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Data Report: 2003 Gulf of Alaska Bottom Trawl Survey

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F.R. Shaw

U.S. DEPARTMENT OF COMMERCE
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PREFACE

This data report is one of three types of standard reports presenting data from the 2003 Gulf of Alaska groundfish survey conducted by the National Marine Fisheries Service (NMFS). The three standard reports are as follows:

- 1) **Cruise Report** outlines the survey objectives; documents itinerary, personnel, and vessels employed; and summarizes major accomplishments¹.
- 2) **Data Report** (this document), contains detailed descriptions of the survey planning and operation, species distribution and abundance charts, length frequency plots, tables of estimated biomass, catch per unit effort, average weight and length estimates, length frequency plots, length-weight regression parameters, list of identified species, survey strata specifications and charts, and trawl descriptions and diagrams.
- 3) **Report to Industry**, contains detailed descriptions of the survey planning and operation, summary listings of species catches by haul and vessel, ranked Catch Per Unit Effort by Species or Species Group and Trawl and Accessories Specifications and Diagrams (Raring 2008).

¹ http://www.afsc.noaa.gov/RACE/surveys/cruise_archives/cruises2003/results_G-NE-SS2003-01.pdf

ABSTRACT

Scientists of the Groundfish Assessment Program of Alaska Fisheries Science Center's Resource Assessment and Conservation Engineering (RACE) Division conducted the third biennial groundfish assessment survey of the Gulf of Alaska during the summer of 2003. These surveys extend the series of surveys, previously conducted every 3 years between 1984 and 1999, which constitute the time series used in stock assessments of Gulf of Alaska groundfish resources. The survey area covered the continental shelf and upper continental slope to 700 m in the Gulf of Alaska from Islands of Four Mountains (170° W long.) and continued eastward approximately 2,800 km across the Gulf of Alaska to Dixon Entrance (133° 25' W long.). The survey was conducted aboard three chartered commercial trawlers, the FV *Gladiator*, the FV *Northwest Explorer* and the FV *Sea Storm*. Trawl haul samples were collected successfully at 809 survey stations using standard RACE Division Poly Nor'Eastern high-opening bottom trawl nets with rubber bobbin roller gear.

The primary survey objectives were to define the distribution and estimate the relative abundance of the principal groundfish within the survey area and to collect data to estimate biological parameters useful to groundfish researchers and managers including age; growth; length-weight relationships; feeding habits; and size, sex, and age composition. The survey also collected ancillary data requested by other research groups.

More than 176 fish and 362 invertebrate species were captured in survey tows. The species highest in total catch abundance (by weight) over the entire survey area were arrowtooth flounder (*Atheresthes stomias*), Pacific halibut (*Hippoglossus stenolepis*), Pacific ocean perch (*Sebastes alutus*), and walleye pollock (*Theragra chalcogramma*). Survey results are presented including estimates of catch per unit of effort, biomass, population size composition, and length-weight relationships, as well as charts depicting the distribution of catch for commercially important species encountered during the survey.

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INTRODUCTION

The third biennial bottom trawl survey of groundfish and invertebrate resources of the Gulf of Alaska (GOA) was conducted during the summer of 2003 by the National Marine Fisheries Service's (NMFS) Alaska Fisheries Science Center (AFSC). Scientists from the Groundfish Assessment Program of AFSC's Resource Assessment and Conservation Engineering (RACE) Division in Seattle, Washington, were responsible for the survey's design and operations. The biennial regimen extends the series begun in 1984, previously conducted every 3 years between 1984 and 1999, which has provided an information time series of distribution, abundance, and biological characteristics of GOA groundfish resources for the purpose of stock assessment and management.

In this report, we document the operations and results of the 2003 GOA bottom trawl survey. Results of routine analyses of distribution, relative abundance, size composition, and biological characteristics are shown for the principal groundfish species in each of the five International North Pacific Fisheries Commission (INPFC) statistical areas sampled in the GOA during this survey: Shumagin, Chirikof, Kodiak, Yakutat, and Southeastern. These results provide stock assessment scientists and resource managers the most current information to be used for subsequent stock assessments. Only the 2003 survey results are presented and no comparisons are made to the results of previous GOA surveys.

The survey objectives were to:

- 1.) Delineate the distributions of major groundfish and commercially important invertebrate species inhabiting the continental shelf and upper continental slope of the GOA in depths ≤ 700 m.
- 2.) Collect data used to estimate the abundance of the major groundfish species.
- 3.) Collect data on specific biological characters of interest to researchers and resource managers including:
 - size, sex, and age composition.
 - growth and length-weight relationships.
 - food habits.
- 4.) Collect specimens and related information for special research projects on behalf of researchers at the RACE and Resource Ecology and Fisheries Management (REFM) Divisions as well as several other scientific and academic organizations. The projects included:
 - Real-time weather observations for the purpose of obtaining ground-truth information;
 - Northern fulmar (*Fulmarus glacialis*) prey items;
 - Collections of mollusk and sea star fauna for ongoing taxonomic and distributional studies;
 - Collections of snailfish and bathymasterids for ongoing taxonomic and distributional studies;

- Steller sea lion (*Eumetopias jubatus*) prey fatty acids;
- Short-tailed albatross (*Diomedea albatrus*) observations.

METHODS

Survey Area

The Gulf of Alaska forms the northeastern border of the Pacific Ocean and consists of complex bathymetric features ranging from jagged, mountainous pinnacles to flat, muddy areas. These features provide a variety of habitats resulting in a complex ecosystem (Fig. 1). Prevailing rough bottom conditions in many areas require the standard use of rubber bobbin roller gear for all survey bottom trawling operations. The 2003 GOA survey included the portion of the continental shelf from the Islands of Four Mountains east approximately 2,800 km to Dixon Entrance and from nearshore waters (minimum depth approximately 15 m) to a depth of 700 m.

The total area of the survey is approximately 308,415 km² (Table 1). Survey depths usually extend out to 1,000 m, making the usual survey area about 320,000 km². During 2003 this additional depth stratum could not be sampled because none of the chartered vessels was equipped to effectively sample at depths greater than 700 m. The continental shelf, waters shallower than about 200 m and consisting of about 81% of the survey area, varies in width from approximately 20 km (11 nautical miles (nmi)) off of the Islands of Four Mountains to approximately 220 km (120 nmi) off Cook Inlet. Gullies intrude onto the shelf in many areas, extending from the upper slope to the inner shore. These gully areas make up about 17% of the total Gulf of Alaska area. The outer shelf is bordered by the continental slope, a region

approximately 20 km in width, which descends steeply to the abyssal Aleutian Trench in the western and central GOA and to the Alaska Plain in the eastern GOA. The survey assessed only that portion of the slope between 200 and 700 m, which represented about 18% of the total survey area. About 32% (97,995 km²) of the total survey area is within the Kodiak INPFC area (Table 1). The portion of the survey area contained within the Chirikof INPFC area and the Shumagin INPFC area are approximately equal at about 21% (64,987 km²) and 20% (63,291 km²), respectively, while the Yakutat INPFC survey area makes up about 18% (55,310 km²). The Southeastern INPFC survey area comprises the smallest portion, about 9% of the total survey area (26,832 km²).

Vessels

Since the inception of the Gulf of Alaska bottom trawl survey series in 1984, commercial trawlers with crew have been chartered to conduct the survey operations under the supervision and guidance of RACE Groundfish Assessment Program staff. Three vessels (occasionally two) have been chartered each year of the survey. Since these surveys generate quantitative data for a time series to describe trends in abundance, distribution, and population biology characteristics of managed resources, it is essential that standardized methods be maintained.

In 2003, three U.S. commercial fishing vessels, the FV *Gladiator*, the FV *Northwest Explorer*, and the FV *Sea Storm* were chartered to conduct the Gulf of Alaska bottom trawl survey. All three chartered vessels are house-forward stern trawlers with hydraulic net reels and paired constant tension hydraulic trawl winches with 2.54 cm diameter steel cable (2.98 cm diameter for the FV *Northwest Explorer*) 1,800 m in length. All vessels have articulating

hydraulic cranes for handling catches and gear. Each vessel has a single main diesel engine with a single-nozzled propeller on the FV *Gladiator* and FV *Sea Storm* and twin propellers on the FV *Northwest Explorer*. The FV *Gladiator* is 38 m long (LOA) with a main engine developing 1,715 continuous horsepower (HP). The FV *Northwest Explorer* is 49.4 m long (LOA) with a 1,800 HP main engine. The FV *Sea Storm* is 37.5 m long (LOA) with a 1,800 HP main engine. Each vessel is equipped with global positioning systems (GPS) integrated with radar, computerized plotting, and autopilots. Other essential electronics supplied by the vessels include color video fish finders, recording depth profilers, and trawl warp measuring systems.

Fishing Gear

All vessels used standard RACE Division Poly Nor'Eastern four-seam bottom trawls with 24.2 m roller gear constructed with 36 cm rubber bobbins separated by 10 cm rubber disks. The fishing dimensions of the trawls during fishing operations were monitored and recorded using Scanmar® acoustic net mensuration equipment mounted on the wing-tips and headrope of the trawl. Each trawl and associated rigging was measured and certified as conforming to standard measurements similar to those called for in Stauffer (2004).

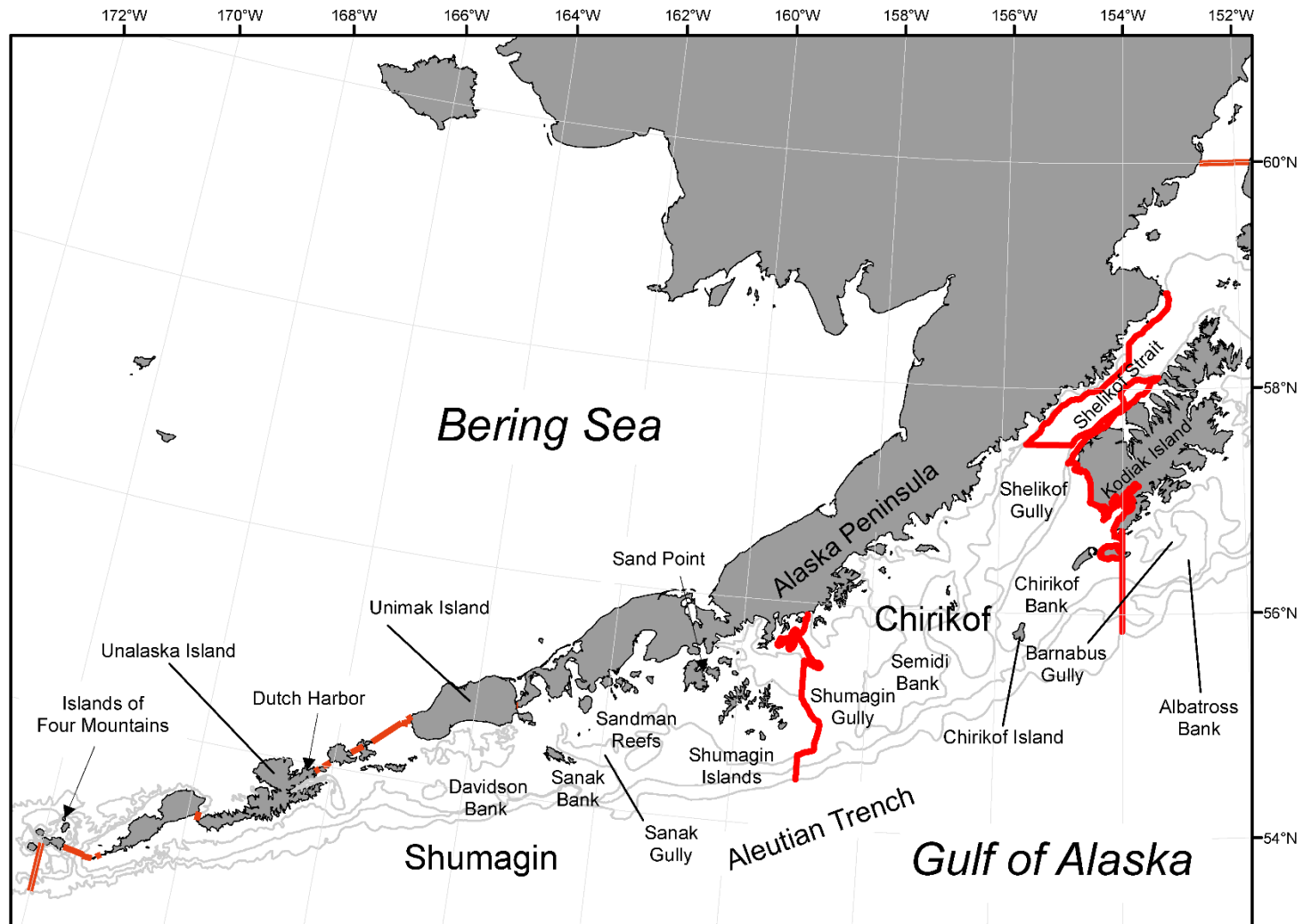


Figure 1. -- Bathymetric and geographic features of the survey area for the 2003 Gulf of Alaska biennial groundfish survey.

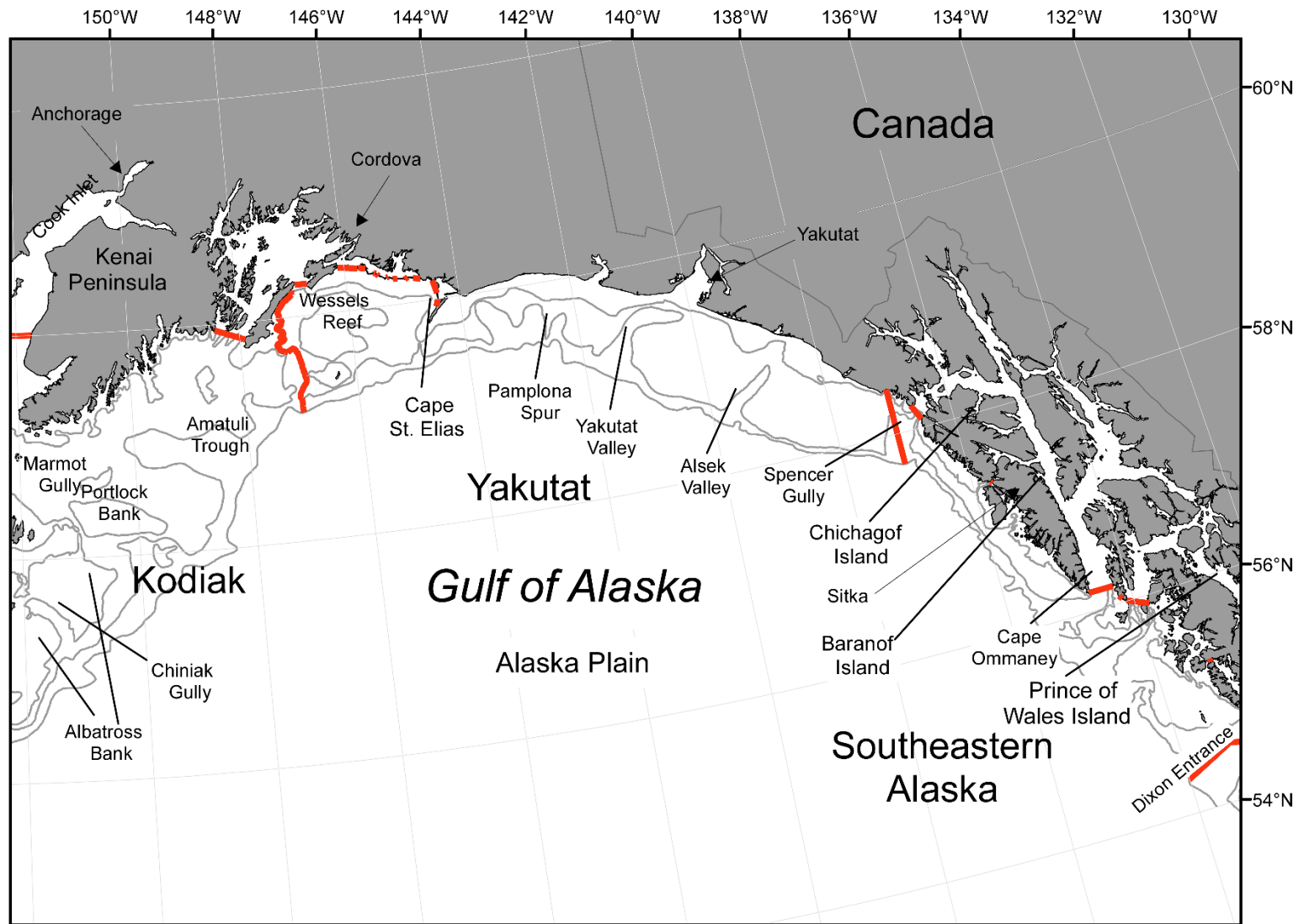


Figure 1. -- Bathymetric and geographic features of the survey area for the 2003 Gulf of Alaska biennial groundfish survey.

Survey Design

The 2003 biennial survey was designed based upon stratified random sampling consistent with previous GOA surveys (Britt and Martin 2000, Martin and Clausen 1995, Stark and Clausen 1995, Munro and Hoff 1995). The survey area was divided into 54 strata defined by water depth, bottom terrain (e.g., shelf, gully, and slope), and INPFC statistical area (Appendix A). As in previous surveys, the number of stations per stratum were determined from a modified Neyman optimal allocation strategy (Cochran 1977). Catch rates, variances, and stratum areas from the 1990-1999 surveys were used to allocate sampling effort among strata for each of the principal groundfish species for each previous survey year using the estimated time to perform a tow in a given stratum as the cost variable since observations in deeper strata have a greater probability of unacceptable gear performance. A mean sample size was estimated for each species across years and then a weighted mean of the estimated sample sizes was calculated using each species' mean biomass multiplied by its ex-vessel value as the weighting variable. These numbers were rounded to whole numbers and represented the number of stations allocated to each stratum with the additional constraint that each stratum was required to have at least two samples.

Within each stratum, the allocated stations were randomly selected without replacement from polygons formed from the intersection of a grid composed of cells 25 km² in area and the stratum boundaries. Since many of the polygons formed by this process are less than 25 km², the probability of selection was directly related to each polygon's area. Small polygons (less than 5 km² in area) were excluded from the pool available for assignment since a vessel would be unable to perform a valid tow within such a small area.

We allocated 807 stations among the 54 strata. Geographic center points of the assigned station polygon were considered to define the location of the station. Vessels were assigned stations and were directed to thoroughly search each area using echosounder returns to locate sufficient trawlable bottom to perform a successful 15-minute tow, preferably through the center point. If trawlable bottom could not be found in the immediate area of the assigned point, a suitable location within the station polygon was sought. If, in the judgment of the field party chief and skipper, no trawlable grounds could be found within the polygon within 2 hours, a nearby alternate station was selected from successful tows completed during previous GOA surveys. If sufficient trawlable bottom was encountered while transiting to the alternate site, this location was instead selected for the sample.

Data Collection Techniques

The 2001 Gulf of Alaska bottom trawl survey was conducted using protocols used by the Alaska Fisheries Science Center's RACE Division. Criteria for a successful tow include maintaining a continuous vessel speed of 3 knots (5.56 m/sec) while keeping the net in contact with the bottom and in fishing configuration for 15 minutes. Occasionally, tows of shorter duration were necessary to avoid obstacles (and, hence, net damage) or when net configuration (e.g., reduced wing spread) indicated that an exceptionally large catch was affecting the performance of the trawl. NMFS-supplied GPS receivers recorded trawling position, time, and trackline position. Water temperature profiles were recorded every 3 seconds during most tows using a Seabird® SBE-39 bathythermograph placed on the headrope of the net. The vertical and horizontal net openings were monitored with Scanmar net mensuration equipment. Scanmar net spread data were generally not collected for tows over extremely rough bottom so as not to risk

losing the instruments. Backup surface water temperatures were measured at most stations with a bucket thermometer. To minimize fishing power differences between the survey vessels, standardized trawling and gear handling methods were practiced including the use of scope ratio relationships (trawl warp relative to bottom depth) and maintaining a 3-knot trawling speed.

A trawl sample was considered successful if horizontal and vertical net openings remained within established tolerances, the roller gear maintained consistent contact with the bottom, the net suffered little or no damage during the tow, and there were no conflicts with derelict fishing gear. Trawl samples were considered unsuccessful when the field party chief judged that the catch was affected by trawl damage, an unstable trawl configuration, insufficient bottom contact, or in the event the duration of the tow was less than 10 minutes.

Collection and Processing of Samples

Numbers and weights of all taxa were recorded for each haul. Catches were sorted to species or other appropriate taxonomic levels and then weighed in aggregate using a Marel® electronic motion-compensating scale. Catches weighing less than approximately 1,000 kg were emptied directly onto a sorting table, sorted by species, and weighed to the nearest 0.01 kg using a Marel® model M1100 digital scale. Species groups weighing less than about 2 kg were generally weighed to the nearest 2 g on a Marel® model M60 digital scale. Larger catches were processed in like manner by successively filling the sorting table from the codend, sorting, and weighing until the entire catch had been processed. Alternatively, the total weight of the catch was determined using a Measurement System's International Portaweigh® Model 4300 crane scale. Afterwards the sorting table was filled with a portion of the catch and the excess catch was

dumped into a deck bin. The dominant species, usually three or fewer, comprising the bulk of the catch were identified. The contents of the deck bin were sorted, the predominant species were discarded and the non-dominant species were retained, which were sorted and weighed with those from the table. Total weight estimates for the predominant species were calculated by expanding their proportion by weight from the sorted sample to the difference between the total catch weight and the total weight of all non-dominant species. Pacific halibut were measured and discarded as promptly as possible and their weights were estimated from the length data.

Additional biological information was recorded from individuals of species of commercial value, ecological importance, or abundance in the survey area. A random subsample of 100 - 300 individuals (target subsample size was species-dependent) of each of these species was sorted by sex, and individual lengths were measured for using Polycorder (Omnidata®) data loggers with barcode readers and barcoded length strips. When recording fish length the most common measurement used was fork length (FL), however sharks and skates were measured using total length (TL) and giant grenadier were measured from the tip of the snout to the insertion of the anal fin. Fish that could not be readily sexed were classified as unsexed and measured. Age structures were collected from randomly-selected samples of walleye pollock (See Appendix Table B-1 for scientific names of fish species), samples stratified by haul, sex, and size of rockfish species, and samples stratified by area, sex, and size of other target species. Every attempt was made to distribute the age specimen collections over the entire survey area. Individuals sampled for age were measured to the nearest 1 cm (FL) and weighed to the nearest 2-5 g (scale accuracy depends on the weight of the specimen) with a Marel® model M60 scale.

Stomach samples for selected species were collected throughout the survey area by biologists from the AFSC's Resource Ecology and Ecosystem Modeling (REEM) Program

aboard the FV *Gladiator*. Ancillary data and specimens were collected for several other research projects as described previously.

Abundance, Size Composition, and Length-Weight Relations

Biomass estimates were calculated using the area-swept method (Alverson and Pereyra 1969). The area swept was calculated as the product of estimated distance towed and the estimated mean net spread for each tow. The distance towed was assumed to be represented by the distance traveled over ground by the vessel between the time when the footrope came into contact with the bottom (on-bottom) and the time when the center of the footrope left the bottom (off-bottom). The distance traveled by the vessel was estimated by smoothing the GPS location data and measuring the distance along this line. The mean net spread was estimated by averaging the smoothed net spread readings from the Scanmar units between on-bottom and off-bottom positions. Net spreads for tows for with insufficient Scanmar data were estimated by a stepwise generalized additive model using net number, net height (when available), mean speed over ground (when available), depth, total catch and the actual scope/expected scope ratio as variables. For each species, catch-per unit effort (CPUE) was calculated as catch weight (kg) per area swept by the trawl in hectares (ha). Mean CPUE was calculated, including zero catches, within each stratum. Mean CPUE values of combined strata were calculated as the weighted average of the component strata CPUE means weighted by stratum area. Biomass estimates were calculated by multiplying each stratum mean CPUE by the stratum area and summing the results to obtain estimates by INPFC statistical areas and depth intervals. The 95% confidence interval was calculated for each species biomass estimate. A detailed description of the analytical procedures is presented in Wakabayashi et al. (1985).

Population length compositions were estimated by expanding the length-frequency to the total catch for each species by length and sex category at each station (Wakabayashi et al. 1985). The stratum population within a sex-length category was calculated by multiplying the stratum population by the proportion of fish in that category from the summed station data. Population size composition estimates were summed over strata to derive estimates by area.

Individual length and weight measurements were used to establish length-weight relationships. The length-weight allometric relationship was expressed as

$$W = a * L^b,$$

where W is weight (grams), L is length (mm), and a and b are the fitted parameters from a non-linear least squares regression (See above for length definition). Parameters for the most common species are listed in Appendix C.

Survey Limitations

The primary purpose of this survey is to support management of a large number of fish and benthic invertebrate species, including various functional groups of fish: flatfish, roundfish, and rockfish. The different functional groups have expected differences in both haul level and survey level catchabilities, which, in turn, are generally unknown and may not be consistent even within each group. Survey catch rates and derived abundance estimates, which are used to tune stock assessment models, are used to monitor population trends and status. Gear deployment is standardized and intentionally not modified over time to ensure scientific consistency and

statistical continuity of the time series necessary to reliably monitor the status of fish stocks and forecast trends.

RESULTS

With a total of 807 stations originally assigned, there were 876 attempted tows, and 809 tows (92%) were completed successfully and included in the biomass and size composition analyses. The difference between the number of successfully completed tows and pre-assigned stations is usually the result of making more tows than initially intended or reclassifying of tows during the editing process (Table 1). Net spread measurements were successfully collected for 782 of attempted tows (89%). Headrope depth and temperature measurements were successfully collected for 865 attempted tows (98%). Bottom temperatures ranged from 3.6° to 11.8° C. Sea surface temperatures were successfully collected for 861 tows and ranged from 5.6° to 15.8° C .

For those tows successfully completed, net height and spread were measured for 717 hauls (for the rest of the hauls net dimensions were estimated from other bottom trawl hauls). Average net spread ranged from 10.2 to 18.2 m. Average net heights of successfully completed tows ranged from 4.7 to 9.2 m.

Table 1. -- Number of stations allocated, attempted, and successfully completed, and sampling density for the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth range (m)	Stations allocated	Stations attempted	Stations successful	Area (km²)	Stations/ 1000 m²
Shumagin	1 - 100	160	173	161	41,289	3.90
	101 - 200	45	49	46	14,677	3.13
	201 - 300	10	10	10	2,788	3.59
	301 - 500	8	12	9	2,531	3.56
	501 - 700	4	4	4	2,006	1.99
	All depths	227	248	230	63,291	3.63
Chirikof	1 - 100	75	84	75	26,035	2.88
	101 - 200	64	67	64	23,849	2.68
	201 - 300	25	27	25	11,546	2.17
	301 - 500	6	7	5	1,604	3.12
	501 - 700	3	3	3	1,953	1.54
	All depths	173	188	172	64,987	2.65
Kodiak	1 - 100	106	120	106	38,516	2.75
	101 - 200	106	109	106	43,332	2.45
	201 - 300	26	26	25	11,490	2.18
	301 - 500	8	9	9	2,912	3.09
	501 - 700	2	3	2	1,745	1.15
	All depths	248	267	248	97,995	2.53
Yakutat	1 - 100	16	18	16	16,661	0.96
	101 - 200	37	38	37	29,382	1.26
	201 - 300	17	18	17	5,170	3.29
	301 - 500	6	6	6	2,628	2.28
	501 - 700	3	3	3	1,469	2.04
	All depths	79	83	79	55,310	1.43
Southeastern	1 - 100	14	14	13	6,546	1.99
	101 - 200	28	32	28	11,084	2.53
	201 - 300	25	26	26	5,052	5.15
	301 - 500	10	14	10	3,117	3.21
	501 - 700	3	4	3	1,033	2.90
	All depths	80	90	80	26,832	2.98
All areas	1 - 100	371	409	371	129,047	2.87
	101 - 200	280	295	281	122,324	2.30
	201 - 300	103	107	103	36,046	2.86
	301 - 500	38	48	39	12,792	3.05
	501 - 700	15	17	15	8,206	1.83
	All depths	807	876	809	308,415	2.62

Catch Results by Area

At least 176 fish species from 41 families were captured during the 2003 survey. Appendix B presents lists of fish (Appendix Table B-1) and invertebrate (Appendix Table B-2) species encountered during the survey. Relative abundance estimates, reported as CPUE, are presented in Table 2 for the 20 most abundant groundfish species in each of the five INPFC areas.

Over the entire survey area, arrowtooth flounder was the most abundant groundfish encountered during the survey (Table 2). Arrowtooth flounder also had the highest CPUE of any species in each of the five INPFC areas. Pacific halibut, Pacific ocean perch, walleye pollock, and giant grenadier were also very important components of the Gulf-wide species composition.

In the Shumagin INPFC area, walleye pollock had the second greatest CPUE of any species. Giant grenadier were also relatively abundant in this area. In the Chirikof and Kodiak INPFC areas, arrowtooth flounder dominated all other species in terms of CPUE by a wide margin. Pacific halibut followed arrowtooth flounder in abundance in both the Kodiak and Yakutat INPFC areas. Silvergrey rockfish were the second most abundant species caught in the Southeast INPFC area.

Table 2. -- Mean CPUE (kg/ha) for the 20 most abundant groundfish in each International North Pacific Fisheries Commission area during the 2003 biennial Gulf of Alaska bottom trawl survey.

<u>Shumagin area</u>	<u>CPUE</u>	<u>Chirikof area</u>	<u>CPUE</u>	<u>Kodiak area</u>	<u>CPUE</u>
arrowtooth flounder	54.0	arrowtooth flounder	77.3	arrowtooth flounder	172.8
walleye pollock	33.7	giant grenadier	19.2	Pacific halibut	30.6
giant grenadier	23.3	Pacific ocean perch	17.9	Pacific ocean perch	17.0
Pacific halibut	15.7	Pacific halibut	17.8	Pacific cod	13.3
Pacific cod	12.0	Pacific cod	11.8	sablefish	12.3
Pacific ocean perch	11.5	walleye pollock	11.0	flathead sole	10.5
flathead sole	10.6	flathead sole	10.4	walleye pollock	10.3
Atka mackerel	9.4	sablefish	8.5	giant grenadier	6.9
southern rock sole	8.7	northern rockfish	7.7	eulachon	6.1
northern rock sole	6.8	dusky rockfish	7.2	spiny dogfish	5.9
yellowfin sole	6.7	southern rock sole	5.4	Dover sole	3.4
shortspine thornyhead	3.3	eulachon	5.4	shortspine thornyhead	3.1
sablefish	2.9	rex sole	4.8	southern rock sole	3.0
Pacific sleeper shark	2.1	Pacific sleeper shark	4.2	starry flounder	3.0
rex sole	2.1	shortspine thornyhead	3.5	rex sole	2.8
shortraker rockfish	1.8	northern rock sole	3.3	big skate	2.2
big skate	1.5	starry flounder	3.2	butter sole	2.0
yellow Irish lord	1.5	Dover sole	2.4	longnose skate	2.0
northern rockfish	1.5	big skate	1.8	northern rock sole	1.6
rougheye rockfish	1.4	rougheye rockfish	1.6	rougheye rockfish	1.5
Number of hauls	230	Number of hauls	172	Number of hauls	248

<u>Yakutat area</u>	<u>CPUE</u>	<u>Southeastern area</u>	<u>CPUE</u>	<u>All areas</u>	<u>CPUE</u>
arrowtooth flounder	27.7	arrowtooth flounder	48.1	arrowtooth flounder	91.4
Pacific halibut	17.8	silvergray rockfish	18.2	Pacific halibut	20.5
giant grenadier	10.2	walleye pollock	7.5	Pacific ocean perch	14.8
spiny dogfish	6.6	spotted ratfish	6.9	walleye pollock	13.7
sablefish	5.9	rex sole	6.7	giant grenadier	12.9
Dover sole	5.7	Pacific halibut	6.7	Pacific cod	9.6
Pacific ocean perch	5.0	Dover sole	5.7	flathead sole	8.3
lingcod	3.4	sablefish	5.0	sablefish	7.8
walleye pollock	3.1	Pacific cod	4.1	southern rock sole	4.1
flathead sole	3.1	shortspine thornyhead	3.9	eulachon	3.7
eulachon	2.7	redstripe rockfish	2.9	shortspine thornyhead	3.3
longnose skate	2.2	lingcod	2.8	rex sole	3.2
shortraker rockfish	2.2	Pacific hake	2.7	Dover sole	3.2
dusky rockfish	2.1	southern rock sole	2.1	spiny dogfish	3.2
rex sole	1.9	sharpchin rockfish	1.9	northern rock sole	2.6
Pacific herring	1.8	big skate	1.3	dusky rockfish	2.3
English sole	1.6	English sole	1.3	northern rockfish	2.2
big skate	1.5	spiny dogfish	0.9	Atka mackerel	2.1
Pacific sandfish	0.7	flathead sole	0.8	starry flounder	1.9
Pacific cod	0.7	redbanded rockfish	0.7	big skate	1.8
Number of hauls	79	Number of hauls	80	Number of hauls	809

Catch Results by Species

For each commercially important groundfish species, as well as those which may not be commercially important but have a high overall abundance, the following information is presented:

1. A brief synopsis of the data collected.
2. A table presenting the number of hauls, the number of hauls with catch, mean CPUE, estimated biomass with 95% confidence intervals, and mean weight of that species by INPFC area and depth.
3. A figure showing the distribution and relative abundance of that species.
4. A figure showing the estimated size composition of the population for that species.
5. CPUE and biomass estimates (with 95% confidence intervals) by stratum for that species.

For other species that were abundant in specific areas (other flatfish and rockfish and skates), only items 1, 2, and 5 above are presented.

Names used are those established by general usage in the scientific community, using the following published resources: Names of Fishes (Nelson et al. 2004), Names of Decapod Crustaceans (Williams et al. 1989), Names of Mollusks (Turgeon et al. 1998), Names of Cnidaria and Ctenophora (Cairns et al. 2002), and the most recent Integrated Taxonomic Information System (ITIS) database (<http://www.itis.usda.gov/>). Names used in this document may differ on the basis of the most recent research.

FLATFISHES

Arrowtooth flounder (*Atheresthes stomias*)

Arrowtooth flounder was the most abundant species caught in the 2003 survey (Table 2) with the highest mean CPUE in each of the five surveyed INPFC areas. Arrowtooth flounder were caught throughout the survey area at all depths except those tows between 500 and 700 m in the Kodiak and Southeastern INPFC areas, occurring in 90% of all tows (Table 3). The highest densities generally occurred on the broad continental shelf in the Kodiak INPFC area, especially around the area of Portlock Bank (Fig. 2 and Table 4). Mean densities were highest in depths between 100 and 200 m over most of the survey. Mean weight almost always increased with depth (Table 3), as fish less than 30 cm FL were relatively rare at depths greater than 300 m (Fig. 3). A distinct length mode around 40 to 45 cm for males occurred at depths between 201 and 300 m.

Table 3. -- Number of survey hauls, number of hauls with arrowtooth flounder, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	146	37.09	153,156	106,396	199,916	0.472
	101 - 200	46	46	125.06	183,558	106,055	261,062	0.608
	201 - 300	10	10	11.40	3,178	0	6,678	1.077
	301 - 500	9	9	6.65	1,682	833	2,532	1.443
	501 - 700	4	1	0.23	46	0	172	2.419
	All depths	230	212	53.98	341,620	253,677	429,563	0.542
Chirikof	1 - 100	75	52	39.44	102,688	47,140	158,236	0.502
	101 - 200	64	64	133.79	319,081	217,813	420,349	0.694
	201 - 300	25	25	69.28	79,990	53,679	106,301	1.172
	301 - 500	5	4	2.20	353	64	641	1.737
	501 - 700	3	1	0.23	44	0	185	1.672
	All depths	172	146	77.27	502,156	385,141	619,170	0.685
Kodiak	1 - 100	106	86	90.06	346,859	26,834	666,884	0.961
	101 - 200	106	106	294.90	1,277,848	623,348	1,932,348	0.974
	201 - 300	25	25	57.31	65,856	25,409	106,303	0.929
	301 - 500	9	6	8.16	2,377	313	4,442	1.445
	501 - 700	2	0	---	---	---	---	---
	All depths	248	223	172.76	1,692,941	971,510	2,414,371	0.97
Yakutat	1 - 100	16	14	11.29	18,809	4,402	33,217	0.244
	101 - 200	37	37	42.29	124,263	64,828	183,698	0.418
	201 - 300	17	17	13.24	6,843	81	13,605	1.01
	301 - 500	6	6	12.16	3,196	1,230	5,163	1.187
	501 - 700	3	2	1.96	288	0	1,021	2.06
	All depths	79	76	27.73	153,400	92,783	214,017	0.399
Southeastern	1 - 100	13	10	9.38	6,141	0	13,129	0.7
	101 - 200	28	27	83.30	92,336	27,045	157,627	0.659
	201 - 300	26	26	18.45	9,319	2,759	15,880	0.663
	301 - 500	10	10	67.96	21,183	0	48,465	1.236
	501 - 700	3	0	---	---	---	---	---
	All depths	80	73	48.07	128,979	58,834	199,123	0.717
All areas	1 - 100	371	308	48.64	627,653	299,087	956,218	0.643
	101 - 200	281	280	163.26	1,997,087	1,325,383	2,668,790	0.795
	201 - 300	103	103	45.83	165,187	126,527	203,846	1.014
	301 - 500	39	35	22.51	28,791	1,366	56,216	1.26
	501 - 700	15	4	0.46	378	0	1,041	2.041
	All depths	809	730	91.41	2,819,095	2,077,792	3,560,398	0.767

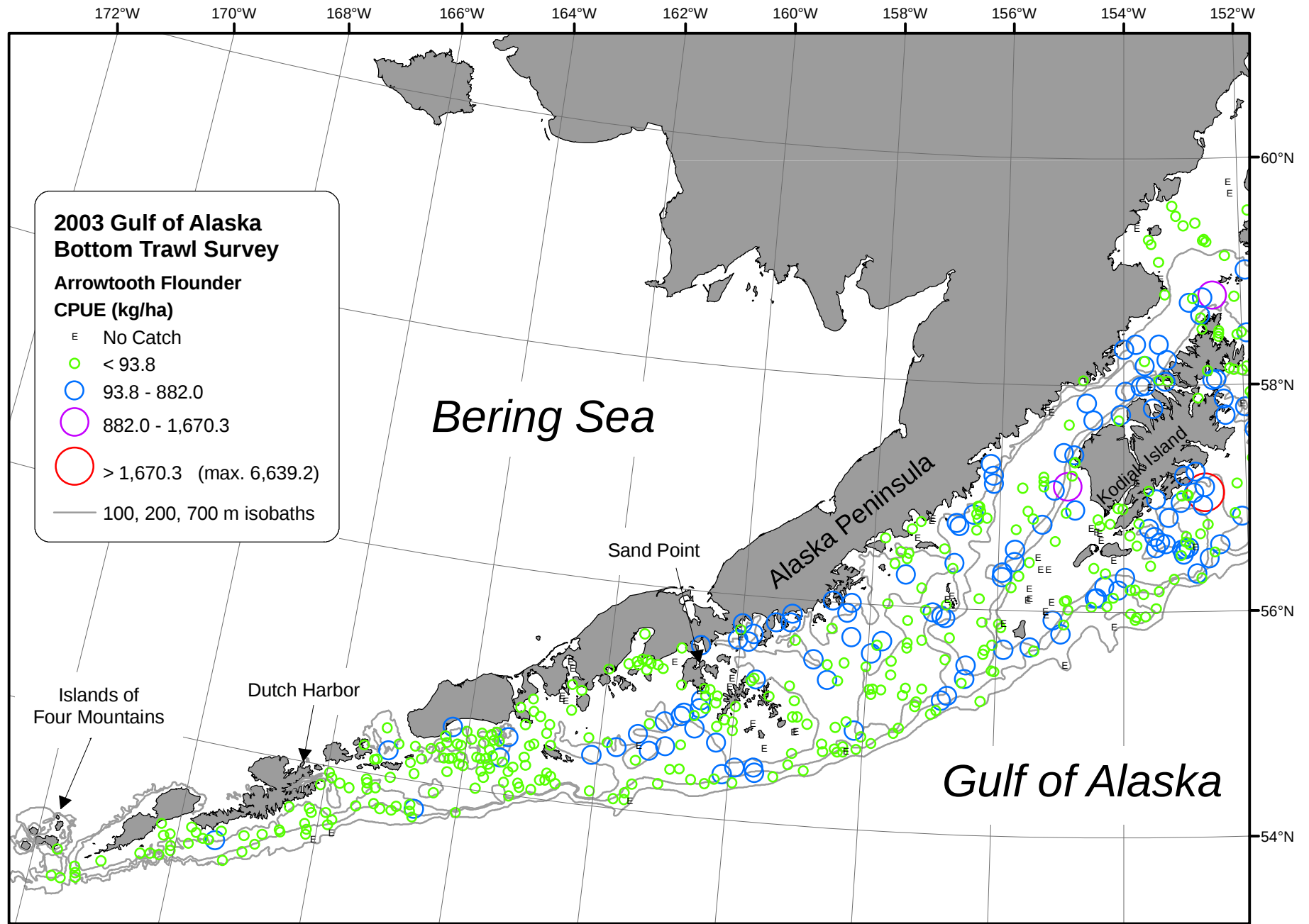


Figure 2.-- Distribution and relative abundance of arrowtooth flounder from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

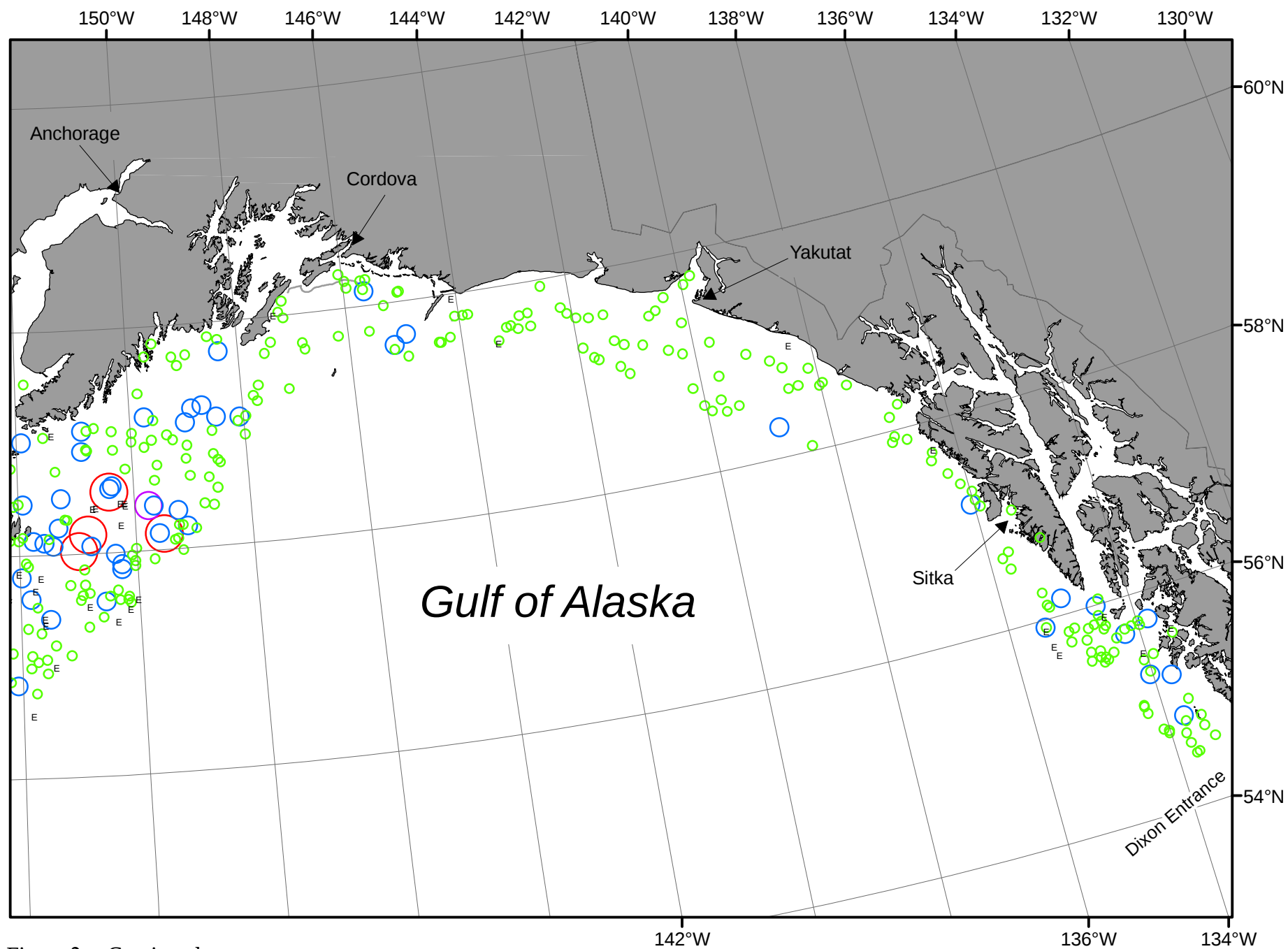


Figure 2.-- Continued.

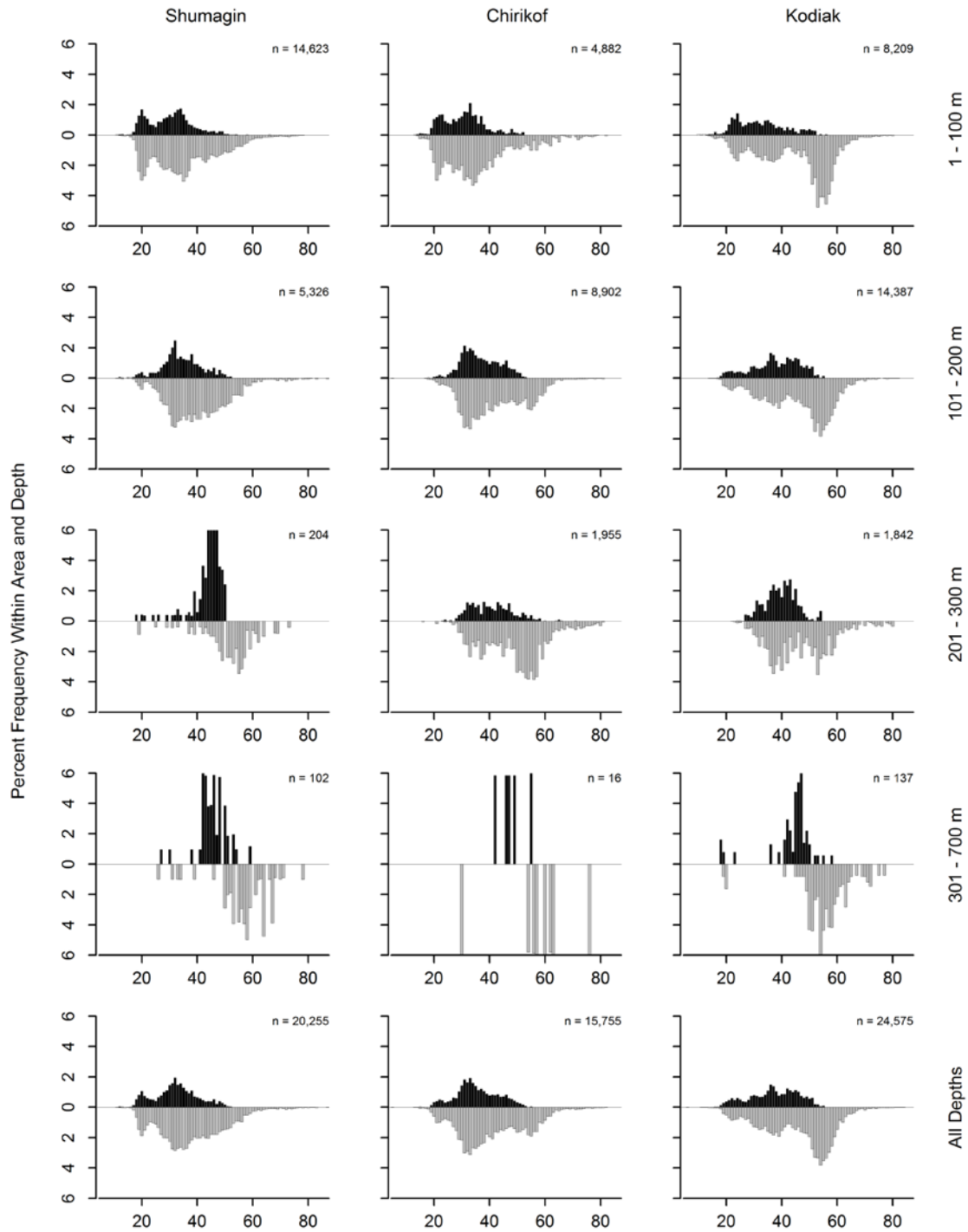


Figure 3. -- Size composition of arrowtooth flounder from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

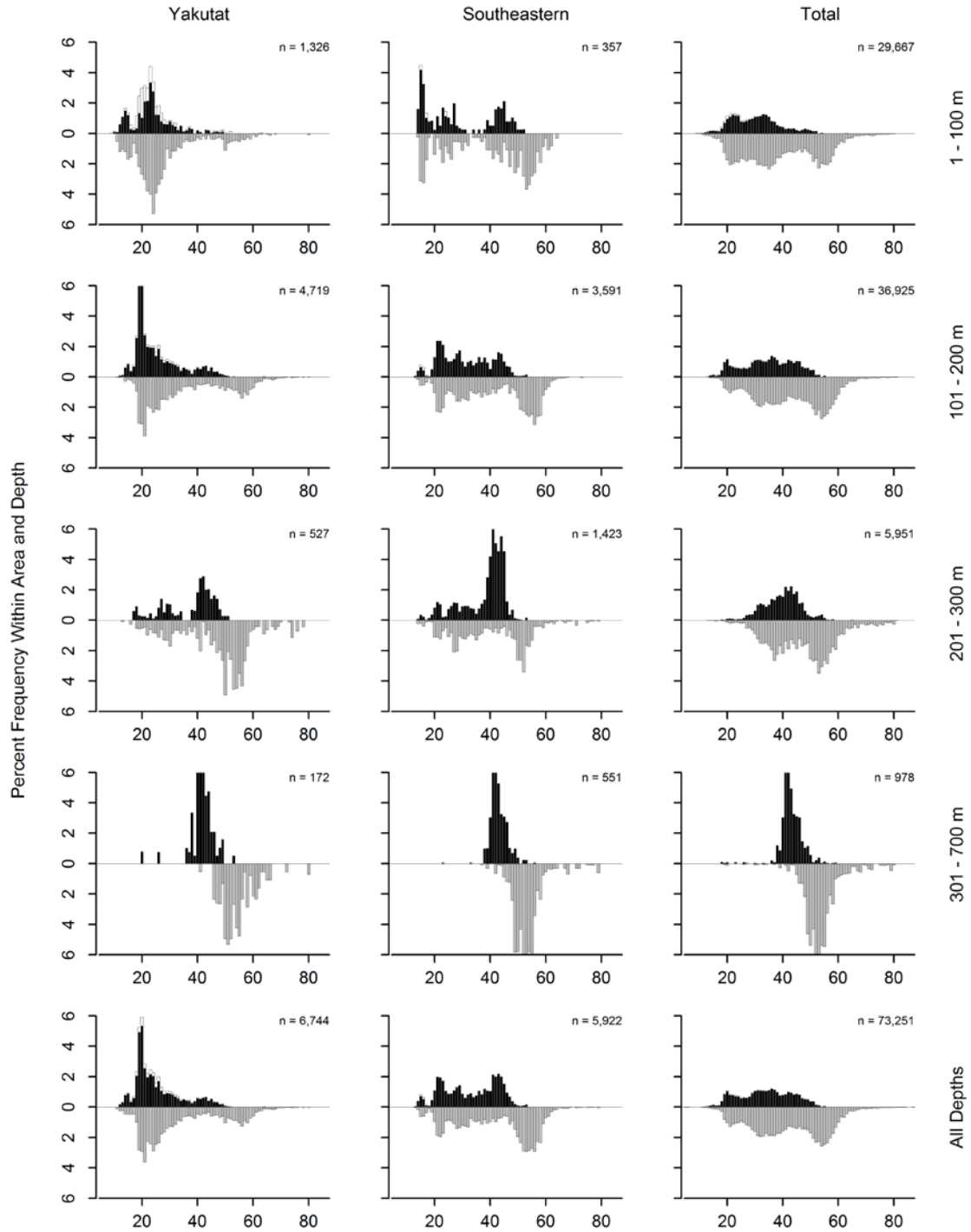


Figure 3. -- Continued (arrowtooth flounder).

Table 4. -- Catch per unit of effort by stratum for arrowtooth flounder sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Kodiak	101 - 200	Portlock Flats	23	23	699.83	513,422	0	1,081,595
Kodiak	101 - 200	Albatross Gullies	25	25	396.12	313,400	57,268	569,531
Kodiak	101 - 200	Barren Islands	14	14	265.20	291,214	40,757	541,670
Shumagin	101 - 200	Sanak Gully	8	8	232.39	98,657	25,399	171,915
Chirikof	101 - 200	Shelikof Edge	24	24	210.18	162,568	72,249	252,888
Shumagin	101 - 200	West Shumagin Gully	5	5	194.61	44,338	17,165	71,511
Kodiak	1 - 100	Northern Kodiak Shallows	9	8	152.47	33,537	1,636	65,437
Kodiak	1 - 100	Albatross Banks	41	29	142.39	219,323	0	535,467
Kodiak	201 - 300	Upper Shelikof Gully	3	3	129.08	41,411	0	94,474
Kodiak	1 - 100	Albatross Shallows	33	32	128.45	74,066	34,359	113,774
Kodiak	101 - 200	Kenai Flats	18	18	106.04	128,066	65,224	190,908
Chirikof	101 - 200	Chirikof Outer Shelf	21	21	105.20	52,714	21,543	83,886
Southeastern	101 - 200	Prince of Wales Shelf	20	19	97.18	66,935	14,162	119,707
Southeastern	301 - 500	Southeastern Slope	2	2	95.82	7,404	0	98,694
Chirikof	101 - 200	East Shumagin Gully	19	19	93.48	103,798	62,742	144,854
Chirikof	201 - 300	Lower Shelikof Gully	18	18	75.78	75,919	49,603	102,235
Yakutat	101 - 200	Middleton Shelf	12	12	67.93	49,897	22,960	76,834
Chirikof	1 - 100	Upper Alaska Peninsula	18	13	67.13	53,308	20,299	86,317
Kodiak	101 - 200	Kodiak Outer Shelf	26	26	63.17	31,747	11,326	52,168
Yakutat	101 - 200	Fairweather Shelf	9	9	61.17	47,266	0	103,597
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	8	60.53	25,401	0	71,300
Southeastern	301 - 500	Southeastern Deep Gullies	8	8	58.78	13,779	0	37,230
Shumagin	101 - 200	Shumagin Outer Shelf	33	33	49.75	40,563	8,262	72,864
Shumagin	1 - 100	Lower Alaska Peninsula	33	26	49.09	33,753	15,752	51,753
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	44.19	4,973	0	13,106
Shumagin	1 - 100	Shumagin Bank	38	30	39.76	49,297	16,240	82,354
Shumagin	1 - 100	Fox Islands	28	28	39.65	33,039	5,775	60,304
Chirikof	1 - 100	Chirikof Bank	37	21	37.61	40,588	0	86,223
Kodiak	201 - 300	Kenai Gullies	16	16	34.26	22,815	16,282	29,349
Shumagin	1 - 100	Davidson Bank	62	62	27.09	37,067	26,054	48,079
Chirikof	201 - 300	Chirikof Slope	7	7	26.64	4,071	1,306	6,836
Kodiak	1 - 100	Kenai Peninsula	8	6	25.21	13,259	1,185	25,334
Yakutat	101 - 200	Yakataga Shelf	7	7	21.32	11,250	6,842	15,658
Yakutat	101 - 200	Yakutat Flats	9	9	17.55	15,851	9,579	22,122
Yakutat	201 - 300	Yakutat Gullies	6	6	17.44	5,308	0	12,370
Yakutat	301 - 500	Yakutat Slope	4	4	16.91	2,572	284	4,860
Yakutat	1 - 100	Middleton Shallows	8	8	14.18	9,523	0	19,368
Chirikof	1 - 100	Semidi Bank	20	18	12.04	8,792	1,772	15,813
Shumagin	201 - 300	Shumagin Slope	10	10	11.40	3,178	0	6,731
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	22	11.07	4,347	2,664	6,030
Kodiak	201 - 300	Kodiak Slope	6	6	10.04	1,629	782	2,477
Southeastern	1 - 100	Southeastern Shallows	13	10	9.38	6,141	0	13,190
Yakutat	1 - 100	Yakutat Shallows	8	6	9.34	9,286	0	21,436
Kodiak	301 - 500	Kodiak Slope	9	6	8.16	2,377	273	4,482
Yakutat	201 - 300	Yakutat Slope	11	11	7.22	1,535	863	2,208
Kodiak	1 - 100	Lower Cook Inlet	15	11	6.75	6,674	260	13,088
Shumagin	301 - 500	Shumagin Slope	9	9	6.65	1,682	816	2,548
Yakutat	301 - 500	Yakutat Gullies	2	2	5.64	625	0	3,936
Chirikof	301 - 500	Chirikof Slope	5	4	2.20	353	41	664
Yakutat	501 - 700	Yakutat Slope	3	2	1.96	288	0	1,279
Shumagin	501 - 700	Shumagin Slope	4	1	0.23	46	0	190
Chirikof	501 - 700	Chirikof Slope	3	1	0.23	44	0	234

Pacific halibut (*Hippoglossus stenolepis*)

Pacific halibut was the second most abundant species caught in the 2003 survey (Table 2) with the second highest mean CPUE in the Kodiak and Yakutat INPFC areas. Pacific halibut were particularly abundant at depths less than 100 m where they were caught in approximately 96% of the tows and 64% of the estimated halibut biomass was found at these depths. The highest CPUEs were found at this depth range in the three western INPFC areas; however, in the Yakutat and Southeastern INPFC areas the highest CPUEs were found in the depths between 100 and 200 m (Table 5). The frequency of occurrence of Pacific halibut in tows decreased from west to east, ranging from about 87% of the tows in the Shumagin INPFC area to 50% of the tows in the Southeastern INPFC area. The strata with the highest densities were recorded were the Albatross Banks stratum southeast of Kodiak Island and the Fairweather Shelf stratum in the Yakutat INPFC area (Fig. 4 and Table 6). Most halibut were not sexed prior to length measurement. A pronounced length mode around 30 cm was noted in the shallowest depth zone of the Shumagin and Chirikof INPFC areas and to a lesser extent the Kodiak area (Fig. 5).

Table 5. -- Number of survey hauls, number of hauls with Pacific halibut, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	159	21.29	87,904	67,295	108,513	1.892
	101 - 200	46	35	6.65	9,763	6,904	12,622	4.575
	201 - 300	10	4	3.42	953	0	2,515	7.255
	301 - 500	9	4	3.04	771	0	1,752	11.133
	501 - 700	4	0	---	---	---	---	---
	All depths	230	202	15.70	99,391	78,523	120,258	2.037
Chirikof	1 - 100	75	75	33.86	88,155	64,633	111,676	2.23
	101 - 200	64	54	9.65	23,008	14,380	31,637	6.674
	201 - 300	25	16	3.78	4,363	0	9,240	6.708
	301 - 500	5	1	1.24	199	0	709	7.378
	501 - 700	3	0	---	---	---	---	---
	All depths	172	146	17.81	115,725	90,538	140,912	2.651
Kodiak	1 - 100	106	102	55.64	214,314	106,968	321,659	2.778
	101 - 200	106	82	19.08	82,660	15,271	150,049	6.563
	201 - 300	25	11	2.30	2,648	371	4,925	9.356
	301 - 500	9	2	2.05	596	0	1,513	12.014
	501 - 700	2	0	---	---	---	---	---
	All depths	248	197	30.64	300,217	174,127	426,308	3.333
Yakutat	1 - 100	16	11	7.82	13,025	0	33,494	1.936
	101 - 200	37	22	26.91	79,079	4,081	154,077	5.483
	201 - 300	17	9	10.89	5,628	2,905	8,350	6.523
	301 - 500	6	1	2.30	605	0	2,285	39.631
	501 - 700	3	0	---	---	---	---	---
	All depths	79	43	17.78	98,337	23,486	173,188	4.464
Southeastern	1 - 100	13	10	8.32	5,448	1,591	9,306	3.786
	101 - 200	28	20	9.60	10,639	4,125	17,153	4.798
	201 - 300	26	9	3.68	1,859	45	3,672	14.745
	301 - 500	10	1	0.16	49	0	161	3.919
	501 - 700	3	0	---	---	---	---	---
	All depths	80	40	6.71	17,995	10,432	25,558	4.742
All areas	1 - 100	371	357	31.68	408,846	295,561	522,131	2.387
	101 - 200	281	213	16.77	205,150	106,211	304,088	5.892
	201 - 300	103	49	4.29	15,450	9,175	21,726	7.523
	301 - 500	39	9	1.73	2,219	386	4,051	12.794
	501 - 700	15	0	---	---	---	---	---
	All depths	809	628	20.48	631,665	485,367	777,962	3.032

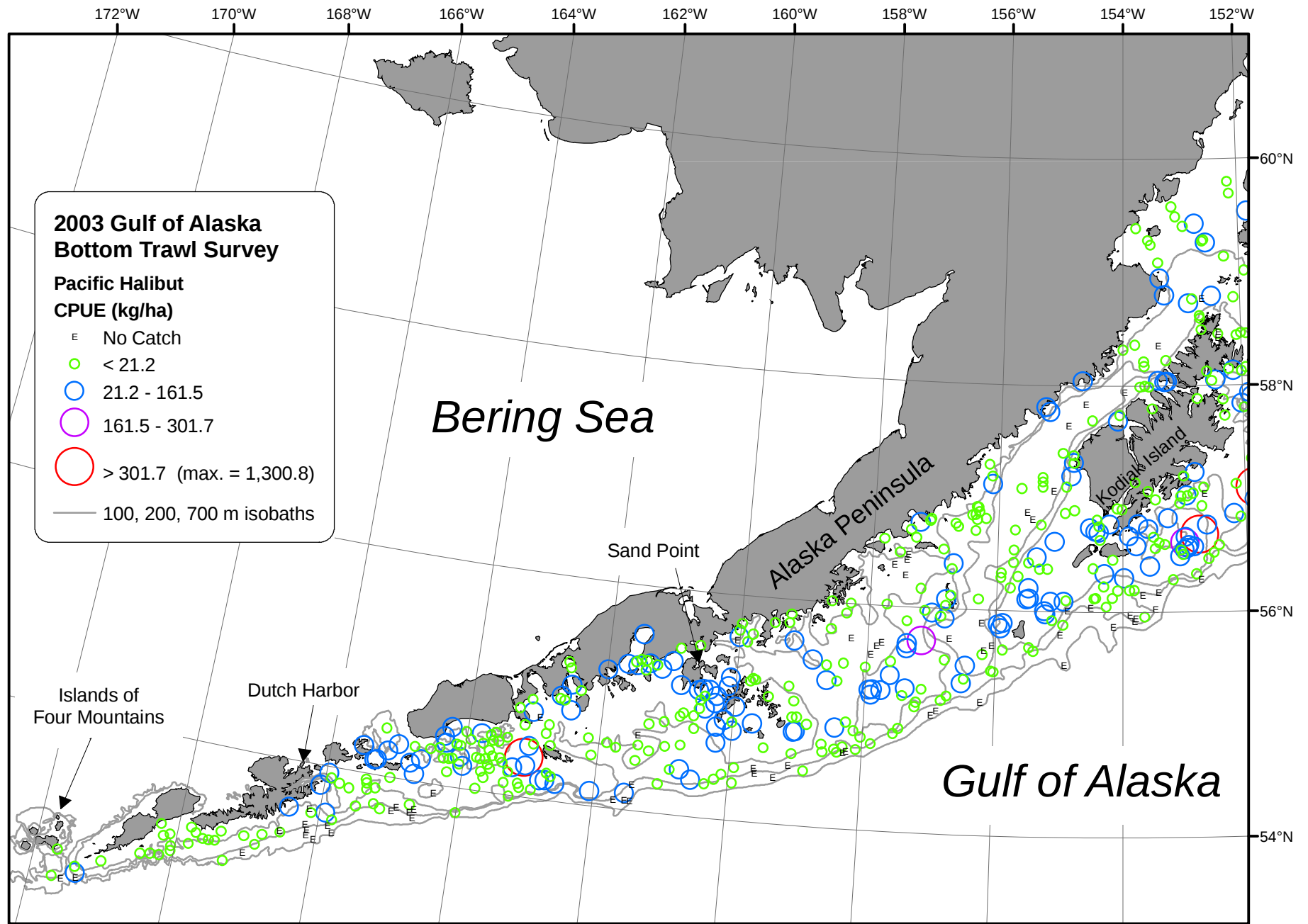


Figure 4.-- Distribution and relative abundance of Pacific halibut from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

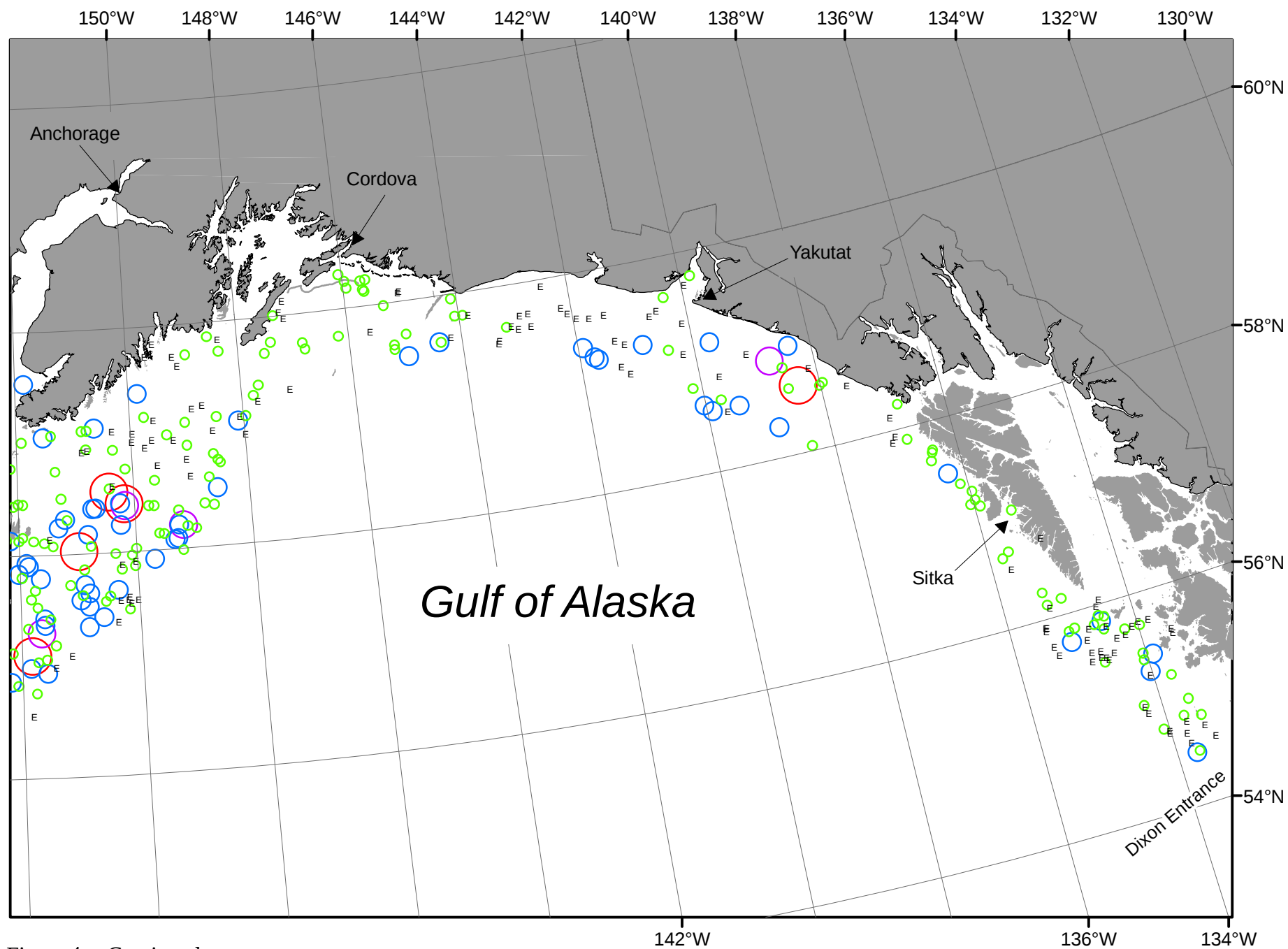


Figure 4.-- Continued.

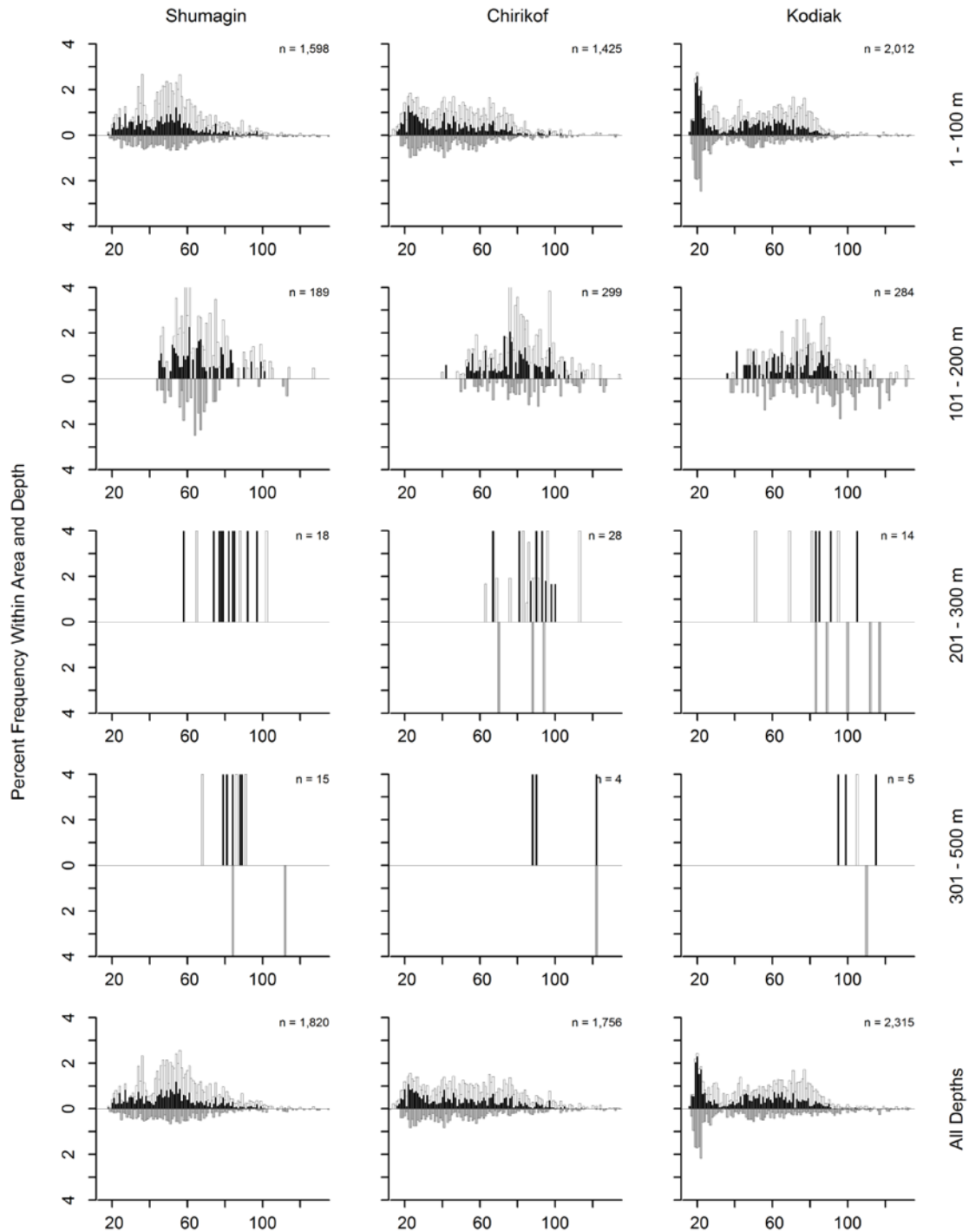


Figure 5. -- Size composition of Pacific halibut from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

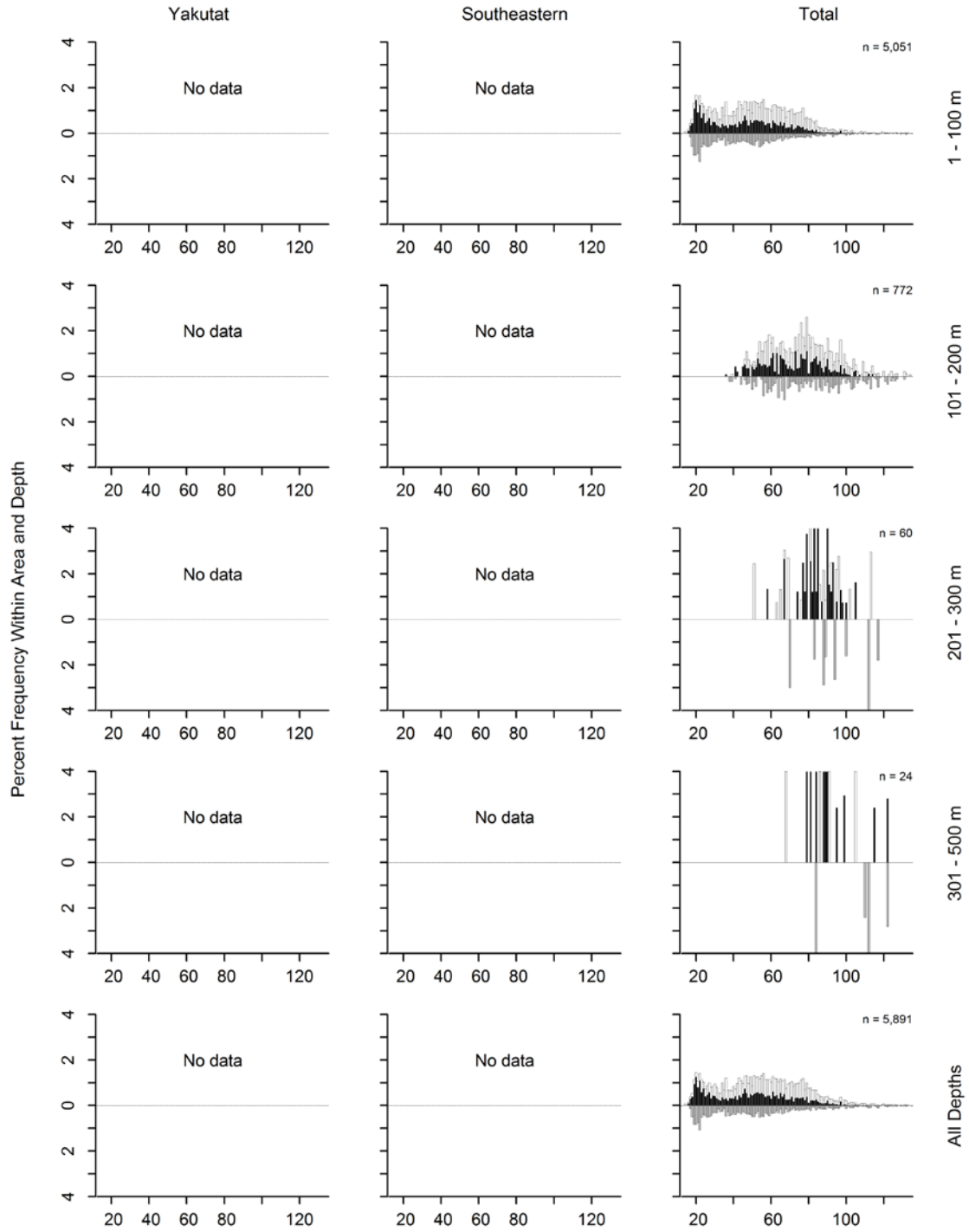


Figure 5. – Continued (Pacific halibut).

Table 6. -- Catch per unit of effort by stratum for Pacific halibut sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Kodiak	1 - 100	Albatross Banks	41	41	112.90	173,903	66,996	280,809
Yakutat	101 - 200	Fairweather Shelf	9	8	88.62	68,480	0	144,350
Kodiak	101 - 200	Portlock Flats	23	18	67.87	49,789	0	117,012
Chirikof	1 - 100	Semidi Bank	20	20	53.78	39,273	18,247	60,299
Chirikof	1 - 100	Chirikof Bank	37	37	31.75	34,261	23,680	44,843
Yakutat	201 - 300	Yakutat Slope	11	9	26.45	5,628	2,872	8,384
Shumagin	1 - 100	Davidson Bank	62	61	23.38	31,985	13,613	50,357
Shumagin	1 - 100	Shumagin Bank	38	38	23.38	28,986	21,061	36,911
Shumagin	1 - 100	Lower Alaska Peninsula	33	32	19.24	13,228	10,263	16,192
Kodiak	1 - 100	Kenai Peninsula	8	6	18.92	9,950	291	19,610
Kodiak	1 - 100	Lower Cook Inlet	15	15	18.64	18,431	14,573	22,290
Kodiak	1 - 100	Northern Kodiak Shallows	9	9	18.58	4,087	2,135	6,040
Chirikof	1 - 100	Upper Alaska Peninsula	18	18	18.41	14,620	9,944	19,296
Shumagin	1 - 100	Fox Islands	28	28	16.45	13,706	9,289	18,123
Kodiak	101 - 200	Albatross Gullies	25	22	14.73	11,654	6,410	16,898
Kodiak	1 - 100	Albatross Shallows	33	31	13.77	7,942	4,775	11,109
Kodiak	101 - 200	Kodiak Outer Shelf	26	19	13.57	6,819	3,919	9,719
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	8	12.25	5,142	2,067	8,218
Yakutat	1 - 100	Yakutat Shallows	8	5	11.36	11,302	0	32,187
Chirikof	101 - 200	Chirikof Outer Shelf	21	20	10.57	5,296	3,752	6,839
Chirikof	101 - 200	Shelikof Edge	24	23	10.31	7,973	4,871	11,075
Yakutat	101 - 200	Yakutat Flats	9	5	8.99	8,120	0	17,428
Kodiak	101 - 200	Barren Islands	14	12	8.87	9,735	4,112	15,357
Chirikof	101 - 200	East Shumagin Gully	19	11	8.77	9,740	1,764	17,716
Southeastern	1 - 100	Southeastern Shallows	13	10	8.32	5,448	1,557	9,340
Southeastern	101 - 200	Prince of Wales Shelf	20	12	7.98	5,497	0	11,544
Shumagin	101 - 200	Shumagin Outer Shelf	33	24	7.34	5,988	3,430	8,546
Shumagin	101 - 200	Sanak Gully	8	7	6.34	2,692	1,420	3,964
Shumagin	101 - 200	West Shumagin Gully	5	4	4.75	1,083	35	2,131
Yakutat	301 - 500	Yakutat Slope	4	1	3.98	605	0	2,531
Chirikof	201 - 300	Lower Shelikof Gully	18	10	3.98	3,984	0	8,878
Southeastern	201 - 300	Baranof-Chichagof Slope	4	2	3.98	447	0	1,660
Kodiak	101 - 200	Kenai Flats	18	11	3.86	4,663	244	9,082
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	7	3.59	1,411	0	3,062
Kodiak	201 - 300	Kodiak Slope	6	2	3.46	562	0	1,706
Shumagin	201 - 300	Shumagin Slope	10	4	3.42	953	0	2,539
Shumagin	301 - 500	Shumagin Slope	9	4	3.04	771	0	1,771
Yakutat	101 - 200	Middleton Shelf	12	8	2.59	1,906	876	2,936
Yakutat	1 - 100	Middleton Shallows	8	6	2.57	1,723	0	3,849
Chirikof	201 - 300	Chirikof Slope	7	6	2.48	379	140	617
Kodiak	201 - 300	Kenai Gullies	16	8	2.14	1,423	117	2,729
Kodiak	201 - 300	Upper Shelikof Gully	3	1	2.07	663	0	3,515
Kodiak	301 - 500	Kodiak Slope	9	2	2.05	596	0	1,531
Chirikof	301 - 500	Chirikof Slope	5	1	1.24	199	0	750
Yakutat	101 - 200	Yakataga Shelf	7	1	1.09	572	0	1,973
Southeastern	301 - 500	Southeastern Deep Gullies	8	1	0.21	49	0	164

Flathead sole (*Hippoglossoides elassodon*)

Flathead sole was the seventh most abundant species caught in the 2003 survey (Table 2). The population was primarily concentrated in bays around Kodiak Island and along the Alaska Peninsula, with 96% of the estimated biomass in waters less than 200 m deep (Fig. 6 and Tables 7-8). The three individual strata which produced the highest CPUE for this species contained an estimated 32% of the estimated biomass but comprised only about 5% of the total survey area. The mean weight of flathead sole did not exhibit a consistent pattern with depth (Table 7). The length frequency showed a distinct length mode at about 33 cm for males in all areas in water shallower than 200 m. Females had a somewhat less distinct mode at about 36 cm (Fig. 7).

Table 7. -- Number of survey hauls, number of hauls with flathead sole, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	109	12.91	53,313	37,102	69,523	0.308
	101 - 200	46	31	9.35	13,718	8,117	19,319	0.248
	201 - 300	10	3	0.09	24	0	64	0.241
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	143	10.59	67,055	50,035	84,075	0.294
Chirikof	1 - 100	75	32	10.62	27,647	10,004	45,290	0.328
	101 - 200	64	51	14.13	33,690	24,828	42,552	0.298
	201 - 300	25	17	5.57	6,431	2,772	10,089	0.363
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	100	10.43	67,768	47,961	87,575	0.315
Kodiak	1 - 100	106	48	14.87	57,268	30,204	84,333	0.402
	101 - 200	106	67	9.80	42,471	29,994	54,948	0.294
	201 - 300	25	18	2.91	3,345	204	6,486	0.387
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	133	10.52	103,084	73,543	132,625	0.349
Yakutat	1 - 100	16	13	3.44	5,734	1,641	9,826	0.251
	101 - 200	37	27	3.87	11,376	7,280	15,471	0.292
	201 - 300	17	5	0.09	45	0	108	0.174
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	45	3.10	17,154	11,603	22,705	0.276
Southeastern	1 - 100	13	5	3.14	2,056	196	3,917	0.254
	101 - 200	28	8	0.15	167	0	420	0.227
	201 - 300	26	3	0.02	11	0	25	0.212
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	16	0.83	2,234	355	4,113	0.251
All areas	1 - 100	371	207	11.32	146,018	110,292	181,745	0.339
	101 - 200	281	184	8.29	101,421	85,119	117,724	0.288
	201 - 300	103	46	2.73	9,855	5,453	14,256	0.368
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	437	8.34	257,294	217,866	296,723	0.318

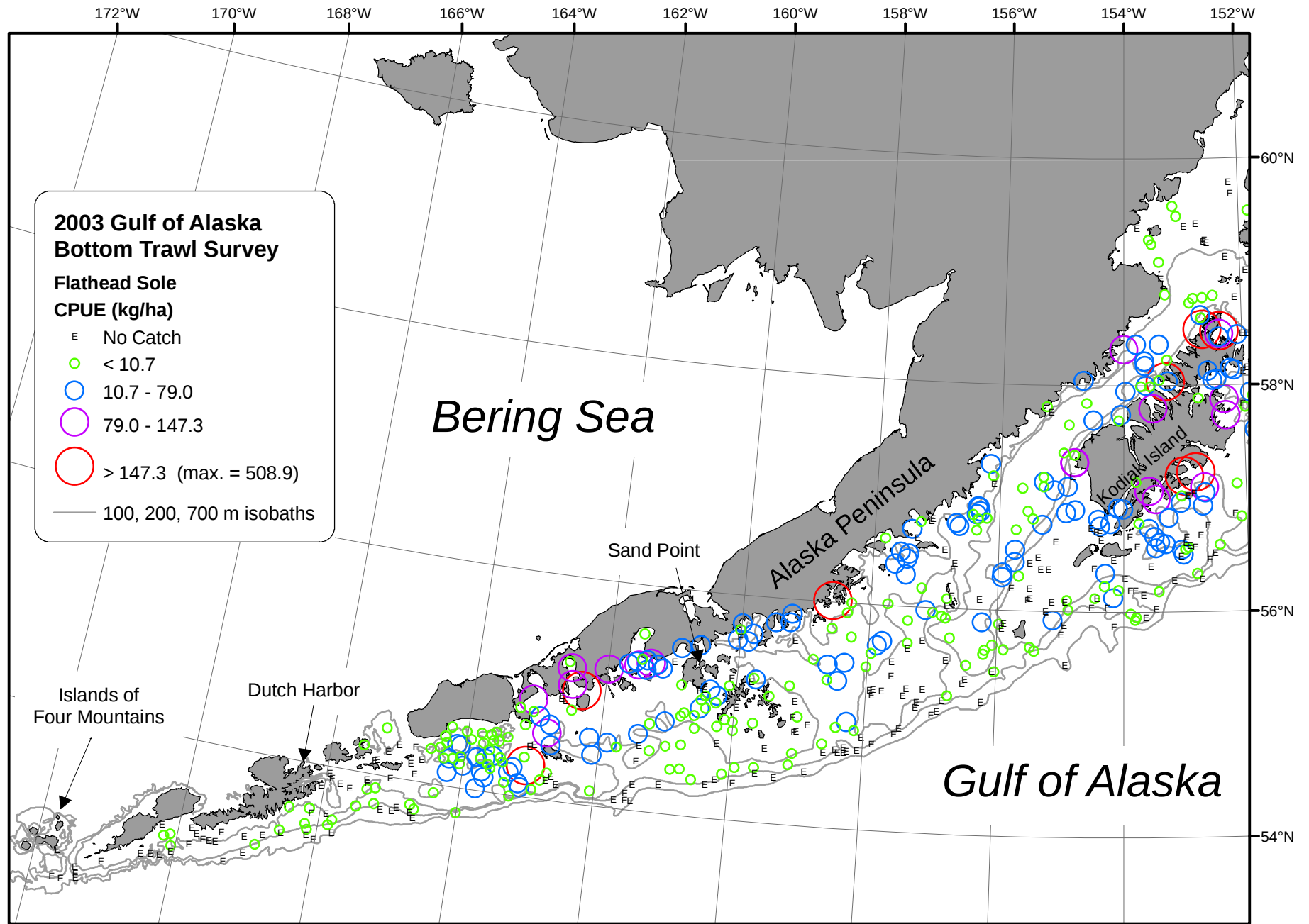


Figure 6.-- Distribution and relative abundance of flathead sole from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

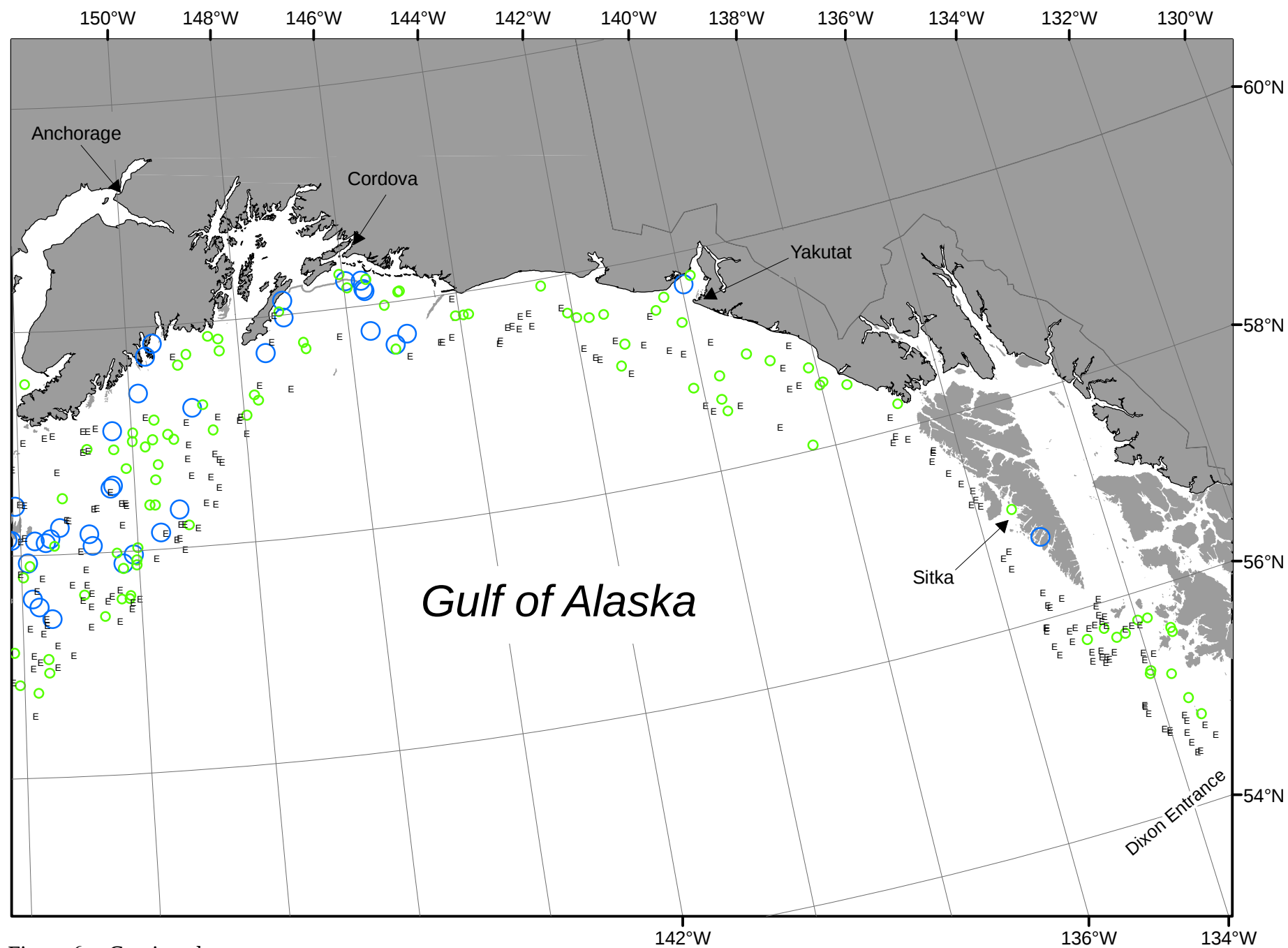


Figure 6.-- Continued.

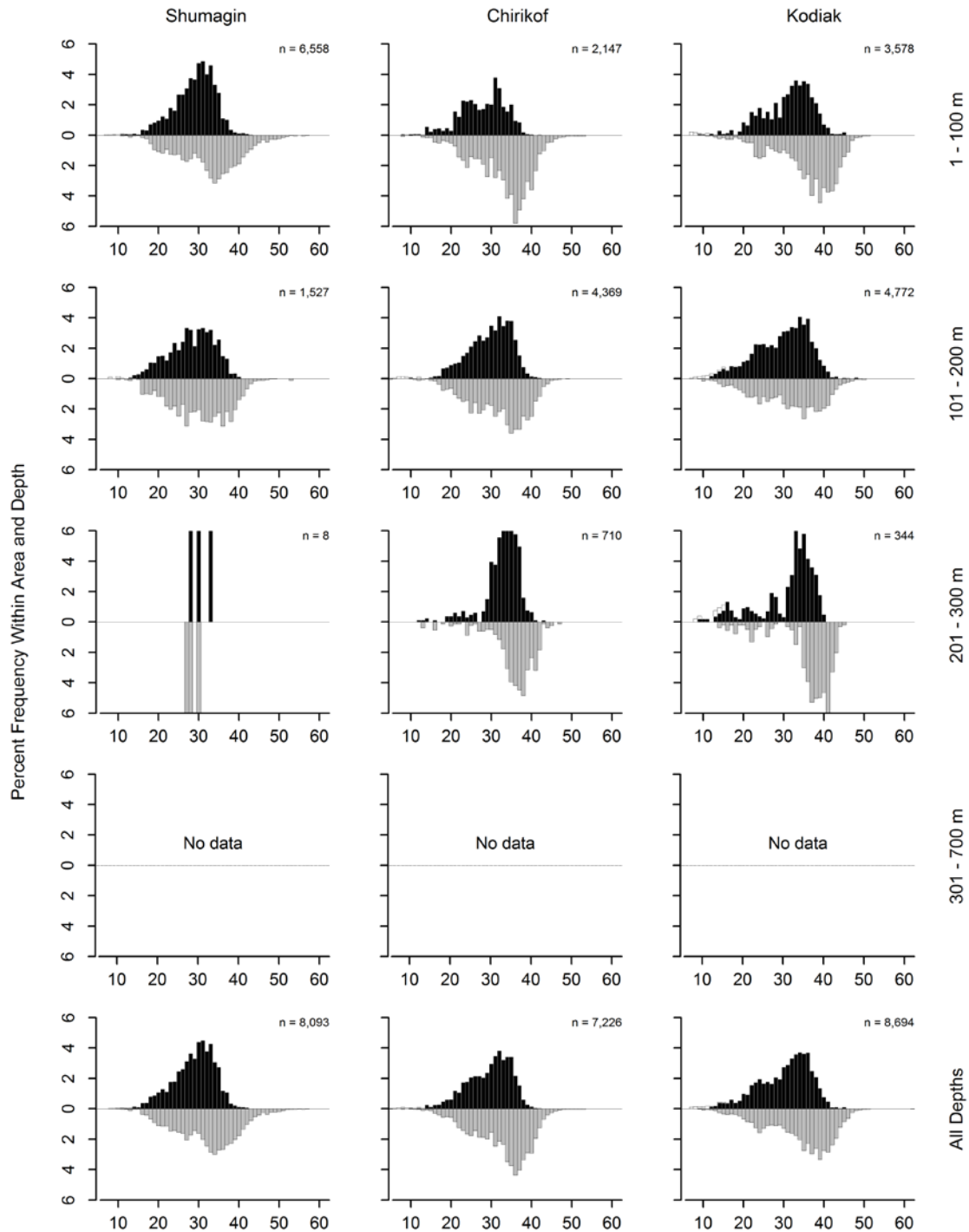


Figure 7. -- Size composition of flathead sole from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

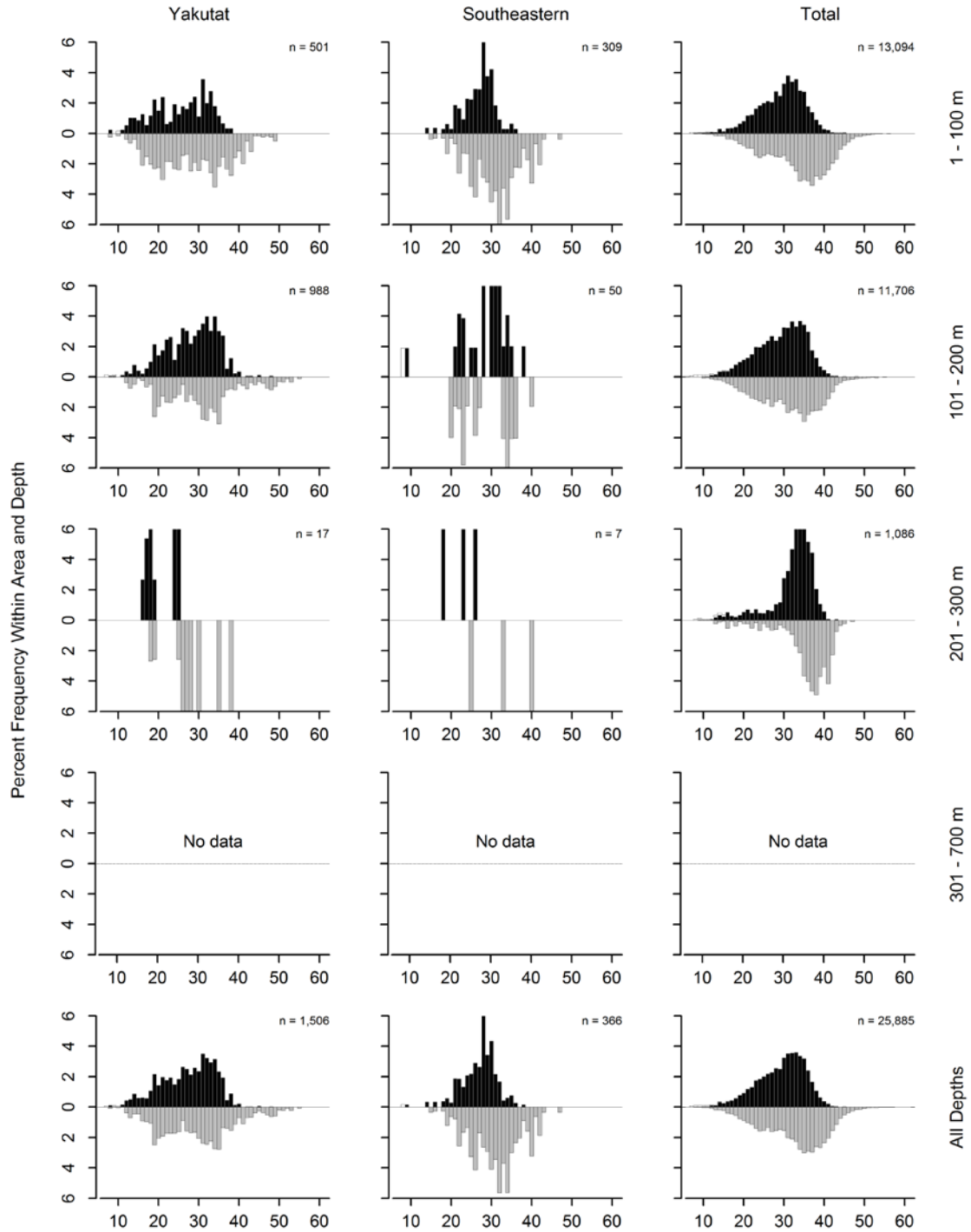


Figure 7. -- Continued (flathead sole).

Table 8. -- Catch per unit of effort by stratum for flathead sole sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Kodiak	1 - 100	Albatross Shallows	33	22	69.75	40,218	16,143	64,294
Shumagin	1 - 100	Lower Alaska Peninsula	33	27	46.11	31,702	17,620	45,784
Kodiak	1 - 100	Northern Kodiak Shallows	9	9	43.68	9,608	0	22,165
Shumagin	101 - 200	West Shumagin Gully	5	5	28.23	6,431	1,127	11,735
Kodiak	101 - 200	Albatross Gullies	25	22	25.13	19,881	13,031	26,731
Chirikof	101 - 200	Shelikof Edge	24	23	19.71	15,241	8,691	21,791
Chirikof	1 - 100	Chirikof Bank	37	15	16.57	17,882	6,201	29,564
Chirikof	101 - 200	East Shumagin Gully	19	19	15.73	17,461	11,324	23,598
Shumagin	101 - 200	Sanak Gully	8	8	15.62	6,632	2,514	10,749
Yakutat	101 - 200	Middleton Shelf	12	12	15.05	11,054	6,932	15,176
Chirikof	1 - 100	Upper Alaska Peninsula	18	12	11.38	9,033	0	22,898
Shumagin	1 - 100	Davidson Bank	62	52	11.20	15,323	7,531	23,115
Kodiak	101 - 200	Barren Islands	14	10	10.75	11,808	2,872	20,744
Kodiak	1 - 100	Kenai Peninsula	8	2	8.62	4,531	0	11,722
Chirikof	201 - 300	Lower Shelikof Gully	18	16	6.42	6,430	2,756	10,104
Kodiak	201 - 300	Upper Shelikof Gully	3	3	6.38	2,047	0	6,639
Kodiak	101 - 200	Portlock Flats	23	12	6.26	4,596	0	9,570
Kodiak	101 - 200	Kenai Flats	18	12	4.94	5,971	2,055	9,887
Shumagin	1 - 100	Shumagin Bank	38	24	4.66	5,783	2,325	9,241
Yakutat	1 - 100	Middleton Shallows	8	7	4.20	2,817	0	5,714
Southeastern	1 - 100	Southeastern Shallows	13	5	3.14	2,056	180	3,933
Yakutat	1 - 100	Yakutat Shallows	8	6	2.93	2,917	0	6,335
Chirikof	101 - 200	Chirikof Outer Shelf	21	9	1.97	988	0	2,092
Kodiak	201 - 300	Kenai Gullies	16	11	1.85	1,235	0	2,501
Kodiak	1 - 100	Albatross Banks	41	9	1.51	2,325	44	4,607
Chirikof	1 - 100	Semidi Bank	20	5	1.00	732	0	1,894
Shumagin	101 - 200	Shumagin Outer Shelf	33	18	0.80	656	232	1,079
Shumagin	1 - 100	Fox Islands	28	6	0.61	505	0	1,122
Kodiak	1 - 100	Lower Cook Inlet	15	6	0.59	585	0	1,436
Kodiak	101 - 200	Kodiak Outer Shelf	26	11	0.43	215	0	435
Kodiak	201 - 300	Kodiak Slope	6	4	0.39	63	0	140
Southeastern	101 - 200	Prince of Wales Shelf	20	8	0.24	167	0	421
Yakutat	101 - 200	Yakutat Flats	9	5	0.18	165	0	498
Yakutat	101 - 200	Yakataga Shelf	7	6	0.15	80	0	185
Yakutat	201 - 300	Yakutat Gullies	6	3	0.14	42	0	108
Yakutat	101 - 200	Fairweather Shelf	9	4	0.10	78	0	192
Shumagin	201 - 300	Shumagin Slope	10	3	0.09	24	0	65
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	3	0.03	11	0	25
Yakutat	201 - 300	Yakutat Slope	11	2	0.01	3	0	7
Chirikof	201 - 300	Chirikof Slope	7	1	0.01	1	0	3

Southern rock sole (*Lepidopsetta bilineata*)

Southern rock sole was the ninth most abundant species caught in the 2003 survey (Table 2). The population was confined to water depths less than 200 m in survey area with the exception of one haul which was deeper, with 95% caught shallower than 100 m (Table 9). The highest concentrations were in bays around Kodiak Island and the Shumagin Islands, as well as in the shallow bays along the Alaska Peninsula (Table 10 and Fig. 8). Frequency of occurrence decreased northeast of Kodiak Island (Fig. 8). A relatively prominent length mode around 35 cm for males occurred in the shallowest depth zone of the Shumagin, Chirikof, and Kodiak INPFC areas and at 42-45 cm for females in the same areas (Fig. 9).

Table 9. -- Number of survey hauls, number of hauls with southern rock sole, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	143	12.83	52,989	41,810	64,167	0.606
	101 - 200	46	21	1.39	2,034	556	3,512	0.742
	201 - 300	10	1	0.34	94	0	302	0.331
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	165	8.71	55,116	43,843	66,389	0.61
Chirikof	1 - 100	75	64	13.51	35,172	14,388	55,955	0.755
	101 - 200	64	6	0.04	102	14	190	1.004
	201 - 300	25	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	70	5.43	35,274	14,490	56,057	0.755
Kodiak	1 - 100	106	80	7.13	27,463	20,081	34,846	0.588
	101 - 200	106	18	0.48	2,066	644	3,488	0.758
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	98	3.01	29,529	22,011	37,047	0.597
Yakutat	1 - 100	16	3	0.54	903	0	2,232	0.426
	101 - 200	37	2	0.12	346	0	865	0.366
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	5	0.23	1,249	0	2,648	0.407
Southeastern	1 - 100	13	8	6.58	4,308	196	8,419	0.7
	101 - 200	28	8	1.21	1,344	80	2,608	0.373
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	16	2.11	5,651	1,391	9,912	0.579
All areas	1 - 100	371	298	9.36	120,834	95,987	145,681	0.639
	101 - 200	281	55	0.48	5,892	3,529	8,254	0.583
	201 - 300	103	1	0.03	94	0	302	0.331
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	354	4.11	126,819	101,860	151,779	0.636

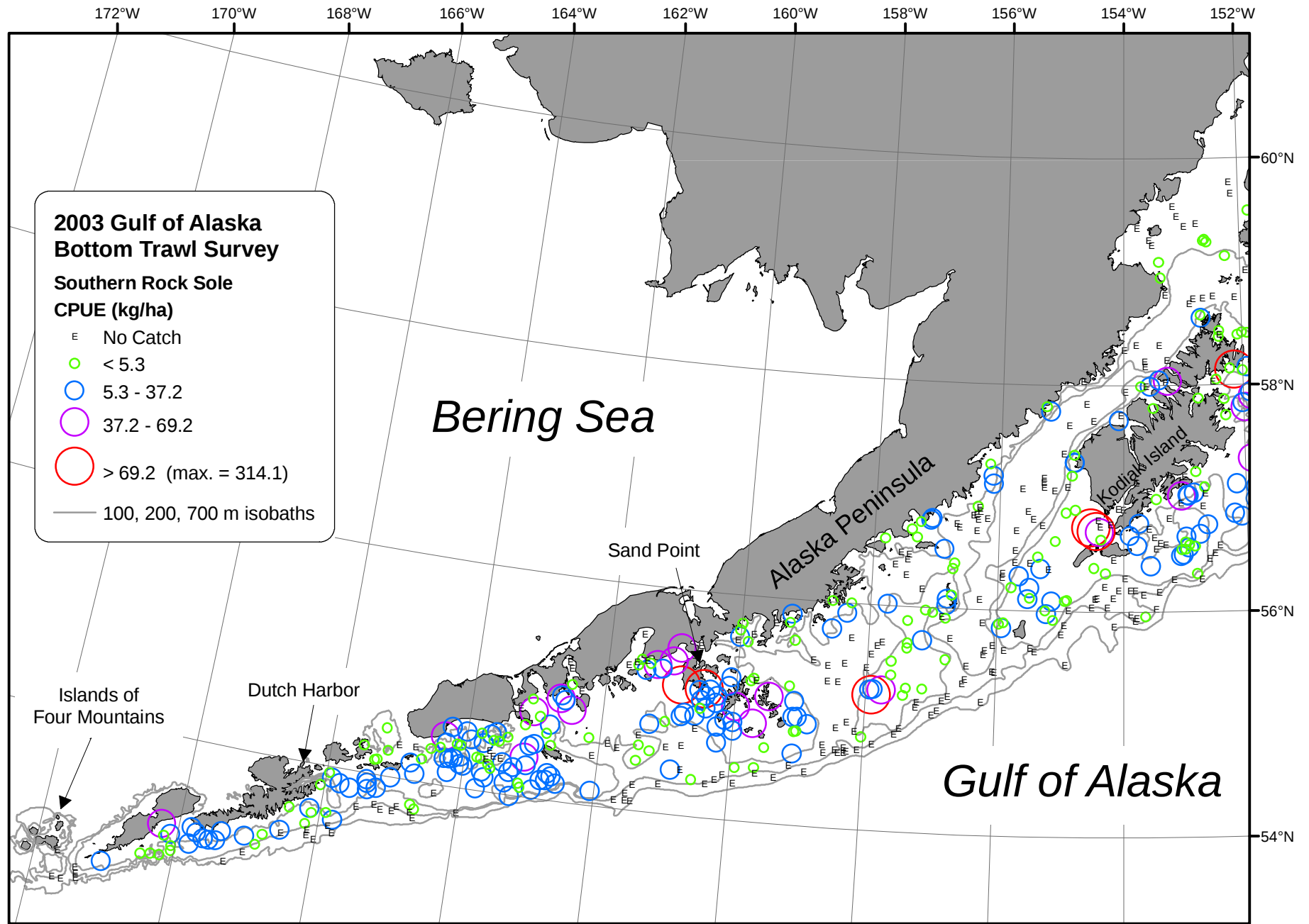


Figure 8.-- Distribution and relative abundance of southern rock sole from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

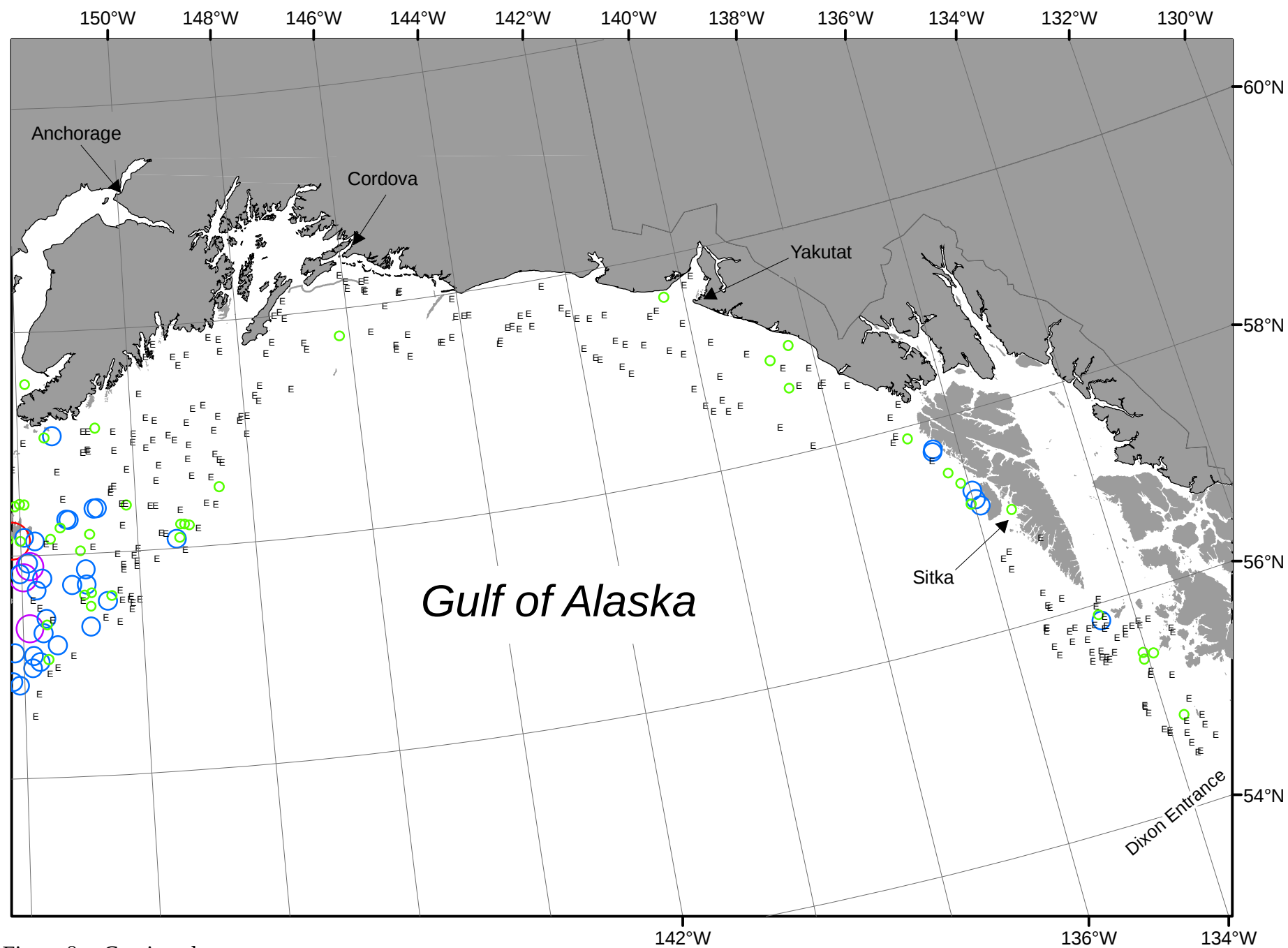


Figure 8.-- Continued.

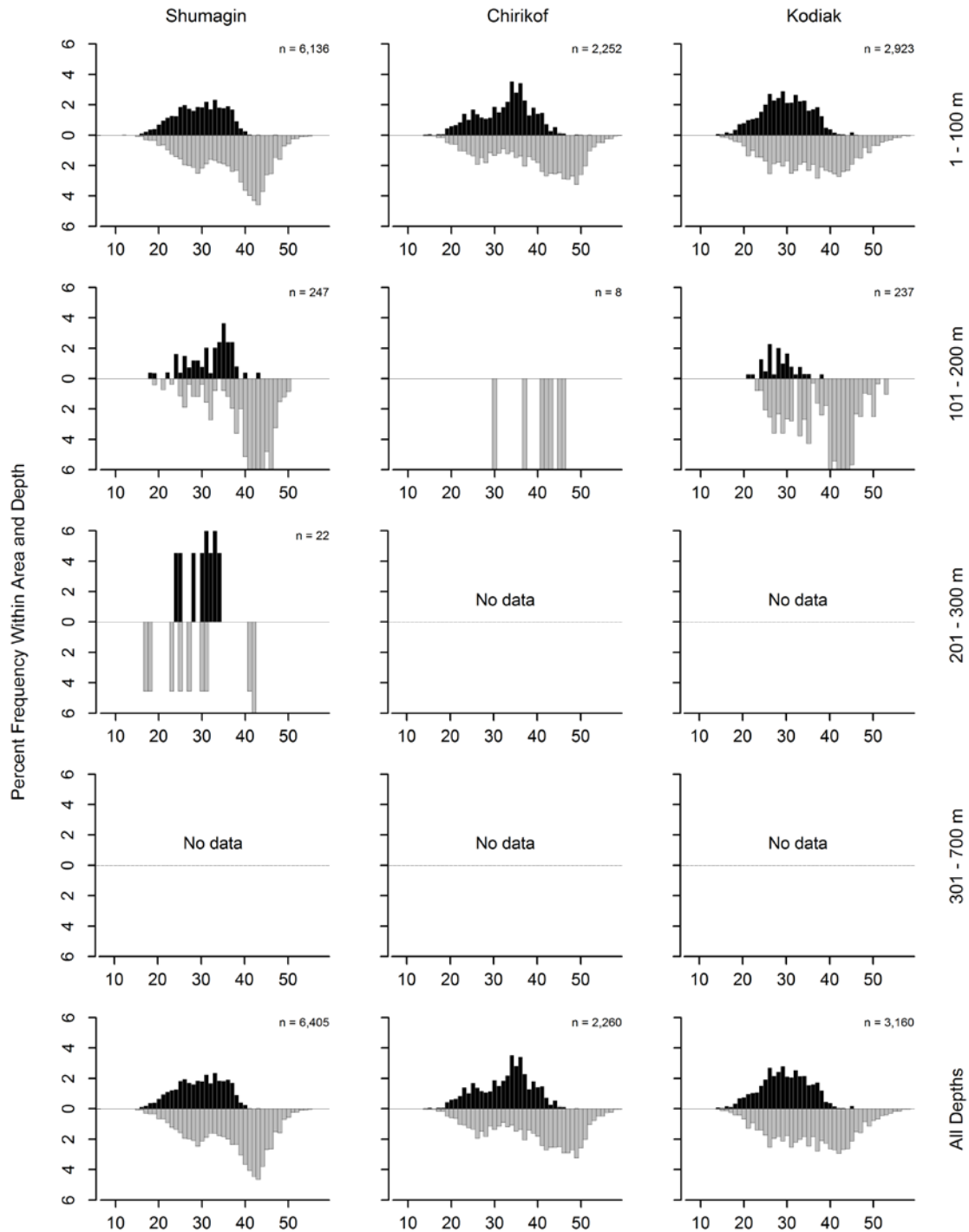


Figure 9. -- Size composition of southern rock sole from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

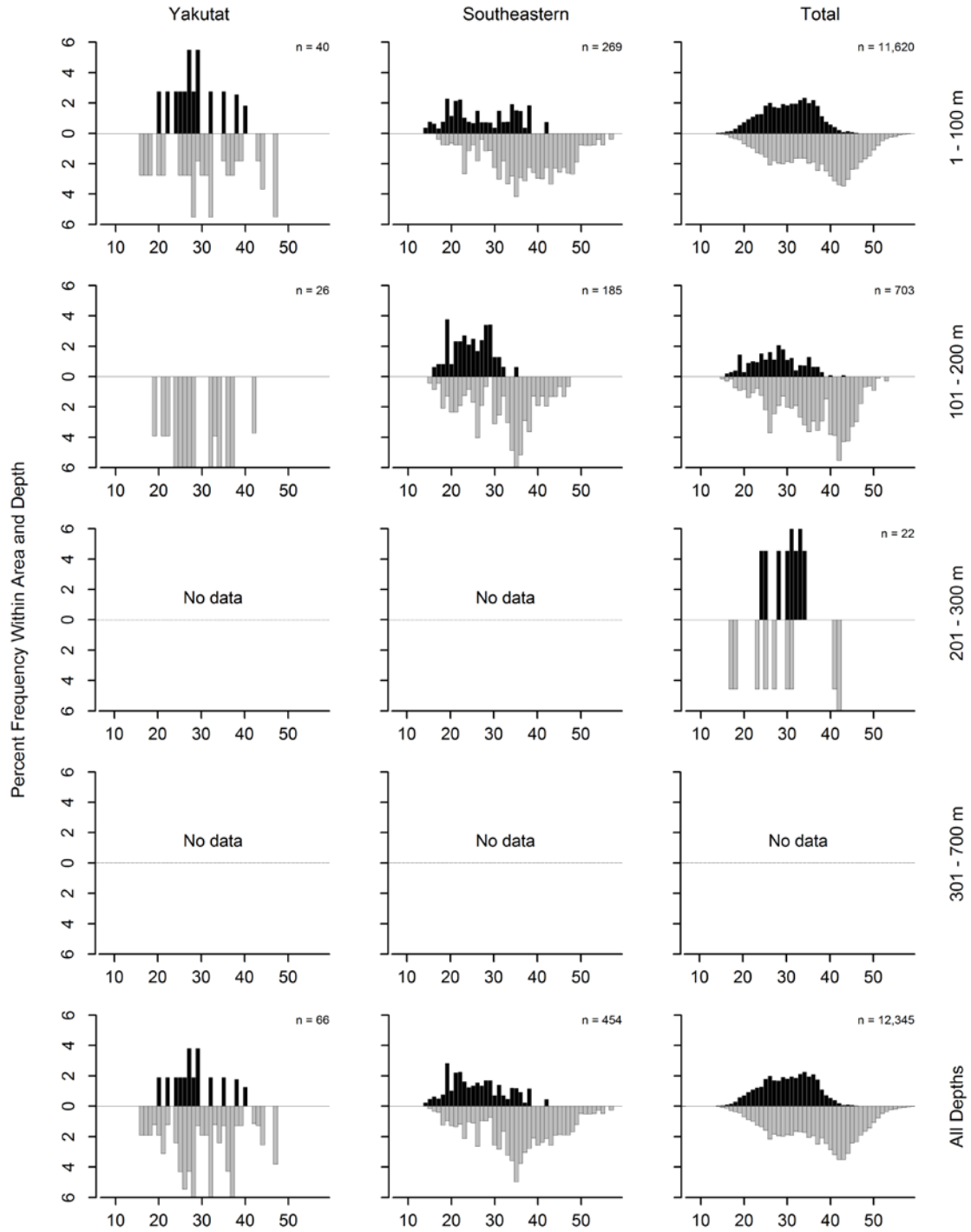


Figure 9. -- Continued (southern rock sole).

Table 10. -- Catch per unit of effort by stratum for southern rock sole sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Shumagin	1 - 100	Shumagin Bank	38	38	19.68	24,405	15,394	33,416
Kodiak	1 - 100	Northern Kodiak Shallows	9	7	16.28	3,581	458	6,703
Chirikof	1 - 100	Chirikof Bank	37	28	15.92	17,177	0	36,210
Chirikof	1 - 100	Semidi Bank	20	20	14.87	10,861	2,807	18,915
Shumagin	1 - 100	Lower Alaska Peninsula	33	22	12.49	8,585	3,622	13,548
Kodiak	1 - 100	Albatross Shallows	33	27	11.28	6,507	2,578	10,436
Shumagin	1 - 100	Fox Islands	28	28	10.95	9,121	5,629	12,612
Kodiak	1 - 100	Albatross Banks	41	37	10.41	16,031	10,591	21,471
Chirikof	1 - 100	Upper Alaska Peninsula	18	16	8.99	7,135	2,881	11,388
Shumagin	1 - 100	Davidson Bank	62	55	7.95	10,878	7,435	14,322
Southeastern	1 - 100	Southeastern Shallows	13	8	6.58	4,308	160	8,455
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	5	2.76	1,158	0	2,439
Shumagin	101 - 200	Shumagin Outer Shelf	33	18	2.41	1,967	491	3,442
Kodiak	1 - 100	Kenai Peninsula	8	3	1.60	843	0	2,526
Kodiak	101 - 200	Kodiak Outer Shelf	26	6	1.15	579	0	1,405
Kodiak	101 - 200	Albatross Gullies	25	6	0.83	656	0	1,431
Kodiak	101 - 200	Portlock Flats	23	5	0.70	514	0	1,148
Yakutat	1 - 100	Middleton Shallows	8	1	0.62	418	0	1,406
Kodiak	1 - 100	Lower Cook Inlet	15	6	0.51	502	0	1,015
Yakutat	1 - 100	Yakutat Shallows	8	2	0.49	485	0	1,553
Yakutat	101 - 200	Fairweather Shelf	9	2	0.45	346	0	876
Shumagin	201 - 300	Shumagin Slope	10	1	0.34	94	0	305
Kodiak	101 - 200	Barren Islands	14	1	0.29	317	0	1,000
Southeastern	101 - 200	Prince of Wales Shelf	20	3	0.27	186	0	539
Shumagin	101 - 200	West Shumagin Gully	5	2	0.20	47	0	152
Chirikof	101 - 200	Shelikof Edge	24	5	0.11	84	3	165
Shumagin	101 - 200	Sanak Gully	8	1	0.05	21	0	71
Chirikof	101 - 200	Chirikof Outer Shelf	21	1	0.04	18	0	54

Northern rock sole (*Lepidopsetta polyxystra*)

The northern rock sole population was almost exclusively confined to depths less than 100 m throughout the survey area, where approximately 98% of the total biomass was found (Tables 11-12 and Fig. 10). No northern rock sole were caught east of 150° W (Fig. 10). Approximately 52% of the total biomass was concentrated in the shallowest depth zone of the Shumagin INPFC area, which makes up less than 13% of the total survey area. Northern rock sole occurred in approximately 88% of the tows in this area and depth range. A very distinct length mode around 28 cm occurred for males and for females at 35 cm at depths less than 100 m in the Shumagin INPFC area (Fig. 11). No pronounced length modes occurred in the Chirikof and Kodiak areas for either males or females.

Table 11. --Number of survey hauls, number of hauls with northern rock sole, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	142	10.10	41,718	27,437	55,999	0.342
	101 - 200	46	21	0.94	1,375	523	2,227	0.493
	201 - 300	10	2	0.12	34	0	91	0.445
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	165	6.81	43,127	28,822	57,433	0.346
Chirikof	1 - 100	75	59	8.20	21,358	11,704	31,013	0.466
	101 - 200	64	1	---	6	0	18	0.471
	201 - 300	25	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	60	3.29	21,364	11,710	31,019	0.466
Kodiak	1 - 100	106	67	3.92	15,083	6,867	23,299	0.467
	101 - 200	106	4	0.02	73	0	173	0.438
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	71	1.55	15,157	6,940	23,373	0.467
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	0	---	---	---	---	---
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	0	---	---	---	---	---
All areas	1 - 100	371	268	6.06	78,160	59,341	96,978	0.391
	101 - 200	281	26	0.12	1,454	596	2,312	0.49
	201 - 300	103	2	0.01	34	0	91	0.445
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	296	2.58	79,648	60,811	98,485	0.392

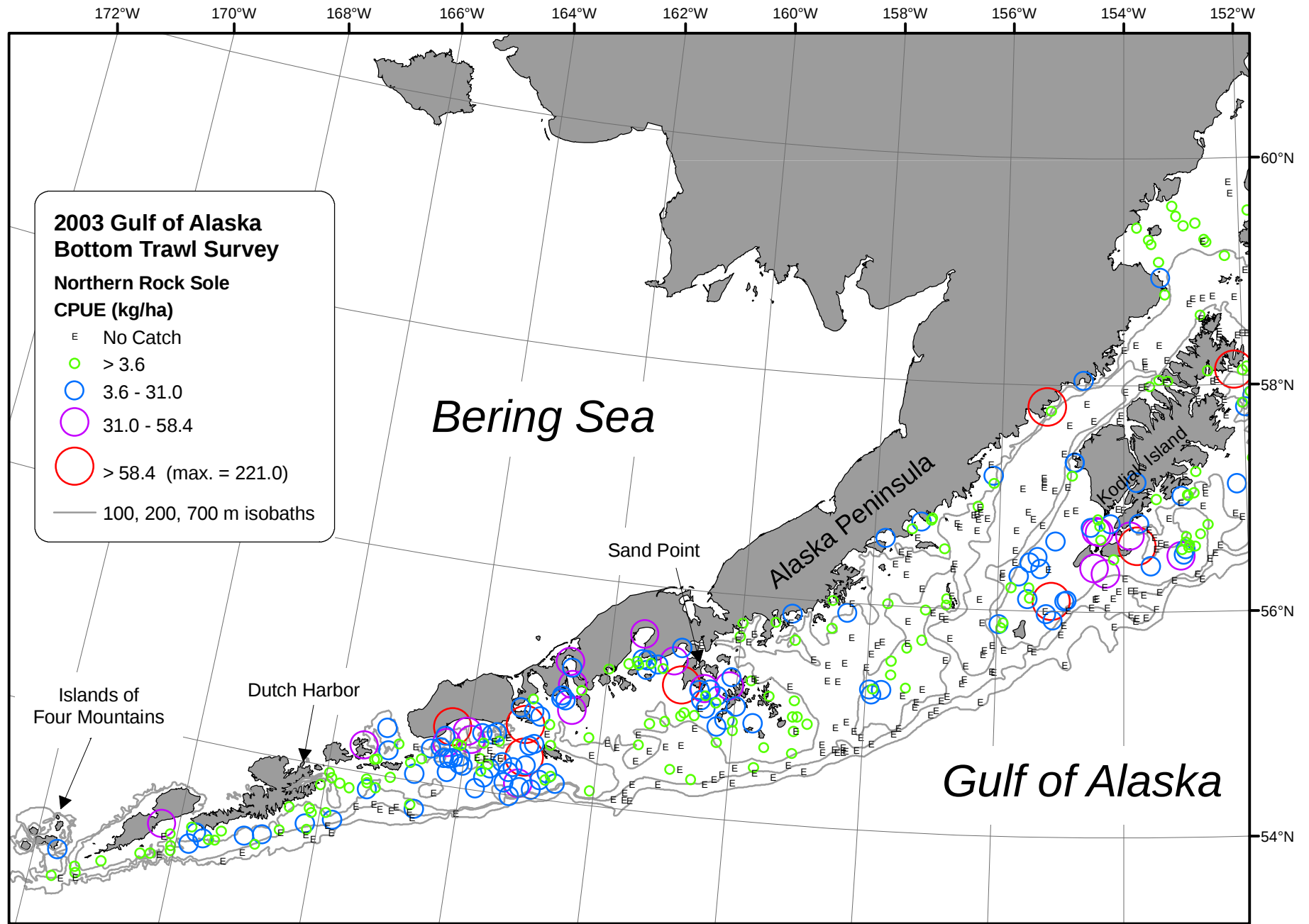


Figure 10.-- Distribution and relative abundance of northern rock sole from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

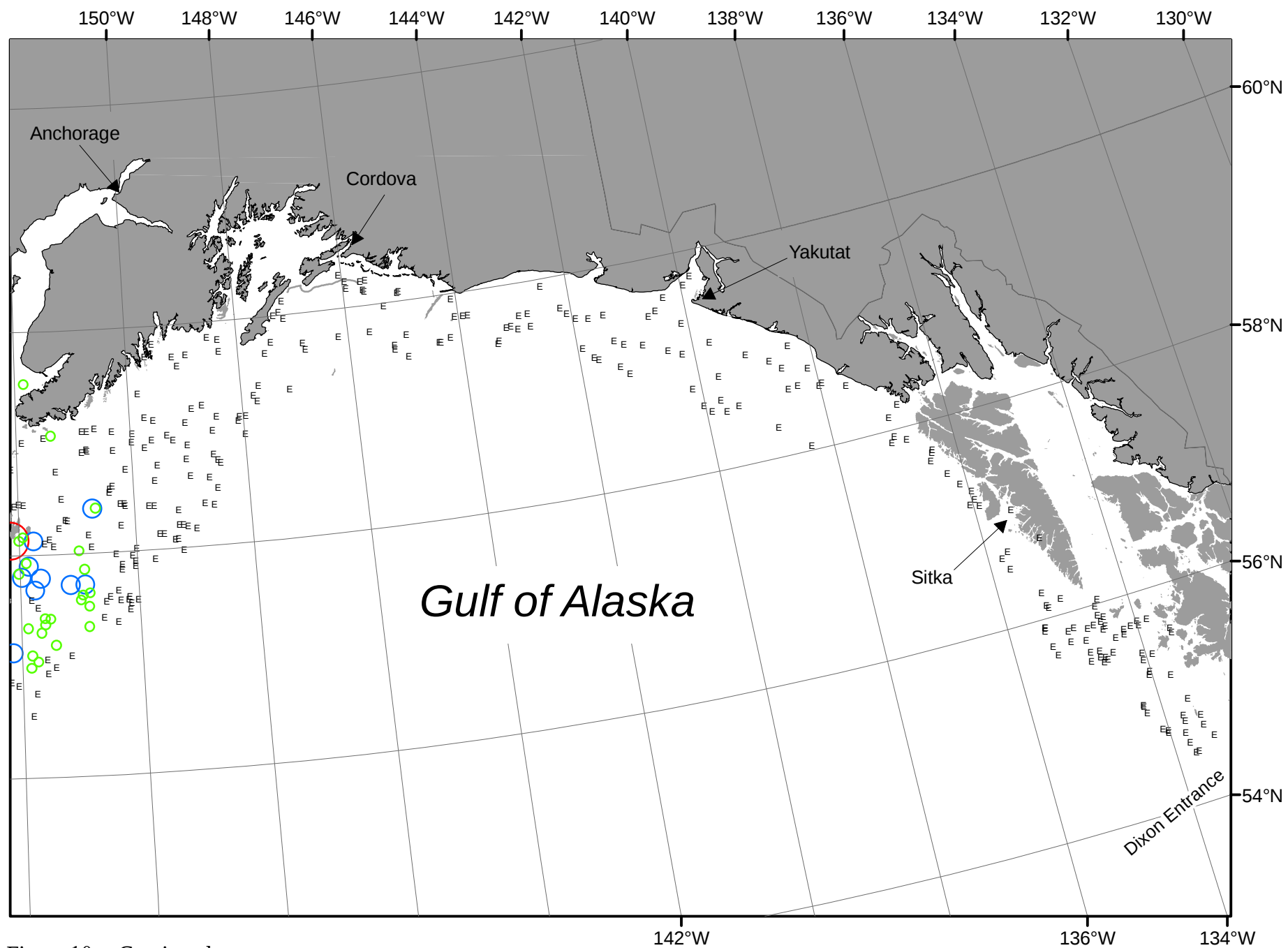


Figure 10.-- Continued.

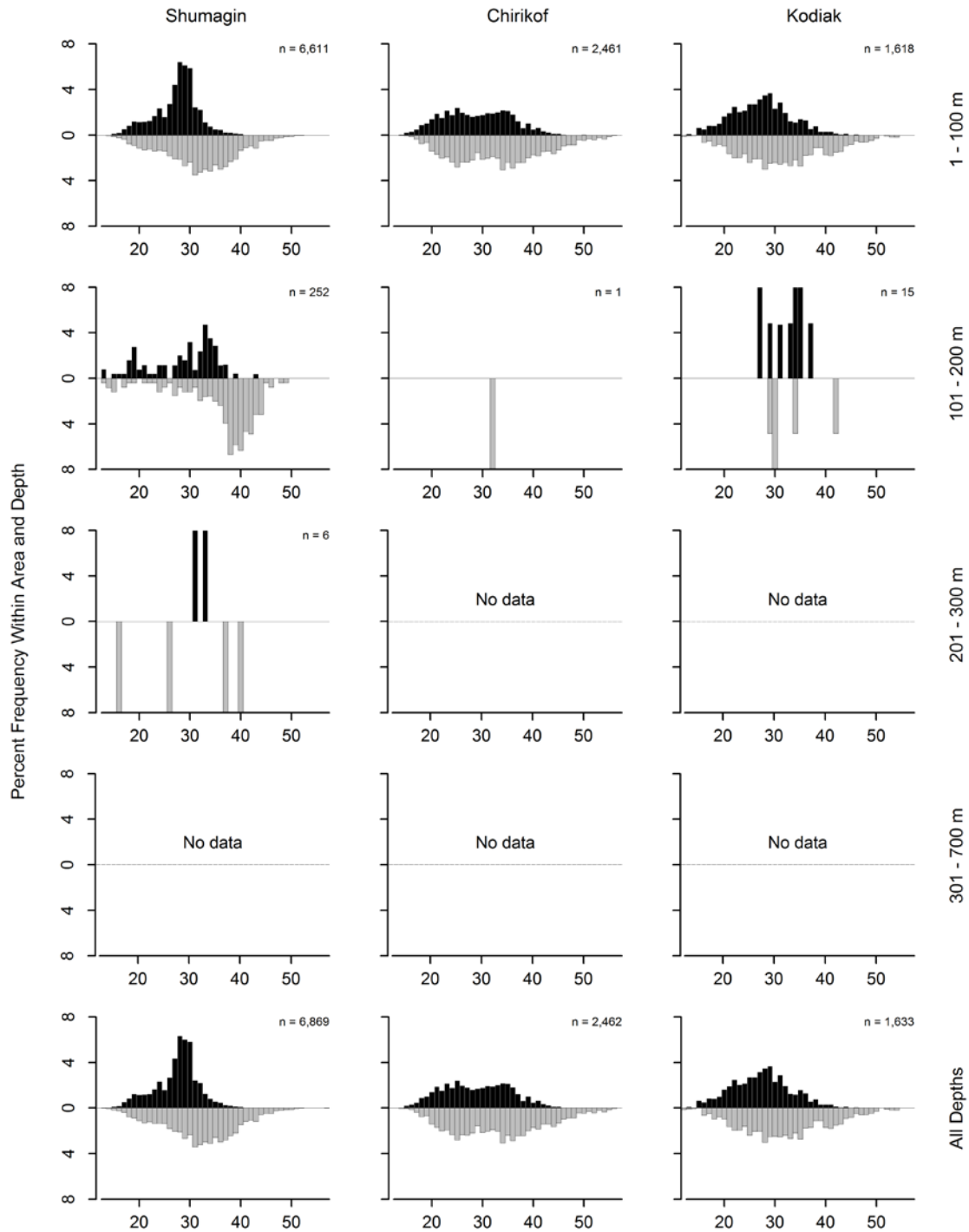


Figure 11. -- Size composition of northern rock sole from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

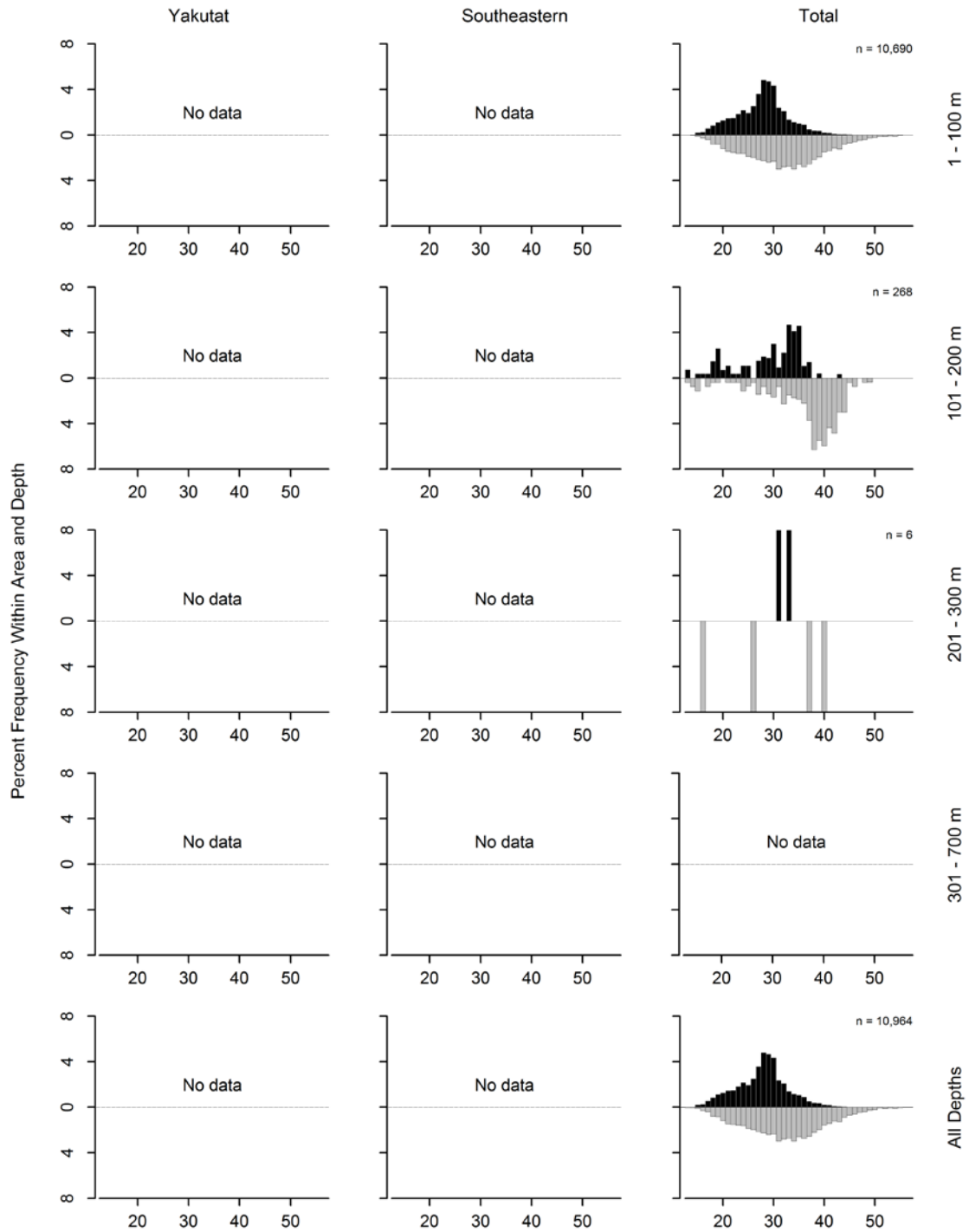


Figure 11. -- Continued (northern rock sole).

Table 12. -- Catch per unit of effort by stratum for northern rock sole sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Shumagin	1 - 100	Davidson Bank	62	52	13.40	18,334	7,787	28,881
Chirikof	1 - 100	Chirikof Bank	37	31	12.74	13,751	7,201	20,301
Shumagin	1 - 100	Lower Alaska Peninsula	33	30	11.36	7,813	3,776	11,850
Shumagin	1 - 100	Shumagin Bank	38	33	9.24	11,462	3,042	19,882
Chirikof	1 - 100	Upper Alaska Peninsula	18	15	8.25	6,549	0	13,972
Kodiak	1 - 100	Albatross Shallows	33	16	7.64	4,405	0	10,093
Kodiak	1 - 100	Albatross Banks	41	35	6.22	9,587	3,704	15,469
Shumagin	1 - 100	Fox Islands	28	27	4.93	4,109	1,020	7,199
Shumagin	101 - 200	Shumagin Outer Shelf	33	20	1.68	1,374	521	2,226
Chirikof	1 - 100	Semidi Bank	20	13	1.45	1,058	231	1,886
Kodiak	1 - 100	Lower Cook Inlet	15	12	1.01	999	0	2,159
Kodiak	1 - 100	Northern Kodiak Shallows	9	3	0.39	85	0	208
Shumagin	201 - 300	Shumagin Slope	10	2	0.12	34	0	92
Kodiak	101 - 200	Kodiak Outer Shelf	26	2	0.08	42	0	122
Kodiak	101 - 200	Barren Islands	14	1	0.03	28	0	89
Kodiak	1 - 100	Kenai Peninsula	8	1	0.02	8	0	27
Chirikof	101 - 200	Shelikof Edge	24	1	0.01	6	0	18
Shumagin	101 - 200	Sanak Gully	8	1	<0.01	2	0	5
Kodiak	101 - 200	Albatross Gullies	25	1	<0.01	3	0	10

Rex sole (*Glyptocephalus zachirus*)

The rex sole was the 12 most abundant species over the entire survey area (Table 2). The population was widely distributed throughout the survey area, occurring in all depths and all areas of the survey (Table 13). The mean weight was greater in the western INPFC areas than in the east and in none of the areas did weight appear to be correlated with depth. Most (95% by biomass) was caught between 100 and 300 m (Tables 13-14, Fig. 12). The length frequency data showed a slight mode for both males and females around 30 to 35 cm in the 100-200 m depth range in all the INPFC areas (Fig. 13).

Table 13. -- Number of survey hauls, number of hauls with rex sole, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	61	0.94	3,898	2,073	5,723	0.374
	101 - 200	46	39	4.32	6,345	3,917	8,773	0.343
	201 - 300	10	10	8.42	2,348	575	4,122	0.322
	301 - 500	9	8	2.62	664	0	1,407	0.395
	501 - 700	4	1	0.05	9	0	36	0.5
	All depths	230	119	2.10	13,265	9,847	16,682	0.35
Chirikof	1 - 100	75	18	0.57	1,477	0	3,006	0.324
	101 - 200	64	61	8.55	20,400	12,683	28,118	0.339
	201 - 300	25	23	7.45	8,602	1,149	16,054	0.359
	301 - 500	5	4	3.11	498	0	1,448	0.341
	501 - 700	3	2	0.23	45	0	146	0.348
	All depths	172	108	4.77	31,022	20,496	41,548	0.344
Kodiak	1 - 100	106	36	1.23	4,744	1,949	7,539	0.258
	101 - 200	106	88	3.97	17,209	12,143	22,276	0.359
	201 - 300	25	25	3.90	4,476	1,778	7,175	0.244
	301 - 500	9	7	1.67	487	136	838	0.291
	501 - 700	2	1	0.20	35	0	186	0.346
	All depths	248	157	2.75	26,951	20,733	33,168	0.312
Yakutat	1 - 100	16	12	1.84	3,065	0	6,338	0.122
	101 - 200	37	30	1.88	5,539	2,708	8,370	0.16
	201 - 300	17	16	2.87	1,485	310	2,659	0.225
	301 - 500	6	4	0.64	167	0	528	0.161
	501 - 700	3	2	2.11	310	0	1,221	0.244
	All depths	79	64	1.91	10,566	6,207	14,925	0.154
Southeastern	1 - 100	13	10	6.64	4,346	0	8,817	0.174
	101 - 200	28	27	8.38	9,293	3,764	14,822	0.185
	201 - 300	26	26	4.32	2,183	1,185	3,180	0.195
	301 - 500	10	10	7.06	2,200	0	5,567	0.237
	501 - 700	3	2	0.69	71	0	281	0.285
	All depths	80	75	6.74	18,093	10,661	25,524	0.189
All areas	1 - 100	371	137	1.36	17,529	11,191	23,868	0.21
	101 - 200	281	245	4.81	58,787	47,770	69,804	0.278
	201 - 300	103	100	5.30	19,094	10,958	27,229	0.283
	301 - 500	39	33	3.14	4,017	560	7,473	0.266
	501 - 700	15	8	0.57	470	0	1,418	0.266
	All depths	809	523	3.24	99,897	84,778	115,015	0.263

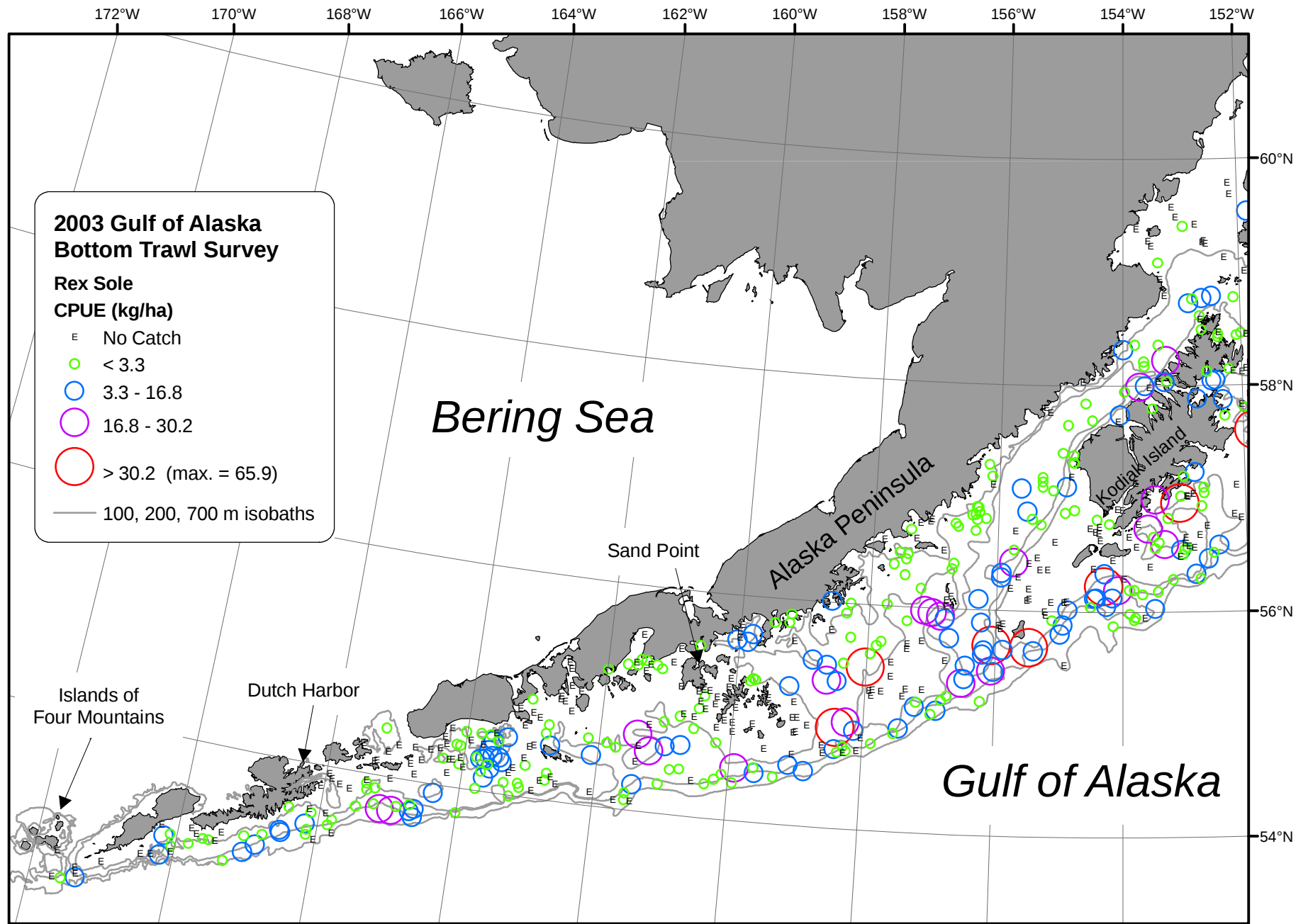


Figure 12.-- Distribution and relative abundance of rex sole from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

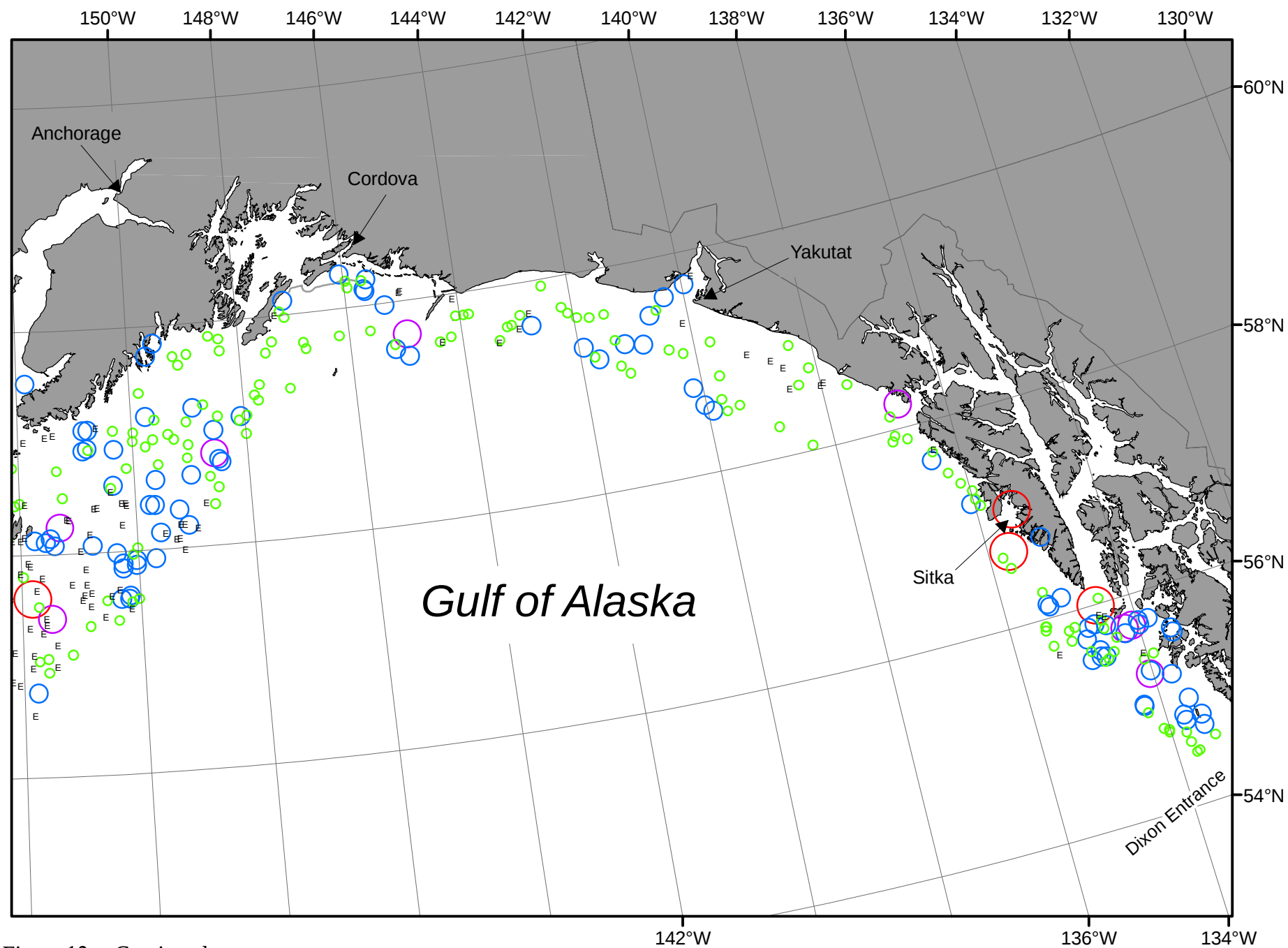


Figure 12.-- Continued.

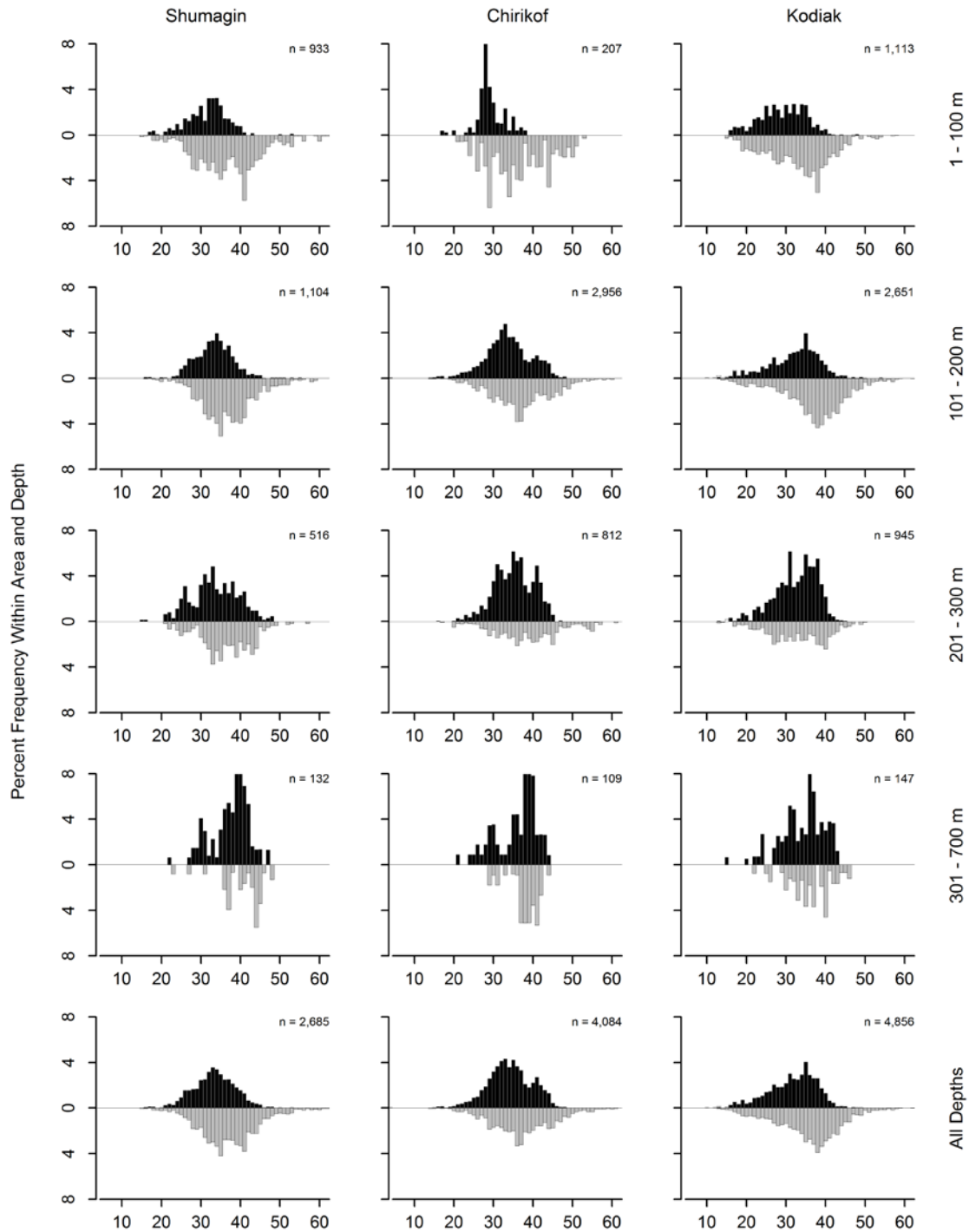


Figure 13. -- Size composition of rex sole from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

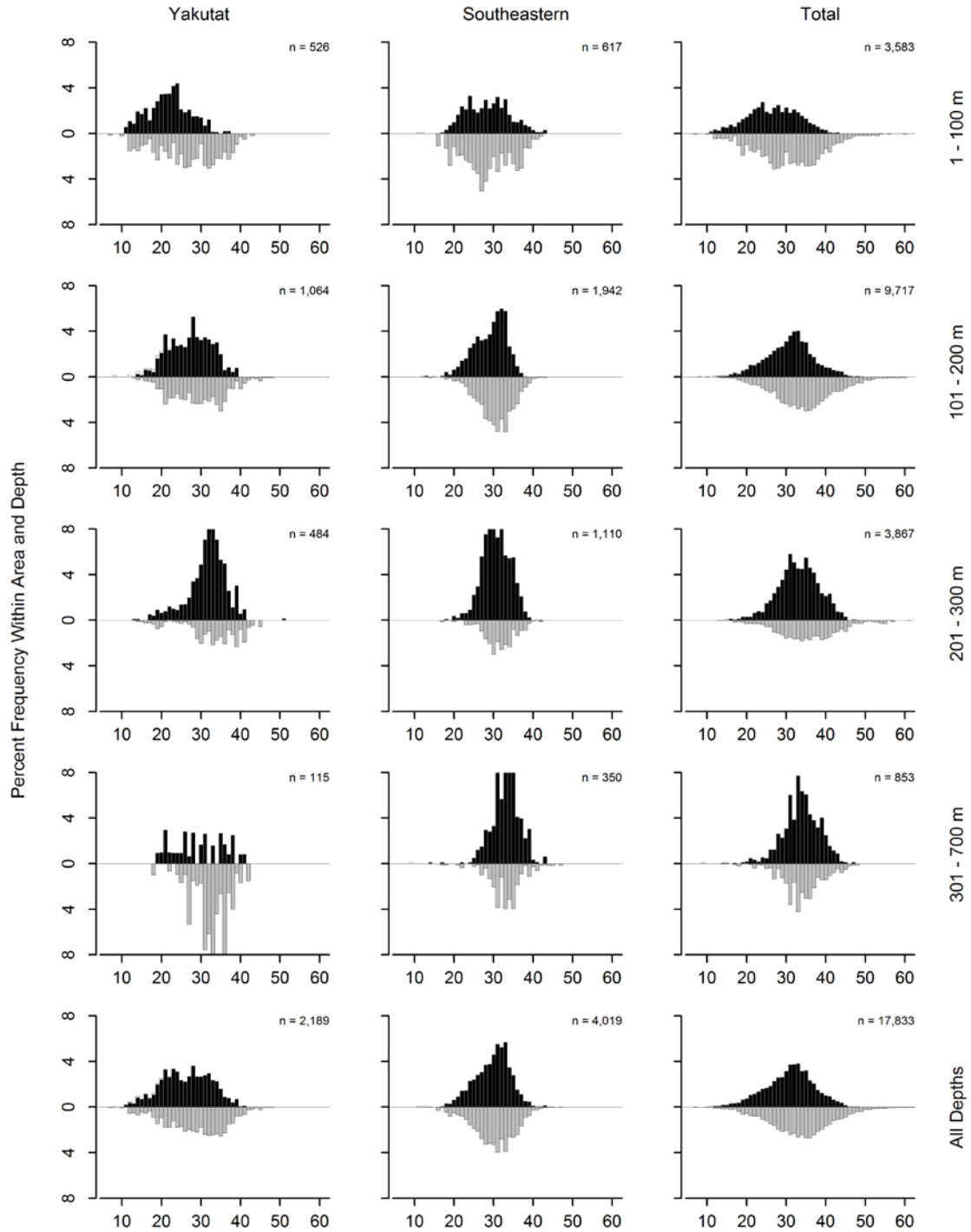


Figure 13. -- Continued (rex sole).

Table 14. -- Catch per unit of effort by stratum for Rex sole sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Chirikof	101 - 200	Chirikof Outer Shelf	21	18	11.99	6,007	3,027	8,986
Kodiak	101 - 200	Albatross Gullies	25	22	9.38	7,423	3,897	10,948
Southeastern	301 - 500	Southeastern Deep Gullies	8	8	8.79	2,060	0	5,512
Chirikof	101 - 200	East Shumagin Gully	19	19	8.73	9,695	2,855	16,535
Southeastern	101 - 200	Prince of Wales Shelf	20	19	8.53	5,873	3,338	8,408
Shumagin	201 - 300	Shumagin Slope	10	10	8.42	2,348	548	4,149
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	8	8.15	3,420	0	8,753
Chirikof	201 - 300	Lower Shelikof Gully	18	17	7.99	8,004	545	15,464
Southeastern	1 - 100	Southeastern Shallows	13	10	6.64	4,346	0	8,857
Shumagin	101 - 200	Sanak Gully	8	8	6.14	2,608	498	4,718
Chirikof	101 - 200	Shelikof Edge	24	24	6.07	4,698	2,426	6,971
Shumagin	101 - 200	West Shumagin Gully	5	5	5.59	1,273	263	2,284
Yakutat	101 - 200	Middleton Shelf	12	12	5.49	4,030	1,256	6,805
Kodiak	201 - 300	Kodiak Slope	6	6	5.22	847	53	1,642
Kodiak	201 - 300	Kenai Gullies	16	16	4.98	3,319	694	5,944
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	22	4.64	1,822	1,077	2,567
Kodiak	101 - 200	Portlock Flats	23	16	4.22	3,093	1,401	4,784
Chirikof	201 - 300	Chirikof Slope	7	6	3.91	597	0	1,298
Yakutat	201 - 300	Yakutat Gullies	6	5	3.23	984	0	2,139
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	3.21	361	0	1,387
Chirikof	301 - 500	Chirikof Slope	5	4	3.11	498	0	1,524
Kodiak	101 - 200	Barren Islands	14	12	3.03	3,323	111	6,535
Shumagin	101 - 200	Shumagin Outer Shelf	33	26	3.02	2,464	1,145	3,782
Shumagin	301 - 500	Shumagin Slope	9	8	2.62	664	0	1,422
Kodiak	1 - 100	Northern Kodiak Shallows	9	6	2.62	575	0	1,396
Kodiak	1 - 100	Kenai Peninsula	8	4	2.53	1,332	0	2,855
Kodiak	101 - 200	Kodiak Outer Shelf	26	20	2.43	1,223	398	2,048
Yakutat	201 - 300	Yakutat Slope	11	11	2.36	501	127	876
Kodiak	1 - 100	Albatross Shallows	33	18	2.21	1,276	401	2,151
Yakutat	501 - 700	Yakutat Slope	3	2	2.11	310	0	1,543
Yakutat	1 - 100	Yakutat Shallows	8	6	1.93	1,916	0	5,084
Southeastern	301 - 500	Southeastern Slope	2	2	1.81	140	0	457
Kodiak	101 - 200	Kenai Flats	18	18	1.78	2,148	1,202	3,094
Shumagin	1 - 100	Davidson Bank	62	33	1.74	2,374	1,395	3,352
Yakutat	1 - 100	Middleton Shallows	8	6	1.71	1,150	0	2,442
Kodiak	301 - 500	Kodiak Slope	9	7	1.67	487	129	845
Yakutat	301 - 500	Yakutat Gullies	2	2	1.24	138	0	1,166
Yakutat	101 - 200	Yakutat Flats	9	7	1.18	1,062	80	2,044
Kodiak	1 - 100	Lower Cook Inlet	15	3	1.03	1,015	0	3,104
Kodiak	201 - 300	Upper Shelikof Gully	3	3	0.97	310	0	678
Chirikof	1 - 100	Semidi Bank	20	4	0.96	701	0	2,110
Shumagin	1 - 100	Shumagin Bank	38	8	0.73	910	0	2,274
Southeastern	501 - 700	Southeastern Slope	3	2	0.69	71	0	355
Shumagin	1 - 100	Fox Islands	28	8	0.59	495	0	1,277
Chirikof	1 - 100	Upper Alaska Peninsula	18	6	0.58	456	0	968
Yakutat	101 - 200	Fairweather Shelf	9	4	0.39	301	0	783
Kodiak	1 - 100	Albatross Banks	41	5	0.35	546	0	1,425
Chirikof	1 - 100	Chirikof Bank	37	8	0.30	319	0	771
Yakutat	101 - 200	Yakataga Shelf	7	7	0.28	147	63	230
Chirikof	501 - 700	Chirikof Slope	3	2	0.23	45	0	182
Kodiak	501 - 700	Kodiak Slope	2	1	0.20	35	0	482
Yakutat	301 - 500	Yakutat Slope	4	2	0.20	30	0	98
Shumagin	1 - 100	Lower Alaska Peninsula	33	12	0.17	120	38	202
Shumagin	501 - 700	Shumagin Slope	4	1	0.05	9	0	39

Dover sole (*Microstomus pacificus*)

Dover sole were distributed throughout the survey area and depth range and were caught in relatively modest numbers in all but 1 of the 54 of the survey strata (Fig. 14 and Tables 15-16). Although large catches of Dover sole were rare, they were present in approximately 94% of the tows at depths greater than 200 m (Table 15). The highest mean CPUEs were recorded in the slope strata in the Kodiak and Chirikof INPFC areas although there were some strata in the Yakutat and Southeastern INPFC areas with relatively high CPUEs (Fig. 14 and Table 16). Although the smallest fish were generally in the shallowest depth zone, there was not a consistent trend of increasing fish size at deeper depths (Fig. 15 and Table 15). Males were considerably more abundant in all INPFC areas, especially at water depths between 301 and 500 m where they were predominant.

Table 15. -- Number of survey hauls, number of hauls with Dover sole, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	19	0.05	194	0	388	0.4
	101 - 200	46	12	0.37	541	0	1,213	0.694
	201 - 300	10	3	0.97	270	0	744	1.133
	301 - 500	9	7	3.21	811	205	1,418	0.98
	501 - 700	4	3	6.65	1,333	0	4,033	0.992
	All depths	230	44	0.50	3,149	664	5,633	0.857
Chirikof	1 - 100	75	14	0.22	580	176	984	0.352
	101 - 200	64	49	2.90	6,920	3,520	10,320	0.79
	201 - 300	25	16	2.87	3,309	1,031	5,587	0.921
	301 - 500	5	5	6.37	1,021	0	2,145	0.911
	501 - 700	3	3	20.74	4,052	0	9,328	0.763
	All depths	172	87	2.44	15,882	10,540	21,224	0.777
Kodiak	1 - 100	106	29	0.59	2,262	812	3,711	0.541
	101 - 200	106	72	3.71	16,084	10,957	21,212	0.853
	201 - 300	25	20	5.88	6,761	1,641	11,881	0.945
	301 - 500	9	9	12.39	3,607	583	6,632	0.817
	501 - 700	2	2	26.86	4,686	0	22,907	0.708
	All depths	248	132	3.41	33,401	21,551	45,250	0.81
Yakutat	1 - 100	16	8	2.05	3,409	0	8,384	0.215
	101 - 200	37	27	6.33	18,604	4,048	33,159	0.753
	201 - 300	17	16	10.10	5,221	1,232	9,209	0.895
	301 - 500	6	6	10.46	2,748	1,004	4,492	0.811
	501 - 700	3	3	11.08	1,628	0	3,636	0.725
	All depths	79	60	5.72	31,609	16,194	47,024	0.607
Southeastern	1 - 100	13	7	5.67	3,710	0	10,140	0.52
	101 - 200	28	21	2.74	3,032	0	6,645	0.469
	201 - 300	26	26	4.49	2,271	790	3,751	0.49
	301 - 500	10	10	17.34	5,405	2,865	7,945	0.69
	501 - 700	3	3	8.11	838	0	2,962	0.945
	All depths	80	67	5.69	15,256	7,470	23,042	0.566
All areas	1 - 100	371	77	0.79	10,154	2,232	18,076	0.346
	101 - 200	281	181	3.69	45,181	29,220	61,142	0.758
	201 - 300	103	81	4.95	17,832	11,341	24,322	0.831
	301 - 500	39	37	10.63	13,593	9,626	17,560	0.773
	501 - 700	15	14	15.28	12,537	0	27,620	0.764
	All depths	809	390	3.22	99,297	77,986	120,607	0.688

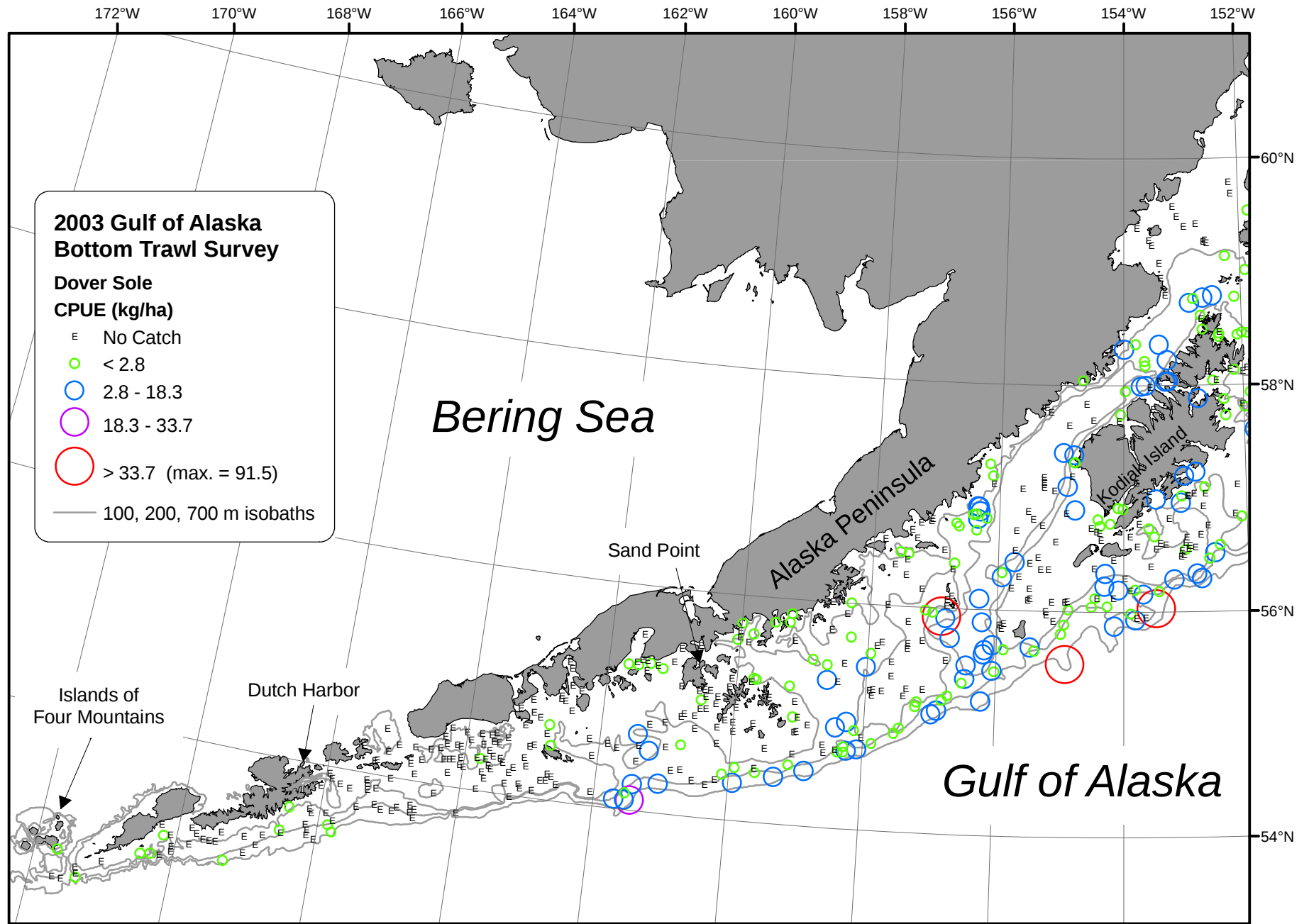


Figure 14.--Distribution and relative abundance of Dover sole from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

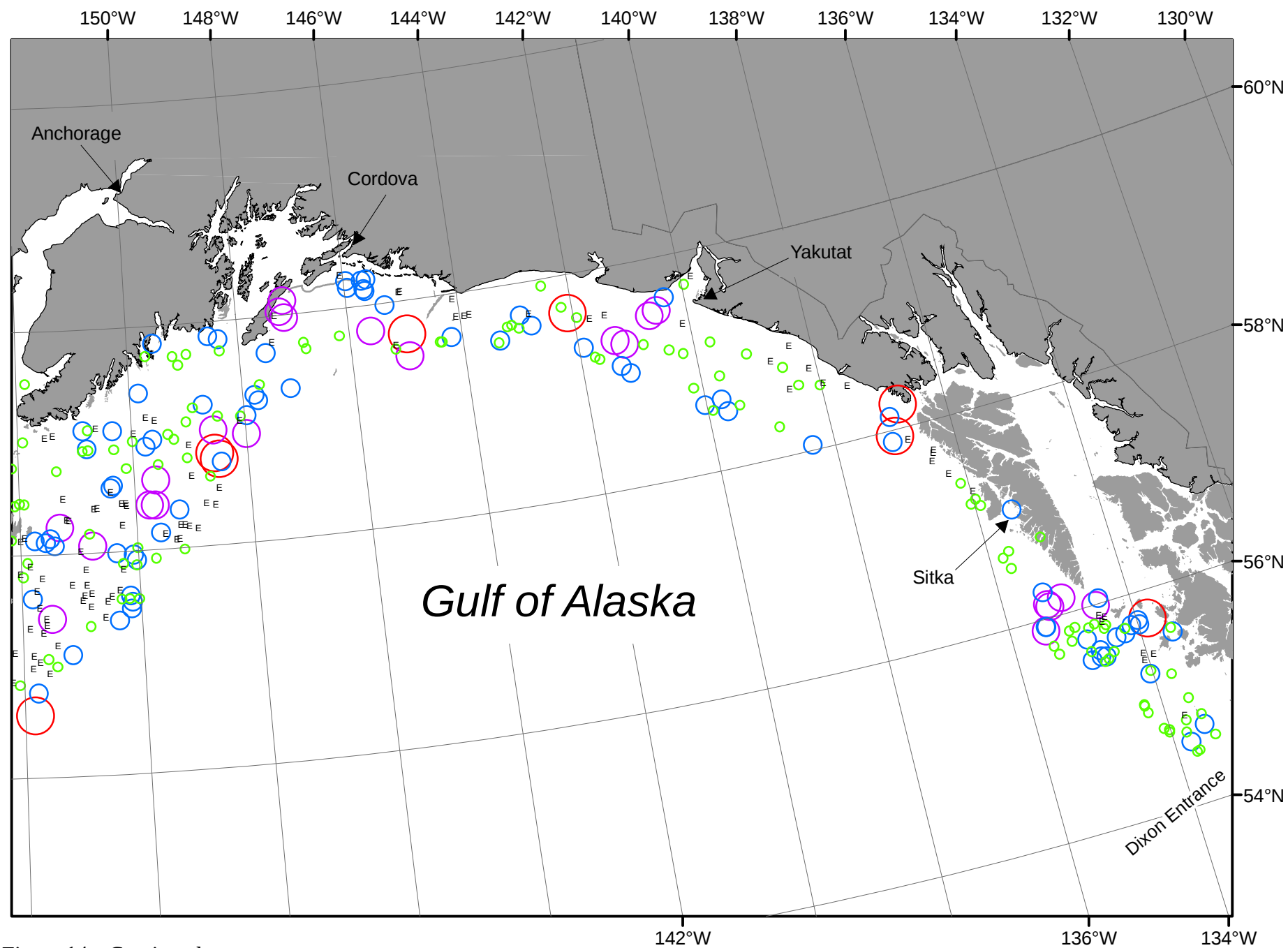


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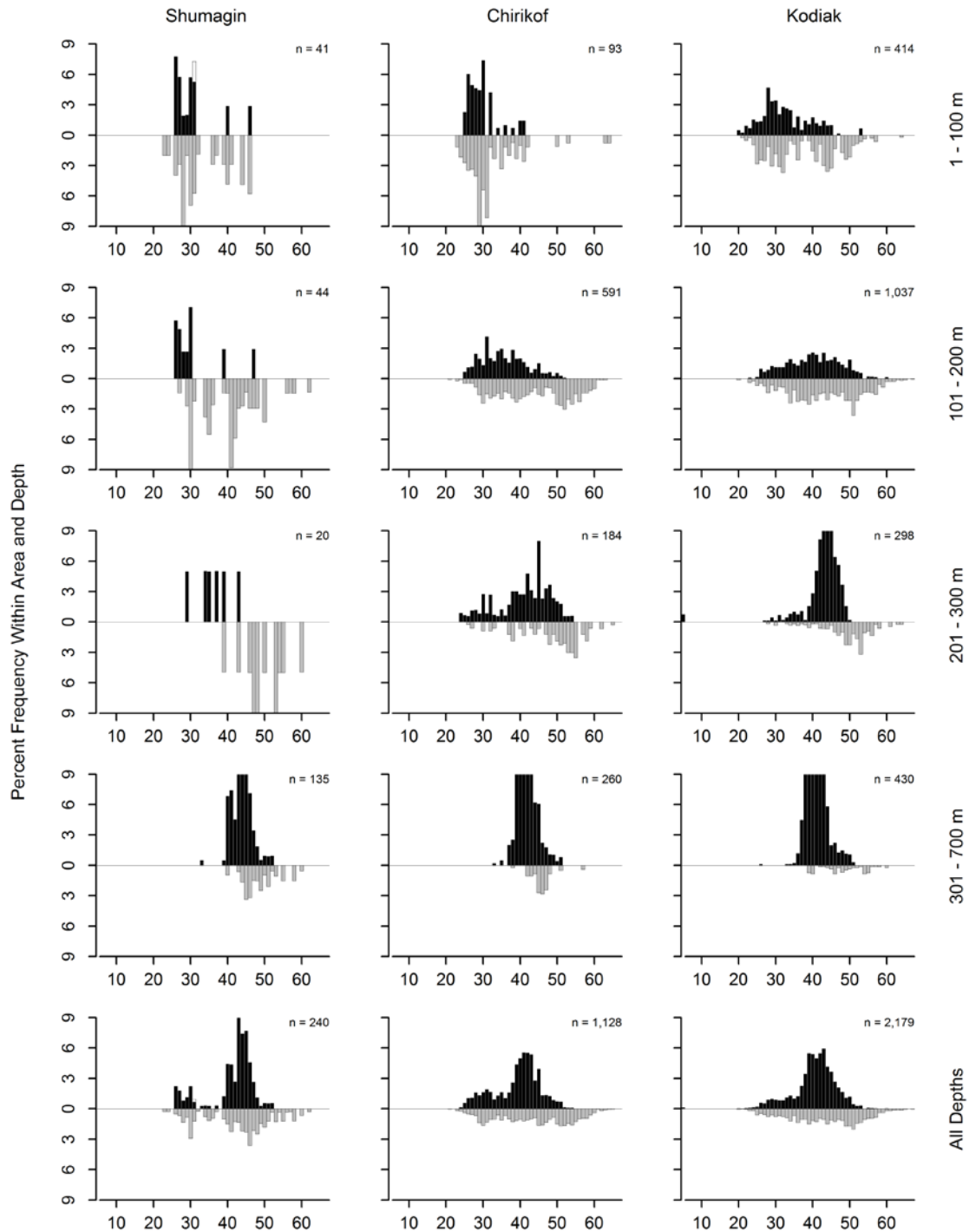


Figure 15. -- Size composition of Dover sole from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

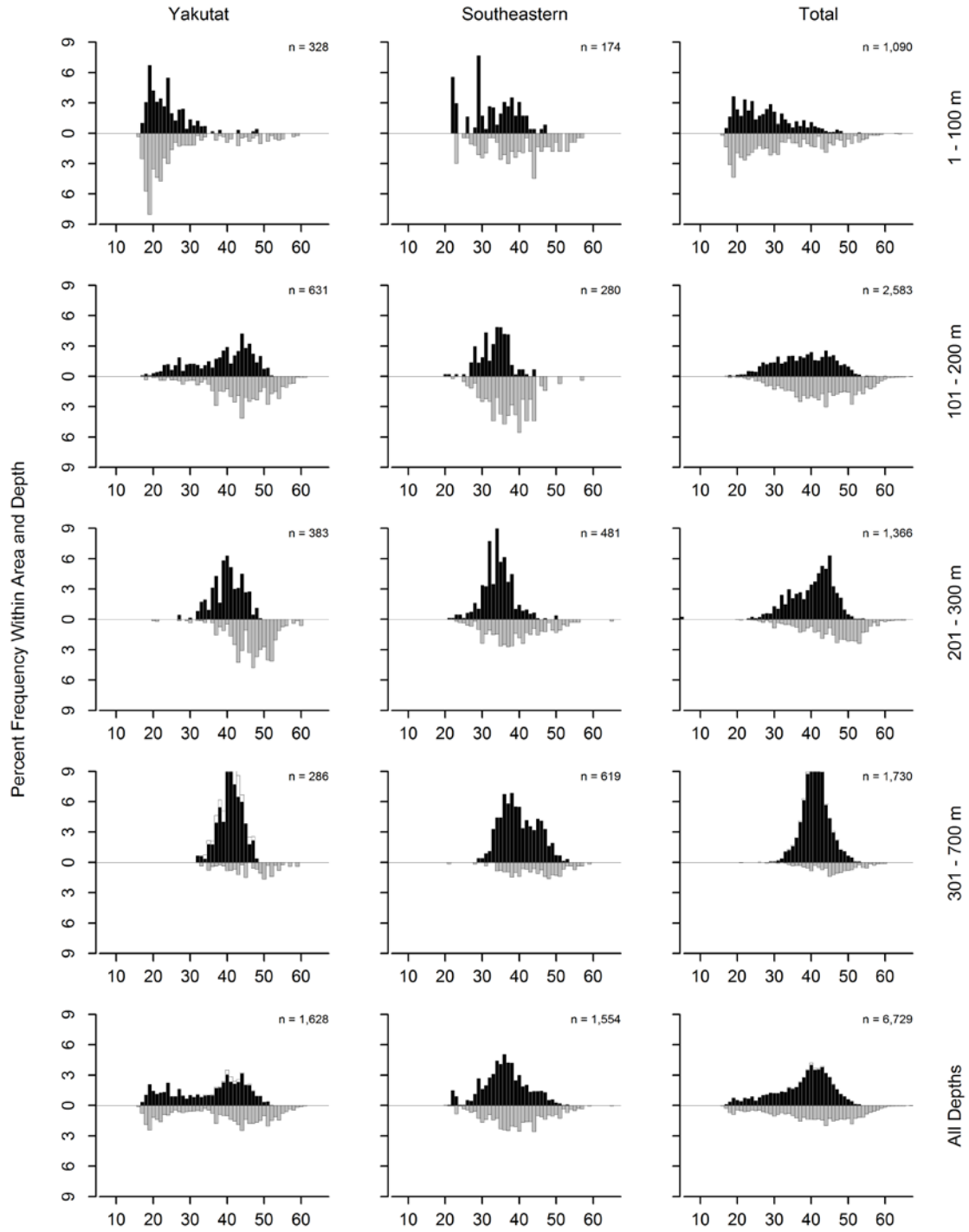


Figure 15. -- Continued (Dover sole).

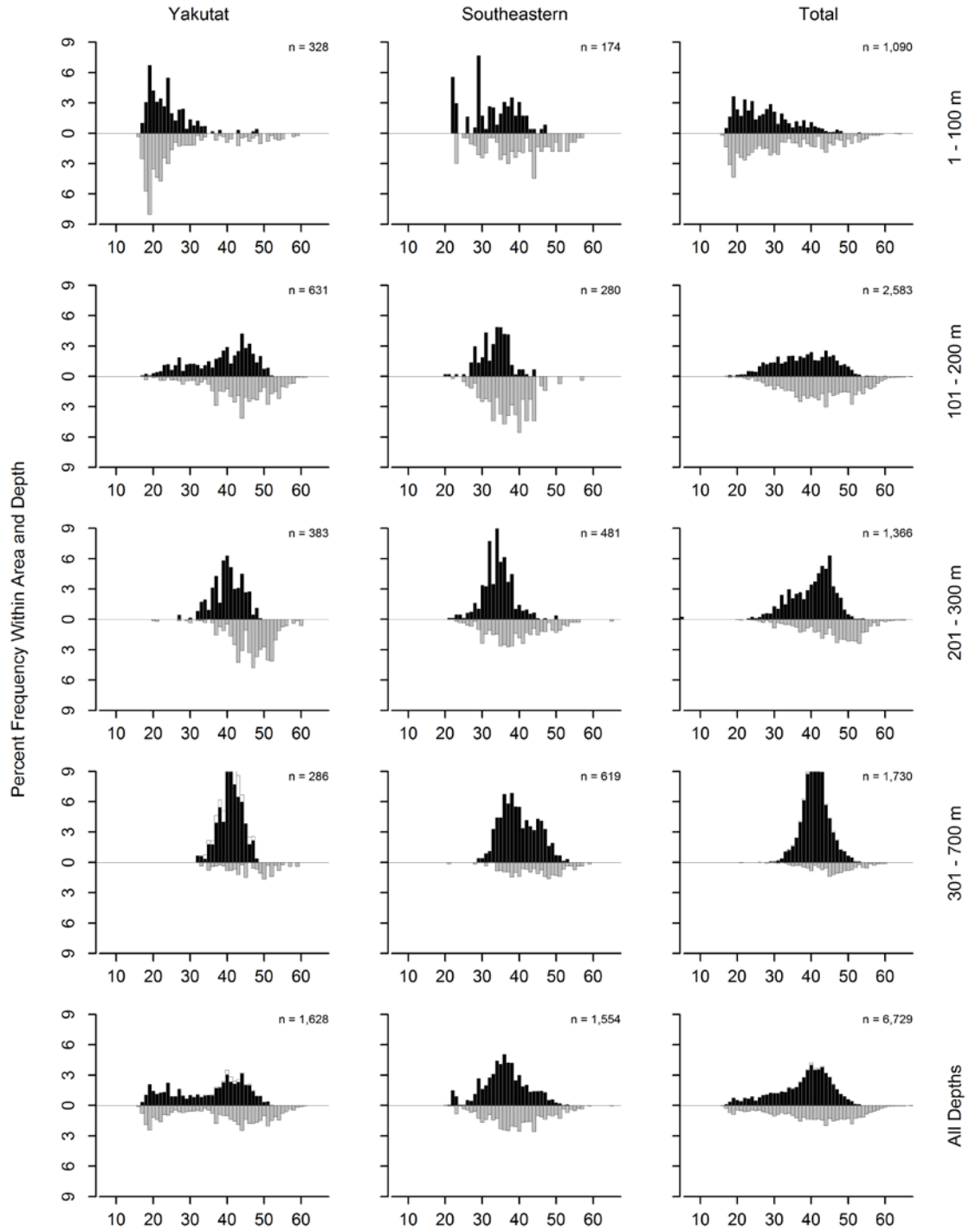


Figure 15. -- Continued (Dover sole).

Table 16. -- Catch per unit of effort by stratum for Dover sole sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Kodiak	501 - 700	Kodiak Slope	2	2	26.86	4,686	0	58,488
Chirikof	501 - 700	Chirikof Slope	3	3	20.74	4,052	0	11,187
Southeastern	301 - 500	Southeastern Deep Gullies	8	8	19.51	4,574	2,034	7,115
Yakutat	101 - 200	Middleton Shelf	12	11	18.23	13,391	1,540	25,242
Yakutat	301 - 500	Yakutat Gullies	2	2	18.04	1,997	0	8,307
Yakutat	201 - 300	Yakutat Gullies	6	5	13.71	4,170	127	8,214
Kodiak	301 - 500	Kodiak Slope	9	9	12.39	3,607	524	6,691
Yakutat	501 - 700	Yakutat Slope	3	3	11.08	1,628	0	4,344
Southeastern	301 - 500	Southeastern Slope	2	2	10.75	831	0	3,929
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	9.97	1,122	0	2,977
Kodiak	201 - 300	Kenai Gullies	16	14	9.04	6,022	886	11,159
Yakutat	101 - 200	Yakataga Shelf	7	3	8.45	4,457	0	15,187
Southeastern	501 - 700	Southeastern Slope	3	3	8.11	838	0	3,711
Shumagin	501 - 700	Shumagin Slope	4	3	6.65	1,333	0	4,428
Chirikof	301 - 500	Chirikof Slope	5	5	6.37	1,021	0	2,235
Southeastern	1 - 100	Southeastern Shallows	13	7	5.67	3,710	0	10,197
Chirikof	101 - 200	Shelikof Edge	24	23	5.54	4,287	1,277	7,297
Kodiak	101 - 200	Albatross Gullies	25	14	5.50	4,353	1,757	6,949
Kodiak	101 - 200	Portlock Flats	23	15	5.07	3,719	965	6,473
Yakutat	201 - 300	Yakutat Slope	11	11	4.94	1,051	96	2,005
Yakutat	301 - 500	Yakutat Slope	4	4	4.94	751	0	1,975
Kodiak	201 - 300	Kodiak Slope	6	6	4.55	739	350	1,127
Southeastern	101 - 200	Prince of Wales Shelf	20	17	4.02	2,772	0	6,383
Kodiak	101 - 200	Kenai Flats	18	16	3.36	4,055	1,540	6,569
Shumagin	301 - 500	Shumagin Slope	9	7	3.21	811	193	1,430
Kodiak	1 - 100	Northern Kodiak Shallows	9	5	3.00	660	0	1,541
Chirikof	201 - 300	Lower Shelikof Gully	18	9	2.99	2,995	727	5,263
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	22	2.93	1,149	673	1,624
Kodiak	101 - 200	Barren Islands	14	13	2.88	3,158	469	5,848
Yakutat	1 - 100	Yakutat Shallows	8	3	2.23	2,220	0	7,072
Chirikof	201 - 300	Chirikof Slope	7	7	2.06	314	0	663
Yakutat	1 - 100	Middleton Shallows	8	5	1.77	1,189	0	3,064
Chirikof	101 - 200	Chirikof Outer Shelf	21	15	1.73	868	333	1,403
Kodiak	1 - 100	Albatross Shallows	33	17	1.66	959	168	1,750
Chirikof	101 - 200	East Shumagin Gully	19	11	1.59	1,766	73	3,458
Kodiak	101 - 200	Kodiak Outer Shelf	26	14	1.59	799	81	1,518
Kodiak	1 - 100	Kenai Peninsula	8	3	1.10	577	0	1,551
Shumagin	201 - 300	Shumagin Slope	10	3	0.97	270	0	751
Shumagin	101 - 200	Sanak Gully	8	2	0.70	295	0	966
Yakutat	101 - 200	Yakutat Flats	9	8	0.67	602	0	1,453
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	4	0.62	260	0	741
Shumagin	101 - 200	West Shumagin Gully	5	4	0.39	88	0	188
Chirikof	1 - 100	Upper Alaska Peninsula	18	4	0.36	284	0	594
Chirikof	1 - 100	Chirikof Bank	37	9	0.22	238	0	489
Yakutat	101 - 200	Fairweather Shelf	9	5	0.20	154	0	354
Shumagin	101 - 200	Shumagin Outer Shelf	33	6	0.19	157	0	321
Shumagin	1 - 100	Shumagin Bank	38	4	0.10	118	0	309
Chirikof	1 - 100	Semidi Bank	20	1	0.08	58	0	178
Shumagin	1 - 100	Lower Alaska Peninsula	33	8	0.08	51	12	91
Kodiak	1 - 100	Lower Cook Inlet	15	1	0.04	36	0	112
Kodiak	1 - 100	Albatross Banks	41	3	0.02	30	0	75
Shumagin	1 - 100	Fox Islands	28	4	0.02	12	0	24
Shumagin	1 - 100	Davidson Bank	62	3	0.01	13	0	30

Yellowfin sole (*Limanda aspera*)

Yellowfin sole were locally abundant in bays along the Alaska Peninsula near the Shumagin Islands and in a few locations around Kodiak Island, but were not widely distributed in the survey area (Table 17, Fig. 16). All fish were caught in the 1 to 100 m depth strata. One stratum on the Alaska Peninsula accounted for 77% of the estimated biomass for this species (Table 18) despite accounting for only 2% of the survey area. The length frequency data showed a strong mode for males around 32 cm while females had a mode at 35 cm (Fig. 17).

Table 17. --Number of survey hauls, number of hauls with yellowfin sole, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	30	10.22	42,178	18,886	65,470	0.417
	101 - 200	46	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	30	6.66	42,178	18,886	65,470	0.417
Chirikof	1 - 100	75	11	2.36	6,142	22	12,261	0.262
	101 - 200	64	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	11	0.94	6,142	22	12,261	0.262
Kodiak	1 - 100	106	13	1.66	6,408	0	13,168	0.145
	101 - 200	106	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	13	0.65	6,408	0	13,168	0.145
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	0	---	---	---	---	---
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	0	---	---	---	---	---
All areas	1 - 100	371	54	4.24	54,727	30,029	79,425	0.324
	101 - 200	281	0	---	---	---	---	---
	201 - 300	103	0	---	---	---	---	---
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	54	1.77	54,727	30,029	79,425	0.324

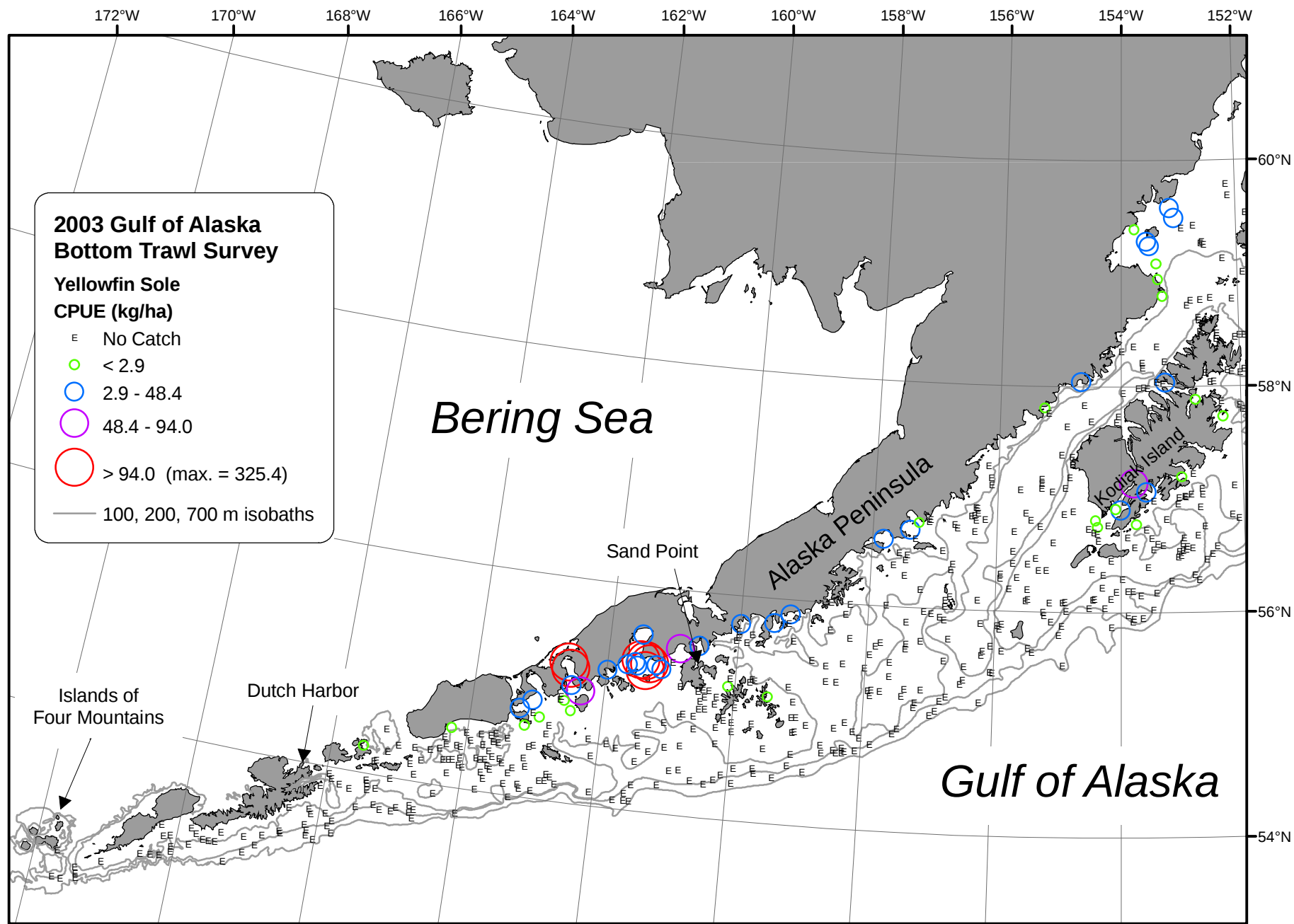


Figure 16.--Distribution and relative abundance of yellowfin sole from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

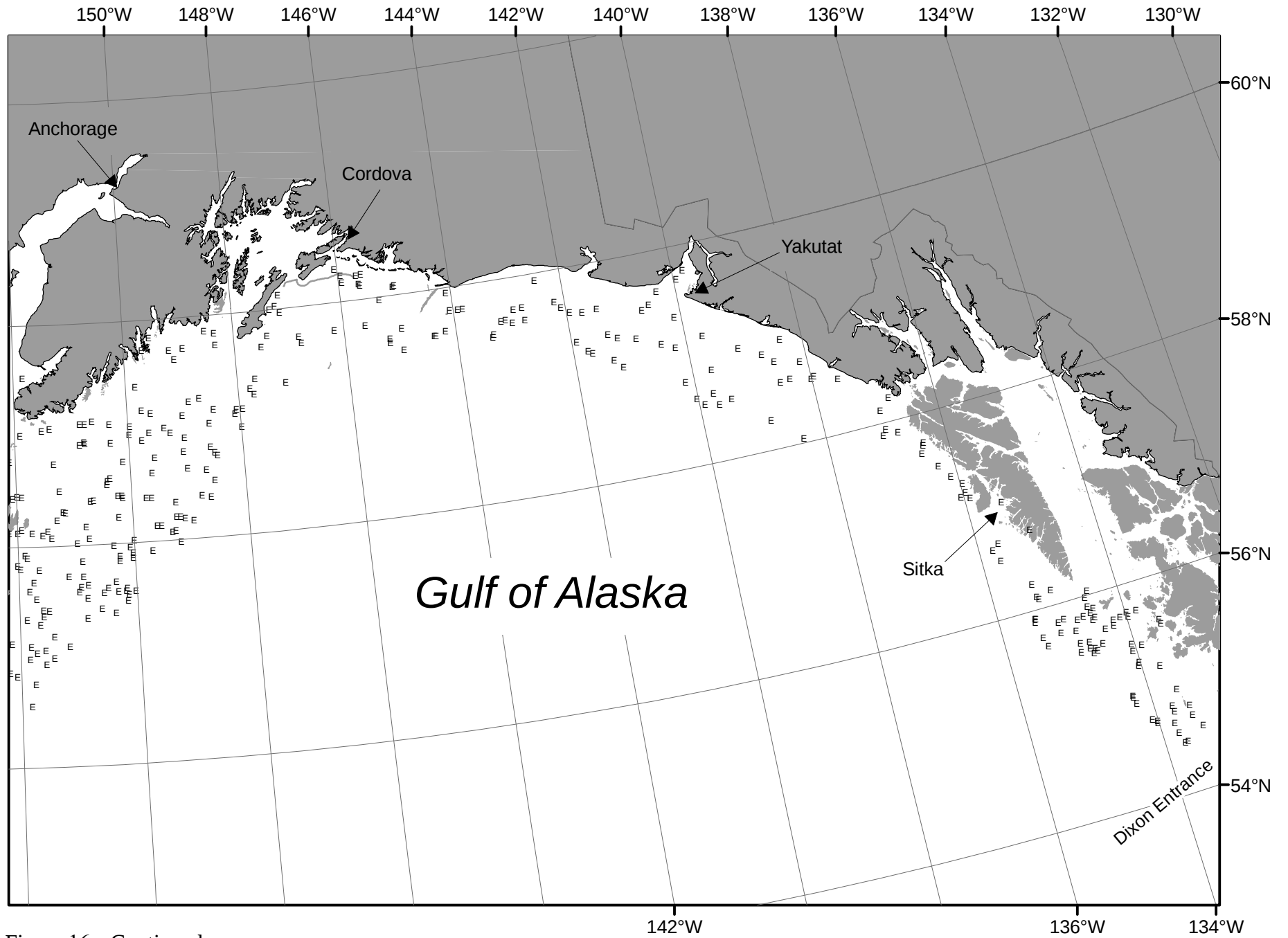


Figure 16.--Continued.

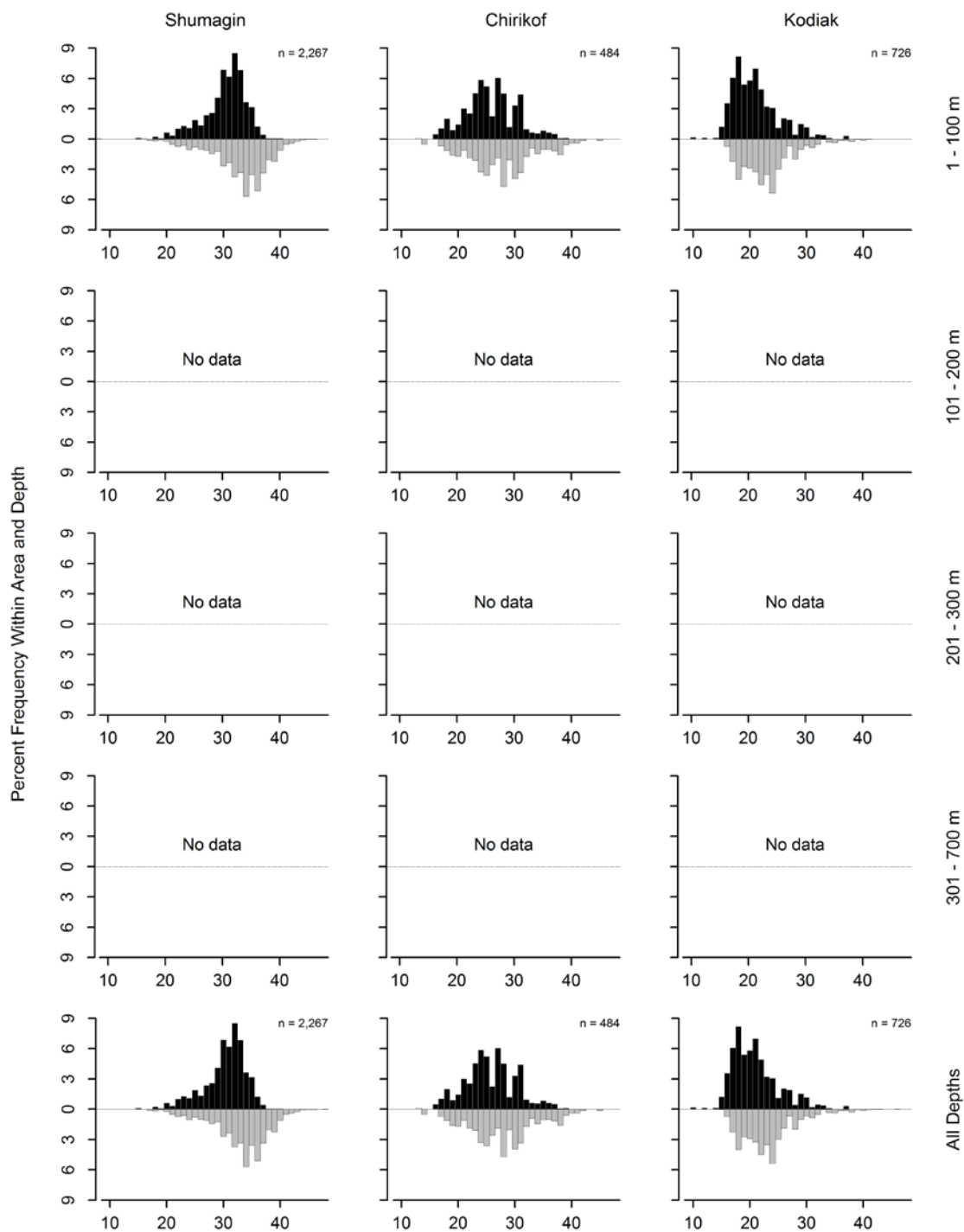


Figure 17. -- Size composition of yellowfin sole from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

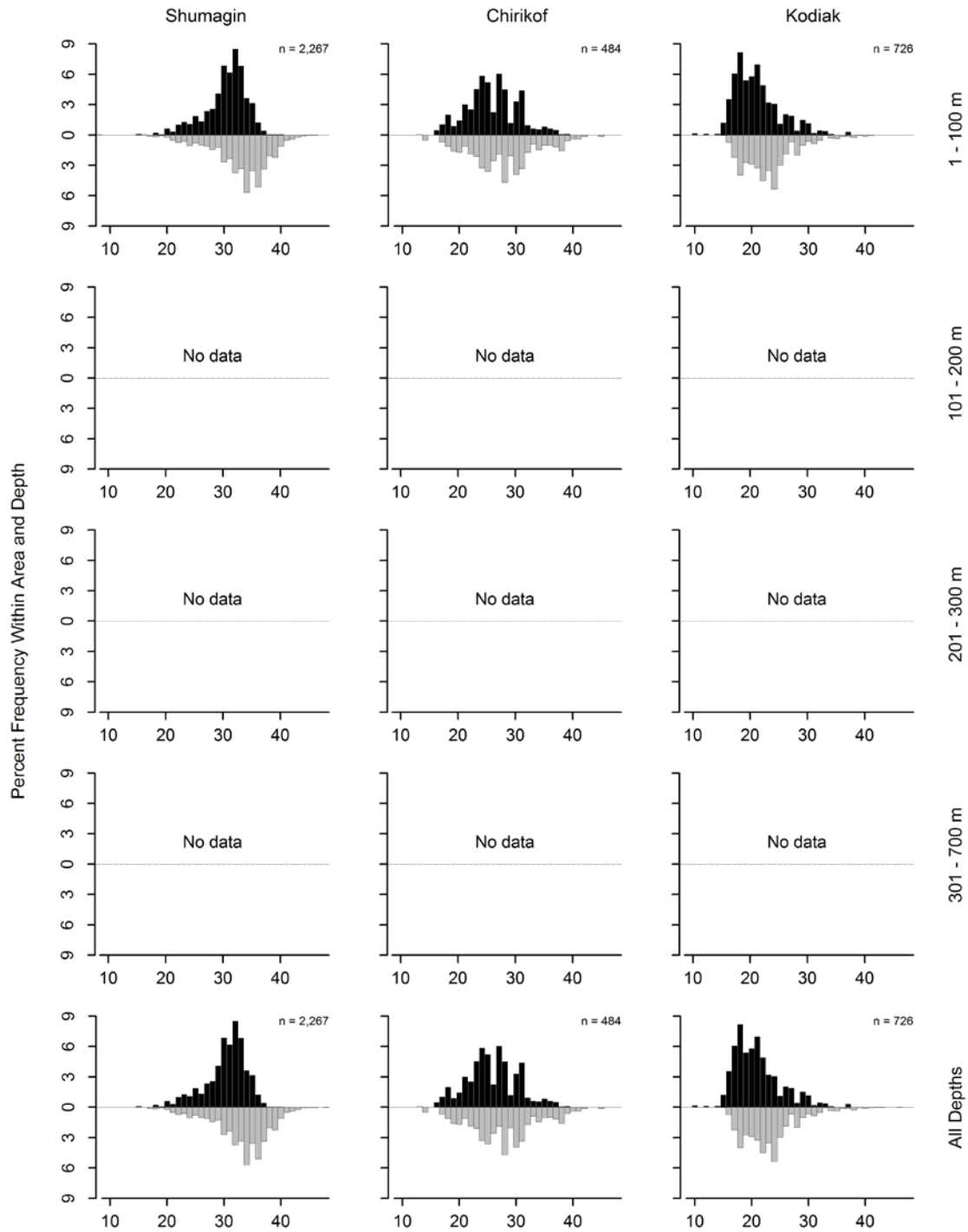


Figure 17. -- Size composition of yellowfin sole from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

Table 18. --Catch per unit of effort by stratum for yellowfin sole sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Shumagin	1 - 100	Lower Alaska Peninsula	33	25	61.07	41,988	18,697	65,280
Kodiak	1 - 100	Lower Cook Inlet	15	7	5.83	5,762	0	12,507
Chirikof	1 - 100	Upper Alaska Peninsula	18	6	3.66	2,904	0	6,537
Chirikof	1 - 100	Chirikof Bank	37	5	3.00	3,238	0	8,324
Kodiak	1 - 100	Northern Kodiak Shallows	9	2	1.35	297	0	958
Kodiak	1 - 100	Albatross Shallows	33	4	0.60	348	0	979
Shumagin	1 - 100	Fox Islands	28	1	0.08	69	0	209
Shumagin	1 - 100	Shumagin Bank	38	2	0.06	79	0	209
Shumagin	1 - 100	Davidson Bank	62	2	0.03	43	0	106

Other Flatfishes

Alaska plaice (*Pleuronectes quadrituberculatus*)

Approximately 82% of the estimated biomass of Alaska plaice in the survey area came from the shallowest depth zone of the Upper Alaska Peninsula, the Lower Alaska Peninsula, and the Northern Kodiak Shallows strata, which together make up only 5.3% of the total survey area (Tables 19-20, Appendix A-1). Only two hauls contained fish from water greater than 100 m deep.

Starry flounder (*Platichthys stellatus*)

Catches of starry flounder were almost exclusively confined to water depths less than 100 m in all INPFC areas (Table 21). The highest densities were recorded in Lower Cook Inlet which produced 49% of the total biomass estimate (Table 22).

English sole (*Parophrys vetulus*)

Approximately 86% of the estimated biomass of English sole in the survey area came from five strata (Northern Kodiak Shallows, Yakutat Shallows, Middleton Shallows, the Southeastern Shallows, and the Lower Cook Inlet). Together these strata make up only 11% of the survey area (Table 24). While virtually all fish were caught in water less than 200 m, there were three hauls in which fish were caught in the 200 - 300 m depth range (Table 23).

Butter sole (*Isopsetta isolepis*)

Catches of butter sole were recorded in all INPFC areas. Densities ranged from small to modest everywhere butter sole were caught, and virtually all of the population was confined to depths less than 100 m (Table 25). Approximately 69% of the estimated biomass of butter sole in the survey area came from two strata: Lower Cook Inlet and Chirikof Bank (Table 26).

Table 19. -- Number of survey hauls, number of hauls with Alaska plaice, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	22	0.70	2,882	1,283	4,480	1.251
	101 - 200	46	1	0.03	44	0	157	2.19
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	23	0.46	2,926	1,325	4,527	1.259
Chirikof	1 - 100	75	15	0.55	1,428	462	2,394	0.775
	101 - 200	64	1	0.05	127	0	390	1.553
	201 - 300	25	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	16	0.24	1,556	559	2,552	0.808
Kodiak	1 - 100	106	11	0.15	591	160	1,022	1.107
	101 - 200	106	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	11	0.06	591	160	1,022	1.107
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	0	---	---	---	---	---
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	0	---	---	---	---	---
All areas	1 - 100	371	48	0.38	4,901	3,032	6,770	1.047
	101 - 200	281	2	0.01	172	0	449	1.678
	201 - 300	103	0	---	---	---	---	---
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	50	0.16	5,072	3,184	6,960	1.06

Table 20. -- Catch per unit of effort by stratum for Alaska plaice sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Shumagin	1 - 100	Lower Alaska Peninsula	33	19	4.14	2,849	1,251	4,447
Chirikof	1 - 100	Upper Alaska Peninsula	18	7	1.31	1,037	108	1,966
Kodiak	1 - 100	Northern Kodiak Shallows	9	2	1.00	219	0	568
Chirikof	1 - 100	Chirikof Bank	37	8	0.36	391	82	701
Kodiak	1 - 100	Albatross Shallows	33	6	0.32	182	6	359
Shumagin	101 - 200	West Shumagin Gully	5	1	0.19	44	0	167
Kodiak	1 - 100	Lower Cook Inlet	15	3	0.19	189	0	432
Chirikof	101 - 200	Shelikof Edge	24	1	0.17	127	0	391
Shumagin	1 - 100	Shumagin Bank	38	2	0.02	21	0	58
Shumagin	1 - 100	Davidson Bank	62	1	0.01	12	0	35

Table 21. -- Number of survey hauls, number of hauls with starry flounder, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	15	1.30	5,355	136	10,574	1.609
	101 - 200	46	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	15	0.85	5,355	136	10,574	1.609
Chirikof	1 - 100	75	14	7.95	20,687	0	41,775	2.473
	101 - 200	64	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	14	3.18	20,687	0	41,775	2.473
Kodiak	1 - 100	106	17	7.54	29,048	2,907	55,188	2.293
	101 - 200	106	1	0.01	55	0	171	1.929
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	18	2.97	29,102	2,961	55,243	2.293
Yakutat	1 - 100	16	4	2.03	3,382	0	9,409	1.704
	101 - 200	37	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	4	0.61	3,382	0	9,409	1.704
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	0	---	---	---	---	---
All areas	1 - 100	371	50	4.53	58,471	24,691	92,252	2.22
	101 - 200	281	1	---	55	0	171	1.929
	201 - 300	103	0	---	---	---	---	---
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	51	1.90	58,526	24,745	92,306	2.219

Table 22. -- Catch per unit of effort by stratum for starry flounder sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Kodiak	1 - 100	Lower Cook Inlet	15	15	29.20	28,869	2,559	55,179
Chirikof	1 - 100	Chirikof Bank	37	8	14.15	15,270	0	35,161
Chirikof	1 - 100	Upper Alaska Peninsula	18	6	6.82	5,417	0	13,312
Shumagin	1 - 100	Lower Alaska Peninsula	33	12	6.43	4,423	0	9,494
Yakutat	1 - 100	Middleton Shallows	8	2	4.48	3,005	0	9,146
Shumagin	1 - 100	Davidson Bank	62	1	0.49	674	0	2,021
Yakutat	1 - 100	Yakutat Shallows	8	2	0.38	377	0	1,083
Shumagin	1 - 100	Shumagin Bank	38	2	0.21	258	0	708
Kodiak	1 - 100	Albatross Banks	41	1	0.11	169	0	512
Kodiak	101 - 200	Barren Islands	14	1	0.05	55	0	172
Kodiak	1 - 100	Albatross Shallows	33	1	0.02	9	0	28

Table 23. -- Number of survey hauls, number of hauls with English sole, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	15	0.08	330	78	583	0.482
	101 - 200	46	1	<.01	3	0	11	0.162
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	16	0.05	334	81	586	0.473
Chirikof	1 - 100	75	3	0.11	297	0	842	0.309
	101 - 200	64	1	<.01	11	0	33	0.745
	201 - 300	25	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	4	0.05	308	0	853	0.315
Kodiak	1 - 100	106	11	1.28	4,935	0	11,269	0.653
	101 - 200	106	3	0.03	112	0	286	1.205
	201 - 300	25	1	0.01	7	0	24	0.624
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	15	0.52	5,053	0	11,390	0.66
Yakutat	1 - 100	16	6	5.14	8,570	0	17,358	0.443
	101 - 200	37	4	0.03	78	0	162	0.607
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	10	1.56	8,648	0	17,437	0.444
Southeastern	1 - 100	13	8	3.30	2,161	238	4,083	0.348
	101 - 200	28	7	0.96	1,065	0	2,377	0.37
	201 - 300	26	2	0.52	262	0	782	0.642
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	17	1.30	3,488	1,168	5,808	0.368
All areas	1 - 100	371	43	1.26	16,292	5,585	26,999	0.469
	101 - 200	281	16	0.10	1,269	0	2,588	0.404
	201 - 300	103	3	0.07	269	0	789	0.641
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	62	0.58	17,830	7,026	28,633	0.466

Table 24. -- Catch per unit of effort by stratum for English sole sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Kodiak	1 - 100	Northern Kodiak Shallows	9	4	9.64	2,119	0	5,754
Yakutat	1 - 100	Yakutat Shallows	8	3	5.22	5,196	0	13,151
Yakutat	1 - 100	Middleton Shallows	8	3	5.02	3,373	0	8,463
Southeastern	1 - 100	Southeastern Shallows	13	8	3.30	2,161	221	4,100
Kodiak	1 - 100	Lower Cook Inlet	15	1	2.56	2,534	0	7,971
Southeastern	101 - 200	Prince of Wales Shelf	20	3	1.35	927	0	2,235
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	1	0.64	250	0	770
Kodiak	1 - 100	Kenai Peninsula	8	3	0.40	210	0	535
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	4	0.33	139	0	303
Chirikof	1 - 100	Upper Alaska Peninsula	18	1	0.33	259	0	804
Shumagin	1 - 100	Fox Islands	28	3	0.17	143	0	352
Kodiak	101 - 200	Albatross Gullies	25	3	0.14	112	0	286
Kodiak	1 - 100	Albatross Shallows	33	3	0.12	71	0	162
Southeastern	201 - 300	Baranof-Chichagof Slope	4	1	0.11	12	0	51
Shumagin	1 - 100	Shumagin Bank	38	5	0.09	108	0	243
Yakutat	101 - 200	Fairweather Shelf	9	2	0.06	43	0	116
Yakutat	101 - 200	Middleton Shelf	12	2	0.05	35	0	88
Shumagin	1 - 100	Davidson Bank	62	4	0.04	60	0	122
Kodiak	201 - 300	Kodiak Slope	6	1	0.04	7	0	25
Chirikof	1 - 100	Chirikof Bank	37	2	0.04	39	0	105
Shumagin	1 - 100	Lower Alaska Peninsula	33	3	0.03	20	0	52
Shumagin	101 - 200	West Shumagin Gully	5	1	0.01	3	0	12
Chirikof	101 - 200	Shelikof Edge	24	1	0.01	11	0	33

Table 25. -- Number of survey hauls, number of hauls with butter sole, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	34	0.82	3,370	774	5,967	0.416
	101 - 200	46	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	34	0.53	3,370	774	5,967	0.416
Chirikof	1 - 100	75	25	2.07	5,384	1,840	8,929	0.346
	101 - 200	64	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	25	0.83	5,384	1,840	8,929	0.346
Kodiak	1 - 100	106	26	4.97	19,157	6,134	32,181	0.266
	101 - 200	106	4	0.13	549	0	1,278	0.46
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	30	2.01	19,706	6,660	32,752	0.269
Yakutat	1 - 100	16	5	1.57	2,617	0	6,154	0.293
	101 - 200	37	2	---	12	0	29	0.134
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	7	0.48	2,629	0	6,165	0.291
Southeastern	1 - 100	13	1	0.04	26	0	83	0.552
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	1	0.01	26	0	83	0.552
All areas	1 - 100	371	91	2.37	30,555	16,588	44,522	0.292
	101 - 200	281	6	0.05	560	0	1,290	0.438
	201 - 300	103	0	---	---	---	---	---
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	97	1.01	31,116	17,128	45,103	0.294

Table 26. -- Catch per unit of effort by stratum for butter sole sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Kodiak	1 - 100	Lower Cook Inlet	15	12	18.01	17,801	4,756	30,846
Chirikof	1 - 100	Chirikof Bank	37	20	3.29	3,548	1,643	5,454
Chirikof	1 - 100	Upper Alaska Peninsula	18	5	2.31	1,836	0	4,924
Shumagin	1 - 100	Lower Alaska Peninsula	33	17	2.20	1,516	0	3,174
Yakutat	1 - 100	Middleton Shallows	8	2	2.14	1,436	0	4,585
Yakutat	1 - 100	Yakutat Shallows	8	3	1.19	1,182	0	3,557
Shumagin	1 - 100	Davidson Bank	62	6	1.10	1,510	0	3,516
Kodiak	1 - 100	Albatross Shallows	33	8	0.76	438	0	1,164
Kodiak	1 - 100	Albatross Banks	41	5	0.49	756	0	1,689
Kodiak	101 - 200	Albatross Gullies	25	3	0.46	363	0	993
Kodiak	1 - 100	Kenai Peninsula	8	1	0.31	162	0	546
Shumagin	1 - 100	Shumagin Bank	38	9	0.26	324	42	607
Kodiak	101 - 200	Barren Islands	14	1	0.17	186	0	588
Southeastern	1 - 100	Southeastern Shallows	13	1	0.04	26	0	83
Shumagin	1 - 100	Fox Islands	28	2	0.03	21	0	59
Yakutat	101 - 200	Middleton Shelf	12	1	0.01	6	0	19
Yakutat	101 - 200	Fairweather Shelf	9	1	0.01	6	0	20

ROUNDFISHES

Walleye pollock (*Theragra chalcogramma*)

Walleye pollock was the fourth most abundant species caught in the 2003 survey (Table 2). Pollock were caught throughout the survey area in 49 of the 54 survey strata (Fig. 18, Table 27). Over the entire survey, catch density was highest in depths less than 100 m where 71% of the estimated biomass occurred. An additional 22% of the estimated biomass occurred between 100 and 200 m. Although the CPUE was highest in the shallowest depth range (23.43 kg/ha), the frequency of occurrence was greatest in the 200 - 300 m depth range where pollock were seen in 92% of the tows. In all but the Kodiak INPFC area, the largest fish were seen in either the 200 - 300 m or the 300 - 500 m depth strata. The highest densities occurred in shallow strata known as Lower Alaska Peninsula and Davidson Bank in the Shumagin INPFC area and the Albatross Shallows along Kodiak Island (Table 28). A distinct length mode of young pollock (around 20 cm) were found at depths less than 100 m in all the INPFC areas as well as in the 100 - 200 m depth range in all the areas except the Shumagin INPFC area. This mode was also found in the 200 to 300 m depth range in the Chirikof, Kodiak and Southeastern INPFC areas.

Table 27. -- Number of survey hauls, number of hauls with walleye pollock, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	100	46.38	191,512	108,957	274,066	0.67
	101 - 200	46	36	14.09	20,674	5,375	35,972	0.81
	201 - 300	10	7	3.55	989	0	2,117	1.174
	301 - 500	9	5	0.46	118	19	216	0.92
	501 - 700	4	0	---	---	---	---	---
	All depths	230	148	33.70	213,291	129,422	297,160	0.683
Chirikof	1 - 100	75	31	15.84	41,251	2,785	79,717	0.626
	101 - 200	64	38	8.49	20,240	807	39,673	0.865
	201 - 300	25	25	8.63	9,965	4,886	15,044	0.483
	301 - 500	5	2	0.50	80	0	213	0.956
	501 - 700	3	0	---	---	---	---	---
	All depths	172	96	11.01	71,536	28,514	114,557	0.65
Kodiak	1 - 100	106	48	14.38	55,406	28,629	82,182	0.568
	101 - 200	106	67	8.54	37,019	10,521	63,518	0.848
	201 - 300	25	23	7.47	8,579	4,695	12,462	0.664
	301 - 500	9	1	0.02	7	0	22	0.566
	501 - 700	2	0	---	---	---	---	---
	All depths	248	139	10.31	101,010	63,939	138,082	0.655
Yakutat	1 - 100	16	14	4.99	8,307	0	18,102	0.203
	101 - 200	37	31	2.46	7,219	3,755	10,682	0.137
	201 - 300	17	15	3.12	1,611	924	2,297	0.531
	301 - 500	6	3	0.33	87	0	216	0.843
	501 - 700	3	1	0.09	14	0	58	0.71
	All depths	79	64	3.12	17,237	6,887	27,587	0.178
Southeastern	1 - 100	13	10	8.99	5,882	0	13,128	0.137
	101 - 200	28	25	9.16	10,154	5,714	14,594	0.175
	201 - 300	26	25	7.48	3,781	1,156	6,406	0.685
	301 - 500	10	1	1.35	420	0	1,389	0.763
	501 - 700	3	0	---	---	---	---	---
	All depths	80	61	7.54	20,238	11,486	28,989	0.189
All areas	1 - 100	371	203	23.43	302,358	208,231	396,484	0.567
	101 - 200	281	197	7.79	95,305	59,376	131,235	0.469
	201 - 300	103	95	6.91	24,924	18,122	31,726	0.58
	301 - 500	39	12	0.56	711	0	1,700	0.811
	501 - 700	15	1	0.02	14	0	58	0.71
	All depths	809	508	13.73	423,312	322,471	524,153	0.542

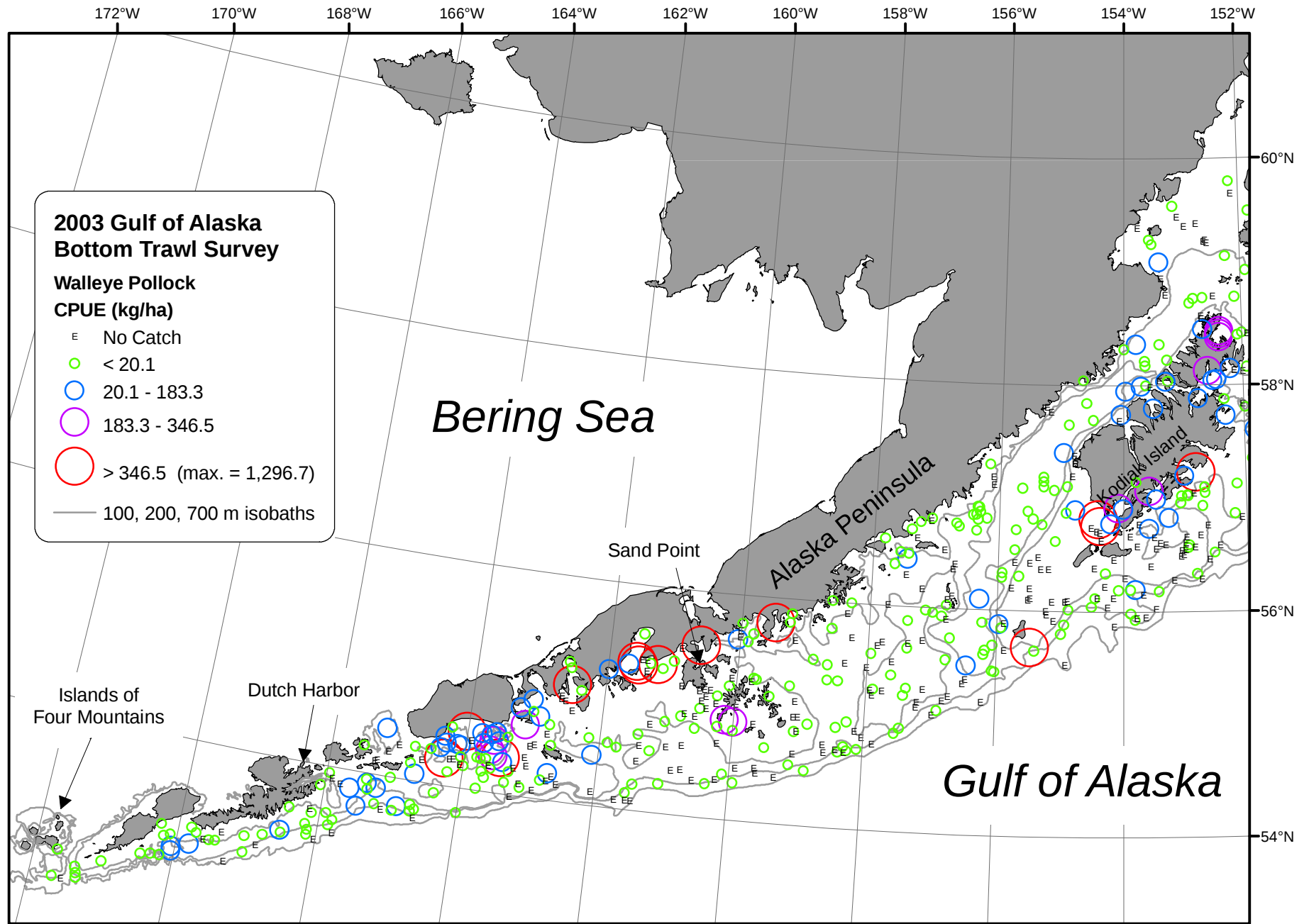


Figure 18.--Distribution and relative abundance of walleye pollock from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

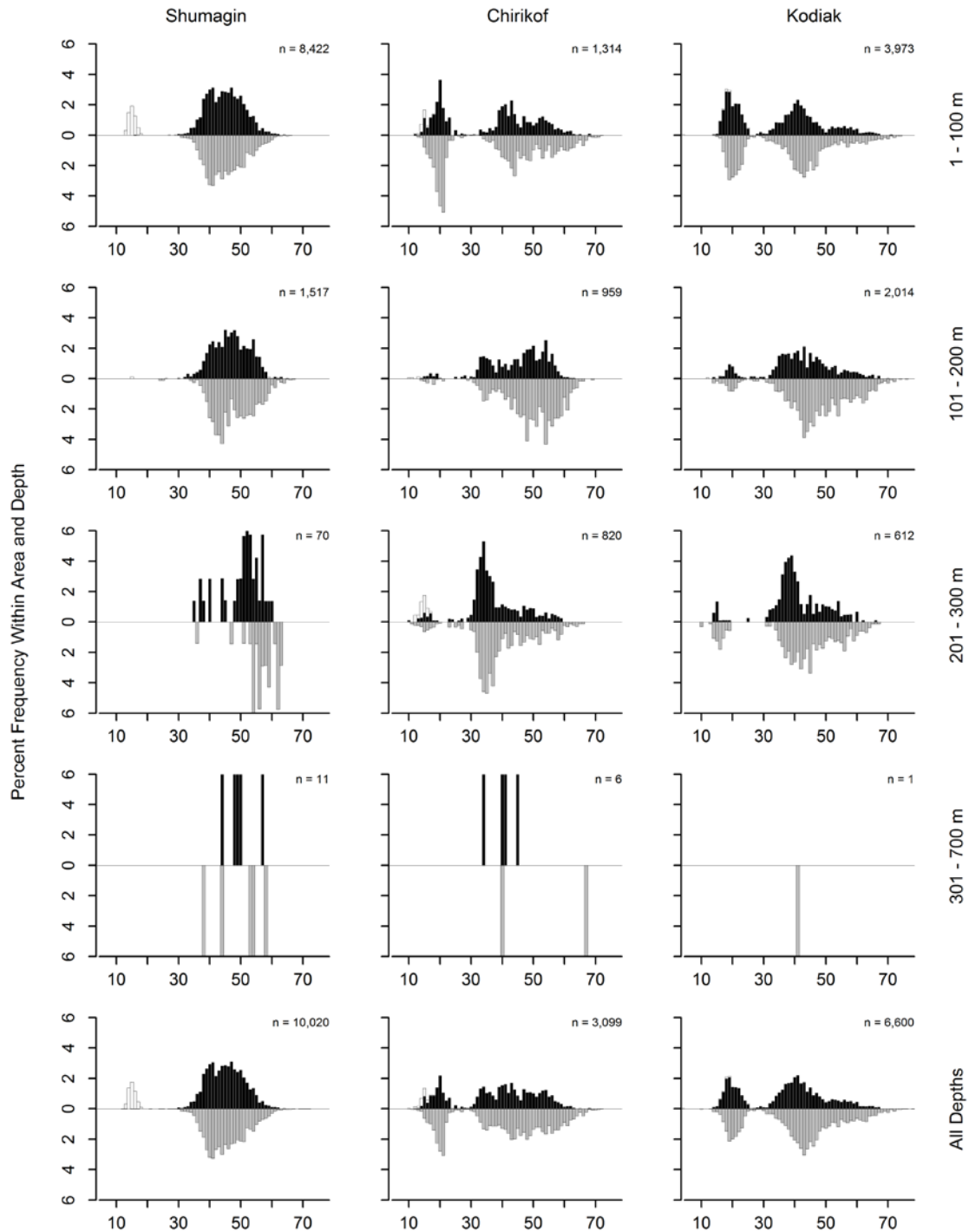


Figure 19. -- Size composition of walleye pollock from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

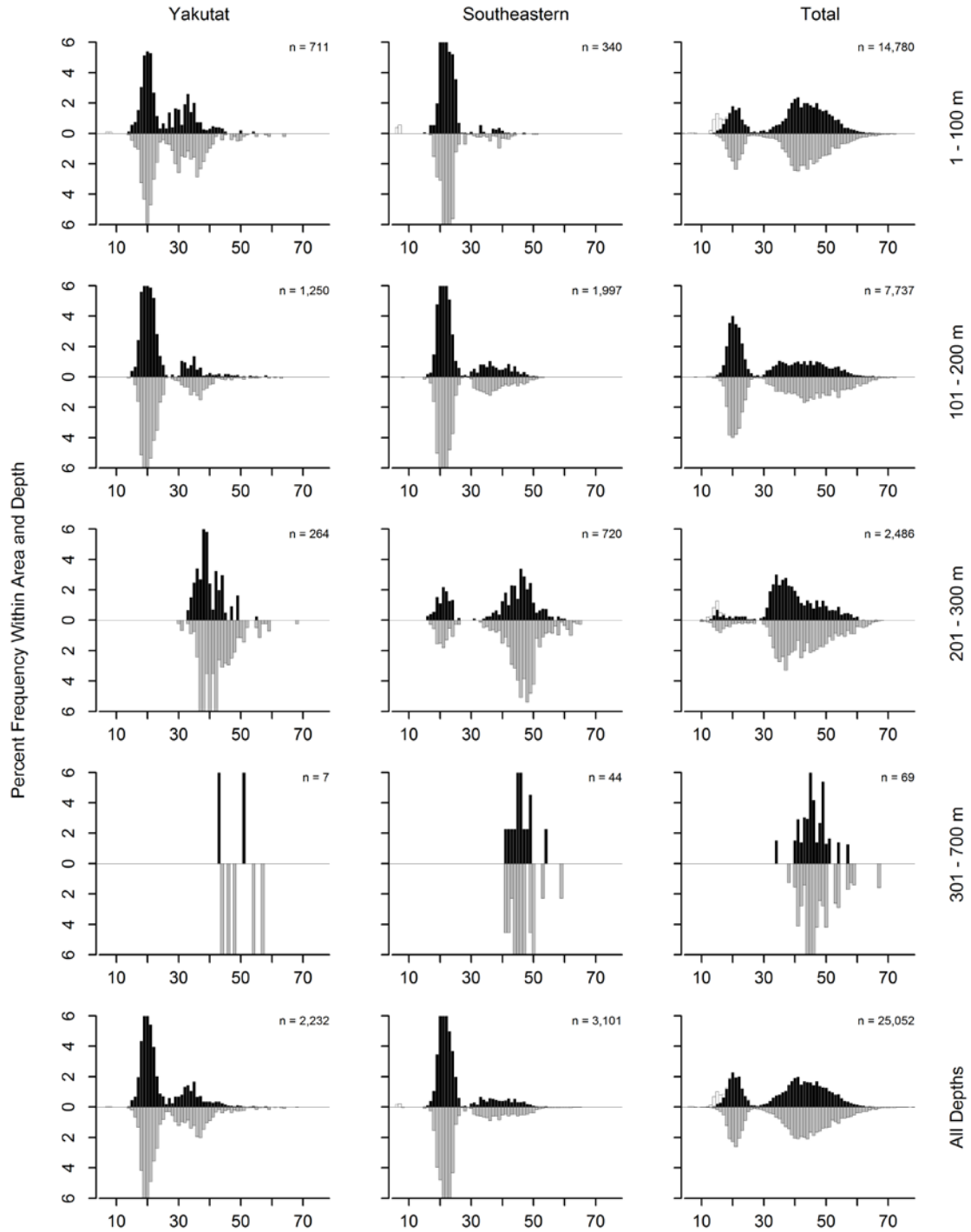


Figure 19. -- Continued (walleye pollock).

Table 28. -- Catch per unit of effort by stratum for walleye pollock sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Shumagin	1 - 100	Lower Alaska Peninsula	33	22	127.98	87,998	21,032	154,964
Kodiak	1 - 100	Albatross Shallows	33	22	65.71	37,889	15,487	60,290
Shumagin	1 - 100	Davidson Bank	62	42	58.99	80,706	36,797	124,616
Kodiak	1 - 100	Northern Kodiak Shallows	9	5	37.50	8,249	457	16,041
Chirikof	1 - 100	Chirikof Bank	37	13	37.29	40,244	1,789	78,698
Kodiak	101 - 200	Albatross Gullies	25	16	31.37	24,815	0	51,034
Shumagin	101 - 200	West Shumagin Gully	5	5	27.31	6,222	0	22,355
Chirikof	101 - 200	Chirikof Outer Shelf	21	7	17.71	8,875	0	26,400
Shumagin	101 - 200	Shumagin Outer Shelf	33	25	15.93	12,989	4,076	21,903
Shumagin	1 - 100	Shumagin Bank	38	15	14.57	18,060	0	42,541
Southeastern	101 - 200	Prince of Wales Shelf	20	19	11.81	8,133	4,032	12,233
Chirikof	201 - 300	Lower Shelikof Gully	18	18	9.78	9,797	4,697	14,898
Kodiak	201 - 300	Upper Shelikof Gully	3	3	9.44	3,027	0	7,873
Southeastern	1 - 100	Southeastern Shallows	13	10	8.99	5,882	0	13,192
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	21	8.43	3,311	710	5,912
Kodiak	201 - 300	Kenai Gullies	16	15	8.04	5,357	2,373	8,340
Chirikof	101 - 200	Shelikof Edge	24	20	7.80	6,036	0	14,321
Yakutat	1 - 100	Yakutat Shallows	8	6	7.48	7,437	0	17,428
Kodiak	1 - 100	Lower Cook Inlet	15	6	6.31	6,234	0	19,571
Kodiak	101 - 200	Barren Islands	14	12	5.79	6,355	2,114	10,596
Shumagin	1 - 100	Fox Islands	28	21	5.70	4,747	1,424	8,070
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	6	4.82	2,022	0	4,171
Chirikof	101 - 200	East Shumagin Gully	19	11	4.80	5,329	251	10,407
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	4.18	470	0	1,153
Kodiak	1 - 100	Kenai Peninsula	8	7	3.95	2,076	19	4,134
Kodiak	101 - 200	Kodiak Outer Shelf	26	10	3.79	1,905	0	4,535
Shumagin	201 - 300	Shumagin Slope	10	7	3.55	989	0	2,135
Shumagin	101 - 200	Sanak Gully	8	6	3.45	1,463	0	4,434
Yakutat	201 - 300	Yakutat Slope	11	9	3.35	713	267	1,159
Yakutat	101 - 200	Yakataga Shelf	7	7	3.28	1,730	0	3,808
Yakutat	101 - 200	Middleton Shelf	12	11	3.26	2,397	973	3,821
Yakutat	201 - 300	Yakutat Gullies	6	6	2.95	898	331	1,464
Kodiak	101 - 200	Kenai Flats	18	15	2.82	3,402	820	5,984
Yakutat	101 - 200	Yakutat Flats	9	7	1.87	1,692	0	4,208
Yakutat	101 - 200	Fairweather Shelf	9	6	1.81	1,400	0	2,984
Southeastern	301 - 500	Southeastern Deep Gullies	8	1	1.79	420	0	1,414
Yakutat	1 - 100	Middleton Shallows	8	8	1.30	870	0	1,918
Kodiak	201 - 300	Kodiak Slope	6	5	1.20	195	34	356
Chirikof	1 - 100	Upper Alaska Peninsula	18	9	1.20	950	0	1,910
Chirikof	201 - 300	Chirikof Slope	7	7	1.10	167	78	257
Kodiak	101 - 200	Portlock Flats	23	14	0.74	542	113	971
Kodiak	1 - 100	Albatross Banks	41	8	0.62	957	0	2,719
Chirikof	301 - 500	Chirikof Slope	5	2	0.50	80	0	223
Shumagin	301 - 500	Shumagin Slope	9	5	0.46	118	17	218
Yakutat	301 - 500	Yakutat Slope	4	2	0.35	53	0	166
Yakutat	301 - 500	Yakutat Gullies	2	1	0.31	35	0	477
Yakutat	501 - 700	Yakutat Slope	3	1	0.09	14	0	73
Chirikof	1 - 100	Semidi Bank	20	9	0.08	58	0	120
Kodiak	301 - 500	Kodiak Slope	9	1	0.02	7	0	22

Pacific cod (*Gadus macrocephalus*)

Pacific cod was the sixth most abundant species caught in the 2003 survey (Table 2). Cod were caught throughout the survey area in 38 of the 54 survey strata at depths less than 300 m, although CPUEs were low at depths greater than 200 m (Fig. 20, Table 29). Cod occurred in about 64% of all tows shallower than 300 m. In the Kodiak INPFC area, however, the mean CPUE was much greater in the 100 – 200 m depth range. The highest mean CPUE came from the Kodiak INPFC area which represented about 43% of the estimated biomass. Cod were also more abundant in the western survey area. Only about 5% of the estimated biomass was caught in the Yakutat and Southeastern INPFC areas. The highest densities were recorded in the Portlock Flats and Albatross Gullies strata (Table 30). Length data showed a bimodal distribution in water shallower than 200 m in the Kodiak INPFC area with a strong peak at about 20-25 cm and a much broader peak in the 40-60 cm range in the shallow tows. The 100-200 m tows had peaks at 42 and 60 cm. (Fig. 21).

Table 29. -- Number of survey hauls, number of hauls with Pacific cod, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	130	16.10	66,461	29,550	103,371	1.795
	101 - 200	46	34	6.12	8,977	5,184	12,770	2.057
	201 - 300	10	2	0.70	195	0	513	2.25
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	166	11.95	75,632	38,534	112,730	1.824
Chirikof	1 - 100	75	51	20.20	52,584	7,168	97,999	2.165
	101 - 200	64	44	8.61	20,534	8,062	33,006	1.829
	201 - 300	25	15	3.10	3,582	1,387	5,777	2.329
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	110	11.80	76,700	29,590	123,810	2.07
Kodiak	1 - 100	106	74	6.52	25,099	12,967	37,231	1.142
	101 - 200	106	72	24.08	104,337	38,040	170,633	2.111
	201 - 300	25	3	0.82	945	0	2,043	2.219
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	149	13.30	130,380	63,646	197,115	1.815
Yakutat	1 - 100	16	6	1.44	2,397	0	5,331	1.782
	101 - 200	37	5	0.38	1,108	0	2,585	2.639
	201 - 300	17	2	0.57	296	0	924	1.977
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	13	0.69	3,801	570	7,031	1.985
Southeastern	1 - 100	13	8	1.66	1,087	73	2,100	1.327
	101 - 200	28	22	6.65	7,374	3,546	11,201	1.475
	201 - 300	26	16	4.81	2,429	535	4,322	1.464
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	46	4.06	10,889	6,554	15,223	1.456
All areas	1 - 100	371	269	11.44	147,626	88,175	207,077	1.728
	101 - 200	281	177	11.64	142,329	75,339	209,319	2.02
	201 - 300	103	38	2.07	7,446	4,344	10,548	1.93
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	484	9.64	297,402	209,195	385,608	1.862

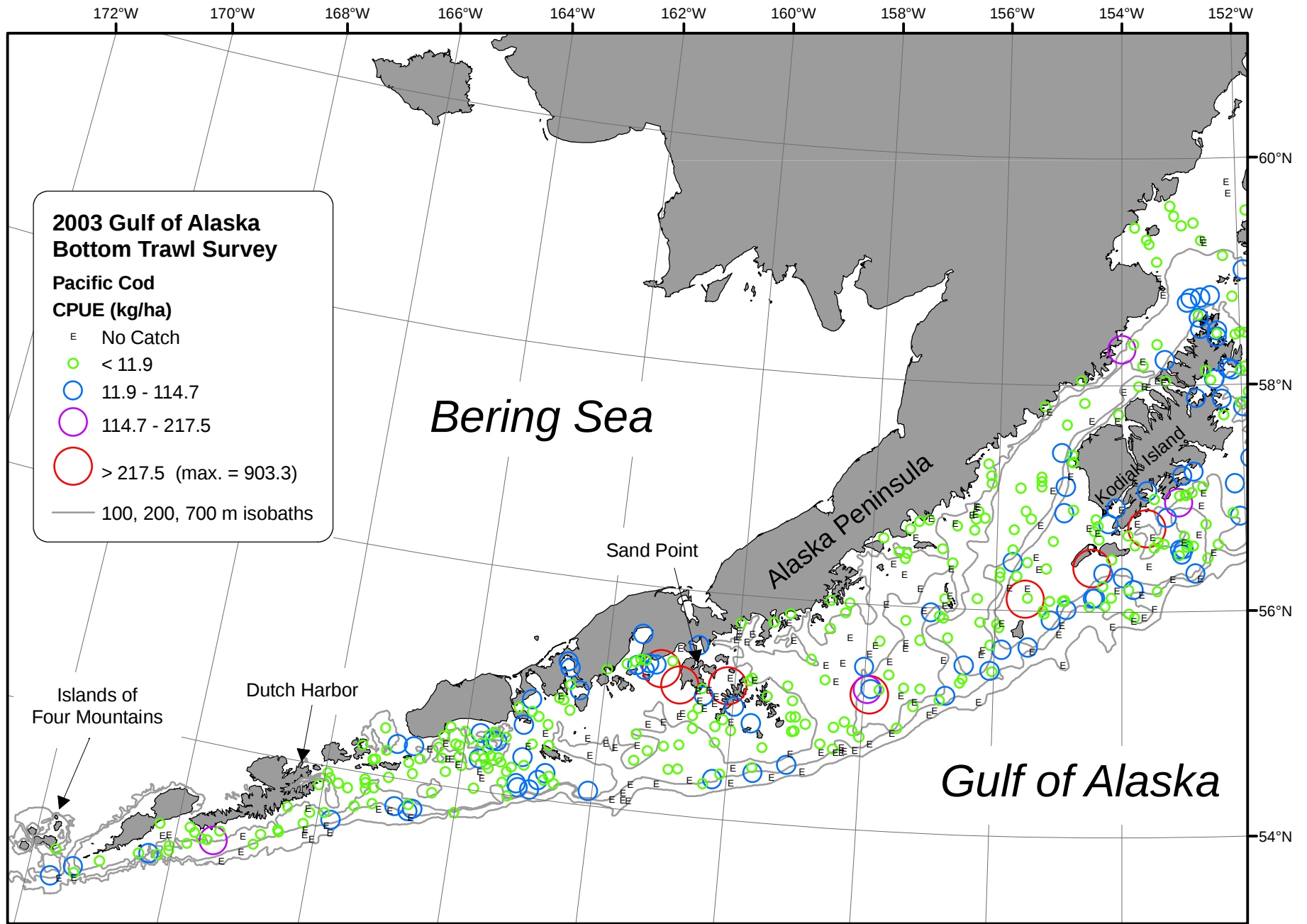


Figure 20.--Distribution and relative abundance of Pacific cod from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

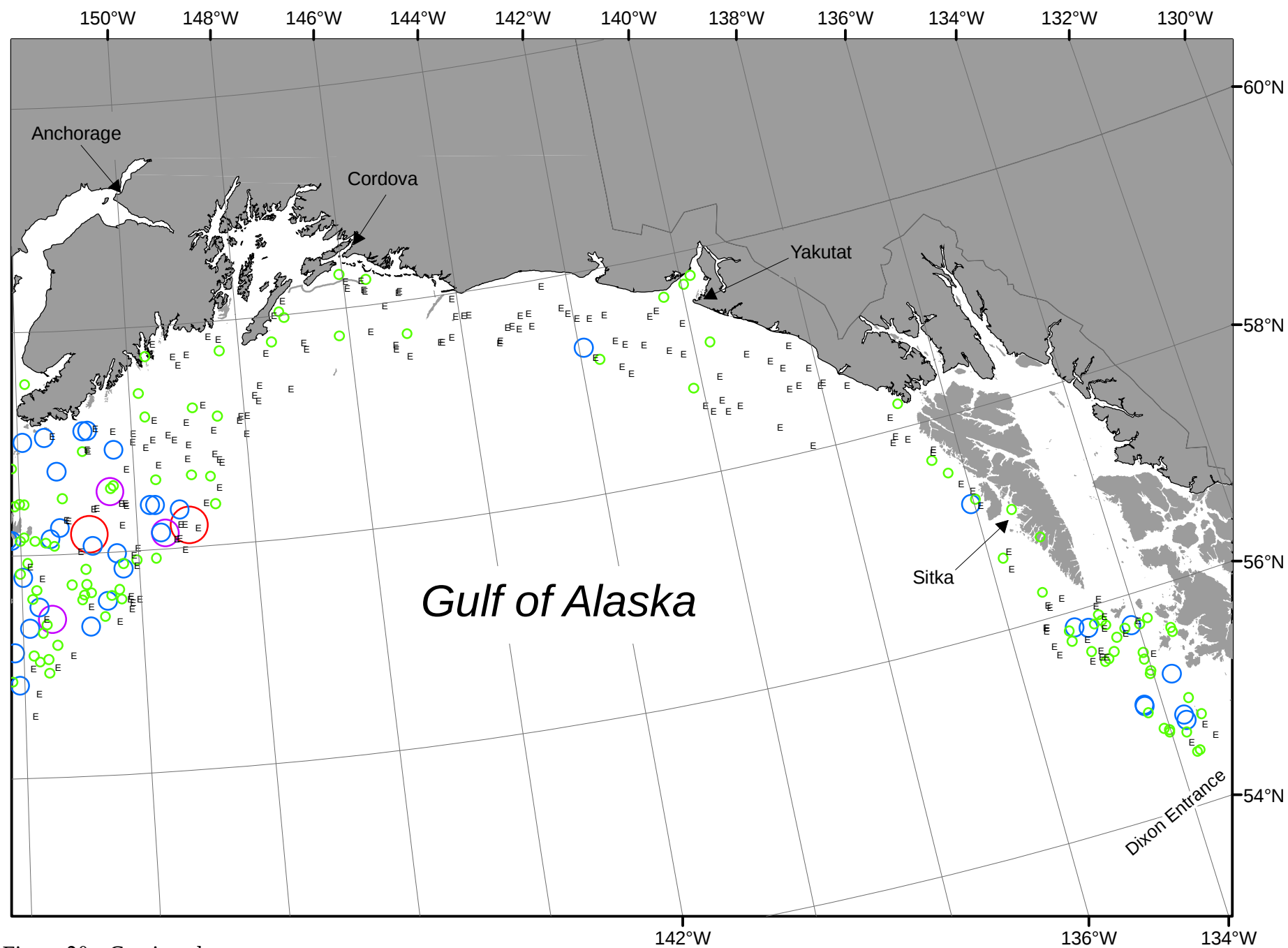


Figure 20.--Continued.

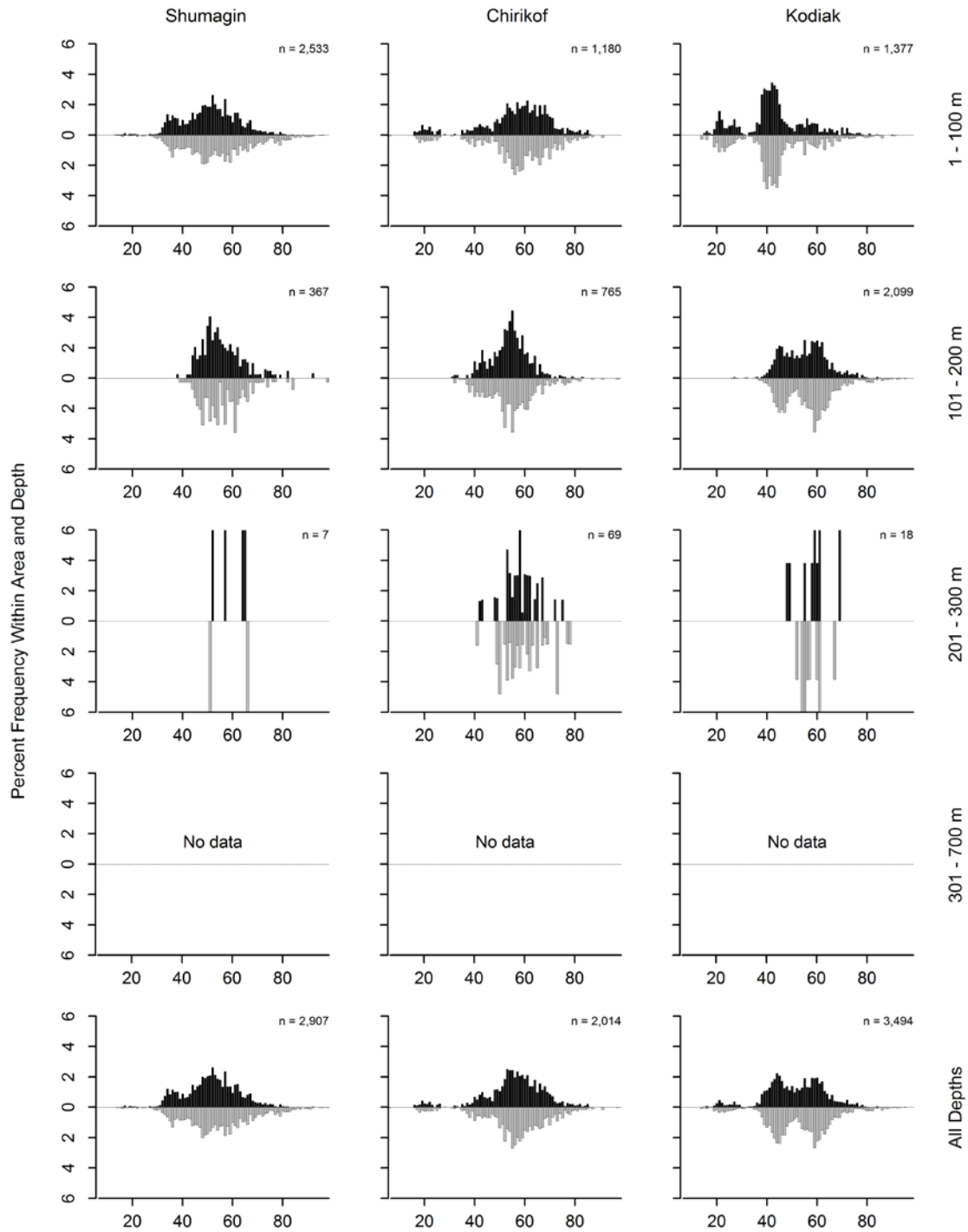


Figure 21. -- Size composition of Pacific cod from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

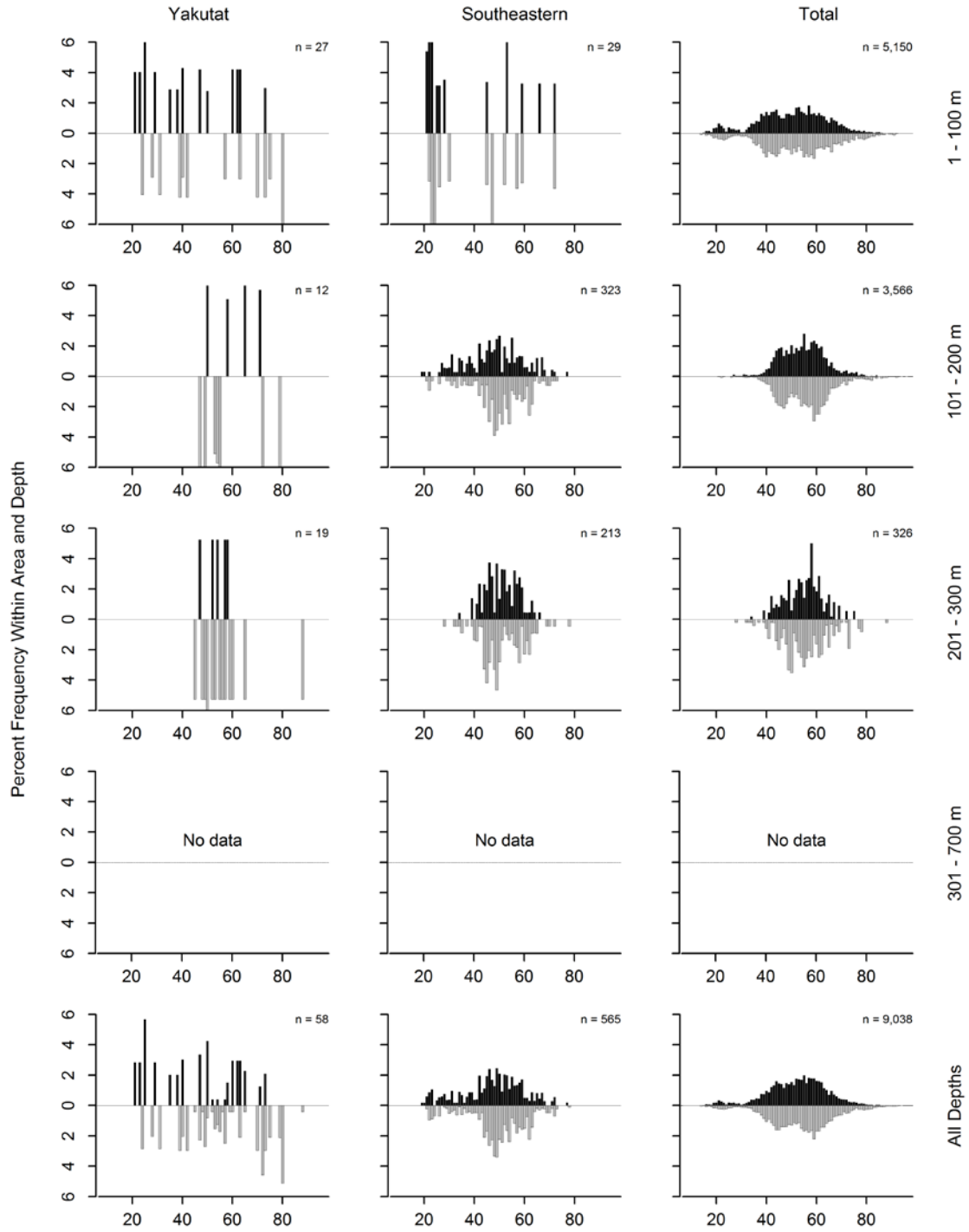


Figure 21. – Continued (Pacific cod).

Table 30. -- Catch per unit of effort by stratum for Pacific cod sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Kodiak	101 - 200	Portlock Flats	23	14	61.11	44,829	0	104,837
Kodiak	101 - 200	Albatross Gullies	25	22	51.19	40,498	11,416	69,581
Chirikof	1 - 100	Semidi Bank	20	10	34.39	25,113	0	61,770
Shumagin	1 - 100	Lower Alaska Peninsula	33	27	27.62	18,991	0	40,820
Chirikof	1 - 100	Chirikof Bank	37	27	23.50	25,358	0	54,084
Shumagin	1 - 100	Shumagin Bank	38	24	20.78	25,769	0	54,677
Chirikof	101 - 200	Shelikof Edge	24	16	15.54	12,020	185	23,854
Kodiak	1 - 100	Albatross Shallows	33	30	12.87	7,420	4,303	10,537
Chirikof	101 - 200	Chirikof Outer Shelf	21	18	11.05	5,536	1,592	9,480
Kodiak	101 - 200	Barren Islands	14	13	10.95	12,027	5,605	18,450
Shumagin	1 - 100	Fox Islands	28	26	10.41	8,676	0	17,697
Shumagin	101 - 200	Shumagin Outer Shelf	33	29	9.84	8,021	4,381	11,661
Shumagin	1 - 100	Davidson Bank	62	53	9.52	13,024	7,892	18,156
Southeastern	101 - 200	Prince of Wales Shelf	20	18	9.23	6,359	2,715	10,003
Kodiak	1 - 100	Albatross Banks	41	26	8.38	12,911	1,968	23,854
Kodiak	101 - 200	Kodiak Outer Shelf	26	17	6.50	3,265	1,530	5,000
Kodiak	1 - 100	Kenai Peninsula	8	4	6.11	3,211	0	7,940
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	15	5.98	2,350	458	4,242
Kodiak	1 - 100	Northern Kodiak Shallows	9	4	3.82	841	0	2,088
Chirikof	201 - 300	Lower Shelikof Gully	18	14	3.51	3,513	1,313	5,713
Kodiak	101 - 200	Kenai Flats	18	6	3.08	3,717	0	9,992
Chirikof	101 - 200	East Shumagin Gully	19	10	2.68	2,979	865	5,094
Chirikof	1 - 100	Upper Alaska Peninsula	18	14	2.66	2,113	905	3,321
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	4	2.42	1,015	0	2,549
Shumagin	101 - 200	West Shumagin Gully	5	1	2.04	465	0	1,755
Kodiak	201 - 300	Upper Shelikof Gully	3	2	1.79	574	0	2,006
Southeastern	1 - 100	Southeastern Shallows	13	8	1.66	1,087	64	2,109
Yakutat	1 - 100	Yakutat Shallows	8	3	1.49	1,484	0	4,054
Yakutat	201 - 300	Yakutat Slope	11	2	1.39	296	0	932
Yakutat	1 - 100	Middleton Shallows	8	3	1.36	913	0	2,738
Shumagin	101 - 200	Sanak Gully	8	4	1.16	491	0	1,059
Yakutat	101 - 200	Yakutat Flats	9	2	0.94	846	0	2,334
Kodiak	1 - 100	Lower Cook Inlet	15	10	0.72	715	43	1,387
Southeastern	201 - 300	Baranof-Chichagof Slope	4	1	0.70	79	0	329
Shumagin	201 - 300	Shumagin Slope	10	2	0.70	195	0	517
Kodiak	201 - 300	Kenai Gullies	16	1	0.56	372	0	1,163
Chirikof	201 - 300	Chirikof Slope	7	1	0.45	69	0	238
Yakutat	101 - 200	Middleton Shelf	12	3	0.36	262	0	597

Atka mackerel (*Pleurogrammus monopterygius*)

Atka mackerel was the eighteenth most abundant species caught in the 2003 survey (Table 2). Almost 90% of the estimated biomass is in the Shumagin INPFC area in water less than 100 m deep (Fig. 22 and Tables 31-32). Small catches of this species (< 1 kg/ha) were seen in 18 of the 54 strata as far east as Prince William Sound and with the exception of one tow always in water shallower than 300 m. The length data showed a strong mode for both males and females at slightly less than 40 cm (Fig. 23).

Table 31. -- Number of survey hauls, number of hauls with Atka mackerel, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	81	14.18	58,529	16,450	100,609	0.839
	101 - 200	46	17	0.54	792	239	1,346	0.701
	201 - 300	10	2	0.15	42	0	112	0.84
	301 - 500	9	1	0.04	10	0	32	0.863
	501 - 700	4	0	---	---	---	---	---
	All depths	230	101	9.38	59,374	17,291	101,456	0.837
Chirikof	1 - 100	75	2	0.01	29	0	70	0.924
	101 - 200	64	10	0.16	392	11	773	0.934
	201 - 300	25	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	12	0.06	421	37	804	0.933
Kodiak	1 - 100	106	7	0.89	3,421	0	10,376	0.968
	101 - 200	106	25	0.39	1,701	693	2,710	1.008
	201 - 300	25	3	0.09	102	0	218	1.265
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	35	0.53	5,224	0	12,135	0.985
Yakutat	1 - 100	16	4	0.16	267	0	569	0.916
	101 - 200	37	5	0.08	246	0	514	0.966
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	9	0.09	514	134	893	0.94
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	0	---	---	---	---	---
All areas	1 - 100	371	94	4.82	62,246	19,736	104,756	0.846
	101 - 200	281	57	0.26	3,132	1,909	4,356	0.897
	201 - 300	103	5	0.04	144	12	276	1.102
	301 - 500	39	1	0.01	10	0	32	0.863
	501 - 700	15	0	---	---	---	---	---
	All depths	809	157	2.12	65,532	23,005	108,060	0.848

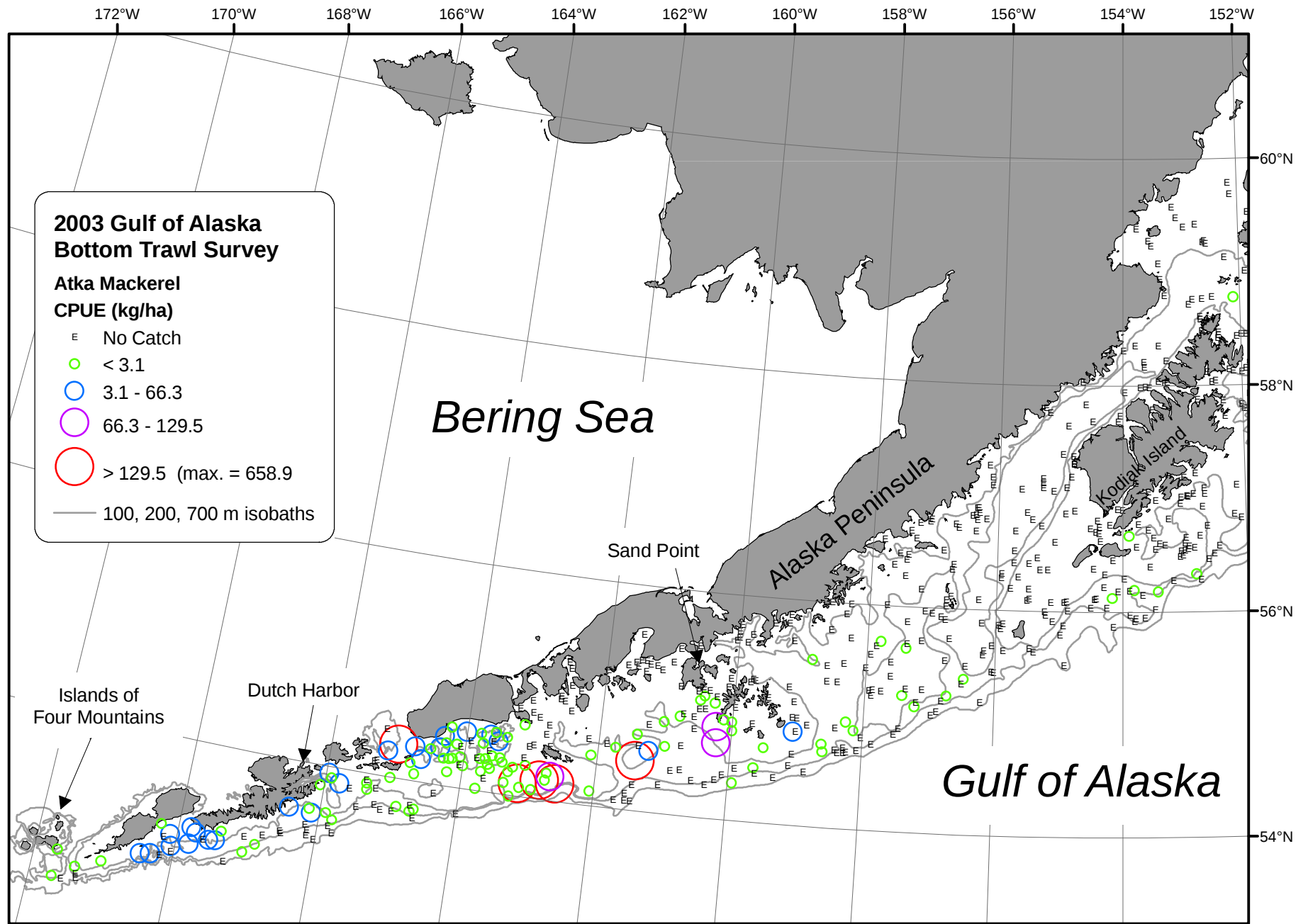


Figure 22.--Distribution and relative abundance of Atka mackerel from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

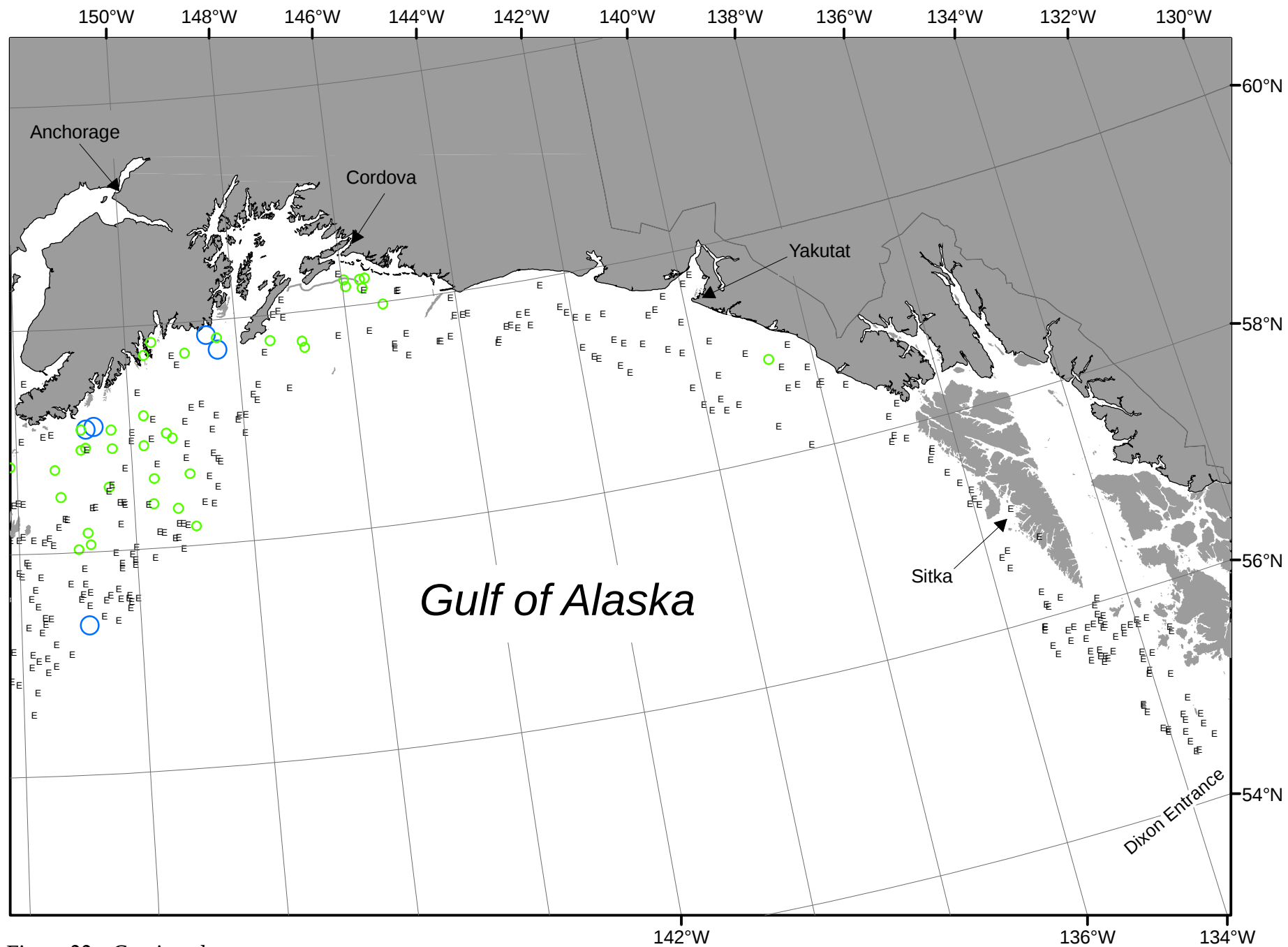


Figure 22.--Continued.

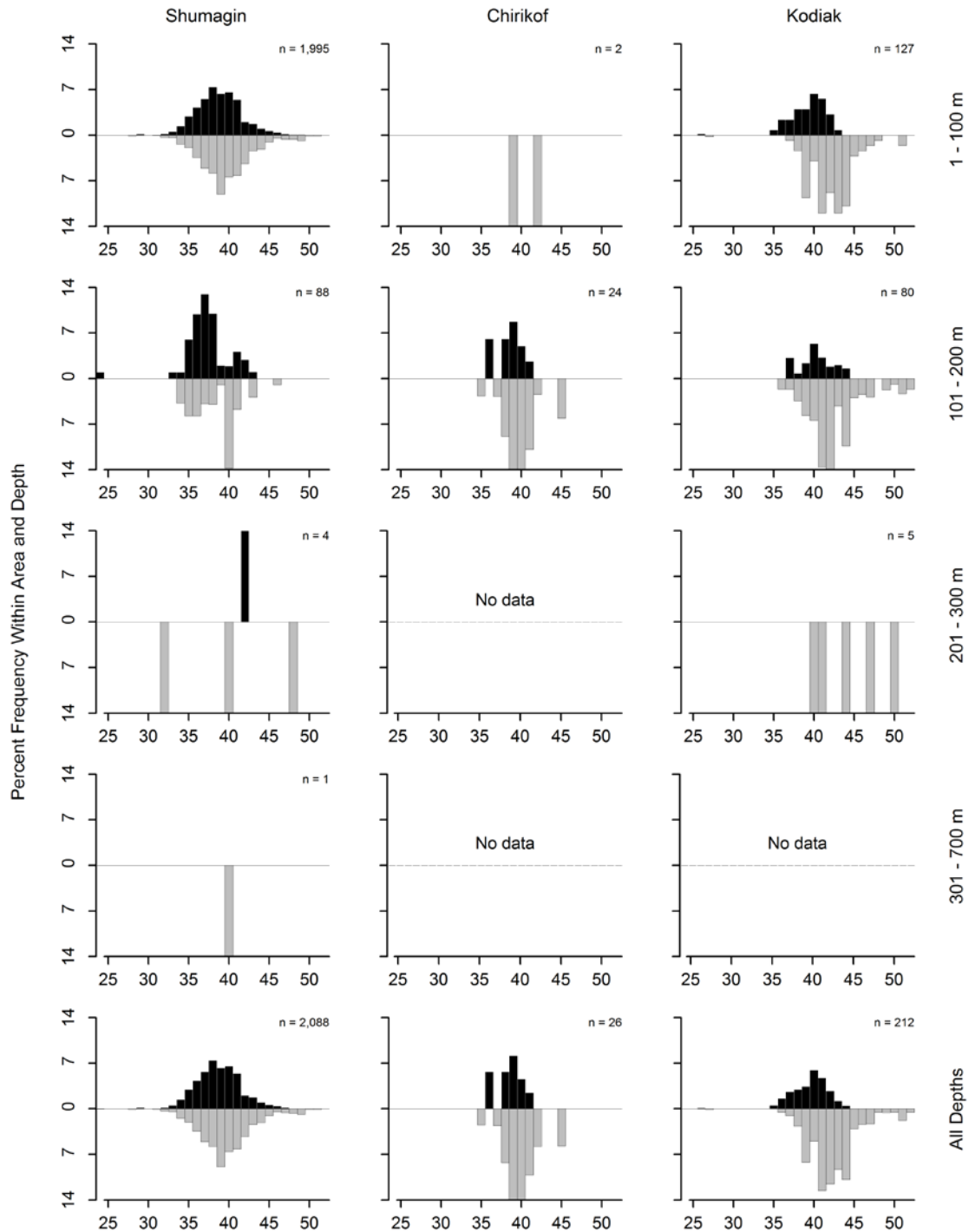


Figure 23. -- Size composition of Atka mackerel from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

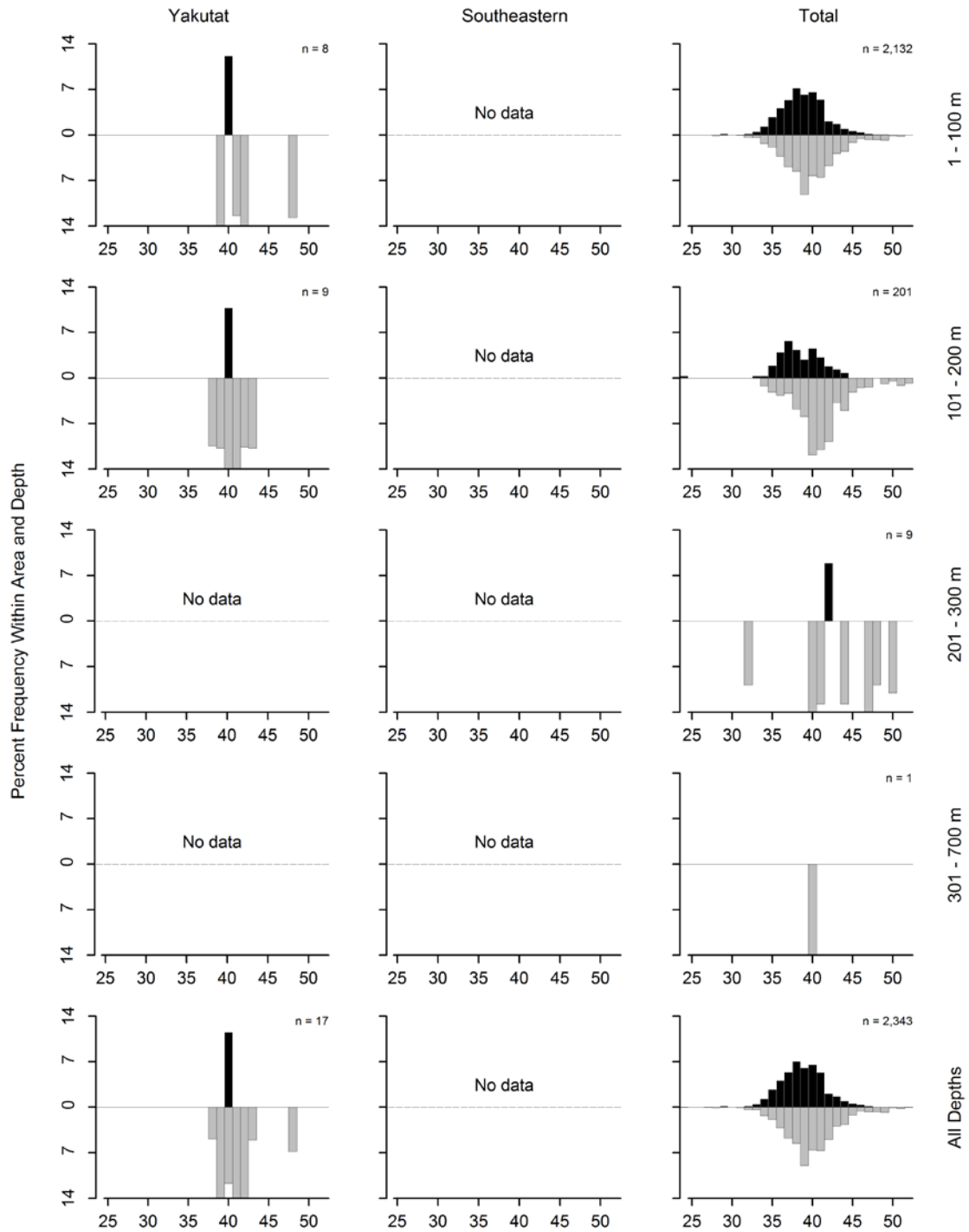


Figure 23. -- Continued (Atka mackerel).

Table 32. -- Catch per unit of effort by stratum for Atka mackerel sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Shumagin	1 - 100	Davidson Bank	62	48	27.32	37,379	1,642	73,115
Shumagin	1 - 100	Shumagin Bank	38	13	14.76	18,299	0	40,941
Kodiak	1 - 100	Kenai Peninsula	8	5	6.46	3,398	0	10,530
Shumagin	1 - 100	Fox Islands	28	20	3.42	2,852	1,491	4,213
Kodiak	101 - 200	Kenai Flats	18	7	0.95	1,142	176	2,107
Shumagin	101 - 200	Shumagin Outer Shelf	33	12	0.66	537	15	1,059
Shumagin	101 - 200	Sanak Gully	8	5	0.60	255	23	487
Yakutat	1 - 100	Middleton Shallows	8	4	0.40	267	0	577
Kodiak	101 - 200	Kodiak Outer Shelf	26	5	0.32	159	0	324
Yakutat	101 - 200	Middleton Shelf	12	4	0.30	219	0	487
Chirikof	101 - 200	Chirikof Outer Shelf	21	6	0.24	122	0	246
Chirikof	101 - 200	East Shumagin Gully	19	4	0.24	270	0	633
Kodiak	101 - 200	Portlock Flats	23	8	0.18	128	45	211
Kodiak	101 - 200	Barren Islands	14	3	0.15	170	0	403
Kodiak	201 - 300	Kenai Gullies	16	3	0.15	102	0	219
Shumagin	201 - 300	Shumagin Slope	10	2	0.15	42	0	113
Kodiak	101 - 200	Albatross Gullies	25	2	0.13	103	0	264
Chirikof	1 - 100	Semidi Bank	20	2	0.04	29	0	71
Shumagin	301 - 500	Shumagin Slope	9	1	0.04	10	0	32
Yakutat	101 - 200	Fairweather Shelf	9	1	0.04	27	0	90
Kodiak	1 - 100	Albatross Banks	41	1	0.01	21	0	62
Kodiak	1 - 100	Albatross Shallows	33	1	0.01	3	0	9

Sablefish (*Anoplopoma fimbria*)

Sablefish was the eighth most abundant species caught in the 2003 survey (Table 2). They were caught throughout the survey area in 51 of the 54 survey strata and at all depths (Table 34). Frequency of occurrence increased with depth, and sablefish were present in 96% of tows deeper than 300 m. Mean weight also increased with depth (Table 33). The stratum with the highest catch rate was Yakutat Slope (500-700 m) which also contained 8.5% of the estimated biomass even though it has only 0.5% of the survey area. Other strata with high catch rates included the three Kodiak Slope strata (200-300 m, 300-500 m, and 500-700 m) and the Shumagin Slope stratum with depths between 500 and 700 m (Fig. 24, Table 34). Length frequency data showed a distinct mode for both males and females at approximately 30 cm in waters shallower than 200 m in the Shumagin and Chirikof INPFC areas (Fig. 25). Another trend in the length frequency data shows that within each INPFC area, the mode gets slightly larger with increasing depth.

Table 33. -- Number of survey hauls, number of hauls with sablefish, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	12	0.06	251	33	470	0.524
	101 - 200	46	14	1.54	2,260	284	4,236	1.284
	201 - 300	10	9	8.27	2,305	1,082	3,528	1.54
	301 - 500	9	9	15.93	4,032	1,290	6,773	2.477
	501 - 700	4	4	47.70	9,567	5,537	13,597	3.793
	All depths	230	48	2.91	18,415	13,890	22,941	2.335
Chirikof	1 - 100	75	4	0.14	359	0	833	0.496
	101 - 200	64	31	3.13	7,465	915	14,016	1.539
	201 - 300	25	25	28.50	32,911	10,284	55,537	2.982
	301 - 500	5	5	38.98	6,252	2,015	10,489	3.075
	501 - 700	3	3	42.46	8,294	3,324	13,264	4.203
	All depths	172	68	8.51	55,281	31,538	79,023	2.681
Kodiak	1 - 100	106	12	0.79	3,046	0	8,083	1.421
	101 - 200	106	70	12.76	55,306	14,669	95,944	1.737
	201 - 300	25	25	25.01	28,737	17,738	39,735	2.625
	301 - 500	9	9	81.16	23,632	3,162	44,102	3.096
	501 - 700	2	2	55.37	9,661	0	23,110	3.423
	All depths	248	118	12.28	120,382	73,843	166,921	2.173
Yakutat	1 - 100	16	4	0.56	934	0	2,563	0.559
	101 - 200	37	18	1.02	2,983	1,029	4,937	1.045
	201 - 300	17	13	6.39	3,306	834	5,777	1.683
	301 - 500	6	5	19.23	5,053	0	17,087	2.819
	501 - 700	3	3	138.99	20,422	1,247	39,596	3.017
	All depths	79	43	5.91	32,697	17,262	48,132	2.173
Southeastern	1 - 100	13	5	0.48	312	0	639	0.953
	101 - 200	28	17	1.66	1,838	849	2,828	1.218
	201 - 300	26	23	6.92	3,494	0	9,055	2.719
	301 - 500	10	9	15.11	4,709	550	8,867	2.556
	501 - 700	3	3	29.26	3,024	368	5,679	2.545
	All depths	80	57	4.98	13,376	7,357	19,395	2.174
All areas	1 - 100	371	37	0.38	4,902	0	9,845	0.917
	101 - 200	281	150	5.71	69,853	28,671	111,034	1.631
	201 - 300	103	95	19.63	70,752	45,246	96,258	2.647
	301 - 500	39	37	34.14	43,677	22,200	65,154	2.926
	501 - 700	15	15	62.11	50,967	33,437	68,498	3.337
	All depths	809	334	7.79	240,151	186,856	293,445	2.285

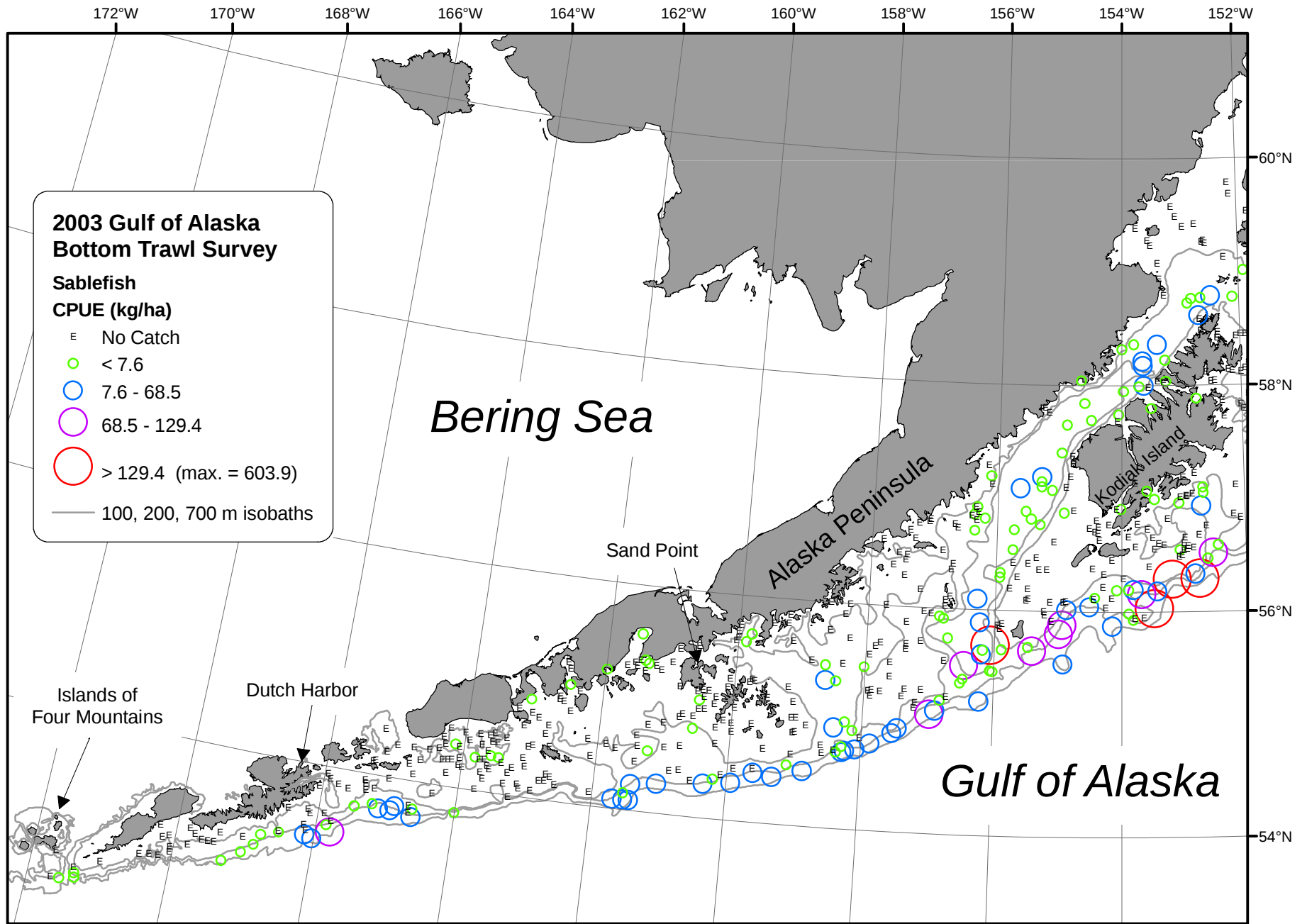


Figure 24.--Distribution and relative abundance of sablefish from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

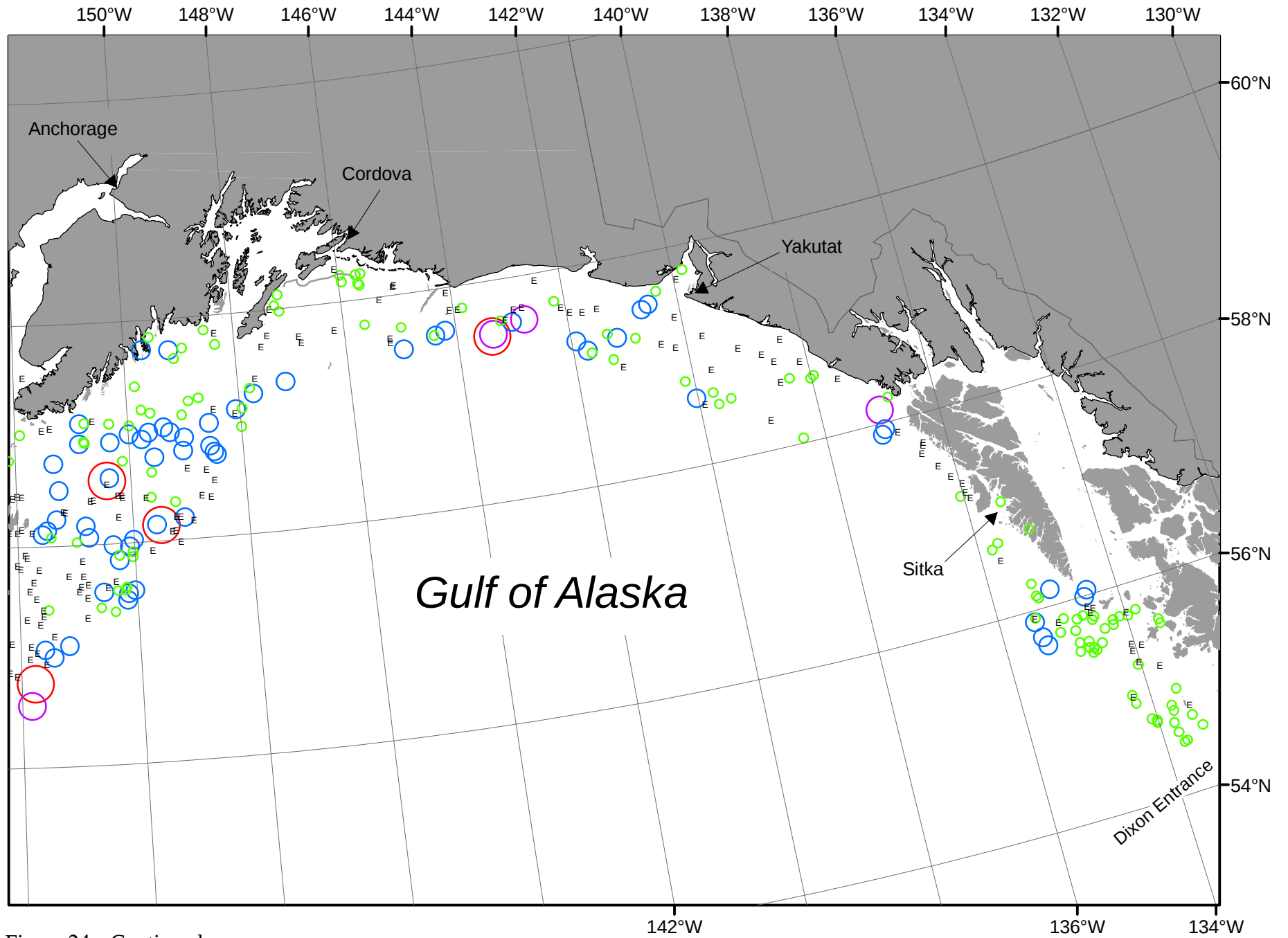


Figure 24.--Continued.

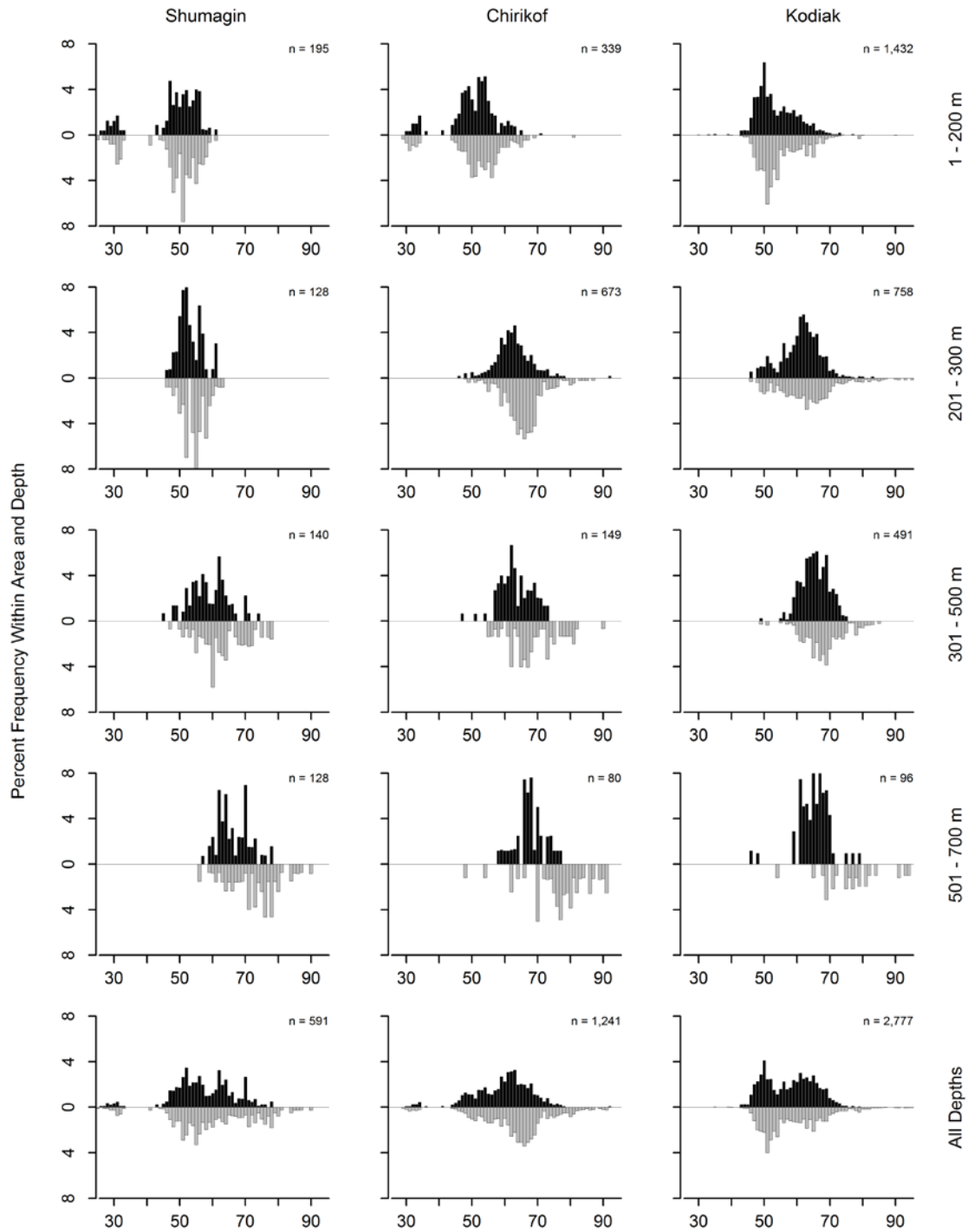


Figure 25. -- Size composition of sablefish from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

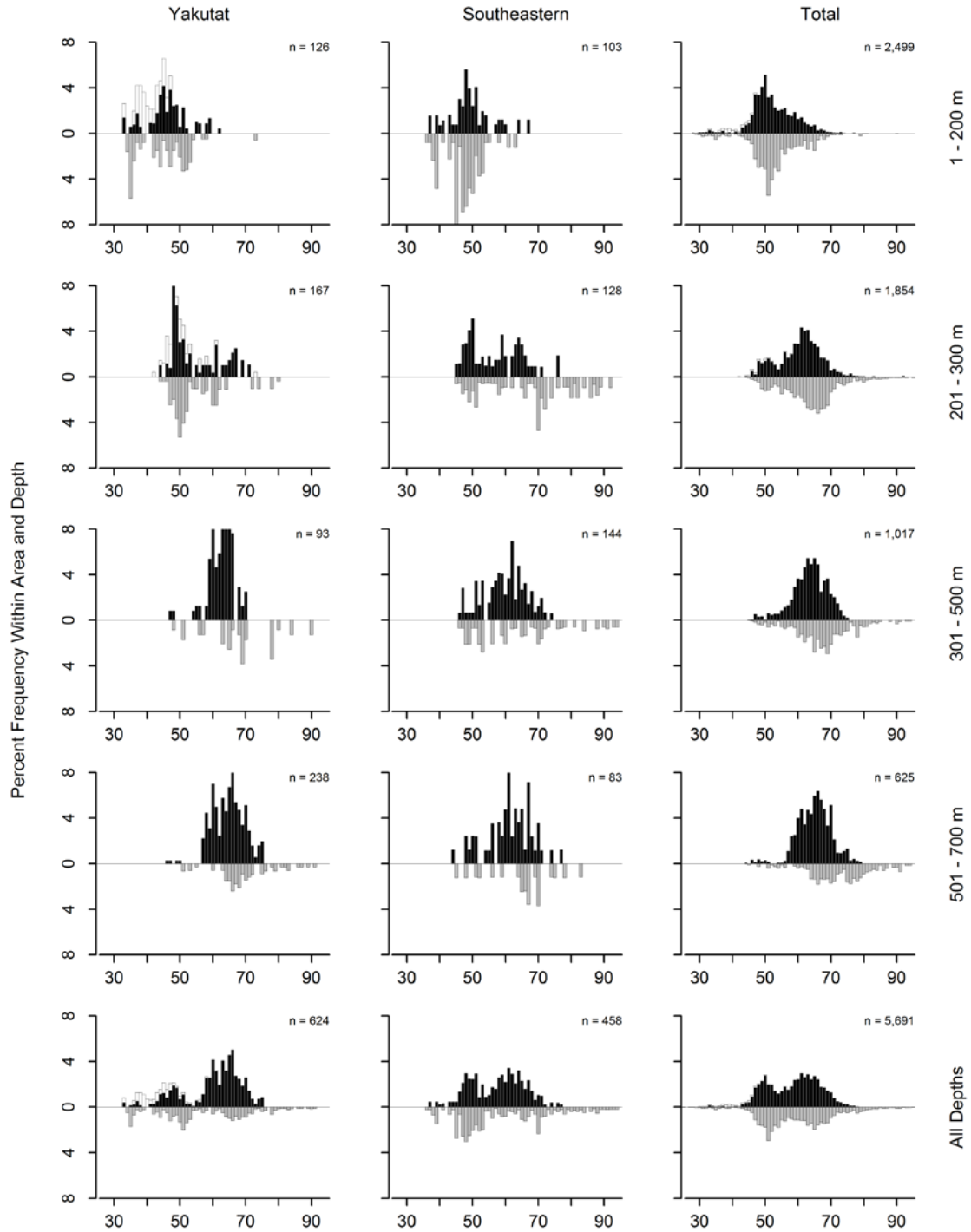


Figure 25. -- Continued (sablefish).

Table 34. -- Catch per unit of effort by stratum for sablefish sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Yakutat	501 - 700	Yakutat Slope	3	3	138.99	20,422	0	46,351
Kodiak	301 - 500	Kodiak Slope	9	9	81.16	23,632	2,764	44,500
Kodiak	201 - 300	Kodiak Slope	6	6	59.85	9,711	0	20,919
Kodiak	501 - 700	Kodiak Slope	2	2	55.37	9,661	0	49,375
Shumagin	501 - 700	Shumagin Slope	4	4	47.70	9,567	4,948	14,186
Chirikof	201 - 300	Chirikof Slope	7	7	45.31	6,925	1,855	11,995
Chirikof	501 - 700	Chirikof Slope	3	3	42.46	8,294	1,573	15,015
Kodiak	101 - 200	Portlock Flats	23	14	39.34	28,863	0	69,044
Chirikof	301 - 500	Chirikof Slope	5	5	38.98	6,252	1,677	10,827
Yakutat	301 - 500	Yakutat Gullies	2	2	30.55	3,382	0	38,015
Southeastern	501 - 700	Southeastern Slope	3	3	29.26	3,024	0	6,614
Kodiak	201 - 300	Kenai Gullies	16	16	26.60	17,712	11,298	24,126
Chirikof	201 - 300	Lower Shelikof Gully	18	18	25.94	25,985	3,687	48,284
Southeastern	201 - 300	Baranof-Chichagof Slope	4	3	24.89	2,801	0	9,166
Southeastern	301 - 500	Southeastern Deep Gullies	8	8	19.82	4,647	385	8,909
Shumagin	301 - 500	Shumagin Slope	9	9	15.93	4,032	1,237	6,827
Yakutat	301 - 500	Yakutat Slope	4	3	10.99	1,670	0	3,663
Kodiak	101 - 200	Barren Islands	14	13	9.82	10,785	3,805	17,766
Kodiak	101 - 200	Albatross Gullies	25	15	8.85	7,003	2,735	11,270
Shumagin	201 - 300	Shumagin Slope	10	9	8.27	2,305	1,064	3,547
Kodiak	101 - 200	Kodiak Outer Shelf	26	14	7.20	3,618	889	6,347
Yakutat	201 - 300	Yakutat Gullies	6	4	6.78	2,064	0	4,431
Yakutat	201 - 300	Yakutat Slope	11	9	5.84	1,241	141	2,342
Kodiak	1 - 100	Kenai Peninsula	8	3	4.67	2,459	0	7,545
Kodiak	101 - 200	Kenai Flats	18	14	4.17	5,038	1,349	8,727
Kodiak	201 - 300	Upper Shelikof Gully	3	3	4.09	1,314	282	2,345
Chirikof	101 - 200	Chirikof Outer Shelf	21	10	3.71	1,860	0	3,863
Chirikof	101 - 200	East Shumagin Gully	19	7	3.66	4,064	0	10,244
Shumagin	101 - 200	Shumagin Outer Shelf	33	11	2.66	2,166	192	4,140
Chirikof	101 - 200	Shelikof Edge	24	14	1.99	1,542	435	2,648
Yakutat	101 - 200	Middleton Shelf	12	9	1.88	1,378	580	2,176
Southeastern	101 - 200	Prince of Wales Shelf	20	14	1.82	1,250	627	1,874
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	20	1.76	693	462	924
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	3	1.40	588	0	1,456
Yakutat	101 - 200	Yakutat Flats	9	3	1.26	1,141	0	2,907
Southeastern	301 - 500	Southeastern Slope	2	1	0.79	61	0	840
Yakutat	1 - 100	Yakutat Shallows	8	2	0.72	715	0	2,349
Kodiak	1 - 100	Albatross Shallows	33	3	0.67	384	0	1,135
Kodiak	1 - 100	Northern Kodiak Shallows	9	4	0.66	145	0	354
Yakutat	101 - 200	Fairweather Shelf	9	4	0.49	380	0	1,098
Southeastern	1 - 100	Southeastern Shallows	13	5	0.48	312	0	642
Yakutat	1 - 100	Middleton Shallows	8	2	0.33	219	0	698
Shumagin	101 - 200	West Shumagin Gully	5	2	0.31	71	0	193
Chirikof	1 - 100	Upper Alaska Peninsula	18	2	0.24	191	0	558
Yakutat	101 - 200	Yakataga Shelf	7	2	0.16	84	0	233
Chirikof	1 - 100	Chirikof Bank	37	2	0.16	168	0	489
Shumagin	1 - 100	Lower Alaska Peninsula	33	6	0.12	83	0	180
Shumagin	1 - 100	Davidson Bank	62	4	0.10	143	0	337
Shumagin	101 - 200	Sanak Gully	8	1	0.05	23	0	76
Kodiak	1 - 100	Albatross Banks	41	2	0.04	58	0	151
Shumagin	1 - 100	Shumagin Bank	38	2	0.02	25	0	61

Giant grenadier (*Albatrossia pectoralis*)

Giant grenadier was the fifth most abundant species caught in the 2003 survey (Table 2). They were caught throughout the survey area, although they were caught almost exclusively in slope strata at depths exceeding 300 m (Fig. 26, Tables 35-36). Giant grenadier occurred in 41 out of 54 (76%) tows deeper than 300 m (Table 35). Mean CPUEs were very high in several of the slope strata where giant grenadier occurred (Table 36). The size composition of female giant grenadier was similar wherever they occurred; a relatively broad length mode was centered around 25-30 cm (snout to anal fin origin) (Fig. 27). Males were not caught in high enough numbers to discern any length pattern.

Table 35. -- Number of survey hauls, number of hauls with giant grenadier, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	0	---	---	---	---	---
	101 - 200	46	0	---	---	---	---	---
	201 - 300	10	6	17.53	4,888	418	9,358	3.746
	301 - 500	9	9	365.89	92,611	25,871	159,350	2.999
	501 - 700	4	4	249.28	49,995	16,776	83,214	2.847
	All depths	230	19	23.30	147,494	77,979	217,008	2.965
Chirikof	1 - 100	75	0	---	---	---	---	---
	101 - 200	64	0	---	---	---	---	---
	201 - 300	25	2	1.58	1,827	0	4,993	3.827
	301 - 500	5	4	415.78	66,689	0	154,035	3.122
	501 - 700	3	3	286.42	55,944	0	157,655	2.772
	All depths	172	9	19.15	124,460	10,269	238,652	2.962
Kodiak	1 - 100	106	0	---	---	---	---	---
	101 - 200	106	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	8	175.85	51,203	8,465	93,941	3.273
	501 - 700	2	2	91.28	15,926	12,825	19,027	2.864
	All depths	248	10	6.85	67,129	24,360	109,899	3.165
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	4	27.83	7,313	0	22,438	2.993
	501 - 700	3	3	332.18	48,806	0	152,616	2.335
	All depths	79	7	10.15	56,119	0	161,368	2.404
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	1	2.47	771	0	2,550	2.897
	501 - 700	3	3	8.96	926	0	2,224	1.608
	All depths	80	4	0.63	1,697	0	3,641	2.016
All areas	1 - 100	371	0	---	---	---	---	---
	101 - 200	281	0	---	---	---	---	---
	201 - 300	103	8	1.86	6,715	1,505	11,925	3.768
	301 - 500	39	26	170.88	218,588	115,404	321,772	3.096
	501 - 700	15	15	209.10	171,596	56,043	287,150	2.649
	All depths	809	49	12.87	396,900	253,052	540,747	2.894

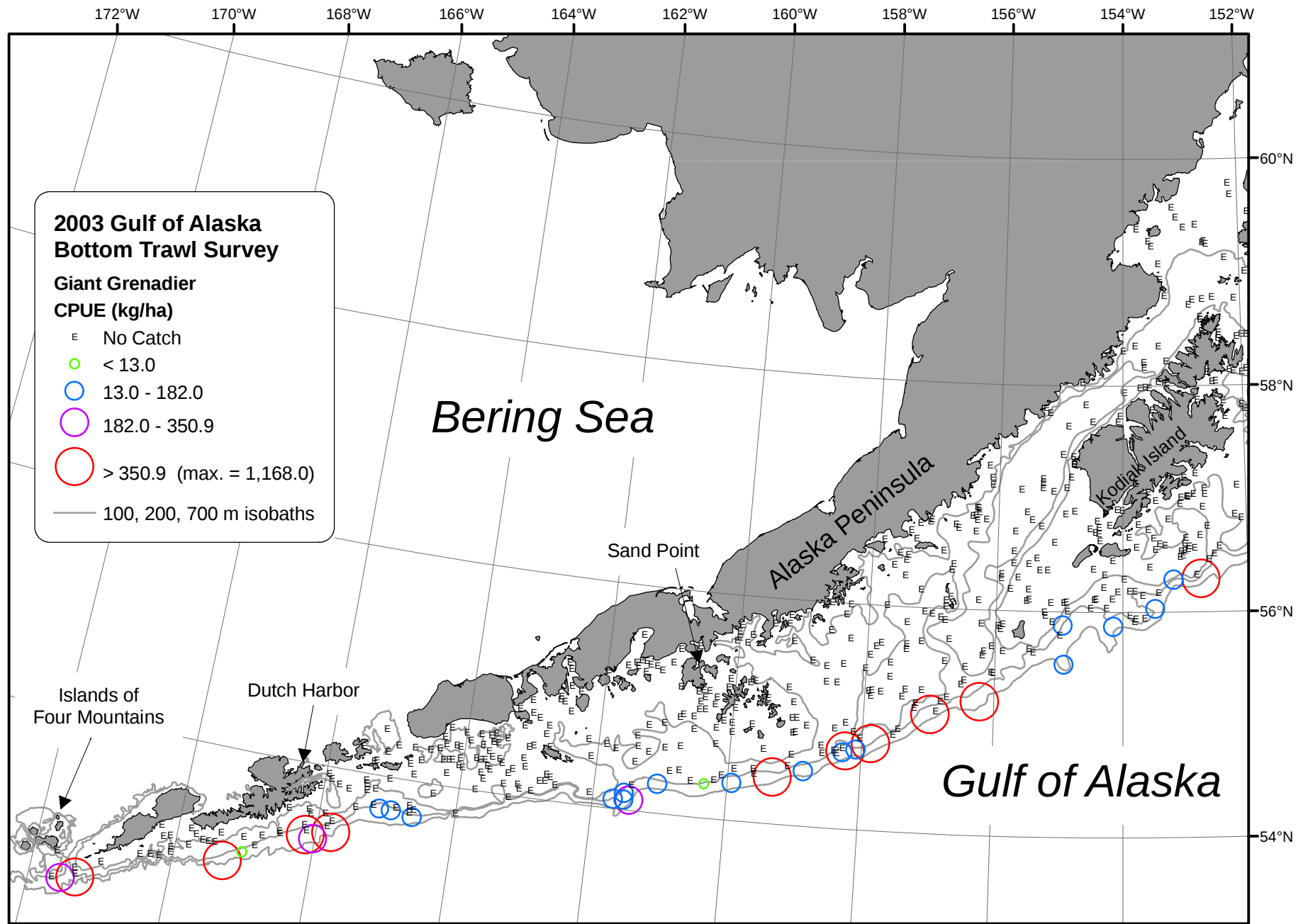
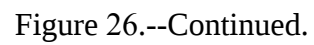


Figure 26.--Distribution and relative abundance of giant grenadier from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.



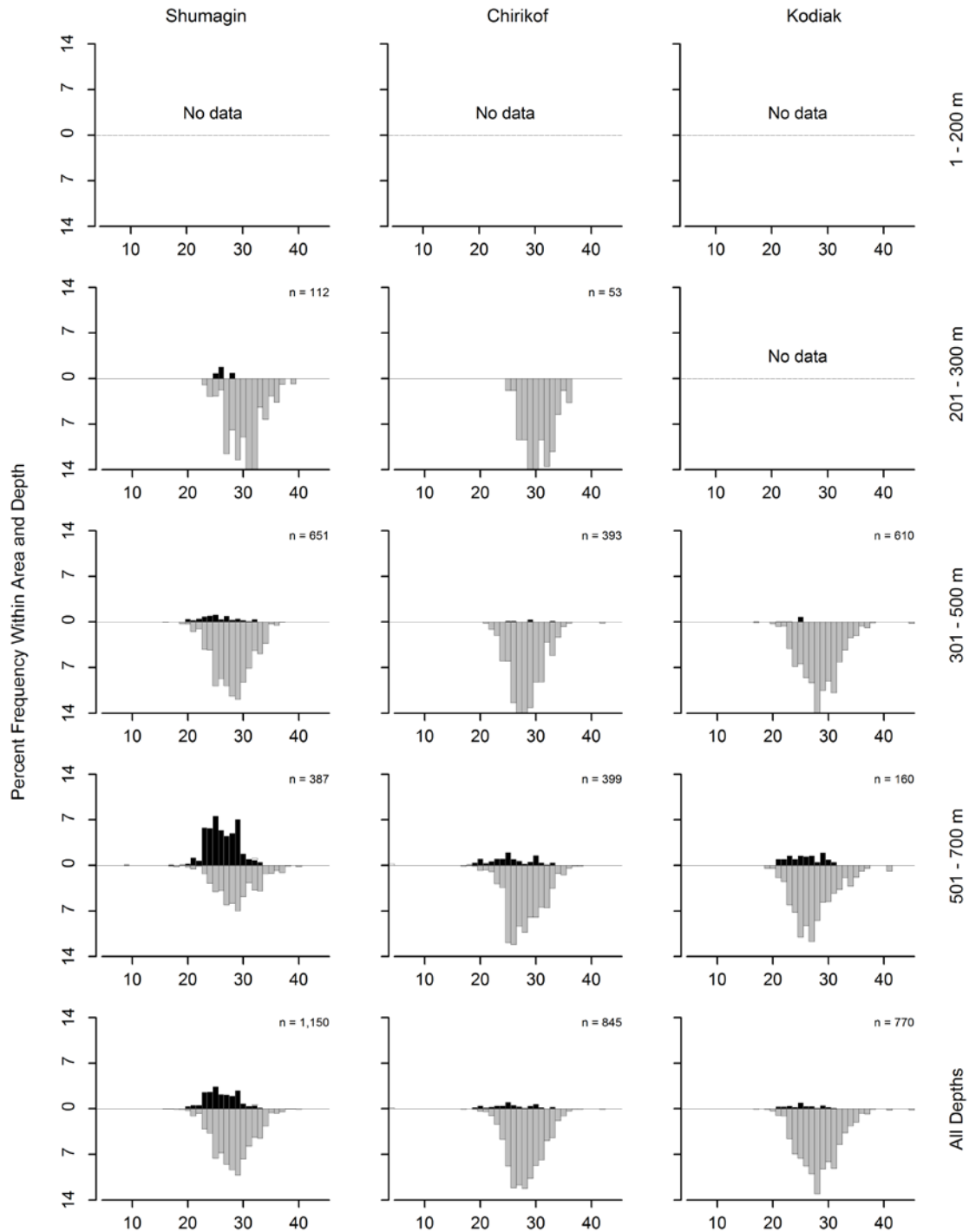


Figure 27. -- Size composition of giant grenadier from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

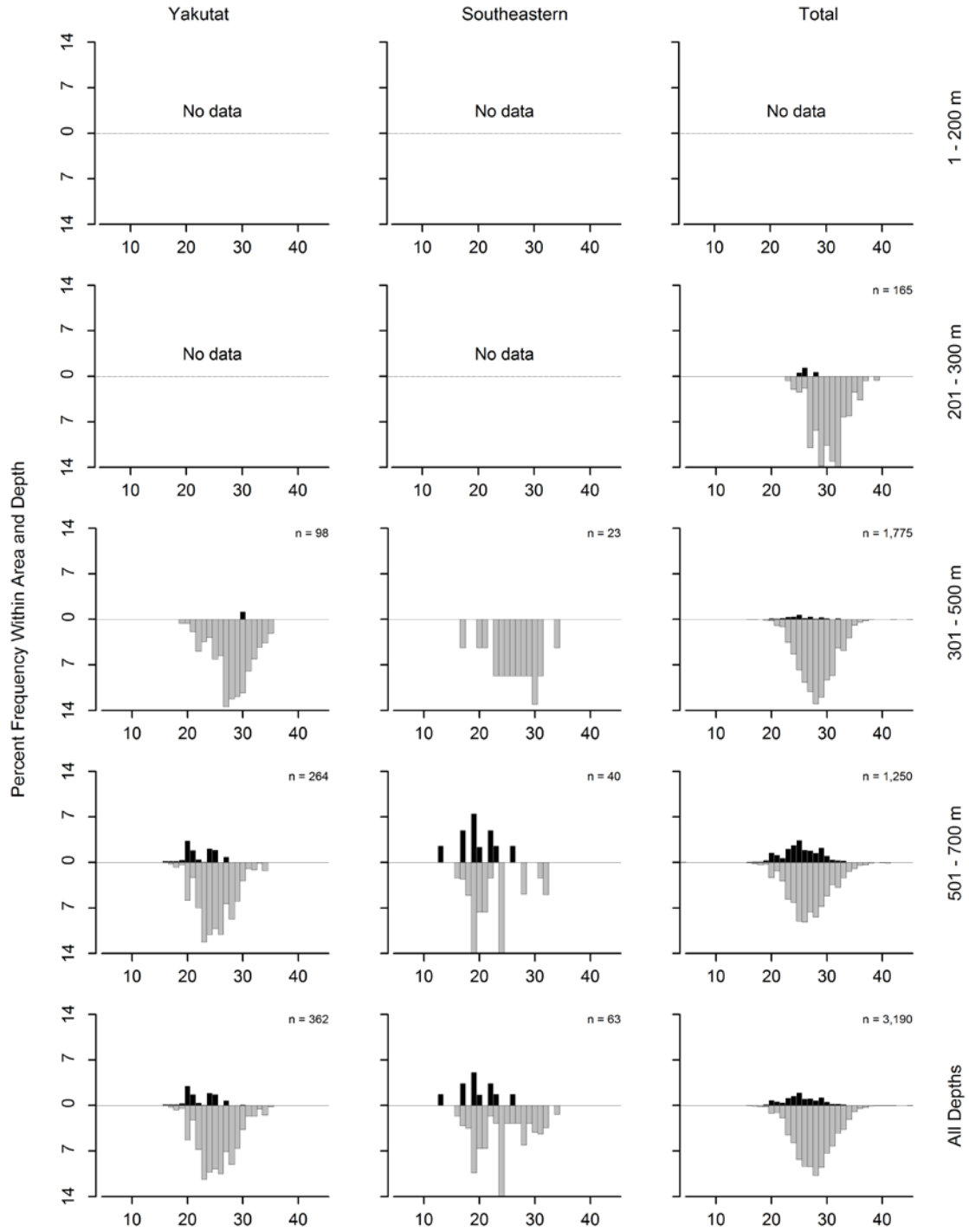


Figure 27. -- Continued (giant grenadier).

Table 36. -- Catch per unit of effort by stratum for giant grenadier sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Chirikof	301 - 500	Chirikof Slope	5	4	415.78	66,689	0	160,999
Shumagin	301 - 500	Shumagin Slope	9	9	365.89	92,611	24,573	160,649
Yakutat	501 - 700	Yakutat Slope	3	3	332.18	48,806	0	189,188
Chirikof	501 - 700	Chirikof Slope	3	3	286.42	55,944	0	193,487
Shumagin	501 - 700	Shumagin Slope	4	4	249.28	49,995	11,918	88,072
Kodiak	301 - 500	Kodiak Slope	9	8	175.85	51,203	7,634	94,773
Kodiak	501 - 700	Kodiak Slope	2	2	91.28	15,926	6,770	25,082
Yakutat	301 - 500	Yakutat Slope	4	3	44.88	6,824	0	24,090
Shumagin	201 - 300	Shumagin Slope	10	6	17.53	4,888	349	9,427
Chirikof	201 - 300	Chirikof Slope	7	2	11.96	1,827	0	5,103
Southeastern	501 - 700	Southeastern Slope	3	3	8.96	926	0	2,681
Yakutat	301 - 500	Yakutat Gullies	2	1	4.42	490	0	6,711
Southeastern	301 - 500	Southeastern Deep Gullies	8	1	3.29	771	0	2,595

ROCKFISHES

Pacific ocean perch (*Sebastes alutus*)

Pacific ocean perch was the third most abundant species caught in the 2003 survey and was by far the most abundant and widely distributed rockfish species encountered in the survey (Table 2). They were caught throughout the survey area in 47 of the 54 survey strata and at all depths (Tables 37). The highest concentrations were in the Chirikof Outer Shelf and Kodiak Outer Shelf strata as well as Shumagin Slope and Prince of Whales Slope/Gullies (Fig. 28, Table 38). Pacific ocean perch were encountered in only one tow deeper than 500 m. The CPUEs were highest in the 201-300 m depth range in the Shumagin, Southeastern, and Yakutat INPFC area, while the Chirikof and Kodiak areas had greater concentrations in the 100 to 200 m depth range. The Kodiak area had the highest estimated biomass (Table 37). Approximately 62% of the estimated population biomass was recorded in the 101 to 200 m depth range and over 97% of it was found in the 101 to 300 m range. The length distribution showed a distinct mode at around 18-22 cm in the shallowest zone of the Shumagin, Chirikof, and Kodiak INPFC areas. Catch numbers in the shallow zone of the Yakutat and Southeastern INPFC areas were too low to make any such comparisons. Larger fish (30 - 48 cm) were found in all areas deeper than 100 m (Fig. 29).

Table 37. -- Number of survey hauls, number of hauls with Pacific ocean perch, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	22	1.14	4,700	0	10,793	0.223
	101 - 200	46	25	20.49	30,079	0	62,836	0.602
	201 - 300	10	9	135.73	37,842	0	106,961	0.608
	301 - 500	9	5	0.91	230	0	549	0.647
	501 - 700	4	0	---	---	---	---	---
	All depths	230	61	11.51	72,851	1,052	144,649	0.545
Chirikof	1 - 100	75	8	0.10	256	0	562	0.239
	101 - 200	64	36	35.32	84,233	22,726	145,740	0.586
	201 - 300	25	14	27.49	31,745	0	80,865	0.661
	301 - 500	5	2	0.27	44	0	116	0.629
	501 - 700	3	0	---	---	---	---	---
	All depths	172	60	17.89	116,278	39,049	193,506	0.603
Kodiak	1 - 100	106	12	0.36	1,373	0	2,820	0.218
	101 - 200	106	63	34.36	148,889	60,773	237,005	0.75
	201 - 300	25	23	14.33	16,465	585	32,344	0.742
	301 - 500	9	3	0.24	68	0	184	0.593
	501 - 700	2	0	---	---	---	---	---
	All depths	248	101	17.02	166,795	77,404	256,187	0.735
Yakutat	1 - 100	16	1	---	2	0	8	0.015
	101 - 200	37	19	1.31	3,843	0	11,484	0.206
	201 - 300	17	15	42.49	21,969	0	50,673	0.598
	301 - 500	6	4	7.37	1,937	0	7,128	0.647
	501 - 700	3	1	0.07	11	0	44	0.595
	All depths	79	40	5.02	27,762	0	56,753	0.474
Southeastern	1 - 100	13	3	0.08	52	0	139	0.168
	101 - 200	28	17	15.18	16,829	3,147	30,510	0.206
	201 - 300	26	25	100.41	50,728	15,807	85,650	0.639
	301 - 500	10	8	19.66	6,128	0	13,021	0.816
	501 - 700	3	0	---	---	---	---	---
	All depths	80	53	27.48	73,737	36,876	110,598	0.436
All areas	1 - 100	371	46	0.49	6,383	120	12,646	0.221
	101 - 200	281	160	23.21	283,873	171,836	395,909	0.576
	201 - 300	103	86	44.04	158,749	66,744	250,753	0.639
	301 - 500	39	22	6.57	8,407	1,629	15,184	0.761
	501 - 700	15	1	0.01	11	0	44	0.595
	All depths	809	315	14.83	457,422	314,832	600,011	0.586

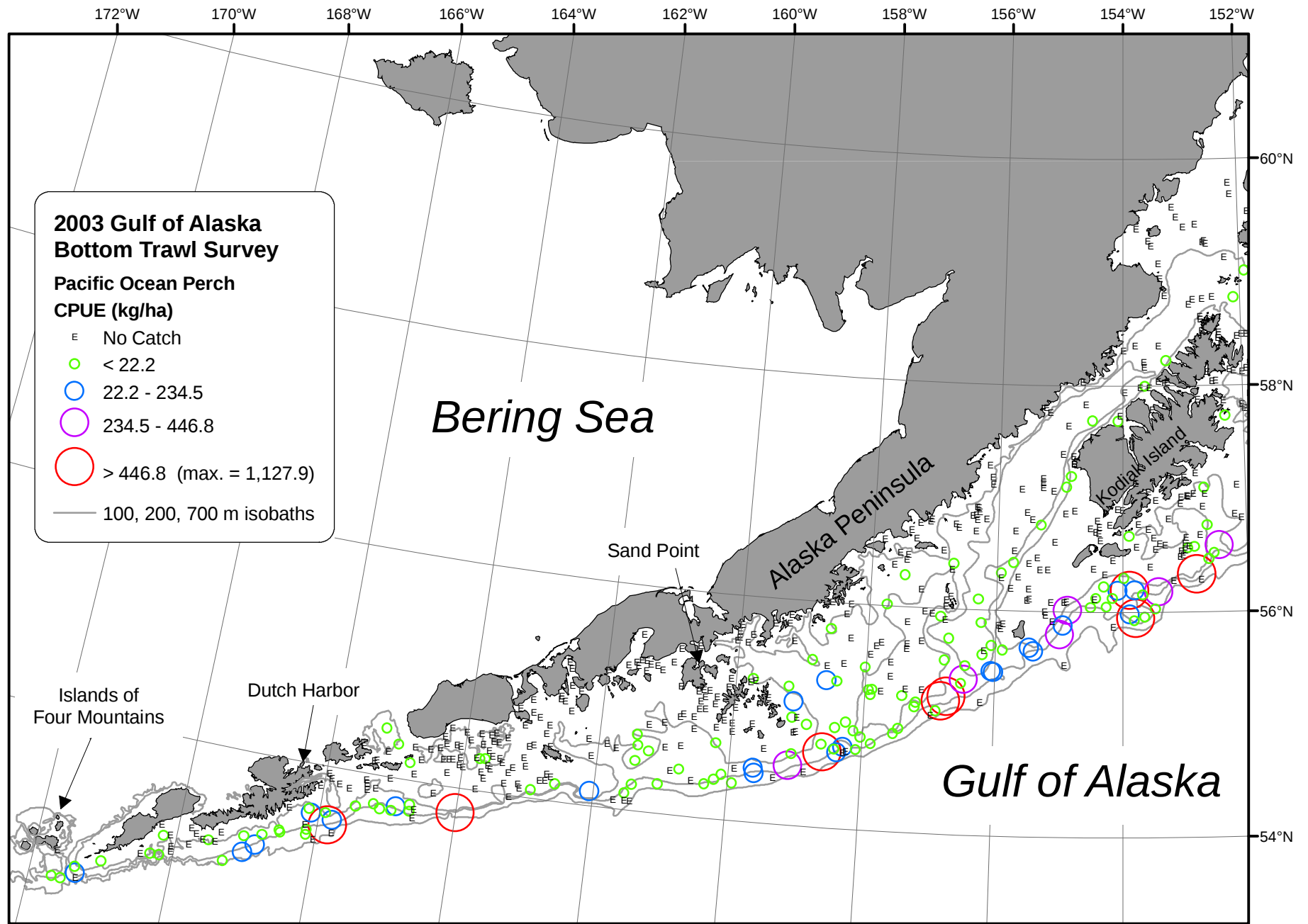


Figure 28.--Distribution and relative abundance of Pacific ocean perch from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

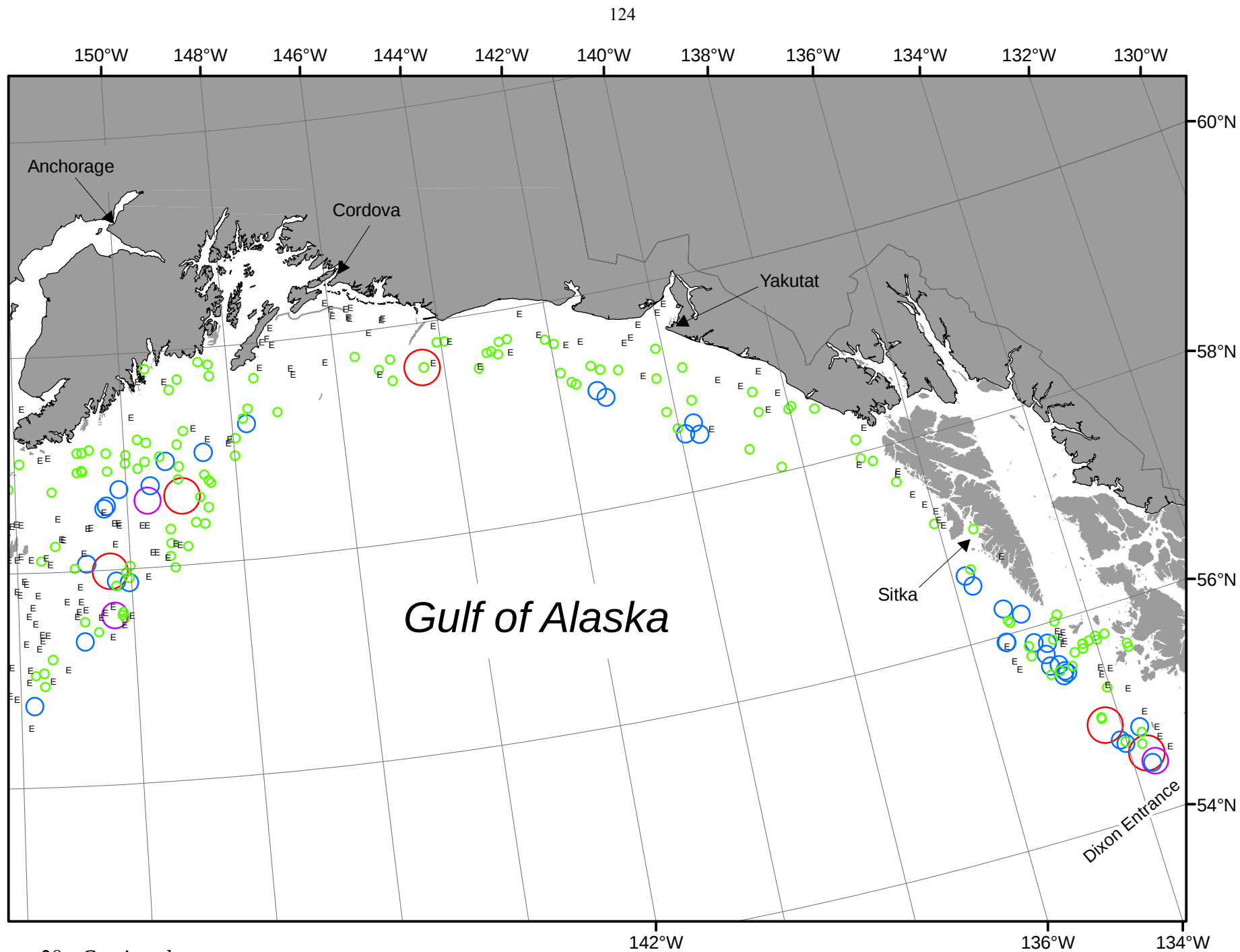


Figure 28.--Continued.

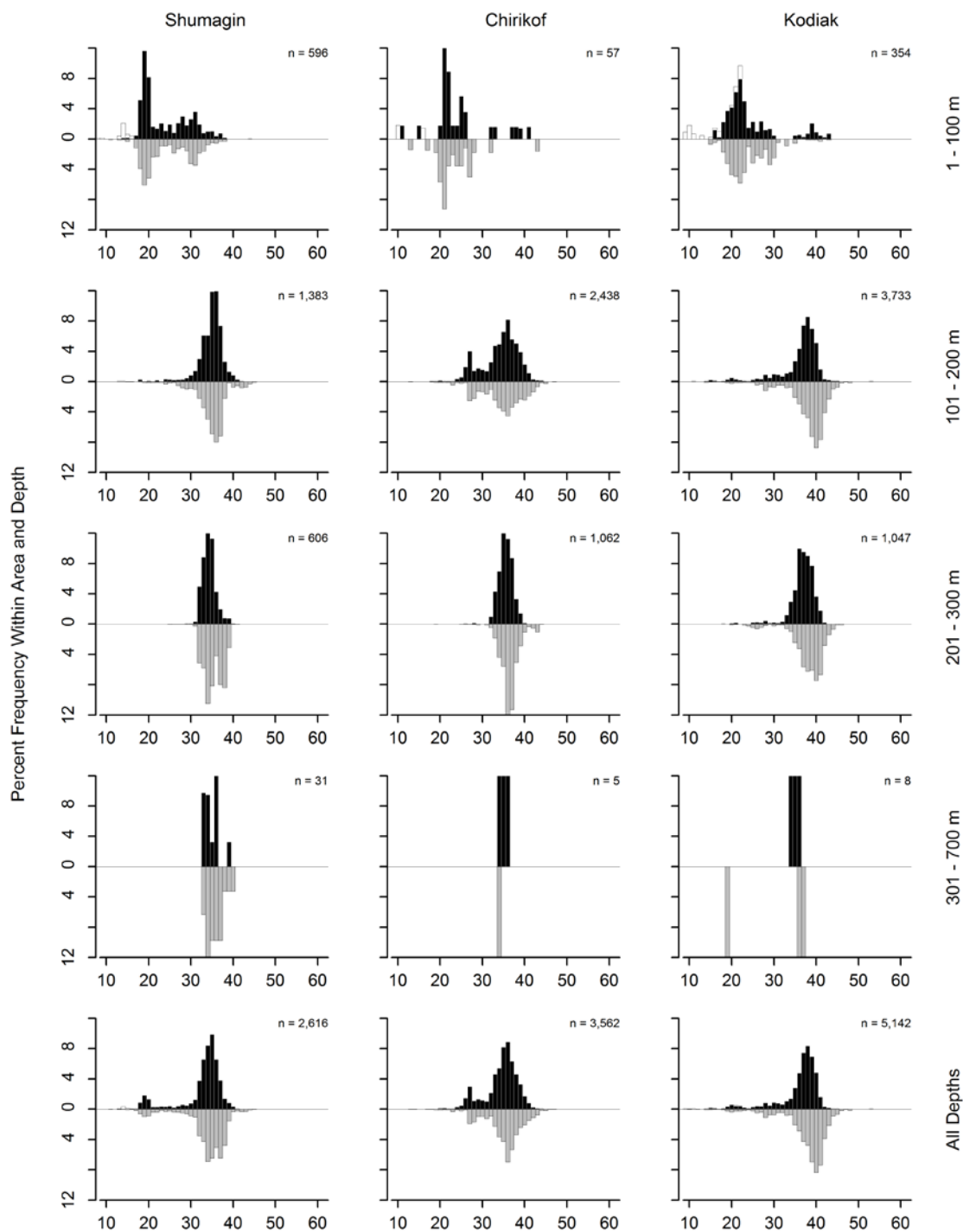


Figure 29. -- Size composition of Pacific ocean perch from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

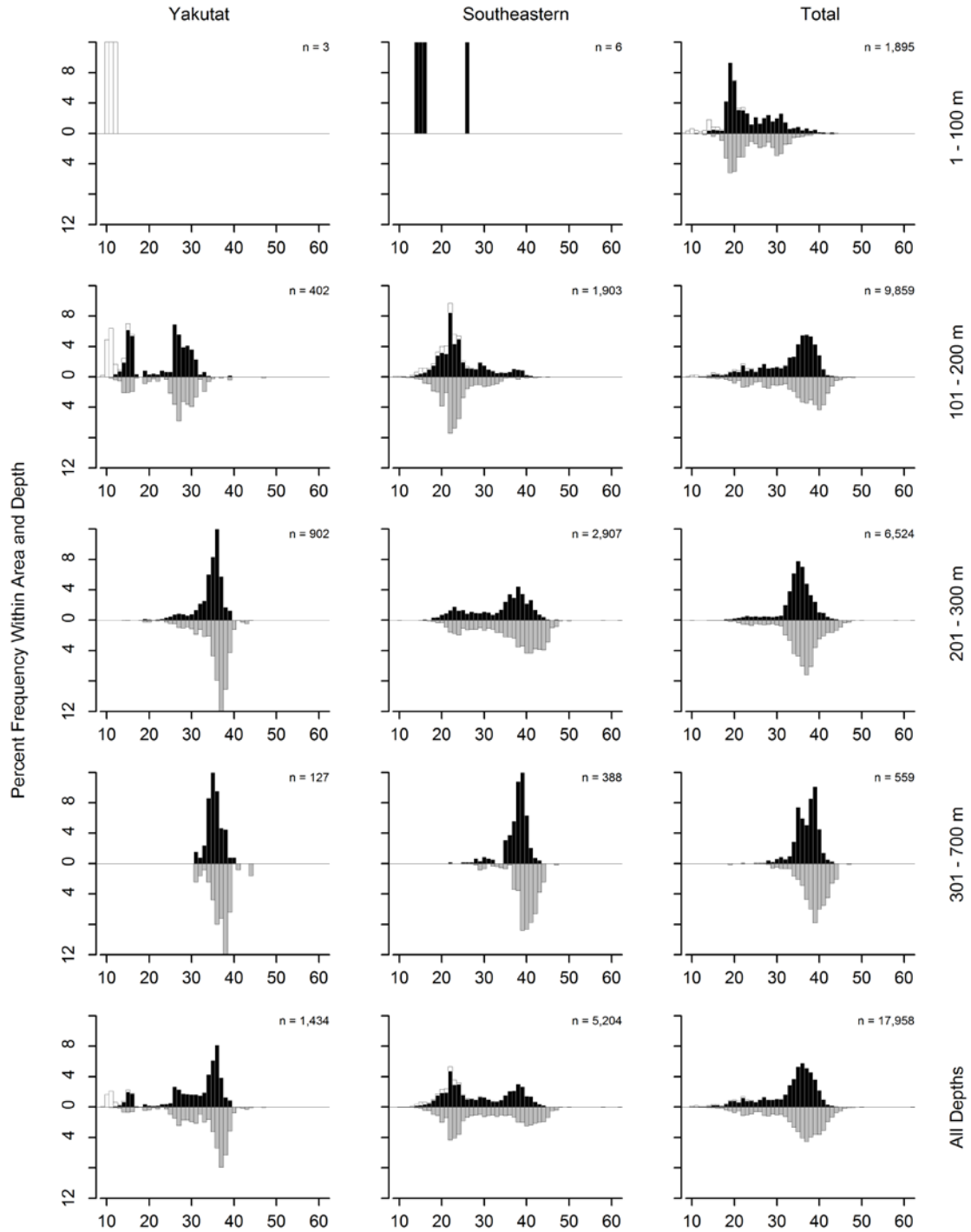


Figure 29. -- Continued (Pacific ocean perch).

Table 38. --Catch per unit of effort by stratum for Pacific Ocean perch sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Chirikof	101 - 200	Chirikof Outer Shelf	21	20	158.17	79,257	17,598	140,915
Kodiak	101 - 200	Kodiak Outer Shelf	26	23	151.61	76,195	16,935	135,454
Shumagin	201 - 300	Shumagin Slope	10	9	135.73	37,842	0	108,015
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	21	113.85	44,707	10,076	79,339
Yakutat	201 - 300	Yakutat Slope	11	11	69.89	14,867	0	41,310
Kodiak	101 - 200	Portlock Flats	23	15	59.73	43,817	0	97,380
Southeastern	301 - 500	Southeastern Slope	2	2	59.50	4,597	0	30,793
Chirikof	201 - 300	Chirikof Slope	7	7	54.86	8,384	0	17,806
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	53.51	6,021	0	14,005
Shumagin	101 - 200	Shumagin Outer Shelf	33	23	36.82	30,020	0	62,777
Kodiak	101 - 200	Albatross Gullies	25	7	31.91	25,243	0	68,703
Yakutat	201 - 300	Yakutat Gullies	6	4	23.34	7,102	0	23,479
Chirikof	201 - 300	Lower Shelikof Gully	18	7	23.32	23,361	0	72,018
Kodiak	201 - 300	Kenai Gullies	16	16	20.58	13,704	0	29,398
Southeastern	101 - 200	Prince of Wales Shelf	20	12	18.51	12,747	486	25,007
Kodiak	201 - 300	Kodiak Slope	6	6	16.83	2,731	0	6,241
Yakutat	301 - 500	Yakutat Slope	4	3	12.47	1,895	0	7,844
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	5	9.73	4,082	0	11,613
Southeastern	301 - 500	Southeastern Deep Gullies	8	6	6.53	1,531	0	3,104
Chirikof	101 - 200	East Shumagin Gully	19	8	3.89	4,318	0	10,914
Yakutat	101 - 200	Yakutat Flats	9	7	3.87	3,498	0	11,281
Shumagin	1 - 100	Davidson Bank	62	7	2.10	2,876	0	8,470
Kodiak	101 - 200	Barren Islands	14	4	1.64	1,805	0	5,368
Kodiak	101 - 200	Kenai Flats	18	14	1.52	1,830	363	3,297
Kodiak	1 - 100	Kenai Peninsula	8	3	1.15	607	0	1,868
Shumagin	1 - 100	Shumagin Bank	38	9	1.12	1,390	0	3,777
Shumagin	301 - 500	Shumagin Slope	9	5	0.91	230	0	556
Chirikof	101 - 200	Shelikof Edge	24	8	0.85	658	0	1,614
Shumagin	1 - 100	Fox Islands	28	6	0.52	433	0	1,056
Kodiak	1 - 100	Albatross Banks	41	6	0.48	735	0	1,676
Yakutat	301 - 500	Yakutat Gullies	2	1	0.37	41	0	567
Chirikof	301 - 500	Chirikof Slope	5	2	0.27	44	0	122
Yakutat	101 - 200	Yakataga Shelf	7	3	0.24	125	0	282
Kodiak	301 - 500	Kodiak Slope	9	3	0.24	68	0	186
Yakutat	101 - 200	Fairweather Shelf	9	6	0.22	167	0	433
Chirikof	1 - 100	Semidi Bank	20	6	0.17	127	0	296
Chirikof	1 - 100	Upper Alaska Peninsula	18	1	0.16	126	0	392
Shumagin	101 - 200	Sanak Gully	8	1	0.11	46	0	154
Kodiak	201 - 300	Upper Shelikof Gully	3	1	0.10	31	0	162
Southeastern	1 - 100	Southeastern Shallows	13	3	0.08	52	0	140
Yakutat	101 - 200	Middleton Shelf	12	3	0.07	53	0	161
Yakutat	501 - 700	Yakutat Slope	3	1	0.07	11	0	56
Shumagin	101 - 200	West Shumagin Gully	5	1	0.06	13	0	51
Kodiak	1 - 100	Albatross Shallows	33	2	0.05	31	0	82
Chirikof	1 - 100	Chirikof Bank	37	1	<0.01	3	0	9
Kodiak	1 - 100	Northern Kodiak Shallows	9	1	<0.01	1	0	2
Yakutat	1 - 100	Yakutat Shallows	8	1	<0.01	2	0	8

Northern rockfish (*Sebastes polyspinis*)

Northern rockfish was the seventeenth most abundant species and the fourth most abundant rockfish species caught in the 2003 survey (Table 2). With the exception of one fish in the Yakutat area, this species was only encountered in the Shumagin, Chirikof, and Kodiak INPFC areas with 75% of those coming from the Chirikof area (Fig. 30, Table 39). This species was virtually always caught in water less than 200 m deep. The highest CPUEs of northern rockfish came from the Chirikof Outer Shelf and Chirikof Bank strata (Table 40). The length distribution of northern rockfish caught during the survey showed a mode around 35-40 cm for both sexes (Fig. 31).

Table 39. --Number of survey hauls, number of hauls with northern rockfish, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	18	1.47	6,064	0	13,081	0.682
	101 - 200	46	24	2.02	2,969	46	5,892	0.729
	201 - 300	10	3	0.40	112	0	325	0.628
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	45	1.45	9,146	1,565	16,726	0.696
Chirikof	1 - 100	75	5	13.12	34,162	0	97,494	0.901
	101 - 200	64	24	6.51	15,519	3,134	27,903	0.838
	201 - 300	25	6	0.10	113	1	225	0.528
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	35	7.66	49,793	0	114,282	0.879
Kodiak	1 - 100	106	9	0.61	2,333	0	5,974	0.55
	101 - 200	106	32	1.14	4,955	0	9,973	0.825
	201 - 300	25	4	0.07	78	0	174	0.54
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	45	0.75	7,366	1,231	13,502	0.709
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	0	---	---	---	---	---
	201 - 300	17	1	0.01	5	0	17	0.661
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	1	---	5	0	17	0.661
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	0	---	---	---	---	---
All areas	1 - 100	371	32	3.30	42,559	0	106,401	0.834
	101 - 200	281	80	1.92	23,443	9,950	36,936	0.82
	201 - 300	103	14	0.09	308	68	549	0.566
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	126	2.15	66,310	1,728	130,892	0.827

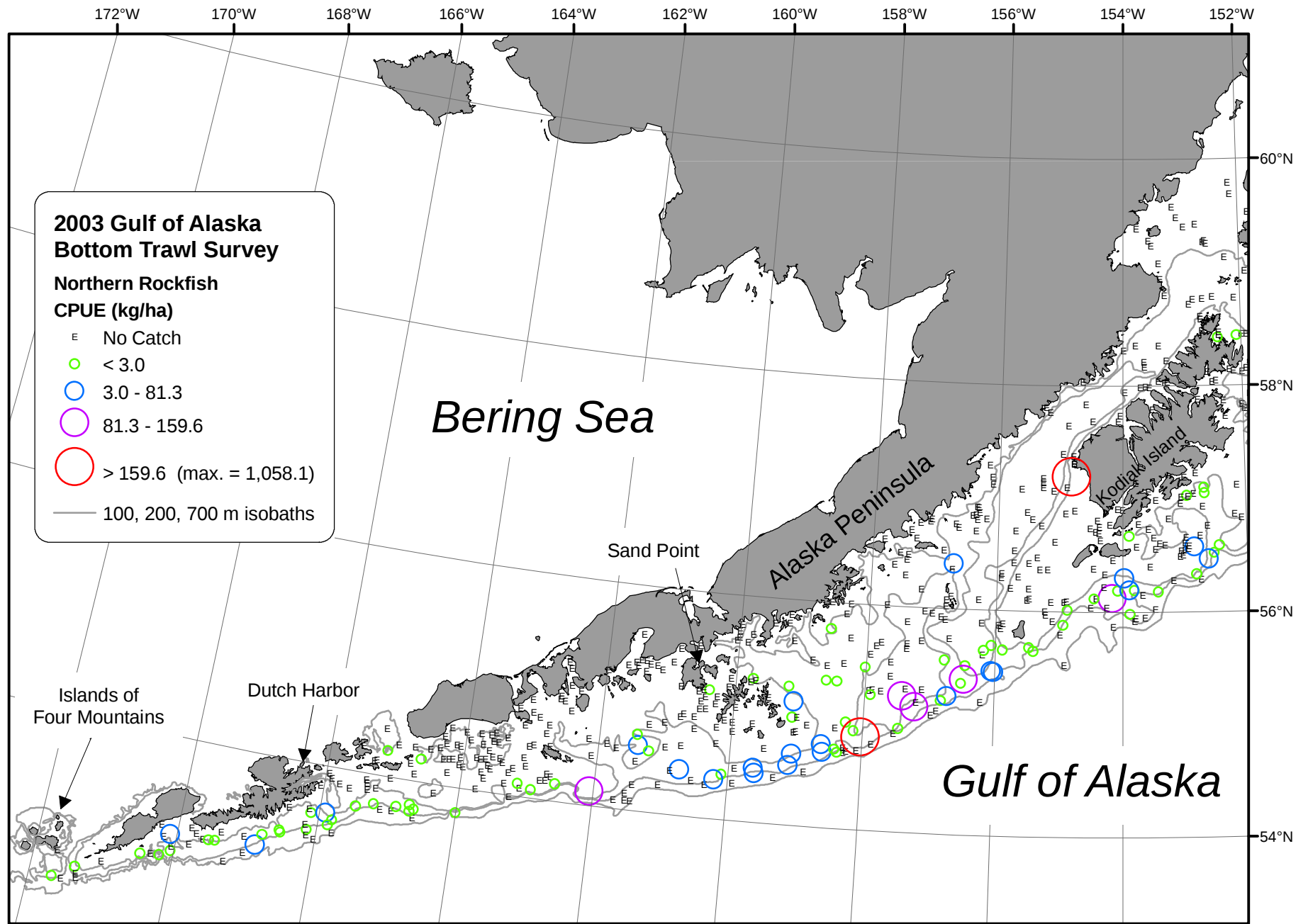


Figure 30.--Distribution and relative abundance of northern rockfish from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

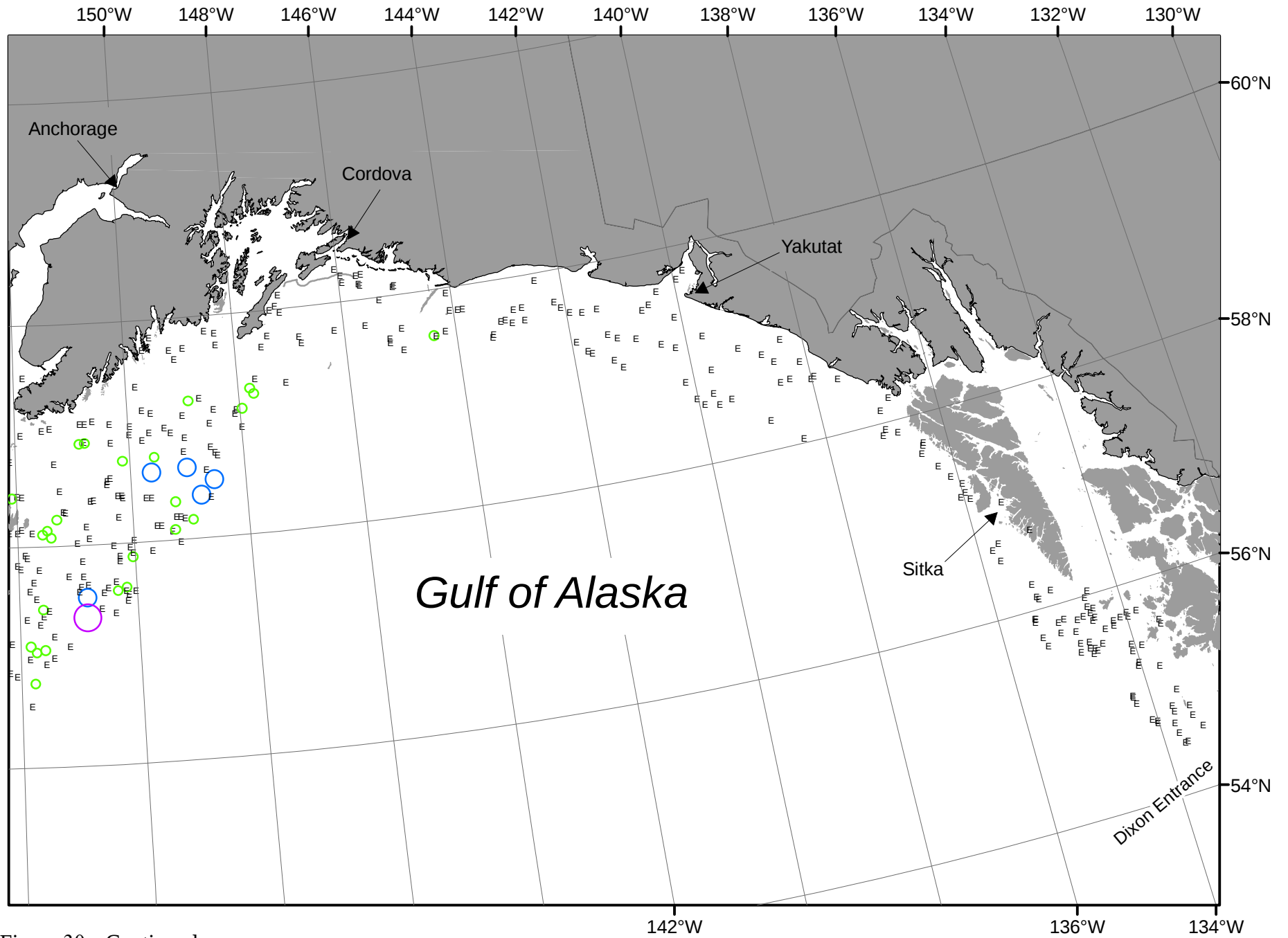


Figure 30.--Continued.

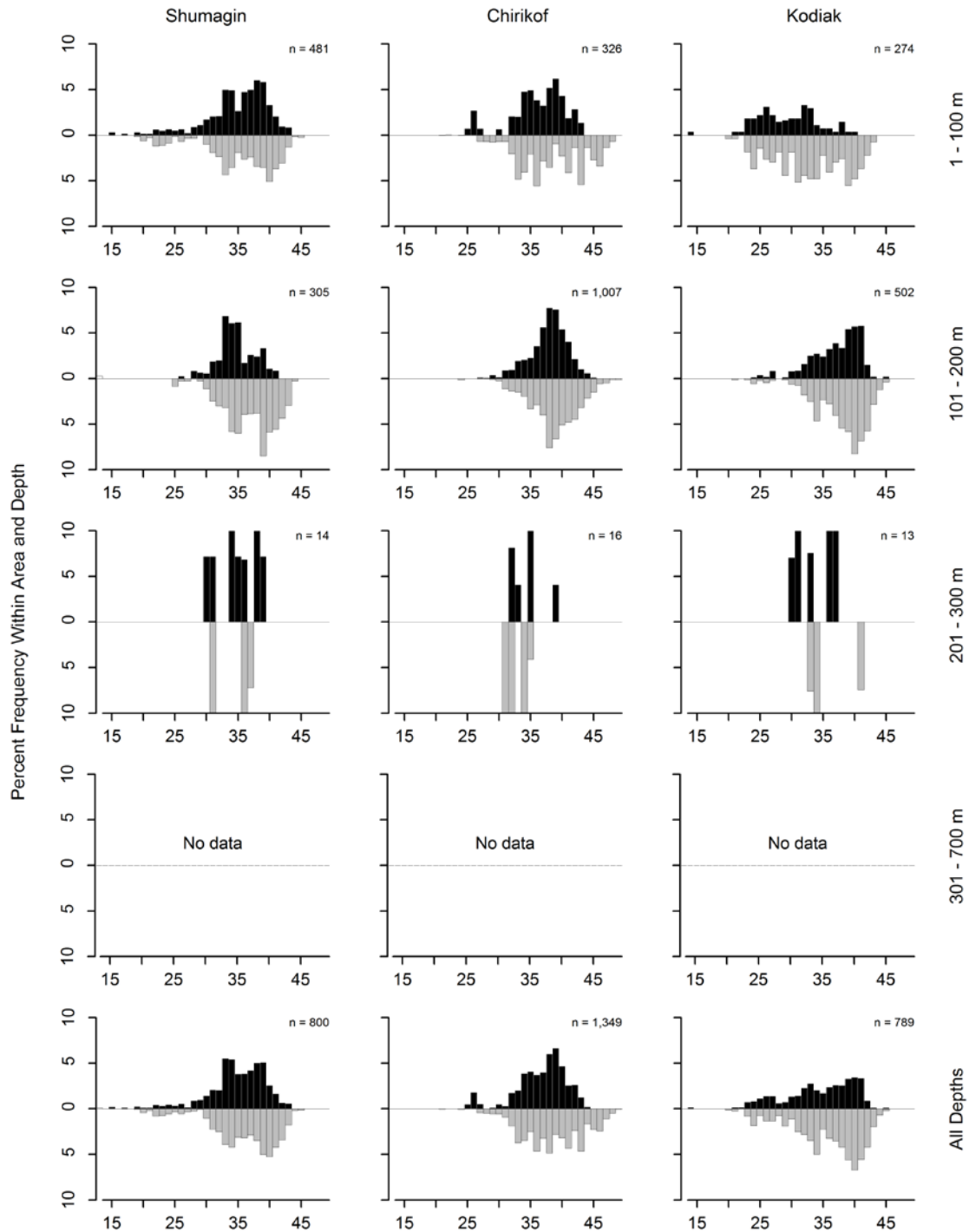


Figure 31. -- Size composition of northern rockfish from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

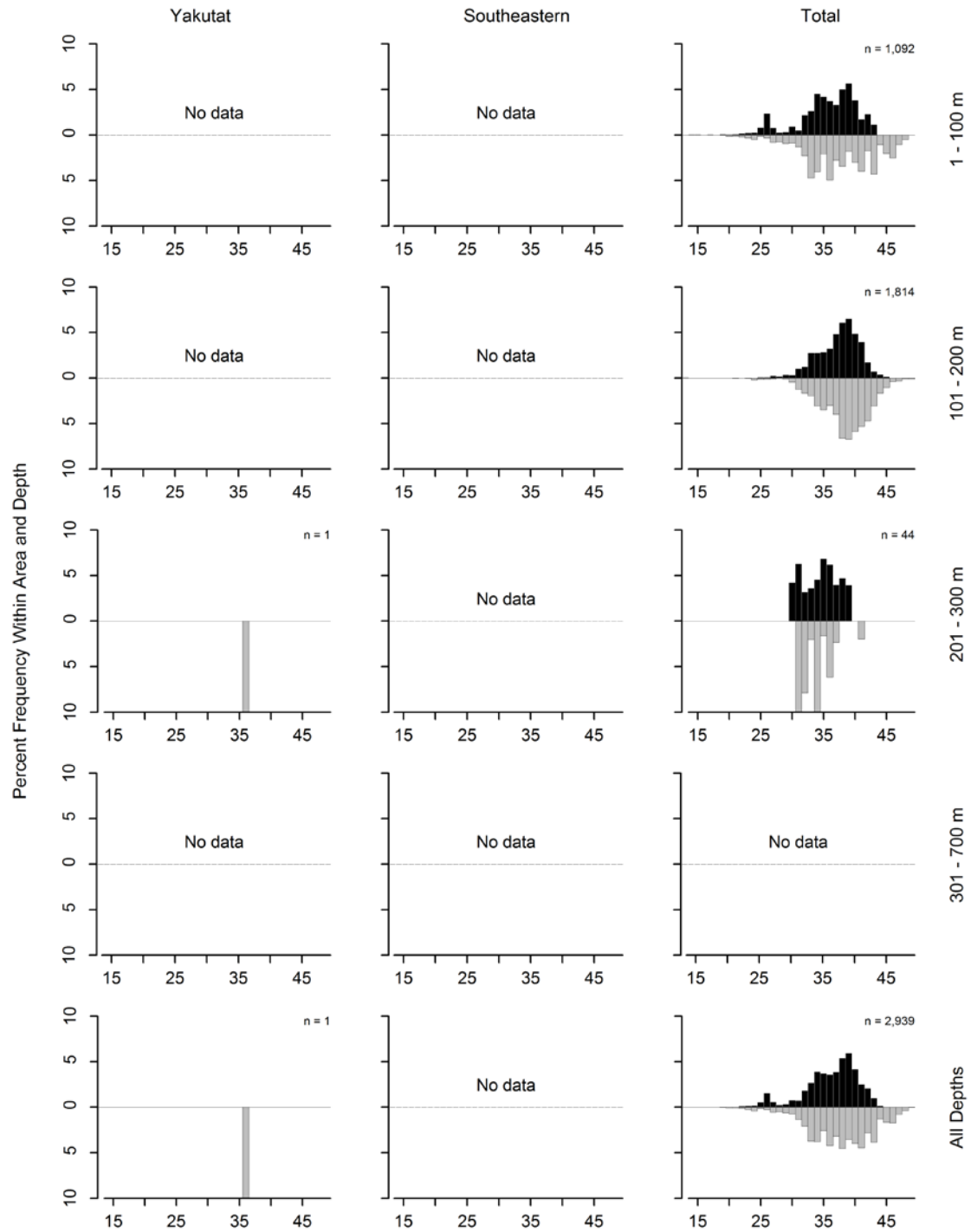


Figure 31. -- Continued (northern rockfish).

Table 40. -- Catch per unit of effort by stratum for northern rockfish sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Chirikof	101 - 200	Chirikof Outer Shelf	21	17	29.59	14,826	2,430	27,222
Chirikof	1 - 100	Chirikof Bank	37	1	28.60	30,861	0	93,880
Kodiak	101 - 200	Kodiak Outer Shelf	26	16	5.75	2,889	0	6,737
Chirikof	1 - 100	Semidi Bank	20	3	4.34	3,172	0	9,617
Shumagin	101 - 200	Shumagin Outer Shelf	33	22	3.57	2,914	0	5,836
Kodiak	101 - 200	Portlock Flats	23	8	2.66	1,951	0	5,342
Shumagin	1 - 100	Fox Islands	28	6	2.45	2,043	0	5,613
Shumagin	1 - 100	Davidson Bank	62	5	2.27	3,112	0	9,120
Kodiak	1 - 100	Albatross Banks	41	5	1.51	2,321	0	5,962
Shumagin	1 - 100	Shumagin Bank	38	7	0.73	910	0	1,943
Chirikof	101 - 200	Shelikof Edge	24	2	0.54	414	0	1,103
Kodiak	201 - 300	Kodiak Slope	6	3	0.43	69	0	177
Shumagin	201 - 300	Shumagin Slope	10	3	0.40	112	0	328
Chirikof	201 - 300	Chirikof Slope	7	3	0.33	50	0	137
Chirikof	101 - 200	East Shumagin Gully	19	5	0.25	279	0	628
Chirikof	1 - 100	Upper Alaska Peninsula	18	1	0.16	128	0	399
Shumagin	101 - 200	Sanak Gully	8	1	0.09	37	0	124
Shumagin	101 - 200	West Shumagin Gully	5	1	0.08	19	0	70
Kodiak	101 - 200	Albatross Gullies	25	6	0.07	55	9	102
Chirikof	201 - 300	Lower Shelikof Gully	18	3	0.06	63	0	148
Kodiak	101 - 200	Kenai Flats	18	2	0.05	60	0	154
Yakutat	201 - 300	Yakutat Slope	11	1	0.02	5	0	17
Kodiak	1 - 100	Albatross Shallows	33	4	0.02	12	0	24
Kodiak	201 - 300	Kenai Gullies	16	1	0.01	9	0	28

Rougheye rockfish (*Sebastes aleutianus*)

In recent years, the species previously referred to as rougheye rockfish was morphometrically and genetically shown to be two separate species - the rougheye rockfish (*Sebastes aleutianus*) and the blackspotted rockfish (*S. melanostictus*)(Orr and Hawkins 2008). In the year of this survey, they had not been distinguished and were all considered to be rougheye rockfish. Rougheye rockfish were found throughout the entire survey area (Fig. 32, Table 41). This species was encountered in each of the five INPFC areas and at each of the depth zones, although there were only three tows in the 500-700 m depth range where rougheye were encountered. About 60% of the estimated biomass exists in depths between 300 and 500 m (Fig. 32, Tables 41-42). The Kodiak INPFC area had the highest estimated biomass overall, however the highest concentration within a stratum was located within the Southeastern Slope stratum in the Southeastern INPFC area. This stratum contained over 12% of the estimated biomass even though it contains only 0.25% of the area surveyed (Table 42). Size generally increased with depth. The length data showed a strong mode for both males and females around 44 cm in water deeper than 300 m in all but the Yakutat INPFC areas (Fig. 33).

Table 41. -- Number of survey hauls, number of hauls with roughey rockfish, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	3	0.02	73	0	167	0.727
	101 - 200	46	8	0.22	324	0	735	0.422
	201 - 300	10	8	5.85	1,631	0	3,419	0.959
	301 - 500	9	7	27.24	6,894	263	13,524	1.229
	501 - 700	4	0	---	---	---	---	---
	All depths	230	26	1.41	8,921	2,219	15,623	1.091
Chirikof	1 - 100	75	2	0.03	75	0	204	0.485
	101 - 200	64	23	0.53	1,271	255	2,287	0.48
	201 - 300	25	18	3.99	4,608	1,065	8,152	1.247
	301 - 500	5	5	27.02	4,334	0	12,299	1.464
	501 - 700	3	0	---	---	---	---	---
	All depths	172	48	1.58	10,288	2,974	17,602	1.088
Kodiak	1 - 100	106	13	0.16	612	0	1,260	0.314
	101 - 200	106	35	0.88	3,830	1,760	5,900	0.493
	201 - 300	25	23	2.39	2,741	1,791	3,690	0.733
	301 - 500	9	6	24.32	7,081	76	14,086	1.318
	501 - 700	2	2	0.34	59	0	198	0.959
	All depths	248	79	1.46	14,322	7,559	21,085	0.759
Yakutat	1 - 100	16	3	0.19	317	0	782	0.123
	101 - 200	37	20	0.26	757	217	1,296	0.277
	201 - 300	17	11	0.68	352	59	645	0.292
	301 - 500	6	4	1.36	358	0	1,265	1.18
	501 - 700	3	0	---	---	---	---	---
	All depths	79	38	0.32	1,783	935	2,631	0.261
Southeastern	1 - 100	13	2	0.49	319	0	791	0.481
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	4	0.47	236	0	591	0.692
	301 - 500	10	8	23.42	7,300	0	16,946	1.514
	501 - 700	3	1	0.32	33	0	138	2.36
	All depths	80	15	2.94	7,888	0	17,565	1.351
All areas	1 - 100	371	23	0.11	1,396	543	2,249	0.256
	101 - 200	281	86	0.51	6,182	3,826	8,538	0.444
	201 - 300	103	64	2.65	9,567	5,529	13,605	0.896
	301 - 500	39	30	20.30	25,965	12,978	38,953	1.362
	501 - 700	15	3	0.11	92	0	239	1.219
	All depths	809	206	1.40	43,202	29,755	56,649	0.879

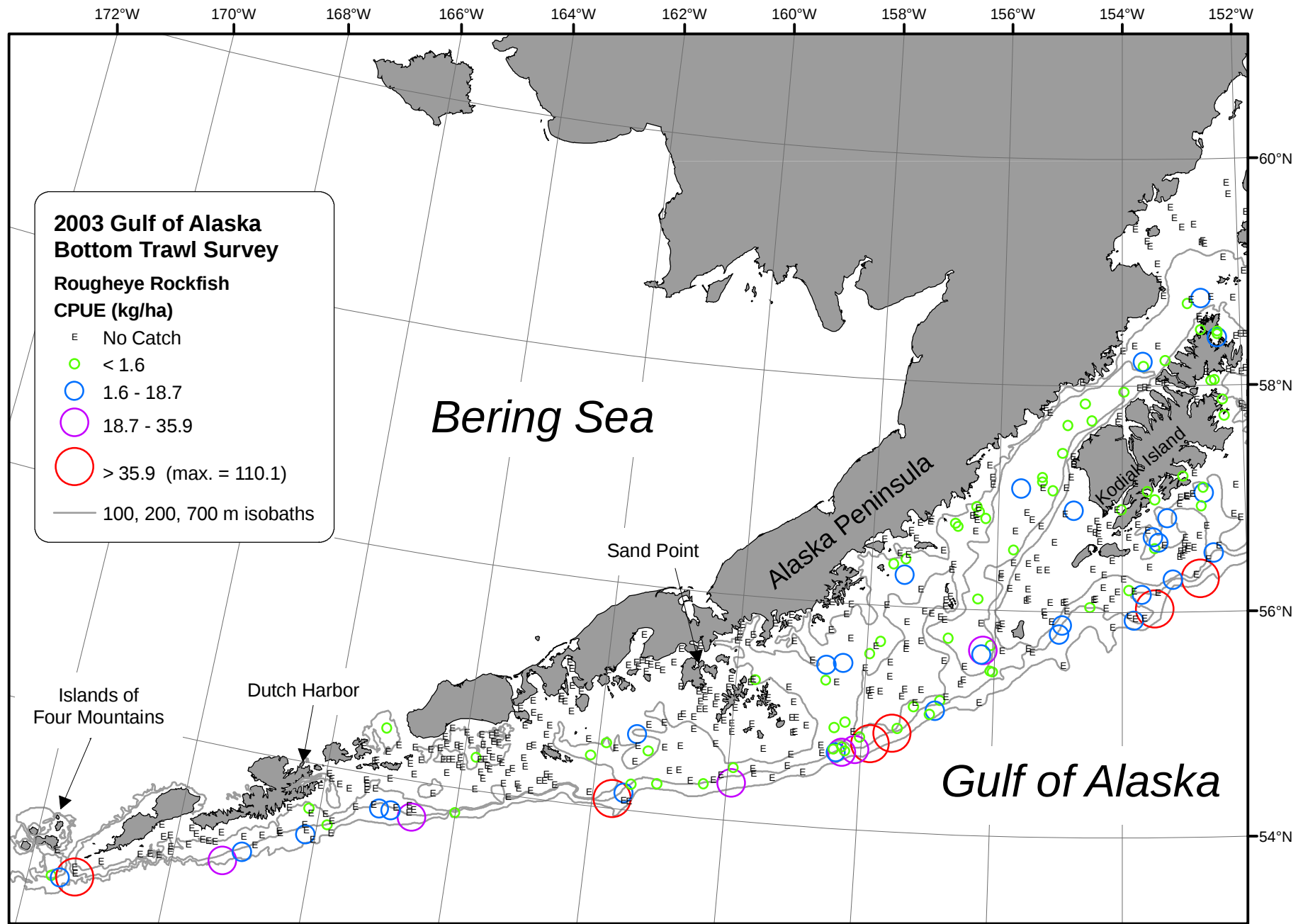


Figure 32.--Distribution and relative abundance of rougheye rockfish from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

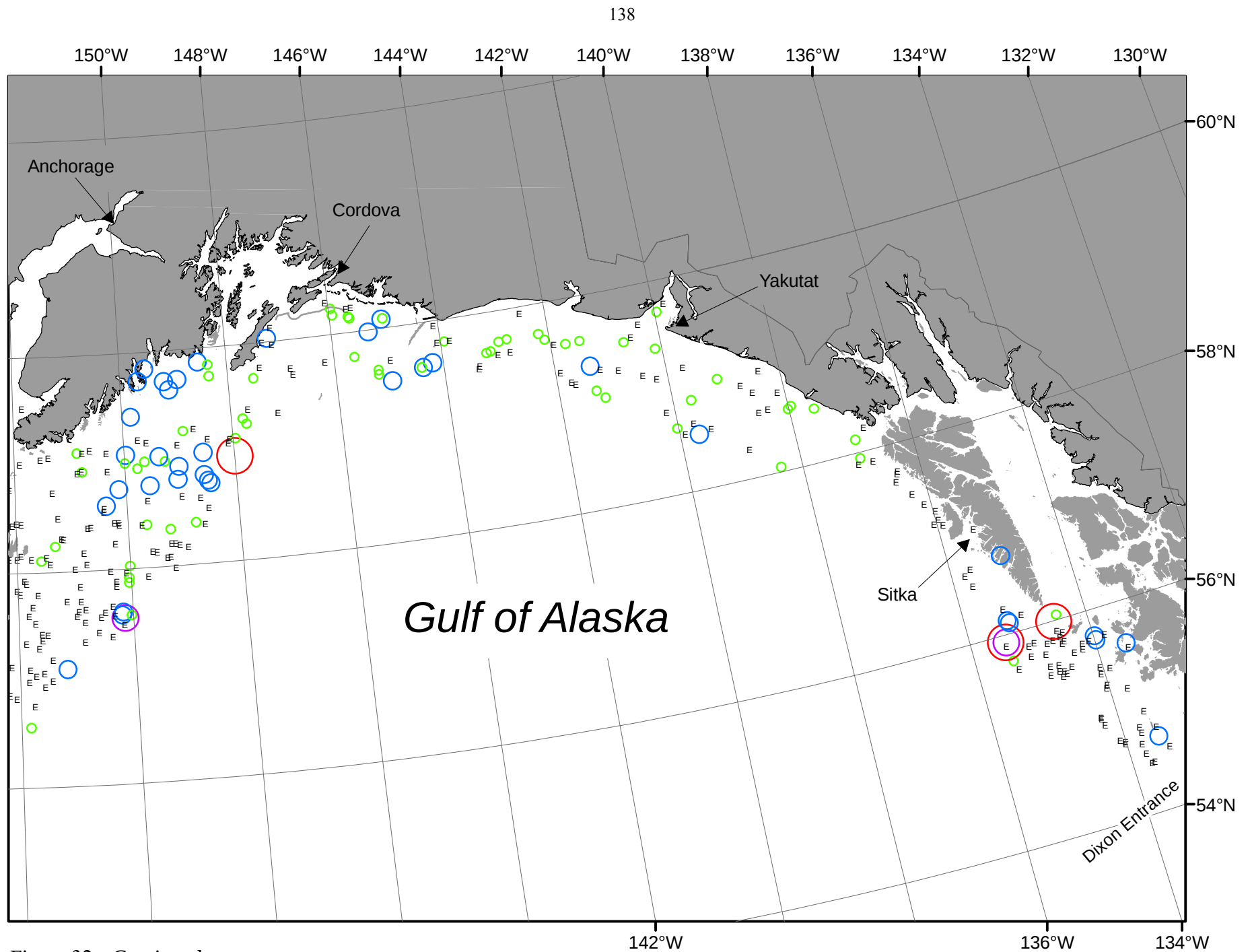


Figure 32.--Continued.

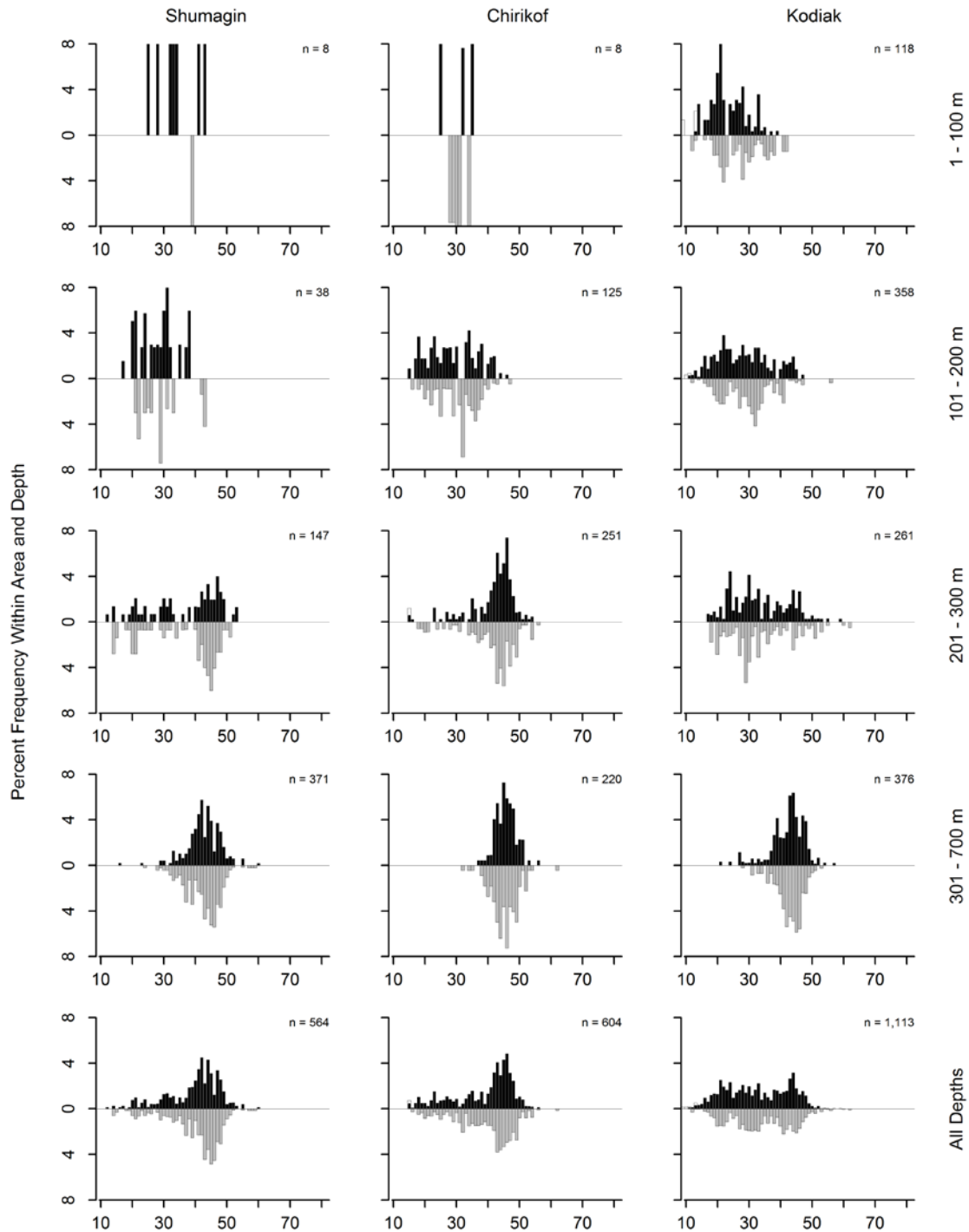


Figure 33. -- Size composition of rougheye rockfish from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

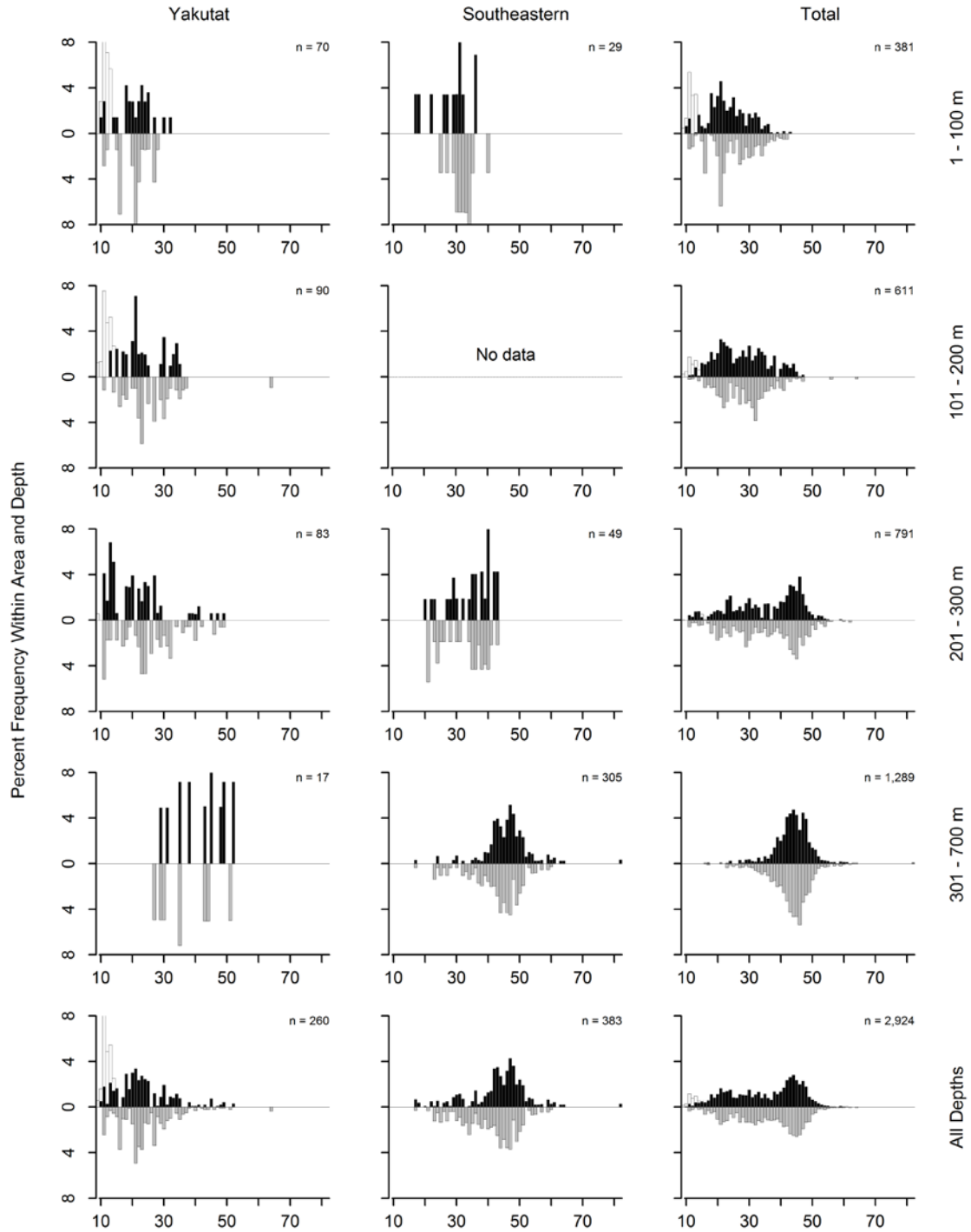


Figure 33. -- Continued (rougheye rockfish).

Table 42. -- Catch per unit of effort by stratum for roughey rockfish sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Southeastern	301 - 500	Southeastern Slope	2	2	68.51	5,294	0	46,108
Shumagin	301 - 500	Shumagin Slope	9	7	27.24	6,894	134	13,653
Chirikof	301 - 500	Chirikof Slope	5	5	27.02	4,334	0	12,934
Kodiak	301 - 500	Kodiak Slope	9	6	24.32	7,081	0	14,222
Chirikof	201 - 300	Chirikof Slope	7	6	10.38	1,586	0	3,694
Southeastern	301 - 500	Southeastern Deep Gullies	8	6	8.56	2,006	0	5,141
Kodiak	201 - 300	Kodiak Slope	6	5	7.84	1,272	320	2,225
Shumagin	201 - 300	Shumagin Slope	10	8	5.85	1,631	0	3,446
Chirikof	201 - 300	Lower Shelikof Gully	18	12	3.02	3,022	0	6,097
Kodiak	201 - 300	Kenai Gullies	16	15	1.89	1,258	689	1,827
Yakutat	301 - 500	Yakutat Gullies	2	1	1.82	202	0	2,762
Kodiak	101 - 200	Kenai Flats	18	11	1.71	2,067	305	3,829
Yakutat	301 - 500	Yakutat Slope	4	3	1.03	156	0	353
Yakutat	201 - 300	Yakutat Slope	11	7	0.93	198	0	472
Chirikof	101 - 200	East Shumagin Gully	19	10	0.90	1,002	0	2,008
Kodiak	1 - 100	Kenai Peninsula	8	2	0.79	413	0	1,054
Yakutat	101 - 200	Middleton Shelf	12	9	0.76	558	53	1,064
Kodiak	101 - 200	Barren Islands	14	5	0.72	794	0	1,769
Kodiak	101 - 200	Portlock Flats	23	6	0.66	481	0	1,120
Kodiak	201 - 300	Upper Shelikof Gully	3	3	0.66	210	65	356
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	3	0.60	234	0	591
Shumagin	101 - 200	Sanak Gully	8	3	0.60	253	0	673
Kodiak	101 - 200	Albatross Gullies	25	9	0.57	450	107	793
Yakutat	201 - 300	Yakutat Gullies	6	4	0.51	154	0	312
Southeastern	1 - 100	Southeastern Shallows	13	2	0.49	319	0	795
Yakutat	1 - 100	Middleton Shallows	8	2	0.45	304	0	780
Kodiak	1 - 100	Albatross Shallows	33	11	0.35	199	46	352
Kodiak	501 - 700	Kodiak Slope	2	2	0.34	59	0	471
Southeastern	501 - 700	Southeastern Slope	3	1	0.32	33	0	175
Chirikof	101 - 200	Shelikof Edge	24	6	0.23	179	29	328
Yakutat	101 - 200	Yakataga Shelf	7	5	0.22	117	0	379
Chirikof	101 - 200	Chirikof Outer Shelf	21	7	0.18	91	24	158
Kodiak	101 - 200	Kodiak Outer Shelf	26	4	0.08	38	0	91
Shumagin	101 - 200	Shumagin Outer Shelf	33	4	0.07	59	0	128
Chirikof	1 - 100	Chirikof Bank	37	2	0.07	75	0	204
Yakutat	101 - 200	Yakutat Flats	9	3	0.06	55	0	138
Shumagin	101 - 200	West Shumagin Gully	5	1	0.06	13	0	49
Yakutat	101 - 200	Fairweather Shelf	9	3	0.03	26	0	76
Shumagin	1 - 100	Shumagin Bank	38	1	0.03	41	0	125
Shumagin	1 - 100	Fox Islands	28	1	0.02	15	0	45
Southeastern	201 - 300	Baranof-Chichagof Slope	4	1	0.02	2	0	7
Yakutat	1 - 100	Yakutat Shallows	8	1	0.01	13	0	43
Shumagin	1 - 100	Davidson Bank	62	1	0.01	17	0	51

Dusky rockfish (*Sebastes variabilis*)

Dusky rockfish was the third most abundant rockfish species encountered during the 2003 survey (Table 2). They were found throughout the survey area, exclusively in waters shallower than 300 m (Fig. 34). Approximately 66% of its estimated biomass was found in the Chirikof INPFC area (Table 43). The areas of highest concentration included the Yakutat Slope and Chirikof Bank strata as well as the Chirikof Outer Shelf. These three strata contained about 73% of the estimated biomass despite having only 5.8% of the area surveyed (Fig. 34, Table 44). Overall the highest concentration of both sexes of fish was around 46 cm (Fig. 35).

Table 43. -- Number of survey hauls, number of hauls with dusky rockfish, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	16	0.28	1,169	0	2,411	0.935
	101 - 200	46	17	1.88	2,759	0	6,911	1.526
	201 - 300	10	2	0.40	110	0	323	1.237
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	35	0.64	4,039	0	8,336	1.283
Chirikof	1 - 100	75	3	12.41	32,314	0	98,167	0.898
	101 - 200	64	16	5.96	14,217	0	29,132	1.528
	201 - 300	25	6	0.17	198	19	378	1.452
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	25	7.19	46,729	0	114,234	1.028
Kodiak	1 - 100	106	10	0.07	260	0	612	0.684
	101 - 200	106	28	1.56	6,753	326	13,180	1.586
	201 - 300	25	5	0.16	179	16	342	1.457
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	43	0.73	7,192	753	13,631	1.511
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	2	1.14	3,354	0	8,705	1.374
	201 - 300	17	1	15.79	8,165	0	26,135	1.56
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	3	2.08	11,519	0	29,455	1.501
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	5	0.92	1,016	0	2,493	1.562
	201 - 300	26	4	0.72	362	0	989	1.562
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	9	0.51	1,377	0	2,979	1.562
All areas	1 - 100	371	29	2.61	33,743	0	99,609	0.897
	101 - 200	281	68	2.30	28,099	10,849	45,349	1.522
	201 - 300	103	18	2.50	9,014	0	27,000	1.55
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	115	2.30	70,856	1,431	140,281	1.145

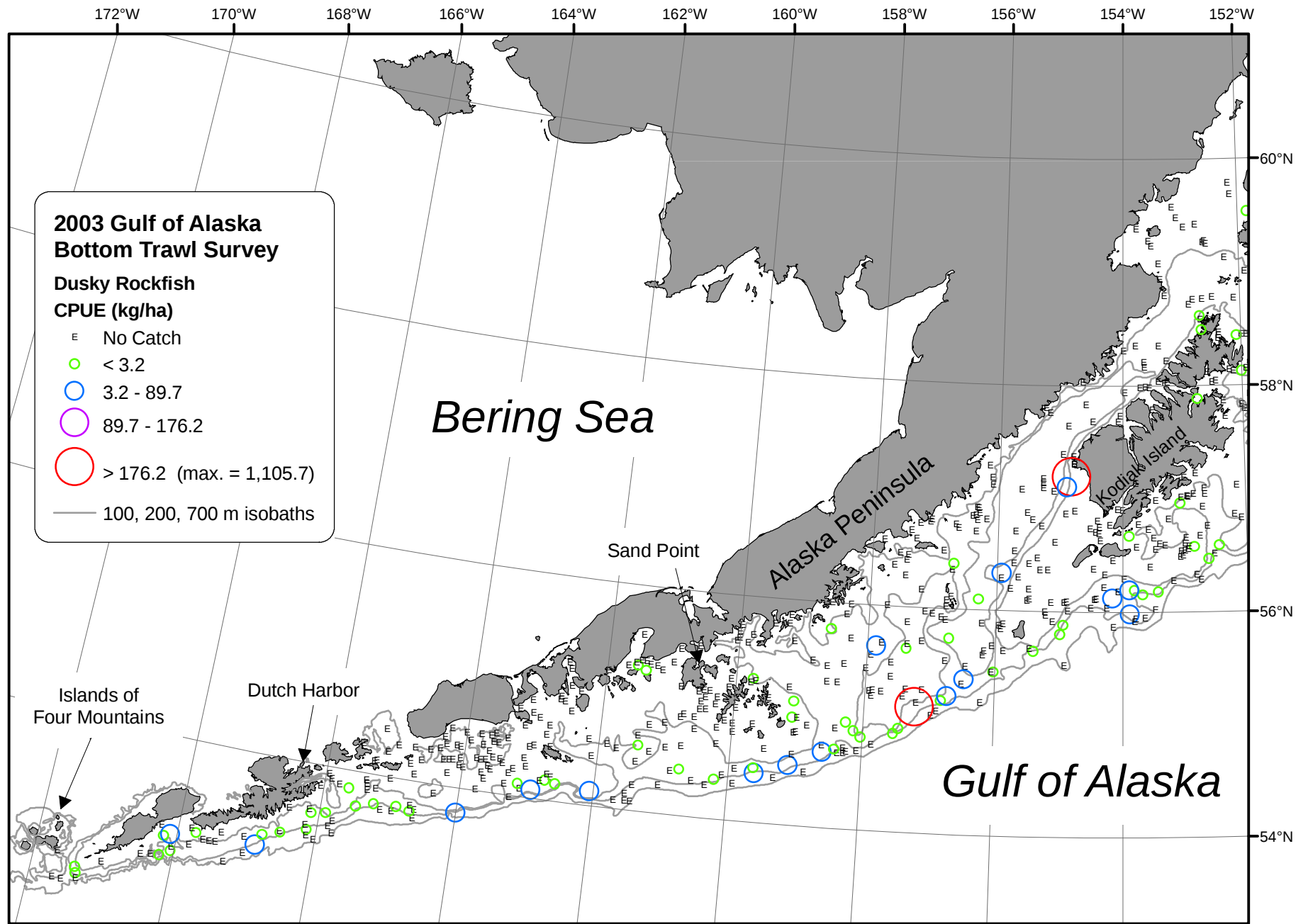


Figure 34.--Distribution and relative abundance of dusky rockfish from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

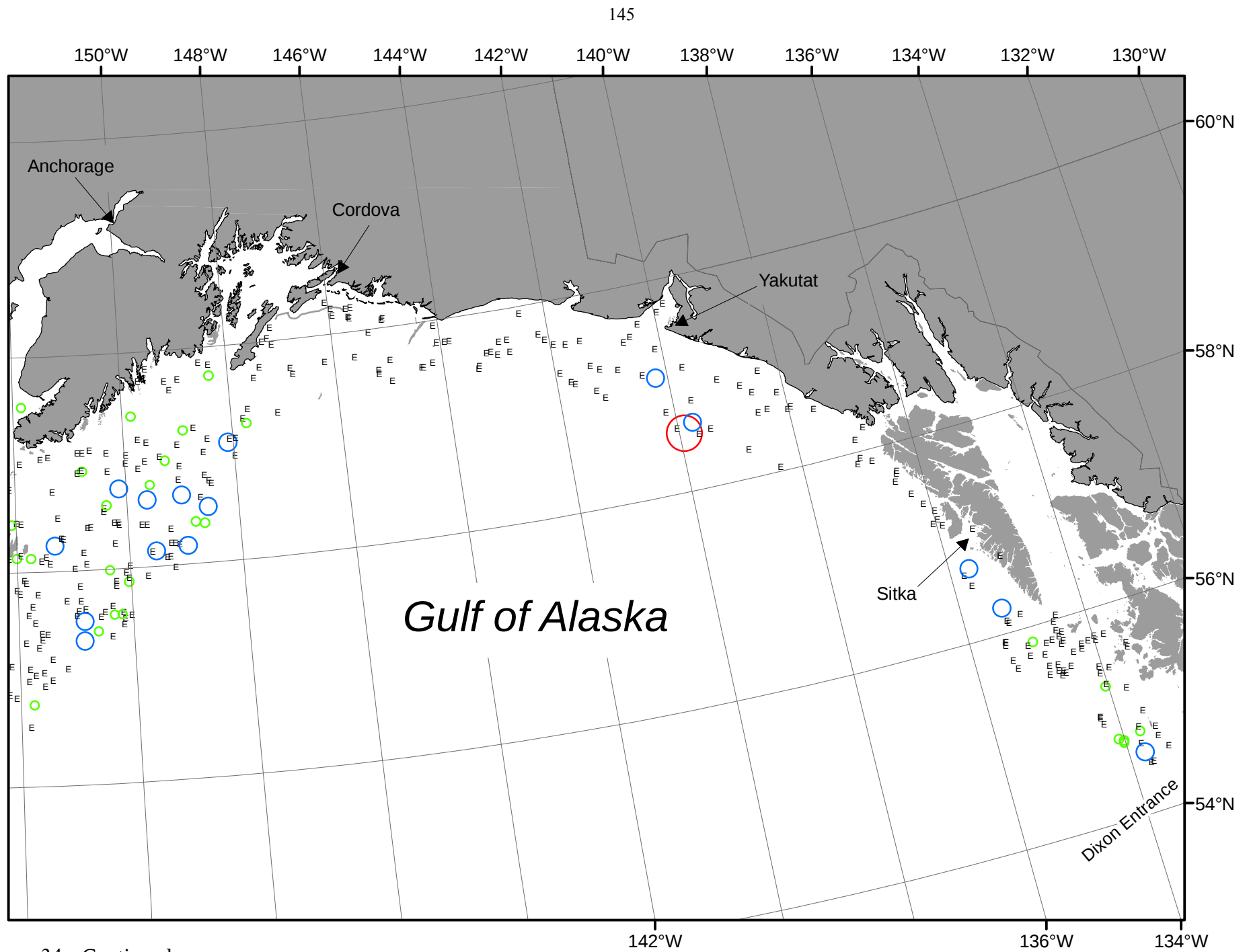


Figure 34.--Continued.

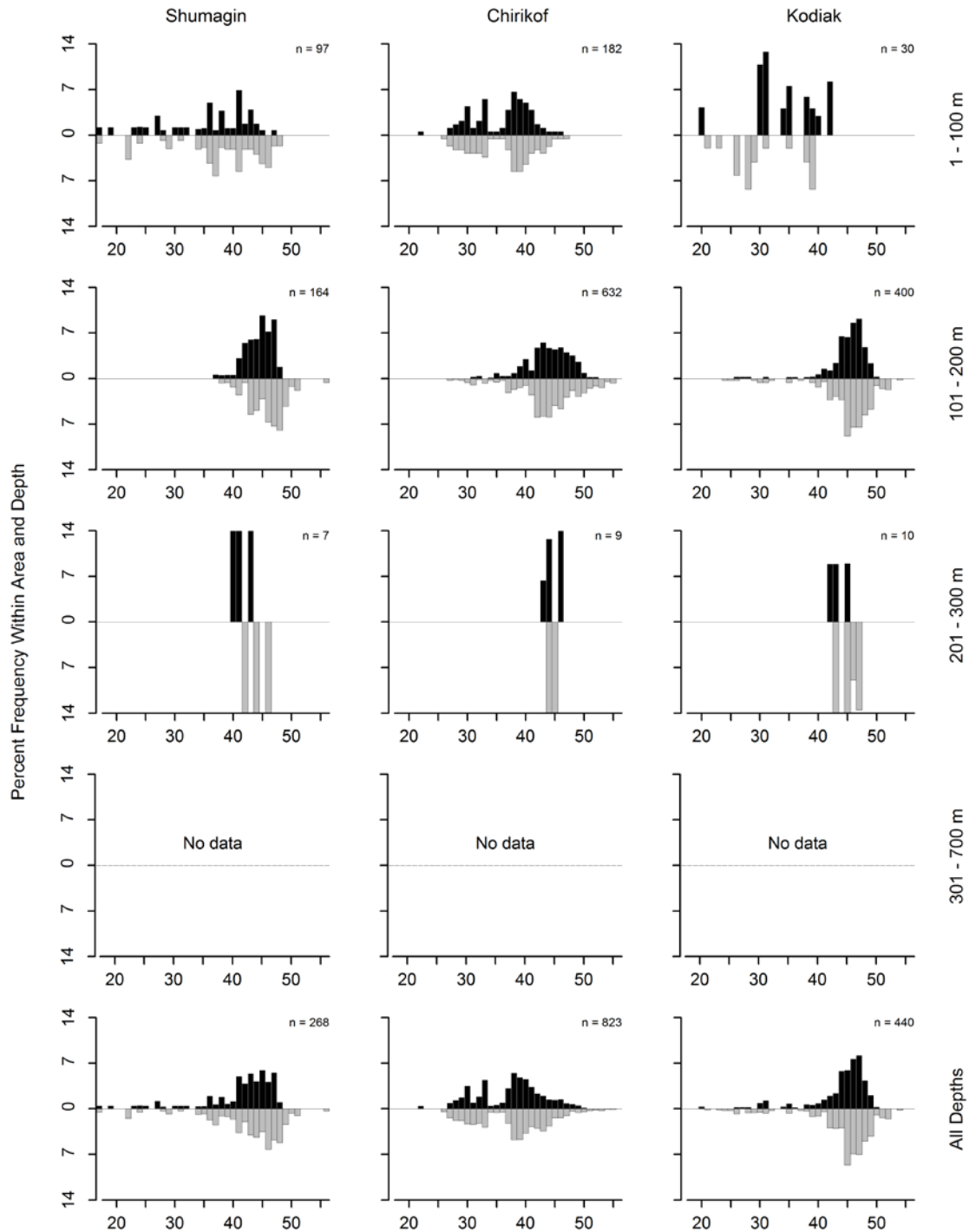


Figure 35. -- Size composition of dusky rockfish from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

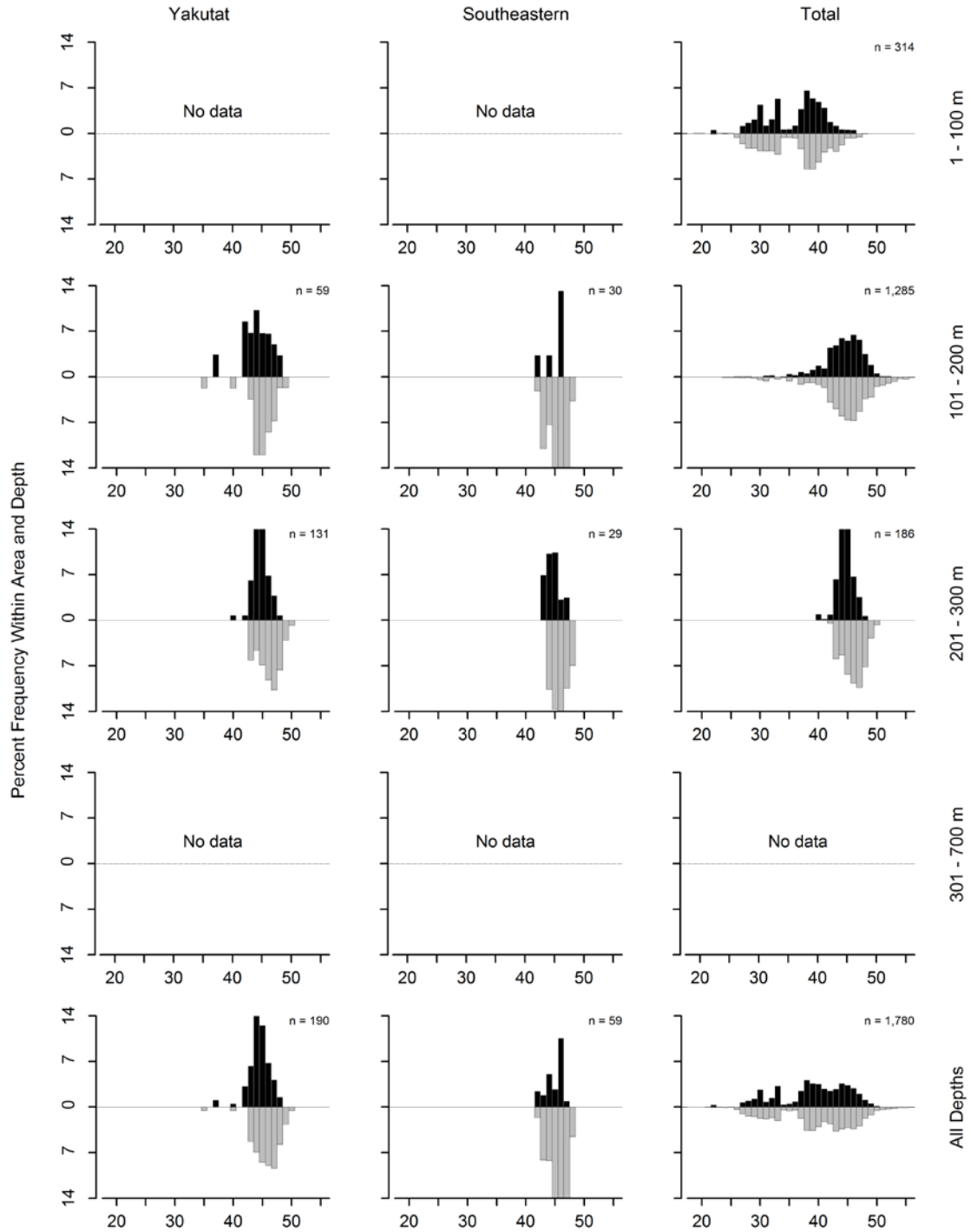


Figure 35. -- Continued (dusky rockfish).

Table 44. -- Catch per unit of effort by stratum for dusky rockfish sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Yakutat	201 - 300	Yakutat Slope	11	1	38.38	8,165	0	26,356
Chirikof	1 - 100	Chirikof Bank	37	1	29.88	32,249	0	98,102
Chirikof	101 - 200	Chirikof Outer Shelf	21	10	22.75	11,399	0	25,988
Kodiak	101 - 200	Kodiak Outer Shelf	26	15	5.86	2,945	0	6,028
Kodiak	101 - 200	Portlock Flats	23	7	4.72	3,461	0	9,181
Yakutat	101 - 200	Yakutat Flats	9	2	3.71	3,354	0	8,809
Shumagin	101 - 200	Shumagin Outer Shelf	33	17	3.38	2,759	0	6,911
Chirikof	101 - 200	Shelikof Edge	24	3	3.00	2,318	0	6,376
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	2	2.15	903	0	2,409
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	4	0.92	362	0	991
Shumagin	1 - 100	Fox Islands	28	5	0.75	628	0	1,743
Kodiak	201 - 300	Kodiak Slope	6	3	0.66	107	0	262
Chirikof	101 - 200	East Shumagin Gully	19	3	0.45	499	0	1,092
Chirikof	201 - 300	Chirikof Slope	7	3	0.41	63	0	151
Shumagin	201 - 300	Shumagin Slope	10	2	0.40	110	0	326
Shumagin	1 - 100	Davidson Bank	62	5	0.29	399	0	944
Kodiak	101 - 200	Albatross Gullies	25	3	0.25	198	0	517
Southeastern	101 - 200	Prince of Wales Shelf	20	3	0.16	113	0	252
Chirikof	201 - 300	Lower Shelikof Gully	18	3	0.14	135	0	300
Kodiak	101 - 200	Kenai Flats	18	3	0.12	149	0	331
Kodiak	1 - 100	Albatross Banks	41	2	0.12	187	0	533
Kodiak	201 - 300	Kenai Gullies	16	2	0.11	72	0	179
Shumagin	1 - 100	Shumagin Bank	38	4	0.11	131	0	309
Kodiak	1 - 100	Albatross Shallows	33	6	0.07	39	0	79
Kodiak	1 - 100	Northern Kodiak Shallows	9	1	0.06	13	0	42
Chirikof	1 - 100	Semidi Bank	20	1	0.05	38	0	118
Chirikof	1 - 100	Upper Alaska Peninsula	18	1	0.03	27	0	83
Kodiak	1 - 100	Lower Cook Inlet	15	1	0.02	21	0	67
Shumagin	1 - 100	Lower Alaska Peninsula	33	2	0.02	11	0	28

Sharpchin rockfish (*Sebastes zacentrus*)

Sharpchin rockfish was not among the 20 most abundant species but is a species of interest. Sharpchin rockfish were rarely captured west of Kodiak Island (Fig. 36). Over 72% of its biomass estimate occurred in the Southeastern INPFC area in depths between 100 and 300 m (Table 45). The highest CPUEs were recorded in the Baranof-Chichagof Slope, Yakutat Slope and Baranof-Chichagof Shelf strata (Table 46). The size composition of females showed a significant mode at 32 cm in the Southeastern INPFC area and among males at around 26 cm in the Yakutat and Southeastern areas (Fig. 37).

Table 45. -- Number of survey hauls, number of hauls with sharpchin rockfish, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	0	---	---	---	---	---
	101 - 200	46	0	---	---	---	---	---
	201 - 300	10	2	0.14	38	0	113	0.448
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	2	0.01	38	0	113	0.448
Chirikof	1 - 100	75	1	---	2	0	6	0.17
	101 - 200	64	2	---	4	0	9	0.179
	201 - 300	25	1	0.02	18	0	61	0.463
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	4	---	24	0	65	0.332
Kodiak	1 - 100	106	1	---	6	0	21	0.223
	101 - 200	106	14	0.06	259	40	479	0.135
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	15	0.03	266	46	485	0.136
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	7	0.03	79	12	146	0.062
	201 - 300	17	8	3.02	1,559	0	4,550	0.267
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	15	0.30	1,638	0	4,630	0.23
Southeastern	1 - 100	13	1	---	2	0	7	0.047
	101 - 200	28	6	2.40	2,658	0	8,656	0.351
	201 - 300	26	12	4.88	2,468	0	5,386	0.303
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	19	1.91	5,128	0	11,804	0.325
All areas	1 - 100	371	3	---	11	0	26	0.121
	101 - 200	281	29	0.25	3,000	0	9,004	0.278
	201 - 300	103	23	1.13	4,083	101	8,065	0.289
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	55	0.23	7,094	0	14,338	0.284

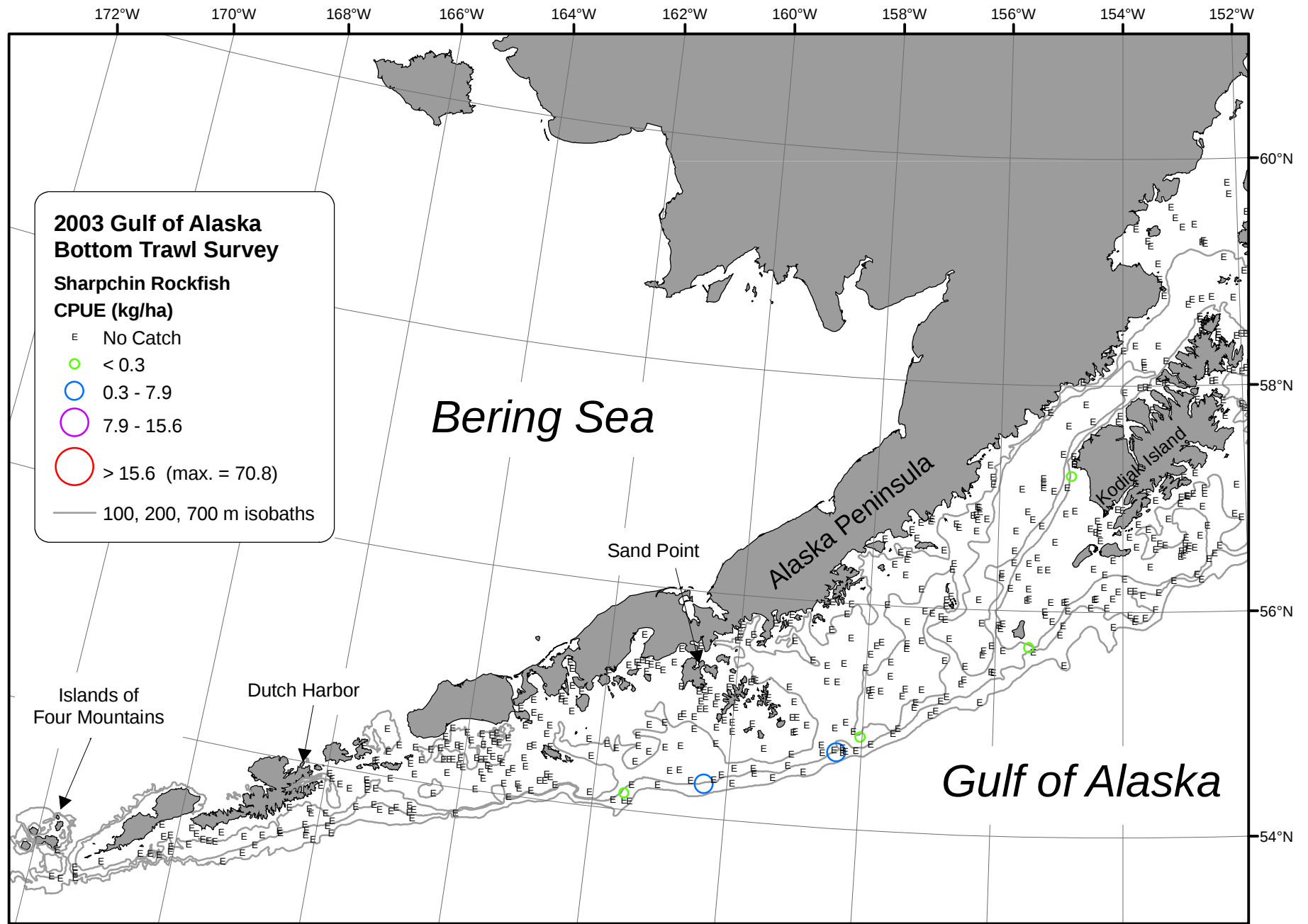


Figure 36.--Distribution and relative abundance of sharpchin rockfish from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

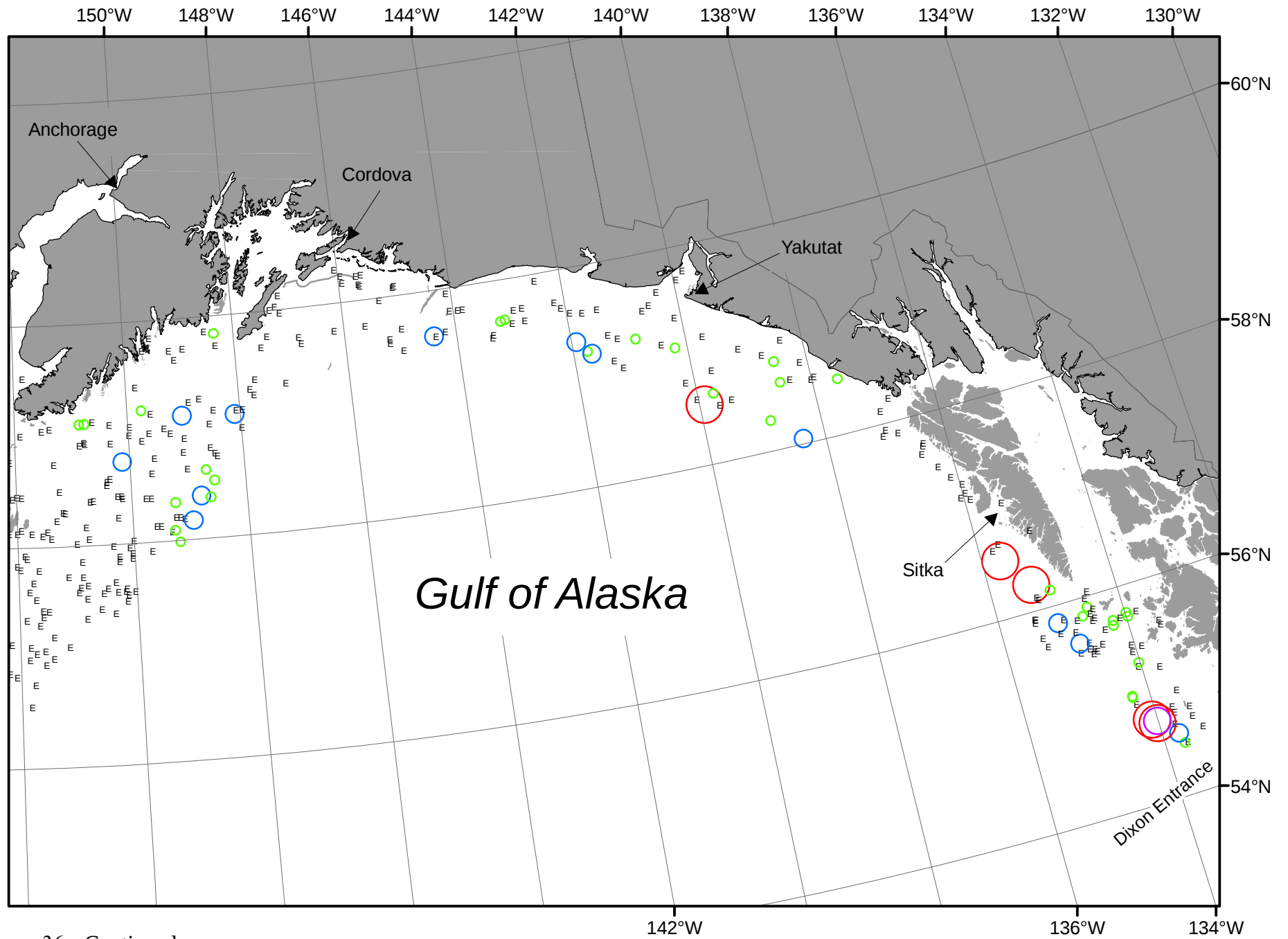


Figure 36.--Continued.

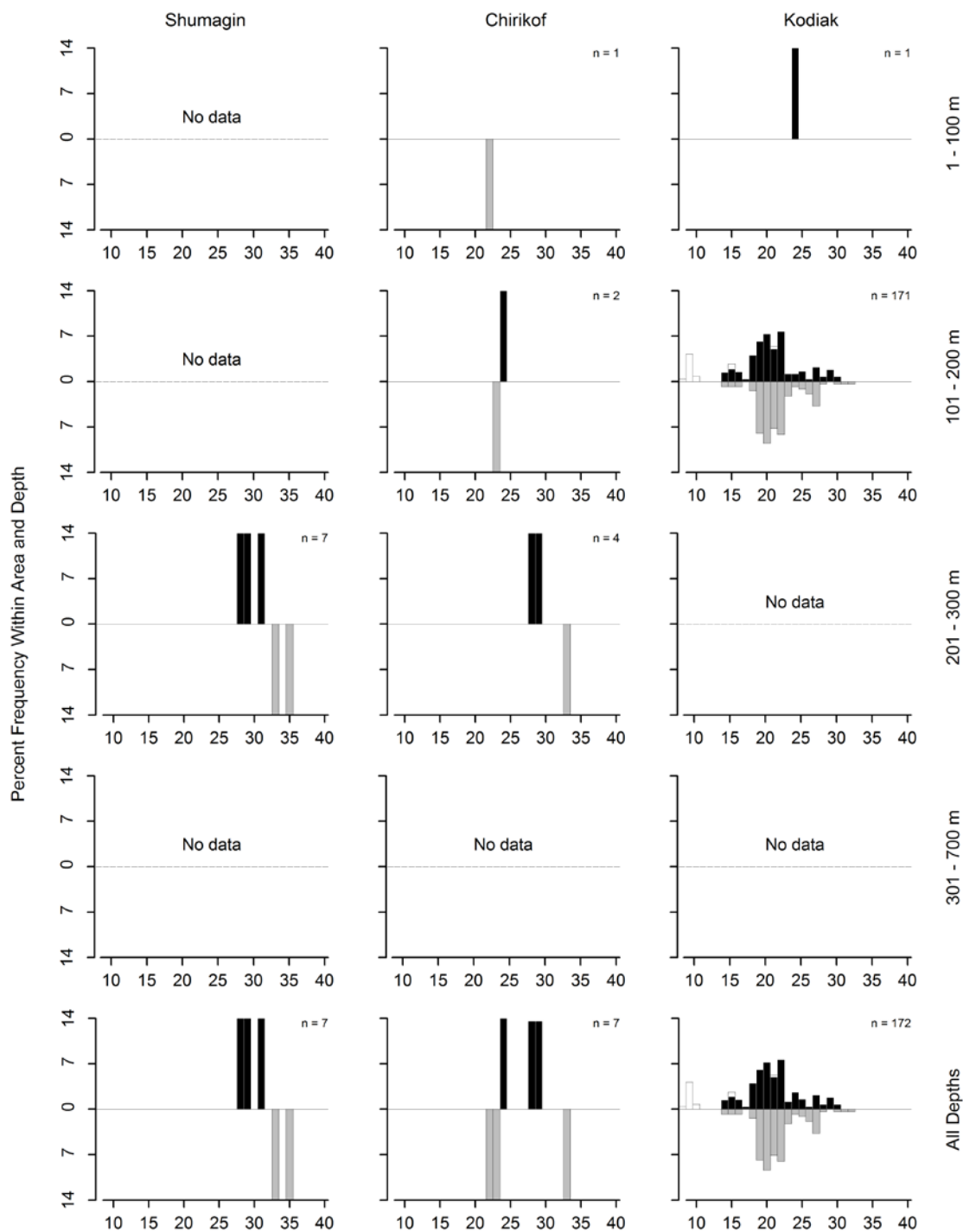


Figure 37. -- Size composition of sharpchin rockfish from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

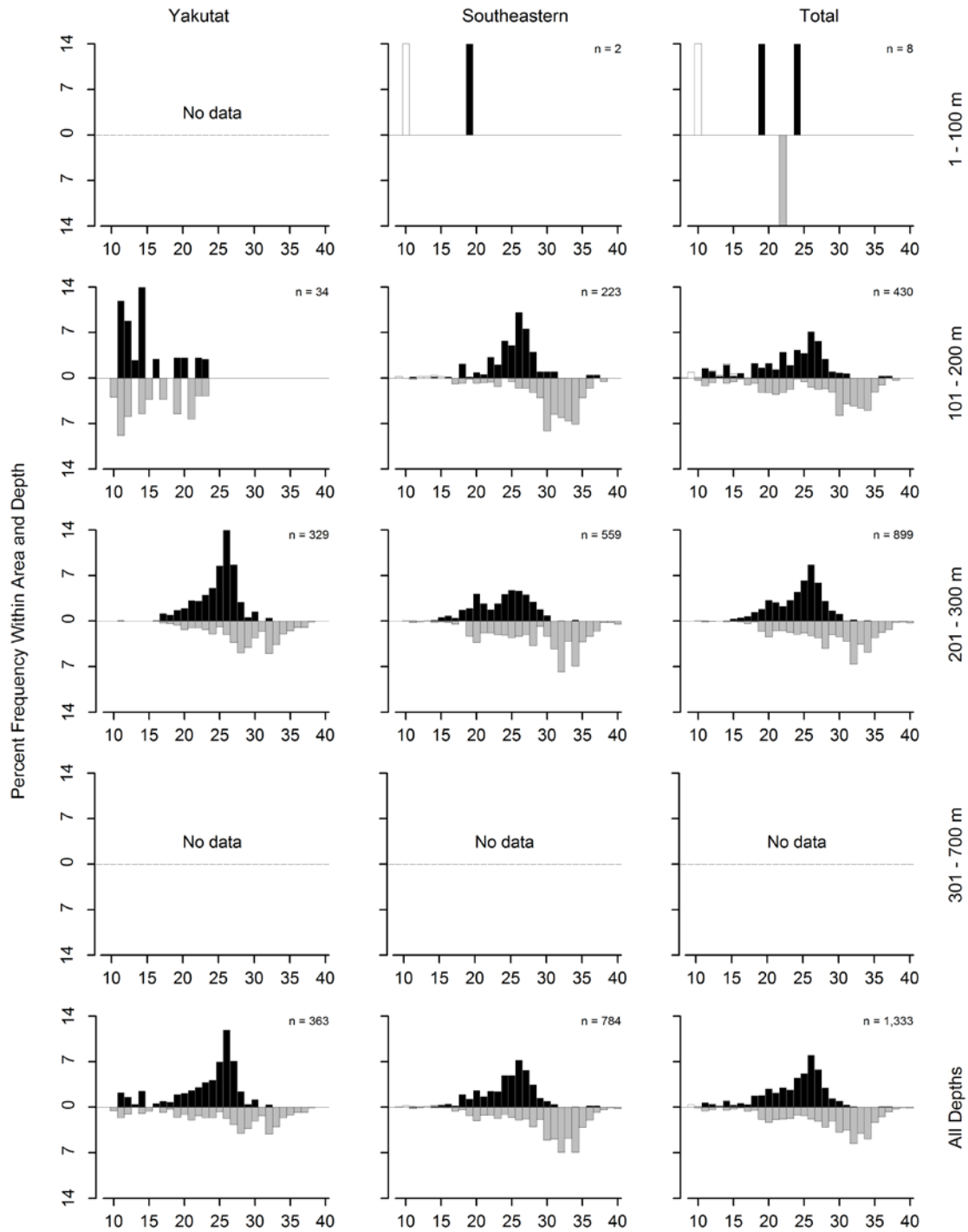


Figure 37. -- Continued (sharpchin rockfish).

Table 46. -- Catch per unit of effort by stratum for sharpchin rockfish sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Southeastern	201 - 300	Baranof-Chichagof Slope	4	2	9.31	1,047	0	4,365
Yakutat	201 - 300	Yakutat Slope	11	8	7.33	1,559	0	4,587
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	1	6.20	2,601	0	8,752
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	10	3.62	1,421	0	3,346
Kodiak	101 - 200	Kodiak Outer Shelf	26	5	0.21	104	0	238
Shumagin	201 - 300	Shumagin Slope	10	2	0.14	38	0	114
Chirikof	201 - 300	Chirikof Slope	7	1	0.12	18	0	63
Kodiak	101 - 200	Portlock Flats	23	5	0.11	83	0	225
Southeastern	101 - 200	Prince of Wales Shelf	20	5	0.08	57	0	167
Yakutat	101 - 200	Fairweather Shelf	9	4	0.07	50	0	100
Kodiak	101 - 200	Kenai Flats	18	4	0.06	72	0	185
Yakutat	101 - 200	Yakutat Flats	9	3	0.03	29	0	82
Kodiak	1 - 100	Kenai Peninsula	8	1	0.01	6	0	21
Chirikof	101 - 200	Chirikof Outer Shelf	21	2	0.01	4	0	9
Southeastern	1 - 100	Southeastern Shallows	13	1	<0.01	2	0	7
Chirikof	1 - 100	Chirikof Bank	37	1	<0.01	2	0	6

Shortraker rockfish (*Sebastes borealis*)

Shortraker rockfish were uncommon but were found throughout the survey area, although almost exclusively on the continental slope in the 200-500 m depth range (Fig. 38, Table 47). The highest CPUEs were consistently recorded in the 301 - 500 m depth range, which accounted for almost 80% of the total biomass (Table 48). In this depth range, shortraker rockfish were caught in about 79% of the tows. The highest concentrations of shortraker rockfish came from three survey strata- The Yakutat Slope, the Shumagin Slope, and the Kodiak Slope. These strata produced almost 68% of the estimated biomass even though they comprised only about 2% of the survey area. The lengths of both sexes were distributed broadly between 40 and 80 cm (Fig. 39). This species displayed a similar size composition at all depths where they were caught.

Table 47. -- Number of survey hauls, number of hauls with shortraker rockfish, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	0	---	---	---	---	---
	101 - 200	46	1	0.03	45	0	135	4.033
	201 - 300	10	3	1.49	415	0	993	3.696
	301 - 500	9	9	42.30	10,707	0	21,528	1.812
	501 - 700	4	0	---	---	---	---	---
	All depths	230	13	1.76	11,166	329	22,004	1.851
Chirikof	1 - 100	75	0	---	---	---	---	---
	101 - 200	64	1	0.02	43	0	133	3.49
	201 - 300	25	5	0.41	468	0	959	2.727
	301 - 500	5	5	15.21	2,440	0	4,898	2.358
	501 - 700	3	1	0.23	45	0	187	1.909
	All depths	172	12	0.46	2,996	799	5,193	2.412
Kodiak	1 - 100	106	0	---	---	---	---	---
	101 - 200	106	2	0.09	375	0	955	4.87
	201 - 300	25	5	3.22	3,696	0	8,076	2.941
	301 - 500	9	8	34.44	10,028	0	22,051	3.65
	501 - 700	2	1	1.10	192	0	1,020	3.51
	All depths	248	16	1.46	14,292	1,774	26,810	3.455
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	0	---	---	---	---	---
	201 - 300	17	4	5.98	3,093	0	7,795	5.619
	301 - 500	6	5	32.96	8,661	0	21,427	4.196
	501 - 700	3	1	1.24	183	0	764	4.521
	All depths	79	10	2.16	11,936	434	23,438	4.496
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	4	5.24	1,633	0	4,470	5.894
	501 - 700	3	0	---	---	---	---	---
	All depths	80	4	0.61	1,633	0	4,470	5.894
All areas	1 - 100	371	0	---	---	---	---	---
	101 - 200	281	4	0.04	463	0	1,056	4.608
	201 - 300	103	17	2.13	7,673	1,680	13,666	3.669
	301 - 500	39	31	26.16	33,468	15,627	51,308	2.782
	501 - 700	15	3	0.51	420	0	1,167	3.539
	All depths	809	55	1.36	42,023	23,572	60,474	2.93

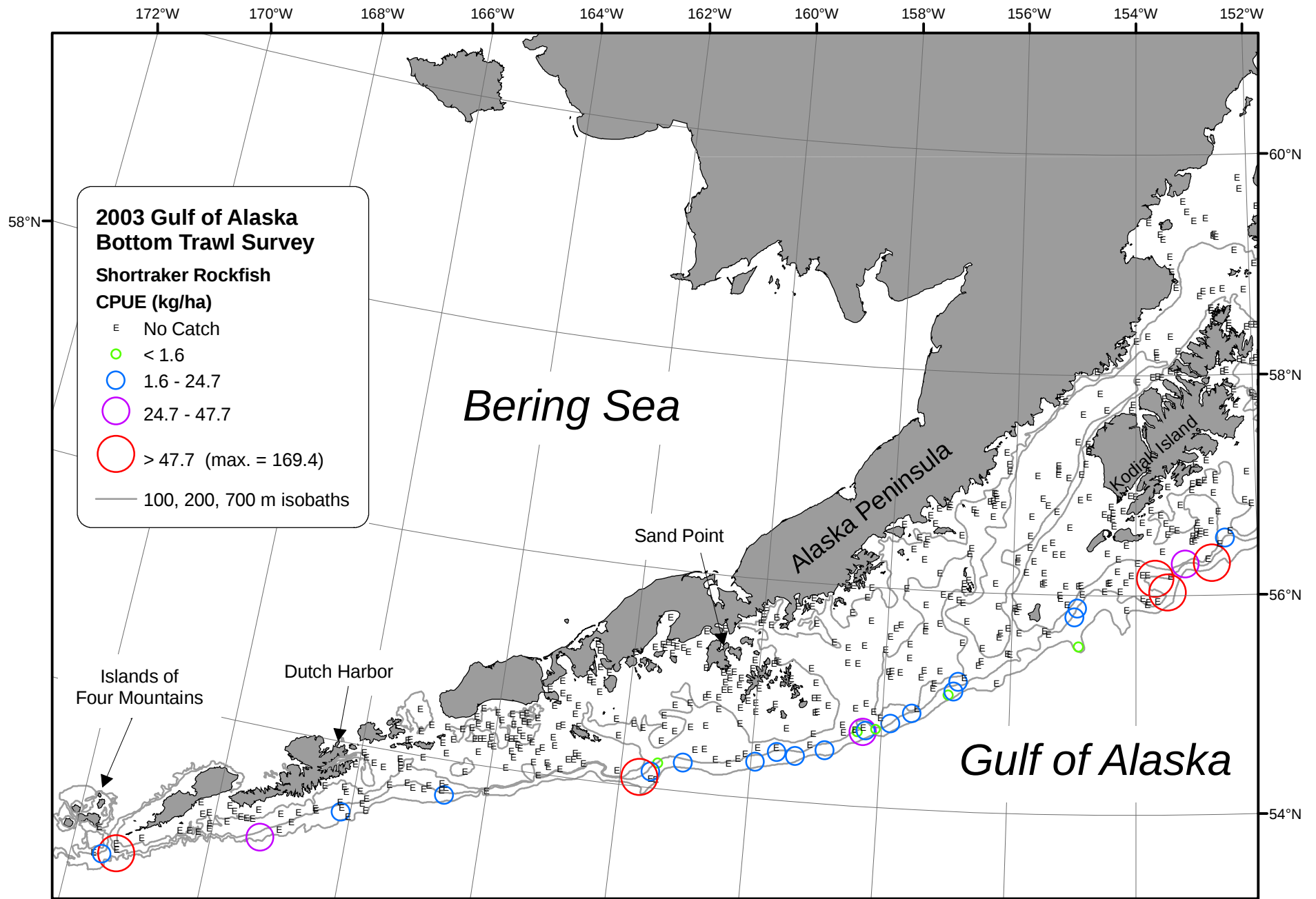


Figure 38.--Distribution and relative abundance of shorttraker rockfish from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

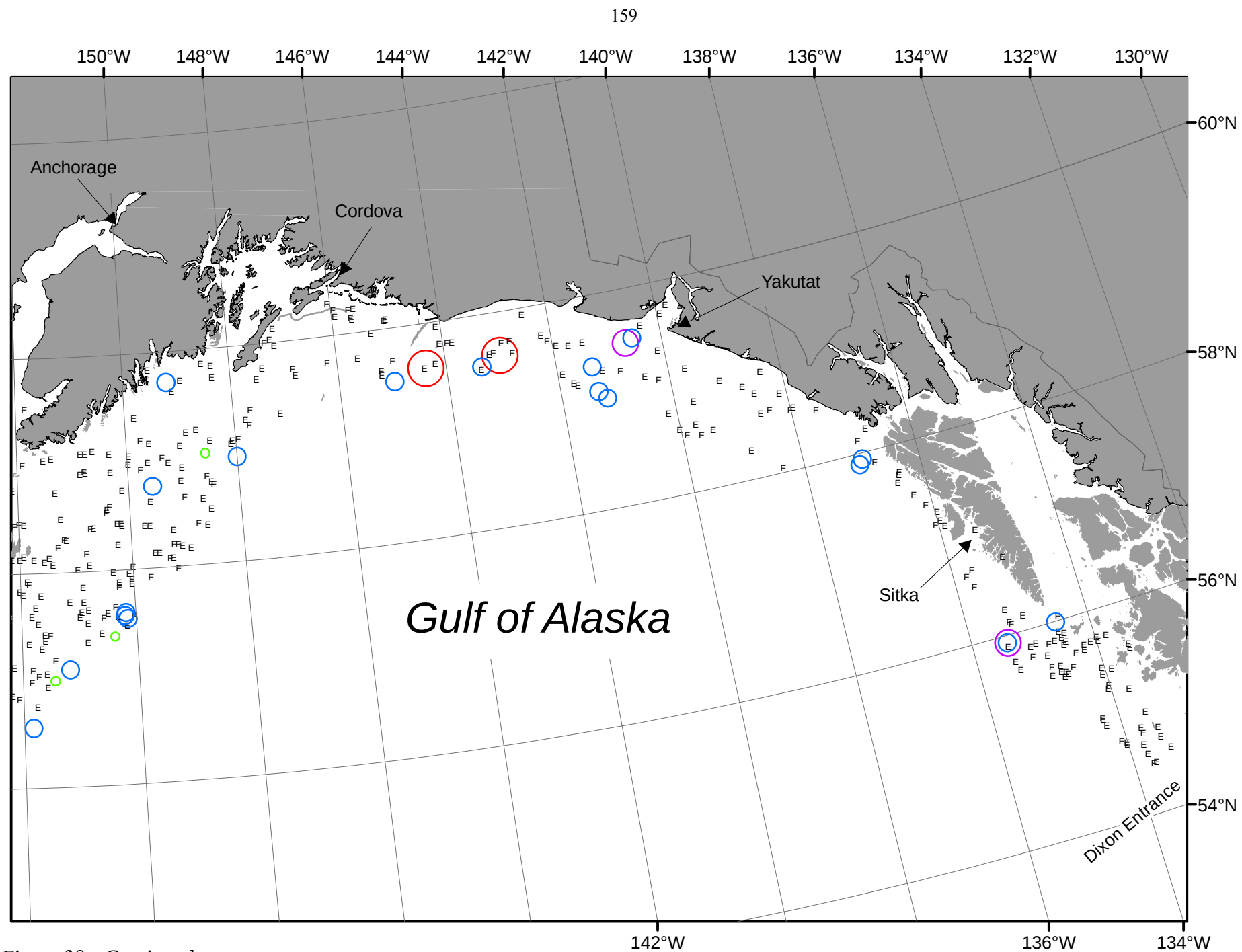


Figure 38.--Continued.

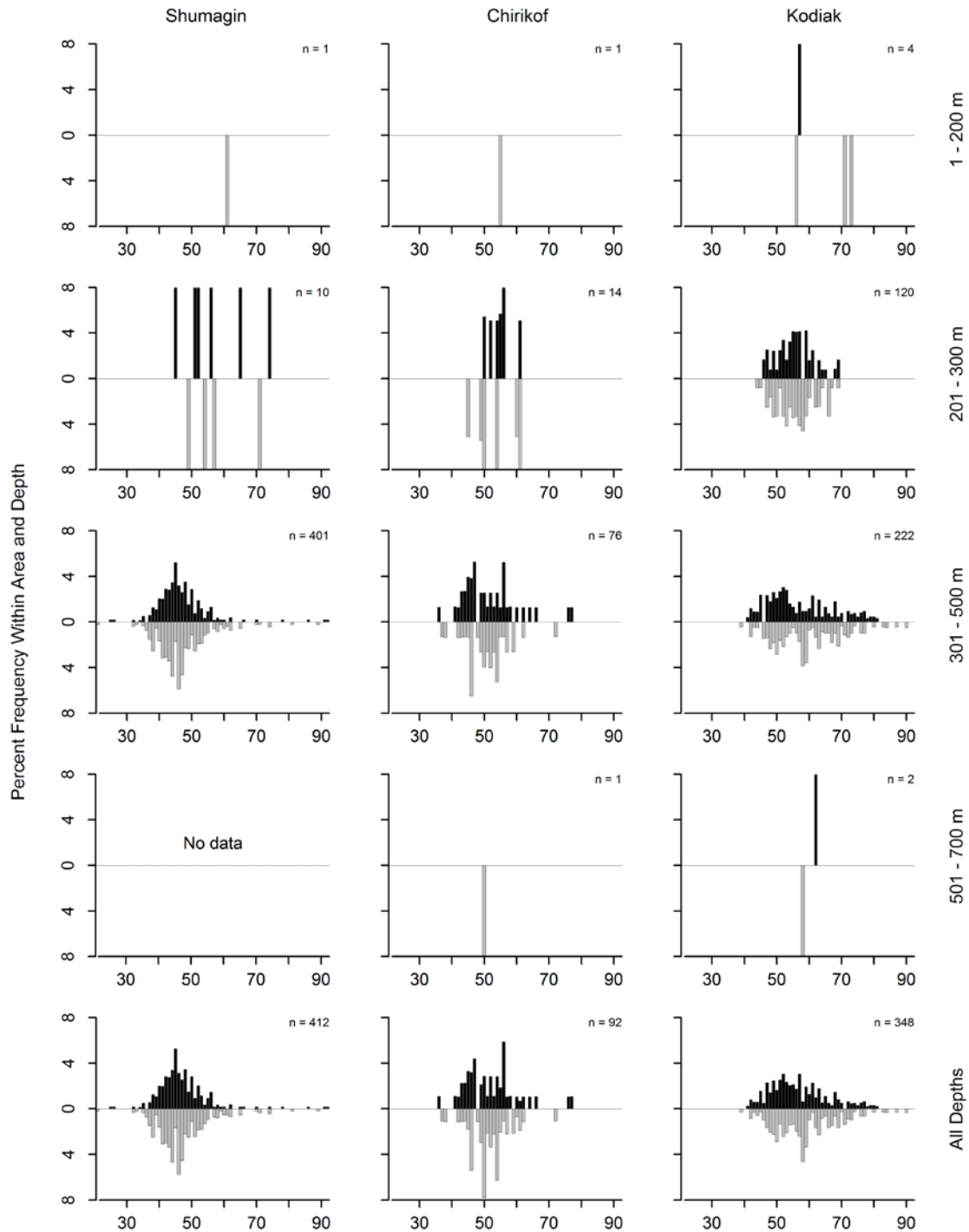


Figure 39. -- Size composition of shorttraker rockfish from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

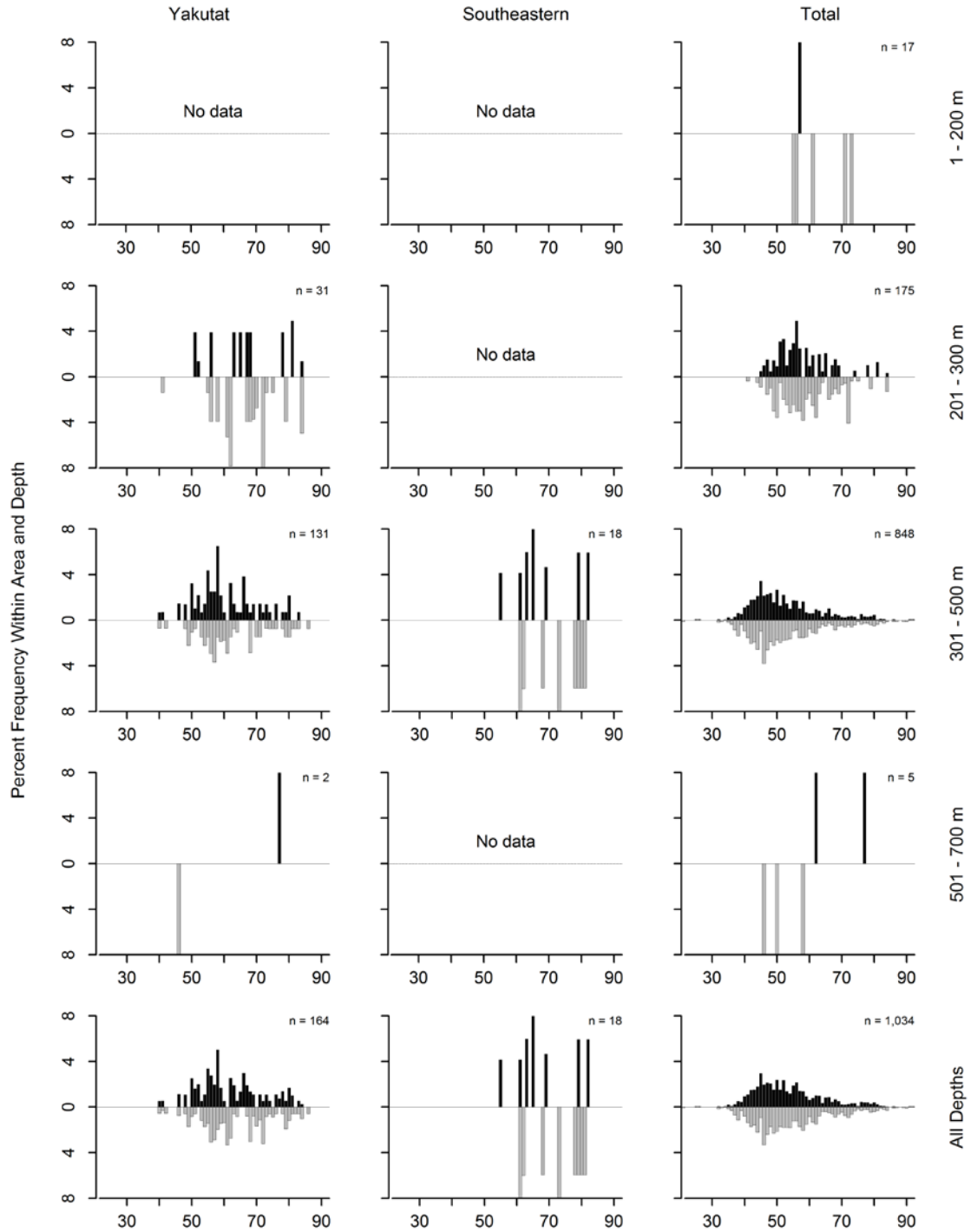


Figure 39. -- Continued (shorttraker rockfish).

Table 48. -- Catch per unit of effort by stratum for shorttraker rockfish sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Yakutat	301 - 500	Yakutat Slope	4	3	50.85	7,732	0	22,316
Shumagin	301 - 500	Shumagin Slope	9	9	42.30	10,707	0	21,738
Kodiak	301 - 500	Kodiak Slope	9	8	34.44	10,028	0	22,285
Kodiak	201 - 300	Kodiak Slope	6	4	22.44	3,641	0	8,241
Southeastern	301 - 500	Southeastern Slope	2	2	17.22	1,331	0	12,283
Chirikof	301 - 500	Chirikof Slope	5	5	15.21	2,440	0	5,094
Yakutat	201 - 300	Yakutat Gullies	6	3	9.02	2,744	0	7,603
Yakutat	301 - 500	Yakutat Gullies	2	2	8.39	929	0	5,714
Chirikof	201 - 300	Chirikof Slope	7	4	1.79	274	0	592
Yakutat	201 - 300	Yakutat Slope	11	1	1.64	349	0	1,126
Shumagin	201 - 300	Shumagin Slope	10	3	1.49	415	0	1,002
Southeastern	301 - 500	Southeastern Deep Gullies	8	2	1.29	302	0	843
Yakutat	501 - 700	Yakutat Slope	3	1	1.24	183	0	969
Kodiak	501 - 700	Kodiak Slope	2	1	1.10	192	0	2,637
Chirikof	501 - 700	Chirikof Slope	3	1	0.23	45	0	237
Kodiak	101 - 200	Kenai Flats	18	1	0.21	249	0	773
Chirikof	201 - 300	Lower Shelikof Gully	18	1	0.20	195	0	606
Kodiak	101 - 200	Portlock Flats	23	1	0.17	127	0	389
Chirikof	101 - 200	Chirikof Outer Shelf	21	1	0.09	43	0	133
Kodiak	201 - 300	Kenai Gullies	16	1	0.08	55	0	173
Shumagin	101 - 200	Shumagin Outer Shelf	33	1	0.06	45	0	135

Shortspine thornyhead (*Sebastolobus alascanus*)

Shortspine thornyhead were uncommon but were found throughout the survey in all five INPFC areas and in all tows deeper than 300 m (Fig. 40, Table 49). The highest CPUEs were recorded in the slope strata between 300 and 500 m, which contained approximately 36% of its total biomass despite containing less than 7% of the survey area (Tables 49 and 50). Population length distributions were similar in all areas and at all depths, with both males and females exhibiting length modes between approximately 22 and 30 cm FL and considerable representation between 10 and 40 cm (Fig. 41).

Table 49. -- Number of survey hauls, number of hauls with shortspine thornyhead, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	0	---	---	---	---	---
	101 - 200	46	10	0.34	500	0	1,091	0.299
	201 - 300	10	10	21.58	6,017	1,682	10,351	0.194
	301 - 500	9	9	33.66	8,519	4,490	12,548	0.31
	501 - 700	4	4	29.35	5,887	1,142	10,631	0.325
	All depths	230	33	3.31	20,922	14,357	27,487	0.268
Chirikof	1 - 100	75	2	0.01	35	0	95	0.343
	101 - 200	64	6	0.07	171	29	313	0.323
	201 - 300	25	15	5.04	5,821	2,847	8,795	0.291
	301 - 500	5	5	64.70	10,378	0	23,802	0.427
	501 - 700	3	3	31.67	6,185	0	17,651	0.353
	All depths	172	31	3.48	22,591	8,550	36,631	0.362
Kodiak	1 - 100	106	1	0.01	20	0	64	0.352
	101 - 200	106	13	0.26	1,146	93	2,199	0.314
	201 - 300	25	22	17.03	19,564	14,443	24,686	0.294
	301 - 500	9	9	19.41	5,652	3,402	7,903	0.201
	501 - 700	2	2	24.51	4,277	0	14,524	0.229
	All depths	248	47	3.13	30,659	23,070	38,248	0.262
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	10	0.72	2,105	0	4,291	0.221
	201 - 300	17	14	8.56	4,426	1,851	7,002	0.201
	301 - 500	6	6	27.43	7,207	5,491	8,924	0.225
	501 - 700	3	3	21.53	3,163	2,398	3,927	0.232
	All depths	79	33	3.06	16,901	13,424	20,377	0.219
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	4	0.06	67	0	151	0.216
	201 - 300	26	19	6.58	3,327	2,539	4,115	0.175
	301 - 500	10	10	16.88	5,261	4,016	6,506	0.263
	501 - 700	3	3	17.89	1,849	0	5,512	0.452
	All depths	80	36	3.91	10,504	7,348	13,659	0.242
All areas	1 - 100	371	3	---	54	0	125	0.347
	101 - 200	281	43	0.33	3,989	1,580	6,397	0.254
	201 - 300	103	80	10.86	39,156	31,849	46,462	0.247
	301 - 500	39	39	28.94	37,017	23,936	50,099	0.28
	501 - 700	15	15	26.03	21,360	9,636	33,085	0.297
	All depths	809	180	3.29	101,576	84,549	118,602	0.269

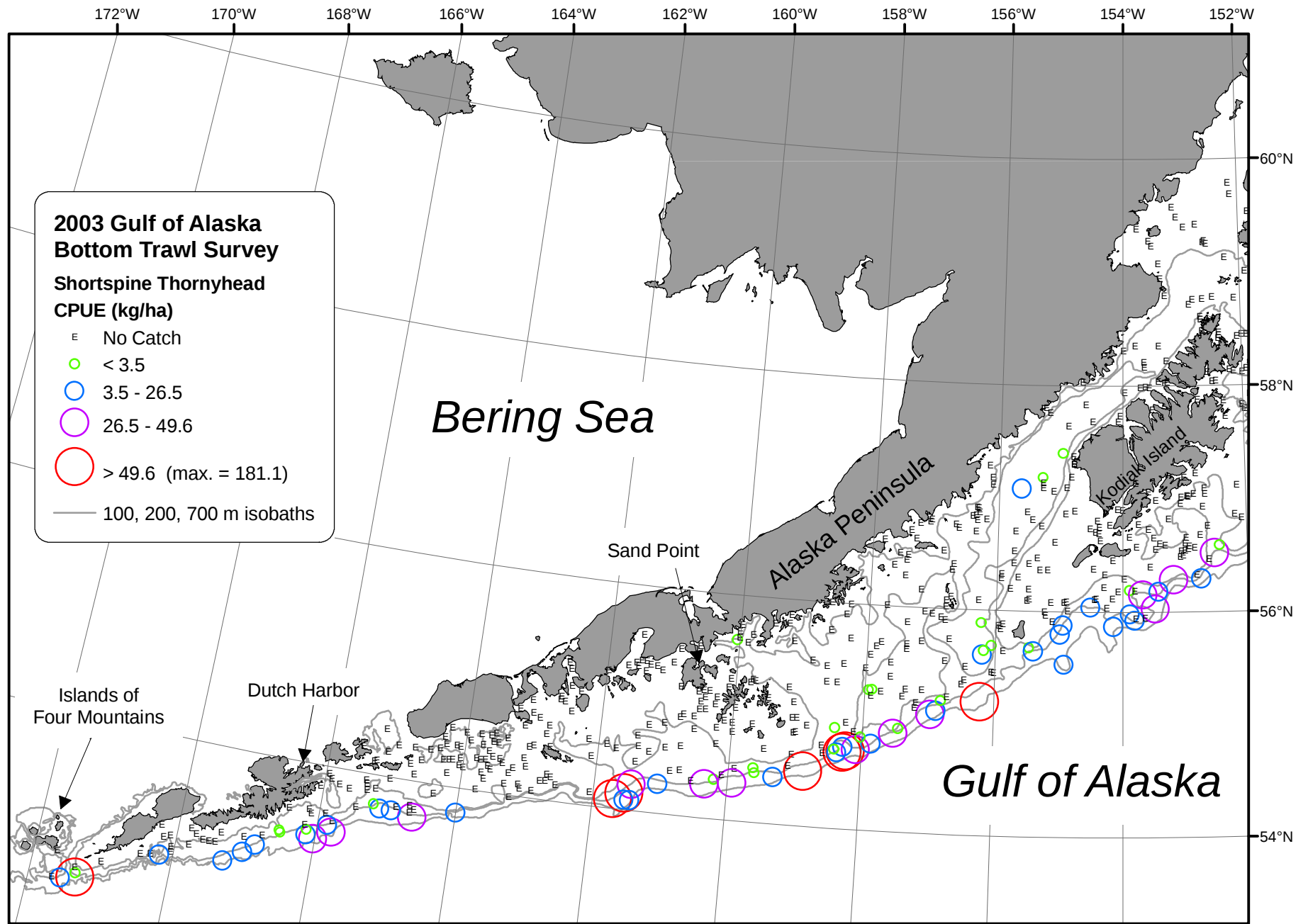


Figure 40.--Distribution and relative abundance of shortspine thornyhead from the 2003 Gulf of Alaska bottom trawl survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

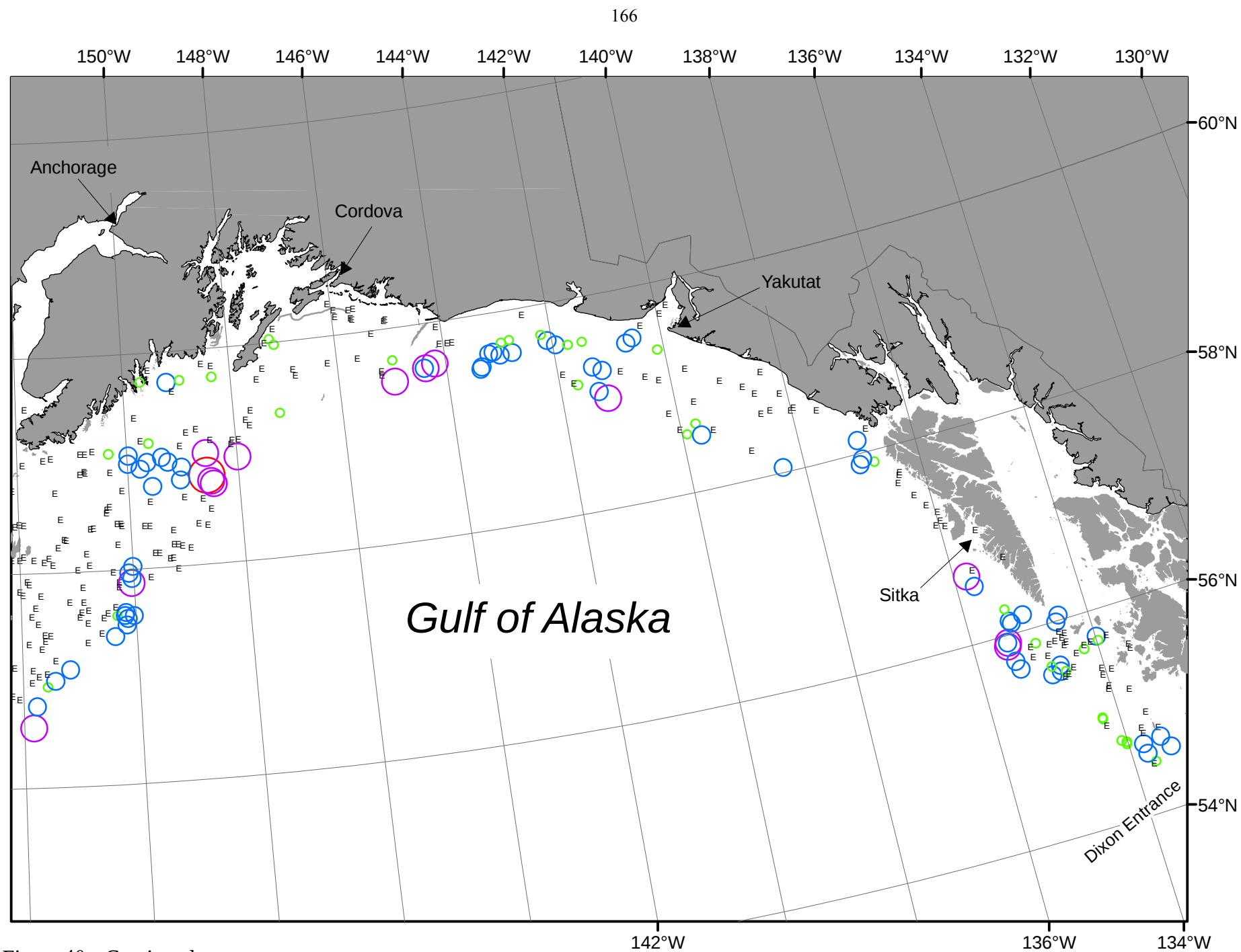


Figure 40.--Continued.

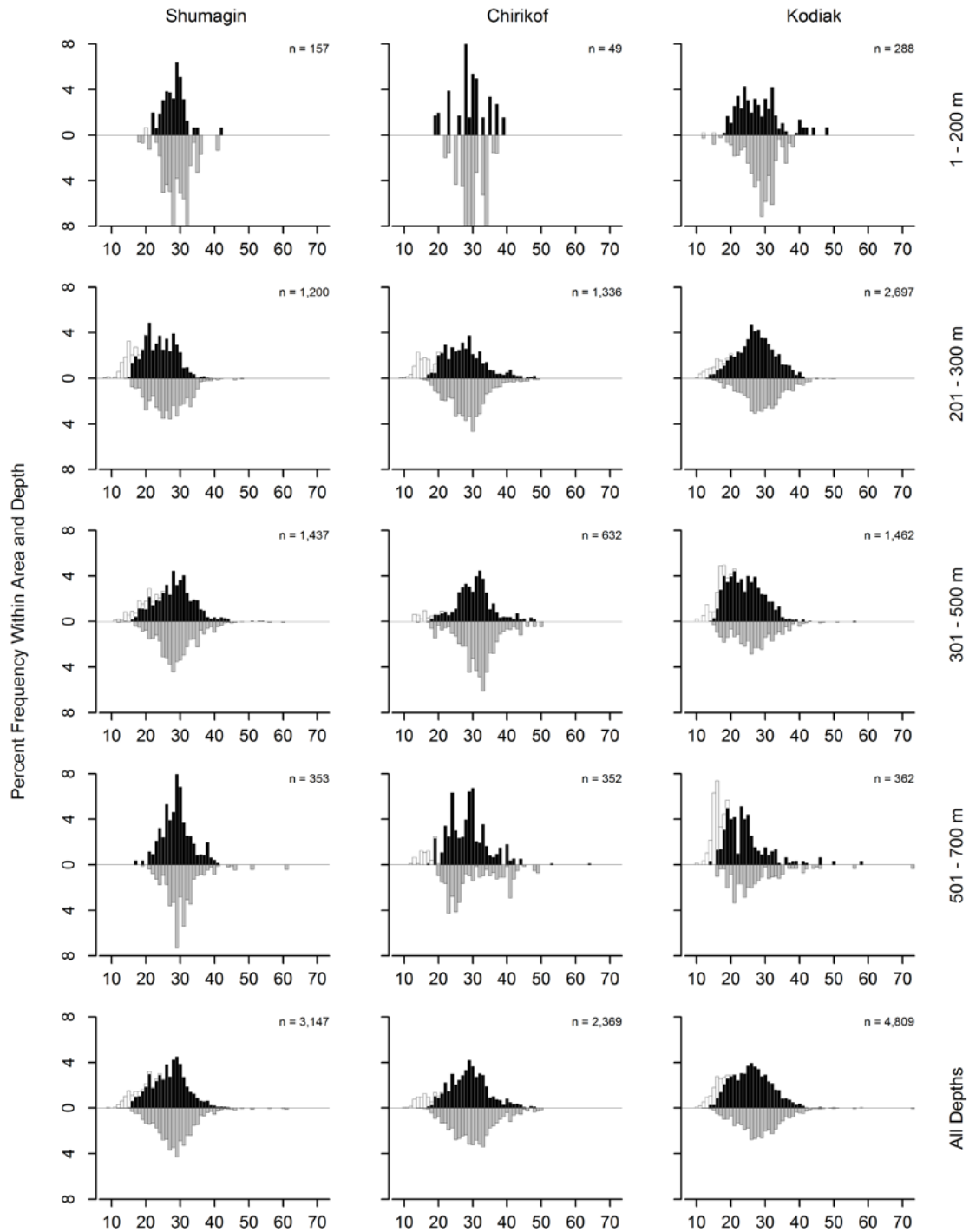


Figure 41. -- Size composition of shortspine thornyhead from the 2003 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray, and unsexed fish in white.

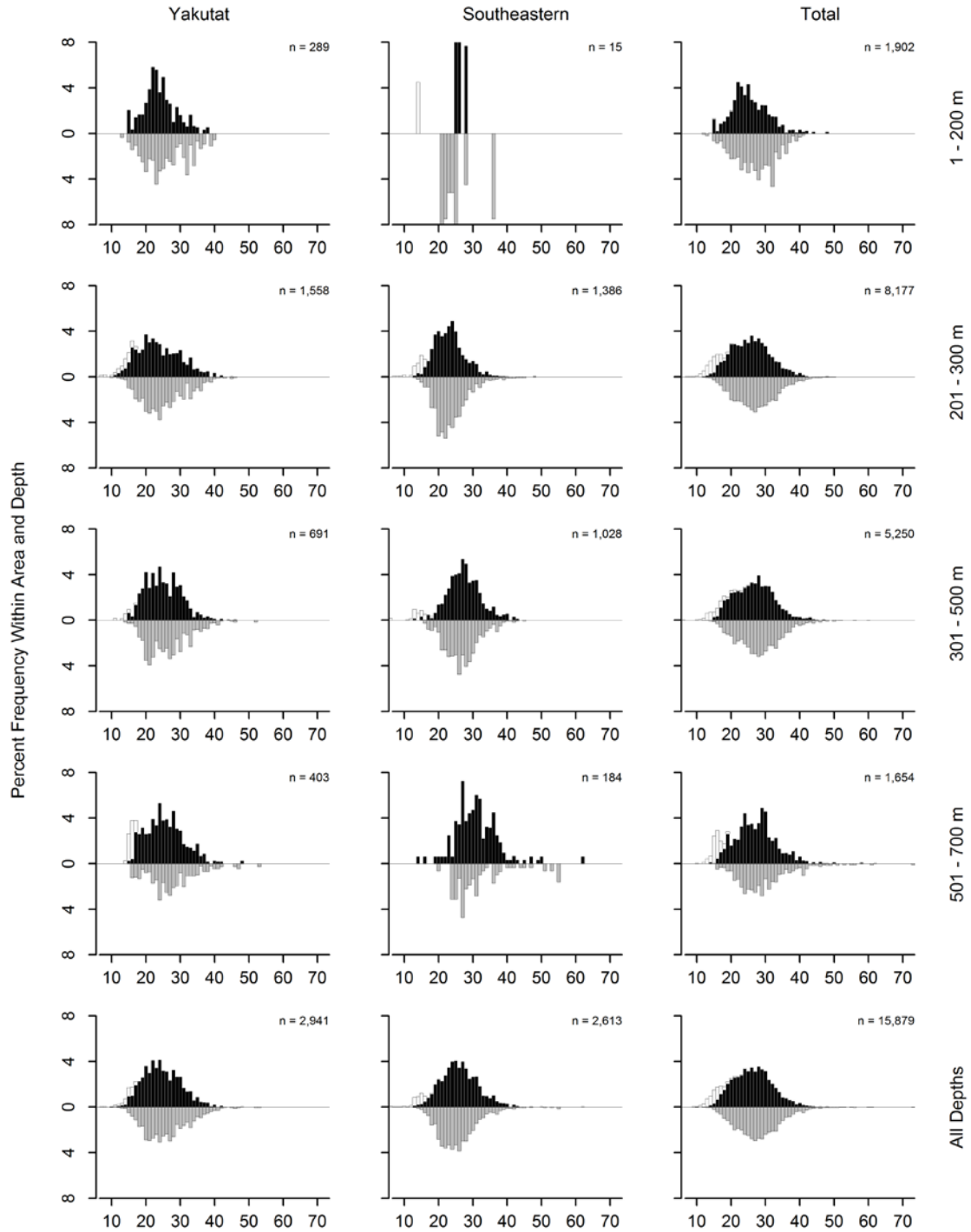


Figure 41. -- Continued (shortspine thornyhead).

Table 50. -- Catch per unit of effort by stratum for shortspine thornyhead sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Chirikof	301 - 500	Chirikof Slope	5	5	64.70	10,378	0	24,872
Shumagin	301 - 500	Shumagin Slope	9	9	33.66	8,519	4,412	12,626
Yakutat	301 - 500	Yakutat Slope	4	4	31.91	4,852	2,874	6,831
Chirikof	501 - 700	Chirikof Slope	3	3	31.67	6,185	0	21,690
Shumagin	501 - 700	Shumagin Slope	4	4	29.35	5,887	449	11,325
Southeastern	301 - 500	Southeastern Slope	2	2	29.33	2,266	0	6,340
Kodiak	201 - 300	Kenai Gullies	16	16	24.53	16,333	11,687	20,980
Kodiak	501 - 700	Kodiak Slope	2	2	24.51	4,277	0	34,536
Shumagin	201 - 300	Shumagin Slope	10	10	21.58	6,017	1,616	10,418
Yakutat	501 - 700	Yakutat Slope	3	3	21.53	3,163	2,129	4,196
Yakutat	301 - 500	Yakutat Gullies	2	2	21.27	2,355	0	5,442
Chirikof	201 - 300	Chirikof Slope	7	7	20.81	3,180	1,808	4,551
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	20.26	2,280	1,379	3,181
Kodiak	201 - 300	Kodiak Slope	6	6	19.91	3,231	489	5,974
Kodiak	301 - 500	Kodiak Slope	9	9	19.41	5,652	3,358	7,947
Southeastern	501 - 700	Southeastern Slope	3	3	17.89	1,849	0	6,802
Southeastern	301 - 500	Southeastern Deep Gullies	8	8	12.77	2,995	1,912	4,077
Yakutat	201 - 300	Yakutat Gullies	6	6	9.34	2,841	687	4,995
Yakutat	201 - 300	Yakutat Slope	11	8	7.45	1,585	0	3,231
Yakutat	101 - 200	Yakataga Shelf	7	5	3.23	1,703	0	3,989
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	15	2.67	1,047	531	1,564
Chirikof	201 - 300	Lower Shelikof Gully	18	8	2.64	2,642	0	5,384
Shumagin	101 - 200	Shumagin Outer Shelf	33	9	0.60	491	0	1,082
Kodiak	101 - 200	Kenai Flats	18	5	0.53	634	0	1,473
Kodiak	101 - 200	Kodiak Outer Shelf	26	7	0.46	230	0	547
Kodiak	101 - 200	Portlock Flats	23	1	0.38	282	0	867
Yakutat	101 - 200	Yakutat Flats	9	2	0.33	299	0	975
Chirikof	101 - 200	Chirikof Outer Shelf	21	5	0.28	142	9	276
Yakutat	101 - 200	Middleton Shelf	12	3	0.14	103	0	248
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	2	0.13	54	0	138
Chirikof	1 - 100	Semidi Bank	20	2	0.05	35	0	95
Shumagin	101 - 200	West Shumagin Gully	5	1	0.04	9	0	34
Kodiak	1 - 100	Kenai Peninsula	8	1	0.04	20	0	66
Chirikof	101 - 200	East Shumagin Gully	19	1	0.03	29	0	90
Southeastern	101 - 200	Prince of Wales Shelf	20	2	0.02	14	0	33

Other Rockfishes

Dark rockfish (*Sebastes ciliatus*)

Dark rockfish were caught in only six different tows over the course of the survey (Table 51). Modest CPUEs were recorded along the Alaska Peninsula and near Kodiak Island at depths less than 200 m. No catches were recorded in the Yakutat and Southeastern INPFC areas. Sixty-seven percent of the estimated biomass was found in the Davidson Bank stratum which makes up only about 4.4% of the survey area (Table 52). Because of the relatively small amount of length frequency data, no trends could be derived and are therefore not presented.

Redstripe rockfish (*Sebastes proriger*)

Redstripe rockfish were relatively rare during this survey and were only caught in 18 hauls; all but two of which were in the Southeastern INPFC area (Table 53). This species was caught as far west as the Shumagin Islands. All fish were caught shallower than 300 m, and while the Prince of Whales Slope/Gully was the only 200-300 m stratum where these fish were found, it also produced about 70% of the estimated biomass (Table 54).

Silvergray rockfish (*Sebastes brevispinis*)

Like redstripe rockfish, silvergray rockfish are generally more common in the eastern Gulf of Alaska. This species was encountered in a total of 51 hauls, 37 of which were in the Southeastern INPFC area, and this trend was also illustrated by the fact that estimated biomass decreased within each INPFC area toward the west (Table 55). None were encountered in the Shumagin INPFC area. They were caught in all but the deepest strata (Table 56).

Harlequin rockfish (*Sebastes variegatus*)

Although not frequently caught, harlequin rockfish were caught over the entire survey area and in all depth strata shallower than 500 m (Table 57). The highest CPUEs came from the Baranof-Chichagof Shelf, Fairweather Shelf, and Chirikof Bank in the Southeastern, Yakutat, and Chirikof INPFC areas. These strata accounted for 76% of the estimated biomass (Table 58), although they represent less than 7.3% of the total survey area.

Redbanded rockfish (*Sebastes babcocki*)

Redbanded rockfish were caught infrequently and in relatively modest numbers, but they were caught over the entire range of the survey and from all but the deepest depth strata (Table 59). As with most rockfish species, they were most common from the Southeastern INPFC area which produced almost 58% of the estimated biomass. The most common depth strata for this species was the 200-300 m depth range which accounted for 57% of the estimated biomass over the entire survey area. The strata of highest concentration were Baranof-Chichagof Slope, the Prince of Wales Slope/Gullies, and the Baranof-Chichagof Shelf strata, all located in the Southeastern INPFC area (Table 60).

Yelloweye rockfish (*Sebastes ruberrimus*)

Yelloweye rockfish were caught very infrequently and in very modest numbers over most of the range survey area (Table 61). They were caught exclusively in less than 300 m of water. The highest mean CPUE was recorded in the Kodiak Outer Shelf stratum, which accounted for almost 42% of its estimated biomass even though it encompassed less than 2% of the survey area (Table 62).

Table 51. -- Number of survey hauls, number of hauls with dark rockfish, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	3	0.06	235	0	539	1.006
	101 - 200	46	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	3	0.04	235	0	539	1.006
Chirikof	1 - 100	75	1	0.02	49	0	150	0.797
	101 - 200	64	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	1	0.01	49	0	150	0.797
Kodiak	1 - 100	106	1	---	8	0	25	0.522
	101 - 200	106	1	---	7	0	23	0.569
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	2	---	16	0	38	0.544
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	0	---	---	---	---	---
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	0	---	---	---	---	---
All areas	1 - 100	371	5	0.02	292	0	612	0.94
	101 - 200	281	1	---	7	0	23	0.569
	201 - 300	103	0	---	---	---	---	---
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	6	0.01	299	0	620	0.925

Table 52. -- Catch per unit of effort by stratum for dark rockfish sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Shumagin	1 - 100	Davidson Bank	62	2	0.15	200	0	496
Chirikof	1 - 100	Chirikof Bank	37	1	0.05	49	0	150
Shumagin	1 - 100	Shumagin Bank	38	1	0.03	35	0	105
Kodiak	101 - 200	Albatross Gullies	25	1	0.01	7	0	23
Kodiak	1 - 100	Albatross Banks	41	1	0.01	8	0	25

Table 53. -- Number of survey hauls, number of hauls with redstripe rockfish, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	1	<.01	5	0	15	0.339
	101 - 200	46	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	1	<.01	5	0	15	0.339
Chirikof	1 - 100	75	0	---	---	---	---	---
	101 - 200	64	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	0	---	---	---	---	---
Kodiak	1 - 100	106	0	---	---	---	---	---
	101 - 200	106	1	0.04	175	0	537	0.533
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	1	0.02	175	0	537	0.533
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	0	---	---	---	---	---
Southeastern	1 - 100	13	1	<.01	2	0	5	0.068
	101 - 200	28	5	2.02	2,237	0	5,632	0.519
	201 - 300	26	10	11.10	5,607	588	10,625	0.58
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	16	2.92	7,845	1,940	13,751	0.561
All areas	1 - 100	371	2	<.01	7	0	17	0.171
	101 - 200	281	6	0.20	2,412	0	5,829	0.52
	201 - 300	103	10	1.56	5,607	588	10,625	0.58
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	18	0.26	8,025	2,109	13,942	0.56

Table 54. -- Catch per unit of effort by stratum for redstripe rockfish sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	10	14.28	5,607	573	10,640
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	1	3.38	1,419	0	4,776
Southeastern	101 - 200	Prince of Wales Shelf	20	4	1.19	818	0	2,164
Kodiak	101 - 200	Portlock Flats	23	1	0.24	175	0	538
Shumagin	1 - 100	Fox Islands	28	1	0.01	5	0	15
Southeastern	1 - 100	Southeastern Shallows	13	1	<0.01	2	0	5

Table 55. -- Number of survey hauls, number of hauls with silvergray rockfish, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	0	---	---	---	---	---
	101 - 200	46	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	0	---	---	---	---	---
Chirikof	1 - 100	75	1	.01	37	0	113	0.747
	101 - 200	64	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	1	0.01	37	0	113	0.747
Kodiak	1 - 100	106	2	<.01	19	0	48	0.479
	101 - 200	106	1	<.01	9	0	29	0.655
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	3	<.01	28	0	63	0.526
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	3	0.12	366	0	1,008	0.977
	201 - 300	17	6	5.19	2,684	0	6,528	2.082
	301 - 500	6	1	0.06	17	0	64	1.139
	501 - 700	3	0	---	---	---	---	---
	All depths	79	10	0.55	3,067	0	6,761	1.827
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	12	4.43	4,913	1,958	7,868	1.842
	201 - 300	26	22	86.65	43,781	0	122,705	1.846
	301 - 500	10	2	0.21	64	0	163	2.151
	501 - 700	3	0	---	---	---	---	---
	All depths	80	37	18.18	48,784	0	127,764	1.845
All areas	1 - 100	371	4	0.01	82	0	176	0.726
	101 - 200	281	16	0.43	5,288	2,299	8,278	1.731
	201 - 300	103	28	12.89	46,465	0	125,472	1.858
	301 - 500	39	3	0.06	81	0	184	1.813
	501 - 700	15	0	---	---	---	---	---
	All depths	809	51	1.68	51,915	0	130,981	1.840

Table 56. -- Catch per unit of effort by stratum for silvergray rockfish sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	20	111.18	43,661	0	122,813
Yakutat	201 - 300	Yakutat Slope	11	6	12.62	2,684	0	6,575
Southeastern	101 - 200	Prince of Wales Shelf	20	9	5.98	4,121	1,331	6,912
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	3	1.89	792	0	2,043
Southeastern	201 - 300	Baranof-Chichagof Slope	4	2	1.06	120	0	382
Yakutat	101 - 200	Fairweather Shelf	9	2	0.38	292	0	943
Southeastern	301 - 500	Southeastern Deep Gullies	8	2	0.27	64	0	166
Yakutat	301 - 500	Yakutat Slope	4	1	0.11	17	0	71
Yakutat	101 - 200	Yakutat Flats	9	1	0.08	74	0	245
Southeastern	1 - 100	Southeastern Shallows	13	1	0.04	26	0	83
Chirikof	1 - 100	Chirikof Bank	37	1	0.03	37	0	113
Kodiak	101 - 200	Portlock Flats	23	1	0.01	9	0	29
Kodiak	1 - 100	Albatross Banks	41	1	0.01	14	0	41
Kodiak	1 - 100	Albatross Shallows	33	1	0.01	5	0	15

Table 57. -- Number of survey hauls, number of hauls with harlequin rockfish, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	2	<.01	8	0	20	0.323
	101 - 200	46	2	0.01	8	0	19	0.36
	201 - 300	10	2	0.03	9	0	23	0.378
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	6	<.01	25	5	45	0.353
Chirikof	1 - 100	75	1	0.36	938	0	2,852	0.212
	101 - 200	64	4	0.01	25	0	53	0.531
	201 - 300	25	1	<.01	5	0	18	0.578
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	6	0.15	968	0	2,883	0.216
Kodiak	1 - 100	106	0	---	---	---	---	---
	101 - 200	106	10	0.12	525	0	1,160	0.269
	201 - 300	25	1	<.01	6	0	17	0.361
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	11	0.05	530	0	1,166	0.27
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	3	0.34	998	0	2,908	0.048
	201 - 300	17	2	0.19	100	0	315	0.356
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	5	0.20	1,097	0	3,020	0.053
Southeastern	1 - 100	13	1	0.01	5	0	16	0.222
	101 - 200	28	10	0.82	904	0	2,945	0.334
	201 - 300	26	7	0.02	11	3	19	0.14
	301 - 500	10	2	0.01	4	0	11	0.096
	501 - 700	3	0	---	---	---	---	---
	All depths	80	20	0.34	924	0	2,965	0.324
All areas	1 - 100	371	4	0.07	951	0	2,866	0.212
	101 - 200	281	29	0.20	2,459	0	5,154	0.097
	201 - 300	103	13	0.04	131	0	346	0.32
	301 - 500	39	2	<.01	4	0	11	0.096
	501 - 700	15	0	---	---	---	---	---
	All depths	809	48	0.11	3,545	313	6,776	0.117

Table 58. -- Catch per unit of effort by stratum for harlequin rockfish sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	2	2.12	888	0	2,981
Yakutat	101 - 200	Fairweather Shelf	9	2	1.11	859	0	2,811
Chirikof	1 - 100	Chirikof Bank	37	1	0.87	938	0	2,852
Yakutat	201 - 300	Yakutat Slope	11	2	0.47	100	0	318
Kodiak	101 - 200	Kodiak Outer Shelf	26	6	0.46	233	0	593
Kodiak	101 - 200	Portlock Flats	23	3	0.39	289	0	823
Yakutat	101 - 200	Yakutat Flats	9	1	0.15	138	0	457
Southeastern	201 - 300	Baranof-Chichagof Slope	4	3	0.06	7	0	17
Chirikof	201 - 300	Chirikof Slope	7	1	0.04	5	0	19
Shumagin	201 - 300	Shumagin Slope	10	2	0.03	9	0	23
Chirikof	101 - 200	Chirikof Outer Shelf	21	3	0.03	13	0	28
Southeastern	101 - 200	Prince of Wales Shelf	20	8	0.02	17	4	29
Chirikof	101 - 200	Shelikof Edge	24	1	0.02	12	0	36
Southeastern	301 - 500	Southeastern Deep Gullies	8	2	0.02	4	0	11
Shumagin	101 - 200	Shumagin Outer Shelf	33	2	0.01	8	0	19
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	4	0.01	4	0	8
Southeastern	1 - 100	Southeastern Shallows	13	1	0.01	5	0	16
Kodiak	201 - 300	Kenai Gullies	16	1	0.01	6	0	17
Shumagin	1 - 100	Davidson Bank	62	1	<0.01	6	0	16
Kodiak	101 - 200	Albatross Gullies	25	1	<0.01	3	0	8
Shumagin	1 - 100	Shumagin Bank	38	1	<0.01	3	0	8

Table 59. -- Number of survey hauls, number of hauls with redbanded rockfish, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	0	---	---	---	---	---
	101 - 200	46	1	<.01	7	0	22	0.655
	201 - 300	10	3	0.04	12	0	28	0.245
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	4	<.01	19	0	40	0.322
Chirikof	1 - 100	75	1	<.01	11	0	32	0.148
	101 - 200	64	4	0.03	64	0	134	1.129
	201 - 300	25	8	0.52	597	0	1,278	1.598
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	13	0.10	672	0	1,357	1.338
Kodiak	1 - 100	106	1	0.01	29	0	93	1.573
	101 - 200	106	6	0.03	142	0	312	0.641
	201 - 300	25	4	0.04	47	0	98	0.264
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	11	0.02	218	31	404	0.521
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	1	0.11	330	0	1,078	0.548
	201 - 300	17	10	0.39	201	38	364	0.35
	301 - 500	6	1	0.06	17	0	91	0.786
	501 - 700	3	0	---	---	---	---	---
	All depths	79	12	0.10	548	0	1,316	0.458
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	4	0.64	712	0	1,705	1.413
	201 - 300	26	21	2.20	1,112	484	1,740	0.961
	301 - 500	10	6	0.51	160	0	346	0.65
	501 - 700	3	0	---	---	---	---	---
	All depths	80	31	0.74	1,984	803	3,165	1.04
All areas	1 - 100	371	2	<.01	39	0	102	0.435
	101 - 200	281	16	0.10	1,255	23	2,488	0.899
	201 - 300	103	46	0.55	1,969	1,030	2,907	0.845
	301 - 500	39	7	0.14	178	0	364	0.661
	501 - 700	15	0	---	---	---	---	---
	All depths	809	71	0.11	3,441	1,907	4,974	0.842

Table 60. -- Catch per unit of effort by stratum for redbanded rockfish sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	2.92	329	0	802
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	17	2.00	783	228	1,338
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	2	0.74	308	0	1,009
Yakutat	201 - 300	Yakutat Slope	11	8	0.70	148	0	297
Southeastern	101 - 200	Prince of Wales Shelf	20	2	0.59	403	0	1,205
Southeastern	301 - 500	Southeastern Slope	2	2	0.57	44	0	535
Chirikof	201 - 300	Lower Shelikof Gully	18	4	0.56	565	0	1,248
Southeastern	301 - 500	Southeastern Deep Gullies	8	4	0.50	117	0	287
Yakutat	101 - 200	Yakutat Flats	9	1	0.37	330	0	1,092
Kodiak	201 - 300	Kodiak Slope	6	3	0.24	39	0	98
Chirikof	201 - 300	Chirikof Slope	7	4	0.21	33	0	69
Yakutat	201 - 300	Yakutat Gullies	6	2	0.17	52	0	147
Yakutat	301 - 500	Yakutat Gullies	2	1	0.15	17	0	234
Kodiak	1 - 100	Northern Kodiak Shallows	9	1	0.13	29	0	94
Chirikof	101 - 200	Chirikof Outer Shelf	21	2	0.08	39	0	102
Kodiak	101 - 200	Kodiak Outer Shelf	26	2	0.07	36	0	88
Kodiak	101 - 200	Kenai Flats	18	2	0.07	81	0	238
Shumagin	201 - 300	Shumagin Slope	10	3	0.04	12	0	29
Kodiak	101 - 200	Portlock Flats	23	2	0.04	25	0	67
Chirikof	101 - 200	Shelikof Edge	24	1	0.02	13	0	40
Chirikof	101 - 200	East Shumagin Gully	19	1	0.01	12	0	37
Kodiak	201 - 300	Kenai Gullies	16	1	0.01	7	0	23
Chirikof	1 - 100	Chirikof Bank	37	1	0.01	11	0	32
Shumagin	101 - 200	Shumagin Outer Shelf	33	1	0.01	7	0	22

Table 61. -- Number of survey hauls, number of hauls with yelloweye rockfish, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	1	0.01	46	0	140	3.173
	101 - 200	46	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	1	0.01	46	0	140	3.173
Chirikof	1 - 100	75	1	0.02	64	0	195	5.179
	101 - 200	64	3	0.08	180	0	468	2.572
	201 - 300	25	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	4	0.04	244	0	556	2.964
Kodiak	1 - 100	106	0	---	---	---	---	---
	101 - 200	106	5	0.14	614	0	1,459	3.513
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	5	0.06	614	0	1,459	3.513
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	1	0.07	211	0	688	5.961
	201 - 300	17	1	0.09	49	0	156	4.392
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	2	0.05	260	0	749	5.585
Southeastern	1 - 100	13	1	0.18	119	0	374	5.011
	101 - 200	28	1	0.16	181	0	598	3.79
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	2	0.11	300	0	754	4.194
All areas	1 - 100	371	3	0.02	229	0	522	4.526
	101 - 200	281	10	0.10	1,186	135	2,237	3.616
	201 - 300	103	1	0.01	49	0	156	4.392
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	14	0.05	1,463	379	2,547	3.756

Table 62. -- Catch per unit of effort by stratum for yelloweye rockfish sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Kodiak	101 - 200	Kodiak Outer Shelf	26	5	1.22	614	0	1,460
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	1	0.43	181	0	609
Yakutat	101 - 200	Fairweather Shelf	9	1	0.27	211	0	697
Yakutat	201 - 300	Yakutat Slope	11	1	0.23	49	0	158
Southeastern	1 - 100	Southeastern Shallows	13	1	0.18	119	0	377
Chirikof	101 - 200	East Shumagin Gully	19	1	0.12	134	0	414
Chirikof	101 - 200	Chirikof Outer Shelf	21	2	0.09	47	0	114
Chirikof	1 - 100	Chirikof Bank	37	1	0.06	64	0	195
Shumagin	1 - 100	Fox Islands	28	1	0.06	46	0	140

SKATES

Alaska skate (*Bathyraja parmifera*)

Alaska skates were caught infrequently and in modest numbers. They were represented in only 20 of the 809 tows, and they were caught in all but the deepest depth range and in four out of the five INPFC areas (Tables 63-64). Virtually all Alaska skates were caught in water shallower than 300 m. Depth distribution varied considerably among the INPFC areas. In the Kodiak area the estimated biomass was evenly distributed between the 1-100 m and the 100-200 m depth ranges. In the Chirikof INPFC area the 200-300 m depth range produced the majority of the biomass while in the Shumagin INPFC all of the biomass was in the shallow stratum.

Aleutian skate (*Bathyraja aleutica*)

Aleutian skates were found in 86 tows and in all of the INPFC areas, although in the Southeastern INPFC, they were present in only one tow in the 500-700 m stratum. Throughout the rest of the survey, they were present in that depth stratum in only one other tow (Table 65). In the Shumagin and Kodiak INPFC areas both the mean CPUE and biomass were highest in the 100-200 m depth range while in the Chirikof area, both of those numbers were highest in the 200-300 m depth range. The highest CPUE within a stratum was in the West Shumagin Gully stratum, although the greatest estimated biomass came from the Barren Islands stratum which is located in the Kodiak INPFC area (Table 66).

Bering skate (*Bathyraja interrupta*)

Bering skates were caught in modest numbers throughout the survey area (Table 67). The highest CPUEs were recorded in the Upper Shelikof Gully, the Northern Kodiak Shallows and the Kenai Gullies survey strata all in the Kodiak INPFC area (Table 68). Bering skate were caught in all depth ranges except the 500-700 m range, but almost 77% of the estimated biomass was recorded in the 101 - 300 m depth range.

Big skate (*Raja binoculata*)

Big skates were caught in modest numbers in approximately 11% of all survey hauls in all five of the INPFC areas (Table 69). The species was much more abundant in the shallowest depth range in each of the three westernmost INPFC areas, where over 73% of the estimated biomass was found. None were caught in water deeper than 200 m (Table 70)..

Longnose skate (*Raja rhina*)

Longnose skate were caught in relatively low numbers in approximately 20% of all survey hauls. Although they were caught in all five INPFC areas, almost 80% of the estimated biomass came from the Kodiak and Yakutat areas (Table 71). They were caught in all depth ranges, although appeared in only four tows greater than 300 m. Strata with the highest CPUEs included the Northern Kodiak Shallows, the Yakutat Slope, and the Middleton Shelf (Table 72).

Table 63. -- Number of survey hauls, number of hauls with Alaska skate, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	4	0.06	265	0	555	4.698
	101 - 200	46	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	4	0.04	265	0	555	4.698
Chirikof	1 - 100	75	0	---	---	---	---	---
	101 - 200	64	4	0.10	247	0	607	2.582
	201 - 300	25	3	0.69	802	0	1,737	7.647
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	7	0.16	1,048	60	2,037	5.231
Kodiak	1 - 100	106	2	0.06	232	0	646	5.562
	101 - 200	106	4	0.07	298	0	699	4.202
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	6	0.05	531	0	1,069	4.706
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	0	---	---	---	---	---
Southeastern	1 - 100	13	1	0.04	25	0	78	0.535
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	1	0.04	18	0	68	1.487
	301 - 500	10	1	0.07	21	0	109	1.242
	501 - 700	3	0	---	---	---	---	---
	All depths	80	3	0.02	63	0	141	0.846
All areas	1 - 100	371	7	0.04	522	42	1,003	3.622
	101 - 200	281	8	0.04	545	16	1,074	3.272
	201 - 300	103	4	0.23	820	0	1,755	7.009
	301 - 500	39	1	0.02	21	0	109	1.242
	501 - 700	15	0	---	---	---	---	---
	All depths	809	20	0.06	1,908	754	3,061	4.294

Table 64. --Catch per unit of effort by stratum for Alaska skate sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Chirikof	201 - 300	Lower Shelikof Gully	18	3	0.80	802	0	1,741
Kodiak	1 - 100	Kenai Peninsula	8	1	0.32	167	0	562
Kodiak	1 - 100	Northern Kodiak Shallows	9	1	0.30	65	0	216
Southeastern	301 - 500	Southeastern Slope	2	1	0.27	21	0	281
Shumagin	1 - 100	Fox Islands	28	2	0.22	183	0	448
Chirikof	101 - 200	Chirikof Outer Shelf	21	2	0.21	106	0	321
Kodiak	101 - 200	Albatross Gullies	25	3	0.18	144	0	377
Southeastern	201 - 300	Baranof-Chichagof Slope	4	1	0.16	18	0	75
Kodiak	101 - 200	Barren Islands	14	1	0.14	155	0	489
Chirikof	101 - 200	East Shumagin Gully	19	2	0.13	141	0	435
Shumagin	1 - 100	Davidson Bank	62	2	0.06	83	0	207
Southeastern	1 - 100	Southeastern Shallows	13	1	0.04	25	0	78

Table 65. -- Number of survey hauls, number of hauls with Aleutian skate, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	14	0.42	1,729	646	2,812	9.177
	101 - 200	46	10	1.70	2,495	734	4,256	11.64
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	2	0.05	12	0	37	0.497
	501 - 700	4	1	0.74	149	0	563	1.432
	All depths	230	28	0.70	4,401	2,342	6,460	8.117
Chirikof	1 - 100	75	1	0.19	495	0	1,536	6.775
	101 - 200	64	13	0.59	1,396	408	2,384	6.007
	201 - 300	25	10	2.00	2,310	801	3,818	5.752
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	24	0.65	4,201	2,164	6,238	5.941
Kodiak	1 - 100	106	2	0.18	677	0	2,182	7.344
	101 - 200	106	18	1.15	4,973	1,412	8,535	9.487
	201 - 300	25	6	0.75	867	0	1,812	4.736
	301 - 500	9	3	0.19	54	0	124	0.929
	501 - 700	2	0	---	---	---	---	---
	All depths	248	29	0.67	6,571	2,729	10,413	7.663
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	1	0.09	277	0	932	8.898
	201 - 300	17	2	0.47	244	0	690	7.679
	301 - 500	6	1	0.05	13	0	48	0.839
	501 - 700	3	0	---	---	---	---	---
	All depths	79	4	0.10	533	0	1,326	6.838
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	1	1.04	107	0	447	3.655
	All depths	80	1	0.04	107	0	447	3.655
All areas	1 - 100	371	17	0.22	2,901	895	4,907	8.203
	101 - 200	281	42	0.75	9,141	5,043	13,239	9.122
	201 - 300	103	19	0.95	3,436	1,706	5,166	5.479
	301 - 500	39	6	0.06	79	3	154	0.807
	501 - 700	15	2	0.31	256	0	728	1.92
	All depths	809	86	0.51	15,813	10,983	20,644	7.143

Table 66. --Catch per unit of effort by stratum for Aleutian skate sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Shumagin	101 - 200	West Shumagin Gully	5	3	2.67	608	0	1,302
Kodiak	101 - 200	Barren Islands	14	4	2.63	2,882	0	6,030
Chirikof	201 - 300	Lower Shelikof Gully	18	10	2.31	2,310	795	3,824
Shumagin	101 - 200	Shumagin Outer Shelf	33	6	2.09	1,701	59	3,343
Kodiak	101 - 200	Portlock Flats	23	7	2.02	1,485	0	3,152
Kodiak	201 - 300	Upper Shelikof Gully	3	2	1.46	468	0	1,667
Chirikof	101 - 200	Shelikof Edge	24	10	1.39	1,076	178	1,975
Kodiak	201 - 300	Kodiak Slope	6	2	1.29	210	0	719
Kodiak	1 - 100	Kenai Peninsula	8	1	1.24	652	0	2,195
Yakutat	201 - 300	Yakutat Slope	11	2	1.15	244	0	696
Shumagin	1 - 100	Fox Islands	28	7	1.07	891	236	1,547
Southeastern	501 - 700	Southeastern Slope	3	1	1.04	107	0	567
Kodiak	101 - 200	Albatross Gullies	25	5	0.76	604	23	1,186
Shumagin	501 - 700	Shumagin Slope	4	1	0.74	149	0	623
Chirikof	101 - 200	Chirikof Outer Shelf	21	3	0.64	320	0	765
Chirikof	1 - 100	Upper Alaska Peninsula	18	1	0.62	495	0	1,540
Yakutat	101 - 200	Yakataga Shelf	7	1	0.53	277	0	955
Shumagin	101 - 200	Sanak Gully	8	1	0.44	186	0	627
Shumagin	1 - 100	Shumagin Bank	38	2	0.40	493	0	1,313
Kodiak	201 - 300	Kenai Gullies	16	2	0.29	190	0	478
Shumagin	1 - 100	Lower Alaska Peninsula	33	2	0.20	134	0	346
Kodiak	301 - 500	Kodiak Slope	9	3	0.19	54	0	125
Shumagin	1 - 100	Davidson Bank	62	3	0.15	211	0	488
Kodiak	1 - 100	Northern Kodiak Shallows	9	1	0.11	24	0	80
Yakutat	301 - 500	Yakutat Slope	4	1	0.08	13	0	53
Shumagin	201 - 300	Shumagin Slope	10	1	0.06	16	0	52
Shumagin	301 - 500	Shumagin Slope	9	2	0.05	12	0	37
Kodiak	101 - 200	Kodiak Outer Shelf	26	1	<0.01	1	0	4
Kodiak	101 - 200	Kenai Flats	18	1	<0.01	1	0	3

Table 67. -- Number of survey hauls, number of hauls with Bering skate, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	0	---	---	---	---	---
	101 - 200	46	1	0.03	38	0	126	1.88
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	2	0.01	39	0	127	1.149
Chirikof	1 - 100	75	5	0.12	318	0	688	2.327
	101 - 200	64	13	0.18	424	156	691	1.709
	201 - 300	25	6	0.31	360	73	647	1.624
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	24	0.17	1,101	578	1,624	1.817
Kodiak	1 - 100	106	6	0.13	495	0	1,104	5.431
	101 - 200	106	18	0.29	1,260	489	2,032	1.824
	201 - 300	25	12	0.58	670	339	1,001	1.784
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	36	0.25	2,425	1,415	3,435	2.095
Yakutat	1 - 100	16	0	---	---	---	---	---
	101 - 200	37	3	0.03	82	0	201	1.017
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	4	0.02	93	0	214	1.05
Southeastern	1 - 100	13	0	---	---	---	---	---
	101 - 200	28	0	---	---	---	---	---
	201 - 300	26	1	0.01	3	0	10	0.45
	301 - 500	10	2	0.12	39	0	98	1.294
	501 - 700	3	0	---	---	---	---	---
	All depths	80	3	0.02	42	0	102	1.129
All areas	1 - 100	371	12	0.06	814	103	1,524	3.368
	101 - 200	281	35	0.15	1,804	982	2,626	1.735
	201 - 300	103	20	0.29	1,045	633	1,456	1.705
	301 - 500	39	2	0.03	39	0	98	1.294
	501 - 700	15	0	---	---	---	---	---
	All depths	809	69	0.12	3,701	2,564	4,838	1.924

Table 68. -- Catch per unit of effort by stratum for Bering skate sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Kodiak	201 - 300	Upper Shelikof Gully	3	3	0.92	294	0	750
Kodiak	1 - 100	Northern Kodiak Shallows	9	3	0.67	148	0	336
Kodiak	201 - 300	Kenai Gullies	16	9	0.56	376	161	590
Kodiak	101 - 200	Albatross Gullies	25	8	0.55	436	92	781
Kodiak	101 - 200	Barren Islands	14	4	0.48	525	0	1,178
Chirikof	101 - 200	Shelikof Edge	24	10	0.45	349	97	601
Chirikof	201 - 300	Lower Shelikof Gully	18	6	0.36	360	72	649
Kodiak	1 - 100	Albatross Banks	41	2	0.21	322	0	906
Chirikof	1 - 100	Upper Alaska Peninsula	18	1	0.21	163	0	507
Southeastern	301 - 500	Southeastern Deep Gullies	8	2	0.17	39	0	100
Kodiak	101 - 200	Kenai Flats	18	3	0.15	176	0	397
Chirikof	1 - 100	Chirikof Bank	37	4	0.14	155	0	312
Kodiak	101 - 200	Portlock Flats	23	2	0.14	105	0	281
Yakutat	101 - 200	Middleton Shelf	12	2	0.11	81	0	200
Shumagin	101 - 200	Sanak Gully	8	1	0.09	38	0	128
Chirikof	101 - 200	Chirikof Outer Shelf	21	2	0.06	32	0	81
Yakutat	201 - 300	Yakutat Slope	11	1	0.05	11	0	36
Kodiak	1 - 100	Albatross Shallows	33	1	0.04	25	0	77
Chirikof	101 - 200	East Shumagin Gully	19	1	0.04	43	0	132
Kodiak	101 - 200	Kodiak Outer Shelf	26	1	0.04	18	0	54
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	1	0.01	3	0	10
Yakutat	101 - 200	Yakataga Shelf	7	1	<0.01	2	0	5
Shumagin	1 - 100	Shumagin Bank	38	1	<0.01	1	0	4

Table 69. -- Number of survey hauls, number of hauls with big skate, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	26	2.33	9,602	4,124	15,080	24.116
	101 - 200	46	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	26	1.52	9,602	4,124	15,080	24.116
Chirikof	1 - 100	75	22	4.19	10,920	5,332	16,508	18.305
	101 - 200	64	3	0.38	899	0	2,110	17.701
	201 - 300	25	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	25	1.82	11,819	6,106	17,531	18.258
Kodiak	1 - 100	106	18	5.19	19,980	6,109	33,851	14.384
	101 - 200	106	6	0.47	2,016	0	4,262	13.72
	201 - 300	25	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	24	2.24	21,995	8,009	35,981	14.321
Yakutat	1 - 100	16	6	4.00	6,671	482	12,859	7.326
	101 - 200	37	2	0.60	1,765	0	4,421	30.372
	201 - 300	17	0	---	---	---	---	---
	301 - 500	6	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	79	8	1.53	8,436	1,777	15,094	8.709
Southeastern	1 - 100	13	2	5.33	3,487	0	10,762	6.696
	101 - 200	28	1	0.05	57	0	177	3.67
	201 - 300	26	0	---	---	---	---	---
	301 - 500	10	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	80	3	1.32	3,545	0	10,820	6.608
All areas	1 - 100	371	74	3.93	50,660	32,665	68,656	13.279
	101 - 200	281	12	0.39	4,736	1,177	8,296	17.451
	201 - 300	103	0	---	---	---	---	---
	301 - 500	39	0	---	---	---	---	---
	501 - 700	15	0	---	---	---	---	---
	All depths	809	86	1.80	55,397	37,053	73,741	13.556

Table 70. -- Catch per unit of effort by stratum for big skate sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Kodiak	1 - 100	Lower Cook Inlet	15	8	13.49	13,334	2,186	24,481
Kodiak	1 - 100	Kenai Peninsula	8	2	8.96	4,714	0	14,479
Chirikof	1 - 100	Chirikof Bank	37	15	7.99	8,624	3,211	14,037
Southeastern	1 - 100	Southeastern Shallows	13	2	5.33	3,487	0	10,826
Yakutat	1 - 100	Middleton Shallows	8	3	4.22	2,832	0	7,016
Yakutat	1 - 100	Yakutat Shallows	8	3	3.86	3,839	0	9,093
Shumagin	1 - 100	Fox Islands	28	3	2.91	2,425	0	6,601
Chirikof	1 - 100	Upper Alaska Peninsula	18	7	2.89	2,297	637	3,956
Shumagin	1 - 100	Davidson Bank	62	11	2.41	3,300	925	5,674
Shumagin	1 - 100	Lower Alaska Peninsula	33	6	2.37	1,627	156	3,099
Yakutat	101 - 200	Yakataga Shelf	7	1	1.82	961	0	3,312
Shumagin	1 - 100	Shumagin Bank	38	6	1.82	2,250	0	4,694
Kodiak	101 - 200	Kenai Flats	18	3	1.18	1,429	0	3,542
Kodiak	1 - 100	Albatross Shallows	33	3	1.18	680	0	1,563
Yakutat	101 - 200	Middleton Shelf	12	1	1.10	804	0	2,574
Chirikof	101 - 200	Shelikof Edge	24	2	1.09	845	0	2,055
Kodiak	1 - 100	Albatross Banks	41	4	0.75	1,161	0	2,560
Kodiak	1 - 100	Northern Kodiak Shallows	9	1	0.41	90	0	299
Kodiak	101 - 200	Barren Islands	14	1	0.37	408	0	1,289
Kodiak	101 - 200	Kodiak Outer Shelf	26	2	0.36	179	0	436
Chirikof	101 - 200	Chirikof Outer Shelf	21	1	0.11	53	0	164
Southeastern	101 - 200	Prince of Wales Shelf	20	1	0.08	57	0	178

Table 71. -- Number of survey hauls, number of hauls with longnose skate, mean CPUE, biomass, and mean weight, based on the 2003 Gulf of Alaska biennial bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

INPFC area	Depth (m)	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Lower 95% biomass CI (t)	Upper 95% biomass CI (t)	Mean weight (kg)
Shumagin	1 - 100	161	2	0.06	247	0	625	9.854
	101 - 200	46	5	0.36	535	0	1,186	5.421
	201 - 300	10	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	All depths	230	7	0.12	782	64	1,499	6.317
Chirikof	1 - 100	75	6	0.43	1,124	143	2,105	6.766
	101 - 200	64	16	1.72	4,110	1,981	6,239	10.684
	201 - 300	25	8	1.15	1,327	407	2,246	6.919
	301 - 500	5	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	All depths	172	30	1.01	6,561	4,069	9,052	8.835
Kodiak	1 - 100	106	35	2.03	7,810	4,217	11,403	9.82
	101 - 200	106	37	1.93	8,349	5,347	11,350	7.596
	201 - 300	25	10	2.63	3,022	0	7,067	7.825
	301 - 500	9	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	248	82	1.96	19,180	13,706	24,655	8.411
Yakutat	1 - 100	16	2	0.79	1,310	0	3,314	8.03
	101 - 200	37	19	2.95	8,665	5,194	12,135	8.977
	201 - 300	17	11	3.97	2,052	906	3,198	7.104
	301 - 500	6	1	0.48	126	0	669	5.799
	501 - 700	3	0	---	---	---	---	---
	All depths	79	33	2.20	12,153	8,134	16,172	8.445
Southeastern	1 - 100	13	4	0.67	439	0	993	3.125
	101 - 200	28	3	0.23	255	0	619	4.785
	201 - 300	26	2	0.16	82	0	230	5.638
	301 - 500	10	2	0.14	42	0	109	1.742
	501 - 700	3	1	1.05	109	0	455	7.441
	All depths	80	12	0.35	927	228	1,627	3.75
All areas	1 - 100	371	49	0.85	10,930	6,725	15,135	8.472
	101 - 200	281	80	1.79	21,913	16,941	26,885	8.425
	201 - 300	103	31	1.80	6,483	2,530	10,436	7.355
	301 - 500	39	3	0.13	169	0	726	3.657
	501 - 700	15	1	0.13	109	0	455	7.441
	All depths	809	164	1.28	39,603	32,401	46,805	8.194

Table 72. -- Catch per unit of effort by stratum for longnose skate sorted by descending CPUE for the 2003 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Kodiak	1 - 100	Northern Kodiak Shallows	9	7	9.26	2,036	0	4,338
Yakutat	201 - 300	Yakutat Slope	11	7	6.63	1,409	354	2,465
Yakutat	101 - 200	Middleton Shelf	12	9	5.27	3,868	2,029	5,706
Yakutat	101 - 200	Yakataga Shelf	7	5	4.40	2,321	319	4,323
Kodiak	201 - 300	Upper Shelikof Gully	3	1	4.23	1,358	0	7,202
Kodiak	1 - 100	Albatross Shallows	33	14	3.27	1,886	733	3,039
Kodiak	101 - 200	Kenai Flats	18	11	3.05	3,683	1,515	5,851
Kodiak	1 - 100	Kenai Peninsula	8	2	2.65	1,395	0	4,050
Chirikof	101 - 200	Shelikof Edge	24	9	2.54	1,963	593	3,334
Kodiak	201 - 300	Kenai Gullies	16	9	2.50	1,664	538	2,790
Yakutat	201 - 300	Yakutat Gullies	6	4	2.11	643	0	1,298
Kodiak	101 - 200	Portlock Flats	23	11	1.98	1,451	579	2,323
Chirikof	101 - 200	East Shumagin Gully	19	6	1.74	1,931	301	3,561
Yakutat	101 - 200	Yakutat Flats	9	2	1.58	1,429	0	3,901
Kodiak	101 - 200	Kodiak Outer Shelf	26	5	1.48	742	45	1,438
Kodiak	1 - 100	Albatross Banks	41	11	1.46	2,250	941	3,559
Kodiak	101 - 200	Albatross Gullies	25	7	1.39	1,102	248	1,957
Yakutat	101 - 200	Fairweather Shelf	9	3	1.36	1,047	0	2,305
Yakutat	1 - 100	Yakutat Shallows	8	2	1.32	1,310	0	3,365
Kodiak	101 - 200	Barren Islands	14	3	1.25	1,371	0	3,102
Chirikof	201 - 300	Lower Shelikof Gully	18	7	1.24	1,239	335	2,144
Yakutat	301 - 500	Yakutat Gullies	2	1	1.14	126	0	1,730
Shumagin	101 - 200	West Shumagin Gully	5	1	1.11	253	0	955
Southeastern	501 - 700	Southeastern Slope	3	1	1.05	109	0	577
Southeastern	1 - 100	Southeastern Shallows	13	4	0.67	439	0	998
Shumagin	101 - 200	Sanak Gully	8	3	0.57	244	0	609
Chirikof	201 - 300	Chirikof Slope	7	1	0.57	87	0	300
Chirikof	1 - 100	Chirikof Bank	37	3	0.48	521	0	1,210
Chirikof	101 - 200	Chirikof Outer Shelf	21	1	0.43	216	0	665
Chirikof	1 - 100	Upper Alaska Peninsula	18	2	0.41	329	0	804
Chirikof	1 - 100	Semidi Bank	20	1	0.38	275	0	851
Southeastern	101 - 200	Baranof-Chichagof Shelf	8	1	0.34	142	0	478
Kodiak	1 - 100	Lower Cook Inlet	15	1	0.25	243	0	763
Southeastern	201 - 300	Prince of Wales Slope/Gullies	22	2	0.21	82	0	231
Shumagin	1 - 100	Fox Islands	28	1	0.20	167	0	511
Southeastern	301 - 500	Southeastern Deep Gullies	8	2	0.18	42	0	110
Southeastern	101 - 200	Prince of Wales Shelf	20	2	0.16	113	0	315
Shumagin	1 - 100	Lower Alaska Peninsula	33	1	0.12	79	0	241
Shumagin	101 - 200	Shumagin Outer Shelf	33	1	0.05	39	0	117

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APPENDIX A

Strata Specifications and Locations

Appendix Table A-1 presents the survey stratum definitions for the 2003 Gulf of Alaska biennial bottom trawl survey including depth range, stratum name, and the area in square nautical miles and square kilometers. Appendix Table A-2 presents the summary stratum code definitions.

Appendix Table A-1. -- Survey strata used for the 2003 Gulf of Alaska biennial survey including depth, stratum code, name and area in square nautical miles (nmi²) and square kilometers (km²).

Depth range (m)	Stratum code	Stratum name	Area (nmi ²)	Area (km ²)
1 - 100	10	Fox Islands	2,430	8,333
	11	Davidson Bank	3,989	13,681
	12	Lower Alaska Peninsula	2,005	6,876
	13	Shumagin Bank	3,615	12,399
	20	Upper Alaska Peninsula	2,315	7,941
	21	Semidi Bank	2,129	7,302
	22	Chirikof Bank	3,147	10,792
	30	Albatross Shallows	1,681	5,766
	31	Albatross Banks	4,491	15,403
	32	Lower Cook Inlet	2,883	9,887
	33	Kenai Peninsula	1,534	5,260
	35	Northern Kodiak Shallows	641	2,200
	40	Yakutat Shallows	2,900	9,947
	41	Middleton Shallows	1,958	6,714
	50	Southeastern Shallows	1,909	6,546
	991	Subtotal	37,628	129,047
101 - 200	110	Sanak Gully	1,238	4,245
	111	Shumagin Outer Shelf	2,377	8,154
	112	West Shumagin Gully	664	2,278
	120	East Shumagin Gully	3,238	11,104
	121	Shelikof Edge	2,255	7,735
	122	Chirikof Outer Shelf	1,461	5,011
	130	Albatross Gullies	2,307	7,912
	131	Portlock Flats	2,139	7,336
	132	Barren Islands	3,202	10,981
	133	Kenai Flats	3,521	12,077
	134	Kodiak Outer Shelf	1,465	5,026
	140	Middleton Shelf	2,142	7,346
	141	Yakataga Shelf	1,539	5,277
	142	Yakutat Flats	2,634	9,032
	143	Fairweather Shelf	2,253	7,728
	150	Baranof-Chichagof Shelf	1,224	4,196
	151	Prince of Wales Shelf	2,008	6,888
	992	Subtotal	35,668	122,324

Appendix Table A-1. - Continued.

Depth range (m)	Stratum code	Stratum name	Area (nmi²)	Area (km²)
201 - 300	210	Shumagin Slope	813	2,788
	220	Lower Shelikof Gully	2,921	10,018
	221	Chirikof Slope	446	1,528
	230	Kenai Gullies	1,942	6,659
	231	Kodiak Slope	473	1,623
	232	Upper Shelikof Gully	935	3,208
	240	Yakutat Gullies	887	3,043
	241	Yakutat Slope	620	2,127
	250	Baranof-Chichagof Slope	328	1,125
	251	Prince of Wales Slope/Gullies	1,145	3,927
	993	Subtotal	10,511	36,047
301 - 500	310	Shumagin Slope	738	2,531
	320	Chirikof Slope	468	1,604
	330	Kodiak Slope	849	2,912
	340	Yakutat Gullies	323	1,107
	341	Yakutat Slope	443	1,521
	350	Southeastern Deep Gullies	684	2,344
	351	Southeastern Slope	225	773
	994	Subtotal	3,730	12,792
501 - 700	410	Shumagin Slope	585	2,006
	420	Chirikof Slope	570	1,953
	430	Kodiak Slope	509	1,745
	440	Yakutat Slope	428	1,469
	450	Southeastern Slope	301	1,033
	995	Subtotal	2,393	8,206
1 – 700	999	Grand Total	89,930	308,416

Appendix Table A-2. -- Summary codes used for the 2003 Gulf of Alaska biennial bottom trawl survey including depth range, International North Pacific Fisheries Commission statistical areas and square area, and strata included in the summary area.

Summary code number	Depth range (m)	INPFC area	Area (nmi ²)	Area (km ²)	Strata included
911	1 - 100	Shumagin	12,039	41,289	10 -13
912	101 - 200		4,280	14,677	110 - 112
913	201 - 300		813	2,788	210
914	301 - 500		738	2,531	310
915	501 - 700		585	2,006	410
919	1 -700		18,455	63,291	
921	1 - 100	Chirikof	7,591	26,035	20-22
922	101 - 200		6,954	23,850	120-122
923	201 - 300		3,367	11,546	220, 221
924	301 - 500		468	1,604	320
925	501 - 700		570	1,953	420
929	1 -700		18,950	64,988	
931	1 - 100	Kodiak	11,230	38,516	30 - 33, 35
932	101 - 200		12,634	43,332	130 - 134
933	201 - 300		3,350	11,490	230 - 232
934	301 - 500		849	2,912	330
935	501 - 700		509	1,745	430
939	1 -700		28,572	97,995	

Appendix Table A-2. - Continued.

Summary code number	Depth range (m)	INPFC area	Area (nmi ²)	Area (km ²)	Strata included
941	1- 100	Yakutat	4,858	16,661	40, 41
942	101 - 200		8,568	29,383	140 – 143
943	201 - 300		1,507	5,170	240, 241
944	301 - 500		766	2,628	340, 341
945	501 - 700		428	1,469	440
949	1 -700		16,127	55,311	
951	1 - 100	Southeastern	1,909	6,546	50
952	101 - 200		3,232	11,084	150, 151
953	201 - 300		1,473	5,052	250, 251
954	301 - 500		909	3,117	350, 351
955	501 - 700		301	1,033	450
959	1 -700		7,824	26,833	
999	1 – 700	All Areas	89,928	308,417	

APPENDIX B**Fish and Invertebrate Taxa Encountered**

Appendix Tables B-1 and B-2 list fish and invertebrate taxa encountered and identified during the 2003 Gulf of Alaska biennial bottom trawl survey. Most common and scientific names are from Nelson et al. (2004). Order of listings and common names used are for convenience and do not imply adherence to a particular phylogenetic system.

Appendix Table B-1. -- Fish species encountered during the 2003 Gulf of Alaska bottom trawl survey.

Family	Scientific Name	Common Name
Petromyzontidae	<i>Petromyzontidae</i>	lamprey unident.
Chimaeridae	<i>Hydrolagus collieri</i>	spotted ratfish
Lamnidae	<i>Lamna ditropis</i>	salmon shark
	<i>Squalus suckleyi</i>	spiny dogfish
Squalidae	<i>Somniosus suckleyi</i>	Pacific sleeper shark
Rajidae	<i>Raja binoculata</i>	big skate
	<i>Bathyraja interrupta</i>	Bering skate
	<i>Raja rhina</i>	longnose skate
	<i>Bathyraja parmifera</i>	Alaska skate
	<i>Bathyraja aleutica</i>	Aleutian skate
	<i>Bathyraja maculata</i>	whiteblotched skate
	<i>Bathyraja minispinosa</i>	whitebrow skate
Clupeidae	<i>Clupea pallasii</i>	Pacific herring
Bathylagidae	<i>Bathylagus milleri</i>	robust blacksmelt
	<i>Leuroglossus schmidtii</i>	northern smoothtongue
	<i>Leuroglossus stilbius</i>	California smoothtongue
Searsiidae	<i>Sagamichthys abei</i>	shining tubeshoulder
Osmeridae	<i>Thaleichthys pacificus</i>	eulachon
	<i>Mallotus villosus</i>	capelin
	<i>Osmerus mordax</i>	rainbow smelt
	<i>Spirinchus thaleichthys</i>	longfin smelt
Salmonidae	<i>Oncorhynchus tshawytscha</i>	chinook salmon
	<i>Oncorhynchus kisutch</i>	coho salmon
	<i>Oncorhynchus gorbuscha</i>	pink salmon
	<i>Oncorhynchus keta</i>	chum salmon
	<i>Oncorhynchus nerka</i>	sockeye salmon
	<i>Salvelinus malma</i>	Dolly Varden
Stomiidae	<i>Stomiidae</i>	barbeled dragonfish
Melanostomiidae	<i>Tactostoma macropus</i>	longfin dragonfish
Chauliodontidae	<i>Chauliodus macouni</i>	Pacific viperfish
Scopelarchidae	<i>Benthalbella dentata</i>	northern pearleye
Paralepididae	<i>Paralepididae</i>	barracudina unident.
Myctophidae	<i>Stenobrachius leucopsarus</i>	northern lampfish
	<i>Diaphus theta</i>	California headlightfish
	<i>Nannobrachium ritteri</i>	broadfin lanternfish
	<i>Nannobrachium regale</i>	pinpoint lampfish
	<i>Lampanyctus jordani</i>	brokenline lampfish
Macrouridae	<i>Coryphaenoides acrolepis</i>	Pacific grenadier
	<i>Albatrossia pectoralis</i>	giant grenadier
	<i>Coryphaenoides cinereus</i>	popeye grenadier
Moridae	<i>Antimora microlepis</i>	Pacific flatnose
Merluccidae	<i>Merluccius productus</i>	Pacific hake
Gadidae	<i>Microgadus proximus</i>	Pacific tomcod
	<i>Gadus macrocephalus</i>	Pacific cod
	<i>Eleginus gracilis</i>	saffron cod
	<i>Theragra chalcogramma</i>	walleye pollock

Oneirodidae	<i>Bertella idiomorpha</i>	
Melamphaeidae	<i>Poromitra curilensis</i>	crested bigscale
Oreosomatidae	<i>Allocyttus folletti</i>	oxeye oreo
Scorpaenidae	<i>Sebastolobus alascanus</i>	shortspine thornyhead
	<i>Sebastolobus altivelis</i>	longspine thornyhead
	<i>Sebastes alutus</i>	Pacific ocean perch
	<i>Sebastes brevispinis</i>	silvergray rockfish
	<i>Sebastes ciliatus</i>	dark rockfish
	<i>Sebastes variabilis</i>	dusky rockfish
	<i>Sebastes crameri</i>	darkblotched rockfish
	<i>Sebastes diploproa</i>	splitnose rockfish
	<i>Sebastes elongatus</i>	greenstriped rockfish
	<i>Sebastes emphaeus</i>	Puget Sound rockfish
	<i>Sebastes entomelas</i>	widow rockfish
	<i>Sebastes flavidus</i>	yellowtail rockfish
	<i>Sebastes helvomaculatus</i>	rosethorn rockfish
	<i>Sebastes maliger</i>	quillback rockfish
	<i>Sebastes melanops</i>	black rockfish
	<i>Sebastes nigrocinctus</i>	tiger rockfish
	<i>Sebastes paucispinis</i>	bocaccio
	<i>Sebastes pinniger</i>	canary rockfish
	<i>Sebastes polyspinis</i>	northern rockfish
	<i>Sebastes proriger</i>	redstripe rockfish
	<i>Sebastes ruberrimus</i>	yelloweye rockfish
	<i>Sebastes babcocki</i>	redbanded rockfish
	<i>Sebastes saxicola</i>	stripetail rockfish
	<i>Sebastes variegatus</i>	harlequin rockfish
	<i>Sebastes wilsoni</i>	pygmy rockfish
	<i>Sebastes zacentrus</i>	sharpchin rockfish
	<i>Sebastes borealis</i>	shortraker rockfish
	<i>Sebastes reedi</i>	yellowmouth rockfish
Anoplopomatidae	<i>Anoplopoma fimbria</i>	sablefish
Hexagrammidae	<i>Ophiodon elongatus</i>	lingcod
	<i>Pleurogrammus monopterygius</i>	Atka mackerel
	<i>Hexagrammos stelleri</i>	whitespotted greenling
	<i>Hexagrammos decagrammus</i>	kelp greenling
Zaniolepididae	<i>Zaniolepis frenata</i>	shortspine combfish
Cottidae	<i>Gymnocanthus pistilliger</i>	threaded sculpin
	<i>Gymnocanthus galeatus</i>	armorhead sculpin
	<i>Radulinus asprellus</i>	slim sculpin
	<i>Malacocottus zonurus</i>	darkfin sculpin
	<i>Hemilepidotus spinosus</i>	brown Irish lord
	<i>Hemilepidotus zapus</i>	longfin Irish lord
	<i>Hemilepidotus hemilepidotus</i>	red Irish lord
	<i>Hemilepidotus jordani</i>	yellow Irish lord
	<i>Triglops forficata</i>	scissortail sculpin
	<i>Triglops metopias</i>	crescent-tail sculpin
	<i>Triglops scepticus</i>	spectacled sculpin
	<i>Triglops pingelii</i>	ribbed sculpin

	<i>Triglops macellus</i>	roughspine sculpin
	<i>Myoxocephalus polyacanthocephalus</i>	great sculpin
	<i>Myoxocephalus jaok</i>	plain sculpin
	<i>Dasycottus setiger</i>	spinyhead sculpin
	<i>Psychrolutes paradoxus</i>	tadpole sculpin
	<i>Nautichthys oculofasciatus</i>	sailfin sculpin
	<i>Rhamphocottus richardsonii</i>	grunt sculpin
	<i>Hemitripterus bolini</i>	bigmouth sculpin
	<i>Icelinus burchami</i>	dusky sculpin
	<i>Icelus spiniger</i>	thorny sculpin
Agonidae	<i>Leptagonus frenatus</i>	sawback poacher
	<i>Bathylagonus infraspinus</i>	spinycheek starsnout
	<i>Bathylagonus pentacanthus</i>	bigeye poacher
	<i>Bathylagonus nigripinnis</i>	blackfin poacher
	<i>Podotrichus accipenserinus</i>	sturgeon poacher
	<i>Hypsagonus quadricornis</i>	fourhorn poacher
Cyclopteridae	<i>Aptocyclus ventricosus</i>	smooth lumpsucker
	<i>Lethotremus muticus</i>	docked snailfish
	<i>Eumicrotremus orbis</i>	Pacific spiny lumpsucker
	<i>Eumicrotremus phrynoides</i>	toad lumpsucker
Liparidae	<i>Crystallichthys cyclospilus</i>	blotched snailfish
	<i>Liparis pulchellus</i>	showy snailfish
	<i>Allocareproctus jordani</i>	cherry snailfish
	<i>Careproctus melanurus</i>	blacktail snailfish
	<i>Careproctus canus</i>	gray snailfish
	<i>Careproctus furcellus</i>	emarginate snailfish
	<i>Careproctus gilberti</i>	smalldisk snailfish
	<i>Careproctus colletti</i>	Alaska snailfish
	<i>Paraliparis dactylosus</i>	red snailfish
	<i>Paraliparis cephalus</i>	swellhead snailfish
	<i>Careproctus ostentum</i>	microdisk snailfish
	<i>Nectoliparis pelagicus</i>	tadpole snailfish
Bathymasteridae	<i>Ronquilus jordani</i>	northern ronquil
	<i>Bathymaster caeruleofasciatus</i>	Alaskan ronquil
	<i>Bathymaster signatus</i>	searcher
Zoarcidae	<i>Bothrocara brunneum</i>	twoline eelpout
	<i>Bothrocara pusillum</i>	Alaska eelpout
	<i>Lycenchelys crotalinus</i>	snakehead eelpout
	<i>Lycodes cortezianus</i>	bigfin eelpout
	<i>Lycodapus fierasfer</i>	blackmouth eelpout
	<i>Lycodes palearis</i>	wattled eelpout
	<i>Lycodes concolor</i>	ebony eelpout
	<i>Lycodes diapterus</i>	black eelpout
	<i>Lycodes brevipes</i>	shortfin eelpout
	<i>Lycodes pacificus</i>	blackbelly eelpout
Stichaeidae	<i>Lumpenus maculatus</i>	daubed shanny
	<i>Lumpenus fabricii</i>	slender eelblenny
	<i>Lumpenus sagitta</i>	snake prickleback
	<i>Lumpenella longirostris</i>	longsnout prickleback

	<i>Chirolophis decoratus</i>	decorated warbonnet
	<i>Chirolophis tarsodes</i>	
	<i>Poroclinus rothrocki</i>	whitebarred prickleback
	<i>Bryozoichthys marjorius</i>	pearly prickleback
Pholididae	<i>Pholidae</i>	gunnel unident.
Cryptacanthodidae	<i>Lyconectes aleutensis</i>	dwarf wrymouth
	<i>Cryptacanthodes giganteus</i>	giant wrymouth
Anarhichadidae	<i>Anarrhichthys ocellatus</i>	wolf-eel
	<i>Anarrhichas orientalis</i>	Bering wolffish
Zaproridae	<i>Zaprora silenus</i>	prowfish
Trichodontidae	<i>Trichodon trichodon</i>	Pacific sandfish
Ammodytidae	<i>Ammodytes hexapterus</i>	Pacific sand lance
Bothidae	<i>Citharichthys sordidus</i>	Pacific sanddab
Pleuronectidae	<i>Atheresthes stomias</i>	arrowtooth flounder
	<i>Atheresthes evermanni</i>	Kamchatka flounder
	<i>Reinhardtius hippoglossoides</i>	Greenland turbot
	<i>Hippoglossus stenolepis</i>	Pacific halibut
	<i>Hippoglossoides elassodon</i>	flathead sole
	<i>Lyopsetta exilis</i>	slender sole
	<i>Eopsetta jordani</i>	petrale sole
	<i>Parophrys vetulus</i>	English sole
	<i>Microstomus pacificus</i>	Dover sole
	<i>Embassichthys bathybius</i>	deepsea sole
	<i>Glyptocephalus zachirus</i>	rex sole
	<i>Limanda aspera</i>	yellowfin sole
	<i>Platichthys stellatus</i>	starry flounder
	<i>Psettichthys melanostictus</i>	sand sole
	<i>Lepidopsetta polyxystra</i>	northern rock sole
	<i>Lepidopsetta bilineata</i>	southern rock sole
	<i>Isopsetta isolepis</i>	butter sole
	<i>Pleuronichthys decurrens</i>	curlfin sole
	<i>Pleuronectes quadrituberculatus</i>	Alaska plaice

Appendix Table B-2. -- Invertebrate species encountered during the 2003 Gulf of Alaska bottom trawl survey.

PHYLUM	SPECIES_NAME	COMMON_NAME
Porifera	<i>Craniella</i> sp.	puffball sponges
	<i>Hexactinellida</i>	glass sponge unident.
	<i>Stelletta</i> sp.	stone sponge
	<i>orange papilliate sponge</i>	
	<i>Neoesperiopsis infundibula</i>	rough China hat sponge
	<i>Neoesperiopsis rigida</i>	soft finger sponge
	<i>Stylissa</i> sp.	drumstick sponge
	<i>Halichondria cf. sitiens</i>	yellow green papillate sponge
	<i>Halichondria sitiens</i>	black papilliate sponge
	<i>Polymastia pacifica</i>	
	<i>Tethya</i> sp.	ball sponge
	<i>Leucosolenia blanca</i>	yellow leafy sponge
	<i>Histodermella</i> sp. A	spud sponge
	<i>Plicatellopsis amphispicula</i>	firm finger sponge
	<i>Myxilla incrustans</i>	scallop sponge
	<i>Phakellia dalli</i>	cat-o-nine-tails sponge
	<i>Mycale bellabellensis</i>	lampshade sponge
	<i>Rhabdocalyptus</i> sp.	cloud sponge
	<i>Halichondria panicea</i>	barrel sponge
	<i>Acanthascus</i> sp.	
	<i>Geodia mesotriaena</i>	
	<i>Coelosphaeridae</i>	ginseng sponge
	<i>Mycale loveni</i>	tree sponge
	<i>Aphrocallistes vastus</i>	clay pipe sponge
	<i>Suberites ficus</i>	
Ctenophora	<i>Beroe</i> sp.	
Cnidaria	<i>Amphilaphis</i> sp.	
	<i>Muriceides</i> sp.	
	<i>Fanellia compressa</i>	
	<i>Thouarella</i> sp.	
	<i>Isidella</i> sp.	articulated bamboo coral
	<i>Plumarella</i> sp.	
	<i>Errinopora</i> sp.	
	<i>Distichopora</i> sp.	
	<i>Cyclohelix lamellata</i>	
	<i>Stylaster campylecus</i>	
	<i>Stylasterina</i> unident.	hydrocoral unident.
	<i>Caryophyllia</i> sp.	
	<i>Scleractinia</i> unident.	stony coral unident.
	<i>Hormathiidae</i>	
	<i>Actinostolidae</i>	
	<i>Liponema brevicornis</i>	tentacle-shedding anemone
	<i>Cribrinopsis fernaldi</i>	chevron-tentacled anemone

	<i>Bathypheilia australis</i>	hot dog sea anemone
	<i>Urticina lofotensis</i>	
	<i>Urticina crassicornis</i>	mottled anemone
	<i>Stomphia coccinea</i>	swimming anemone
	<i>Metridium farcimen</i>	gigantic anemone
	<i>Actinernus</i> sp.	
	<i>Paractinostola faeculenta</i>	rough purple sea anemone
	<i>Actinauge verrilli</i>	reticulate anemone
	<i>Ptilosarcus gurneyi</i>	orange sea pen
	<i>Halipteris californica</i>	
	<i>Balticina</i> sp.	
	<i>Stylatula</i> sp.	slender seawhips
	<i>Virgularia</i> sp.	smoothstem seawhip
	<i>Calcigorgia spiculifera</i>	
	<i>Paragorgia arborea</i>	Kamchatka coral
	<i>Swiftia</i> sp.	
	<i>Primnoa willeyi</i>	red tree coral
	<i>Gorgonacea</i>	gorgonian coral unident.
	<i>Anthomastus</i> sp.	
	<i>Gersemia rubiformis</i>	
	<i>Alcyonium</i> sp.	
	<i>Anthozoa</i>	
	<i>Cyanea capillata</i>	lion's mane
	<i>Aurelia aurita</i>	
	<i>Aurelia labiata</i>	
	<i>Atolla</i> sp.	
	<i>Bolinopsis</i> sp.	
	<i>Aequorea</i> sp.	
	<i>Phacellophora camtschatica</i>	egg yolk jelly
	<i>Chrysaora melanaster</i>	
	<i>Periphylla periphylla</i>	
	<i>Bonneviella</i> sp. A	champagne flute hydroid
	<i>Plumulariidae</i>	plumulariid hydroids
Echiura	<i>Echiura</i>	echiuroid worm unident.
Sipuncula	<i>Sipuncula</i>	peanut worm unid.
Rhynchozoela	<i>Nemertea</i>	nemertean worm unident.
Platyhelminthes	<i>Platyhelminthes</i>	flatworm unident.
Annelida	<i>Notostombdella</i>	striped sea leech
	<i>Serpula vermicularis</i>	
	<i>Eunoe depressa</i>	depressed scale worm
	<i>Cheilonereis cyclurus</i>	
	<i>Aphrodita negligens</i>	
	<i>Spinther alaskensis</i>	
	<i>Polychaeta</i>	polychaete worm unident.
Arthropoda	<i>Munida quadrispina</i>	pinchbug
	<i>Pugettia producta</i>	
	<i>Pugettia gracilis</i>	graceful kelp crab
	<i>Erimacrus isenbeckii</i>	horsethair crab
	<i>Placetron wosnessenskii</i>	scaled crab

<i>Paralithodes camtschaticus</i>	red king crab
<i>Rhinolithodes wosnessenskii</i>	rhinoceros crab
<i>Lithodes aequispinus</i>	golden king crab
<i>Lithodes couesi</i>	scarlet king crab
<i>Acantholithodes hispidus</i>	fuzzy crab
<i>Lopholithodes foraminatus</i>	box crab
<i>Lithodidae unident.</i>	stone crab unident.
<i>Elassochirus gilli</i>	Pacific red hermit
<i>Elassochirus cavimanus</i>	purple hermit
<i>Pagurus capillatus</i>	hairy hermit crab
<i>Elassochirus tenuimanus</i>	widehand hermit crab
<i>Pagurus tanneri</i>	longhand hermit
<i>Pagurus rathbuni</i>	longfinger hermit
<i>Pagurus ochotensis</i>	Alaskan hermit
<i>Pagurus trigonocheirus</i>	fuzzy hermit crab
<i>Pagurus kennerlyi</i>	bluespine hermit
<i>Pagurus dalli</i>	whiteknee hermit
<i>Pagurus cornutus</i>	
<i>Pagurus confragosus</i>	knobbyhand hermit
<i>Labidochirus splendescens</i>	splendid hermit
<i>Pagurus aleuticus</i>	Aleutian hermit
<i>Pagurus brandti</i>	sponge hermit
<i>Telmessus cheiragonus</i>	helmet crab
<i>Chionoecetes opilio</i>	snow crab
<i>Hyas lyratus</i>	Pacific lyre crab
<i>Chionoecetes bairdi</i>	Tanner crab
<i>Chionoecetes tanneri</i>	grooved Tanner crab
<i>Chorilia longipes</i>	Longhorned decorator crab
<i>Oregonia gracilis</i>	graceful decorator crab
<i>Oregonia bifurca</i>	
<i>Cancer oregonensis</i>	Oregon rock crab
<i>Cancer magister</i>	Dungeness crab
<i>Pasiphaea pacifica</i>	Pacific glass shrimp
<i>Argis ovifer</i>	split-eye argid
<i>Sclerocrangon boreas</i>	sculptured shrimp
<i>Argis dentata</i>	Arctic argid
<i>Argis alaskensis</i>	common argid
<i>Crangon septemspinosa</i>	sevenspine bay shrimp
<i>Crangon dalli</i>	ridged crangon
<i>Crangon communis</i>	twospine crangon
<i>Lebbeus groenlandicus</i>	spiny lebbeid
<i>Eualus macrophthalmus</i>	bigeye eualid
<i>Eualus townsendi</i>	Townsend eualid
<i>Eualus barbatus</i>	barbed eualid
<i>Pandalopsis ampla</i>	
<i>Pandalopsis dispar</i>	sidestripe shrimp
<i>Pandalopsis aleutica</i>	
<i>Pandalus hypsinotus</i>	coonstripe shrimp
<i>Pandalus goniurus</i>	humpy shrimp

Mollusca

<i>Pandalus platyceros</i>	spot shrimp
<i>Pandalus tridens</i>	yellowleg pandalid
<i>Pandalus eous</i>	Alaskan pink
<i>Pandalus jordani</i>	ocean shrimp
<i>Sergestes</i> sp.	
<i>Scalpellum</i> sp.	
<i>Balanus rostratus</i>	beaked barnacle
<i>Balanus hesperius</i>	crab barnacle
<i>Balanus evermanni</i>	giant barnacle
<i>Balanus balanus</i>	
<i>Litoscalpellum ursum</i>	
<i>Neognathophausia ingens</i>	red mysid
<i>Isopoda</i>	isopod unident.
<i>Octopoteuthis deletron</i>	
<i>Taonius pavo</i>	
<i>Chiroteuthis calyx</i>	
<i>Onychoteuthis borealijaponicus</i>	boreal clubhook squid
<i>Moroteuthis robusta</i>	robust clubhook squid
<i>Gonatopsis borealis</i>	boreopacific armhook squid
<i>Berryteuthis magister</i>	magistrate armhook squid
<i>Gonatus onyx</i>	clawed armhook squid
<i>Loligo opalescens</i>	California market squid
<i>Rossia pacifica</i>	eastern Pacific bobtail
<i>Vampyroteuthis infernalis</i>	vampire squid
<i>Benthoctopus</i> sp.	
<i>Octopus rubescens</i>	
<i>Octopus dofleini</i>	giant octopus
<i>Opisthoteuthis californiana</i>	flapjack devilfish
<i>Japatella diaphana</i>	
<i>Benthoctopus leioderma</i>	smoothskin octopus
<i>Pododesmus macrochisma</i>	Alaska falsejingle
<i>Mya pseudoarenaria</i>	false softshell
<i>Serripes groenlandicus</i>	Greenland cockle
<i>Protothaca staminea</i>	Pacific littleneck
<i>Saxidomus gigantea</i>	butter clam
<i>Clinocardium ciliatum</i>	hairy cockle
<i>Clinocardium nuttallii</i>	Nuttall cockle
<i>Astarte crenata</i>	crenulate astarte
<i>Musculus discors</i>	discordant mussel
<i>Empleconia vaginata</i>	vaginated limops
<i>Nuculana fossa</i>	trenched nutclam
<i>Yoldia thraciaeformis</i>	broad yoldia
<i>Yoldia seminuda</i>	crisscrossed yoldia
<i>Panomya arctica</i>	
<i>Hiatella arctica</i>	Arctic hiatella
<i>Cyclopecten</i> sp.	
<i>Delectopecten vancouverensis</i>	Vancouver scallop
<i>Patinopecten caurinus</i>	weathervane scallop
<i>Chlamys hastata</i>	spiny scallop

<i>Chlamys rubida</i>	reddish scallop
<i>Modiolus modiolus</i>	northern horsemussel
<i>Arctomelon borealis</i>	
<i>Arctomelon stearnsii</i>	Alaska volute
<i>Buccinum scalariforme</i>	ladder whelk
<i>Buccinum plectrum</i>	sinuous whelk
<i>Buccinum oedematum</i>	swollen whelk
<i>Buccinum simulatum</i>	
<i>Cidarina cidaris</i>	
<i>Bathybembix bairdii</i>	
<i>Calliostoma</i> sp.	
<i>Fusitriton oregonensis</i>	Oregon triton
<i>Boreotrophon stuarti</i>	winged trophon
<i>Torelliavellutina ammonia</i>	rams-horn hairsnail
<i>Epitonium greenlandicum</i>	Greenland wentletrap
<i>Aforia circinata</i>	keeled aforia
<i>Liomesus ooides</i>	egg whelk
<i>Plicifusus virens</i>	
<i>Volutopsius callorhinus</i>	
<i>Plicifusus kroyeri</i>	
<i>Neptunea insularis</i>	
<i>Neptunea ventricosa</i>	fat whelk
<i>Neptunea lyrata</i>	lyre whelk
<i>Neptunea middendorffii</i>	
<i>Neptunea borealis</i>	
<i>Neptunea pribiloffensis</i>	Pribilof whelk
<i>Neptunea smirnia</i>	
<i>Neptunea amianta</i>	white neptune
<i>Beringius eyerdami</i>	
<i>Beringius undatus</i>	
<i>Beringius kennicottii</i>	
<i>Volutopsius middendorffii</i>	tulip whelk
<i>Volutopsius castaneus</i>	volute whelk
<i>Volutopsius regularis</i>	regular whelk
<i>Volutopsius fragilis</i>	fragile whelk
<i>Pyrulofusus harpa</i>	left-hand whelk
<i>Pyrulofusus dexius</i>	
<i>Japelion</i> sp.	
<i>Colus jordani</i>	
<i>Colus calathus</i>	
<i>Crepidula</i> sp.	slipper shell
<i>Euspira</i>	pale moonsnail
<i>Euspira</i>	
<i>Nucella lamellosa</i>	frilled dogwinkle
<i>Cryptonatica</i>	rusty moonsnail
<i>Cryptonatica</i>	Aleutian moonsnail
<i>Natica clausa</i>	
<i>Cranopsis major</i>	great puncturella
<i>Archidoris odhneri</i>	white night doris

	<i>Anisodoris lentiginosa</i>	mottled pale sea-lemon
	<i>Anisodoris nobilis</i>	Pacific sea lemon
	<i>Chlamylla</i> sp.	
	<i>Armina californica</i>	California armina
	<i>Archidoris montereyensis</i>	Monterey dorid
	<i>Triopha catalinae</i>	sea-clown triopha
	<i>Acteocina</i> sp.	
	<i>Tritonia diomedea</i>	rosy tritonia
	<i>Dendronotus</i> sp.	
	<i>Tochuina tetraquetra</i>	giant orange tochui
	<i>Tonicella insignis</i>	
	<i>Leptochiton</i> sp.	
	<i>Amicula vestita</i>	
	<i>Lepidozona trifida</i>	
	<i>Cryptochiton stelleri</i>	giant Pacific chiton
	<i>Neomenia</i> sp.	
Bryozoa	<i>Rhamphostomella costata</i>	ribbed bryozoan
	<i>Porella compressa</i>	flattened bryozoan
	<i>Flustrellidra corniculata</i>	
	<i>Flustra serrulata</i>	leafy bryozoan
	<i>Eucratea loricata</i>	feathery bryozoan
Brachiopoda	<i>Hemithiris psittacea</i>	black brachiopod
	<i>Laqueus californianus</i>	California lamp shell
	<i>Terebratulina unguicula</i>	snakeshead brachiopod
	<i>Frieleia halli</i>	
	<i>Terebratalia transversa</i>	common brachiopod
Echinodermata	<i>Synallactes challengerii</i>	
	<i>Pannychia moseleyi</i>	deep sea papillate cucumber
	<i>Psolus japonicus</i>	
	<i>Psolus squamatus</i>	whitescaled sea cucumber
	<i>Psolus fabricii</i>	brownscaled sea cucumber
	<i>Cucumaria fallax</i>	sea football
	<i>Bathyplores</i> sp.	
	<i>Pentamera lissoplaca</i>	crescent sea cucumber
	<i>Molpadia intermedia</i>	sweet sea potato
	<i>Pseudostichopus mollis</i>	sandy sea cucumber
	<i>Parastichopus californicus</i>	California sea cucumber
	<i>Parastichopus leukothele</i>	giant orange cucumber
	<i>Cucumaria japonica</i>	
	<i>Ophiomusium jolliensis</i>	
	<i>Ophioscolex</i> sp.	
	<i>Ophiopholis aculeata</i>	ubiquitous brittle star
	<i>Ophiopholis longispina</i>	
	<i>Ophiacantha diplasia</i>	
	<i>Stegophiura ponderosa</i>	
	<i>Ophiura sarsi</i>	notched brittlestar
	<i>Asteronyx loveni</i>	serpent sea star
	<i>Gorgonocephalus eucnemis</i>	basketstar
	<i>Psathyrometra fragilis</i>	

<i>Florometra asperima</i>	common northern feather star
<i>Florometra serratissima</i>	featherstar crinoid
<i>Echinarachnius parma</i>	parma sand dollar
<i>Brisaster owstoni</i>	
<i>Brisaster latifrons</i>	heart urchin
<i>Allocentrotus fragilis</i>	orange-pink sea urchin
<i>Strongylocentrotus pallidus</i>	white sea urchin
<i>Strongylocentrotus purpuratus</i>	purple sea urchin
<i>Strongylocentrotus polyacanthus</i>	
<i>Strongylocentrotus franciscanus</i>	red sea urchin
<i>Strongylocentrotus droebachiensis</i>	green sea urchin
<i>Myxoderma sacculatum</i>	
<i>Nearchaster pedicellaris</i>	
<i>Nearchaster variabilis</i>	
<i>Cheiraster dawsoni</i>	fragile sea star
<i>Dipsacaster borealis</i>	northern sea star
<i>Leptychaster arcticus</i>	North Pacific sea star
<i>Ctenodiscus crispatus</i>	common mud star
<i>Asterias amurensis</i>	purple-orange sea star
<i>Diplopteraster multipes</i>	pincushion sea star
<i>Pteraster obscurus</i>	obscure sea star
<i>Pteraster marssipus</i>	
<i>Pteraster militaris</i>	
<i>Pteraster jordani</i>	wrinkled star
<i>Pteraster tessellatus</i>	
<i>Pteraster temnochiton</i>	cushion sea star
<i>Lophaster furcilliger</i>	crested sea star
<i>Lophaster vexator</i>	crested star
<i>Heterozonias alternatus</i>	cannonball sun star
<i>Crossaster papposus</i>	rose sea star
<i>Crossaster borealis</i>	grooved sea star
<i>Solaster paxillatus</i>	evening sun sea star
<i>Solaster stimpsoni</i>	striped sun sea star
<i>Solaster dawsoni</i>	morning sun sea star
<i>Solaster endeca</i>	northern sun sea star
<i>Luidia foliolata</i>	sand sea star
<i>Ceramaster arcticus</i>	Arctic bat sea star
<i>Ceramaster patagonicus</i>	orange bat sea star
<i>Ceramaster japonicus</i>	red bat star
<i>Mediaster aequalis</i>	vermilion sea star
<i>Mediaster tenellus</i>	
<i>Pseudarchaster parelii</i>	scarlet sea star
<i>Hippasteria spinosa</i>	spiny red sea star
<i>Hippasteria californica</i>	
<i>Gephyreaster swifti</i>	Swift's sea star
<i>Leptasterias polaris</i>	
<i>Odontohenricia fisheri</i>	
<i>Henricia longispina</i>	
<i>Henricia asthenactis</i>	

Chordata	<i>Henricia tumida</i>	tumid sea star
	<i>Henricia leviuscula</i>	blood sea star
	<i>Henricia aspera</i>	ridged blood star
	<i>Henricia sanguinolenta</i>	sanguine sea star
	<i>Poraniopsis inflata</i>	thorny sea star
	<i>Lethasterias nanimensis</i>	blackspined sea star
	<i>Tarsaster alaskanus</i>	
	<i>Ampheraster marianus</i>	
	<i>Stylasterias forreri</i>	long-rayed star
	<i>Pycnopodia helianthoides</i>	sunflower sea star
	<i>Leptasterias hylodes</i>	Aleutian sea star
	<i>Orthasterias koehleri</i>	redbanded sea star
	<i>Evasterias echinosoma</i>	giant sea star
	<i>Evasterias troschelii</i>	mottled sea star
	<i>Ophioscolax</i> sp.	
	<i>Molgula griffithsii</i>	sea grape
	<i>Halocynthia hispidus</i>	hairy tunicate
	<i>Ascidia paratropa</i>	glassy tunicate
	<i>Synoicum</i> sp.	sea blob
	<i>Aplidium</i> sp. A	sea glob
	<i>Halocynthia aurantium</i>	sea peach
	<i>Boltenia ovifera</i>	
	<i>Styela rustica</i>	sea potato
	<i>Thetys vagina</i>	common salp

APPENDIX C

Length-weight relationships

Appendix Table C-1. -- Length-weight parameters (a and b) for species where individual length and weight data were collected. The number of individuals measured and weighed (n) is also provided.

Species	Sex	a	b	n	Species	Sex	a	b	n
Arrowtooth flounder	Male	3.509E-06	3.149	514	Walleye pollock	Male	6.075E-06	3.035	499
	Female	4.494E-06	3.114	880		Female	5.311E-06	3.059	603
	Both	3.849E-06	3.137	1394		Both	5.625E-06	3.049	1112
Atka mackerel	Male	3.467E-06	3.222	35	Pacific ocean perch	Male	1.242E-05	3.020	583
	Female	1.195E-05	3.010	41		Female	1.437E-05	2.994	606
	Both	7.939E-06	3.080	76		Both	1.338E-05	3.007	1189
Pacific cod	Male	4.756E-06	3.137	563	Rex sole	Male	4.893E-07	3.440	292
	Female	4.285E-06	3.155	621		Female	5.364E-07	3.430	389
	Both	4.498E-06	3.147	1184		Both	5.048E-07	3.438	682
Dover sole	Male	2.997E-06	3.198	248	Rougheye RF complex	Male	1.023E-05	3.070	250
	Female	2.930E-06	3.202	305		Female	9.492E-06	3.083	248
	Both	2.925E-06	3.202	553		Both	9.827E-06	3.077	498
Dusky rockfish	Male	8.142E-06	3.125	322	Sablefish	Male	1.404E-06	3.308	546
	Female	9.953E-06	3.092	398		Female	1.406E-06	3.308	459
	Both	8.911E-06	3.110	720		Both	1.406E-06	3.308	1005
Flathead sole	Male	1.605E-06	3.295	406	Shortraker rockfish	Male	1.175E-05	3.051	186
	Female	1.357E-06	3.324	466		Female	7.412E-06	3.129	196
	Both	1.589E-06	3.297	876		Both	9.420E-06	3.088	382
Northern rockfish	Male	1.381E-05	3.012	523	Southern rock sole	Male	4.778E-06	3.163	301
	Female	1.225E-05	3.035	536		Female	2.747E-06	3.265	542
	Both	1.259E-05	3.029	1059		Both	2.971E-06	3.250	843
Northern rock sole	Male	4.420E-06	3.167	277	Shortspine thornyhead	Male	3.075E-06	3.234	445
	Female	2.956E-06	3.244	398		Female	3.026E-06	3.240	470
	Both	3.159E-06	3.231	675		Both	3.556E-06	3.210	990

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