska skate) for the 2012 Chukchi Sea bottom trawl survey.

Only one large skate was encountered during the survey therefore an estimated abundance at length plot was not created.

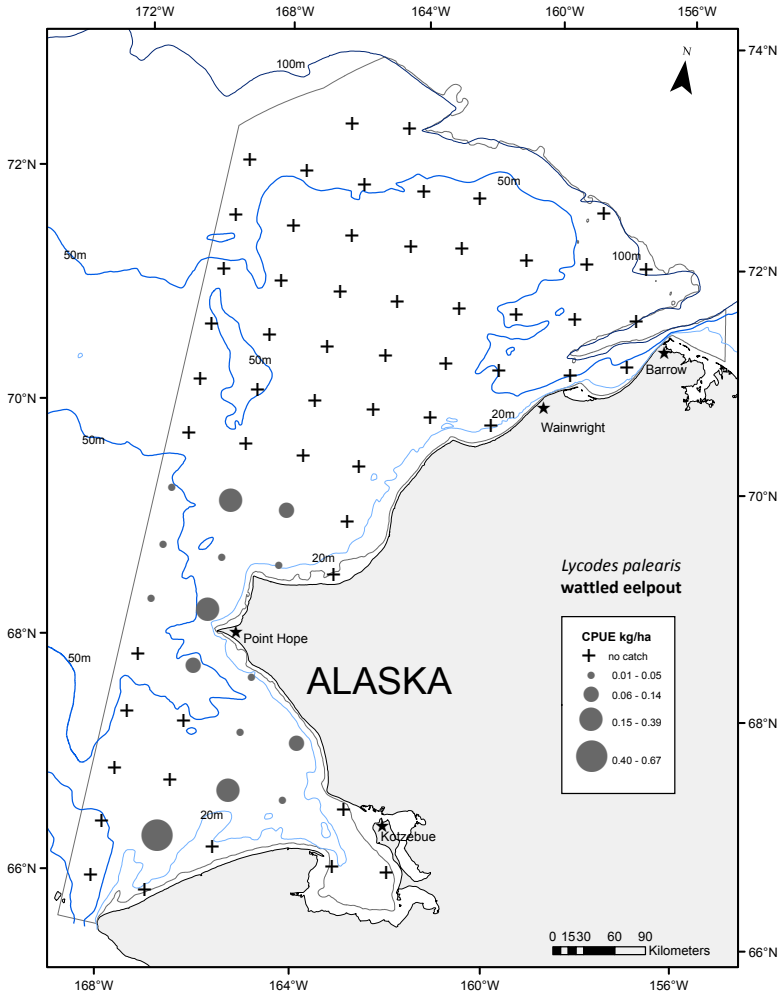


Figure 33.--Distribution and relative abundance (CPUE kg/ha) of *Lycodes palearis* (wattled eelpout) for the 2012 Chukchi Sea bottom trawl survey.

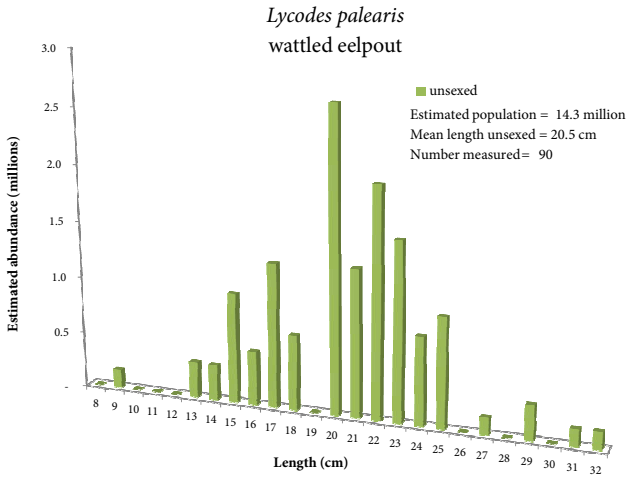


Figure 34.--Estimated abundance at length by sex of *Lycodes palearis* (wattled eelpout) for the 2012 Chukchi Sea bottom trawl survey.

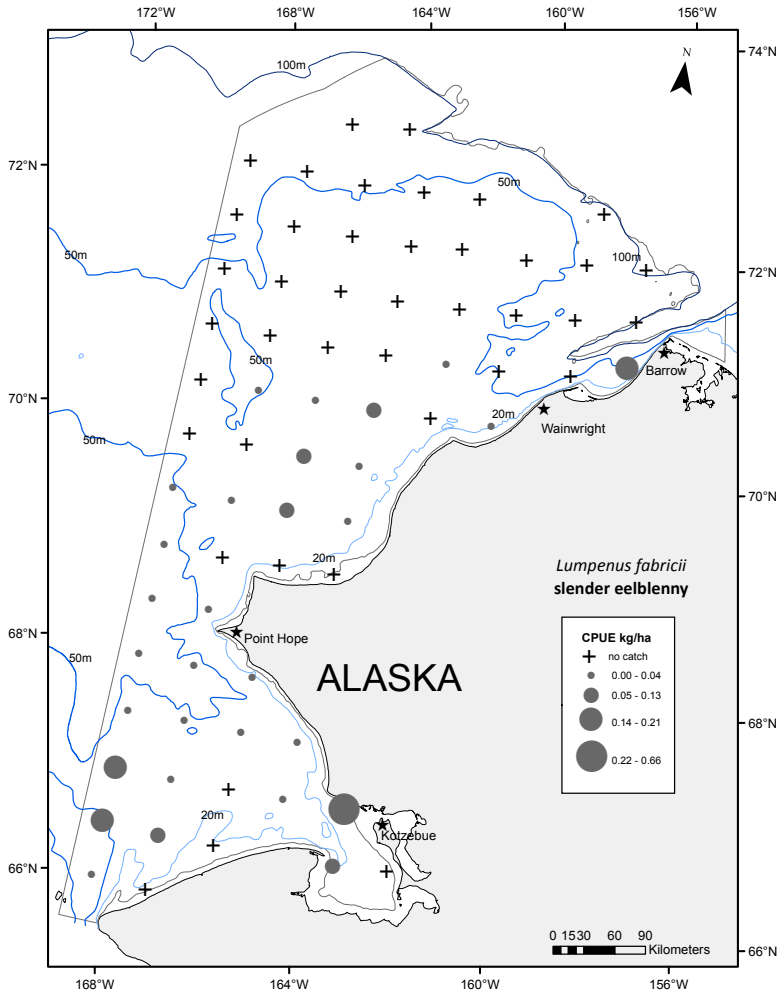


Figure 35.--Distribution and relative abundance (CPUE kg/ha) of *Lumpenus fabricii* (slender eelblenny) for the 2012 Chukchi Sea bottom trawl survey.

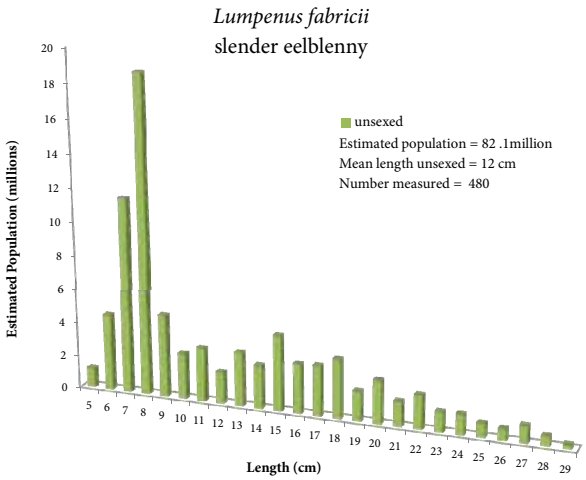


Figure 36.--Estimated abundance at length by sex of *Lumpenus fabricii* (slender eelblenny) for the 2012 Chukchi Sea bottom trawl survey.

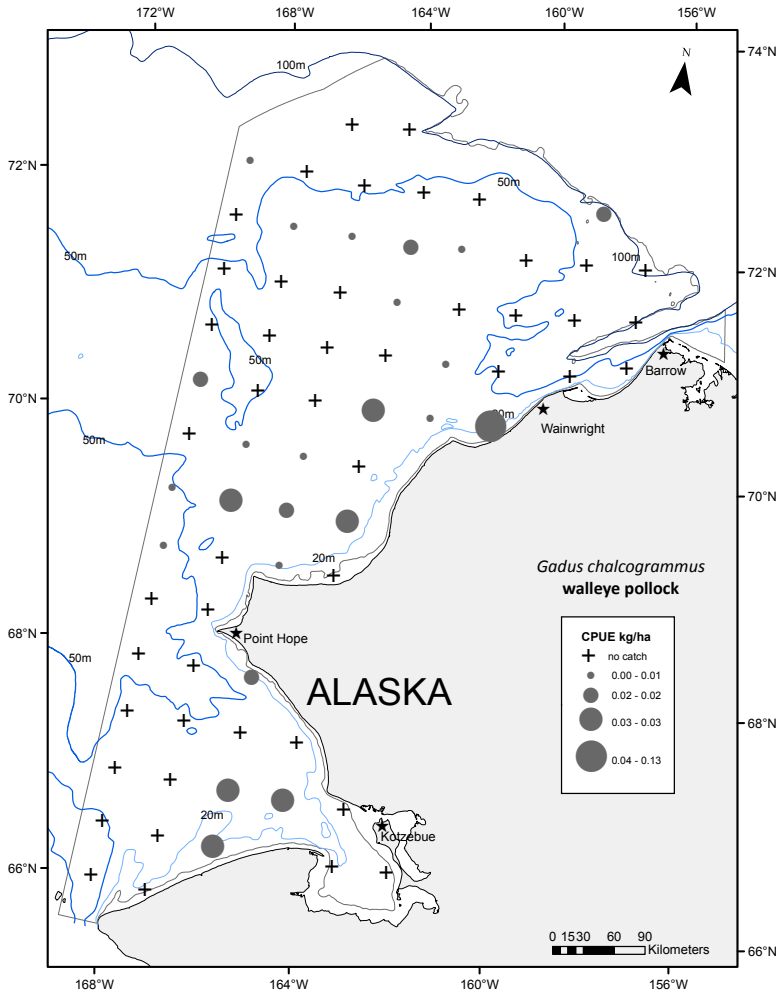


Figure 37.--Distribution and relative abundance (CPUE kg/ha) of *Gadus chalcogrammus* (walleye pollock) for the 2012 Chukchi Sea bottom trawl survey.

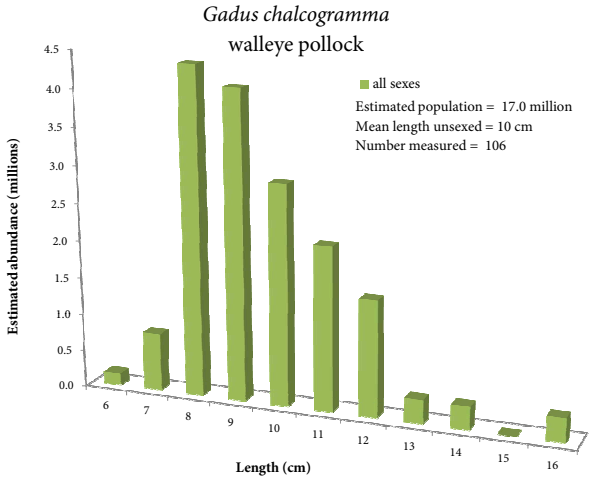


Figure 38.--Estimated abundance at length by sex of *Gadus chalcogrammus* (walleye pollock) for the 2012 Chukchi Sea bottom trawl survey.

Table 8.--Mean and standard error of catch per unit effort (CPUE kg/ha and no./ha) for invertebrate taxa caught during the 2012 Chukchi Sea bottom trawl survey.

Scientific name	Common name	Mean CPUE (kg/ha)	Standard error mean CPUE (kg/ha)	Mean CPUE (no./ha)	Standard error mean CPUE (no./ha)
Strongylocentrotus droebachiensis	green sea urchin	15.89	6.93	387.17	213.89
Asterias amurensis	purple-orange sea star	8.80	3.39	236.35	127.27
Pagurus trigonocheirus	fuzzy hermit crab	7.87	1.67	162.34	27.54
Chionoecetes opilio	snow crab	7.45	2.58	212.50	76.12
Psolus fabricii	brownscaled sea cucumber	5.54	2.45	156.93	72.28
Neptunea heros		4.48	1.18	45.42	11.27
Boltenia ovifera		4.17	3.32	1.71	0.85
Leptasterias polaris		3.99	0.94	40.30	8.76
Gorgonocephalus sp. cf. *arcticus*		3.59	1.51	37.42	13.69
	empty gastropod shells	3.55	1.14	-	-
Halichondria sp.		3.30	3.17	-	-
Styela rustica	sea potato	2.42	1.16	1.10	0.60
Chrysaora melanaster		2.27	0.42	2.46	0.54
Urticina crassicornis	mottled anemone	1.93	0.60	43.76	14.55
Halichondria sitiens	black papillate sponge	1.77	1.24	-	-
Halocynthia aurantium	sea peach	1.65	0.96	5.40	4.77
Gorgonocephalus eucnemis	basketstar	1.58	1.23	9.81	6.48
Cyanea capillata	lion's mane	1.45	0.43	12.35	4.24
Hyas coarctatus	circumboreal toad crab	1.34	0.49	43.91	14.21
Neptunea ventricosa	fat whelk	1.33	0.73	15.30	7.91
	empty bivalve shells	1.16	0.74	0.01	0.01
Urasterias lincki		1.15	0.47	8.31	3.81
Ascidiacea	tunicate unident.	1.12	0.65	3.25	2.63
Solaster arcticus		0.98	0.86	1.24	0.64
Telmessus cheiragonus	helmet crab	0.89	0.36	12.22	5.57
Lethasterias nanimensis	blackspined sea star	0.84	0.30	3.42	1.12
Thoracica	barnacle unident.	0.75	0.41	2.60	1.28
Ctenodiscus crispatus	common mud star	0.66	0.46	87.75	59.49
Ophiura sarsi	notched brittlestar	0.62	0.19	190.80	73.66
Pagurus capillatus	hairy hermit crab	0.62	0.26	23.24	10.55
Echinarachnius parma	parma sand dollar	0.58	0.58	0.44	0.32
Porifera	sponge unident.	0.46	0.26	-	-
Suberites sp.		0.43	0.43	-	-
Boltenia ecinata		0.40	0.22	0.14	0.12
Bryozoa	bryozoan unident.	0.39	0.20	0.03	0.02

Table 8.--Continued.

Scientific name	Common name	Mean CPUE (kg/ha)	Standard error mean CPUE (kg/ha)	Mean CPUE (no./ha)	Standard error mean CPUE (no./ha)
Gersemia sp.	sea raspberry	0.36	0.17	1.78	1.03
Evasterias echinosoma	giant sea star	0.35	0.12	1.96	1.00
Actiniaria	sea anemone unident.	0.33	0.14	17.44	10.94
Leptasterias arctica		0.33	0.14	13.90	3.96
Pagurus rathbuni	longfinger hermit	0.32	0.06	17.16	3.14
Neptunea borealis		0.31	0.05	20.51	4.49
Beringius beringii		0.30	0.15	3.15	1.33
Stomphia sp.		0.26	0.25	4.91	4.69
Labidochirus splendescens	splendid hermit	0.25	0.07	21.93	5.84
Chlamys behringiana	Iceland scallop	0.21	0.12	3.49	2.02
Serripes laperousii	broad cockle	0.18	0.18	0.44	0.39
Chelyosoma productum		0.18	0.12	24.51	19.42
Stomphia coccinea	swimming anemone	0.17	0.12	4.46	3.00
Plicifusus kroyeri		0.17	0.06	6.50	2.29
Leptasterias groenlandica		0.16	0.04	27.51	14.45
Buccinum glaciale	glacial whelk	0.16	0.15	3.10	2.73
Polychaete tubes		0.14	0.13	-	-
Buccinum sp. eggs		0.13	0.04	-	-
Sclerocrangon boreas	sculptured shrimp	0.12	0.08	9.33	5.56
Argis lar	kuro argid	0.12	0.02	22.80	4.81
Crossaster papposus	rose sea star	0.12	0.03	6.52	1.74
Paralithodes platypus	blue king crab	0.11	0.05	0.25	0.13
	hydroid unident.	0.11	0.04	-	-
	compound ascidian unident.	0.11	0.10	0.03	0.03
Tritonia diomedea	rosy tritonia	0.10	0.10	1.54	1.53
Pyrulofusus deformis	warped whelk	0.10	0.03	1.52	0.41
Myriotrochus rinkii		0.10	0.04	273.76	130.60
Pteraster obscurus	obscure sea star	0.09	0.03	1.29	0.41
Naticidae eggs	moonsnail eggs unident.	0.09	0.02	-	-
Alcyonidium enteromorpha	noodle bryozoan	0.09	0.05	1.45	1.45
Molgula sp.		0.09	0.09	5.92	5.92
Alcyonidium disforme		0.09	0.05	22.95	18.78
Buccinum angulosum	angular whelk	0.08	0.02	3.73	1.19
gastropod eggs	snail eggs	0.08	0.03	-	-
Volutopsius fragilis	fragile whelk	0.08	0.04	1.85	0.70

Table 8.--Continued.

Scientific name	Common name	Mean CPUE (kg/ha)	Standard error mean CPUE (kg/ha)	Mean CPUE (no./ha)	Standard error mean CPUE (no./ha)
Gersemia fruticosa		0.08	0.03	0.11	0.05
Amicula vestita		0.07	0.04	7.58	3.86
Beringius stimpsoni		0.07	0.05	0.92	0.46
Buccinum scalariforme	ladder whelk	0.07	0.02	4.00	1.10
Stylissa sp.	drumstick sponge	0.06	0.05	0.63	0.38
Musculus discors	discordant mussel	0.06	0.03	8.68	6.29
Neptunea sp. eggs		0.05	0.03	-	-
Ocnus glacialis		0.05	0.03	7.28	4.76
Buccinum polare	polar whelk	0.05	0.01	2.16	0.45
Volutopsius stefanssoni	shouldered whelk	0.04	0.03	0.63	0.40
Clinocardium ciliatum	hairy cockle	0.04	0.03	1.68	1.08
Actinostola sp.		0.04	0.03	0.52	0.39
Metridium sp.		0.04	0.02	0.72	0.41
Nuculana pernula	northern nutclam	0.04	0.02	26.32	13.51
Tritonia sp.		0.03	0.02	0.73	0.42
Alcyonidium pedunculatum		0.03	0.01	0.42	0.29
Cribrinopsis fernaldi	chevron-tentacled anemone	0.03	0.03	0.49	0.35
Aplidium sp. A (Clark 2006)	sea glob	0.03	0.01	0.11	0.08
Urticina sp.		0.03	0.02	1.36	0.90
	tube worm unident.	0.03	0.02	-	-
Actinostola groenlandica		0.03	0.02	0.46	0.29
Polychaeta	polychaete worm unident.	0.03	0.02	3.83	2.79
Serripes groenlandicus	Greenland cockle	0.03	0.01	0.85	0.22
Polymastia sp.		0.03	0.02	0.01	0.01
Cryptonatica (=*Natica*) *russa*	rusty moonsnail	0.02	0.01	2.18	0.57
Ocnus sp.		0.02	0.02	17.41	17.26
Euspira pallida	pale moonsnail	0.02	0.01	1.42	0.30
Pandalus goniurus	humpy shrimp	0.02	0.01	13.95	6.86
Distaplia sp. A (Clark 2006)		0.02	0.02	-	-
Astarte arctica		0.02	0.01	0.81	0.37
Hiatella arctica	Arctic hiatella	0.02	0.02	5.51	5.33
Halocynthia sp.	sea peach unident.	0.02	0.02	-	-
Mytilus sp.		0.02	0.02	0.89	0.89
Paralithodes camtschaticus	red king crab	0.02	0.01	0.02	0.01
Ophiacantha bidentata		0.02	0.02	15.26	15.26
Alcyonidium sp.		0.02	0.02	0.01	0.01
Henricia tumida	tumid sea star	0.02	0.01	2.28	1.09

Table 8.--Continued.

Scientific name	Common name	Mean CPUE (kg/ha)	Standard error mean CPUE (kg/ha)	Mean CPUE (no./ha)	Standard error mean CPUE (no./ha)
Holothuroidea	sea cucumber unident.	0.02	0.01	0.18	0.17
Actinostolidae		0.01	0.01	0.67	0.44
Colus halli	shrew whelk	0.01	<0.01	1.09	0.31
Colus sp.		0.01	0.01	0.41	0.39
Musculus niger	black mussel	0.01	0.01	1.40	1.39
Trichotropis bicarinata	two-keel hairysnail	0.01	0.01	0.96	0.69
Molgula griffithsii	sea grape	0.01	0.01	0.52	0.44
Amphiophiura nodosa		0.01	0.01	6.99	4.29
Cucumaria sp.		0.01	0.01	0.02	0.02
Eualus sp.		0.01	<0.01	12.57	4.54
Eunoe nodosa	giant scale worm	0.01	<0.01	1.54	0.50
Pagurus ochotensis	Alaskan hermit	0.01	0.01	0.16	0.12
Saduria entomon		0.01	0.01	0.25	0.18
Eunoe depressa	depressed scale worm	0.01	0.01	1.67	0.68
Balanus sp.		0.01	0.01	0.31	0.29
Clinopegma magnum	helmet whelk	0.01	<0.01	0.27	0.10
Colus sabini		0.01	0.01	0.54	0.48
Eualus gaimardii		0.01	<0.01	7.23	3.22
Henricia beringiania	Bering Henricia	0.01	<0.01	0.10	0.04
Eunoe sp.		0.01	<0.01	0.98	0.53
Echiura	echiuroid worm unident.	0.01	<0.01	0.19	0.10
Golfingia margaritacea		0.01	<0.01	0.34	0.17
Benthoctopus sibiricus		0.01	<0.01	0.06	0.02
Colus spitzbergensis	thick-ribbed whelk	0.01	<0.01	0.60	0.28
Dendrobeania sp.		0.01	0.01	-	-
Nemertea	nemertean worm unident.	0.01	<0.01	1.50	0.88
Margarites costalis	boreal rosy margarite	0.01	<0.01	0.97	0.35
Onchidiopsis sp.		0.01	<0.01	0.63	0.33
Onchidiopsis carnea		0.01	<0.01	0.14	0.06
Volutopsius sp. eggs		<0.01	<0.01	-	-
Calycidoris guentheri		<0.01	<0.01	0.53	0.42
Pteraster tesselatus		<0.01	<0.01	0.01	0.01
Astarte sp.		<0.01	<0.01	2.09	2.08
Argis sp.		<0.01	<0.01	0.46	0.45
Astarte esquimalti		<0.01	<0.01	1.53	0.92
Eualus suckleyi	shortscale eualid	<0.01	<0.01	3.85	2.11
Ptychodactis patula		<0.01	<0.01	0.10	0.06

Table 8.--Continued.

Scientific name	Common name	Mean CPUE (kg/ha)	Standard error mean CPUE (kg/ha)	Mean CPUE (no./ha)	Standard error mean CPUE (no./ha)
Buccinum tenellum		<0.01	<0.01	0.17	0.16
Neptunea middendorffii		<0.01	<0.01	0.09	0.09
Buccinum ectomycina		<0.01	<0.01	0.07	0.05
Plicifusus johanseni		<0.01	<0.01	0.18	0.06
Rhamphostomella costata	ribbed bryozoan	<0.01	<0.01	0.01	0.01
Buccinum plectrum	sinuous whelk	<0.01	<0.01	0.11	0.05
Onchidiopsis glacialis	icy lamellaria	<0.01	<0.01	0.10	0.06
Cryptonatica (=*Natica*) *aleutica*	Aleutian moonsnail	<0.01	<0.01	0.29	0.28
Colus hypolispus		<0.01	<0.01	0.17	0.07
Buccinum obsoletum		<0.01	<0.01	0.14	0.04
Ophiopholis aculeata	ubiquitous brittle star	<0.01	<0.01	1.74	0.98
Dendronotus frondosus	frond-aeolis	<0.01	<0.01	0.13	0.12
Stegocephalus inflatus		<0.01	<0.01	0.32	0.21
Eualus macilentus	Greenland shrimp	<0.01	<0.01	1.34	0.96
Distaplia sp.		<0.01	<0.01	0.01	0.01
Asteroidea	sea star unident.	<0.01	<0.01	0.01	0.01
Flustra serrulata	leafy bryozoan	<0.01	<0.01	-	-
Onchidiopsis sp. *B* (Clark & McLean)		<0.01	<0.01	0.03	0.03
Pteraster octaster		<0.01	<0.01	0.02	0.02
Beroe sp.		<0.01	<0.01	0.02	0.02
Sipuncula	peanut worm unident.	<0.01	<0.01	1.03	0.76
Scyphozoa	jellyfish unident.	<0.01	<0.01	0.03	0.02
Lebbeus groenlandicus	spiny lebbeid	<0.01	<0.01	0.28	0.19
Crangon sp.		<0.01	<0.01	0.44	0.34
Amphipoda	amphipod unident.	<0.01	<0.01	2.22	1.45
Cyclocardia crassidens	thick carditid	<0.01	<0.01	0.21	0.17
Macoma calcarea	chalky macoma	<0.01	<0.01	0.12	0.09
Lamellaria sp.		<0.01	<0.01	0.03	0.03
Argis dentata	Arctic argid	<0.01	<0.01	0.21	0.21
Heliometra glacialis		<0.01	<0.01	0.10	0.10
Nudibranchia	nudibranch unident.	<0.01	<0.01	0.12	0.09
Sabinea septemcarinata		<0.01	<0.01	0.35	0.19
Ophiura sp.		<0.01	<0.01	3.35	3.21
Cyclocardia sp. cf. *borealis* (Clark 2006)	northern carditid	<0.01	<0.01	0.33	0.29
Tochuina tetraquetra	giant orange tochui	<0.01	<0.01	0.01	0.01

Table 8.--Continued.

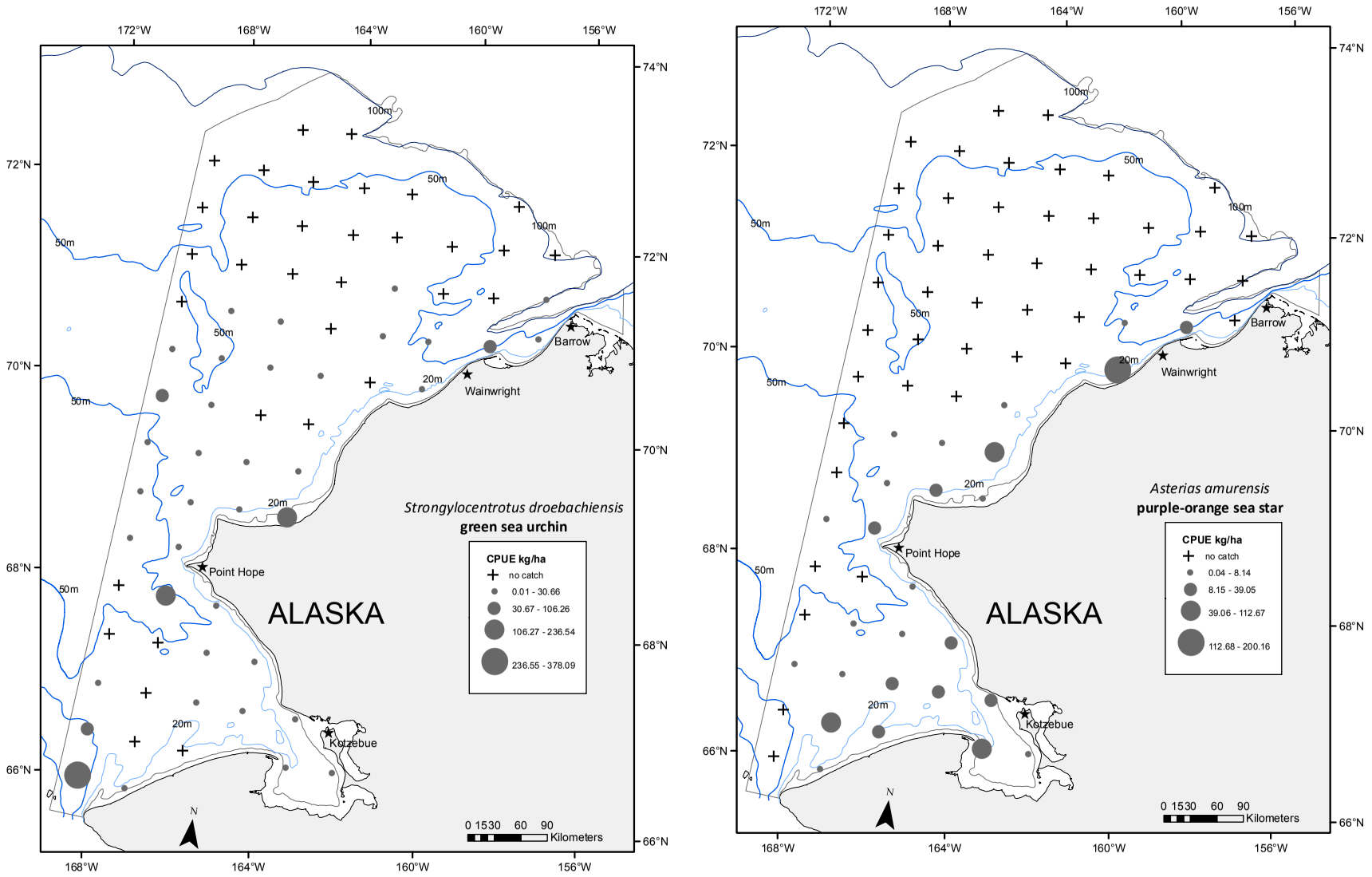
Scientific name	Common name	Mean CPUE (kg/ha)	Standard error mean CPUE (kg/ha)	Mean CPUE (no./ha)	Standard error mean CPUE (no./ha)
Dendronotus sp.		<0.01	<0.01	0.09	0.04
Distaplia occidentalis		<0.01	<0.01	0.02	0.02
Serripes notabilis	oblique smoothcockle	<0.01	<0.01	0.03	0.03
Crangon communis	twospine crangon	<0.01	<0.01	0.52	0.52
Crangon sp. cf. *communis* (*CAS*)		<0.01	<0.01	0.26	0.26
Mya truncata	truncate softshell	<0.01	<0.01	0.01	0.01
Cribrinopsis sp.		<0.01	<0.01	0.01	0.01
Colus martensi		<0.01	<0.01	0.09	0.04
Tachyrhynchus erosus	eroded turretsnail	<0.01	<0.01	0.85	0.72
Crangon dalli	ridged crangon	<0.01	<0.01	0.29	0.13
Nucula tenuis	smooth nutclam	<0.01	<0.01	0.04	0.04
Rachotropis sp.		<0.01	<0.01	0.87	0.57
Hemithiris psittacea	black brachiopod	<0.01	<0.01	0.28	0.19
Macoma sp.		<0.01	<0.01	0.15	0.09
Colus ombronius	shady whelk	<0.01	<0.01	0.07	0.03
Polynoidae	scale worm unident.	<0.01	<0.01	0.34	0.16
Mactromeris polynyma	Arctic surfclam	<0.01	<0.01	0.01	0.01
Boreotrophon pacificus		<0.01	<0.01	0.26	0.15
Clinocardium californiense	California cockle	<0.01	<0.01	0.02	0.02
Rhachotropis aculeata		<0.01	<0.01	0.66	0.32
	worm unident.	<0.01	<0.01	0.17	0.06
Boreotrophon coronatus		<0.01	<0.01	0.09	0.03
Henricia sanguinolenta	sanguine sea star	<0.01	<0.01	0.01	0.01
Pelonaia corrugata		<0.01	<0.01	0.77	0.75
Volutopsius attenuatus	attenuate melon whelk	<0.01	<0.01	0.04	0.03
Buccinum normale		<0.01	<0.01	0.07	0.05
Beringius sp. eggs		<0.01	<0.01	-	-
Maldanidae unident.	bamboo worm unident.	<0.01	<0.01	0.10	0.07
Pandalus eous (=*borealis*)	Alaskan pink (=northern) shrimp	<0.01	<0.01	0.23	0.19
Nototropis sp.		<0.01	<0.01	0.23	0.19
Oractis diomedeae	grape anemone	<0.01	<0.01	0.01	0.01
Hapalogaster grebnitzkii		<0.01	<0.01	0.03	0.02
Psolus phantapus		<0.01	<0.01	0.04	0.04
Priapulus caudatus		<0.01	<0.01	0.01	0.01
Admete regina	noble admete	<0.01	<0.01	0.05	0.02

Table 8.--Continued.

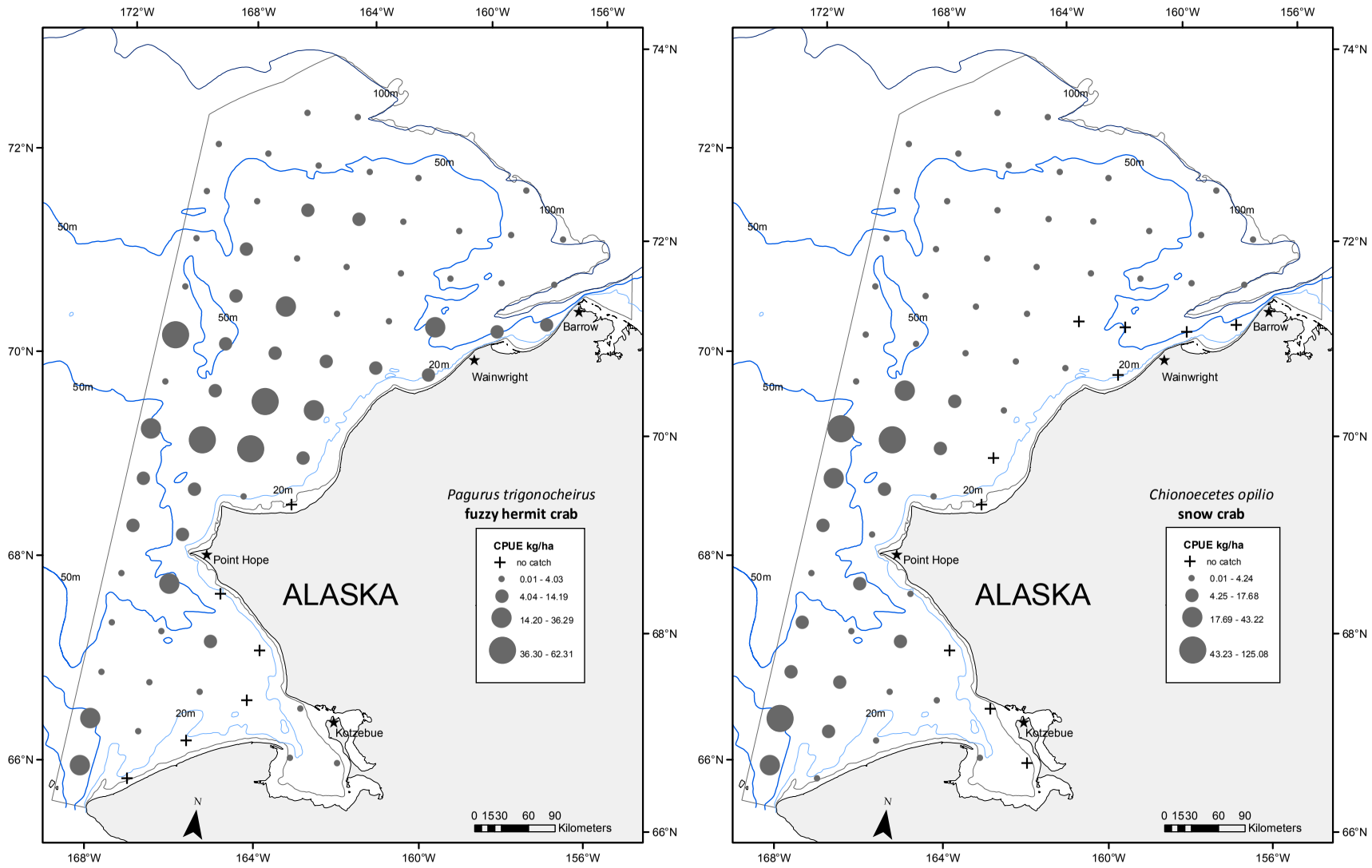
Scientific name	Common name	Mean CPUE (kg/ha)	Standard error mean CPUE (kg/ha)	Mean CPUE (no./ha)	Standard error mean CPUE (no./ha)
Arctolembos arcticus		<0.01	<0.01	0.17	0.15
Nephtyidae	cat worm unident.	<0.01	<0.01	0.03	0.02
Yoldia hyperborea	northern yoldia	<0.01	<0.01	0.26	0.23
Crangonidae	crangonid shrimp unident.	<0.01	<0.01	0.04	0.03
Sertulariidae unident.	Sertulariid hydroid	<0.01	<0.01	-	-
Ophiuroidea	brittlestar unident.	<0.01	<0.01	1.25	1.25
Tridemnum sp.		<0.01	<0.01	-	-
Anonyx nugax	riddick amphipod	<0.01	<0.01	0.38	0.34
Tachyrhynchus reticulatus	reticulated turretsnail	<0.01	<0.01	0.11	0.09
Spirontocaris arcuata	Rathbun blade shrimp	<0.01	<0.01	0.19	0.18
Liomesus ooides	egg whelk	<0.01	<0.01	0.01	0.01
Colus bristolensis		<0.01	<0.01	0.01	0.01
Astarte montagui		<0.01	<0.01	0.03	0.03
Heteropora sp.		<0.01	<0.01	-	-
Yoldia sp.		<0.01	<0.01	0.25	0.25
Thaliacea	salp unident.	<0.01	<0.01	0.01	0.01
Travisia sp.		<0.01	<0.01	0.04	0.04
Buccinum solenum		<0.01	<0.01	0.01	0.01
Cryptonatica sp.		<0.01	<0.01	0.01	0.01
Colus capponius		<0.01	<0.01	0.02	0.02
Eunice valens		<0.01	<0.01	0.01	0.01
Stenosemus albus	northern white chiton	<0.01	<0.01	0.10	0.05
Boreotrophon clathratus	clathrate trophon	<0.01	<0.01	0.02	0.01
Doridiidae	dorid nudibranch unident.	<0.01	<0.01	0.02	0.02
Crangon septemspinosa	sevenspine bay shrimp	<0.01	<0.01	0.03	0.03
Costazia ventricosa	rusty bryozoan	<0.01	<0.01	-	-
Trichotropis borealis		<0.01	<0.01	0.09	0.08
Argis levior	Nelson's argid	<0.01	<0.01	0.09	0.09
Buccinum sp.		<0.01	<0.01	0.01	0.01
Musculus sp.		<0.01	<0.01	0.03	0.03
Velutina undata	wavy lamellaria	<0.01	<0.01	0.02	0.02
Ctenophora	comb jelly unident.	<0.01	<0.01	-	-
Pentamera sp.		<0.01	<0.01	0.01	0.01
Dendronotus dalli	Dall's dendronotid	<0.01	<0.01	0.01	0.01
Spirontocaris sp.		<0.01	<0.01	0.02	0.02
Colus roseus	rosy whelk	<0.01	<0.01	0.03	0.02

Table 8.--Continued.

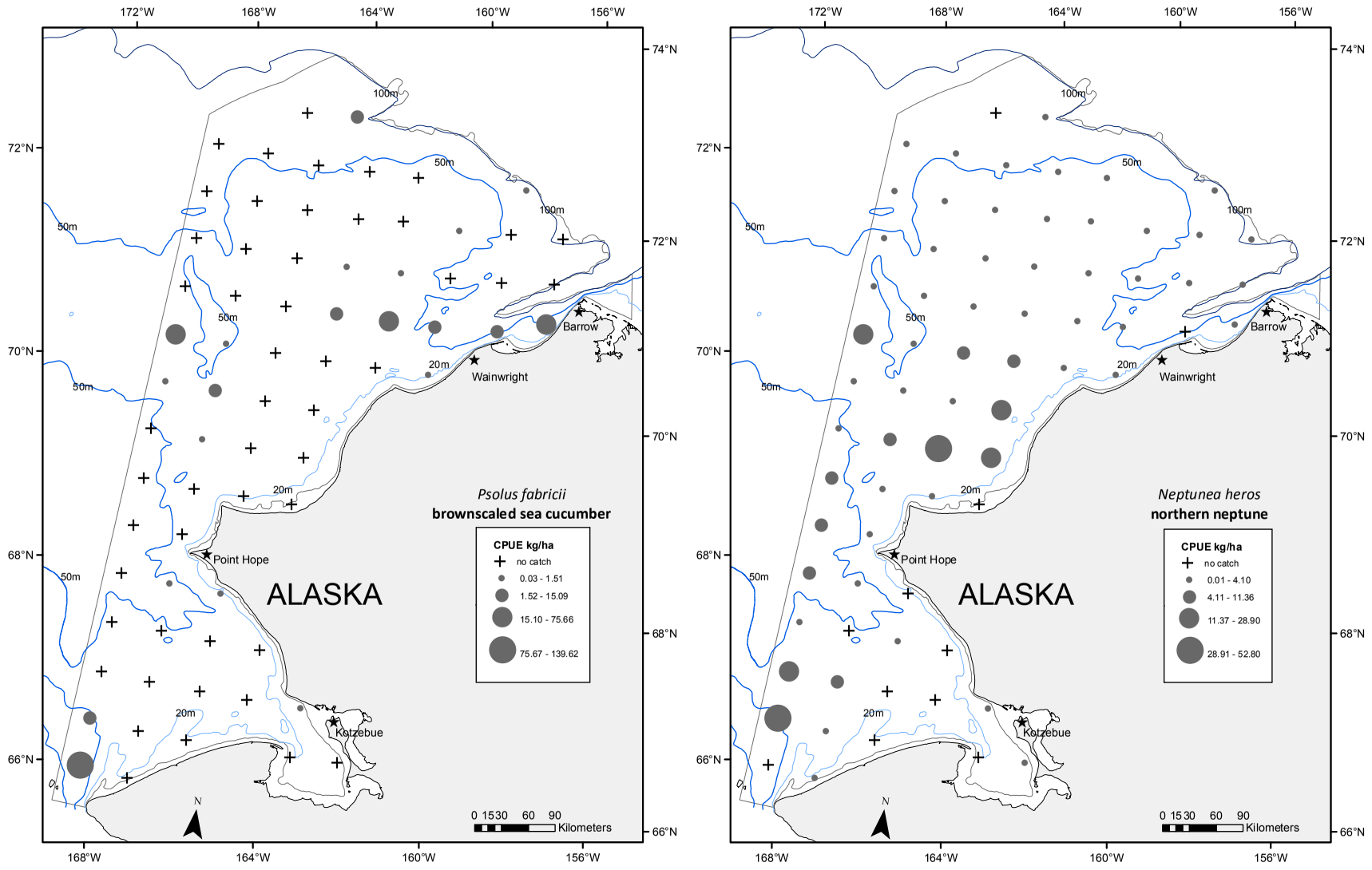
Scientific name	Common name	Mean CPUE (kg/ha)	Standard error mean CPUE (kg/ha)	Mean CPUE (no./ha)	Standard error mean CPUE (no./ha)
Emplectonema sp.		<0.01	<0.01	0.01	0.01
Bivalvia	bivalve unident.	<0.01	<0.01	0.05	0.05
Hemithyridae	hemithyrid brachiopods	<0.01	<0.01	0.02	0.02
Buccinum ciliatum		<0.01	<0.01	0.01	0.01
Sabellidae	sabellid unident.	<0.01	<0.01	0.01	0.01
Anonyx sp.		<0.01	<0.01	0.03	0.03
Pandora glacialis	glacial pandora	<0.01	<0.01	0.01	0.01
Eusirus cuspidatus		<0.01	<0.01	0.04	0.04
	limpet unident.	<0.01	<0.01	0.04	0.04
Cyclocardia sp.		<0.01	<0.01	0.01	0.01
Velutina prolongata	elongate lamellaria	<0.01	<0.01	0.01	0.01
Velutina sp.		<0.01	<0.01	0.02	0.02
Musculus glacialis	corrugate mussel	<0.01	<0.01	0.01	0.01
Cerebratulus californienesis		<0.01	<0.01	0.01	0.01
Eualus fabricii	Arctic eualid	<0.01	<0.01	0.02	0.02
Margarites giganteus	giant margarite	<0.01	<0.01	0.02	0.01
Mysida	opossum shrimps	<0.01	<0.01	0.05	0.05
Phyllodocidae unident.		<0.01	<0.01	0.03	0.02
Oenopota sp.		<0.01	<0.01	0.01	0.01
Eunoe senta		<0.01	<0.01	0.01	0.01
Melita dentata		<0.01	<0.01	0.03	0.03
Margarites sp.		<0.01	<0.01	0.01	0.01
Neoiphinoe echinata		<0.01	<0.01	0.01	0.01
Bugula sp.		<0.01	<0.01	0.01	0.01
Tubulanus sp.		<0.01	<0.01	0.01	0.01
Solariella obscura	obscure solarelle	<0.01	<0.01	0.01	0.01
Quasimelita formosa		<0.01	<0.01	0.01	0.01



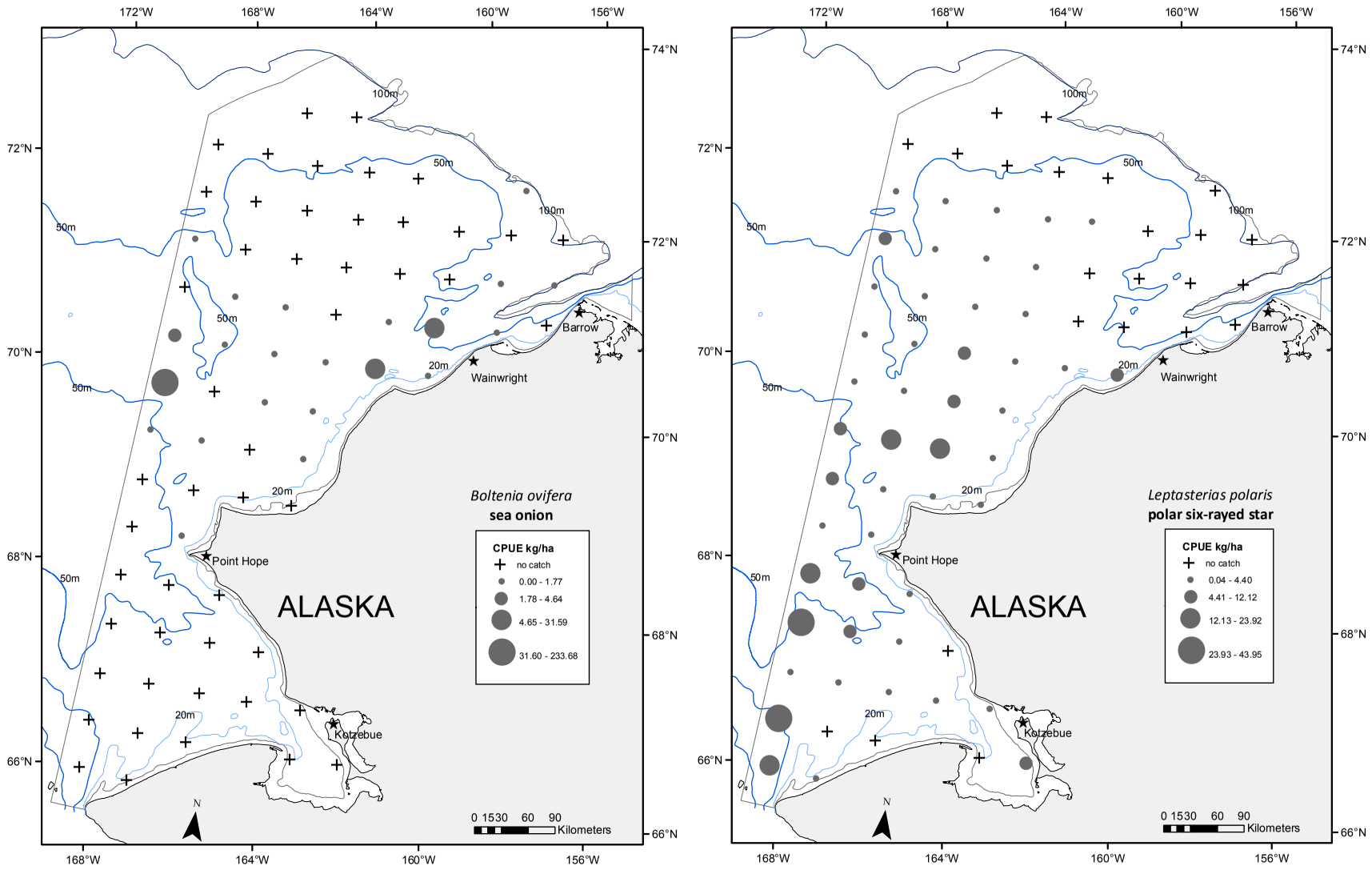
Figures 39-40.--Distribution and relative abundance (CPUE kg/ha) of *Stongylocentrotus droebachiensis* (green sea urchin) and *Asterias amurensis* (purple-orange sea star) for the 2012 Chukchi Sea bottom trawl survey.



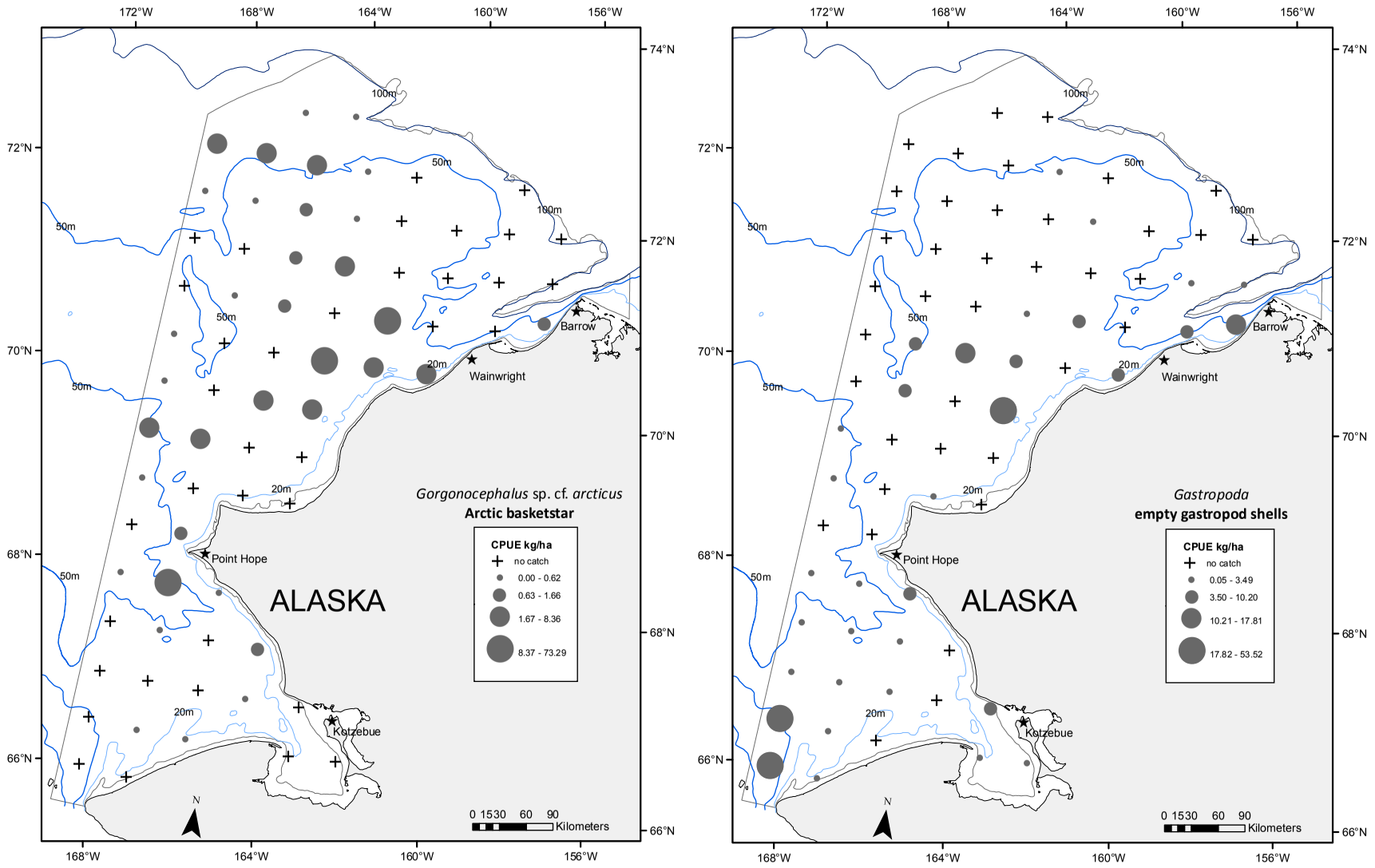
Figures 41-42.--Distribution and relative abundance (CPUE kg/ha) of *Pagurus trigonocheirus* (fuzzy hermit crab) and *Chionoecetes opilio* (snow crab) for the 2012 Chukchi Sea bottom trawl survey.



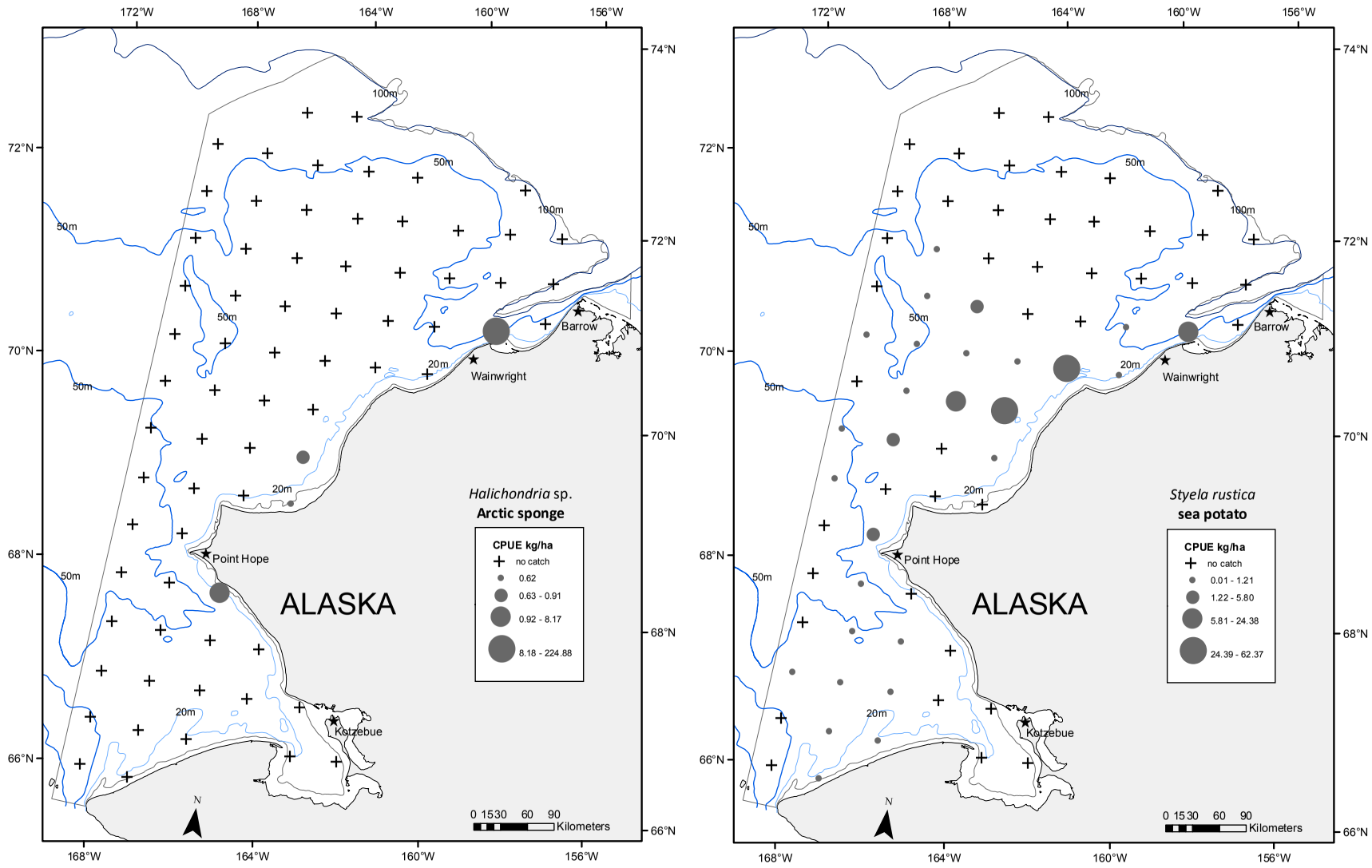
Figures 43-44.--Distribution and relative abundance (CPUE kg/ha) of *Psolus fabricii* (brownscaled sea cucumber) and *Neptunea heros* (northern neptune) for the 2012 Chukchi Sea bottom trawl survey.



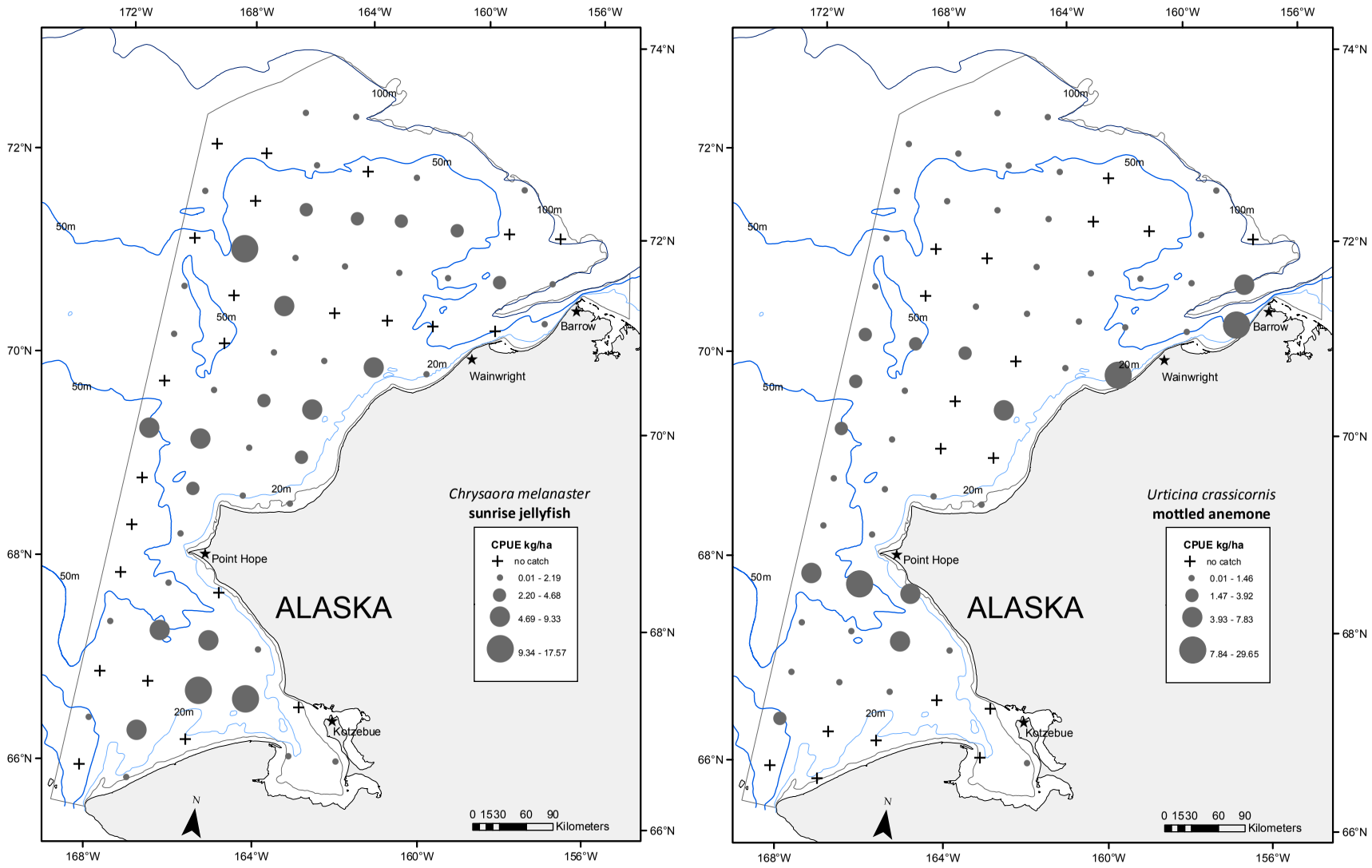
Figures 45-46.--Distribution and relative abundance (CPUE kg/ha) of *Boltenia ovifera* (sea onion) and *Leptasterias polaris* (polar six-rayed star) for the 2012 Chukchi Sea bottom trawl survey.



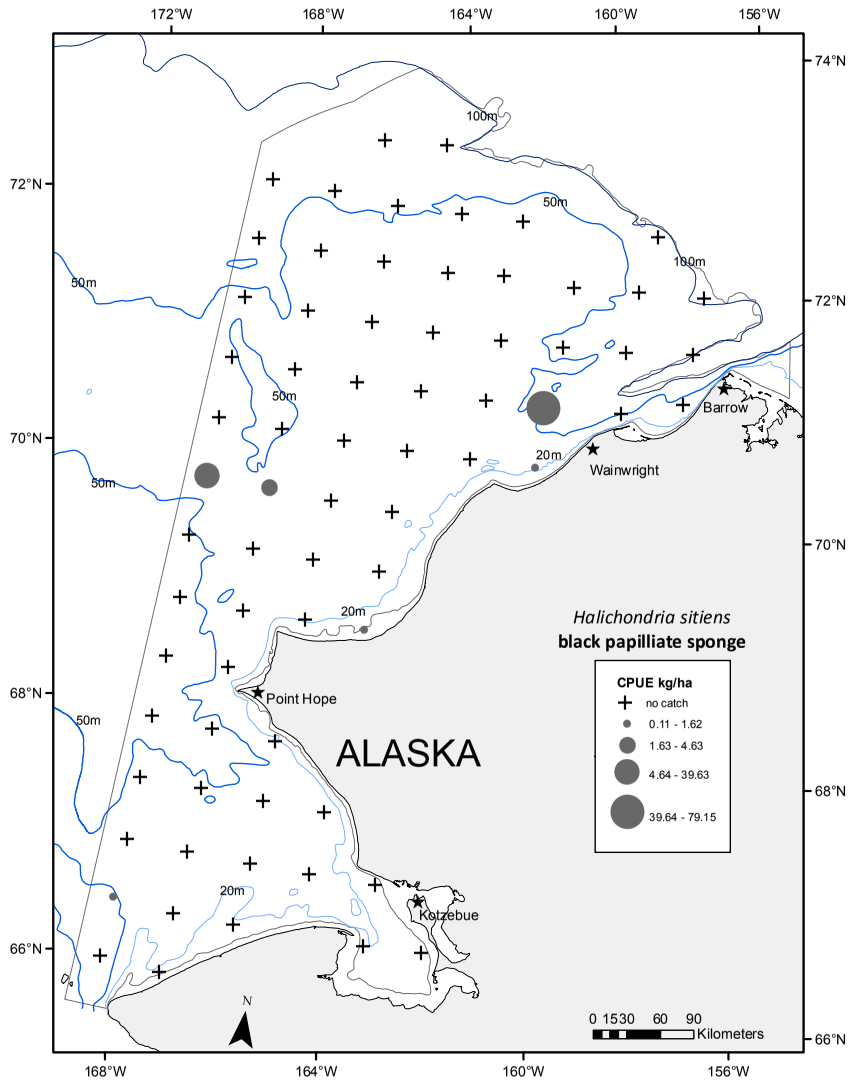
Figures 47-48.--Distribution and relative abundance (CPUE kg/ha) of *Gorgonocephalus* sp. cf. *arcticus* (Arctic basketstar) and Gastropoda (empty gastropod shells) for the 2012 Chukchi Sea bottom trawl survey.



Figures 49-50.--Distribution and relative abundance (CPUE kg/ha) of *Halichondria* sp. and *Styela rustica* (sea potato) for the 2012 Chukchi Sea bottom trawl survey.



Figures 51-52.--Distribution and relative abundance (CPUE kg/ha) of *Chrysaora melanaster* (sunrise jellyfish) and *Urticina crassicornis* (mottled anemone) for the 2012 Chukchi Sea bottom trawl survey.



Figures 53-54.--Distribution and relative abundance (CPUE kg/ha) of *Halichondria sitiens* (black papillate sponge) for the 2012 Chukchi Sea bottom trawl survey.

Table 9.--Summary of data collected for *Chionoecetes opilio* on the 2012 Chukchi Sea bottom trawl survey.

	Number of stations	Stations with crab	Number measured	Number caught	Estimate abundance	Estimated abundance CI	Estimated biomass (t)	Estimated biomass (t) CI
Immature male (< 75 mm CW)	71	58	2,952	14,640	2,382,547,304	1,981,901,110	86,917	67,469
Mature male (≥ 75 mm CW)	71	11	34	61	9,679,638	7,974,330	1,981	1,582
Legal (≥ 78 mm CW)	71	10	18	29	4,434,317	2,993,756	1,057	702
Immature female (< 50 mm CW)	71	52	1,816	9,005	1,491,533,174	1,119,118,560	52,882	36,159
Mature female (≥ 50 mm CW)	71	43	468	3,856	653,503,181	626,440,030	56,156	56,099
Immature unsexed (< 16 mm)	71	9	304	799	120,235,857	112,385,343	*	*

* no size-weight regression factors available for unsexed crab

CW = carapace width

CI = confidence interval

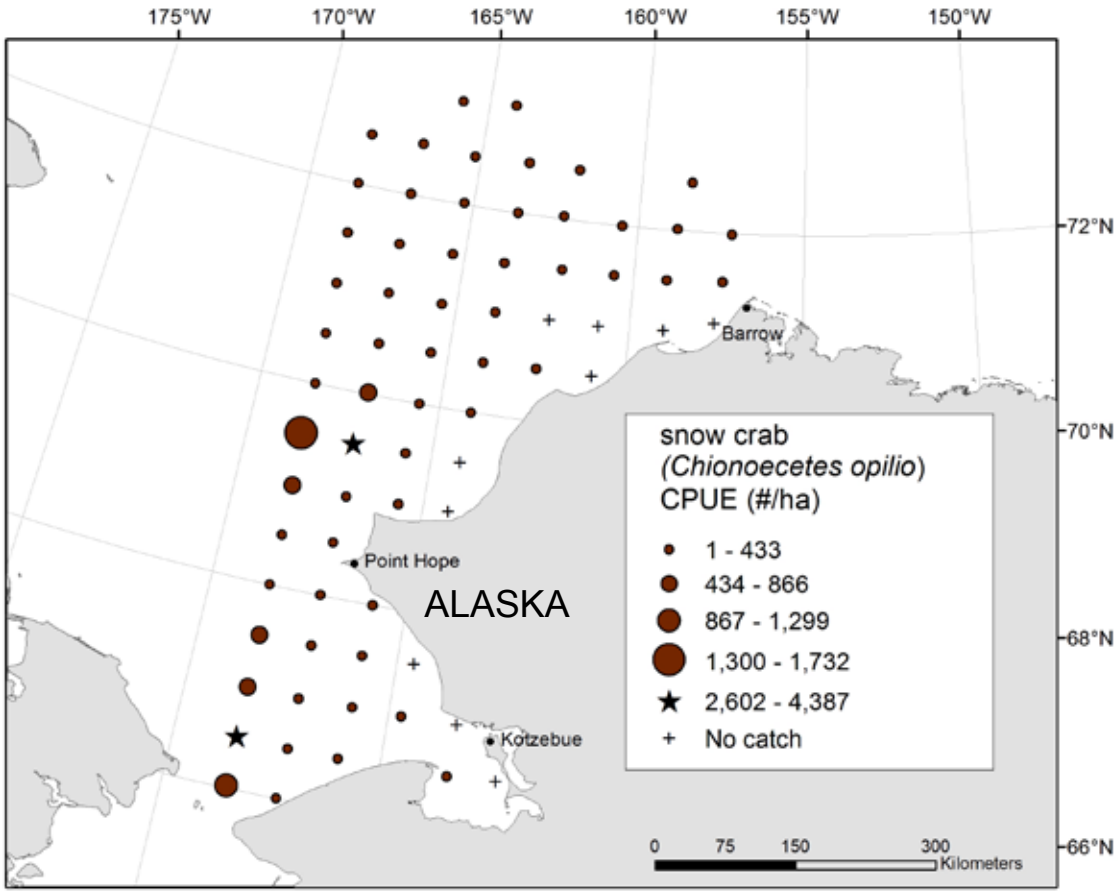


Figure 55.--Total density (CPUE no./ha) of *Chionoecetes opilio* (snow crab) at each station sampled in the 2012 Chukchi Sea bottom trawl survey. Data depicted by circles are crab densities at equal intervals.

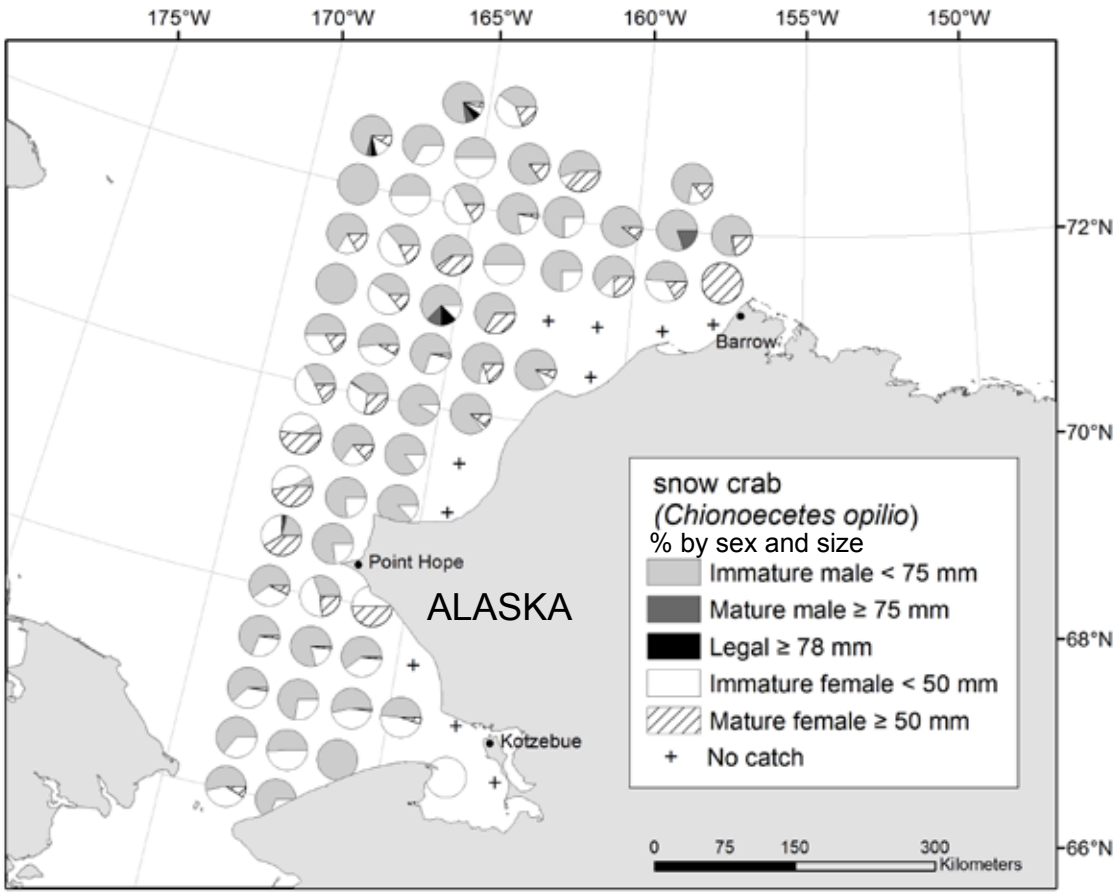


Figure 56.--Percentage of male and female *Chionoecetes opilio* (snow crab) size categories caught at each station sampled in the 2012 Chukchi Sea bottom trawl survey.

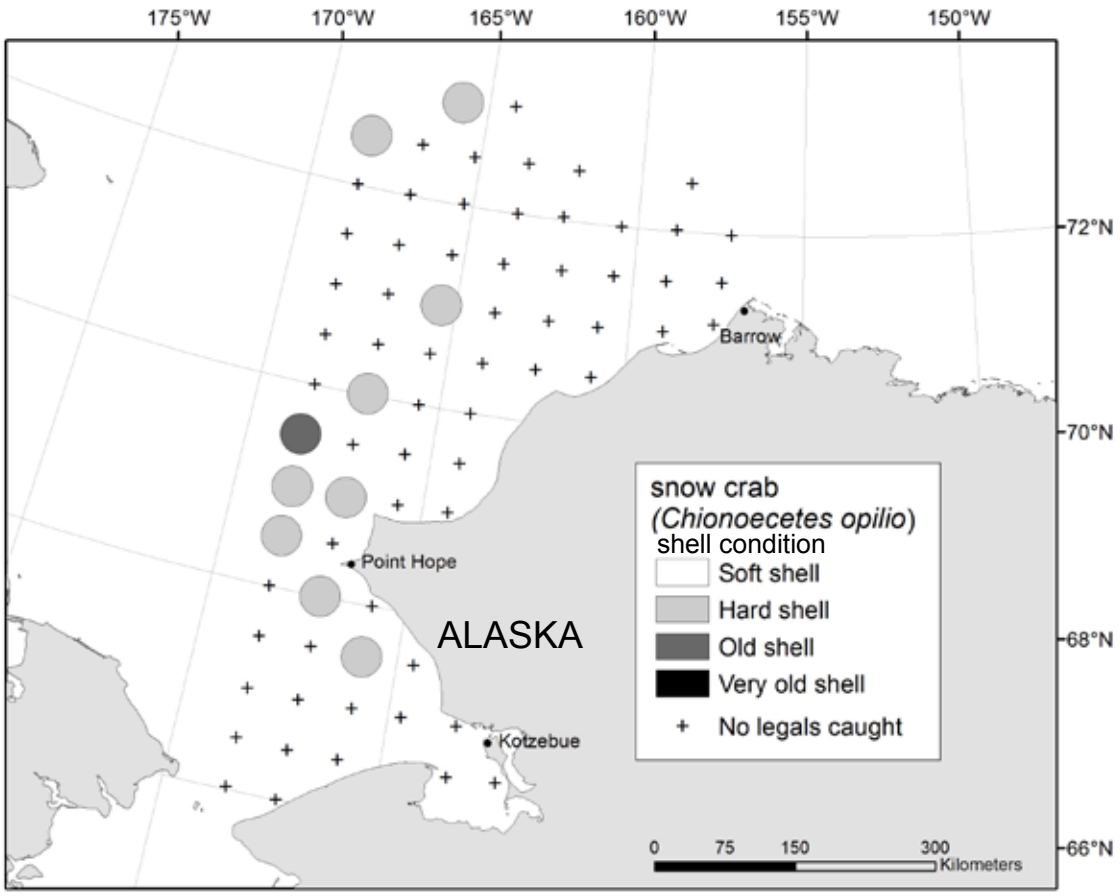


Figure 57.--Distribution of legal-sized male *Chionoecetes opilio* (snow crab), distinguished by shell condition, caught at each station sampled in the 2012 Chukchi Sea bottom trawl survey.

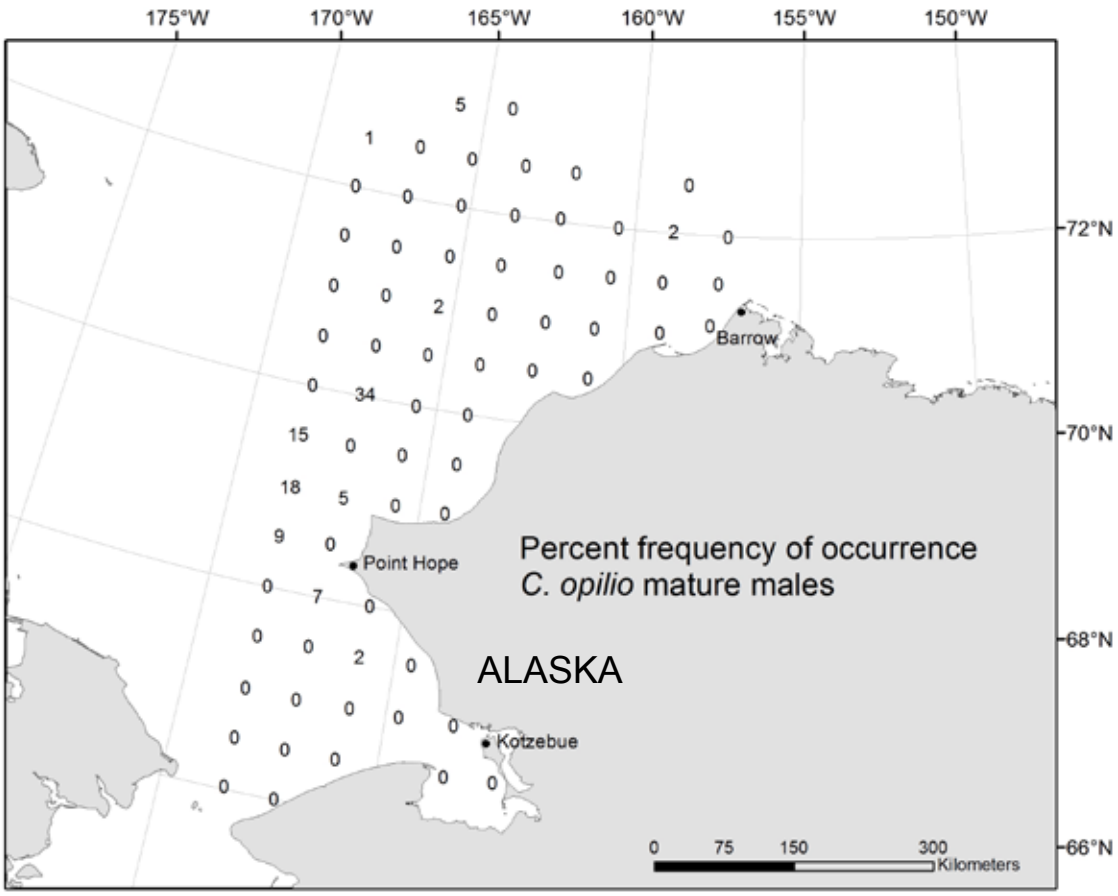


Figure 58.--Percent occurrence of mature male *Chionoecetes opilio* (snow crab) sampled in the 2012 Chukchi Sea bottom trawl survey (e.g., 34 means that 34% of all the mature male *C. opilio* observed during the survey were sampled at that station).

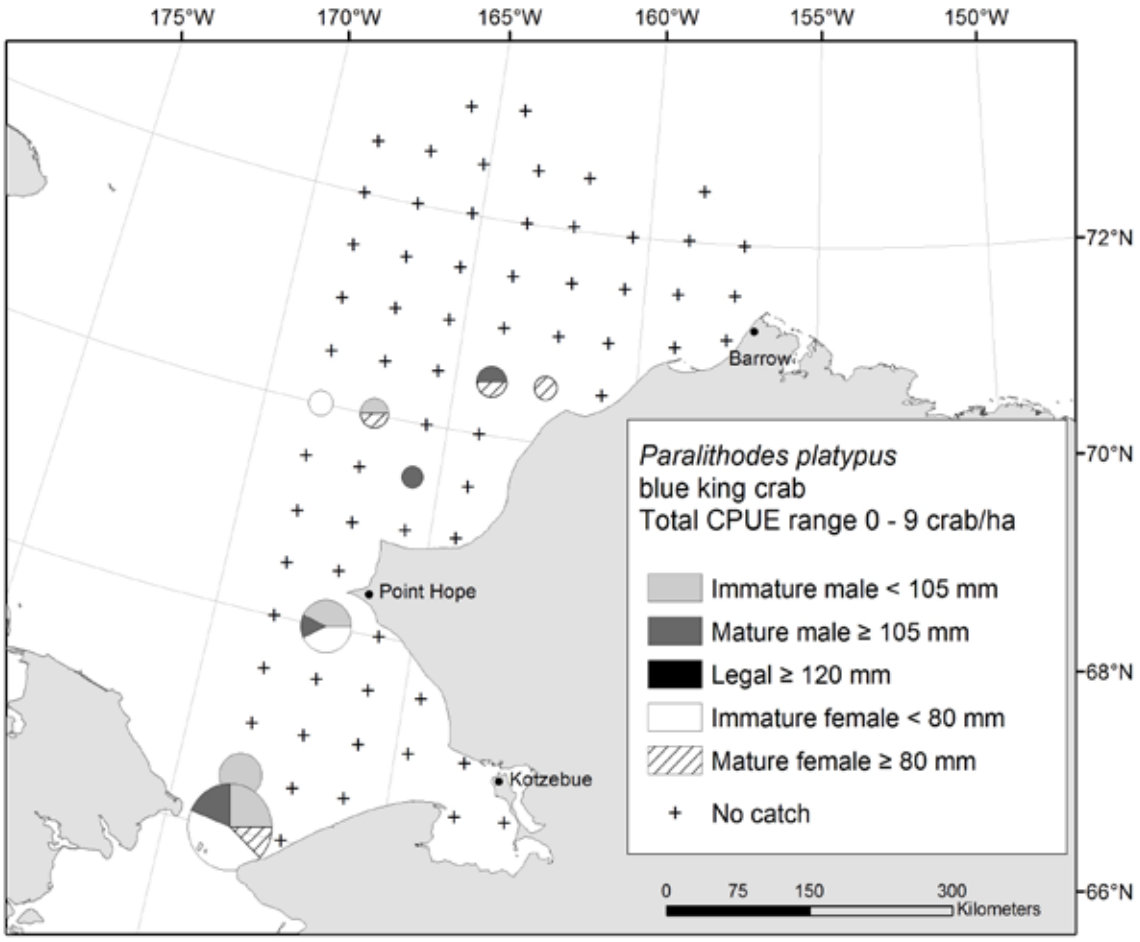


Figure 59.--Total density (CPUE no./ha) and percentage of male and female *Paralithodes platypus* (blue king crab) size categories at each station sampled in the 2012 Chukchi Sea bottom trawl survey.

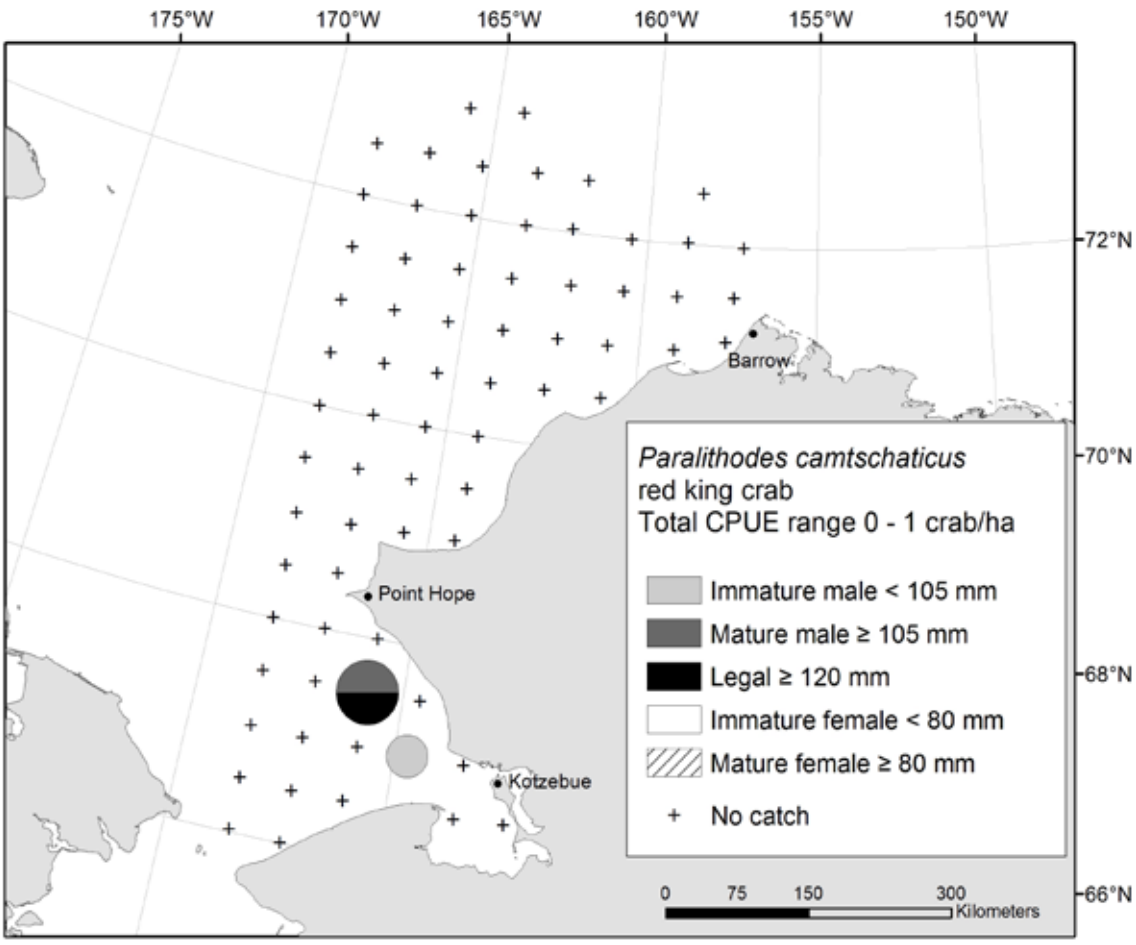


Figure 60.--Total density (CPUE no./ha) and percentage of male and female *Paralithodes camtschaticus* (red king crab) size categories at each station sampled in the 2012 Chukchi Sea bottom trawl survey.

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Recognition and appreciation is extended to the captains, crew, vessel managers, and parent corporations of the FV *Alaska Knight*. Their cooperation, expertise, and goodwill made this survey possible. Appreciation is also extended to the scientists, researchers, and contractors who worked tirelessly aboard the vessel to complete the survey in a safe and successful manner. We also thank the survey support team who provided us with technical and scientific equipment. Finally, appreciation is extended to the reviewers of this document whose comments and suggestions improved it.

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APPENDICES

Appendix A.--Haul and catch (kg) data for successfully completed tows during the 2012 Chukchi Sea bottom trawl survey.

Appendix B. --Rank of fish and invertebrate taxa by the mean catch per unit effort (CPUE kg/ha) from the 2012 Chukchi Sea bottom trawl survey.

Appendix C.--Fish species encountered, in alphabetical order by family, during the 2012 Chukchi Sea bottom trawl survey.

Appendix D.--Invertebrate species, in alphabetical order by phylum or subphylum, encountered during the 2012 Chukchi Sea bottom trawl survey.

Appendix A.--Haul and catch (kg) data for successfully completed tows during the 2012 Chukchi Sea bottom trawl survey.

Haul No.	1	2	3	5	6	8
Station	CH30-B01	CH30-A01	CH30-A02	CH30-B02	CH30-B03	CH30-C03
Date	14-AUG-12	14-AUG-12	14-AUG-12	15-AUG-12	15-AUG-12	15-AUG-12
Start Latitude	66.51	66.03	66.00	66.48	66.48	66.99
Start Longitude	-168.50	-168.49	-167.29	-167.25	-166.03	-165.92
Net width (m)	14.99	15.2	13.61	14.43	13.67	14.37
Distance fished (km)	1.21	1.23	1.47	1.37	1.51	1.44
Duration	0.23	0.23	0.26	0.25	0.27	0.26
Depth (m)	52	52	15	29	17	24
Bottom temperature (°C)	1.3	1.6	9.9	8.4	9.3	8.2
Surface temperature (°C)	1.4	1.7	10.3	8.6	9.3	8.7
Bathyraja parmifera	6.92					
Hippoglossoides robustus	0.55	0.33		0.70		0.12
Limanda aspera			8.78	2.80	8.14	3.88
Platichthys stellatus			9.18	5.34	6.36	2.62
Pleuronectes quadrituberculatus			0.56	0.56	2.07	1.84
Other flatfish	3.19	1.70	1.76	3.63	11.29	3.93
Clupea pallasi			1.08	1.01	4.52	3.26
Sculpins	1.81	2.27	1.16	0.53	1.13	0.55
Boreogadus saida	1.64	4.26	0.04	34.31	0.04	1.57
Eleginus gracilis			1.12	0.12	11.03	0.44
Snailfish	2.70	0.40		0.01		
Eelpouts	0.75			6.59	0.05	
Other roundfish	3.22	0.69	2.38	48.72		4.06
Chionoecetes opilio	170.58	44.04	0.94	15.64	0.12	1.67
Paralithodes camtschaticus						
Paralithodes platypus	1.43	5.05			36.97	
Other crab	249.02	472.01	9.44	26.98	0.00	12.89
Shrimp	1.15	0.10	0.03	0.73	0.23	0.18
Snails	181.26	99.28	0.51	4.85		0.02
Sea stars	70.39	152.65	14.35	223.01	28.66	64.68
Sea urchins	193.06	705.73	0.02	0.00	7.43	0.36
Other inverts	587.89	2000.12	11.35	132.50		114.14

Appendix A.--Continued.

Haul No.	9	10	13	14	15	17
Station	CH30-B05	CH30-B06	CH30-C05	CH30-C04	CH30-D04	CH30-D03
Date	16-AUG-12	16-AUG-12	16-AUG-12	17-AUG-12	17-AUG-12	17-AUG-12
Start Latitude	66.48	66.49	66.98	66.99	67.50	67.51
Start Longitude	-163.40	-162.21	-163.32	-164.69	-164.58	-165.88
Net width (m)	14.07	15.2	15.79	14.62	14.79	13.81
Distance fished (km)	1.46	1.43	1.40	1.32	1.34	1.22
Duration	0.27	0.27	0.26	0.25	0.24	0.23
Depth (m)	14	14	14	27	30	40
Bottom temperature (°C)	10.6	-0.4	10.7	8.4	9.8	5
Surface temperature (°C)	10.9	10.3	11.2	8.9	9.8	6.6
Bathyraja parmifera						
Hippoglossoides robustus				0.61	0.14	0.04
Limanda aspera	6.00	0.18	9.68	0.83	0.90	
Platichthys stellatus	2.96		3.15	0.80	0.14	
Pleuronectes quadrituberculatus	1.00	2.54	0.72	0.34	0.39	
Other flatfish	3.02		0.56	3.06	0.68	0.22
Clupea pallasi	0.27	0.01		17.74	1.51	25.21
Sculpins	0.75	0.04	1.94	0.01	0.19	0.07
Boreogadus saida	18.03	0.03	0.01	2.02	0.09	0.05
Eleginus gracilis			16.47	18.42	8.67	
Snailfish						
Eelpouts			0.94	0.05	0.19	0.09
Other roundfish	8.19		37.79	13.01	5.70	3.15
Chionoecetes opilio	0.02	44.63		1.48		13.68
Paralithodes camtschaticus				0.63		1.66
Paralithodes platypus						
Other crab	65.96		73.92	2.73	11.64	107.73
Shrimp	0.12	0.16	0.49	0.40	0.27	0.14
Snails		10.72	1.77		0.10	4.17
Sea stars	140.06	42.03	63.88	58.63	37.34	25.23
Sea urchins	0.48	0.32	1.43	1.11	1.80	0.14
Other inverts	36.53	21.97	97.41	214.22	62.45	140.08

Appendix A.--Continued.

Haul No.	18	19	21	23	25	27
Station	CH30-D02	CH30-C02	CH30-C01	CH30-D01	CH30-E01	CH30-E02
Date	18-AUG-12	18-AUG-12	18-AUG-12	19-AUG-12	19-AUG-12	20-AUG-12
Start Latitude	67.52	66.99	66.99	67.50	68.01	68.00
Start Longitude	-167.19	-167.22	-168.48	-168.49	-168.51	-167.21
Net width (m)	16.49	17.03	14.3	16.32	16.72	15.92
Distance fished (km)	1.25	1.29	1.26	1.39	1.38	1.40
Duration	0.23	0.24	0.23	0.26	0.25	0.26
Depth (m)	46	38	37	47	58	56
Bottom temperature (°C)	1.7	2	2.4	1.3	1.5	2
Surface temperature (°C)	4.7	2.5	4.9	3.9	4.6	5.4
Bathyraja parmifera						
Hippoglossoides robustus	0.59		0.74	1.72	1.11	0.84
Limanda aspera						
Platichthys stellatus						
Pleuronectes quadrituberculatus						
Other flatfish	2.96		3.83	8.59	5.57	5.99
Clupea pallasi						0.11
Sculpins	0.28	0.04	1.74	0.63	0.63	0.63
Boreogadus saida	0.55	0.41	3.05	4.89	26.34	0.52
Eleginus gracilis						
Snailfish		0.21	1.06	0.94	0.55	0.62
Eelpouts			0.02		0.14	0.48
Other roundfish	0.18	0.37	2.38	1.60	2.30	1.44
Chionoecetes opilio	3.43	14.53	16.07	19.23	4.57	39.30
Paralithodes camtschaticus						
Paralithodes platypus						2.91
Other crab	10.88	42.50	33.12	8.03	45.30	161.97
Shrimp	0.04	0.01	0.09	0.21	0.11	1.33
Snails	1.56	20.56	40.78	2.55	28.28	14.07
Sea stars	35.33	10.90	13.83	101.52	39.08	16.03
Sea urchins			0.08		142.61	525.70
Other inverts	70.39	36.67	22.28	64.37		852.82

Appendix A.--Continued.

Haul No.	28	30	31	33	34	35
Station	CH30-E03	CH30-F02	CH30-G02	CH30-G03	CH30-G04	CH30-H04
Date	20-AUG-12	21-AUG-12	21-AUG-12	21-AUG-12	22-AUG-12	22-AUG-12
Start Latitude	68.00	68.52	68.99	69.01	69.01	69.50
Start Longitude	-165.84	-167.14	-167.06	-165.67	-164.34	-164.22
Net width (m)	13.51	13.85	15.58	14.01	13.71	13.46
Distance fished (km)	1.33	1.33	1.27	1.38	1.53	1.40
Duration	0.25	0.24	0.25	0.24	0.27	0.25
Depth (m)	29	37	47	21	12	23
Bottom temperature (°C)	9.9	9.6	4.9	9.1	9.3	7
Surface temperature (°C)	9.9	9.4	7.6	9.4	9.3	8.9
Bathyraja parmifera						
Hippoglossoides robustus		0.08	0.07			
Limanda aspera	2.40	2.78		0.05	1.67	
Platichthys stellatus	0.60			5.25		
Pleuronectes quadrituberculatus	0.22	0.41				
Other flatfish		0.61	0.34	0.13		
Clupea pallasi	11.95	10.85	1.20		0.77	
Sculpins	1.37	1.61	0.45	0.42	1.76	0.33
Boreogadus saida	0.08	9.26	8.83	0.13	0.06	11.26
Eleginus gracilis	69.33	2.56		0.26	0.75	0.01
Snailfish	0.07	0.92	0.01			0.01
Eelpouts	0.04	0.77	0.08	0.05		
Other roundfish	17.78	1.20	0.16	0.94	4.27	0.77
Chionoecetes opilio	0.09	0.50	17.41	1.19	95.06	81.75
Paralithodes camtschaticus						
Paralithodes platypus						
Other crab	136.78	160.90	61.96	94.61		
Shrimp	1.49	0.33	0.90	0.50	0.51	0.30
Snails		10.19	6.65	1.04		56.96
Sea stars	10.47	33.22	7.46	35.00	22.53	102.72
Sea urchins	18.68	3.00	0.25	0.13	374.25	0.49
Other inverts	346.47	551.32	96.69	44.53	32.30	61.04

Appendix A.--Continued.

Haul No.	37	38	40	42	43	45
Station	CH30-I04	CH30-J05	CH30-J06	CH30-K06	CH30-K07	CH30-K08
Date	22-AUG-12	23-AUG-12	23-AUG-12	23-AUG-12	24-AUG-12	24-AUG-12
Start Latitude	69.99	70.51	70.50	70.99	71.00	71.11
Start Longitude	-164.14	-162.52	-160.96	-160.91	-159.04	-157.57
Net width (m)	13.47	13.03	12.46	14.09	13.25	12.17
Distance fished (km)	1.32	1.26	1.50	1.28	1.39	0.93
Duration	0.24	0.23	0.28	0.24	0.25	0.17
Depth (m)	31	35	21	45	37	35
Bottom temperature (°C)	7	7.2	9.2	1.7		7.6
Surface temperature (°C)	8.5	8.6	9.4	7		8.7
Bathyraja parmifera						
Hippoglossoides robustus	0.04					
Limanda aspera						
Platichthys stellatus						
Pleuronectes quadrituberculatus						
Other flatfish	0.22					
Clupea pallasi			3.81	0.06	5.54	0.87
Sculpins	0.56	0.85	1.83	0.43	4.15	4.50
Boreogadus saida	1.06	2.40	0.06			
Eleginus gracilis			0.01	0.10	0.03	
Snailfish	0.03	0.06			0.07	0.47
Eelpouts						4.46
Other roundfish	0.42	0.67	2.34			8.78
Chionoecetes opilio	6.95	4.50				
Paralithodes camtschaticus		0.56				
Paralithodes platypus						
Other crab	202.94	95.08	52.04	149.77	72.08	37.42
Shrimp			3.42	0.18	9.61	1.80
Snails	58.77	9.86	17.24	9.95	11.01	7.22
Sea stars	25.98	2.51	425.60	2.20	81.16	1.02
Sea urchins			0.91	55.25	184.99	0.39
Other inverts	1452.50	993.84	396.60	800.06	2627.54	555.07

Appendix A.--Continued.

Haul No.	48	50	52	54	57	59
Station	CH30-L08	CH30-K05	CH30-J04	CH30-I03	CH30-H03	CH30-H02
Date	24-AUG-12	25-AUG-12	25-AUG-12	26-AUG-12	26-AUG-12	27-AUG-12
Start Latitude	71.52	71.00	70.50	70.00	69.50	69.50
Start Longitude	-157.39	-162.30	-163.99	-165.55	-165.73	-167.12
Net width (m)	17.12	14.28	13.68	15.38	13.17	14.20
Distance fished (km)	1.01	1.41	1.35	1.46	1.35	1.33
Duration	0.19	0.26	0.25	0.27	0.25	0.25
Depth (m)	90	45	43	40	35	47
Bottom temperature (°C)	-1.7	2.2	6.2	5.4	7.9	5.7
Surface temperature (°C)	1.6	6.5	7.7	6.6	9.2	7.9
Bathyraja parmifera						
Hippoglossoides robustus			0.01	0.08	0.04	0.41
Limanda aspera						
Platichthys stellatus						
Pleuronectes quadrituberculatus					0.19	0.46
Other flatfish			0.30	0.39	0.18	2.06
Clupea pallasi			11.90		15.16	1.13
Sculpins	0.16	0.01	0.74	0.11	0.77	1.39
Boreogadus saida	0.69	1.25	4.23	4.85	3.76	1.00
Eleginus gracilis					0.03	0.04
Snailfish		0.02	0.07	0.21	0.19	0.09
Eelpouts		0.02	0.09	0.40	1.73	0.51
Other roundfish	0.02	0.32	2.78	3.65	4.67	1.07
Chionoecetes opilio	0.04		1.66	0.54	1.26	1.28
Paralithodes camtschaticus			3.41	14.51	13.52	236.76
Paralithodes platypus			1.69	571.74	1.33	438.24
Other crab	30.09	24.41	132.62		526.98	
Shrimp	0.05	0.55				
Snails	7.33	9.52	12.77	12.07	98.73	28.95
Sea stars	5.86	3.21	7.70	17.67	51.86	41.78
Sea urchins	0.31	0.20	0.09	243.24	0.64	0.11
Other inverts	171.77	1039.69	652.94		33.61	323.86

Appendix A.Table 1.--Continued.

Haul No.	61	63	65	67	68	69
Station	CH30-H01	CH30-G01	CH30-F01	CH30-I02	CH30-J02	CH30-J03
Date	27-AUG-12	28-AUG-12	28-AUG-12	02-SEP-12	03-SEP-12	03-SEP-12
Start Latitude	69.50	68.99	68.50	70.01	70.50	70.50
Start Longitude	-168.59	-168.49	-168.49	-167.02	-166.99	-165.51
Net width (m)	13.34	14.08	14.62	15.04	14.99	15.14
Distance fished (km)	1.28	1.26	1.26	1.38	1.35	1.43
Duration	0.23	0.23	0.23	0.25	0.24	0.26
Depth (m)	51	51	51	47	50	42
Bottom temperature (°C)	3.8	2.1	2.3	2	0.3	2.2
Surface temperature (°C)	7	4.2	3.9	5.5	5.1	6
Bathyraja parmifera						
Hippoglossoides robustus	0.24	1.78	2.06		0.02	0.02
Limanda aspera						
Platichthys stellatus						
Pleuronectes quadrituberculatus						
Other flatfish	1.19	8.91	10.31		0.16	0.09
Clupea pallasi						
Sculpins	0.49	0.27	0.20	0.30		0.09
Boreogadus saida	1.73	1.79	3.76	2.02	1.08	0.50
Eleginus gracilis	0.01	0.01	1.17	0.01		
Snailfish	0.04	0.22	0.27	0.79	0.19	0.26
Eelpouts	0.02	0.44		0.07		
Other roundfish	0.46	2.05	3.28	0.16	0.19	1.66
Chionoecetes opilio	150.41	76.50	14.00	74.39	8.59	1.50
Paralithodes camtschaticus						
Paralithodes platypus				1.64		
Other crab	122.13	75.05	83.09	137.90	62.08	114.17
Shrimp	2.05	1.12	0.44	0.60	0.14	0.32
Snails	11.59	14.29	14.51	14.81	2.63	19.60
Sea stars	11.56	11.74	10.65	5.64	18.81	21.91
Sea urchins	0.21	0.09	0.11	60.39	0.09	0.08
Other inverts	196.02	29.12	9.17	845.59	802.17	248.06

Appendix A.--Continued.

Haul No.	70	72	73	74	76	77
Station	CH30-K04	CH30-L05	CH30-L06	CH30-L07	CH30-M08	CH30-M07
Date	04-SEP-12	05-SEP-12	05-SEP-12	05-SEP-12	06-SEP-12	06-SEP-12
Start Latitude	71.00	71.50	71.50	71.50	71.99	72.01
Start Longitude	-163.89	-162.13	-160.60	-159.02	-157.19	-158.82
Net width (m)	15.27	16.29	16.24	16.18	16.79	15.63
Distance fished (km)	1.38	1.08	1.33	1.31	1.29	0.90
Duration	0.25	0.19	0.25	0.23	0.23	0.16
Depth (m)	42	44	46	50	86	53
Bottom temperature (°C)	-1.2	-1.7	-1.7	-1.7	-1.6	-1.7
Surface temperature (°C)	3.3	1.7	5.4	3.9	2.5	1.7
Bathyraja parmifera						
Hippoglossoides robustus		0.10		0.04	0.15	
Limanda aspera						
Platichthys stellatus						
Pleuronectes quadrituberculatus						
Other flatfish		0.52		0.22	0.77	
Clupea pallasi						
Sculpins	0.02	0.12	0.04		0.01	
Boreogadus saida	0.51	0.74	1.17	0.28	0.33	0.27
Eleginus gracilis			0.01			
Snailfish	0.07	0.03			0.01	
Eelpouts	0.00	0.13	0.02		0.06	
Other roundfish	0.54	0.13			0.06	
Chionoecetes opilio	0.17	0.15	0.32	1.17	2.34	0.33
Paralithodes camtschaticus						
Paralithodes platypus						
Other crab	3.54	7.40	3.41	4.25	6.77	10.57
Shrimp	0.27	0.15	0.05	0.07	0.02	0.03
Snails	6.11	3.25	1.32	4.65	2.56	2.95
Sea stars	7.93	3.08	2.04	4.52	72.77	1.63
Sea urchins		0.01				
Other inverts	349.46	51.55	28.47	67.45	18.08	14.22

Appendix A.--Continued.

Haul No.	78	82	84	85	86	88
Station	CH30-N07	CH30-M06	CH30-N05	CH30-N04	CH30-O03	CH30-O02
Date	07-SEP-12	07-SEP-12	08-SEP-12	08-SEP-12	08-SEP-12	09-SEP-12
Start Latitude	72.48	72.00	72.50	72.50	73.04	73.00
Start Longitude	-158.44	-160.47	-161.93	-163.51	-164.17	-165.82
Net width (m)	16.62	14.53	17.43	16.76	17.78	18.04
Distance fished (km)	1.40	1.31	0.94	1.38	0.50	1.42
Duration	0.26	0.23	0.17	0.24	0.09	0.25
Depth (m)	59	38	42	47	84	59
Bottom temperature (°C)	-1.6	-1.7	-1.2	-1.3	-1.7	-1.4
Surface temperature (°C)	2	0.1	1.5	2	0.3	-0.5
Bathyraja parmifera						
Hippoglossoides robustus		0.19	0.09	0.12		0.12
Limanda aspera						
Platichthys stellatus						
Pleuronectes quadrituberculatus						
Other flatfish		0.97	0.44	0.60	0.01	0.58
Clupea pallasi						
Sculpins	0.13	0.21	0.01		0.01	0.03
Boreogadus saida	0.66	1.21	0.45	1.91	0.26	1.64
Eleginus gracilis						
Snailfish	0.03	0.05	0.03	0.02	0.03	
Eelpouts	0.30	0.50	0.08	0.11		0.07
Other roundfish	0.03	0.35		0.13	0.29	
Chionoecetes opilio	0.92	2.13	0.66	1.03	0.20	3.40
Paralithodes camtschaticus						
Paralithodes platypus						
Other crab	22.62	13.30	5.78	11.77	9.66	4.61
Shrimp	0.23	0.06	0.05	0.08		0.02
Snails	3.82	1.70	0.89	2.16	2.91	1.28
Sea stars	19.85	0.02	0.04	0.07	4.25	54.46
Sea urchins						
Other inverts	46.17	33.86	15.70	17.86	66.29	14.22

Appendix A.--Continued.

Haul No.	89	92	93	94	96	97
Station	CH30-N01	CH30-N02	CH30-N03	CH30-M03	CH30-M04	CH30-M05
Date	09-SEP-12	10-SEP-12	10-SEP-12	10-SEP-12	11-SEP-12	11-SEP-12
Start Latitude	72.50	72.51	72.48	72.01	72.00	72.04
Start Longitude	-168.46	-166.84	-165.18	-165.28	-163.65	-162.25
Net width (m)	16.14	16.14	16.11	16.37	13.07	12.43
Distance fished (km)	1.34	1.29	0.88	1.04	1.27	1.40
Duration	0.23	0.23	0.15	0.18	0.23	0.25
Depth (m)	53	50	50	42	39	28
Bottom temperature (°C)	-1.1	-0.8	-0.8	-0.9	-1.2	-1.6
Surface temperature (°C)	2.4	3.3	2	1.4	-0.1	0.3
Bathyraja parmifera						
Hippoglossoides robustus	0.01	0.01	0.01			
Limanda aspera						
Platichthys stellatus						
Pleuronectes quadrituberculatus						
Other flatfish	0.04	0.03	0.04			
Clupea pallasi						0.76
Sculpins			0.77	1.86	0.68	0.69
Boreogadus saida	7.55	4.48	0.01			
Eleginus gracilis	0.01					
Snailfish	0.01	0.12	0.03	0.03	0.01	0.02
Eelpouts	0.01					
Other roundfish	0.14	0.05		0.21	0.13	0.16
Chionoecetes opilio	1.08	0.13	0.05	0.41	0.98	0.09
Paralithodes camtschaticus						
Paralithodes platypus						
Other crab	5.64	7.41	5.01	46.78	48.06	4.56
Shrimp	0.05	0.03	0.06	0.02	0.04	0.03
Snails	3.92	3.96	3.46	8.02	9.17	1.02
Sea stars	20.21	1.05				
Sea urchins			0.36	1.92	2.53	0.34
Other inverts	110.29	87.87	54.63	36.14	36.36	23.11

Appendix A.--Continued.

Haul No.	100	102	107	108	109	111
Station	CH30-L04	CH30-L03	CH30-K03	CH30-K02	CH30-L02	CH30-M02
Date	12-SEP-12	12-SEP-12	13-SEP-12	13-SEP-12	13-SEP-12	14-SEP-12
Start Latitude	71.49	71.50	70.99	71.01	71.50	72.01
Start Longitude	-163.80	-165.34	-165.43	-166.97	-166.95	-166.90
Net width (m)	15.55	16.24	13.01	15.86	16.25	17.14
Distance fished (km)	1.44	1.43	1.30	1.43	1.01	1.44
Duration	0.25	0.25	0.23	0.25	0.19	0.25
Depth (m)	44	42	41	45	47	47
Bottom temperature (°C)	-1.1	-0.6	0.5	1.5	0.3	-0.8
Surface temperature (°C)	0.7	1.8	3	5	3.7	3.1
Bathyraja parmifera						
Hippoglossoides robustus						0.07
Limanda aspera						
Platichthys stellatus						
Pleuronectes quadrituberculatus						
Other flatfish						0.34
Clupea pallasi	0.76					
Sculpins	0.69	0.02				
Boreogadus saida		1.53	0.60	9.02	1.64	1.98
Eleginus gracilis						
Snailfish	0.02		0.14	0.04	0.02	
Eelpouts						0.04
Other roundfish	0.16		0.86	0.32	0.18	
Chionoecetes opilio	0.09	0.25	0.43	1.11	0.58	0.16
Paralithodes camtschaticus						
Paralithodes platypus						
Other crab	4.56	9.39	119.05	53.19	42.77	11.78
Shrimp	0.03	0.02	0.06	0.06	0.02	0.02
Snails	1.02	3.48	3.12	7.20	9.53	2.18
Sea stars			6.61	17.02	9.57	4.99
Sea urchins	0.34	1.80	0.08	0.12		
Other inverts	23.11	19.81	126.74	107.38	85.54	3.38

Appendix A.--Continued.

Haul No.	112	113	116	118	120
Station	CH30-M01	CH30-L01	CH30-K01	CH30-J01	CH30-I01
Date	14-SEP-12	14-SEP-12	15-SEP-12	15-SEP-12	16-SEP-12
Start Latitude	72.00	71.50	71.00	70.49	70.00
Start Longitude	-168.50	-168.51	-168.51	-168.49	-168.47
Net width (m)	15.94	16.17	16.12	13.48	15.49
Distance fished (km)	1.38	1.42	1.43	1.32	0.92
Duration	0.24	0.25	0.25	0.24	0.17
Depth (m)	50	49	46	39	42
Bottom temperature (°C)	-0.5	-0.3		0.1	0.7
Surface temperature (°C)	3.8	3.8	3.9	4.1	6
Bathyraja parmifera					
Hippoglossoides robustus	0.02	0.01			0.02
Limanda aspera					
Platichthys stellatus					
Pleuronectes quadrituberculatus					
Other flatfish	0.08	0.06	0.01		0.09
Clupea pallasi					
Sculpins				0.19	0.59
Boreogadus saida	5.56	1.89	3.21	0.46	0.42
Eleginus gracilis					
Snailfish	0.04	0.06	0.01	0.09	0.23
Eelpouts				0.06	
Other roundfish	0.05		0.10	0.74	0.37
Chionoecetes opilio	0.04	1.05	0.04	0.53	1.38
Paralithodes camtschaticus					
Paralithodes platypus					0.32
Other crab	10.53	16.54	36.62	383.72	134.59
Shrimp	0.22	0.10	0.15	0.23	0.94
Snails	9.24	6.97	8.55	81.69	4.79
Sea stars	32.85	69.28	9.77	12.04	0.60
Sea urchins			8.09	0.51	73.23
Other inverts	21.34	11.58		622.60	1728.02

Appendix B. --Rank of fish and invertebrate taxa by the mean catch per unit effort (CPUE kg/ha) from the 2012 Chukchi Sea bottom trawl survey.

Rank	Species code	Mean CPUE (kg/ha)	Standard error	95% Confidence limits		Proportion	Cumulative proportion	Scientific name
1	82510	15.8907	6.9291	2.0325	29.7490	0.1470	0.1470	*Strongylocentrotus droebachiensis*
2	81742	8.8009	3.3937	2.0134	15.5883	0.0814	0.2285	*Asterias amurensis*
3	69086	7.8716	1.6707	4.5301	11.2131	0.0728	0.3013	*Pagurus trigonocheirus*
4	68580	7.4508	2.5756	2.2995	12.6020	0.0689	0.3702	*Chionoecetes opilio*
5	85219	5.5437	2.4547	0.6342	10.4531	0.0513	0.4215	*Psolus fabricii*
6	71884	4.4800	1.1823	2.1154	6.8447	0.0415	0.4630	*Neptunea heros*
7	98105	4.1656	3.3204	0.0000	10.8065	0.0385	0.5015	*Boltenia ovifera*
8	80590	3.9912	0.9407	2.1097	5.8727	0.0369	0.5384	*Leptasterias polaris*
9	83021	3.5915	1.5096	0.5723	6.6107	0.0332	0.5717	*Gorgonocephalus* sp.
10	99994	3.5541	1.1416	1.2709	5.8373	0.0329	0.6045	empty gastropod shells
11	91049	3.3040	3.1675	0.0000	9.6390	0.0306	0.6351	*Halichondria* sp.
12	98082	2.4225	1.1637	0.0950	4.7500	0.0224	0.6575	*Styela rustica*
13	40504	2.2667	0.4203	1.4261	3.1073	0.0210	0.6785	*Chrysaora melanaster*
14	43042	1.9315	0.6034	0.7248	3.1383	0.0179	0.6964	*Urticina crassicornis*
15	91079	1.7669	1.2396	0.0000	4.2461	0.0163	0.7127	*Halichondria sitiens*
16	98205	1.6520	0.9629	0.0000	3.5778	0.0153	0.7280	*Halocynthia aurantium*
17	83020	1.5791	1.2316	0.0000	4.0423	0.0146	0.7426	*Gorgonocephalus eucnemis*
18	21725	1.4599	0.3088	0.8424	2.0774	0.0135	0.7561	*Boreogadus saida*
19	40561	1.4513	0.4311	0.5891	2.3136	0.0134	0.7695	*Cyanea capillata*
20	68577	1.3372	0.4858	0.3656	2.3089	0.0124	0.7819	*Hyas coarctatus*
21	71882	1.3341	0.7256	0.0000	2.7854	0.0123	0.7943	*Neptunea ventricosa*
22	99993	1.1648	0.7424	0.0000	2.6497	0.0108	0.8050	empty bivalve shells
23	80030	1.1549	0.4687	0.2175	2.0923	0.0107	0.8157	*Urasterias lincki*
24	98000	1.1180	0.6505	0.0000	2.4191	0.0103	0.8261	Ascidiacea
25	21735	1.0801	0.5820	0.0000	2.2442	0.0100	0.8361	*Eleginus gracilis*
26	81073	0.9834	0.8578	0.0000	2.6989	0.0091	0.8452	*Solaster arcticus*

Appendix B.--Continued.

Rank	Species code	Mean CPUE (kg/ha)	Standard error	95% Confidence limits		Proportion	Cumulative proportion	Scientific name
27	68781	0.8870	0.3583	0.1703	1.6036	0.0082	0.8534	*Telmessus cheiragonus*
28	80200	0.8421	0.3021	0.2379	1.4462	0.0078	0.8612	*Lethasterias nanimensis*
29	21110	0.8305	0.3046	0.2214	1.4396	0.0077	0.8688	*Clupea pallasi*
30	65100	0.7483	0.4071	0.0000	1.5624	0.0069	0.8758	Thoracica
31	81780	0.6552	0.4630	0.0000	1.5811	0.0061	0.8818	*Ctenodiscus crispatus*
32	83320	0.6195	0.1937	0.2322	1.0068	0.0057	0.8876	*Ophiura sarsi*
33	69120	0.6153	0.2614	0.0926	1.1380	0.0057	0.8932	*Pagurus capillatus*
34	82740	0.5829	0.5809	0.0000	1.7446	0.0054	0.8986	*Echinarachnius parma*
35	91000	0.4611	0.2595	0.0000	0.9800	0.0043	0.9029	Porifera
36	91015	0.4326	0.4272	0.0000	1.2870	0.0040	0.9069	*Suberites* sp.
37	98102	0.3963	0.2239	0.0000	0.8441	0.0037	0.9106	*Boltenia ecinata*
38	95000	0.3903	0.1976	0.0000	0.7856	0.0036	0.9142	Bryozoa
39	41201	0.3590	0.1714	0.0162	0.7018	0.0033	0.9175	*Gersemia* sp.
40	80020	0.3549	0.1205	0.1138	0.5959	0.0033	0.9208	*Evasterias echinosoma*
41	43000	0.3347	0.1411	0.0524	0.6169	0.0031	0.9239	Actiniaria
42	10210	0.3316	0.1145	0.1026	0.5607	0.0031	0.9270	*Limanda aspera*
43	80594	0.3299	0.1379	0.0541	0.6057	0.0031	0.9300	*Leptasterias arctica*
44	69095	0.3192	0.0614	0.1964	0.4420	0.0030	0.9330	*Pagurus rathbuni*
45	71835	0.3140	0.0462	0.2217	0.4063	0.0029	0.9359	*Neptunea borealis*
46	71772	0.3028	0.1473	0.0083	0.5974	0.0028	0.9387	*Beringius beringii*
47	43030	0.2573	0.2536	0.0000	0.7645	0.0024	0.9410	*Stomphia* sp.
48	69061	0.2539	0.0702	0.1135	0.3943	0.0023	0.9434	*Labidochirus splendescens*
49	10220	0.2537	0.0968	0.0602	0.4472	0.0023	0.9457	*Platichthys stellatus*
50	74105	0.2107	0.1220	0.0000	0.4548	0.0019	0.9477	*Chlamys behringiana*
51	75286	0.1809	0.1771	0.0000	0.5351	0.0017	0.9494	*Serripes laperousii*
52	98331	0.1793	0.1231	0.0000	0.4255	0.0017	0.9510	*Chelyosoma productum*
53	43032	0.1684	0.1168	0.0000	0.4019	0.0016	0.9526	*Stomphia coccinea*

Appendix B.--Continued.

Rank	Species code	Mean CPUE (kg/ha)	Standard error	95% Confidence limits		Proportion	Cumulative proportion	Scientific name
54	71891	0.1663	0.0580	0.0504	0.2823	0.0015	0.9541	*Plicifusus kroyeri*
55	80110	0.1570	0.0447	0.0675	0.2464	0.0015	0.9556	*Leptasterias groenlandica*
56	72758	0.1565	0.1474	0.0000	0.4513	0.0014	0.9570	*Buccinum glaciale*
57	21368	0.1431	0.0478	0.0474	0.2387	0.0013	0.9583	*Myoxocephalus verrucosus*
58	99998	0.1383	0.1337	0.0000	0.4057	0.0013	0.9596	Polychaete tubes
59	23055	0.1315	0.0546	0.0223	0.2408	0.0012	0.9608	*Osmerus mordax*
60	71002	0.1292	0.0408	0.0477	0.2107	0.0012	0.9620	*Buccinum* sp.
61	66601	0.1207	0.0752	0.0000	0.2712	0.0011	0.9632	*Sclerocrangon boreas*
62	66611	0.1187	0.0231	0.0724	0.1649	0.0011	0.9643	*Argis lar*
63	81095	0.1184	0.0264	0.0657	0.1712	0.0011	0.9653	*Crossaster papposus*
64	69323	0.1102	0.0470	0.0162	0.2042	0.0010	0.9664	*Paralithodes platypus*
65	40011	0.1094	0.0400	0.0295	0.1893	0.0010	0.9674	hydroid unident.
66	98300	0.1093	0.1028	0.0000	0.3149	0.0010	0.9684	compound ascidian unident.
67	71030	0.1043	0.1015	0.0000	0.3072	0.0010	0.9694	*Tritonia diomedea*
68	24189	0.1019	0.0649	0.0000	0.2318	0.0009	0.9703	*Lycodes turneri*
69	71753	0.1014	0.0286	0.0441	0.1586	0.0009	0.9712	*Pyrulofusus deformis*
70	85085	0.0989	0.0389	0.0211	0.1767	0.0009	0.9721	*Myriotrochus rinkii*
71	10140	0.0953	0.0257	0.0439	0.1467	0.0009	0.9730	*Hippoglossoides robustus*
72	81355	0.0931	0.0292	0.0347	0.1515	0.0009	0.9739	*Pteraster obscurus*
73	71511	0.0910	0.0201	0.0508	0.1311	0.0008	0.9747	Naticidae eggs
74	95041	0.0908	0.0527	0.0000	0.1962	0.0008	0.9756	*Alcyonidium enteromorpha*
75	99900	0.0881	0.0881	0.0000	0.2642	0.0008	0.9764	*Molgula* sp.
76	95039	0.0874	0.0550	0.0000	0.1973	0.0008	0.9772	*Alcyonidium disforme*
77	72743	0.0849	0.0246	0.0356	0.1341	0.0008	0.9780	*Buccinum angulosum*
78	71001	0.0833	0.0322	0.0188	0.1478	0.0008	0.9788	gastropod eggs
79	21315	0.0831	0.0184	0.0464	0.1198	0.0008	0.9795	*Gymnocanthus tricuspis*

Appendix B.--Continued.

Rank	Species code	Mean CPUE (kg/ha)	Standard error	95% Confidence limits		Proportion	Cumulative proportion	Scientific name
80	71756	0.0817	0.0360	0.0096	0.1538	0.0008	0.9803	*Volutopsius fragilis*
81	10285	0.0775	0.0263	0.0249	0.1301	0.0007	0.9810	*Pleuronectes quadri*tuber*culatus*
82	41220	0.0770	0.0318	0.0134	0.1405	0.0007	0.9817	*Gersemia fruticosa*
83	70115	0.0741	0.0386	0.0000	0.1513	0.0007	0.9824	*Amicula vestita*
84	22205	0.0725	0.0251	0.0224	0.1226	0.0007	0.9831	*Liparis gibbus*
85	71774	0.0696	0.0476	0.0000	0.1648	0.0006	0.9837	*Beringius stimpsoni*
86	72752	0.0679	0.0201	0.0278	0.1081	0.0006	0.9843	*Buccinum scalariforme*
87	91086	0.0648	0.0450	0.0000	0.1549	0.0006	0.9849	*Stylissa* sp.
88	74562	0.0571	0.0316	0.0000	0.1203	0.0005	0.9855	*Musculus discors*
89	471	0.0536	0.0536	0.0000	0.1609	0.0005	0.9860	*Bathyraja parmifera*
90	71004	0.0483	0.0300	0.0000	0.1083	0.0004	0.9864	*Neptunea* sp.
91	85013	0.0483	0.0320	0.0000	0.1124	0.0004	0.9869	*Ocnus glacialis*
92	72755	0.0467	0.0117	0.0234	0.0700	0.0004	0.9873	*Buccinum polare*
93	71763	0.0423	0.0292	0.0000	0.1008	0.0004	0.9877	*Volutopsius stefanssoni*
94	74983	0.0416	0.0289	0.0000	0.0993	0.0004	0.9881	*Clinocardium ciliatum*
95	43110	0.0368	0.0318	0.0000	0.1003	0.0003	0.9884	*Actinostola* sp.
96	43010	0.0363	0.0221	0.0000	0.0806	0.0003	0.9887	*Metridium* sp.
97	74436	0.0351	0.0191	0.0000	0.0733	0.0003	0.9891	*Nuculana pernula*
98	71025	0.0345	0.0186	0.0000	0.0717	0.0003	0.9894	*Tritonia* sp.
99	95036	0.0314	0.0146	0.0022	0.0606	0.0003	0.9897	*Alcyonidium pedunculatum*
100	43082	0.0311	0.0263	0.0000	0.0837	0.0003	0.9900	*Cribrinopsis fernaldi*
101	98310	0.0291	0.0146	0.0000	0.0583	0.0003	0.9902	*Aplidium* sp.
102	24185	0.0287	0.0117	0.0054	0.0521	0.0003	0.9905	*Lycodes palearis*
103	43040	0.0277	0.0199	0.0000	0.0676	0.0003	0.9908	*Urticina* sp.
104	23807	0.0276	0.0105	0.0065	0.0486	0.0003	0.9910	*Lumpenus fabricii*
105	50010	0.0272	0.0165	0.0000	0.0602	0.0003	0.9913	tube worm unident.
106	43113	0.0270	0.0170	0.0000	0.0610	0.0003	0.9915	*Actinostola groenlandica*

Appendix B.--Continued.

Rank	Species code	Mean CPUE (kg/ha)	Standard error	95% Confidence limits		Proportion	Cumulative proportion	Scientific name
107	50000	0.0262	0.0194	0.0000	0.0651	0.0002	0.9918	Polychaeta
108	75285	0.0256	<0.0001	0.0151	0.0361	0.0002	0.9920	*Serripes groenlandicus*
109	91074	0.0255	0.0194	0.0000	0.0642	0.0002	0.9922	*Polymastia* sp.
110	71537	0.0249	<0.0001	0.0101	0.0397	0.0002	0.9925	*Cryptonatica* (=*Natica*)
111	24184	0.0235	0.0124	0.0000	0.0484	0.0002	0.9927	*Lycodes raridens*
112	85012	0.0227	0.0221	0.0000	0.0668	0.0002	0.9929	*Ocnus* sp.
113	10211	0.0224	0.0161	0.0000	0.0545	0.0002	0.9931	*Limanda proboscidea*
114	71580	0.0217	<0.0001	0.0112	0.0323	0.0002	0.9933	*Euspira pallida*
115	66045	0.0212	0.0101	0.0010	0.0413	0.0002	0.9935	*Pandalus goniurus*
116	22238	0.0208	<0.0001	0.0070	0.0345	0.0002	0.9937	*Liparis tunicatus*
117	98214	0.0203	0.0203	0.0000	0.0609	0.0002	0.9939	*Distaplia* sp.
118	74646	0.0202	0.0103	0.0000	0.0408	0.0002	0.9941	*Astarte arctica*
119	21388	0.0194	<0.0001	0.0022	0.0367	0.0002	0.9942	*Enophrys diceraus*
120	74311	0.0192	0.0190	0.0000	0.0572	0.0002	0.9944	*Hiatella arctica*
121	98200	0.0191	0.0191	0.0000	0.0572	0.0002	0.9946	*Halocynthia* sp.
122	74065	0.0190	0.0190	0.0000	0.0569	0.0002	0.9948	*Mytilus* sp.
123	69322	0.0184	0.0145	0.0000	0.0475	0.0002	0.9949	*Paralithodes camtschaticus*
124	83348	0.0180	0.0180	0.0000	0.0541	0.0002	0.9951	*Ophiacantha bidentata*
125	21371	0.0165	<0.0001	0.0000	0.0333	0.0002	0.9953	*Myoxocephalus jaok*
126	95038	0.0160	0.0159	0.0000	0.0478	0.0001	0.9954	*Alcyonidium* sp.
127	80546	0.0153	<0.0001	0.0000	0.0305	0.0001	0.9955	*Henricia tumida*
128	85000	0.0151	0.0149	0.0000	0.0449	0.0001	0.9957	Holothuroidea
129	43100	0.0142	<0.0001	0.0000	0.0332	0.0001	0.9958	Actinostolidae
130	23041	0.0139	<0.0001	0.0028	0.0250	0.0001	0.9959	*Mallotus villosus*
131	71731	0.0136	<0.0001	0.0052	0.0221	0.0001	0.9961	*Colus halli*
132	71710	0.0134	0.0133	0.0000	0.0399	0.0001	0.9962	*Colus* sp.
133	24188	0.0130	<0.0001	0.0010	0.0249	0.0001	0.9963	*Lycodes polaris*

Appendix B.--Continued.

Rank	Species code	Mean CPUE (kg/ha)	Standard error	95% Confidence limits		Proportion	Cumulative proportion	Scientific name
134	74561	0.0126	0.0125	0.0000	0.0375	0.0001	0.9964	*Musculus niger*
135	72305	0.0124	0.0106	0.0000	0.0336	0.0001	0.9965	*Trichotropis bicarinata*
136	99902	0.0120	<0.0001	0.0000	0.0256	0.0001	0.9967	*Molgula griffithsii*
137	83336	0.0117	<0.0001	0.0000	0.0250	0.0001	0.9968	*Amphiophiura nodosa*
138	85200	0.0115	0.0115	0.0000	0.0345	0.0001	0.9969	*Cucumaria* sp.
139	66170	0.0104	<0.0001	0.0032	0.0176	<0.0001	0.9970	*Eualus* sp.
140	56311	0.0102	<0.0001	0.0038	0.0167	<0.0001	0.9971	*Eunoe nodosa*
141	69090	0.0090	<0.0001	0.0000	0.0211	<0.0001	0.9971	*Pagurus ochotensis*
142	62020	0.0088	<0.0001	0.0000	0.0231	<0.0001	0.9972	*Saduria entomon*
143	56312	0.0086	<0.0001	0.0000	0.0193	<0.0001	0.9973	*Eunoe depressa*
144	65201	0.0073	<0.0001	0.0000	0.0213	<0.0001	0.9974	*Balanus* sp.
145	71886	0.0072	<0.0001	0.0027	0.0117	<0.0001	0.9974	*Clinopegma magnum*
146	71720	0.0071	<0.0001	0.0000	0.0181	<0.0001	0.9975	*Colus sabini*
147	66175	0.0071	<0.0001	0.0003	0.0138	<0.0001	0.9976	*Eualus gaimardii*
148	80597	0.0069	<0.0001	0.0003	0.0134	<0.0001	0.9976	*Henricia beringiania*
149	21377	0.0067	<0.0001	0.0000	0.0169	<0.0001	0.9977	*Myoxocephalus quadricornis*
150	56310	0.0067	<0.0001	0.0000	0.0149	<0.0001	0.9978	*Eunoe* sp.
151	94500	0.0066	<0.0001	0.0000	0.0143	<0.0001	0.9978	Echiura
152	94001	0.0066	<0.0001	0.0000	0.0134	<0.0001	0.9979	*Golfingia margaritacea*
153	78013	0.0065	<0.0001	0.0013	0.0117	<0.0001	0.9979	*Benthoctopus sibiricus*
154	71726	0.0065	<0.0001	0.0004	0.0126	<0.0001	0.9980	*Colus spitzbergensis*
155	21314	0.0061	<0.0001	0.0000	0.0179	<0.0001	0.9981	*Gymnocanthus pistilliger*
156	95105	0.0060	<0.0001	0.0000	0.0172	<0.0001	0.9981	*Dendrobeania* sp.
157	21740	0.0054	<0.0001	0.0014	0.0094	<0.0001	0.9982	*Gadus chalcogrammus*
158	92500	0.0052	<0.0001	0.0000	0.0135	<0.0001	0.9982	Nemertea
159	23809	0.0052	<0.0001	0.0000	0.0155	<0.0001	0.9983	*Acantholumpenus mackayi*
160	72535	0.0051	<0.0001	0.0013	0.0088	<0.0001	0.9983	*Margarites costalis*

Appendix B.--Continued.

Rank	Species code	Mean CPUE (kg/ha)	Standard error	95% Confidence limits		Proportion	Cumulative proportion	Scientific name
161	71590	0.0050	<0.0001	0.0019	0.0081	<0.0001	0.9984	*Onchidiopsis* sp.
162	71597	0.0050	<0.0001	0.0000	0.0109	<0.0001	0.9984	*Onchidiopsis carnea*
163	10155	0.0049	<0.0001	0.0000	0.0132	<0.0001	0.9984	*Liopsetta glacialis*
164	71751	0.0047	<0.0001	0.0000	0.0135	<0.0001	0.9985	*Volutopsius* sp.
165	71027	0.0044	<0.0001	0.0000	0.0114	<0.0001	0.9985	*Calycidoris guentheri*
166	81315	0.0042	<0.0001	0.0000	0.0127	<0.0001	0.9986	*Pteraster tesselatus*
167	21355	0.0042	<0.0001	0.0011	0.0073	<0.0001	0.9986	*Triglops pingeli*
168	74640	0.0042	<0.0001	0.0000	0.0125	<0.0001	0.9986	*Astarte* sp.
169	66570	0.0041	<0.0001	0.0000	0.0123	<0.0001	0.9987	*Argis* sp.
170	74648	0.0041	<0.0001	0.0000	0.0089	<0.0001	0.9987	*Astarte esquimalti*
171	20041	0.0039	<0.0001	0.0013	0.0065	<0.0001	0.9988	*Podothecus veternus*
172	66193	0.0038	<0.0001	0.0000	0.0077	<0.0001	0.9988	*Eualus suckleyi*
173	10212	0.0037	<0.0001	0.0000	0.0085	<0.0001	0.9988	*Limanda sakhalinensis*
174	43008	0.0036	<0.0001	0.0000	0.0081	<0.0001	0.9989	*Ptychodactis patula*
175	21334	0.0035	<0.0001	0.0011	0.0060	<0.0001	0.9989	*Artediellus scaber*
176	72759	0.0033	<0.0001	0.0000	0.0089	<0.0001	0.9989	*Buccinum tenellum*
177	21387	0.0033	<0.0001	0.0000	0.0068	<0.0001	0.9990	*Enophrys lucasi*
178	71840	0.0032	<0.0001	0.0000	0.0097	<0.0001	0.9990	*Neptunea middendorffii*
179	72766	0.0028	<0.0001	0.0000	0.0063	<0.0001	0.9990	*Buccinum ectomycina*
180	71902	0.0028	<0.0001	0.0005	0.0050	<0.0001	0.9990	*Plicifusus johanseni*
181	95070	0.0028	<0.0001	0.0000	0.0074	<0.0001	0.9991	*Rhamphostomella costata*
182	21932	0.0027	<0.0001	0.0000	0.0066	<0.0001	0.9991	*Hexagrammos stelleri*
183	72751	0.0025	<0.0001	0.0000	0.0049	<0.0001	0.9991	*Buccinum plectrum*
184	71585	0.0025	<0.0001	0.0000	0.0059	<0.0001	0.9991	*Onchidiopsis glacialis*
185	71535	0.0024	<0.0001	0.0000	0.0071	<0.0001	0.9992	*Cryptonatica* (=*Natica*)
186	71722	0.0024	<0.0001	0.0002	0.0046	<0.0001	0.9992	*Colus hypolispus*
187	72737	0.0024	<0.0001	0.0008	0.0039	<0.0001	0.9992	*Buccinum obsoletum*

Appendix B.--Continued.

Rank	Species code	Mean CPUE (kg/ha)	Standard error	95% Confidence limits		Proportion	Cumulative proportion	Scientific name
188	83400	0.0023	<0.0001	0.0000	0.0048	<0.0001	0.9992	*Ophiopholis aculeata*
189	71021	0.0021	<0.0001	0.0000	0.0061	<0.0001	0.9992	*Dendronotus frondosus*
190	60107	0.0021	<0.0001	0.0000	0.0054	<0.0001	0.9993	*Stegocephalus inflatus*
191	66179	0.0021	<0.0001	0.0000	0.0051	<0.0001	0.9993	*Eualus macilentus*
192	98210	0.0021	<0.0001	0.0000	0.0064	<0.0001	0.9993	*Distaplia* sp.
193	80000	0.0021	<0.0001	0.0000	0.0064	<0.0001	0.9993	Asteroidea
194	95030	0.0021	<0.0001	0.0000	0.0062	<0.0001	0.9993	*Flustra serrulata*
195	71589	0.0020	<0.0001	0.0000	0.0054	<0.0001	0.9994	*Onchidiopsis* sp.
196	81322	0.0020	<0.0001	0.0000	0.0048	<0.0001	0.9994	*Pteraster octaster*
197	45005	0.0017	<0.0001	0.0000	0.0046	<0.0001	0.9994	*Beroe* sp.
198	94000	0.0017	<0.0001	0.0000	0.0037	<0.0001	0.9994	Sipuncula
199	40500	0.0016	<0.0001	0.0000	0.0046	<0.0001	0.9994	Scyphozoa
200	66203	0.0016	<0.0001	0.0000	0.0040	<0.0001	0.9994	*Lebbeus groenlandicus*
201	66502	0.0016	<0.0001	0.0000	0.0042	<0.0001	0.9995	*Crangon* sp.
202	60100	0.0016	<0.0001	0.0000	0.0035	<0.0001	0.9995	Amphipoda
203	74654	0.0016	<0.0001	0.0000	0.0037	<0.0001	0.9995	*Cyclocardia crassidens*
204	75242	0.0016	<0.0001	0.0000	0.0041	<0.0001	0.9995	*Macoma calcarea*
205	71584	0.0015	<0.0001	0.0000	0.0045	<0.0001	0.9995	*Lamellaria* sp.
206	66580	0.0015	<0.0001	0.0000	0.0045	<0.0001	0.9995	*Argis dentata*
207	82755	0.0014	<0.0001	0.0000	0.0043	<0.0001	0.9995	*Heliometra glacialis*
208	71010	0.0014	<0.0001	0.0000	0.0039	<0.0001	0.9995	Nudibranchia
209	66605	0.0014	<0.0001	0.0000	0.0028	<0.0001	0.9996	*Sabinea septemcarinata*
210	23843	0.0014	<0.0001	0.0000	0.0041	<0.0001	0.9996	*Chirolophis snyderi*
211	83310	0.0013	<0.0001	0.0000	0.0039	<0.0001	0.9996	*Ophiura* sp.
212	22265	0.0013	<0.0001	0.0005	0.0021	<0.0001	0.9996	*Liparis marmoratus*
213	74658	0.0013	<0.0001	0.0000	0.0037	<0.0001	0.9996	*Cyclocardia* sp.
214	71012	0.0012	<0.0001	0.0000	0.0037	<0.0001	0.9996	*Tochuina tetraquetra*

Appendix B.--Continued.

Rank	Species code	Mean CPUE (kg/ha)	Standard error	95% Confidence limits		Proportion	Cumulative proportion	Scientific name
215	24186	0.0012	<0.0001	0.0000	0.0030	<0.0001	0.9996	*Lycodes mucosus*
216	21397	0.0012	<0.0001	0.0000	0.0031	<0.0001	0.9996	*Blepsias bilobus*
217	71018	0.0012	<0.0001	0.0000	0.0025	<0.0001	0.9997	*Dendronotus* sp.
218	21348	0.0012	<0.0001	0.0000	0.0022	<0.0001	0.9997	*Hemilepidotus papilio*
219	98212	0.0011	<0.0001	0.0000	0.0033	<0.0001	0.9997	*Distaplia occidentalis*
220	75287	0.0011	<0.0001	0.0000	0.0032	<0.0001	0.9997	*Serripes notabilis*
221	66515	0.0010	<0.0001	0.0000	0.0031	<0.0001	0.9997	*Crangon communis*
222	21376	0.0010	<0.0001	0.0000	0.0030	<0.0001	0.9997	*Megalocottus platycephalus*
223	66516	0.0010	<0.0001	0.0000	0.0029	<0.0001	0.9997	*Crangon* sp.
224	75333	0.0010	<0.0001	0.0000	0.0029	<0.0001	0.9997	*Mya truncata*
225	43081	0.0009	<0.0001	0.0000	0.0028	<0.0001	0.9997	*Cribrinopsis* sp.
226	71716	0.0009	<0.0001	0.0002	0.0017	<0.0001	0.9997	*Colus martensi*
227	71634	0.0009	<0.0001	0.0000	0.0024	<0.0001	0.9997	*Tachyrhynchus erosus*
228	66530	0.0009	<0.0001	0.0000	0.0018	<0.0001	0.9998	*Crangon dalli*
229	74333	0.0008	<0.0001	0.0000	0.0025	<0.0001	0.9998	*Nucula tenuis*
230	60111	0.0008	<0.0001	0.0000	0.0018	<0.0001	0.9998	*Rachotropis* sp.
231	21378	0.0008	<0.0001	0.0000	0.0023	<0.0001	0.9998	*Myoxocephalus scorpioides*
232	97120	0.0008	<0.0001	0.0000	0.0018	<0.0001	0.9998	*Hemithiris psittacea*
233	75240	0.0007	<0.0001	0.0000	0.0019	<0.0001	0.9998	*Macoma* sp.
234	21441	0.0007	<0.0001	0.0000	0.0018	<0.0001	0.9998	*Icelus spatula*
235	71723	0.0007	<0.0001	0.0000	0.0014	<0.0001	0.9998	*Colus ombronius*
236	56300	0.0007	<0.0001	0.0000	0.0013	<0.0001	0.9998	Polynoidae
237	75111	0.0007	<0.0001	0.0000	0.0020	<0.0001	0.9998	*Mactromeris polynyma*
238	72421	0.0006	<0.0001	0.0001	0.0011	<0.0001	0.9998	*Boreotrophon pacificus*
239	74985	0.0006	<0.0001	0.0000	0.0019	<0.0001	0.9998	*Clinocardium californiense*
240	60112	0.0006	<0.0001	0.0000	0.0012	<0.0001	0.9998	*Rhachotropis aculeata*
241	50001	0.0006	<0.0001	0.0001	0.0011	<0.0001	0.9998	worm unident.

Appendix B.--Continued.

Rank	Species code	Mean CPUE (kg/ha)	Standard error	95% Confidence limits		Proportion	Cumulative proportion	Scientific name
242	21405	0.0006	<0.0001	0.0001	0.0010	<0.0001	0.9998	*Nautichthys pribilovius*
243	20051	0.0006	<0.0001	0.0002	0.0010	<0.0001	0.9999	*Ulcina olrikii*
244	72403	0.0006	<0.0001	0.0002	0.0010	<0.0001	0.9999	*Boreotrophon coronatus*
245	80542	0.0006	<0.0001	0.0000	0.0017	<0.0001	0.9999	*Henricia sanguinolenta*
246	98079	0.0005	<0.0001	0.0000	0.0014	<0.0001	0.9999	*Pelonaia corrugata*
247	71739	0.0005	<0.0001	0.0000	0.0011	<0.0001	0.9999	*Volutopsius attenuatus*
248	10001	0.0005	<0.0001	0.0000	0.0016	<0.0001	0.9999	*Pleuronectiformes*
249	72736	0.0005	<0.0001	0.0000	0.0012	<0.0001	0.9999	*Buccinum normale*
250	71777	0.0005	<0.0001	0.0000	0.0012	<0.0001	0.9999	*Beringius* sp.
251	92900	0.0005	<0.0001	0.0000	0.0011	<0.0001	0.9999	*Maldanidae unid.*
252	21370	0.0005	<0.0001	0.0000	0.0011	<0.0001	0.9999	*Myoxocephalus polyacanthocephalus*
253	23806	0.0004	<0.0001	0.0000	0.0009	<0.0001	0.9999	*Lumpenus medius*
254	66031	0.0004	<0.0001	0.0000	0.0012	<0.0001	0.9999	*Pandalus eous*
255	20202	0.0004	<0.0001	0.0000	0.0010	<0.0001	0.9999	*Ammodytes hexapterus*
256	60118	0.0004	<0.0001	0.0000	0.0011	<0.0001	0.9999	*Nototropis* sp.
257	43050	0.0004	<0.0001	0.0000	0.0012	<0.0001	0.9999	*Oractis diomedeae*
258	69316	0.0004	<0.0001	0.0000	0.0011	<0.0001	0.9999	*Hapalogaster grebnitzkii*
259	21720	0.0004	<0.0001	0.0000	0.0008	<0.0001	0.9999	*Gadus macrocephalus*
260	23804	0.0004	<0.0001	0.0000	0.0009	<0.0001	0.9999	*Stichaeus punctatus*
261	85211	0.0003	<0.0001	0.0000	0.0010	<0.0001	0.9999	*Psolus phantapus*
262	22201	0.0003	<0.0001	0.0000	0.0010	<0.0001	0.9999	*Liparis* sp.
263	93102	0.0003	<0.0001	0.0000	0.0009	<0.0001	0.9999	*Priapulus caudatus*
264	73186	0.0003	<0.0001	0.0000	0.0006	<0.0001	0.9999	*Admete regina*
265	60115	0.0003	<0.0001	0.0000	0.0009	<0.0001	0.9999	*Arctolembos arcticus*
266	53700	0.0003	<0.0001	0.0000	0.0007	<0.0001	0.9999	*Nephtyidae*
267	74420	0.0003	<0.0001	0.0000	0.0008	<0.0001	0.9999	*Yoldia hyperborea*
268	66500	0.0003	<0.0001	0.0000	0.0008	<0.0001	0.9999	*Crangonidae*

Appendix B.--Continued.

Rank	Species code	Mean CPUE (kg/ha)	Standard error	95% Confidence limits		Proportion	Cumulative proportion	Scientific name
269	40049	0.0003	<0.0001	0.0000	0.0008	<0.0001	0.9999	*Sertulariidae unid.*
270	83000	0.0002	<0.0001	0.0000	0.0007	<0.0001	1.0000	Ophiuroidea
271	98319	0.0002	<0.0001	0.0000	0.0007	<0.0001	1.0000	*Trididemnum* sp.
272	60109	0.0002	<0.0001	0.0000	0.0005	<0.0001	1.0000	*Anonyx nugax*
273	71635	0.0002	<0.0001	0.0000	0.0006	<0.0001	1.0000	*Tachyrhynchus reticulatus*
274	66161	0.0002	<0.0001	0.0000	0.0006	<0.0001	1.0000	*Spirontocaris arcuata*
275	71911	0.0002	<0.0001	0.0000	0.0005	<0.0001	1.0000	*Liomesus ooides*
276	474	0.0002	<0.0001	0.0000	0.0006	<0.0001	1.0000	*Bathyraja parmifera*
277	71733	0.0002	<0.0001	0.0000	0.0006	<0.0001	1.0000	*Colus bristolensis*
278	74647	0.0002	<0.0001	0.0000	0.0005	<0.0001	1.0000	*Astarte montagui*
279	95103	0.0002	<0.0001	0.0000	0.0005	<0.0001	1.0000	*Heteropora* sp.
280	74414	0.0002	<0.0001	0.0000	0.0005	<0.0001	1.0000	*Yoldia* sp.
281	98070	0.0002	<0.0001	0.0000	0.0005	<0.0001	1.0000	Thaliacea
282	50220	0.0002	<0.0001	0.0000	0.0005	<0.0001	1.0000	*Travisia* sp.
283	1	0.0002	<0.0001	0.0000	0.0005	<0.0001	1.0000	fish eggs unident.
284	72756	0.0001	<0.0001	0.0000	0.0003	<0.0001	1.0000	*Buccinum solenum*
285	71524	0.0001	<0.0001	0.0000	0.0004	<0.0001	1.0000	*Cryptonatica* sp.
286	22212	0.0001	<0.0001	0.0000	0.0004	<0.0001	1.0000	*Liparis fabricii*
287	71713	0.0001	<0.0001	0.0000	0.0004	<0.0001	1.0000	*Colus capponius*
288	20001	0.0001	<0.0001	0.0000	0.0003	<0.0001	1.0000	*Pallasina barbata*
289	50005	0.0001	<0.0001	0.0000	0.0003	<0.0001	1.0000	*Eunice valens*
290	70150	0.0001	<0.0001	0.0000	0.0002	<0.0001	1.0000	*Stenosemus albus*
291	72406	0.0001	<0.0001	0.0000	0.0003	<0.0001	1.0000	*Boreotrophon clathratus*
292	71250	0.0001	<0.0001	0.0000	0.0002	<0.0001	1.0000	Doridiidae
293	66548	<0.0001	<0.0001	0.0000	0.0003	<0.0001	1.0000	*Crangon septemspinosa*
294	95081	<0.0001	<0.0001	0.0000	0.0003	<0.0001	1.0000	*Costazia ventricosa*
295	72302	<0.0001	<0.0001	0.0000	0.0003	<0.0001	1.0000	*Trichotropis borealis*

Appendix B.--Continued.

Rank	Species code	Mean CPUE (kg/ha)	Standard error	95% Confidence limits		Proportion	Cumulative proportion	Scientific name
296	66613	<0.0001	<0.0001	0.0000	0.0003	<0.0001	1.0000	*Argis levior*
297	72740	<0.0001	<0.0001	0.0000	0.0003	<0.0001	1.0000	*Buccinum* sp.
298	23805	<0.0001	<0.0001	0.0000	0.0002	<0.0001	1.0000	*Lumpenus maculatus*
299	74560	<0.0001	<0.0001	0.0000	0.0002	<0.0001	1.0000	*Musculus* sp.
300	72800	<0.0001	<0.0001	0.0000	0.0002	<0.0001	1.0000	*Velutina undata*
301	45000	<0.0001	<0.0001	0.0000	0.0002	<0.0001	1.0000	*Ctenophora*
302	85170	<0.0001	<0.0001	0.0000	0.0002	<0.0001	1.0000	*Pentamera* sp.
303	71020	<0.0001	<0.0001	0.0000	0.0002	<0.0001	1.0000	*Dendronotus dalli*
304	66160	<0.0001	<0.0001	0.0000	0.0001	<0.0001	1.0000	*Spirontocaris* sp.
305	10115	<0.0001	<0.0001	0.0000	0.0002	<0.0001	1.0000	*Reinhardtius hippoglossoides*
306	71724	<0.0001	<0.0001	0.0000	0.0001	<0.0001	1.0000	*Colus roseus*
307	92502	<0.0001	<0.0001	0.0000	0.0002	<0.0001	1.0000	*Emplectonema* sp.
308	74000	<0.0001	<0.0001	0.0000	0.0001	<0.0001	1.0000	Bivalvia
309	97010	<0.0001	<0.0001	0.0000	0.0001	<0.0001	1.0000	*Hemithyridae*
310	72757	<0.0001	<0.0001	0.0000	0.0001	<0.0001	1.0000	*Buccinum ciliatum*
311	57000	<0.0001	<0.0001	0.0000	0.0001	<0.0001	1.0000	*Sabellidae*
312	60140	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Anonyx* sp.
313	75220	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Pandora glacialis*
315	60105	<0.0001	<0.0001	0.0000	0.0001	<0.0001	1.0000	*Eusirus cuspidatus*
314	71405	<0.0001	<0.0001	0.0000	0.0001	<0.0001	1.0000	limpet unident.
316	74656	<0.0001	<0.0001	0.0000	0.0001	<0.0001	1.0000	*Cyclocardia* sp.
317	72804	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Velutina prolongata*
318	72806	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Velutina* sp.
319	74565	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Musculus glacialis*
320	92802	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Cerebratulus californienesis*
321	66174	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Eualus fabricii*
322	72533	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Margarites giganteus*

Appendix B.--Continued.

Rank	Species code	Mean CPUE (kg/ha)	Standard error	95% Confidence limits		Proportion	Cumulative proportion	Scientific name
323	64000	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	Mysida
324	55900	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Phyllodocidae unid.*
325	72100	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Oenopota* sp.
326	56313	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Eunoe senta*
327	60130	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Melita dentata*
328	72531	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Margarites* sp.
329	72372	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Neoiphinoe echinata*
330	95016	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Bugula* sp.
331	92510	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Tubulanus* sp.
332	72541	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Solariella obscura*
333	60131	<0.0001	<0.0001	0.0000	<0.0001	<0.0001	1.0000	*Quasimelita formosa*

Appendix C.--Fish species encountered, in alphabetical order by family, during the 2012 Chukchi Sea bottom trawl survey.

Family	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Agonidae	*Pallasina barbata*	tubenose poacher	3	12	14	13	66.48	69.01
	Podothecus veternus	veteran poacher	15	12	56	35	66.48	71.00
	Ulcina olrikii	Arctic alligatorfish	20	29	90	45	66.48	72.00
Ammodytidae	*Ammodytes hexapterus*	Pacific sand lance	4	12	51	29	69.01	69.99
Clupeidae	*Clupea pallasi*	Pacific herring	17	12	56	30	66.00	70.50
Cottidae	*Gymnocanthus pistilliger*	threaded sculpin	2	14	14	14	66.49	66.98
	Gymnocanthus tricuspis	Arctic staghorn sculpin	51	12	90	40	66.00	73.00
	Artediellus scaber	hamecon	18	12	86	46	68.00	73.04
	Hemilepidotus papilio	butterfly sculpin	7	37	59	51	66.03	72.48
	Triglops pingeli	ribbed sculpin	14	21	90	46	66.03	72.50
	Myoxocephalus verrucosus	warty sculpin	28	12	58	38	66.03	71.11
	Myoxocephalus polyacanthocephalus	great sculpin	2	37	52	45	66.51	66.99
	Myoxocephalus jaok	plain sculpin	5	14	24	17	66.00	66.99
	Megalocottus platycephalus	belligerent sculpin	1	14	14	14	66.98	66.98
	Myoxocephalus quadricornis	fourhorn sculpin	4	14	17	15	66.00	66.98
	Myoxocephalus scorpioides	Arctic sculpin	1	12	12	12	69.01	69.01
	Enophrys lucasi	leister sculpin	4	14	30	23	66.48	67.50
	Enophrys diceraus	antlered sculpin	9	12	56	32	68.00	69.99
	Icelus spatula	spatulate sculpin	3	50	90	66	71.52	72.48
Gadidae	*Gadus macrocephalus*	Pacific cod	3	29	47	41	67.50	69.50
	Boreogadus saida	Arctic cod	71	12	90	42	66.00	73.04
	Eleginus gracilis	saffron cod	24	12	53	33	66.00	72.50
	Gadus chalcogrammus	walleye pollock	24	17	59	38	66.48	72.50

Appendix C.--Continued.

Family	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Hemitripteridae	*Blepsias bilobus*	crested sculpin	2	29	42	36	66.48	70.50
	Nautichthys pribilovius	eyeshade sculpin	9	27	90	42	66.48	71.52
Hexagrammidae	*Hexagrammos stelleri*	whitespotted greenling	2	12	14	13	66.98	69.01
Liparidae	*Liparis* sp.		2	41	47	44	69.50	70.99
	Liparis gibbus	variegated snailfish	26	29	59	45	66.03	72.51
	Liparis fabricii	gelatinous seasnail	1	44	44	44	71.50	71.50
	Liparis tunicatus	kelp snailfish	36	21	86	44	66.48	73.04
	Liparis marmoratus	festive snailfish	11	23	53	40	69.50	72.50
Osmeridae	*Mallotus villosus*	capelin	30	12	58	40	66.03	72.50
	Osmerus mordax	rainbow smelt	11	12	30	21	66.00	70.50
Pleuronectidae	*Reinhardtius hippoglossoides*	Greenland turbot	1	50	50	50	70.50	70.50
	Hippoglossoides robustus	Bering flounder	40	24	86	47	66.03	73.04
	Liopsetta glacialis	Arctic flounder	2	14	14	14	66.48	66.98
	Limanda aspera	yellowfin sole	16	12	56	26	66.00	70.50
	Limanda proboscidea	longhead dab	5	15	37	23	66.00	69.01
	Limanda sakhalinensis	Sakhalin sole	6	29	56	45	66.03	70.50
	Platichthys stellatus	starry flounder	10	14	30	22	66.00	69.01
	Pleuronectes quadrituberculatus	Alaska plaice	13	14	47	26	66.00	69.50
	Pleuronectiformes	flatfish unident.	1	15	15	15	66.00	66.00
Rajidae	*Bathyraja parmifera*	Alaska skate	1	52	52	52	66.51	66.51
	Bathyraja parmifera egg case	Alaska skate egg case	1	49	49	49	71.50	71.50
Stichaeidae	*Stichaeus punctatus*	Arctic shanny	2	14	52	33	66.03	66.98
	Lumpenus maculatus	daubed shanny	2	47	84	66	70.01	73.04
	Lumpenus medius	stout eelblenny	5	35	59	44	69.50	72.48
	Lumpenus fabricii	slender eelblenny	30	14	58	39	66.03	71.11

Appendix C.--Continued.

Family	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
	Acantholumpenus mackayi	pighead prickleback	1	14	14	14	66.98	66.98
	Chirolophis snyderi	bearded warbonnet	1	29	29	29	68.00	68.00
Zoarcidae	*Lycodes raridens*	marbled eelpout	12	35	51	43	68.50	72.50
	Lycodes palearis	wattled eelpout	15	21	56	38	66.48	69.50
	Lycodes mucosus	saddled eelpout	2	47	51	49	68.50	70.01
	Lycodes polaris	Canadian eelpout	12	35	86	51	66.51	73.00
	Lycodes turneri	polar eelpout	11	14	58	38	66.48	71.11
Other		fish eggs unident.	1	39	39	39	70.49	70.49

Appendix D.--Invertebrate species, in alphabetical order by phylum or subphylum, encountered during the 2012 Chukchi Sea bottom trawl survey.

Phylum/ subphylum	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Annelida	Polychaeta	polychaete worm unid.	30	14	90	47	66.98	73.04
		worm unid.	10	28	84	49	70.00	73.04
	Eunice valens		1	46	46	46	67.52	67.52
		tube worm unid.	6	42	86	56	71.49	72.48
	Travisia sp.		1	58	58	58	68.01	68.01
	Nephtyidae	cat worm unid.	4	42	59	49	71.50	72.48
	Phyllodocidae unid.		2	46	50	48	71.50	71.50
	Polynoidae	scale worm unid.	7	39	53	46	68.50	72.50
	Eunoe sp.		6	37	59	50	66.03	72.48
	Eunoe nodosa	giant scale worm	28	23	90	49	67.51	73.04
	Eunoe depressa	depressed scale worm	15	24	53	42	66.99	72.50
	Eunoe senta		1	41	41	41	70.99	70.99
	Sabellidae	sabellid unid.	1	53	53	53	72.01	72.01
	Maldanidae unid.	bamboo worm unid.	5	39	84	51	71.50	73.04
	Polychaete tubes		3	23	42	31	68.00	71.00
	Polychaete tubes		3	23	42	31	68.00	71.00
Arthropoda	Amphipoda	amphipod unid.	9	21	90	43	69.99	72.04
	Eusirus cuspidatus		1	42	42	42	70.00	70.00
	Stegocephalus inflatus		4	35	90	52	70.00	71.52
	Anonyx nugax	riddick amphipod	3	28	44	38	71.50	72.04
	Rachotropis sp.		5	28	53	43	71.50	72.04
	Rhachotropis aculeata		8	28	86	45	70.00	72.04
	Arctolembos arcticus		2	35	35	35	69.50	71.11

Appendix D.--Continued.

Phylum/ subphylum	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Arthropoda cont.	*Nototropis* sp.		2	47	51	49	68.99	69.50
	Melita dentata		2	39	46	43	71.00	72.00
	Quasimelita formosa		1	46	46	46	71.00	71.00
	Anonyx sp.		2	21	35	28	70.50	71.11
	Saduria entomon		4	46	59	51	71.50	72.48
	Mysida	opossum shrimps	2	28	45	37	71.01	72.04
	Thoracica	barnacle unid.	14	29	52	42	66.03	72.50
	Balanus sp.		2	31	42	37	69.99	71.00
	Pandalus eous (=*borealis*)	Alaskan pink (=northern) shrimp	5	39	59	48	69.50	73.00
	Pandalus goniurus	humpy shrimp	33	21	58	42	66.03	72.50
	Spirontocaris sp.		2	29	90	60	68.00	71.52
	Spirontocaris arcuata	Rathbun blade shrimp	3	14	42	33	66.49	71.00
	Eualus sp.		37	12	90	46	67.50	73.00
	Eualus fabricii	Arctic eualid	1	50	50	50	72.00	72.00
	Eualus gaimardii		18	39	53	46	68.50	72.50
	Eualus macilentus	Greenland shrimp	2	43	51	47	69.50	70.50
	Eualus suckleyi	shortscale eualid	6	40	56	48	68.00	70.50
	Lebbeus groenlandicus	spiny lebbeid	6	12	56	33	68.00	69.99
	Crangonidae	crangonid shrimp unid.	2	45	46	46	71.00	71.50
	Crangon sp.		4	14	90	49	66.98	71.52
	Crangon communis	twospine crangon	1	43	43	43	70.50	70.50
	Crangon sp. cf. *communis* (CAS)		1	29	29	29	66.48	66.48
	Crangon dalli	ridged crangon	12	14	53	41	66.48	72.50
	Crangon septemspinosa	sevenspine bay shrimp	1	17	17	17	66.48	66.48

Appendix D.--Continued.

Phylum/ subphylum	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Arthropoda cont.	*Argis* sp.		2	29	50	40	66.48	72.51
	Argis dentata	Arctic argid	2	17	46	32	66.48	72.48
	Sclerocrangon boreas	sculptured shrimp	17	12	59	33	66.49	72.48
	Sabinea septemcarinata		13	38	86	51	71.00	73.00
	Argis lar	kuro argid	63	12	59	40	66.00	73.00
	Argis levior	Nelson's argid	1	42	42	42	70.00	70.00
	Hyas coarctatus	circumboreal toad crab	66	14	90	44	66.03	73.04
	Chionoecetes opilio	snow crab	61	14	90	44	66.00	73.04
	Telmessus cheiragonus	helmet crab	18	12	40	24	66.00	71.11
	Labidochirus splendescens	splendid hermit	65	12	90	41	66.00	73.00
	Pagurus trigonocheirus	fuzzy hermit crab	66	14	90	44	66.03	73.04
	Pagurus ochotensis	Alaskan hermit	3	14	17	15	66.00	66.48
	Pagurus rathbuni	longfinger hermit	37	37	86	49	66.99	73.04
	Pagurus capillatus	hairy hermit crab	24	14	58	36	66.48	71.01
	Hapalogaster grebnitzkii	soft crab	2	37	37	37	68.52	71.00
	Paralithodes camtschaticus	red king crab	2	27	40	34	66.99	67.51
	Paralithodes platypus	blue king crab	8	35	56	45	66.03	70.51
Brachiopoda	Hemithyridae	hemithyrid brachiopods	1	45	45	45	70.99	70.99
	Hemithiris psittacea	black brachiopod	3	39	56	46	68.00	70.49
Bryozoa	Bryozoa	bryozoan unid.	35	12	84	39	66.00	73.04
Cnidaria		hydroid unid.	26	21	86	43	69.01	72.51
	Sertulariidae unid.	Sertulariid hydroid	2	37	46	42	68.52	72.48
	Scyphozoa	jellyfish unid.	2	37	50	44	71.00	71.50
	Chrysaora melanaster		48	12	90	40	66.00	73.04

Appendix D.--Continued.

Phylum/ subphylum	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Cnidaria cont.	*Cyanea capillata*	lion's mane	32	12	86	40	66.00	72.01
	Gersemia sp.	sea raspberry	20	14	90	40	66.48	71.52
	Gersemia fruticosa		21	28	86	50	70.00	73.04
	Actiniaria	sea anemone unid.	29	12	90	41	66.03	72.48
	Ptychodactis patula		5	39	56	47	68.00	71.50
	Metridium sp.		7	14	30	20	66.48	67.50
	Stomphia sp.		3	21	52	37	66.03	70.50
	Stomphia coccinea	swimming anemone	4	29	56	40	68.00	71.11
	Urticina sp.		4	27	40	33	66.48	70.00
	Urticina crassicornis	mottled anemone	53	12	90	44	66.49	73.04
	Oractis diomedeae	grape anemone	1	58	58	58	68.01	68.01
	Cribrinopsis sp.		1	49	49	49	71.50	71.50
	Cribrinopsis fernaldi	chevron-tentacled anemone	2	21	35	28	70.50	71.11
	Actinostolidae		4	24	86	52	66.99	71.99
	Actinostola sp.		2	47	56	52	68.00	70.01
	Actinostola groenlandica		3	21	37	29	68.00	70.50
Ctenophora	Ctenophora	comb jelly unid.	1	53	53	53	72.50	72.50
	Beroe sp.		3	42	59	49	71.00	73.00
Echinodermata	Asteroidea	sea star unid.	1	47	47	47	69.50	69.50
	Evasterias echinosoma	giant sea star	13	12	46	27	66.48	71.00
	Urasterias lincki		17	39	86	51	68.50	73.00
	Leptasterias groenlandica		41	28	86	47	66.99	73.00
	Lethasterias nanimensis	blackspined sea star	15	12	46	25	66.48	71.00
	Henricia sanguinolenta	sanguine sea star	1	29	29	29	68.00	68.00

Appendix D.--Continued.

Phylum/ subphylum	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Echinodermata cont.	*Henricia tumida*	tumid sea star	15	12	52	34	66.03	71.00
	Leptasterias polaris		48	12	58	39	66.00	72.04
	Leptasterias arctica		42	12	56	37	66.00	72.04
	Henricia beringiania	Bering Henricia	7	29	90	55	68.00	73.04
	Solaster arcticus		12	29	90	54	66.03	73.04
	Crossaster papposus	rose sea star	43	12	90	44	66.03	73.04
	Pteraster tesselatus		1	29	29	29	68.00	68.00
	Pteraster octaster		2	30	37	34	67.50	68.52
	Pteraster obscurus	obscure sea star	22	21	86	47	66.51	73.00
	Asterias amurensis	purple-orange sea star	26	12	51	30	66.00	71.00
	Ctenodiscus crispatus	common mud star	21	28	86	51	71.00	73.04
	Strongylocentrotus droebachiensis	green sea urchin	38	12	90	38	66.00	71.52
	Echinarachnius parma	parma sand dollar	4	21	35	28	69.50	70.51
	Heliometra glacialis		1	90	90	90	71.52	71.52
	Ophiuroidea	brittlestar unid.	1	50	50	50	72.00	72.00
	Gorgonocephalus eucnemis	basketstar	6	42	52	47	66.51	72.48
	Gorgonocephalus sp. cf. *arcticus*		35	17	84	43	66.48	73.04
	Ophiura sp.		2	50	50	50	72.48	72.51
	Ophiura sarsi	notched brittlestar	35	14	90	45	66.48	73.04
	Stegophiura nodosa		13	15	56	36	66.00	72.04
	Ophiacantha bidentata		1	90	90	90	71.52	71.52
	Ophiopholis aculeata	ubiquitous brittle star	8	29	56	42	68.00	71.11
	Holothuroidea	sea cucumber unid.	2	21	29	25	68.00	70.50
	Ocnus sp.		2	35	90	63	71.11	71.52

Appendix D.--Continued.

Phylum/ subphylum	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Echinodermata cont.	*Ocnus glacialis*		16	35	86	51	69.50	73.04
	Myriotrochus rinkii		16	23	86	46	69.50	72.51
	Pentamera sp.		1	14	14	14	66.98	66.98
	Cucumaria sp.		1	37	37	37	71.00	71.00
	Psolus phantapus		1	45	45	45	70.99	70.99
	Psolus fabricii	brownscaled sea cucumber	21	14	84	44	66.03	73.04
Echiura	Echiura	echiuroid worm unid.	7	14	90	50	66.98	73.00
Ectoprocta	*Bugula* sp.		1	47	47	47	72.01	72.01
	Flustra serrulata	leafy bryozoan	1	50	50	50	71.50	71.50
	Alcyonidium pedunculatum		14	21	84	39	67.51	73.04
	Alcyonidium sp.		2	23	31	27	69.50	69.99
	Alcyonidium disforme		11	14	59	41	66.98	73.00
	Alcyonidium enteromorpha	noodle bryozoan	6	31	90	49	69.99	71.52
	Rhamphostomella costata	ribbed bryozoan	3	37	56	46	68.00	70.99
	Costazia ventricosa	rusty bryozoan	1	45	45	45	70.99	70.99
	Heteropora sp.		1	45	45	45	70.99	70.99
	Dendrobeania sp.		5	29	86	51	68.00	72.01
Mollusca	*Amicula vestita*		10	21	90	46	68.00	71.52
	Stenosemus albus	northern white chiton	4	37	47	43	70.00	71.00
	gastropod eggs	snail eggs	13	14	58	40	66.49	72.01
	Buccinum sp. Eggs		33	21	90	47	68.00	73.04
	Neptunea sp. eggs		6	21	90	43	69.01	71.52
	Nudibranchia	nudibranch unid.	4	23	53	45	68.50	72.50
	Tochuina tetraquetra	giant orange tochui	1	23	23	23	69.50	69.50

Appendix D.--Continued.

Phylum/ subphylum	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Mollusca cont.	*Dendronotus* sp.		6	37	90	58	66.99	72.50
	Dendronotus dalli	Dall's dendronotid	1	58	58	58	68.01	68.01
	Dendronotus frondosus	frond-aeolis	2	21	43	32	70.50	70.50
	Tritonia sp.		8	35	47	42	69.50	71.11
	Calycidoris guentheri		7	28	59	45	70.51	73.00
	Tritonia diomedea	rosy tritonia	3	14	30	22	66.49	70.50
	Doridídae	dorid nudibranch unid.	2	37	38	38	66.99	66.99
		limpet unident.	1	42	42	42	70.00	70.00
	Naticidae eggs	moonsnail eggs unid.	28	28	90	50	67.50	73.04
	Cryptonatica sp.		1	28	28	28	72.04	72.04
	Cryptonatica (=*Natica*) *aleutica*	Aleutian moonsnail	2	37	46	42	66.99	67.52
	Cryptonatica (=*Natica*) *russa*	rusty moonsnail	32	38	90	49	67.50	73.00
	Euspira pallida	pale moonsnail	35	14	90	47	66.49	73.00
	Lamellaria sp.		1	47	47	47	70.01	70.01
	Onchidiopsis glacialis	icy lamellaria	5	31	47	41	69.50	70.99
	Onchidiopsis sp. B (Clark & McLean)		2	31	35	33	69.99	70.51
	Onchidiopsis sp.		13	21	59	41	68.50	72.48
	Onchidiopsis carnea		6	31	47	40	69.99	71.50
	Tachyrhynchus erosus	eroded turretsnail	5	40	51	46	69.50	71.50
	Tachyrhynchus reticulatus	reticulated turretsnail	3	28	51	40	69.50	72.04
	Colus sp.		3	21	52	39	66.03	71.01
	Colus capponius		1	58	58	58	68.01	68.01
	Colus martensi		8	42	53	48	71.00	72.51
	Colus sabini		2	84	86	85	71.99	73.04

Appendix D.--Continued.

Phylum/ subphylum	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Mollusca cont.	*Colus hypolispus*		8	42	58	49	68.01	72.51
	Colus ombronius	shady whelk	5	14	51	40	66.49	71.50
	Colus roseus	rosy whelk	5	41	50	45	70.50	71.50
	Colus spitzbergensis	thick-ribbed whelk	15	35	90	52	68.00	73.04
	Colus halli	shrew whelk	22	14	84	47	66.49	73.04
	Colus bristolensis		1	40	40	40	67.51	67.51
	Volutopsius attenuatus	attenuate melon whelk	3	43	51	46	69.50	71.00
	Volutopsius sp. eggs		3	42	90	72	71.00	73.04
	Pyrulofusus deformis	warped whelk	16	14	90	49	66.49	73.04
	Volutopsius fragilis	fragile whelk	17	14	90	51	66.49	73.04
	Volutopsius stefanssoni	shouldered whelk	8	21	56	42	66.03	71.11
	Beringius beringii		29	14	90	46	66.03	73.04
	Beringius stimpsoni		9	21	90	46	66.03	71.52
	Beringius sp. eggs		2	59	84	72	72.48	73.04
	Neptunea borealis		55	14	90	46	66.48	73.04
	Neptunea middendorffii		1	45	45	45	70.99	70.99
	Neptunea ventricosa	fat whelk	24	14	56	38	66.03	72.00
	Neptunea heros		60	14	90	44	66.00	73.04
	Clinopegma magnum	helmet whelk	13	41	86	52	68.50	72.50
	Plicifusus kroyeri		25	21	90	49	66.51	73.04
	Plicifusus johanseni		15	42	90	50	68.01	72.51
	Liomesus ooides	egg whelk	2	23	24	24	66.99	69.50
	Oenopota sp.		1	39	39	39	72.00	72.00
	Trichotropis borealis		2	44	59	52	71.50	73.00

Appendix D.--Continued.

Phylum/ subphylum	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Mollusca cont.	*Trichotropis bicarinata*	two-keel hairysnail	3	21	37	31	68.52	71.11
	Neoiphinoe echinata		1	50	50	50	71.50	71.50
	Boreotrophon coronatus		9	35	56	47	68.00	72.50
	Boreotrophon clathratus	clathrate trophon	2	42	44	43	70.00	71.50
	Boreotrophon pacificus		8	39	90	50	69.50	71.52
	Margarites sp.		1	42	42	42	71.00	71.00
	Margarites giganteus	giant margarite	2	46	58	52	68.01	71.50
	Margarites costalis	boreal rosy margarite	14	28	59	44	70.50	72.48
	Solariella obscura	obscure solarelle	1	46	46	46	71.50	71.50
	Buccinum normale		2	28	58	43	68.01	72.04
	Buccinum obsoletum		13	35	86	49	68.50	72.51
	Buccinum sp.		1	45	45	45	71.01	71.01
	Buccinum angulosum	angular whelk	29	21	90	45	66.48	71.99
	Buccinum plectrum	sinuous whelk	5	35	84	50	70.00	73.04
	Buccinum scalariforme	ladder whelk	39	23	90	46	66.99	72.50
	Buccinum polare	polar whelk	39	29	90	48	66.48	73.00
	Buccinum solenum		2	38	90	64	66.99	71.52
	Buccinum ciliatum		1	45	45	45	71.00	71.00
	Buccinum glaciale	glacial whelk	7	35	56	46	66.03	71.11
	Buccinum tenellum		2	14	29	22	66.48	66.49
	Buccinum ectomycina		3	39	45	42	70.00	70.99
	Velutina undata	wavy lamellaria	2	24	29	27	66.48	66.99
	Velutina prolongata	elongate lamellaria	1	37	37	37	66.99	66.99
	Velutina sp.		1	21	21	21	70.50	70.50
	Admete regina	noble admete	5	14	56	40	66.49	70.50

Appendix D.--Continued.

Phylum/ subphylum	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Mollusca cont.	Bivalvia	bivalve unid.	2	46	50	48	71.50	72.00
	Mytilus sp.		1	37	37	37	71.00	71.00
	Chlamys behringiana	Iceland scallop	11	37	90	54	68.00	73.04
	Hiatella arctica	Arctic hiatella	6	37	51	44	68.99	71.50
	Nucula tenuis	smooth nutclam	1	46	46	46	71.50	71.50
	Yoldia sp.		1	59	59	59	72.48	72.48
	Yoldia hyperborea	northern yoldia	3	35	46	42	71.11	71.50
	Nuculana pernula	northern nutclam	17	28	59	46	69.50	73.00
	Musculus sp.		1	50	50	50	71.50	71.50
	Musculus niger	black mussel	2	45	90	68	71.01	71.52
	Musculus discors	discordant mussel	10	21	90	40	69.01	71.52
	Musculus glacialis	corrugate mussel	2	39	47	43	72.00	72.50
	Astarte sp.		2	59	90	75	71.52	72.48
	Astarte arctica		20	14	90	42	66.49	72.51
	Astarte montagui		1	14	14	14	66.49	66.49
	Astarte esquimalti		8	28	86	52	71.49	73.04
	Cyclocardia crassidens	thick carditid	4	21	47	38	70.01	71.00
	Cyclocardia sp.		1	35	35	35	70.51	70.51
	Cyclocardia sp. cf. *borealis* (Clark 2006)	northern carditid	3	21	50	39	70.50	71.50
	Clinocardium ciliatum	hairy cockle	27	14	56	41	66.49	72.51
	Clinocardium californiense	California cockle	2	21	49	35	69.01	71.50
	Mactromeris polynyma	Arctic surfclam	1	12	12	12	69.01	69.01
	Pandora glacialis	glacial pandora	2	46	50	48	71.50	71.50
	Macoma sp.		3	44	47	46	67.50	71.50

Appendix D.--Continued.

Phylum/ subphylum	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Mollusca cont.	*Macoma calcarea*	chalky macoma	2	14	84	49	66.98	73.04
	Serripes groenlandicus	Greenland cockle	30	14	59	41	66.00	73.00
	Serripes laperousii	broad cockle	6	12	52	30	66.03	71.00
	Serripes notabilis	oblique smoothcockle	1	39	39	39	72.00	72.00
	Mya truncata	truncate softshell	1	12	12	12	69.01	69.01
	Benthoctopus sibiricus		8	38	84	53	66.03	73.04
		empty bivalve shells	58	12	90	41	66.00	73.00
		empty gastropod shells	34	14	90	39	66.00	72.50
Nemertea	Nemertea	nemertean worm unid.	10	42	90	49	67.50	72.50
	Emplectonema sp.		1	46	46	46	67.52	67.52
	Tubulanus sp.		1	46	46	46	67.52	67.52
	Cerebratulus californienesis		1	46	46	46	67.52	67.52
Porifera	Porifera	sponge unid.	11	14	84	42	66.03	73.04
	Suberites sp.		2	37	90	64	71.00	71.52
	Halichondria sp.		4	12	37	25	68.00	71.00
	Polymastia sp.		3	59	86	76	71.99	73.04
	Halichondria sitiens	black papillate sponge	6	12	52	37	66.51	70.99
	Stylissa sp.	drumstick sponge	10	23	90	51	67.50	73.04
Priapula	*Priapulus caudatus*		2	37	47	42	67.50	71.00
Sipuncula	Sipuncula	peanut worm unid.	4	14	90	46	66.98	71.52
	Golfingia margaritacea		10	38	59	48	68.00	73.00
Tunicata	Ascidiacea	tunicate unid.	21	12	90	40	66.99	73.04
	Thaliacea	salp unid.	1	90	90	90	71.52	71.52
	Pelonaia corrugata		3	37	47	43	66.99	72.01
	Styela rustica	sea potato	28	15	56	38	66.00	71.50

Appendix D.--Continued.

Phylum/ subphylum	Scientific name	Common name	Number stations present	Bottom depth (m)			Latitude range	
				Min. depth	Max. depth	Avg. depth	Southern	Northern
Tunicata cont.	*Boltenia ecinata*		12	21	56	39	66.99	71.50
	Boltenia ovifera		22	21	90	44	68.52	72.48
	Halocynthia sp.	sea peach unid.	1	45	45	45	70.99	70.99
	Halocynthia aurantium	sea peach	10	21	90	46	68.00	71.52
	Distaplia sp.		1	56	56	56	68.00	68.00
	Distaplia occidentalis		1	29	29	29	68.00	68.00
	Distaplia sp. A (Clark 2006)		1	29	29	29	68.00	68.00
		compound ascidian unid.	2	29	37	33	68.00	68.52
	Aplidium sp. A (Clark 2006)	sea glob	9	15	53	33	66.00	72.01
	Trididemnum sp.		1	21	21	21	70.50	70.50
	Chelyosoma productum		8	21	59	40	68.52	72.48
	Molgula sp.		1	27	27	27	66.99	66.99
	Molgula griffithsii	sea grape	6	23	59	43	68.00	72.48

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