NOAA Technical Memorandum NMFS-AFSC-208

Data Report: 2009 Gulf of Alaska Bottom Trawl Survey

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U.S. DEPARTMENT OF COMMERCE
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PREFACE

This data report is one of two types of standard reports presenting data from the 2009 Gulf of Alaska groundfish survey conducted by the National Marine Fisheries Service (NMFS). The two standard reports are:

1) **Cruise Report** outlines the survey objectives; documents itinerary, personnel, and vessels employed; and summarizes major accomplishments.

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.

ABSTRACT

Scientists of the Groundfish Assessment Program of Alaska Fisheries Science Center's Resource Assessment and Conservation Engineering (RACE) Division conducted the sixth biennial groundfish assessment survey of the Gulf of Alaska during the summer of 2009. 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 1,000 m in the Gulf of Alaska from Islands of Four Mountains (170°W long.) to Dixon Entrance (132°40'W long.). The survey was conducted aboard three chartered commercial trawlers, the FV *Pacific Explorer*, FV *Sea Storm*, and FV *Vesteraalen*. Trawl haul samples were collected successfully at 823 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.

A total of 185 fish and 393 invertebrate species were captured in survey tows. Arrowtooth flounder (*Atheresthes stomias*), Pacific cod (*Gadus macrocephalus*), giant grenadier (*Albatrossia pectoralis*), walleye pollock (*Theragra chalcogramma*), Pacific ocean perch

(*Sebastes alutus*), and Pacific halibut (*Hippoglossus stenolepis*) were, in descending order, the most abundant species within the survey area. Atka mackerel (*Pleurogrammus monopterygius*), Pacific hake (*Merluccius productus*), southern rock sole (*Lepidopsetta bilineata*), flathead sole (*Hippoglossoides elassodon*), and spotted ratfish (*Hydrolagus colliei*) were locally abundant in some areas. 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.

CONTENTS

INTRODUCTION

The sixth biennial groundfish survey of groundfish and invertebrate resources of the Gulf of Alaska (GOA) was conducted during the summer of 2009 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 have 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 2009 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 in the GOA: 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 2009 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 ≤ 1,000 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 Resource Assessment & Conservation Engineering (RACE) and Resource Ecology & Fisheries Management (REFM) Divisions and Auke Bay Laboratories of the Alaska Fisheries Science Center, the International Pacific Halibut Commission, and the Northwest Fisheries Science Center. The projects included:

- A taxonomic study of snailfish;
- Genetic studies of Pacific hake, rougheye, blackspotted, and shortraker rockfish, and Pacific ocean perch;
- A study of light levels at trawl stations;
- A study of marine mammal food habits;
- A study of age and growth for big skate and longnose skate;

- A study of age and growth for forage species;
- A study of squid stock structure and distribution;
- A study of weight and length relationships for octopuses;
- A study to identify untrawlable areas;
- A study of the reproductive biology of Pacific ocean perch, and northern, blackspotted, rougheye, and shortraker rockfishes;
- A study of the visual ecology of snailfishes;
- A study to identify Pacific sandfish spawning habitat;
- A study of the effect of trawl heave on the accuracy of seafloor trawlability measurements using an echosounder;
- A study of growth rate differences in rex sole from the eastern and western Gulf of Alaska

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 mosaic (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 2009 GOA survey included the entire

continental shelf and upper portion of the continental slope down as deep as the 1,000 m depth contour.

The total area the survey represents is approximately 320,000 km² (Table 1). The continental shelf, waters shallower than about 200 m and consisting of about 79% of the total Gulf of Alaska survey area, extends approximately 220 km (120 nautical miles (nmi)) off Cook Inlet and narrows to 40 km (22 nmi) off Dixon Entrance and 20 km (11 nmi) off the Islands of Four Mountains. Gullies intrude onto the shelf in many areas, extending from the upper slope to the inner shore. These gully areas make up about 16% of the total survey 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 1,000 m, an area of approximately 68,635 km². About 32% (101,489 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% (68,053 km²) and 20% (65,228 km²), respectively, while the Yakutat INPFC survey area makes up about 18% (57,197 km²). The Southeastern INPFC survey area comprises the smallest portion, about 9% of the total survey area (28,038 km²).

Vessels

Since the inception of the Gulf of Alaska bottom trawl survey series in 1984, commercial trawlers and crew have been chartered to conduct the survey operations under the supervision and guidance of RACE Groundfish Assessment Program staff. Three vessels (occasionally two)

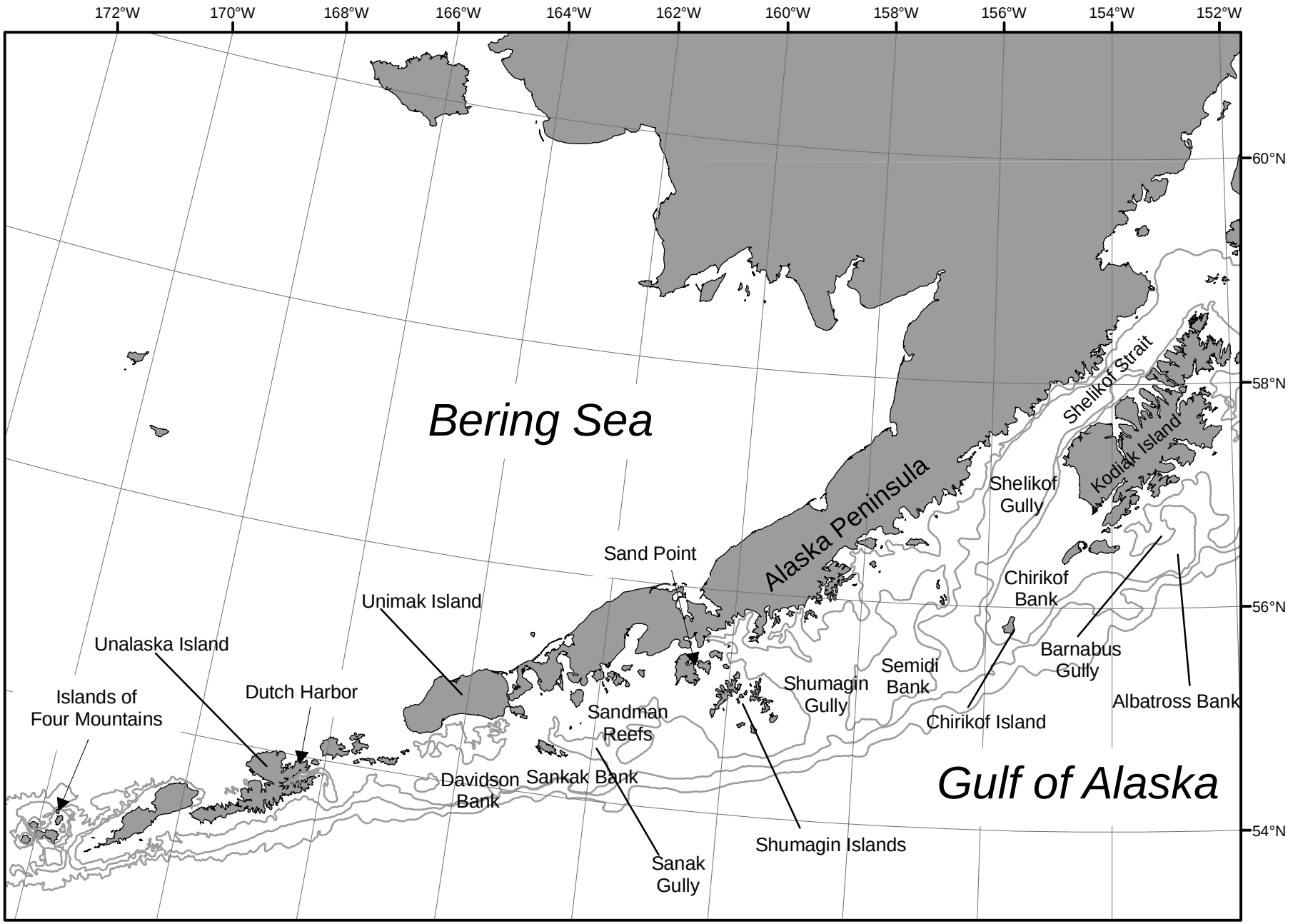

Figure 1. -- Bathymetric and geographic features of the survey area for the 2009 Gulf of Alaska biennial groundfish survey.

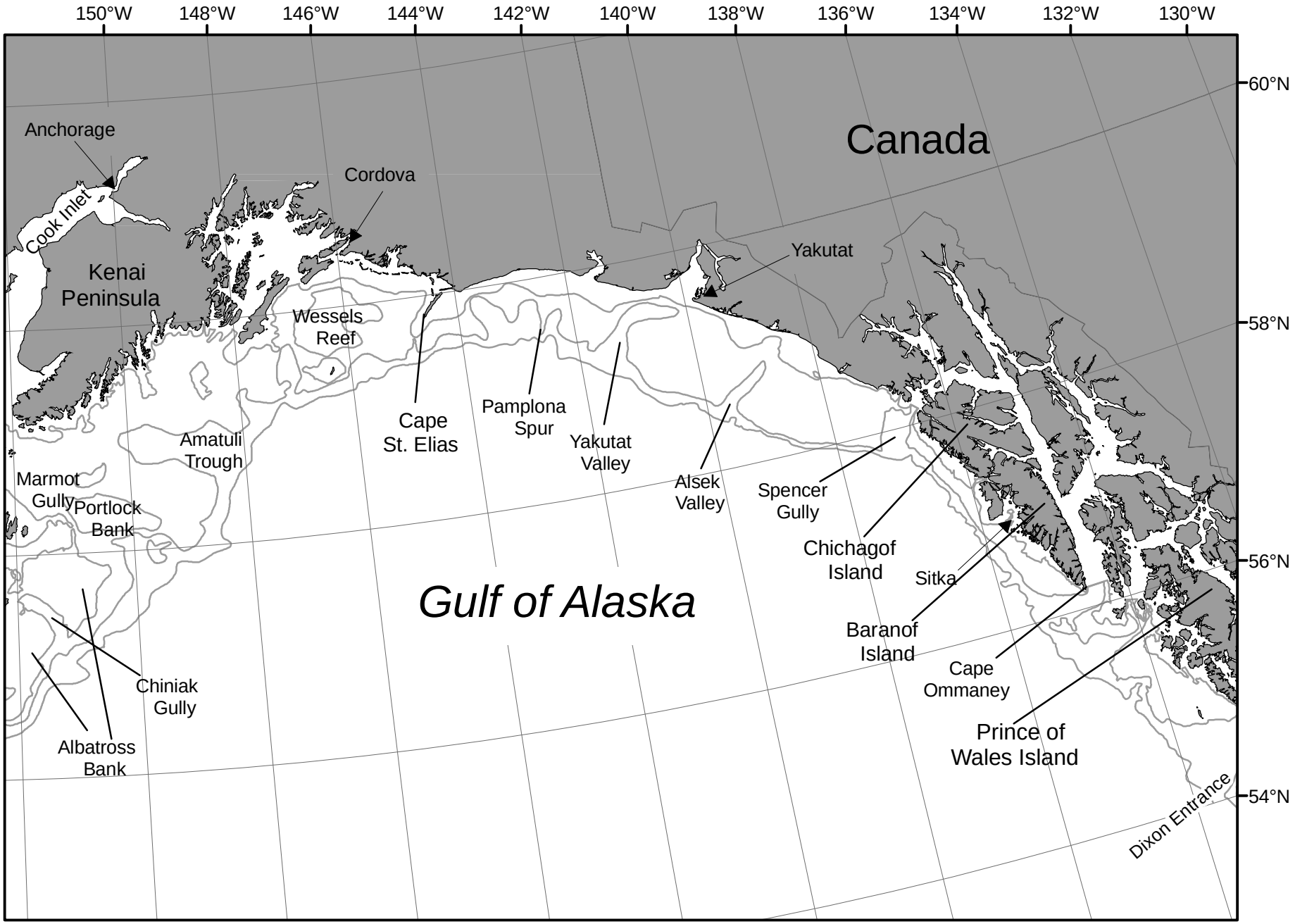

Figure 1. -- Continued.

have been chartered each year the survey has been done. 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. Stringent standards for selecting charter vessels are specified whenever new charters are arranged to ensure that the sampling platforms can adequately collect samples and do so in as similar a manner as possible within and between years. As such, vessels and crews must meet minimum criteria in terms of size, main engine horsepower, fishing machinery, skipper and crew experience, and navigational and safety equipment. Continuity of suitable platforms has been further enhanced in the past decade through the use of multi-year charters, assuring both the government and the contractors a stable planning situation for as much as 4 years at a time.

In 2009, three U.S. commercial fishing vessels, FV *Pacific Explorer*, FV *Sea Storm,* and FV *Vesteraalen* were chartered to conduct the Gulf of Alaska bottom trawl survey. All three vessels were house-forward stern trawlers with stern ramps and two aft net storage reels (*Sea Storm* and *Vesteraalen*; two forward net storage reels on the *Pacific Explorer*); telescoping deck cranes; propeller nozzles; and paired, controlled-tension hydraulic trawl winches with 1,280 m, 1,460 m, and 2,200 m of 2.54 cm (*Pacific Explorer, Sea Storm, and Vesteraalen*, respectively) diameter steel cable. The *Pacific Explorer* is 47.2 m in overall length (LOA) and is powered by a single continous 1,800 HP main engine. The *Sea Storm* and *Vesteraalen* are both 37.8 m (LOA) and are also powered by single continuous main engines (1,710 HP on the *Sea Storm* and 1,725 HP on the *Vesteraalen*). The *Pacific Explorer* was operated by Captain Rick Loan for the

first leg and by Captain Lorin Perry for the second through fourth legs. Captain Tim Cosgrove skippered the *Vesteraalen* for all four legs. The *Sea Storm* was operated by Captain Steve Branstiter for all four legs. All vessels were equipped with GPS receivers with video position plotters, at least two radars, single sideband and VHF transmitter-receivers, color video fish-finders, paper recorder depth sounders, and autopilots.

Fishing Gear

The fishing gear and protocols for deployment are described in detail in Stauffer (2004). 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 deployment 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 prior to its use in the survey.

Survey Design

The 2009 biennial survey used stratified random sampling consistent with previous GOA surveys (von Szalay et al. 2008, Britt and Martin 2000, Martin and Clausen 1995, Stark and Clausen 1995, Munro and Hoff 1995). The Gulf of Alaska was divided into 59 strata defined by water depth, bottom terrain (e.g., shelf, gully, and slope), and INPFC statistical area (Appendix A). As in previous surveys, a modified Neyman optimal allocation strategy (Cochran 1977)

based upon catch rates from the 1990-2007 surveys was used to allocate effort among strata. Neyman optimum allocation calculations were made 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.

The calculated number of stations was randomly selected without replacement from polygons formed from the intersection of a grid composed of cells 25 km^2 in area and the stratum boundaries. Since many of the polygons formed by this process are less than 25 km^2, the probability of selection was directly related to each polygon's area. Small polygons (less than 5 km^2 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. To maximize efficient use of survey time and optimize fuel consumption, assignment of tows to vessels was non-random in the Central GOA where the shelf is nearly 200 km wide in places. In general, the *Vesteraalen* was assigned to sample the outer shelf and slope stations, the *Pacific Explorer* the middle shelf stations, and the *Sea Storm* the nearshore stations. However, tows in all strata, with the exception of those between Kodiak Island and Cook Inlet, were assigned randomly between at least two boats.

We allocated 825 stations among the 59 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 protocols used by the AFSC's RACE Division for conducting bottom trawl surveys have been standardized (Stauffer 2004). 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. The track of the vessel was recorded every 2 seconds during each tow using the vessel's global positioning system (GPS). Pressure at depth, water temperature, and time 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 except for on the *Pacific Explorer*, which lacked a suitable location for collecting these data. To minimize fishing power differences between the survey vessels, standardized trawling and gear handling methods were practiced including the use of scope ratio tables (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

Catches were sorted to species or other appropriate taxonomic levels and then weighed in aggregate using an 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 iteratively 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 weighed with Measurement Systems International Portaweigh Model 4300 crane scale and the sorting table was filled with a portion of the catch. The excess catch was dumped into a deck bin and the dominant species, usually three or fewer, making up the bulk of the catch were identified. The contents of the deck bin were sorted, discarding the predominant species and retaining the non-dominant species, 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. Numbers and weights of all taxa were estimated for each haul.

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 identified in the catch was sorted by sex, and individual fork lengths (FL) were measured using Polycorder (Omnidata) data loggers with barcode readers and barcoded length strips. 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 *Vesteraalen*. In addition, stomach samples for selected species were scanned for their content aboard the *Sea Storm* by REEM staff. Ancillary data and specimens including whole specimens, ovaries, a variety of tissues, and acoustic data were collected for several other research projects including a taxonomic study of snailfish, and genetic studies of Pacific ocean perch, Pacific hake, and rougheye, blackspotted, and shortraker rockfish. Additional studies included measurements of light level variability; marine mammal food habits; age and growth of big skate, longnose skate, and forage species; squid stock structure and distribution; weight and length relationships for octopuses; identification of untrawlable areas; reproductive biology of Pacific ocean perch, northern rockfish, blackspotted rockfish, rougheye rockfish, and shortraker rockfish; visual ecology of snailfishes; identification of Pacific sandfish spawning habitat; the effect of trawl heave on the accuracy of seafloor trawlability measurements; and growth rate differences in rex sole from the eastern and western Gulf of Alaska.

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 by 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 which there were insufficient Scanmar readings 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. 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 fish 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

Out of a total of 884 attempted tows, 823 (93%) were completed successfully at allocated survey stations and were included in the biomass and size composition analysis (Table 1). Net spread measurements were successfully collected for 860 tows (97%). Headrope depth and temperature measurements were successfully collected for 870 tows (98%). Bottom temperatures ranged from 2.4° to 9.7° C. Sea surface temperatures were successfully collected for 871 tows and ranged from 3.3° to 15.7° C.

Net height and spread were measured for all but 20 of the successful survey hauls (for these hauls net dimensions were estimated from other bottom trawl hauls). Average net spread ranged from 12.5 to 19.3 m. Average net heights of successfully completed tows ranged from 3.9 to 9.1 m. Temperatures were successfully recorded for all but 14 tows. Average bottom temperatures ranged from 2.4° C to 9.7° C. Sea surface temperatures ranged from 3.3° to 15.7° C.

Table 1. -- Number of stations allocated, attempted, and successfully completed, and sampling density for the 2009 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 (km^2)	Sampling density (stations/1,000 km^2)
Shumagin	1 - 100	127	135	127	41,289	3.08
	101 - 200	40	40	40	14,677	2.73
	201 - 300	17	20	17	2,788	6.10
	301 - 500	7	7	7	2,531	2.77
	501 - 700	3	3	3	2,006	1.50
	701 - 1000	2	2	2	1,937	1.03
	All depths	**196**	**207**	**196**	**65,228**	**3.00**
Chirikof	1 - 100	79	79	78	26,035	3.00
	101 - 200	71	72	72	23,849	3.02
	201 - 300	25	25	25	11,546	2.17
	301 - 500	7	8	7	1,604	4.36
	501 - 700	5	6	5	1,953	2.56
	701 - 1000	3	3	3	3,066	0.98
	All depths	**190**	**193**	**190**	**68,053**	**2.79**
Kodiak	1 - 100	100	105	100	38,516	2.60
	101 - 200	126	128	125	43,332	2.88
	201 - 300	31	31	31	11,490	2.70
	301 - 500	16	16	16	2,912	5.49
	501 - 700	4	5	4	1,745	2.29
	701 - 1000	4	4	4	3,494	1.14
	All depths	**281**	**289**	**280**	**101,489**	**2.76**
Yakutat	1 - 100	19	19	19	16,661	1.14
	101 - 200	36	37	36	29,382	1.23
	201 - 300	17	18	17	5,170	3.29
	301 - 500	8	9	8	2,628	3.04
	501 - 700	2	2	2	1,469	1.36
	701 - 1000	2	1	1	1,887	0.53
	All depths	**84**	**86**	**83**	**57,197**	**1.45**
Southeastern	1 - 100	11	11	11	6,546	1.68
	101 - 200	26	27	26	11,084	2.35
	201 - 300	19	19	19	5,052	3.76
	301 - 500	14	15	14	3,117	4.49
	501 - 700	2	2	2	1,033	1.94
	701 - 1000	2	2	2	1,206	1.66
	All depths	**74**	**76**	**74**	**28,038**	**2.64**
All areas	1 - 100	336	349	335	129,047	2.60
	101 - 200	299	304	299	122,324	2.44
	201 - 300	109	113	109	36,046	3.02
	301 - 500	52	55	52	12,792	4.07
	501 - 700	16	18	16	8,206	1.95
	701 - 1000	13	12	12	11,590	1.04
	All depths	**825**	**851**	**823**	**320,005**	**2.57**

Catch Results by Area

At least 185 fish species from 40 families were captured during the 2009 survey. Appendix B presents lists of fish (Appendix B-1) and invertebrate (Appendix 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 had the highest CPUE of any species in all of the five INPFC areas. Pacific cod, giant grenadier, walleye pollock, Pacific ocean perch, and Pacific halibut were also very important components of the Gulf-wide species composition.

In the Shumagin INPFC area, arrowtooth flounder had by far the greatest CPUE of any species. Walleye pollock, Pacific cod, giant grenadier, Atka mackerel, and Pacific halibut were also relatively abundant in this area. In the Chirikof INPFC area, arrowtooth flounder dominated all other species in terms of CPUE. Walleye pollock, Pacific ocean perch, Pacific cod, giant grenadier, and Pacific halibut were also important components of the species composition. In the Kodiak INPFC area, arrowtooth flounder was by far the dominant component of the groundfish CPUE. Giant grenadier, Pacific cod, Pacific halibut, Pacific ocean perch, and walleye pollock were also relatively abundant in this area. In the Yakutat INPFC area, arrowtooth flounder, Pacific ocean perch, and Pacific halibut were the dominant species. The mean CPUEs of these species were either more than twice or almost twice that of the next most abundant species: sablefish. In the Southeastern INPFC area, arrowtooth flounder was again the

most abundant species. Pacific ocean perch, Pacific hake, spotted ratfish, Pacific halibut, and walleye pollock were also important catch components.

Table 2. -- Mean CPUE (kg/ha) for the 20 most abundant groundfish in each International North Pacific Fisheries Commission area during the 2009 biennial Gulf of Alaska bottom trawl survey.

Shumagin area		Chirikof area		Kodiak area	
Species	CPUE	Species	CPUE	Species	CPUE
arrowtooth flounder	43.8	arrowtooth flounder	64.0	arrowtooth flounder	75.5
walleye pollock	32.7	walleye pollock	34.7	giant grenadier	40.6
Pacific cod	30.5	Pacific ocean perch	30.8	Pacific cod	39.4
giant grenadier	28.5	Pacific cod	20.6	Pacific halibut	24.7
Atka mackerel	20.7	giant grenadier	14.3	Pacific ocean perch	24.4
Pacific halibut	16.0	Pacific halibut	13.8	walleye pollock	19.6
southern rock sole	12.7	flathead sole	9.6	sablefish	8.1
flathead sole	12.3	rex sole	7.5	flathead sole	6.3
northern rock sole	8.6	southern rock sole	7.4	southern rock sole	5.4
northern rockfish	6.9	sablefish	5.8	eulachon	5.2
Pacific ocean perch	4.9	eulachon	3.1	dusky rockfish	4.0
rex sole	3.0	Pacific sleeper shark	3.0	northern rockfish	3.6
yellow Irish lord	3.0	northern rock sole	2.7	rex sole	3.1
shortspine thornyhead	2.9	Dover sole	2.4	northern rock sole	2.1
sablefish	2.7	popeye grenadier	1.7	shortspine thornyhead	2.1
yellowfin sole	1.8	Aleutian skate	1.4	Dover sole	2.0
starry flounder	1.6	northern rockfish	1.3	rougheye rockfish	1.9
shortraker rockfish	1.4	Pacific herring	1.3	yellowfin sole	1.8
Pacific sleeper shark	1.3	starry flounder	1.2	longnose skate	1.8
popeye grenadier	1.2	shortspine thornyhead	1.1	big skate	1.4
Number of hauls	196	Number of hauls	190	Number of hauls	280

Yakutat area		Southeastern area		All areas	
Species	CPUE	Species	CPUE	Species	CPUE
arrowtooth flounder	32.8	arrowtooth flounder	34.7	arrowtooth flounder	55.4
Pacific ocean perch	17.0	Pacific ocean perch	22.5	Pacific cod	23.5
Pacific halibut	13.2	Pacific hake	17.0	giant grenadier	22.5
sablefish	7.2	spotted ratfish	12.9	walleye pollock	22.0
lingcod	4.5	Pacific halibut	11.6	Pacific ocean perch	20.3
dusky rockfish	4.4	walleye pollock	11.1	Pacific halibut	17.4
walleye pollock	4.3	sablefish	7.9	flathead sole	7.0
shortspine thornyhead	3.0	shortspine thornyhead	5.2	sablefish	6.3
spiny dogfish	2.6	rex sole	4.1	southern rock sole	6.0
shortraker rockfish	2.2	Dover sole	3.4	Atka mackerel	4.2
rex sole	2.0	sharpchin rockfish	3.2	rex sole	3.9
big skate	1.9	flathead sole	2.5	northern rock sole	3.0
Pacific cod	1.9	rougheye rockfish	2.3	northern rockfish	2.8
eulachon	1.8	lingcod	2.3	eulachon	2.7
flathead sole	1.7	shortraker rockfish	2.2	shortspine thornyhead	2.5
longnose skate	1.5	silvergray rockfish	2.0	Dover sole	2.4
rougheye rockfish	0.8	Pacific herring	1.9	dusky rockfish	2.3
silvergray rockfish	0.7	English sole	1.8	Pacific hake	1.5
English sole	0.7	southern rock sole	1.4	big skate	1.4
Pacific herring	0.6	giant grenadier	1.3	shortraker rockfish	1.4
Number of hauls	83	Number of hauls	74	Number of hauls	823

Catch Results by Species

For each commercially or ecologically important species, 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 locally abundant (other flatfish and other rockfish, skates, capelin, eulachon, and Pacific hake), only items 1, 2, and 5 above are presented.

The scientific names follow the fifth edition of the Common and Scientific Names of Fishes from the United States and Canada (Robins et al. 1991). The exceptions to this are in the orders Pleuronectiformes (flatfish) and Scorpaeniformes (rockfish) scientific names. The names used throughout this report reflect recent reexamination of the phylogeny of these orders (Berendzen 1997, Cooper and Chapleau 1998, Ivankov 1996, Orr and Matarese 2000, Rass 1996, Orr and Blackburn 2004, Orr and Hawkins 2008).

FLATFISHES

Arrowtooth flounder (*Atheresthes stomias*)

Arrowtooth flounder was the most abundant species caught in the 2009 survey (Table 2) with the highest mean CPUE in all five INPFC areas. Arrowtooth flounder were caught throughout the survey area at all depths less than 700 m, occurring in 89% of tows at these depths, including 99% of the tows at depths between 101 and 500 m. The highest densities generally occurred on the broad continental shelf in the Kodiak and eastern Chirikof INPFC areas, especially around the Barren Islands and in the area northeast of Kodiak Island (Fig. 2 and Table 4). Mean densities were uniformly low on the continental slope at depths greater than 500 m and essentially zero at depths greater than 700 m. Mean weight generally increased with depth except in the Kodiak INPFC area (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 in the Shumagin and Southeastern INPFC areas and at depths between 301 m and 500 m in the Southeastern and Yakutat INPFC areas. In addition, a length mode for females around 55 cm occurred in all INPFC areas and at all depths between 0 and 500 m except in the Shumagin INPFC area and in the Chirikof INPFC area at depths less than 200 m. The arrowtooth flounder population in the survey area was dominated by females, which accounted for approximately 68% of the total estimated population.

Table 3. -- Number of survey hauls, number of hauls with arrowtooth flounder, mean CPUE, biomass, and mean weight, based on the 2009 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	127	118	39.49	163,042	66,475	259,608	0.455
	101 - 200	40	39	78.96	115,893	55,095	176,691	0.513
	201 - 300	17	17	15.46	4,310	2,182	6,438	0.67
	301 - 500	7	7	7.93	2,006	767	3,245	1.306
	501 - 700	3	1	0.88	176	0	737	1.43
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	182	43.76	285,427	174,606	396,248	0.481
Chirikof	1 - 100	78	65	34.66	90,234	20,382	160,087	0.791
	101 - 200	72	72	121.82	290,540	144,944	436,136	0.65
	201 - 300	25	25	43.77	50,534	28,589	72,479	0.851
	301 - 500	7	7	20.99	3,367	1,658	5,075	1.234
	501 - 700	5	2	3.13	612	0	1,599	1.594
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	171	63.96	435,287	273,768	596,806	0.698
Kodiak	1 - 100	100	83	38.92	149,890	72,540	227,240	1.007
	101 - 200	125	125	125.79	545,082	322,756	767,407	0.906
	201 - 300	31	31	50.40	57,906	26,165	89,646	0.838
	301 - 500	16	16	46.53	13,548	539	26,557	1.271
	501 - 700	4	2	0.25	44	0	152	0.684
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	257	75.52	766,469	530,015	1,002,924	0.923
Yakutat	1 - 100	19	18	24.74	41,220	17,550	64,889	0.543
	101 - 200	36	35	43.25	127,082	63,063	191,101	0.602
	201 - 300	17	17	17.41	9,000	5,509	12,492	1.066
	301 - 500	8	7	38.43	10,100	2,857	17,342	1.099
	501 - 700	2	1	0.27	40	0	210	1.443
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	78	32.77	187,441	120,054	254,827	0.615
Southeastern	1 - 100	11	8	11.71	7,664	0	17,547	0.733
	101 - 200	26	25	68.74	76,193	0	169,324	0.613
	201 - 300	19	19	17.97	9,079	732	17,425	0.744
	301 - 500	14	14	13.90	4,333	1,357	7,309	1.029
	501 - 700	2	1	1.32	137	0	724	1.034
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	67	34.74	97,406	3,941	190,870	0.644
All areas	1 - 100	335	292	35.03	452,050	310,460	593,640	0.639
	101 - 200	299	296	94.40	1,154,790	866,340	1,443,239	0.717
	201 - 300	109	109	36.29	130,829	95,212	166,446	0.841
	301 - 500	52	51	26.07	33,353	18,763	47,942	1.178
	501 - 700	16	7	1.23	1,009	0	2,020	1.379
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	755	55.37	1,772,029	1,449,878	2,094,181	0.708

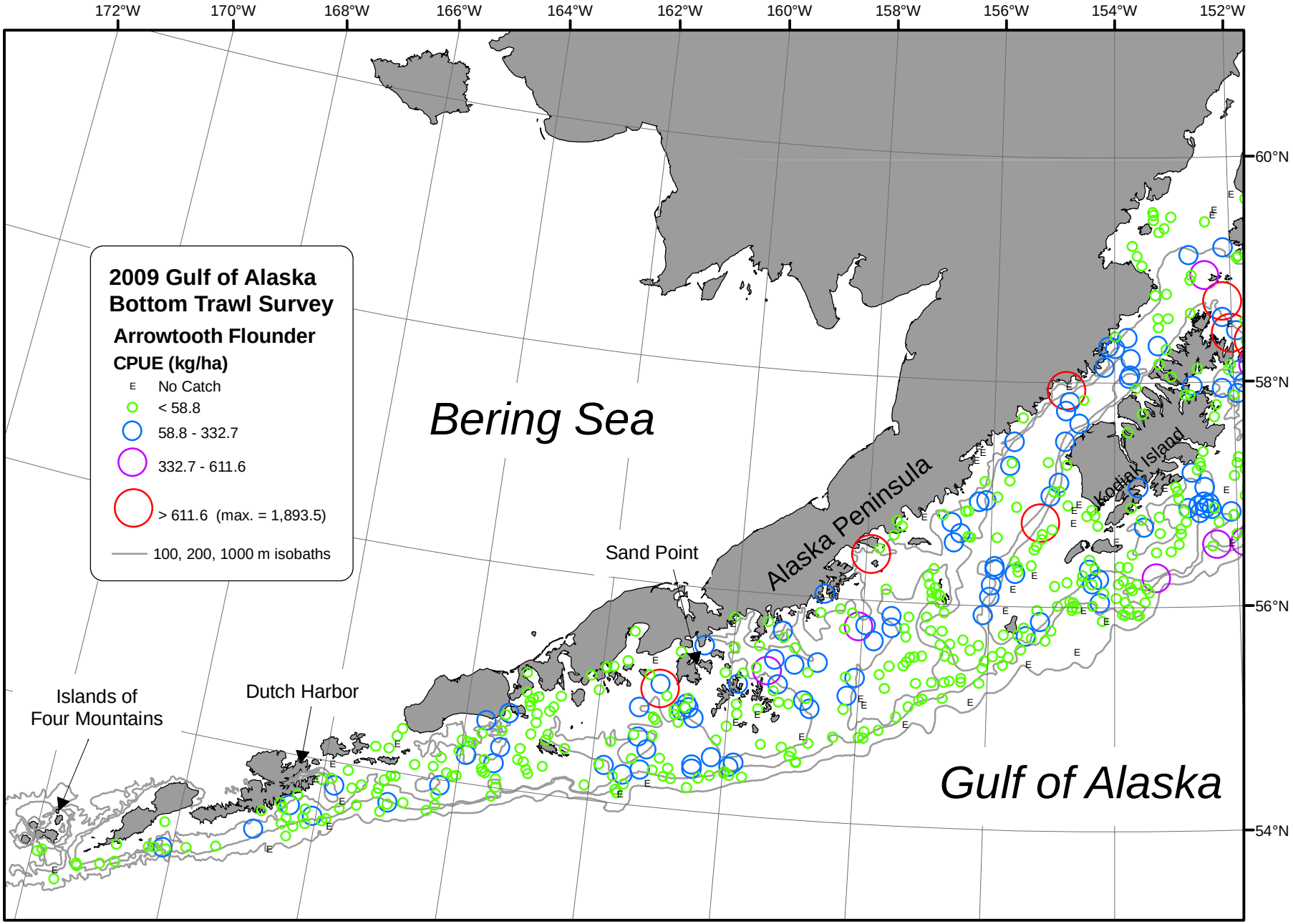

Figure 2. -- Distribution and relative abundance of arrowtooth flounder from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

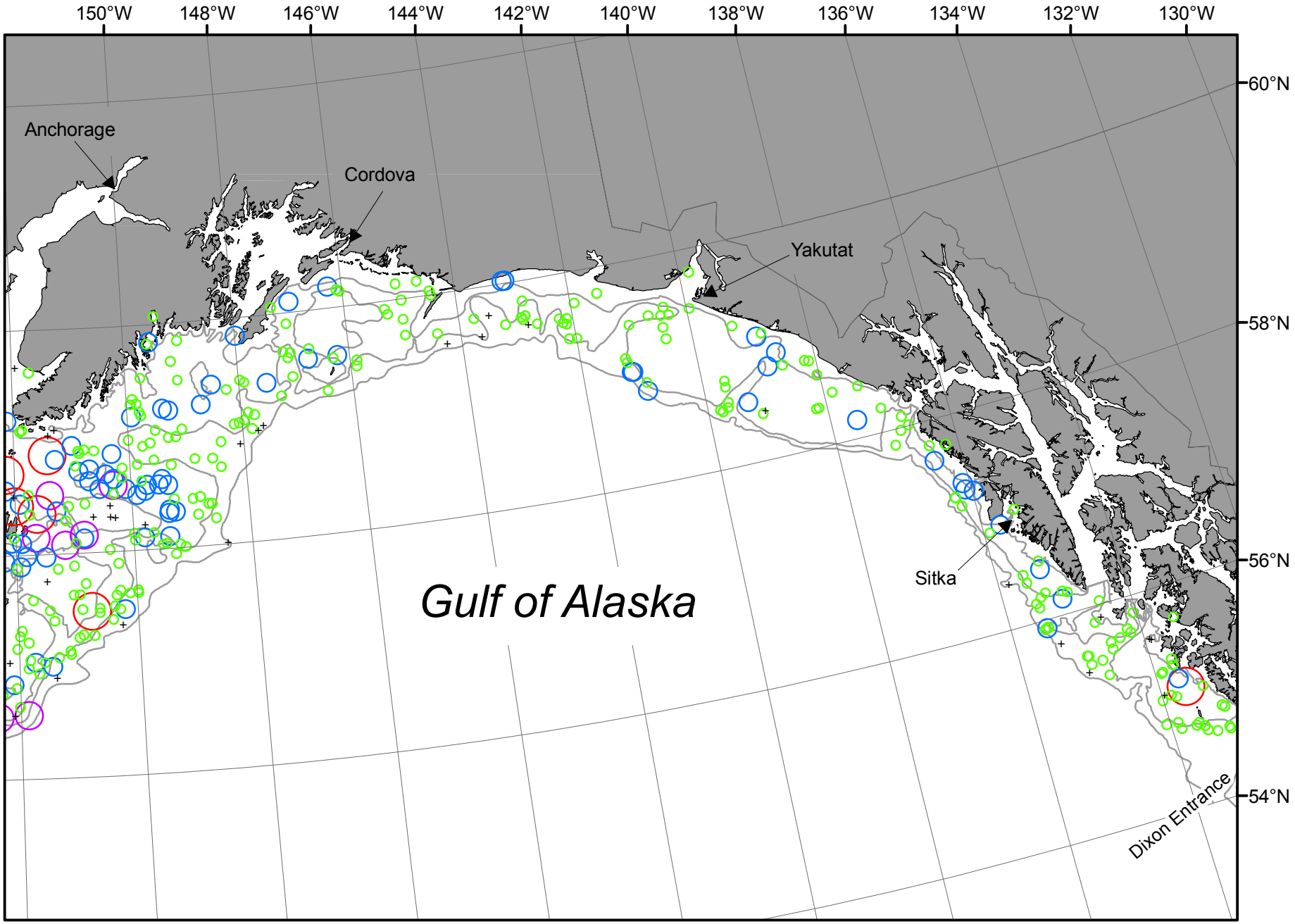

Figure 2. -- Continued (arrowtooth flounder).

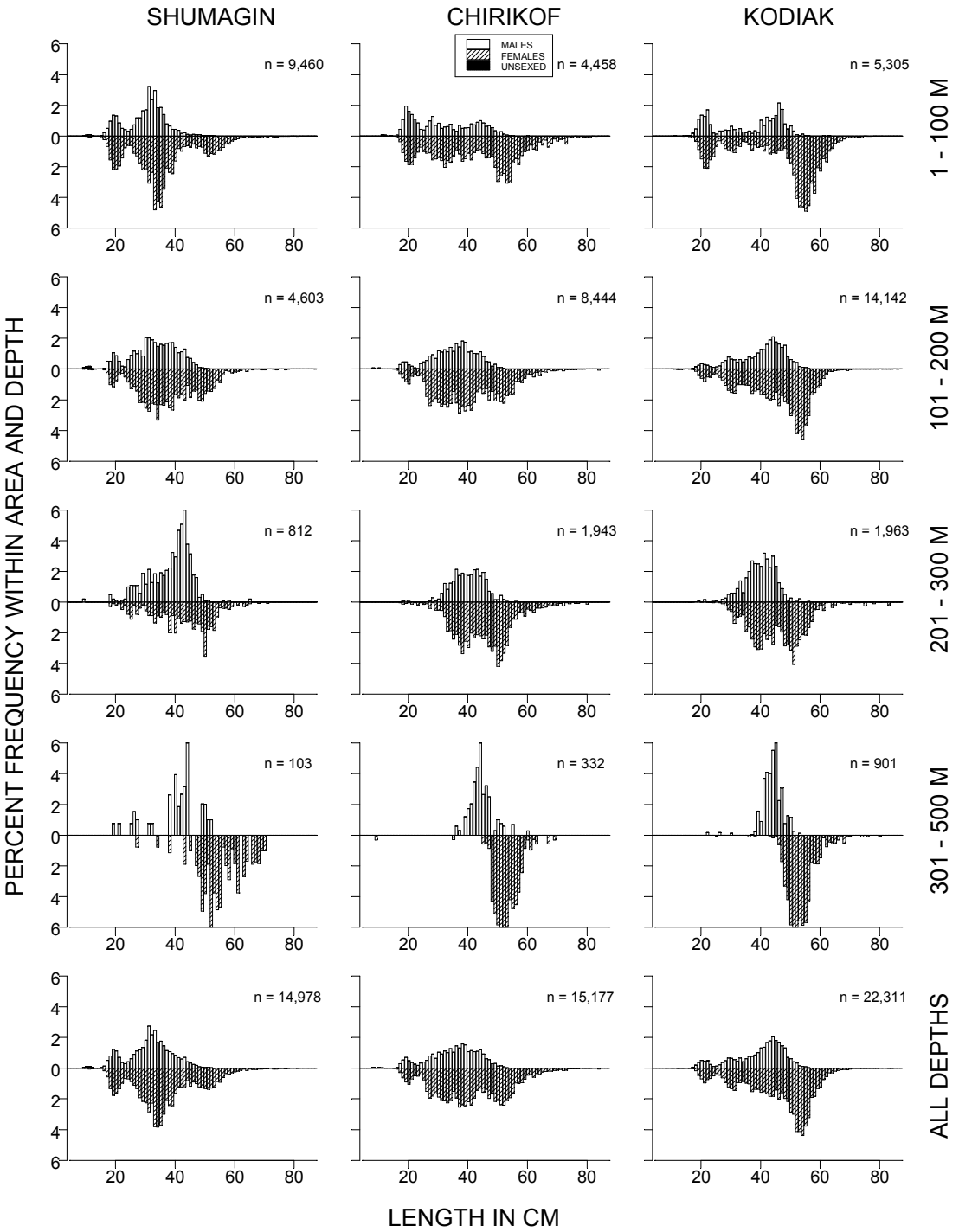

Figure 3. -- Size composition of arrowtooth flounder from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

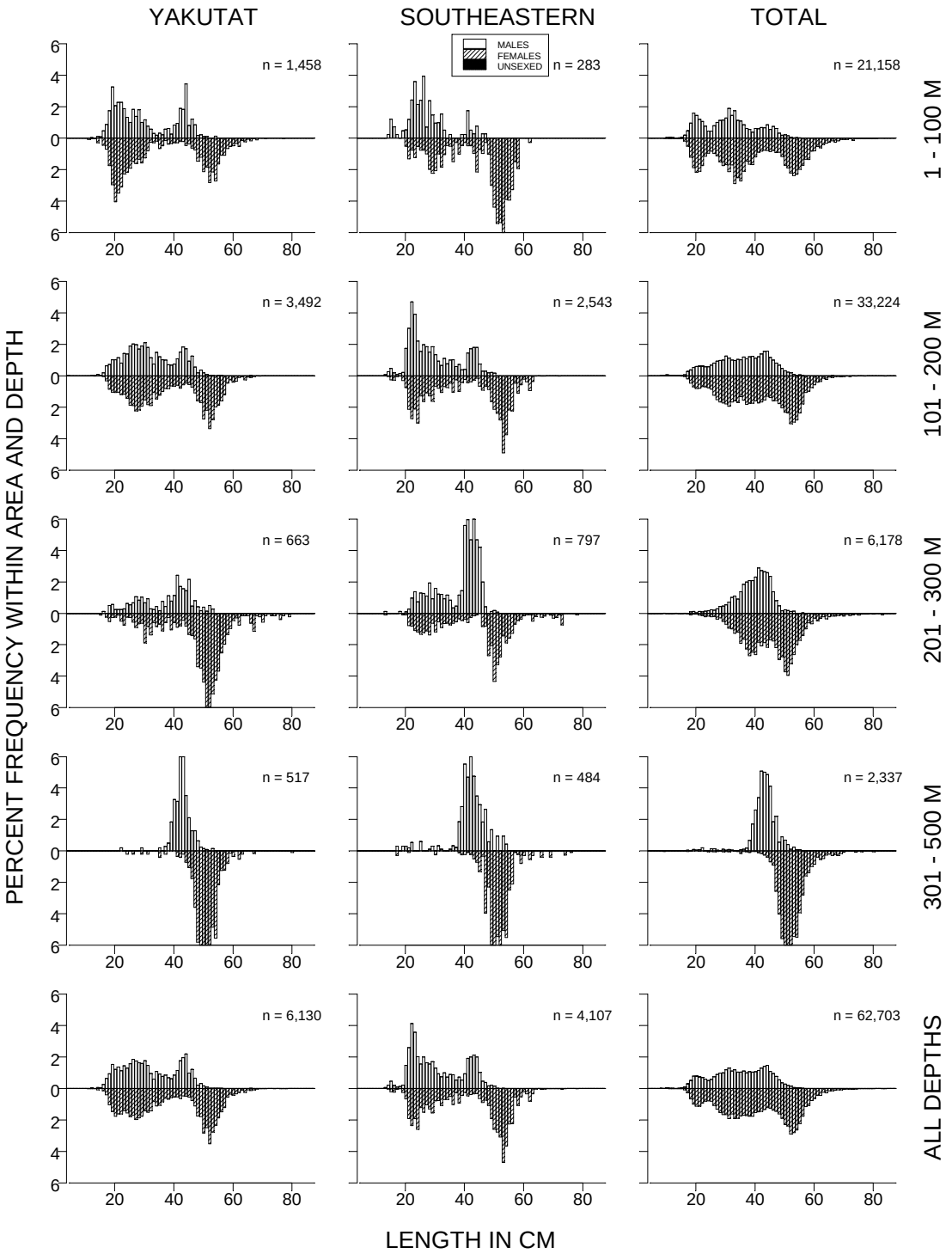

Figure 3. -- Continued (arrowtooth flounder).

Table 4. -- Catch per unit of effort by stratum for arrowtooth flounder sorted by descending CPUE for the 2009 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	Barren Islands	18	18	272.57	299,301	85,838	512,765
Shumagin	101 - 200	West Shumagin Gully	4	4	206.73	47,097	0	122,061
Chirikof	101 - 200	Shelikof Edge	27	27	156.04	120,688	12,363	229,014
Chirikof	101 - 200	East Shumagin Gully	19	19	142.88	158,656	58,017	259,295
Kodiak	101 - 200	Albatross Gullies	26	26	117.29	92,793	46,962	138,624
Kodiak	201 - 300	Upper Shelikof Gully	4	4	115.86	37,172	417	73,927
Kodiak	1 - 100	Albatross Shallows	28	25	99.91	57,611	13,460	101,763
Kodiak	101 - 200	Portlock Flats	35	35	86.45	63,426	38,359	88,493
Shumagin	1 - 100	Shumagin Bank	35	32	80.39	99,668	5,406	193,930
Southeastern	101 - 200	Prince of Wales Shelf	15	14	79.62	54,839	0	147,531
Shumagin	101 - 200	Sanak Gully	6	6	62.97	26,732	3,221	50,243
Yakutat	301 - 500	Yakutat Slope	6	6	60.52	9,202	1,674	16,730
Yakutat	101 - 200	Middleton Shelf	10	10	59.434	43,658	23,118	64,198
Kodiak	101 - 200	Kenai Flats	19	19	58.728	70,926	29,359	112,493
Chirikof	1 - 100	Chirikof Bank	37	31	53.938	58,210	0	126,233
Shumagin	101 - 200	Shumagin Outer Shelf	30	29	51.589	42,064	23,345	60,783
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	11	50.887	21,354	6,813	35,895
Yakutat	101 - 200	Fairweather Shelf	10	10	49.986	38,627	0	77,467
Chirikof	201 - 300	Lower Shelikof Gully	17	17	49.25	49,342	27,296	71,387
Kodiak	1 - 100	Kenai Peninsula	9	7	48.81	25,674	0	68,296
Southeastern	201 - 300	Baranof-Chichagof Slope	5	5	48.46	5,453	0	14,772
Kodiak	301 - 500	Kodiak Slope	16	16	46.53	13,548	471	26,624
Yakutat	101 - 200	Yakutat Flats	7	7	41.57	37,542	0	91,998
Kodiak	101 - 200	Kodiak Outer Shelf	27	27	37.08	18,636	0	37,849
Southeastern	301 - 500	Southeastern Slope	7	7	36.80	2,844	0	6,087
Kodiak	1 - 100	Albatross Banks	40	32	36.52	56,248	4,106	108,391
Kodiak	201 - 300	Kenai Gullies	20	20	28.38	18,900	6,603	31,198
Shumagin	1 - 100	Fox Islands	19	16	26.82	22,346	489	44,203
Yakutat	1 - 100	Yakutat Shallows	11	10	26.26	26,119	3,026	49,211
Shumagin	1 - 100	Davidson Bank	47	46	24.45	33,446	20,876	46,017
Yakutat	201 - 300	Yakutat Gullies	9	9	23.639	7,193	3,742	10,643
Chirikof	1 - 100	Upper Alaska Peninsula	17	12	22.721	18,042	3,340	32,744
Yakutat	1 - 100	Middleton Shallows	8	8	22.491	15,101	6,687	23,515
Chirikof	101 - 200	Chirikof Outer Shelf	26	26	22.342	11,195	3,671	18,719
Chirikof	301 - 500	Chirikof Slope	7	7	20.989	3,367	1,599	5,134
Chirikof	1 - 100	Semidi Bank	24	22	19.148	13,982	1,422	26,541
Shumagin	201 - 300	Shumagin Slope	17	17	15.46	4,310	2,172	6,449
Yakutat	101 - 200	Yakataga Shelf	9	8	13.75	7,255	1,652	12,859
Southeastern	1 - 100	Southeastern Shallows	11	8	11.71	7,664	0	17,668
Kodiak	201 - 300	Kodiak Slope	7	7	11.30	1,834	476	3,191
Shumagin	1 - 100	Lower Alaska Peninsula	26	24	11.03	7,581	2,847	12,316
Kodiak	1 - 100	Northern Kodiak Shallows	8	7	11.01	2,423	0	5,051
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	14	9.23	3,626	2,322	4,930
Yakutat	201 - 300	Yakutat Slope	8	8	8.50	1,808	707	2,908
Yakutat	301 - 500	Yakutat Gullies	2	1	8.11	898	0	12,303
Kodiak	1 - 100	Lower Cook Inlet	15	12	8.03	7,934	0	21,137
Shumagin	301 - 500	Shumagin Slope	7	7	7.93	2,006	724	3,288
Chirikof	201 - 300	Chirikof Slope	8	8	7.80	1,192	716	1,668
Southeastern	301 - 500	Southeastern Deep Gullies	7	7	6.352	1,489	567	2,411
Chirikof	501 - 700	Chirikof Slope	5	2	3.134	612	0	1,677
Southeastern	501 - 700	Southeastern Slope	2	1	1.322	137	0	1,872
Shumagin	501 - 700	Shumagin Slope	3	1	0.878	176	0	934
Yakutat	501 - 700	Yakutat Slope	2	1	0.27	40	0	544
Kodiak	501 - 700	Kodiak Slope	4	2	0.252	44	0	168

Pacific halibut (*Hippoglossus stenolepis*)

Pacific halibut was the sixth most abundant species caught in the 2009 survey (Table 2) with the third highest mean CPUE in the Yakutat INPFC area. Pacific halibut were particularly abundant at depths less than 100 m where they were caught in approximately 98% of the tows, and 78% of the estimated halibut biomass was found at these depths. The highest CPUEs were found at this depth range in all INPFC areas (Table 5). The frequency of occurrence of Pacific halibut in tows decreased from west to east, ranging from about 89% of the tows in the Shumagin INPFC area to 42% of the tows in the Southeastern INPFC area. The highest densities were recorded on Albatross Banks northeast of Kodiak Island, around the Kenai Peninsula, and in the Middleton Shallows in the Yakutat INPFC area (Fig. 4 and Table 6). Most halibut were not sexed prior to length measurement. A pronounced length mode around 62 cm was noted in the two shallowest depth zones of the Yakutat and Southeastern INPFC areas, and around 42 cm in the Shumagin INPFC area. Two more moderate length modes around 20 and 42 cm were noted in depths less than 100 m in the Chirikof INPFC area (Fig. 5).

Table 5. -- Number of survey hauls, number of hauls with Pacific halibut, mean CPUE, biomass, and mean weight, based on the 2009 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	127	126	20.99	86,677	71,176	102,178	1.47
	101 - 200	40	35	11.10	16,290	5,604	26,977	2.459
	201 - 300	17	12	3.78	1,054	363	1,745	5.906
	301 - 500	7	1	0.10	25	0	85	1.792
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	174	15.95	104,047	85,536	122,558	1.582
Chirikof	1 - 100	78	78	25.11	65,371	49,136	81,606	1.72
	101 - 200	72	61	10.16	24,234	13,850	34,617	3.456
	201 - 300	25	13	3.34	3,862	1,357	6,366	5.68
	301 - 500	7	3	2.34	375	0	935	8.749
	501 - 700	5	2	1.42	278	0	718	10.167
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	157	13.83	94,120	74,807	113,433	2.057
Kodiak	1 - 100	100	97	57.08	219,844	118,041	321,648	2.381
	101 - 200	125	102	6.67	28,885	20,845	36,924	6.176
	201 - 300	31	11	1.52	1,744	640	2,847	5.939
	301 - 500	16	4	1.10	321	4	638	11.845
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	214	24.71	250,794	148,661	352,926	2.576
Yakutat	1 - 100	19	16	24.42	40,695	0	102,389	2.803
	101 - 200	36	28	10.92	32,072	6,190	57,954	3.766
	201 - 300	17	7	4.81	2,488	629	4,347	14.92
	301 - 500	8	3	1.49	391	0	937	12.071
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	54	13.23	75,647	11,745	139,549	3.256
Southeastern	1 - 100	11	11	35.67	23,349	0	49,915	2.756
	101 - 200	26	14	7.87	8,726	727	16,725	4.149
	201 - 300	19	5	0.65	330	0	665	5.267
	301 - 500	14	1	0.08	25	0	84	6.036
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	31	11.57	32,430	5,125	59,736	3.048
All areas	1 - 100	335	328	33.78	435,937	317,196	554,677	2.054
	101 - 200	299	240	9.01	110,207	79,040	141,373	3.809
	201 - 300	109	48	2.63	9,478	6,236	12,719	6.861
	301 - 500	52	12	0.89	1,138	388	1,888	9.433
	501 - 700	16	2	0.34	278	0	718	10.167
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	630	17.41	557,037	434,492	679,582	2.295

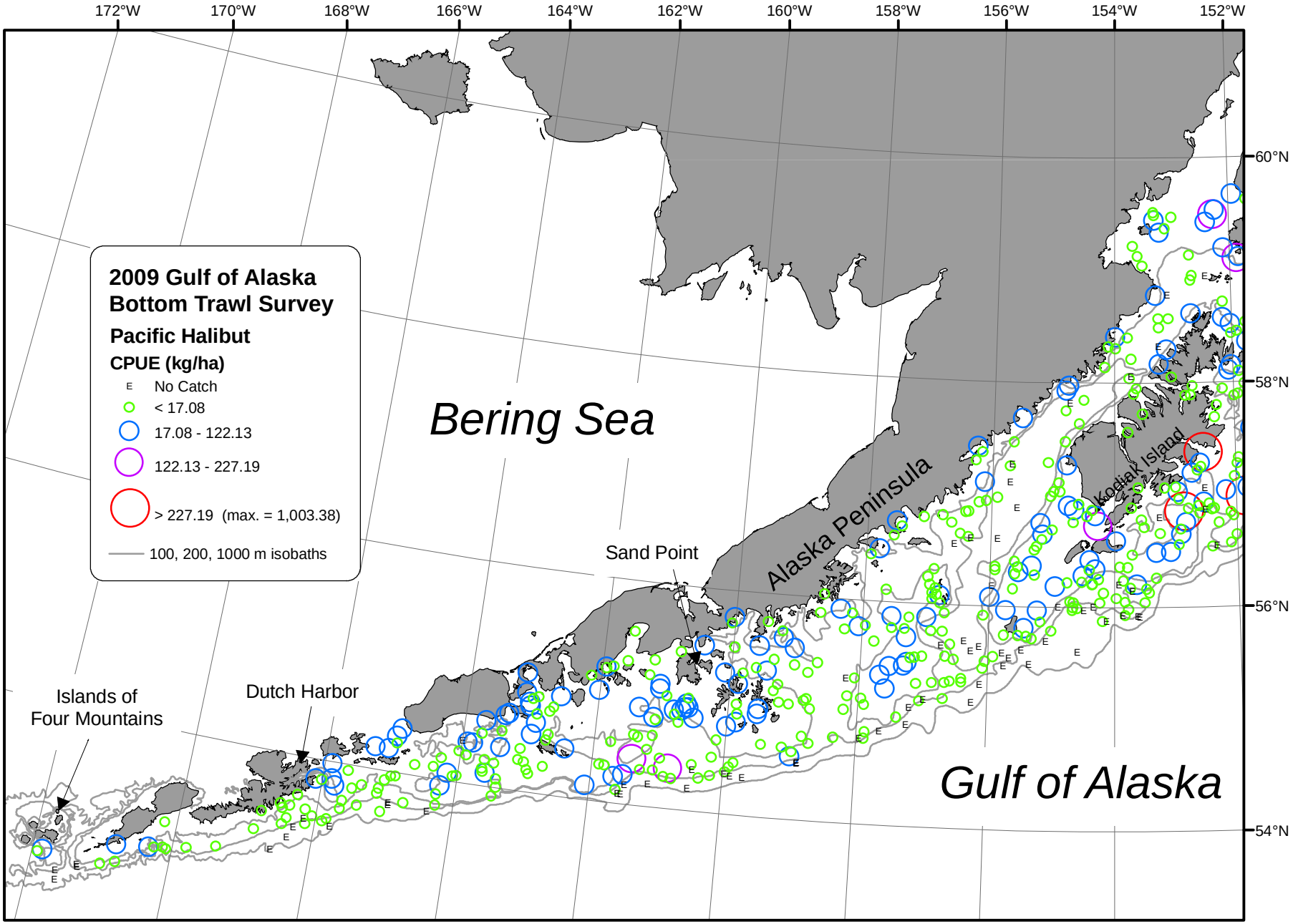

Figure 4. -- Distribution and relative abundance of Pacific halibut from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

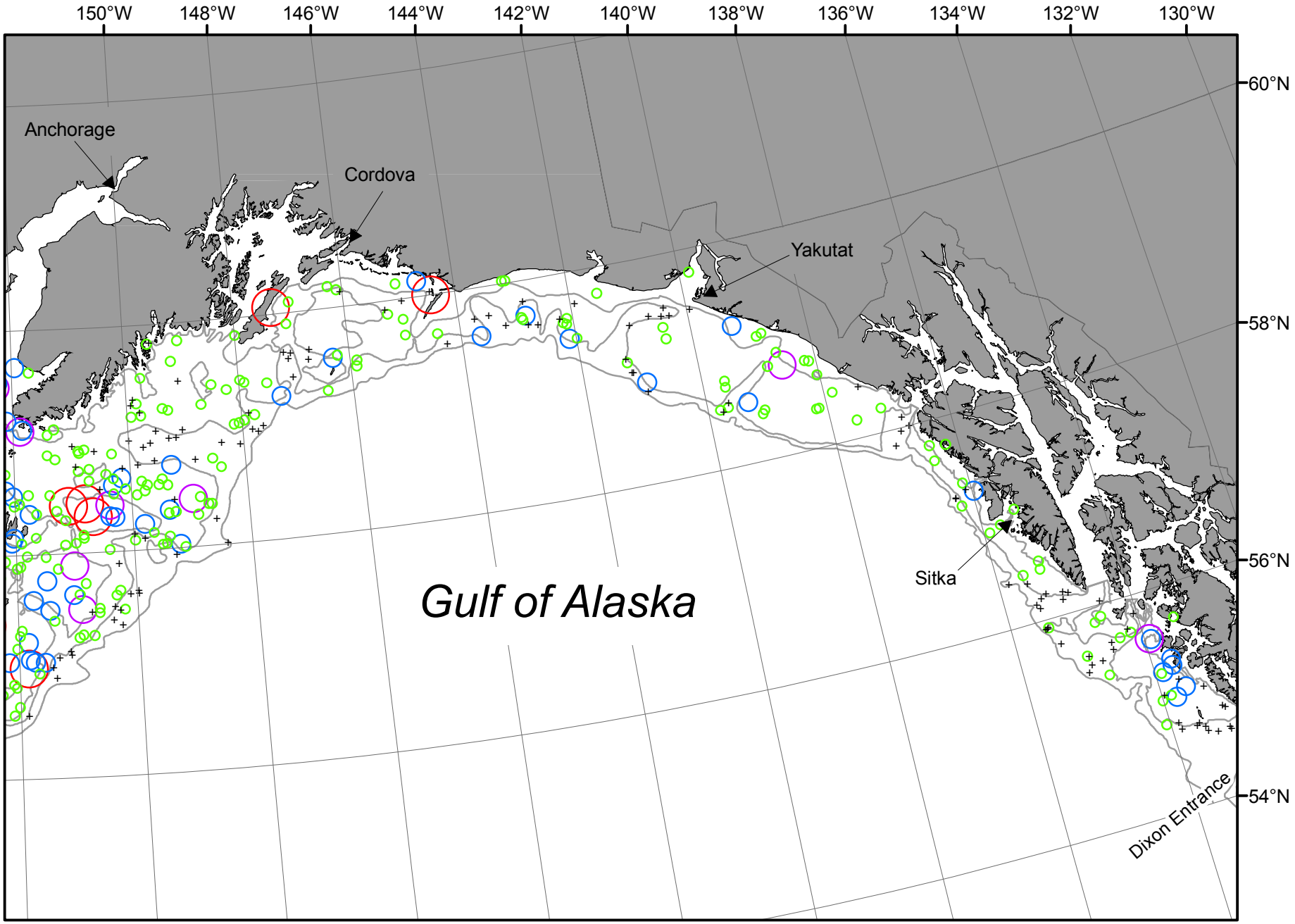

Figure 4. -- Continued (Pacific halibut).

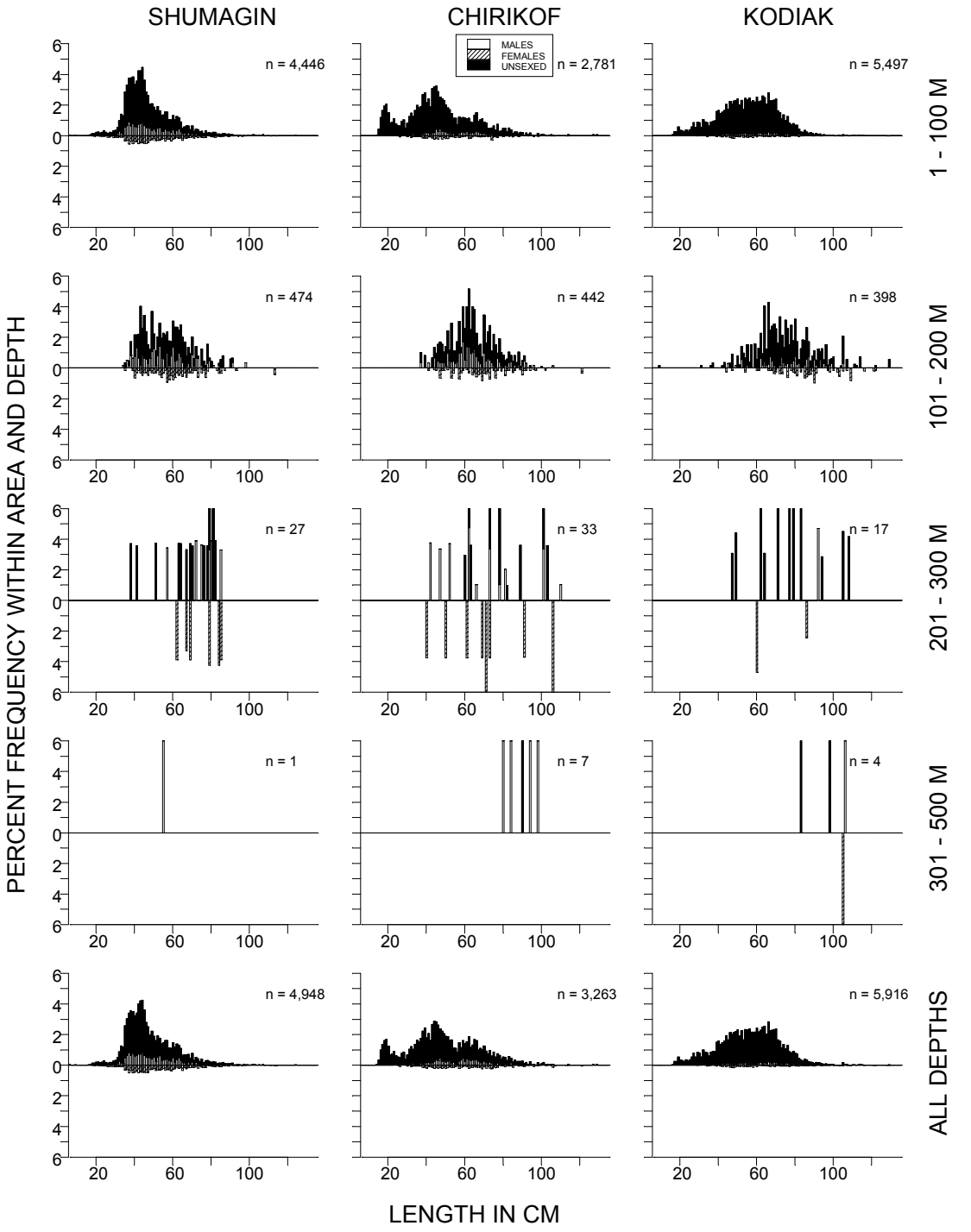

Figure 5. -- Size composition of Pacific halibut from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

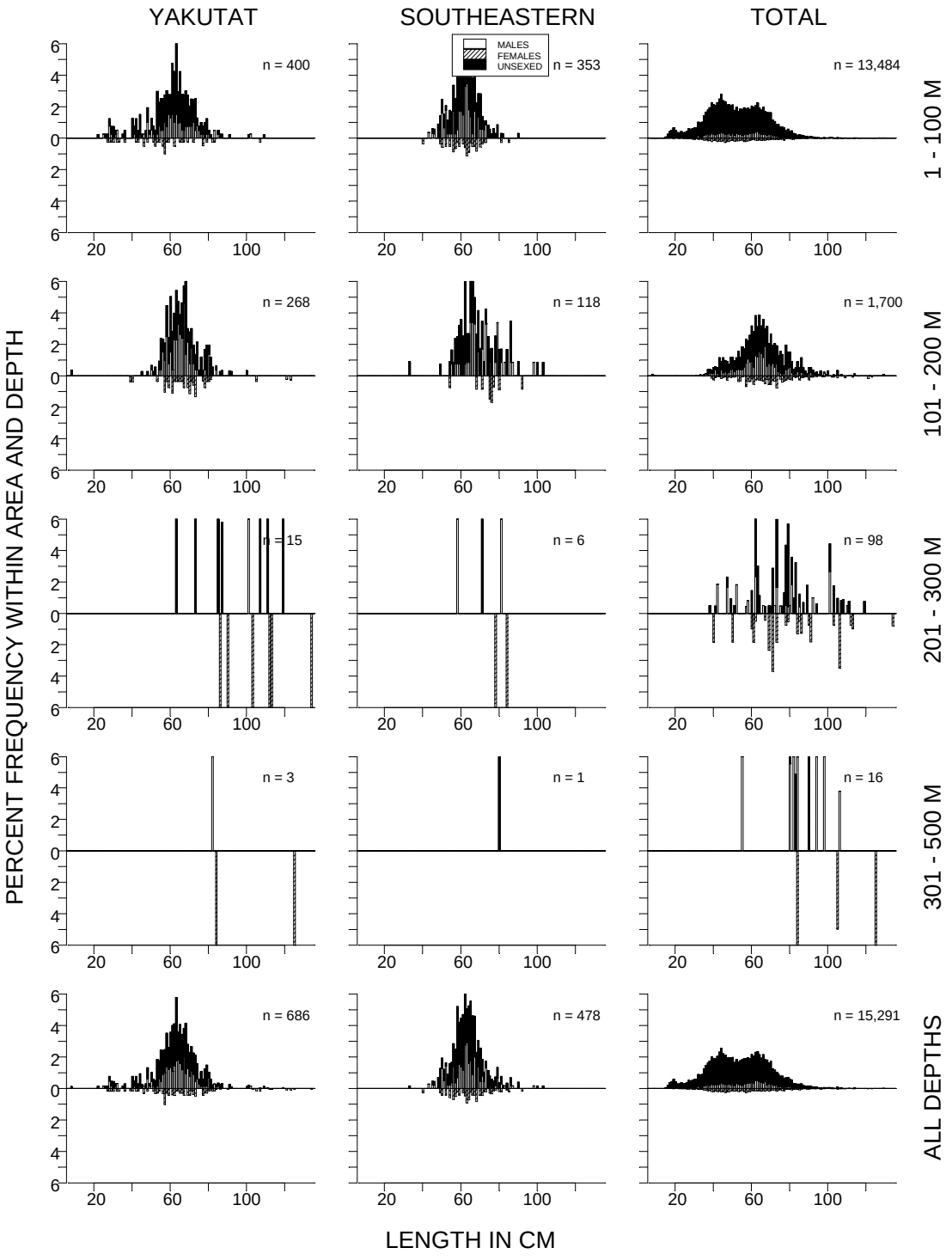

Figure 5b. – Continued (Pacific halibut).

Table 6. -- Catch per unit of effort by stratum for Pacific halibut sorted by descending CPUE for the 2009 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	40	39	90.08	138,748	45,043	232,453
Kodiak	1 - 100	Kenai Peninsula	9	8	52.70	27,723	0	62,151
Yakutat	1 - 100	Middleton Shallows	8	5	51.53	34,597	0	97,758
Southeastern	1 - 100	Southeastern Shallows	11	11	35.67	23,349	0	50,241
Kodiak	1 - 100	Lower Cook Inlet	15	15	33.46	33,082	6,567	59,598
Chirikof	1 - 100	Chirikof Bank	37	37	29.78	32,134	19,844	44,423
Kodiak	1 - 100	Albatross Shallows	28	27	29.39	16,946	1,666	32,226
Chirikof	1 - 100	Upper Alaska Peninsula	17	17	25.31	20,097	10,821	29,372
Shumagin	1 - 100	Lower Alaska Peninsula	26	26	22.58	15,528	9,369	21,687
Shumagin	1 - 100	Shumagin Bank	35	35	22.18	27,504	17,782	37,226
Yakutat	101 - 200	Fairweather Shelf	10	9	20.43	15,789	0	40,861
Shumagin	1 - 100	Davidson Bank	47	46	20.30	27,774	19,620	35,928
Shumagin	1 - 100	Fox Islands	19	19	19.047	15,871	8,537	23,205
Chirikof	1 - 100	Semidi Bank	24	24	17.996	13,141	6,427	19,855
Kodiak	1 - 100	Northern Kodiak Shallows	8	8	15.205	3,345	1,731	4,959
Shumagin	101 - 200	Sanak Gully	6	6	13.167	5,590	0	13,140
Yakutat	101 - 200	Yakataga Shelf	9	6	12.521	6,607	0	15,152
Southeastern	101 - 200	Prince of Wales Shelf	15	8	11.501	7,922	0	15,931
Chirikof	101 - 200	Shelikof Edge	27	23	11.45	8,855	1,862	15,848
Chirikof	101 - 200	East Shumagin Gully	19	18	11.41	12,666	4,822	20,510
Yakutat	201 - 300	Yakutat Slope	8	6	11.40	2,425	524	4,326
Kodiak	101 - 200	Portlock Flats	35	28	10.77	7,899	2,101	13,698
Shumagin	101 - 200	Shumagin Outer Shelf	30	25	10.70	8,721	52	17,389
Yakutat	101 - 200	Yakutat Flats	7	6	9.11	8,231	1,830	14,632
Kodiak	101 - 200	Albatross Gullies	26	21	8.93	7,067	2,751	11,383
Shumagin	101 - 200	West Shumagin Gully	4	4	8.689	1,980	0	4,517
Kodiak	101 - 200	Kodiak Outer Shelf	27	25	7.447	3,743	2,482	5,004
Yakutat	1 - 100	Yakutat Shallows	11	11	6.131	6,099	2,577	9,620
Chirikof	101 - 200	Chirikof Outer Shelf	26	20	5.41	2,713	1,491	3,935
Kodiak	101 - 200	Barren Islands	18	15	5.35	5,879	3,130	8,628
Shumagin	201 - 300	Shumagin Slope	17	12	3.78	1,054	360	1,749
Kodiak	101 - 200	Kenai Flats	19	13	3.56	4,297	1,615	6,978
Chirikof	201 - 300	Lower Shelikof Gully	17	9	3.53	3,533	1,037	6,029
Yakutat	301 - 500	Yakutat Slope	6	3	2.57	391	0	964
Kodiak	201 - 300	Upper Shelikof Gully	4	3	2.55	818	0	1,944
Chirikof	301 - 500	Chirikof Slope	7	3	2.34	375	0	954
Chirikof	201 - 300	Chirikof Slope	8	4	2.148	328	0	687
Yakutat	101 - 200	Middleton Shelf	10	7	1.969	1,446	576	2,317
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	6	1.92	804	0	1,663
Kodiak	201 - 300	Kodiak Slope	7	3	1.68	272	0	618
Chirikof	501 - 700	Chirikof Slope	5	2	1.42	278	0	753
Kodiak	301 - 500	Kodiak Slope	16	4	1.10	321	2	640
Kodiak	201 - 300	Kenai Gullies	20	5	0.98	653	16	1,291
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	4	0.75	296	0	625
Southeastern	301 - 500	Southeastern Slope	7	1	0.32	25	0	86
Southeastern	201 - 300	Baranof-Chichagof Slope	5	1	0.307	35	0	130
Yakutat	201 - 300	Yakutat Gullies	9	1	0.208	63	0	209
Shumagin	301 - 500	Shumagin Slope	7	1	0.1	25	0	87

Flathead sole (*Hippoglossoides elassodon*)

Flathead sole was the seventh most abundant species caught in the 2009 survey (Table 2). The population was primarily concentrated in bays around Kodiak Island and along the Alaska Peninsula, with 97% of the estimated biomass in waters less than 200 m deep and the remainder at depths between 201 and 300 m (Fig. 6 and Tables 7-8). Although the mean CPUE was considerably higher in the lower Alaska Peninsula and Northern Kodiak shallows than in any of the other strata, the biomass of flathead sole was not predominant in any individual stratum. Only about 7% of the estimated biomass was found in the Yakutat and Southeastern INPFC areas even though those areas account for 27% of the total survey area. The mean weight of flathead sole did not exhibit a consistent correlation with depth among the individual INPFC areas, but over the entire survey area the mean weight increased somewhat with increasing depth (Table 7). The length frequency data did not exhibit a consistent length mode for either males or females in the different INPFC areas or depth ranges. However, a distinct length mode for females around 38 cm occurred in the less than 100 m and 201 to 300 m depth ranges in the Chirikof INPFC area, as well as in the 201-300 m depth range in the Kodiak INPFC area. A distinct mode for males at 35 cm occurred in the 101-200 m depth range in the Chirikof and Kodiak INPFC areas (Fig. 7). The sex ratio for flathead sole was even, with males accounting for approximately 49% of the population.

Table 7. -- Number of survey hauls, number of hauls with flathead sole, mean CPUE, biomass, and mean weight, based on the 2009 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	127	100	16.50	68,139	35,679	100,599	0.277
	101 - 200	40	24	8.05	11,814	1,560	22,067	0.232
	201 - 300	17	7	0.58	163	48	278	0.249
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	131	12.28	80,115	46,434	113,796	0.269
Chirikof	1 - 100	78	43	13.50	35,137	3,721	66,553	0.421
	101 - 200	72	59	11.56	27,561	17,471	37,651	0.351
	201 - 300	25	19	2.43	2,807	309	5,306	0.452
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	121	9.63	65,505	32,836	98,175	0.39
Kodiak	1 - 100	100	51	6.60	25,438	14,443	36,432	0.29
	101 - 200	125	85	8.05	34,870	25,942	43,798	0.336
	201 - 300	31	18	2.70	3,097	0	6,323	0.363
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	154	6.25	63,405	49,167	77,644	0.317
Yakutat	1 - 100	19	13	2.00	3,324	388	6,261	0.265
	101 - 200	36	20	2.06	6,048	0	13,363	0.31
	201 - 300	17	6	0.17	86	0	176	0.341
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	39	1.65	9,458	1,876	17,039	0.293
Southeastern	1 - 100	11	3	10.37	6,786	0	16,410	0.145
	101 - 200	26	6	0.09	103	0	258	0.157
	201 - 300	19	1	0.01	5	0	14	0.397
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	10	2.46	6,894	0	16,519	0.145
All areas	1 - 100	335	210	10.76	138,824	91,912	185,737	0.291
	101 - 200	299	194	6.57	80,395	63,208	97,583	0.317
	201 - 300	109	51	1.71	6,157	2,556	9,759	0.393
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	455	7.04	225,377	175,797	274,957	0.302

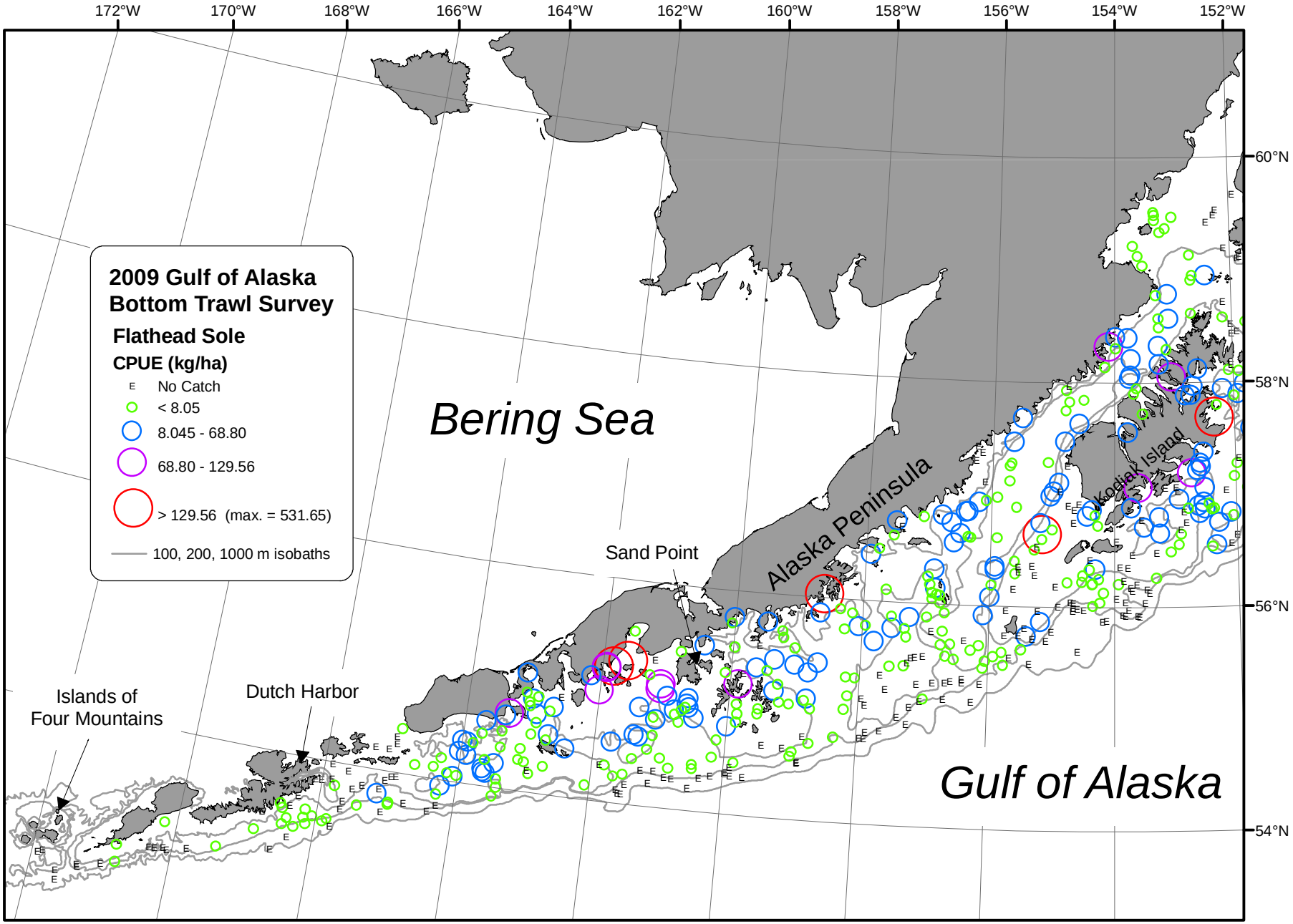

Figure 6. -- Distribution and relative abundance of a flathead sole from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

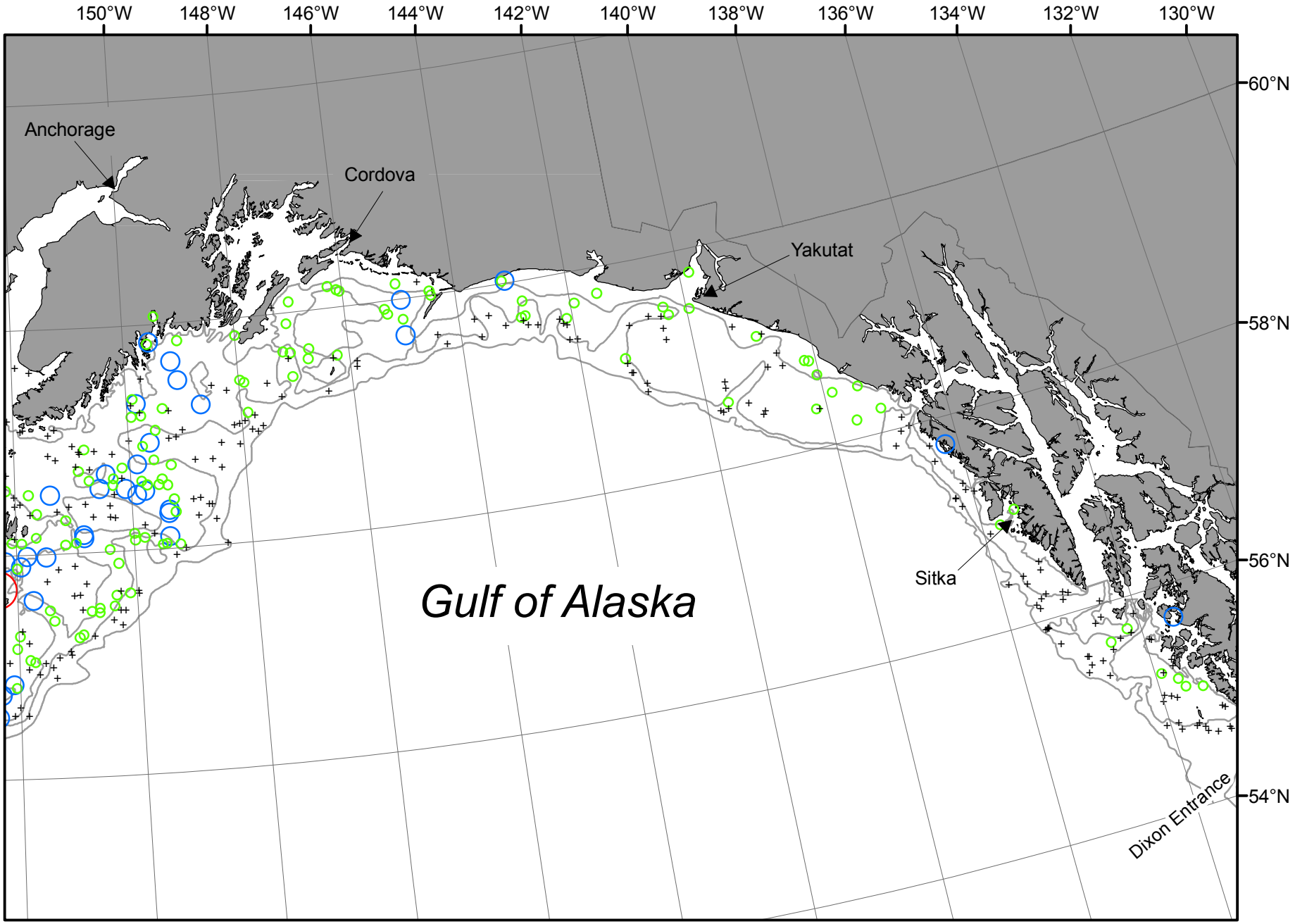

Figure 6. -- Continued (flathead sole).

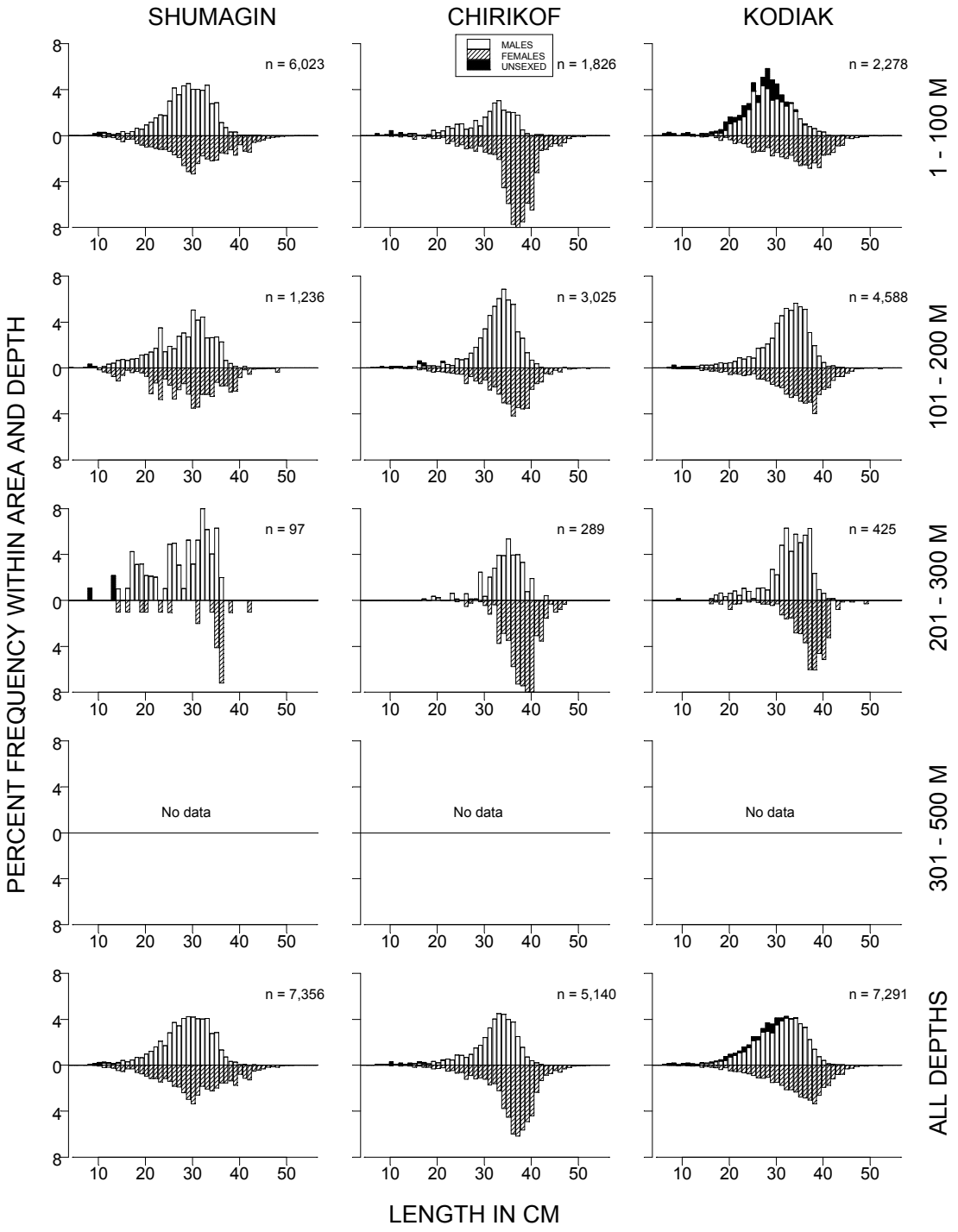

Figure 7. -- Size composition of flathead sole from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

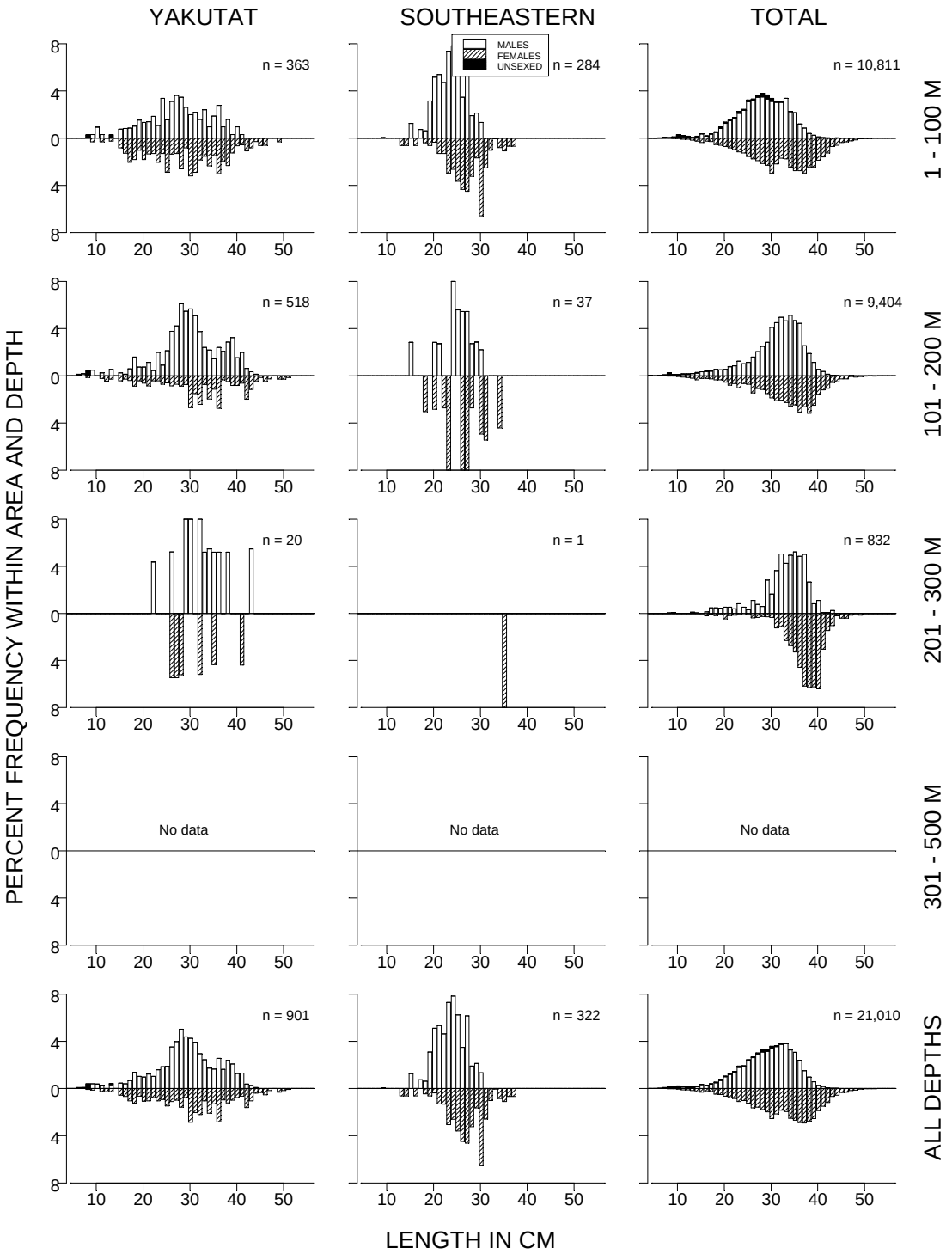

Figure 7. -- Continued (flathead sole).

Table 8. -- Catch per unit of effort by stratum for flathead sole sorted by descending CPUE for the 2009 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	26	23	49.88	34,296	3,845	64,746
Kodiak	1 - 100	Northern Kodiak Shallows	8	8	36.42	8,012	720	15,304
Kodiak	1 - 100	Albatross Shallows	28	18	24.90	14,356	5,366	23,346
Shumagin	101 - 200	West Shumagin Gully	4	4	20.17	4,595	0	11,932
Chirikof	1 - 100	Upper Alaska Peninsula	17	11	19.04	15,123	0	30,878
Chirikof	1 - 100	Chirikof Bank	37	18	17.61	19,004	0	46,872
Shumagin	1 - 100	Shumagin Bank	35	31	17.35	21,506	10,160	32,851
Kodiak	101 - 200	Albatross Gullies	26	26	16.85	13,328	8,742	17,914
Chirikof	101 - 200	Shelikof Edge	27	27	16.14	12,482	8,036	16,927
Shumagin	101 - 200	Sanak Gully	6	6	14.83	6,295	0	16,021
Chirikof	101 - 200	East Shumagin Gully	19	19	13.33	14,796	5,615	23,978
Southeastern	1 - 100	Southeastern Shallows	11	3	10.37	6,786	0	16,528
Shumagin	1 - 100	Davidson Bank	47	41	8.828	12,078	6,170	17,986
Yakutat	101 - 200	Middleton Shelf	10	10	7.947	5,838	0	13,262
Kodiak	101 - 200	Barren Islands	18	14	7.875	8,647	4,214	13,080
Kodiak	201 - 300	Upper Shelikof Gully	4	4	6.136	1,969	0	5,714
Kodiak	101 - 200	Portlock Flats	35	23	6.095	4,472	2,188	6,755
Kodiak	101 - 200	Kenai Flats	19	12	6.066	7,326	1,238	13,414
Chirikof	201 - 300	Lower Shelikof Gully	17	15	2.74	2,747	237	5,257
Yakutat	1 - 100	Middleton Shallows	8	6	2.21	1,481	118	2,844
Kodiak	101 - 200	Kodiak Outer Shelf	27	10	2.18	1,098	0	2,547
Yakutat	1 - 100	Yakutat Shallows	11	7	1.85	1,843	0	4,610
Kodiak	201 - 300	Kenai Gullies	20	11	1.60	1,067	162	1,973
Chirikof	1 - 100	Semidi Bank	24	14	1.38	1,010	196	1,824
Kodiak	1 - 100	Albatross Banks	40	13	1.28	1,977	283	3,672
Kodiak	1 - 100	Kenai Peninsula	9	3	1.17	616	0	1,584
Shumagin	101 - 200	Shumagin Outer Shelf	30	14	1.13	924	153	1,695
Shumagin	201 - 300	Shumagin Slope	17	7	0.58	163	47	278
Chirikof	101 - 200	Chirikof Outer Shelf	26	13	0.56	283	78	487
Kodiak	1 - 100	Lower Cook Inlet	15	9	0.48	477	116	837
Chirikof	201 - 300	Chirikof Slope	8	4	0.40	61	0	123
Kodiak	201 - 300	Kodiak Slope	7	3	0.38	61	0	150
Shumagin	1 - 100	Fox Islands	19	5	0.31	260	0	725
Yakutat	201 - 300	Yakutat Gullies	9	4	0.26	78	0	170
Yakutat	101 - 200	Yakataga Shelf	9	3	0.23	123	0	288
Southeastern	101 - 200	Prince of Wales Shelf	15	5	0.13	87	0	240
Yakutat	101 - 200	Fairweather Shelf	10	6	0.10	80	0	205
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	1	0.04	16	0	51
Yakutat	201 - 300	Yakutat Slope	8	2	0.04	8	0	20
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	1	0.01	5	0	14
Yakutat	101 - 200	Yakutat Flats	7	1	0.01	7	0	26

Southern rock sole (*Lepidopsetta bilineata*)

Southern rock sole was the ninth most abundant species caught in the 2009 survey (Table 2). The population was primarily confined to water depths less than 100 m in the Shumagin, Chirikof, and Kodiak INPFC areas, with the highest concentrations in bays around Kodiak Island and around the Shumagin Islands (Table 10 and Fig. 8). Ninety-six percent of the southern rock sole biomass occurred in these areas even though they make up only 33% of the total survey area (Table 9). The CPUEs ranged from zero to very small throughout the Yakutat and Southeastern areas except for two locations in the Southeastern Shallows off of Sitka and off the northern end of Chicagof Island, where relatively high abundances were found. A relatively prominent length mode around 30 cm for males occurred in the shallowest depth zone of the Kodiak INPFC area and at 42-45 cm for females in the Shumagin and Kodiak INPFC areas (Fig. 9). The southern rock sole population in the survey area was dominated by females, which accounted for approximately 70% of the total estimated population.

Table 9. -- Number of survey hauls, number of hauls with southern rock sole, mean CPUE, biomass, and mean weight, based on the 2009 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	127	113	19.54	80,675	53,953	107,397	0.636
	101 - 200	40	22	1.39	2,041	1,014	3,068	0.745
	201 - 300	17	1	0.02	5	0	14	0.338
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	136	12.68	82,720	55,978	109,461	0.639
Chirikof	1 - 100	78	61	19.24	50,100	17,619	82,582	0.777
	101 - 200	72	14	0.11	256	100	413	0.734
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	75	7.40	50,357	17,875	82,838	0.777
Kodiak	1 - 100	100	81	13.76	52,999	33,967	72,031	0.546
	101 - 200	125	25	0.29	1,273	486	2,060	0.812
	201 - 300	31	1	0.01	6	0	20	0.328
	301 - 500	16	1	0.04	12	0	38	0.818
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	108	5.35	54,291	35,243	73,339	0.55
Yakutat	1 - 100	19	3	0.23	384	0	946	1.077
	101 - 200	36	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	3	0.07	384	0	946	1.077
Southeastern	1 - 100	11	8	5.67	3,714	0	8,868	0.583
	101 - 200	26	6	0.27	299	26	572	0.391
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	14	1.43	4,013	0	9,175	0.563
All areas	1 - 100	335	266	14.56	187,873	142,235	233,511	0.637
	101 - 200	299	67	0.32	3,869	2,562	5,176	0.714
	201 - 300	109	2	---	10	0	26	0.332
	301 - 500	52	1	0.01	12	0	38	0.818
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	336	5.99	191,765	146,107	237,422	0.638

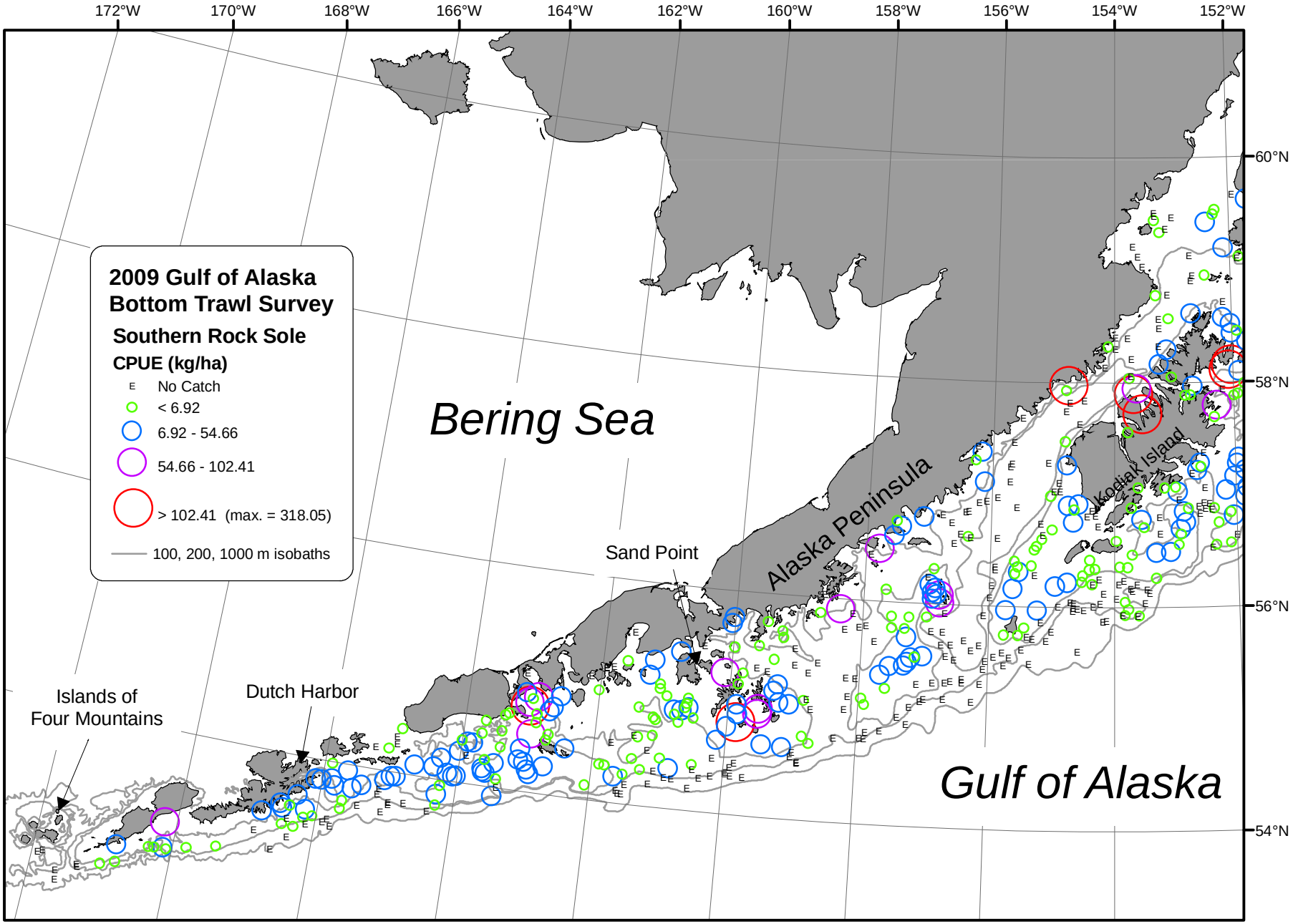

Figure 8. -- Distribution and relative abundance of a southern rock sole from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

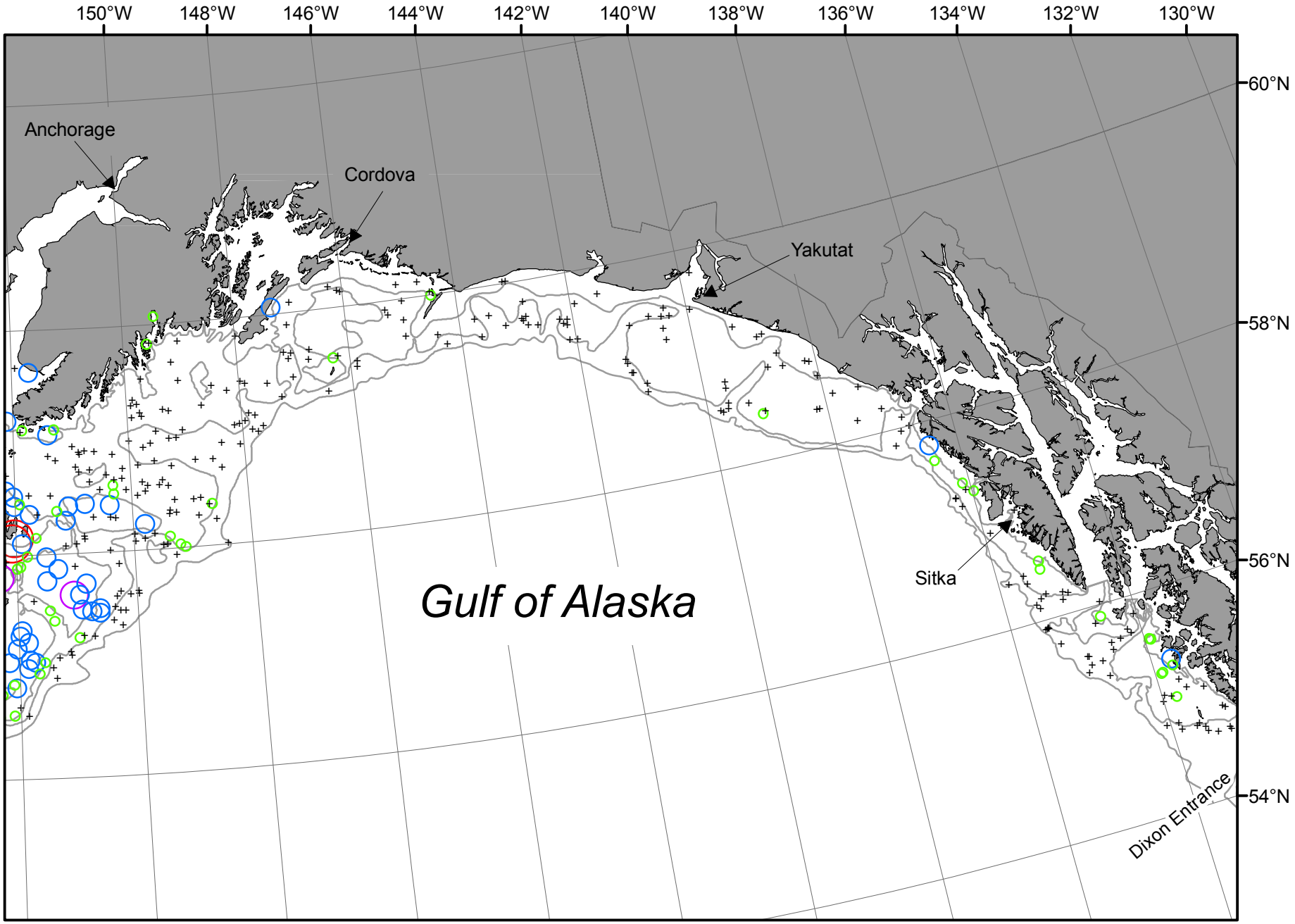

Figure 8. -- Continued (southern rock sole).

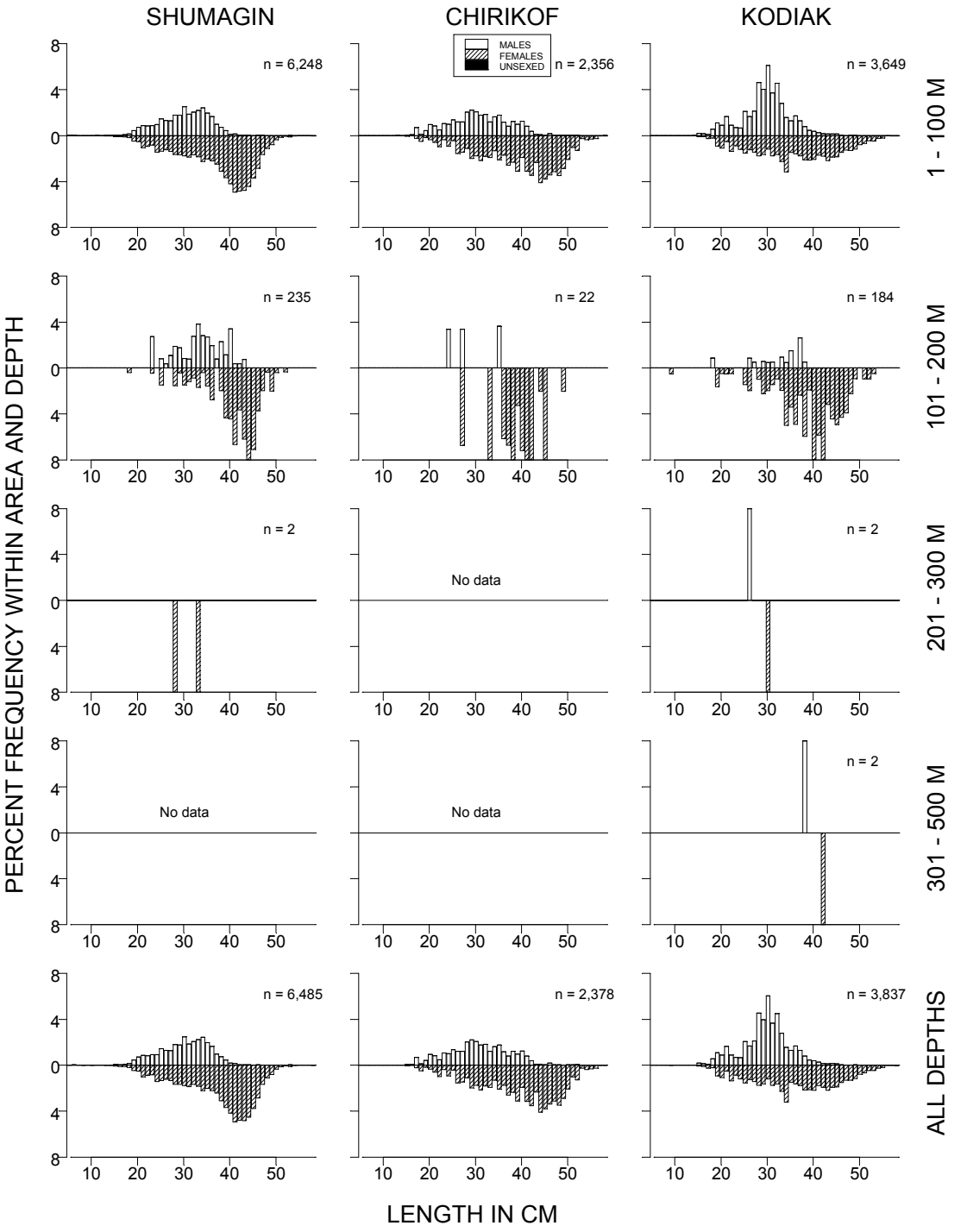

Figure 9. -- Size composition of southern rock sole from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

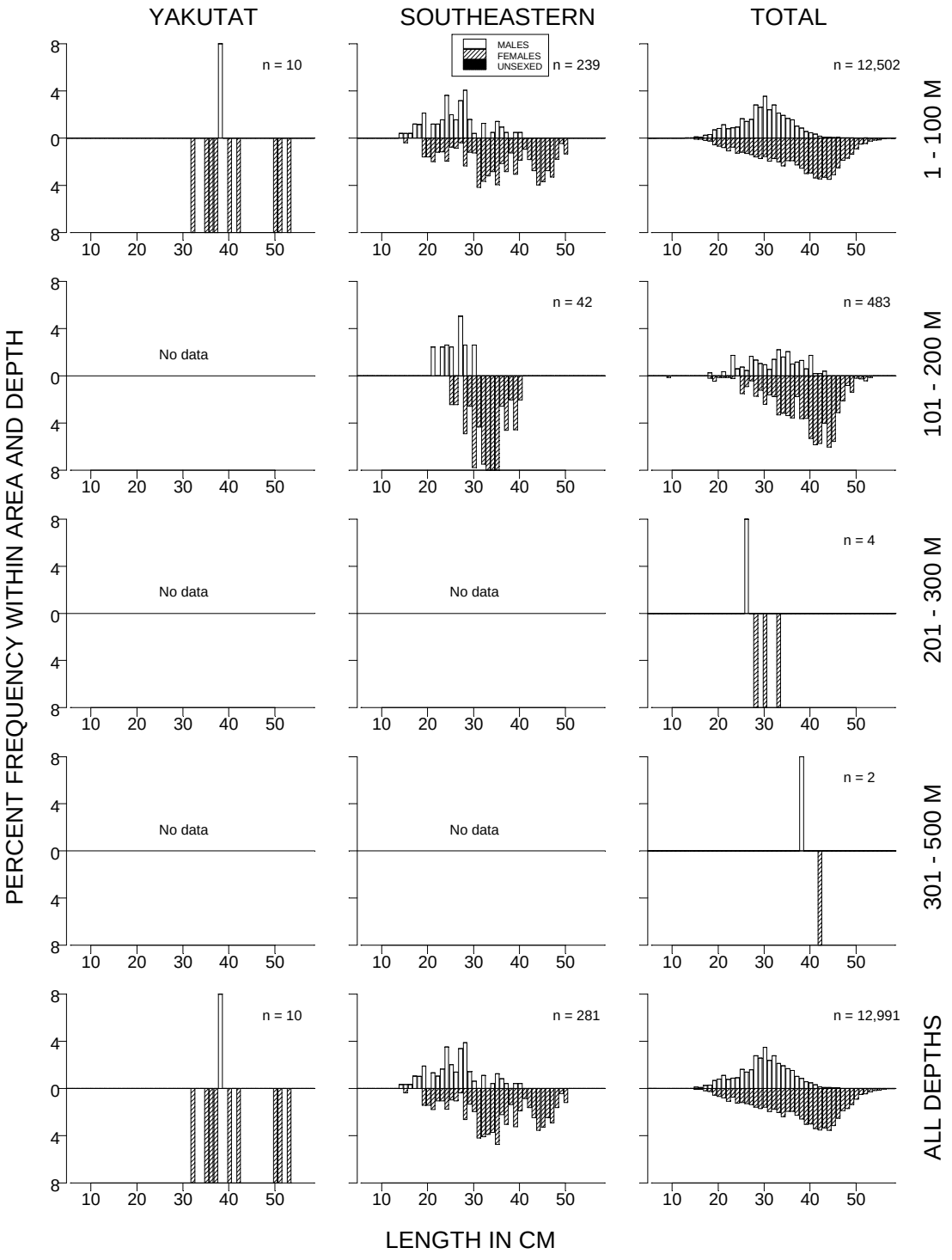

Figure 9. -- Continued (southern rock sole).

Table 10. -- Catch per unit of effort by stratum for southern rock sole sorted by descending CPUE for the 2009 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	8	8	72.62	15,973	0	34,297
Chirikof	1 - 100	Upper Alaska Peninsula	17	13	36.62	29,078	0	60,743
Shumagin	1 - 100	Shumagin Bank	35	34	26.70	33,109	9,431	56,787
Shumagin	1 - 100	Lower Alaska Peninsula	26	18	20.44	14,054	5,471	22,637
Kodiak	1 - 100	Albatross Shallows	28	25	20.35	11,736	4,711	18,761
Shumagin	1 - 100	Fox Islands	19	18	20.12	16,762	8,900	24,623
Chirikof	1 - 100	Semidi Bank	24	21	17.59	12,843	6,081	19,606
Shumagin	1 - 100	Davidson Bank	47	43	12.24	16,751	10,686	22,815
Kodiak	1 - 100	Albatross Banks	40	35	11.46	17,657	11,960	23,353
Chirikof	1 - 100	Chirikof Bank	37	27	7.58	8,179	3,511	12,847
Kodiak	1 - 100	Kenai Peninsula	9	6	7.11	3,738	0	10,082
Southeastern	1 - 100	Southeastern Shallows	11	8	5.67	3,714	0	8,931
Kodiak	1 - 100	Lower Cook Inlet	15	7	3.94	3,896	0	7,882
Shumagin	101 - 200	Shumagin Outer Shelf	30	18	2.326	1,896	877	2,916
Kodiak	101 - 200	Kodiak Outer Shelf	27	11	1.686	847	110	1,585
Yakutat	1 - 100	Middleton Shallows	8	2	0.424	285	0	847
Shumagin	101 - 200	Sanak Gully	6	3	0.333	142	0	315
Southeastern	101 - 200	Prince of Wales Shelf	15	3	0.31	216	0	475
Kodiak	101 - 200	Portlock Flats	35	4	0.25	183	0	448
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	3	0.20	83	0	186
Kodiak	101 - 200	Albatross Gullies	26	7	0.19	147	36	258
Chirikof	101 - 200	East Shumagin Gully	19	5	0.14	159	19	299
Yakutat	1 - 100	Yakutat Shallows	11	1	0.10	100	0	322
Kodiak	101 - 200	Barren Islands	18	3	0.09	96	0	214
Chirikof	101 - 200	Shelikof Edge	27	7	0.08	65	17	114
Chirikof	101 - 200	Chirikof Outer Shelf	26	2	0.06	32	0	86
Kodiak	301 - 500	Kodiak Slope	16	1	0.04	12	0	39
Kodiak	201 - 300	Kodiak Slope	7	1	0.036	6	0	20
Shumagin	201 - 300	Shumagin Slope	17	1	0.016	5	0	14
Shumagin	101 - 200	West Shumagin Gully	4	1	0.01	3	0	11

Northern rock sole (*Lepidopsetta polyxystra*)

The northern rock sole population was almost exclusively confined to depths less than 100 m in the Shumagin, Chirikof, and Kodiak INPFC areas, where approximately 98% of the total biomass was found (Tables 11-12 and Fig. 10). Northern rock sole were extremely rare east of 150ºW (Fig. 10). Approximately 57% 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 94% of the tows in this area and depth range. A very distinct length mode around 28 cm occurred for males at depths less than 100 m in the Shumagin INPFC area. An equally distinct length mode around 40 cm at depths between 101 and 200 m occurred for females in the same INPFC area (Fig. 11). No prononounced length modes occurred in the Chirikof and Kodiak areas for either males or females. Females were considerably more abundant in the survey area and accounted for approximately 59% of the northern rock sole population.

Table 11. -- Number of survey hauls, number of hauls with northern rock sole, mean CPUE, biomass, and mean weight, based on the 2009 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	127	119	13.13	54,229	28,666	79,792	0.303
	101 - 200	40	21	1.33	1,956	1,103	2,809	0.589
	201 - 300	17	1	< 0.01	1	0	3	0.124
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	141	8.61	56,186	30,609	81,762	0.308
Chirikof	1 - 100	78	62	---	18,621	5,953	31,289	0.522
	101 - 200	72	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	62	2.74	18,621	5,953	31,289	0.522
Kodiak	1 - 100	100	69	5.45	20,974	6,096	35,852	0.542
	101 - 200	125	5	0.01	41	0	86	0.883
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	74	2.07	21,014	6,136	35,893	0.543
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	0	---	---	---	---	---
Southeastern	1 - 100	11	1	0.04	25	0	80	0.318
	101 - 200	26	0	---	---	---	---	---
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	1	0.01	25	0	80	0.318
All areas	1 - 100	335	251	7.27	93,849	62,045	125,652	0.37
	101 - 200	299	26	0.16	1,997	1,142	2,851	0.593
	201 - 300	109	1	---	1	0	3	0.124
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	278	3.00	95,846	64,032	127,660	0.373

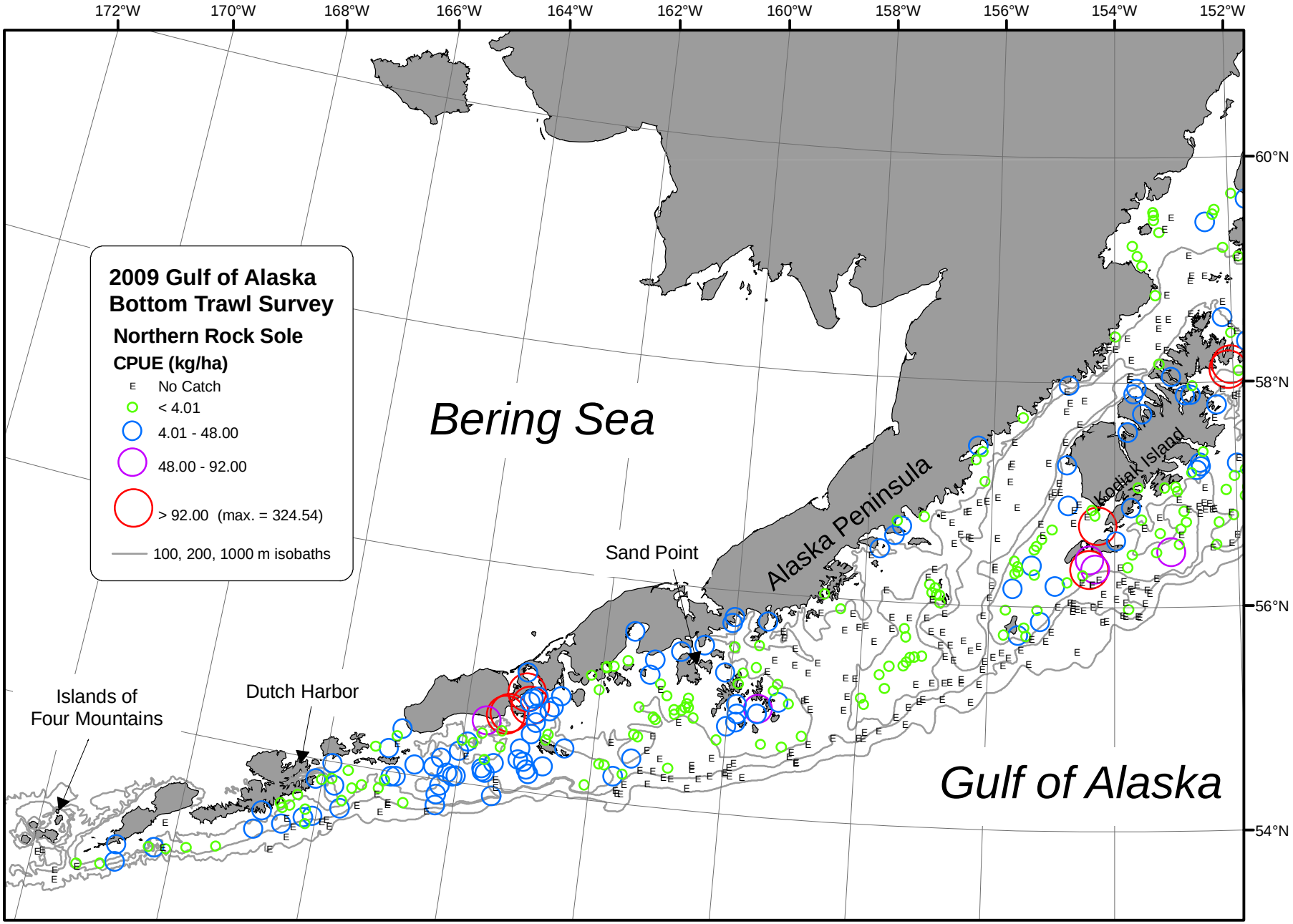

Figure 10. -- Distribution and relative abundance of a northern rock sole from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

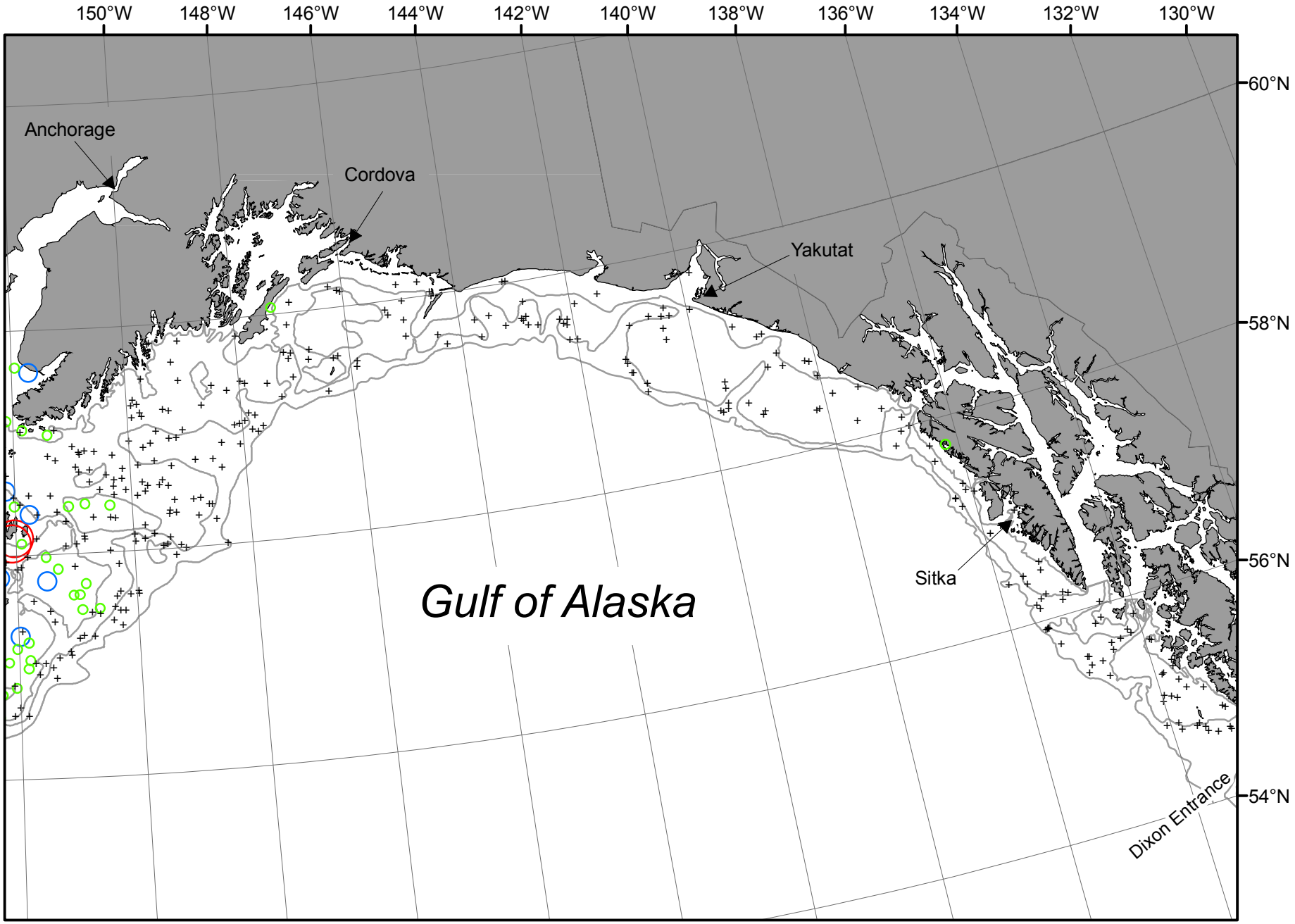

Figure 10. -- Continued (northern rock sole).

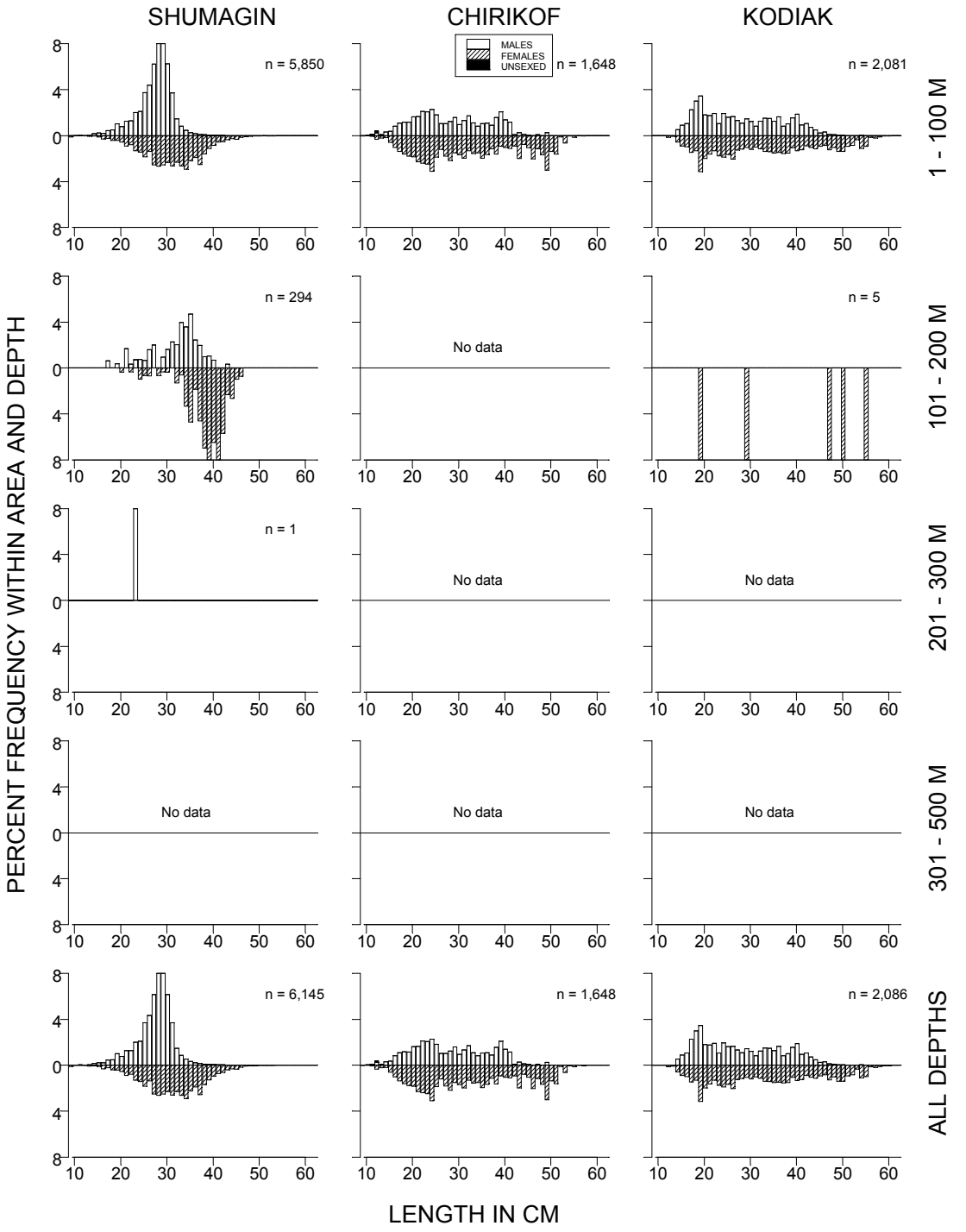

Figure 11. -- Size composition of northern rock sole from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

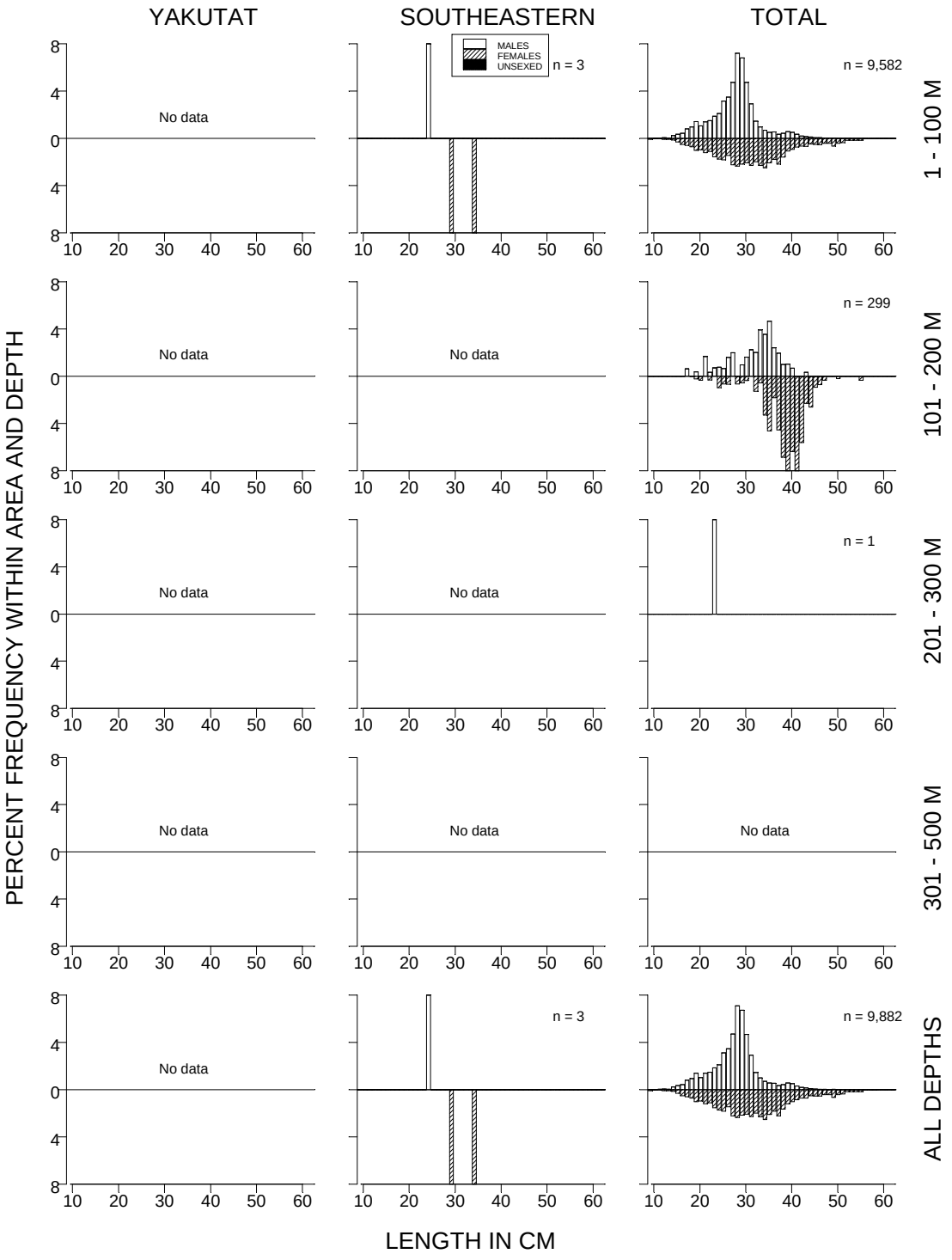

Figure 11. -- Continued (northern rock sole).

Table 12. -- Catch per unit of effort by stratum for northern rock sole sorted by descending CPUE for the 2009 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	26	25	26.92	18,507	1,470	35,544
Kodiak	1 - 100	Albatross Shallows	28	21	22.21	12,805	0	26,893
Shumagin	1 - 100	Davidson Bank	47	43	16.53	22,618	3,771	41,465
Chirikof	1 - 100	Chirikof Bank	37	29	13.24	14,288	1,780	26,796
Shumagin	1 - 100	Shumagin Bank	35	33	6.57	8,141	3,469	12,814
Kodiak	1 - 100	Northern Kodiak Shallows	8	7	6.15	1,352	552	2,153
Shumagin	1 - 100	Fox Islands	19	18	5.96	4,963	1,471	8,454
Chirikof	1 - 100	Upper Alaska Peninsula	17	15	5.00	3,967	1,153	6,780
Kodiak	1 - 100	Lower Cook Inlet	15	13	2.90	2,863	0	5,797
Kodiak	1 - 100	Albatross Banks	40	25	2.50	3,856	0	8,948
Shumagin	101 - 200	Shumagin Outer Shelf	30	19	2.34	1,907	1,058	2,756
Chirikof	1 - 100	Semidi Bank	24	18	0.50	366	176	556
Kodiak	1 - 100	Kenai Peninsula	9	3	0.185	98	0	235
Shumagin	101 - 200	Sanak Gully	6	1	0.106	45	0	160
Southeastern	1 - 100	Southeastern Shallows	11	1	0.038	25	0	81
Kodiak	101 - 200	Albatross Gullies	26	2	0.03	25	0	63
Kodiak	101 - 200	Kodiak Outer Shelf	27	3	0.03	15	0	41
Shumagin	101 - 200	West Shumagin Gully	4	1	0.02	4	0	17
Shumagin	201 - 300	Shumagin Slope	17	1	0.00	1	0	3

Rex sole (*Glyptocephalus zachirus*)

The rex sole population was widely distributed throughout the survey area, occurring in 52 of the 54 strata shallower than 700 m deep. No catches were recorded in the 701 to 1,000 m strata (Fig. 12 and Tables 13-14). Although large catches of rex sole were rare, rex sole were present in approximately 88% of the tows between 101 and 500 m (Table 13). The mean weight of rex sole was substantially greater in the three westernmost INPFC areas than in the Yakutat and Southeastern INPFC areas. The length frequency data did not exhibit a consistent length mode for either males or females in the different INPFC areas or depth ranges. A much higher fraction of large fish (greater than 40 cm FL) of both sexes occurred in the Shumagin, Chirikof, and Kodiak INPFC areas than in the Yakutat and Southeastern INPFC areas. A relatively distinct length mode around 32 cm FL occurred in the depth zones deeper than 100 m for both males and females in the Southeastern INPFC area. Females in the 301-500 m depth zone of this area, however, were slightly larger, with a mode of approximately 38 cm (Fig. 13). The sex ratio for rex sole was almost exactly even.

Table 13. -- Number of survey hauls, number of hauls with rex sole, mean CPUE, biomass, and mean weight, based on the 2009 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	127	64	0.98	4,065	2,035	6,095	0.333
	101 - 200	40	33	9.11	13,375	8,293	18,456	0.372
	201 - 300	17	15	7.05	1,964	855	3,074	0.34
	301 - 500	7	6	1.49	376	77	675	0.501
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	118	3.03	19,780	14,270	25,291	0.362
Chirikof	1 - 100	78	32	1.90	4,942	2,186	7,698	0.403
	101 - 200	72	69	12.78	30,471	19,621	41,321	0.355
	201 - 300	25	24	13.13	15,163	6,845	23,481	0.396
	301 - 500	7	7	2.29	368	96	639	0.324
	501 - 700	5	2	0.55	107	0	322	0.382
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	134	7.50	51,050	37,435	64,664	0.37
Kodiak	1 - 100	100	24	0.93	3,591	721	6,461	0.314
	101 - 200	125	104	5.14	22,278	15,434	29,122	0.366
	201 - 300	31	31	3.57	4,105	2,056	6,153	0.247
	301 - 500	16	15	3.31	964	370	1,557	0.301
	501 - 700	4	2	0.60	104	0	279	0.221
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	176	3.06	31,041	23,398	38,685	0.335
Yakutat	1 - 100	19	15	1.16	1,929	523	3,336	0.146
	101 - 200	36	26	2.08	6,113	0	15,007	0.232
	201 - 300	17	17	4.77	2,469	935	4,002	0.217
	301 - 500	8	8	1.26	330	103	557	0.129
	501 - 700	2	2	3.25	477	415	539	0.211
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	68	1.98	11,318	2,286	20,350	0.203
Southeastern	1 - 100	11	6	2.28	1,490	0	4,068	0.183
	101 - 200	26	21	6.70	7,426	2,256	12,595	0.208
	201 - 300	19	18	2.64	1,332	617	2,046	0.201
	301 - 500	14	13	3.02	942	0	2,163	0.274
	501 - 700	2	2	3.54	366	340	392	0.271
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	60	4.12	11,555	5,760	17,349	0.209
All areas	1 - 100	335	141	1.24	16,017	10,914	21,120	0.28
	101 - 200	299	253	6.51	79,662	62,993	96,331	0.325
	201 - 300	109	105	6.94	25,032	16,275	33,790	0.318
	301 - 500	52	49	2.33	2,980	1,641	4,318	0.269
	501 - 700	16	8	1.28	1,054	814	1,293	0.242
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	556	3.90	124,744	105,529	143,960	0.315

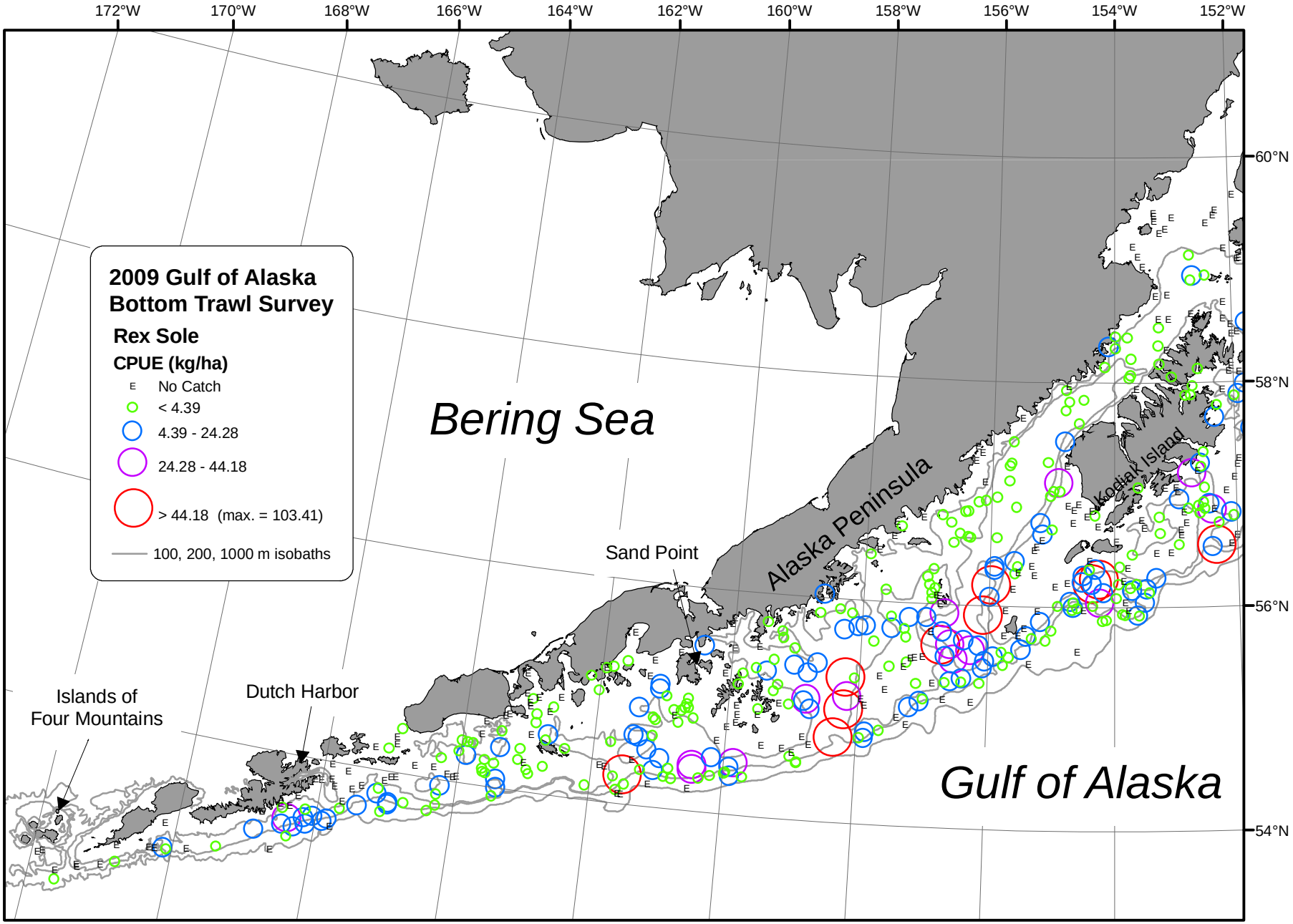

Figure 12. -- Distribution and relative abundance of a rex sole from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

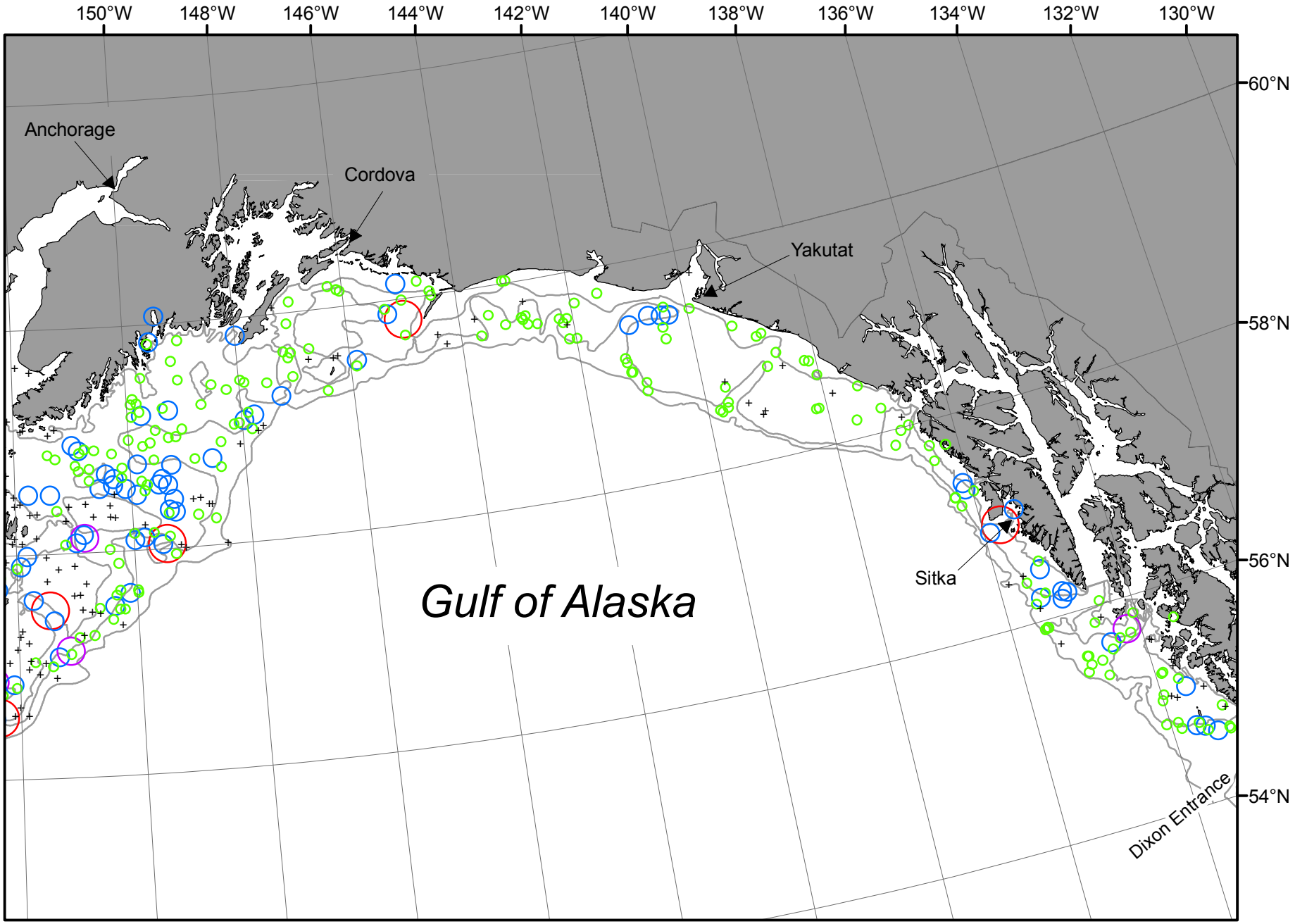

Figure 12. -- Continued (rex sole).

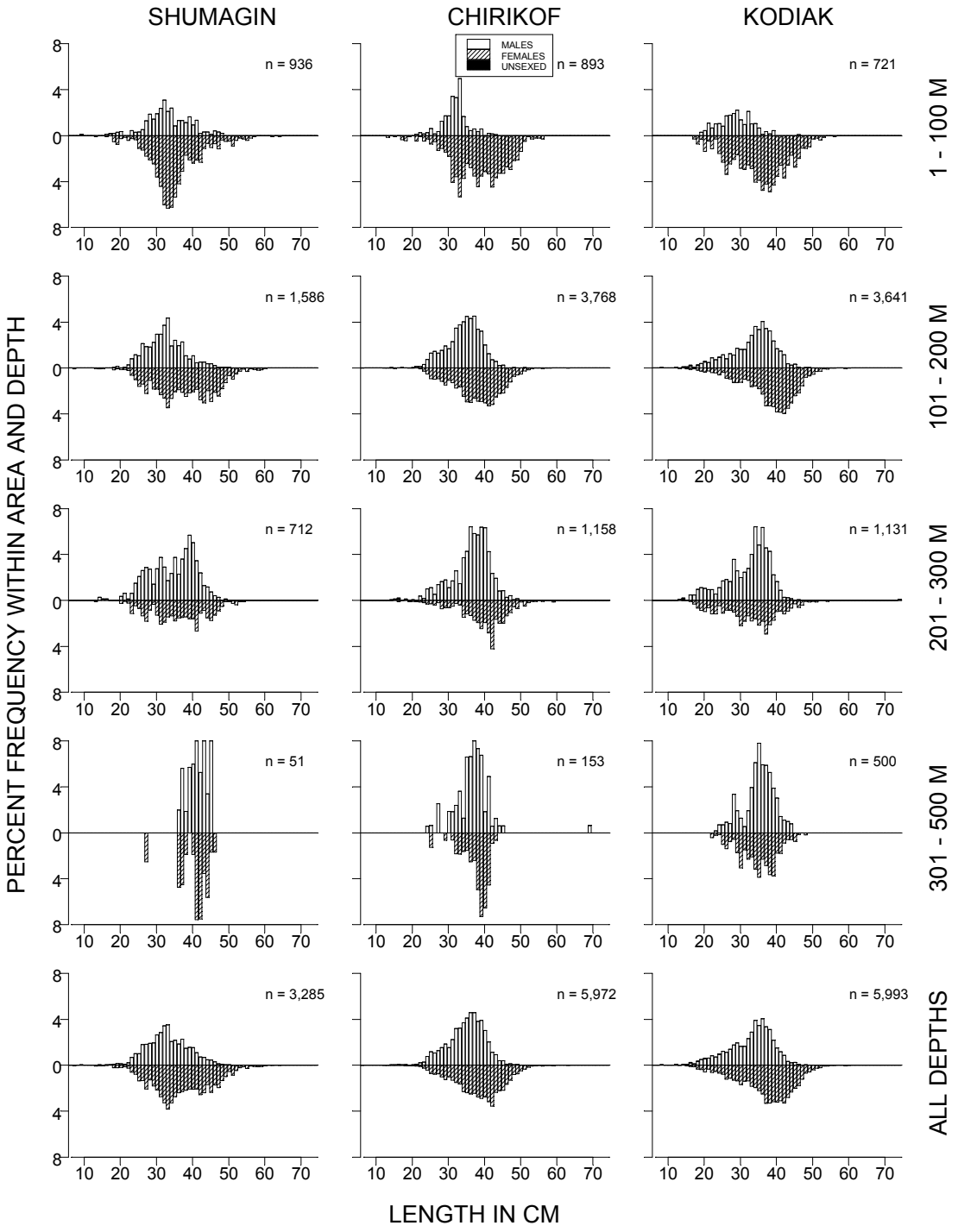

Figure 13. -- Size composition of rex sole from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

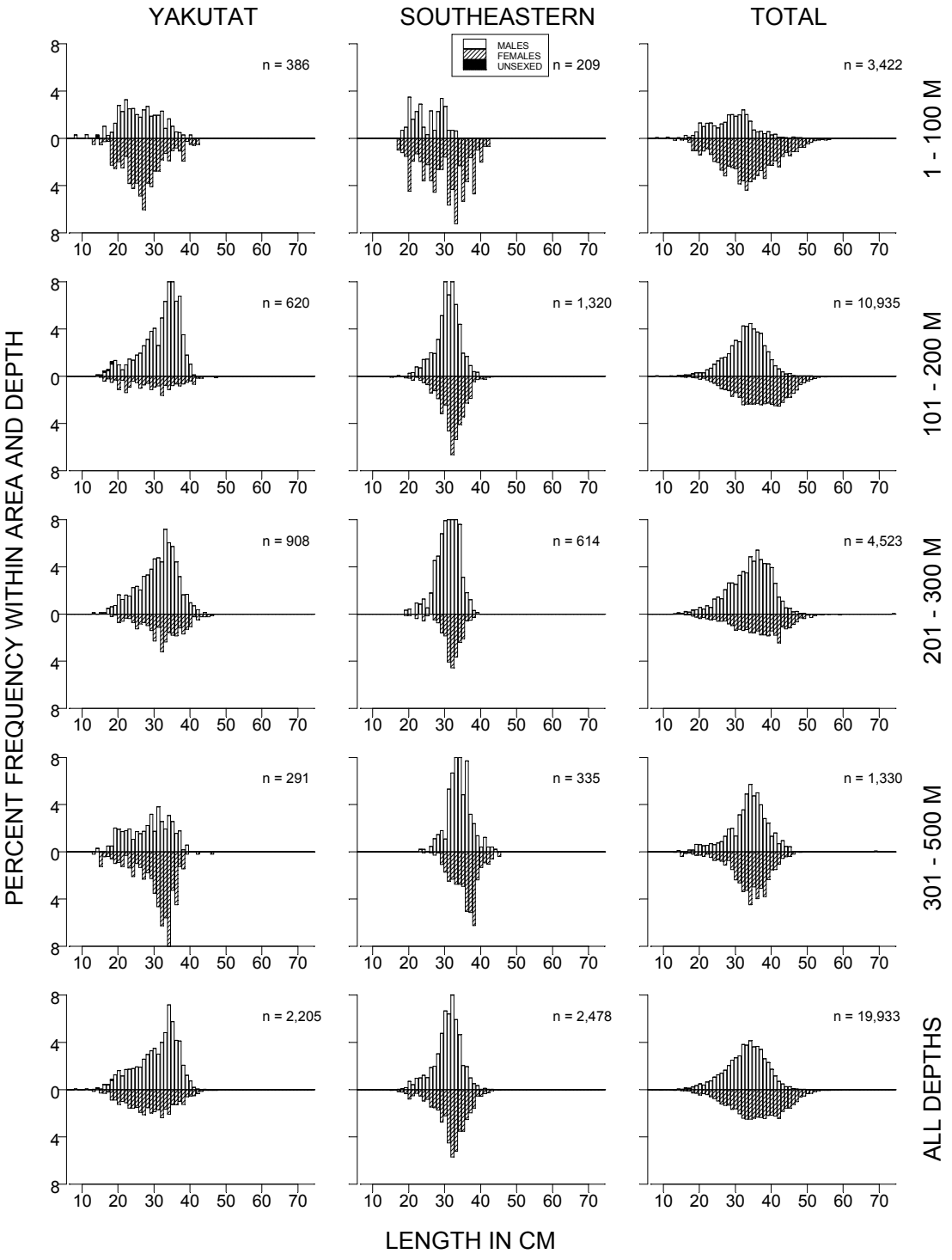

Figure 13. -- Continued (rex sole).

Table 14. -- Catch per unit of effort by stratum for rex sole sorted by descending CPUE for the 2009 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	17	16	13.51	13,534	5,432	21,637
Chirikof	101 - 200	East Shumagin Gully	19	19	13.39	14,864	6,213	23,515
Chirikof	101 - 200	Chirikof Outer Shelf	26	23	12.61	6,319	2,735	9,903
Chirikof	101 - 200	Shelikof Edge	27	27	12.01	9,288	3,481	15,095
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	10	11.01	4,619	770	8,468
Chirikof	201 - 300	Chirikof Slope	8	8	10.66	1,628	0	3,912
Shumagin	101 - 200	Shumagin Outer Shelf	30	23	9.90	8,074	4,001	12,146
Kodiak	101 - 200	Albatross Gullies	26	24	9.80	7,752	3,240	12,264
Shumagin	101 - 200	Sanak Gully	6	6	9.44	4,008	381	7,636
Kodiak	101 - 200	Kodiak Outer Shelf	27	17	8.71	4,376	0	8,803
Kodiak	201 - 300	Kodiak Slope	7	7	8.69	1,409	127	2,691
Yakutat	101 - 200	Middleton Shelf	10	8	7.06	5,183	0	14,181
Shumagin	201 - 300	Shumagin Slope	17	15	7.046	1,964	850	3,079
Yakutat	201 - 300	Yakutat Gullies	9	9	6.364	1,936	407	3,466
Kodiak	101 - 200	Portlock Flats	35	31	6.039	4,430	2,979	5,882
Shumagin	101 - 200	West Shumagin Gully	4	4	5.674	1,293	0	2,626
Southeastern	201 - 300	Baranof-Chichagof Slope	5	4	4.412	497	0	1,225
Southeastern	101 - 200	Prince of Wales Shelf	15	11	4.075	2,807	0	6,710
Southeastern	301 - 500	Southeastern Deep Gullies	7	7	3.80	891	0	2,152
Southeastern	501 - 700	Southeastern Slope	2	2	3.54	366	289	442
Kodiak	1 - 100	Kenai Peninsula	9	4	3.46	1,819	0	4,386
Kodiak	201 - 300	Kenai Gullies	20	20	3.40	2,267	516	4,019
Kodiak	301 - 500	Kodiak Slope	16	15	3.31	964	367	1,561
Yakutat	501 - 700	Yakutat Slope	2	2	3.25	477	293	661
Chirikof	1 - 100	Chirikof Bank	37	14	3.03	3,275	1,057	5,493
Kodiak	101 - 200	Barren Islands	18	13	2.61	2,870	282	5,458
Yakutat	201 - 300	Yakutat Slope	8	8	2.50	532	200	865
Kodiak	101 - 200	Kenai Flats	19	19	2.36	2,850	1,772	3,929
Chirikof	301 - 500	Chirikof Slope	7	7	2.29	368	87	649
Southeastern	1 - 100	Southeastern Shallows	11	6	2.28	1,490	0	4,100
Kodiak	1 - 100	Albatross Shallows	28	10	2.16	1,246	0	2,685
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	14	2.13	835	364	1,307
Shumagin	1 - 100	Shumagin Bank	35	21	1.77	2,188	342	4,035
Chirikof	1 - 100	Upper Alaska Peninsula	17	6	1.54	1,219	0	2,884
Shumagin	301 - 500	Shumagin Slope	7	6	1.49	376	67	686
Yakutat	301 - 500	Yakutat Slope	6	6	1.45	220	7	433
Kodiak	201 - 300	Upper Shelikof Gully	4	4	1.33	428	191	665
Yakutat	1 - 100	Middleton Shallows	8	7	1.31	882	0	2,236
Shumagin	1 - 100	Davidson Bank	47	30	1.07	1,460	669	2,251
Yakutat	1 - 100	Yakutat Shallows	11	8	1.05	1,047	314	1,780
Yakutat	301 - 500	Yakutat Gullies	2	2	0.99	110	0	786
Southeastern	301 - 500	Southeastern Slope	7	6	0.66	51	0	128
Chirikof	1 - 100	Semidi Bank	24	12	0.61	449	0	967
Yakutat	101 - 200	Fairweather Shelf	10	7	0.60	467	0	979
Kodiak	501 - 700	Kodiak Slope	4	2	0.60	104	0	304
Shumagin	1 - 100	Lower Alaska Peninsula	26	11	0.58	402	0	804
Chirikof	501 - 700	Chirikof Slope	5	2	0.55	107	0	339
Yakutat	101 - 200	Yakataga Shelf	9	5	0.43	227	0	570
Kodiak	1 - 100	Albatross Banks	40	7	0.34	526	0	1,176
Yakutat	101 - 200	Yakutat Flats	7	6	0.26	236	0	702
Shumagin	1 - 100	Fox Islands	19	2	0.02	15	0	39
Kodiak	1 - 100	Northern Kodiak Shallows	8	3	0.00	1	0	2

Dover sole (*Microstomus pacificus*)

Dover sole were distributed throughout the survey area and depth range and were caught in relatively modest numbers in 56 of the 59 survey strata (Fig. 14 and Tables 15-16). Although large catches of Dover sole were rare, they were present in approximately 85% of the tows at depths greater than 200 m (Table 15). The highest mean CPUEs were generally recorded at depths between 200 and 700 m primarily southwest of Kodiak Island and in the central part of the Gulf of Alaska between the Kenai Peninsula and Yakutat. The mean weight of Dover sole generally decreased from west to east. Although the smallest fish were 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 the survey area, especially at water depths between 301 and 500 m where they were predominant. Overall, males made up approximately 59% of the population.

Table 15. -- Number of survey hauls, number of hauls with Dover sole, mean CPUE, biomass, and mean weight, based on the 2009 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	127	15	0.04	154	44	265	0.265
	101 - 200	40	13	0.39	565	172	959	0.518
	201 - 300	17	9	0.31	88	11	164	0.715
	301 - 500	7	4	2.16	548	0	1,188	1.286
	501 - 700	3	3	18.51	3,712	0	14,044	0.984
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	44	0.78	5,067	0	15,453	0.845
Chirikof	1 - 100	78	11	0.71	1,843	0	5,021	0.86
	101 - 200	72	56	2.73	6,523	4,100	8,945	0.744
	201 - 300	25	21	4.79	5,527	3,009	8,046	0.91
	301 - 500	7	6	8.21	1,316	0	3,057	0.822
	501 - 700	5	5	4.01	782	369	1,196	0.802
	701 - 1000	3	1	0.08	23	0	98	0.629
	All depths	190	100	2.35	16,015	11,189	20,841	0.817
Kodiak	1 - 100	100	15	0.14	529	40	1,018	0.387
	101 - 200	125	90	2.11	9,145	6,839	11,452	0.859
	201 - 300	31	30	6.17	7,091	3,907	10,276	0.883
	301 - 500	16	16	6.32	1,841	1,132	2,550	0.777
	501 - 700	4	3	5.65	986	11	1,961	0.775
	701 - 1000	4	1	0.61	212	0	802	1.124
	All depths	280	155	1.95	19,805	15,810	23,801	0.829
Yakutat	1 - 100	19	9	2.23	3,720	0	9,363	0.51
	101 - 200	36	25	3.02	8,867	2,430	15,303	0.767
	201 - 300	17	17	15.99	8,266	4,208	12,325	0.965
	301 - 500	8	8	10.72	2,816	513	5,118	0.812
	501 - 700	2	2	14.77	2,169	212	4,127	0.652
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	61	4.52	25,838	16,663	35,013	0.755
Southeastern	1 - 100	11	3	0.44	288	0	731	0.342
	101 - 200	26	17	1.25	1,386	551	2,221	0.458
	201 - 300	19	18	5.37	2,713	1,406	4,020	0.447
	301 - 500	14	13	8.91	2,779	1,038	4,520	0.744
	501 - 700	2	2	19.11	1,975	541	3,409	0.787
	701 - 1000	2	2	3.40	411	0	1,497	0.823
	All depths	74	55	3.41	9,551	7,245	11,857	0.573
All areas	1 - 100	335	53	0.51	6,534	67	13,001	0.535
	101 - 200	299	201	2.17	26,486	19,374	33,599	0.755
	201 - 300	109	95	6.57	23,685	18,079	29,291	0.821
	301 - 500	52	47	7.27	9,300	6,316	12,284	0.802
	501 - 700	16	15	11.73	9,625	0	20,183	0.812
	701 - 1000	12	4	0.56	646	0	1,456	0.891
	All depths	823	415	2.38	76,277	63,268	89,286	0.76

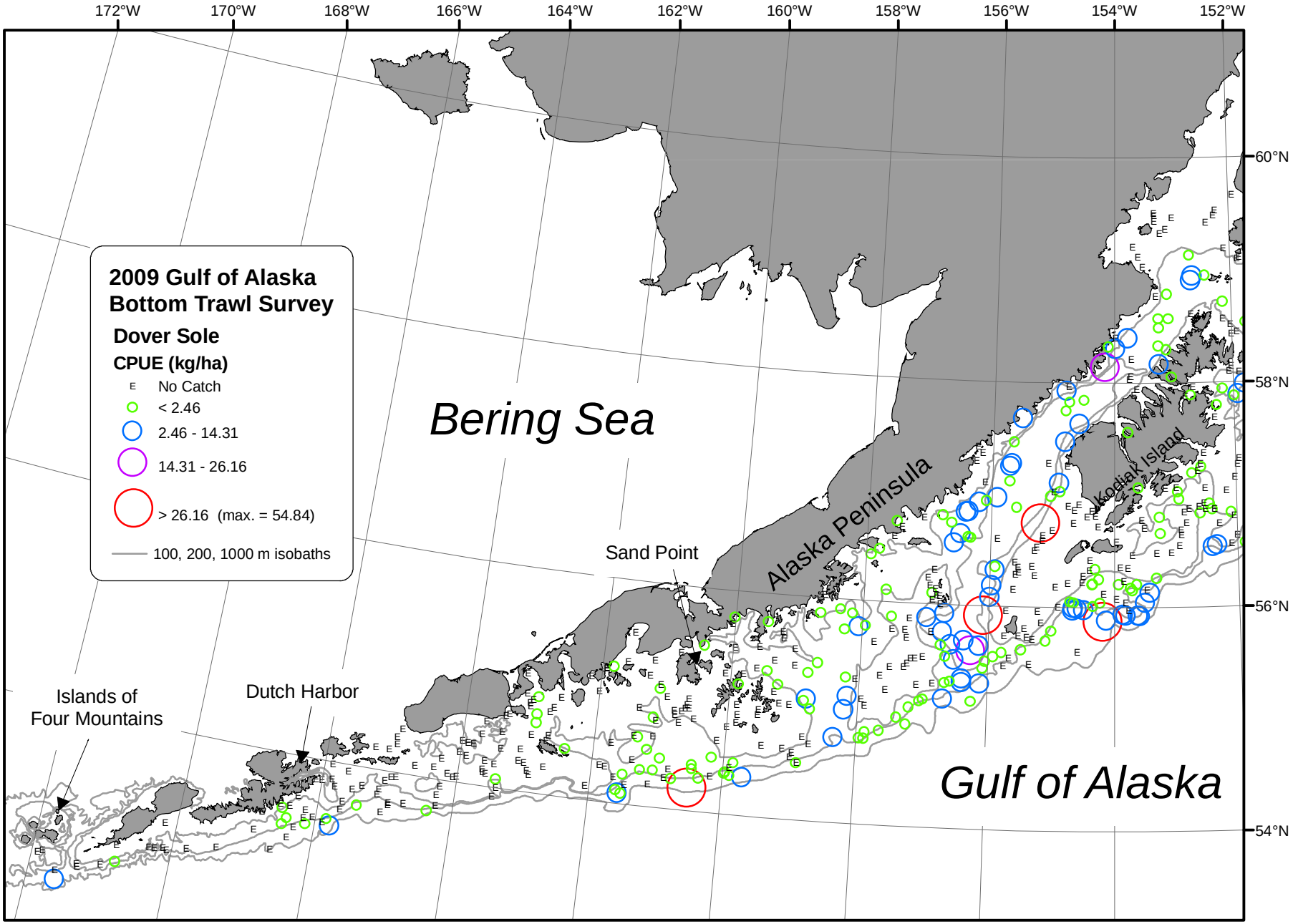

Figure 14. -- Distribution and relative abundance of a Dover sole from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

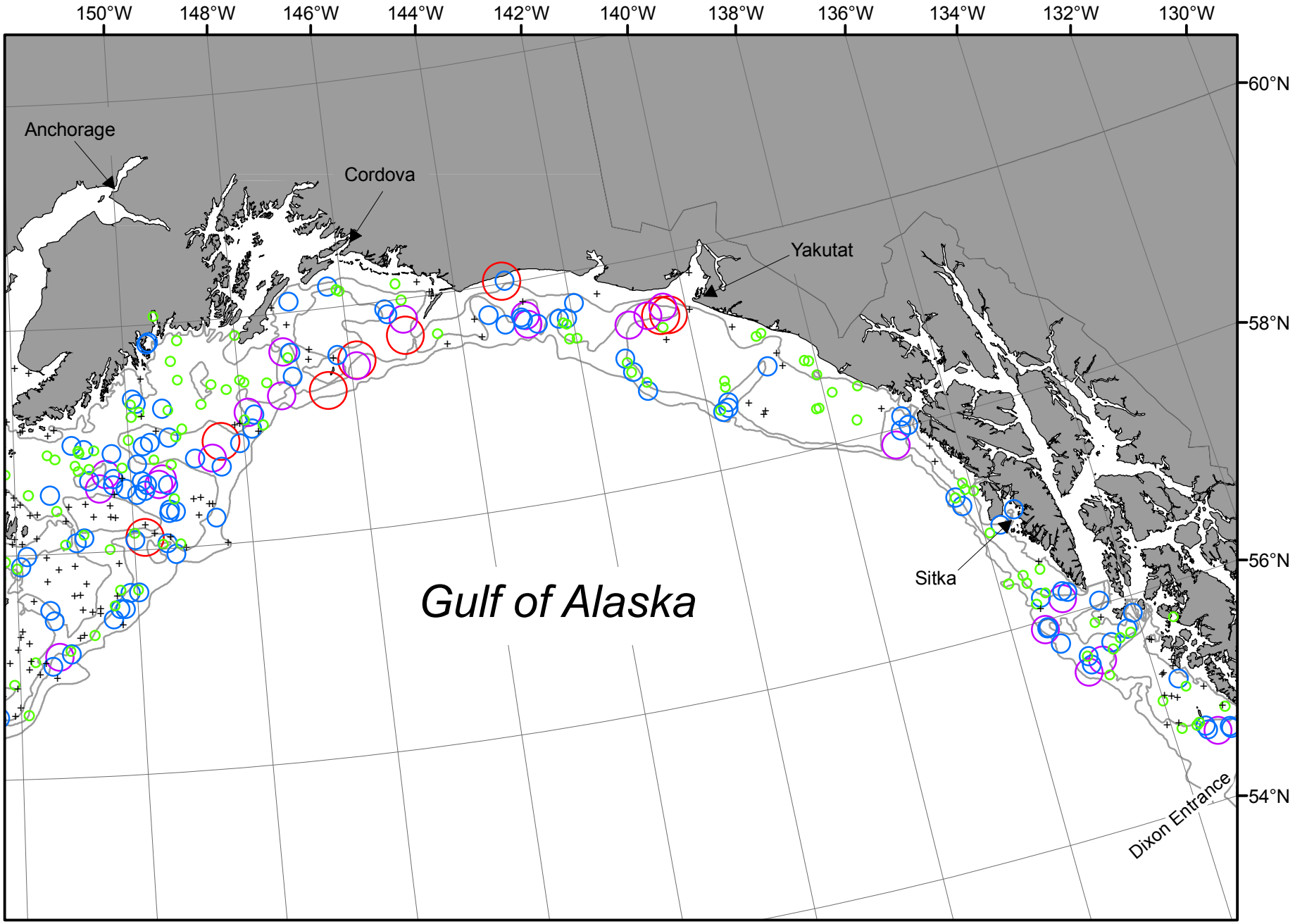

Figure 14. -- Continued (Dover sole).

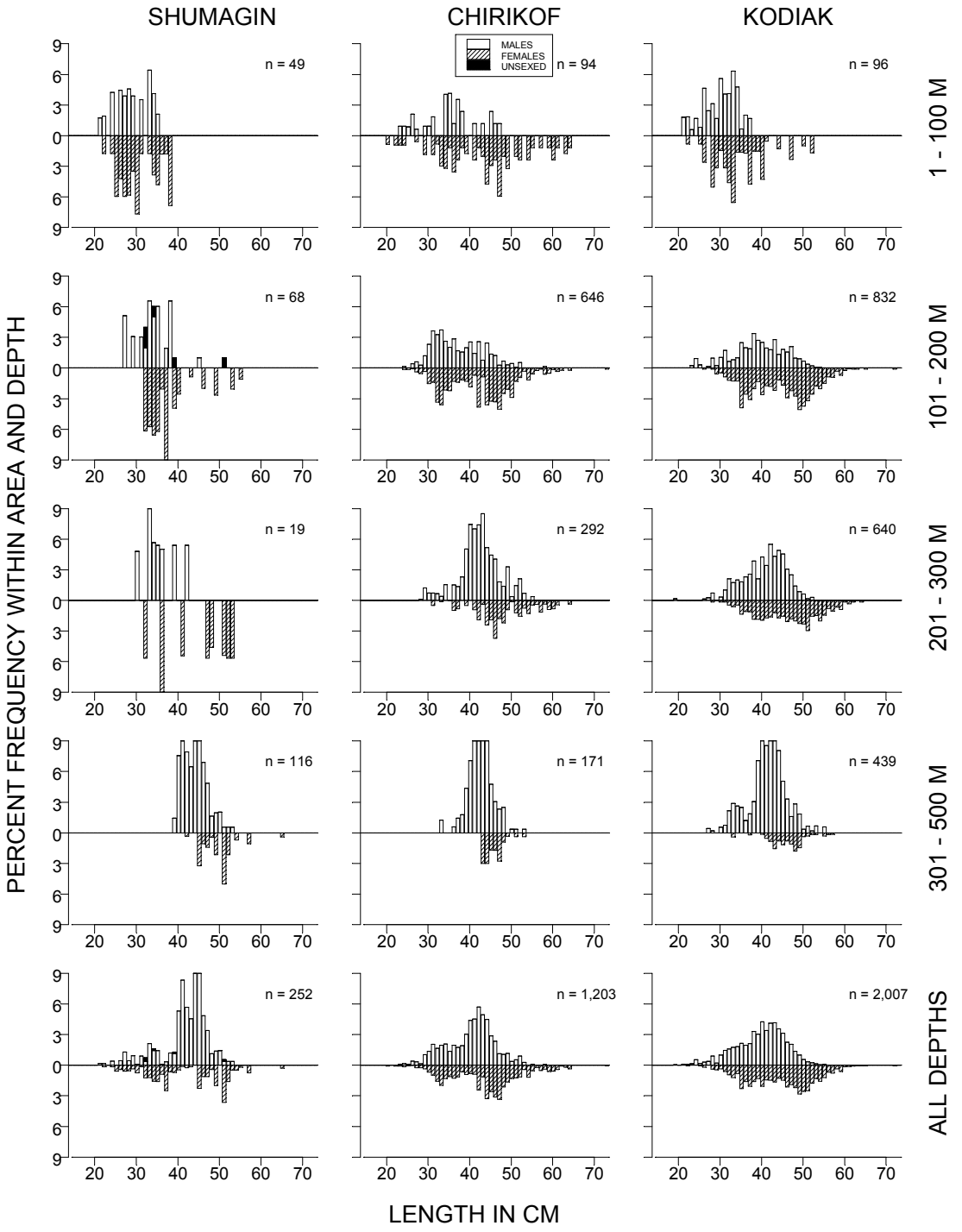

Figure 15. -- Size composition of Dover sole from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

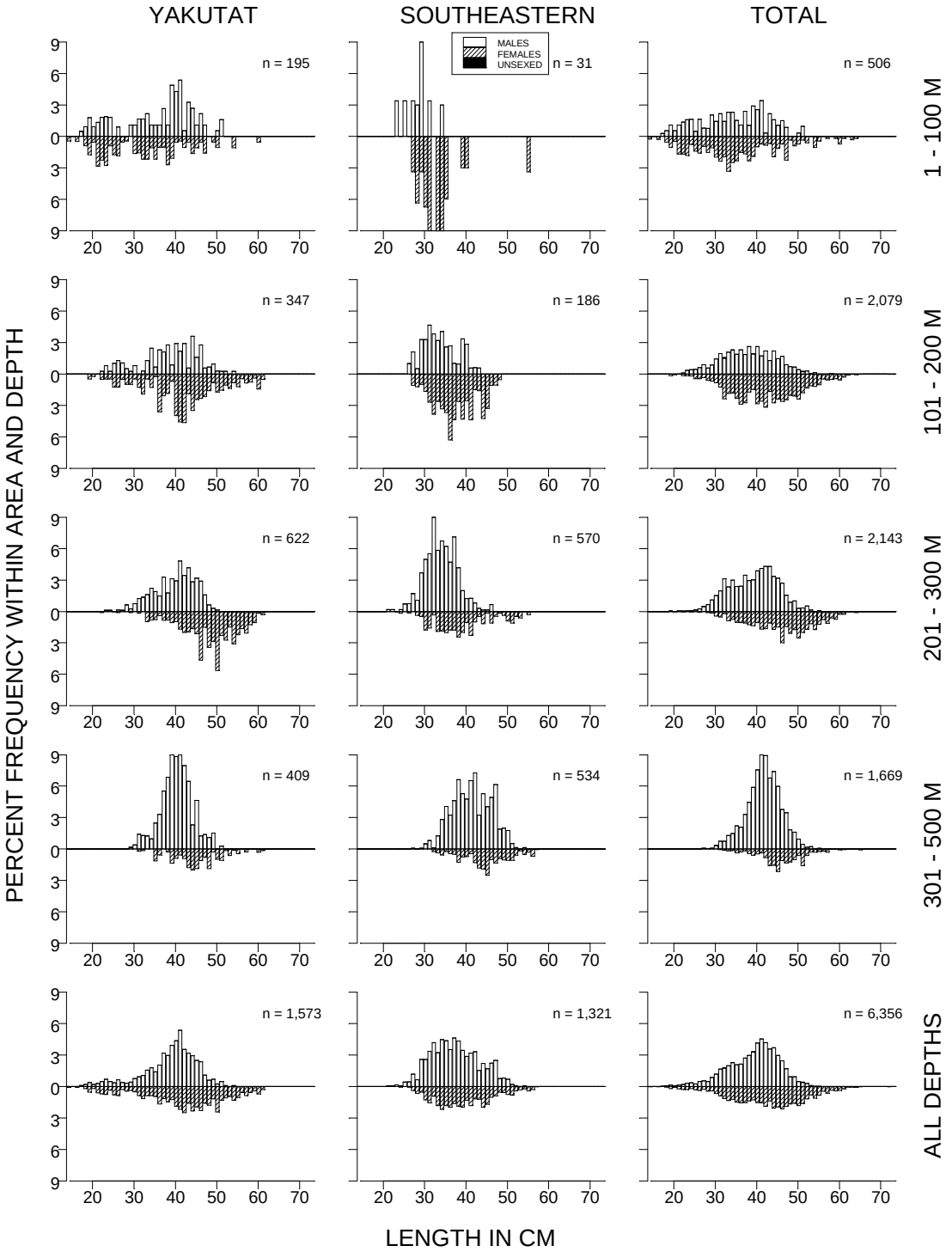

Figure 15. -- Continued (Dover sole).

Table 16. -- Catch per unit of effort by stratum for Dover sole sorted by descending CPUE for the 2009 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 Gullies	9	9	19.53	5,942	2,250	9,634
Southeastern	501 - 700	Southeastern Slope	2	2	19.11	1,975	0	6,209
Shumagin	501 - 700	Shumagin Slope	3	3	18.51	3,712	0	17,683
Yakutat	501 - 700	Yakutat Slope	2	2	14.77	2,169	0	7,948
Yakutat	301 - 500	Yakutat Slope	6	6	12.21	1,857	296	3,418
Yakutat	201 - 300	Yakutat Slope	8	8	10.93	2,324	0	4,651
Southeastern	201 - 300	Baranof-Chichagof Slope	5	5	10.41	1,171	294	2,048
Southeastern	301 - 500	Southeastern Deep Gullies	7	7	9.96	2,336	569	4,102
Yakutat	101 - 200	Middleton Shelf	10	8	9.21	6,762	347	13,176
Kodiak	201 - 300	Kenai Gullies	20	19	8.97	5,974	2,863	9,086
Yakutat	301 - 500	Yakutat Gullies	2	2	8.66	959	0	9,321
Chirikof	301 - 500	Chirikof Slope	7	6	8.21	1,316	0	3,117
Kodiak	301 - 500	Kodiak Slope	16	16	6.324	1,841	1,129	2,554
Southeastern	301 - 500	Southeastern Slope	7	6	5.738	443	88	799
Kodiak	501 - 700	Kodiak Slope	4	3	5.651	986	0	2,104
Chirikof	201 - 300	Lower Shelikof Gully	17	14	5.305	5,315	2,789	7,841
Chirikof	101 - 200	Shelikof Edge	27	23	5.249	4,060	2,185	5,936
Kodiak	101 - 200	Portlock Flats	35	29	4.446	3,262	1,857	4,666
Kodiak	201 - 300	Kodiak Slope	7	7	4.18	679	15	1,342
Chirikof	501 - 700	Chirikof Slope	5	5	4.01	782	336	1,229
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	13	3.93	1,542	399	2,685
Yakutat	1 - 100	Yakutat Shallows	11	6	3.57	3,547	0	9,254
Southeastern	701 - 1000	Southeastern Slope	2	2	3.40	411	0	3,619
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	10	2.19	918	185	1,652
Shumagin	301 - 500	Shumagin Slope	7	4	2.16	548	0	1,210
Yakutat	101 - 200	Yakataga Shelf	9	6	2.04	1,074	0	2,206
Chirikof	101 - 200	East Shumagin Gully	19	14	1.89	2,094	512	3,675
Kodiak	101 - 200	Barren Islands	18	16	1.74	1,910	715	3,104
Kodiak	101 - 200	Albatross Gullies	26	18	1.70	1,343	576	2,110
Kodiak	101 - 200	Kenai Flats	19	18	1.69	2,037	952	3,123
Chirikof	1 - 100	Chirikof Bank	37	3	1.468	1,585	0	4,745
Chirikof	201 - 300	Chirikof Slope	8	7	1.391	213	46	379
Kodiak	201 - 300	Upper Shelikof Gully	4	4	1.367	438	0	1,306
Kodiak	101 - 200	Kodiak Outer Shelf	27	9	1.181	594	0	1,255
Yakutat	101 - 200	Fairweather Shelf	10	7	0.814	629	0	1,718
Chirikof	101 - 200	Chirikof Outer Shelf	26	19	0.74	369	174	564
Kodiak	1 - 100	Northern Kodiak Shallows	8	4	0.71	157	0	475
Southeastern	101 - 200	Prince of Wales Shelf	15	7	0.68	468	0	975
Kodiak	701 - 1000	Kodiak Slope	4	1	0.61	212	0	888
Kodiak	1 - 100	Kenai Peninsula	9	3	0.53	281	0	683
Shumagin	101 - 200	Sanak Gully	6	3	0.48	203	0	522
Yakutat	101 - 200	Yakutat Flats	7	4	0.45	403	0	874
Southeastern	1 - 100	Southeastern Shallows	11	3	0.44	288	0	737
Shumagin	101 - 200	West Shumagin Gully	4	1	0.43	99	0	413
Shumagin	101 - 200	Shumagin Outer Shelf	30	9	0.32	264	68	460
Shumagin	201 - 300	Shumagin Slope	17	9	0.31	88	11	165
Chirikof	1 - 100	Upper Alaska Peninsula	17	6	0.31	249	0	601
Yakutat	1 - 100	Middleton Shallows	8	3	0.258	173	0	434
Kodiak	1 - 100	Albatross Shallows	28	6	0.113	65	0	142
Shumagin	1 - 100	Lower Alaska Peninsula	26	6	0.079	54	0	125
Chirikof	701 - 1000	Chirikof Slope	3	1	0.076	23	0	124
Shumagin	1 - 100	Shumagin Bank	35	5	0.055	68	0	145
Shumagin	1 - 100	Davidson Bank	47	3	0.02	27	0	69
Kodiak	1 - 100	Albatross Banks	40	2	0.02	26	0	65
Chirikof	1 - 100	Semidi Bank	24	2	0.01	9	0	23
Shumagin	1 - 100	Fox Islands	19	1	0.01	5	0	16

Yellowfin sole (*Limanda aspera*)

Yellowfin sole were locally abundant in bays around Kodiak Island and the Alaska Peninsula near the Shumagin Islands, but were not widely distributed in the survey area. Yellowfin sole were only caught in near shore strata, all 10 of them in the shallowest depth zone (Fig. 16 and Tables 17-18). The highest mean CPUEs were noted in the Northern Kodiak Shallows and on the lower Alaska Peninsula (Table 18). These two strata accounted for approximately 69% of the survey area's biomass estimate despite accounting for only 2.8% of the survey area. The sex ratio for yellowfin sole was approximately even, with females making up approximately 51% of the population.

Table 17. -- Number of survey hauls, number of hauls with yellowfin sole, mean CPUE, biomass, and mean weight, based on the 2009 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	127	27	2.83	11,695	5,178	18,212	0.462
	101 - 200	40	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	27	1.79	11,695	5,178	18,212	0.462
Chirikof	1 - 100	78	11	1.18	3,073	159	5,986	0.389
	101 - 200	72	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	11	0.45	3,073	159	5,986	0.389
Kodiak	1 - 100	100	19	4.82	18,555	2,955	34,155	0.283
	101 - 200	125	0	---	---	---	---	---
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	19	1.83	18,555	2,955	34,155	0.283
Yakutat	1 - 100	19	2	0.02	29	0	94	0.073
	101 - 200	36	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	2	0.01	29	0	94	0.073
Southeastern	1 - 100	11	1	0.10	62	0	199	0.215
	101 - 200	26	0	---	---	---	---	---
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	1	0.02	62	0	199	0.215
All areas	1 - 100	335	60	2.59	33,414	16,712	50,116	0.336
	101 - 200	299	0	---	---	---	---	---
	201 - 300	109	0	---	---	---	---	---
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	60	1.04	33,414	16,712	50,116	0.336

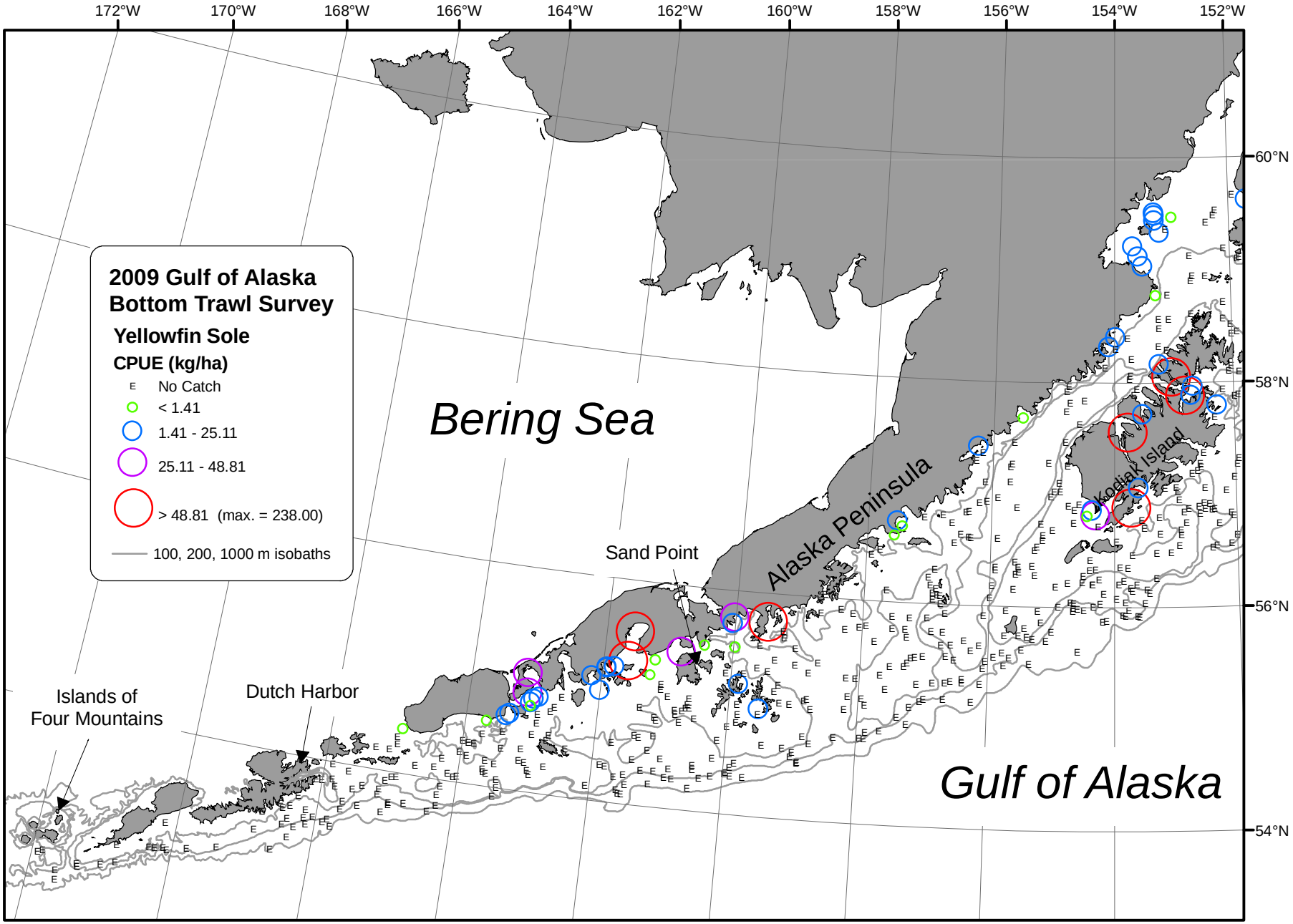

Figure 16. -- Distribution and relative abundance of a yellowfin sole from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

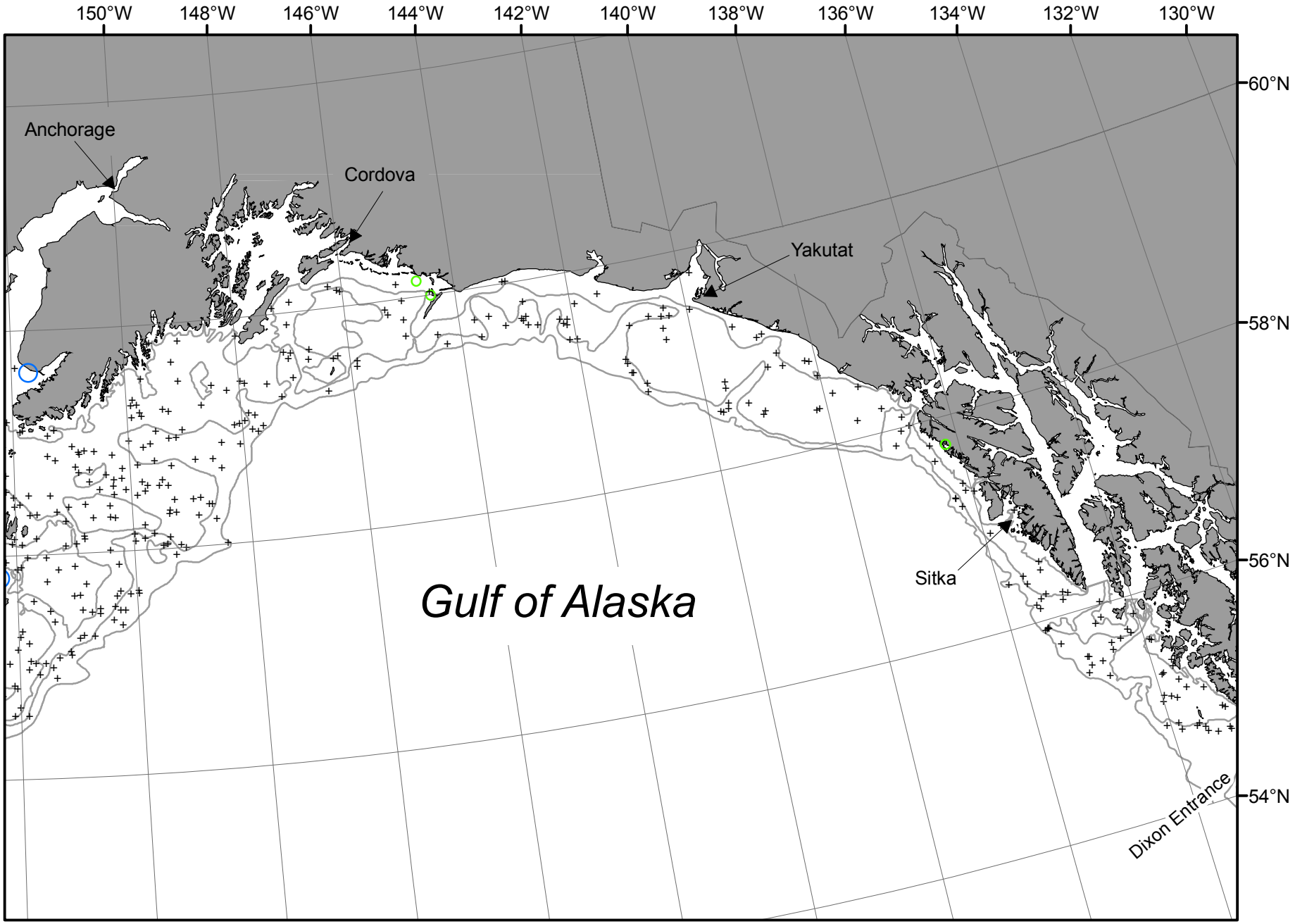

Figure 16. -- Continued (yellowfin sole).

Table 18. -- Catch per unit of effort by stratum for yellowfin sole sorted by descending CPUE for the 2009 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	8	5	55.62	12,235	0	28,489
Shumagin	1 - 100	Lower Alaska Peninsula	26	20	15.79	10,855	4,358	17,352
Kodiak	1 - 100	Albatross Shallows	28	5	5.15	2,971	0	8,102
Kodiak	1 - 100	Lower Cook Inlet	15	9	3.39	3,349	1,029	5,669
Chirikof	1 - 100	Upper Alaska Peninsula	17	8	2.35	1,863	0	3,829
Chirikof	1 - 100	Chirikof Bank	37	3	1.12	1,209	0	3,464
Shumagin	1 - 100	Shumagin Bank	35	3	0.47	583	0	1,447
Shumagin	1 - 100	Davidson Bank	47	4	0.19	257	0	601
Southeastern	1 - 100	Southeastern Shallows	11	1	0.10	62	0	201
Yakutat	1 - 100	Middleton Shallows	8	2	0.04	29	0	96

Other Flatfishes

Alaska plaice (*Pleuronectes quadrituberculatus*)

Approximately 81% of the estimated biomass of Alaska plaice in the survey area came from the shallowest depth zone of the Davidson Bank and the Upper and Lower Alaska Peninsula strata, which together make up only 8.9% of the total survey area (Tables 19-20). Moderate densities were also recorded in the shallowest depth zone of the Northern Kodiak Shallows stratum. No Alaska plaice were caught in the Yakutat or Southeastern INPFC areas.

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 and in the Lower and Upper Alaska Peninsula strata (Table 22).

English sole (*Parophrys vetulus*)

Approximately 59% of the estimated biomass of English sole in the survey area came from three strata (Northern Kodiak Shallows, Southeastern Shallows, and Kenai Peninsula) in two of the five INPFC areas (Kodiak and Southeastern), which together make up only 4.4% of the survey area (Table 24). Densities ranged from small to modest everywhere English sole were caught, and almost the entire population was confined to depths less than 200 m (Table 23). Mean weight generally increased with depth.

Butter sole (*Isopsetta isolepis*)

Approximately 68% of the estimated biomass of butter sole in the survey area came from three strata: Albatross Shallows, Albatross Gullies, and Chirikof Bank (Table 26). Densities ranged from small to modest everywhere butter sole were caught, and approximately 80% of the population was confined to depths less than 100 m, with 100% at less than 200 m (Table 25). Catches of butter sole were recorded in all INPFC areas except Southeastern.

Table 19. -- Number of survey hauls, number of hauls with Alaska plaice, mean CPUE, biomass, and mean weight, based on the 2009 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	127	22	1.30	5,387	1,942	8,832	1.183
	101 - 200	40	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	22	0.83	5,387	1,942	8,832	1.183
Chirikof	1 - 100	78	10	0.58	1,507	358	2,656	1.796
	101 - 200	72	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	10	0.22	1,507	358	2,656	1.796
Kodiak	1 - 100	100	12	0.23	894	253	1,536	1.158
	101 - 200	125	0	---	---	---	---	---
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	12	0.09	894	253	1,536	1.158
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	0	---	---	---	---	---
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	0	---	---	---	---	---
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	0	---	---	---	---	---
All areas	1 - 100	335	44	0.60	7,788	4,148	11,427	1.263
	101 - 200	299	0	---	---	---	---	---
	201 - 300	109	0	---	---	---	---	---
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	44	0.24	7,788	4,148	11,427	1.263

Table 20. -- Catch per unit of effort by stratum for Alaska plaice sorted by descending CPUE for the 2009 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	26	16	6.11	4,198	897	7,500
Kodiak	1 - 100	Northern Kodiak Shallows	8	5	1.74	382	0	784
Chirikof	1 - 100	Upper Alaska Peninsula	17	4	1.24	988	0	2,007
Shumagin	1 - 100	Davidson Bank	47	4	0.81	1,101	0	2,265
Chirikof	1 - 100	Chirikof Bank	37	6	0.48	519	0	1,101
Kodiak	1 - 100	Albatross Shallows	28	4	0.35	204	0	455
Kodiak	1 - 100	Lower Cook Inlet	15	3	0.31	308	0	785
Shumagin	1 - 100	Shumagin Bank	35	2	0.07	88	0	232

Table 21. -- Number of survey hauls, number of hauls with starry flounder, mean CPUE, biomass, and mean weight, based on the 2009 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	127	22	2.46	10,154	2,250	18,058	1.828
	101 - 200	40	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	22	1.56	10,154	2,250	18,058	1.828
Chirikof	1 - 100	78	15	3.07	7,980	654	15,305	2.167
	101 - 200	72	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	15	1.17	7,980	654	15,305	2.167
Kodiak	1 - 100	100	21	3.09	11,898	2,154	21,642	1.988
	101 - 200	125	2	0.02	82	0	209	2.139
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	23	1.18	11,980	2,235	21,725	1.989
Yakutat	1 - 100	19	3	1.63	2,717	0	7,939	1.982
	101 - 200	36	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	3	0.48	2,717	0	7,939	1.982
Southeastern	1 - 100	11	2	0.66	433	0	1,237	2.573
	101 - 200	26	0	---	---	---	---	---
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	2	0.15	433	0	1,237	2.573
All areas	1 - 100	335	63	2.57	33,182	18,269	48,094	1.98
	101 - 200	299	2	0.01	82	0	209	2.139
	201 - 300	109	0	---	---	---	---	---
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	65	1.04	33,264	18,351	48,177	1.98

Table 22. -- Catch per unit of effort by stratum for starry flounder sorted by descending CPUE for the 2009 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	11	10.26	10,147	441	19,852
Shumagin	1 - 100	Lower Alaska Peninsula	26	14	8.86	6,088	352	11,825
Chirikof	1 - 100	Upper Alaska Peninsula	17	8	8.80	6,984	0	14,290
Kodiak	1 - 100	Northern Kodiak Shallows	8	5	4.30	945	0	1,906
Shumagin	1 - 100	Davidson Bank	47	2	2.53	3,462	0	9,085
Yakutat	1 - 100	Yakutat Shallows	11	2	2.41	2,394	0	7,631
Kodiak	1 - 100	Albatross Shallows	28	5	1.40	806	0	1,869
Chirikof	1 - 100	Chirikof Bank	37	7	0.92	996	0	2,078
Southeastern	1 - 100	Southeastern Shallows	11	2	0.66	433	0	1,247
Yakutat	1 - 100	Middleton Shallows	8	1	0.48	323	0	1,088
Shumagin	1 - 100	Fox Islands	19	2	0.45	373	0	1,071
Shumagin	1 - 100	Shumagin Bank	35	4	0.19	230	0	467
Kodiak	101 - 200	Albatross Gullies	26	1	0.073	58	0	177
Kodiak	101 - 200	Barren Islands	18	1	0.022	24	0	75

Table 23. -- Number of survey hauls, number of hauls with English sole, mean CPUE, biomass, and mean weight, based on the 2009 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	127	20	0.21	851	125	1,578	0.499
	101 - 200	40	1	0.04	52	0	158	1.113
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	21	0.14	903	170	1,637	0.515
Chirikof	1 - 100	78	14	0.31	797	0	1,930	0.63
	101 - 200	72	3	0.02	45	0	108	0.427
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	17	0.12	842	0	1,977	0.615
Kodiak	1 - 100	100	15	2.00	7,695	0	15,500	0.511
	101 - 200	125	6	0.06	260	0	683	1.043
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	21	0.78	7,955	137	15,773	0.52
Yakutat	1 - 100	19	10	2.41	4,013	0	8,339	0.282
	101 - 200	36	1	0.01	29	0	94	1.085
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	11	0.71	4,042	0	8,369	0.284
Southeastern	1 - 100	11	8	6.40	4,192	0	9,449	0.402
	101 - 200	26	5	0.66	726	18	1,435	0.519
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	1	0.03	10	0	34	0.74
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	14	1.76	4,928	0	10,239	0.416
All areas	1 - 100	335	67	1.36	17,548	7,812	27,283	0.411
	101 - 200	299	16	0.09	1,113	292	1,933	0.609
	201 - 300	109	0	---	---	---	---	---
	301 - 500	52	1	0.01	10	0	34	0.74
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	84	0.58	18,671	8,900	28,442	0.419

Table 24. -- Catch per unit of effort by stratum for English sole sorted by descending CPUE for the 2009 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	8	5	17.39	3,826	0	8,415
Southeastern	1 - 100	Southeastern Shallows	11	8	6.40	4,192	0	9,513
Kodiak	1 - 100	Kenai Peninsula	9	1	5.56	2,925	0	9,671
Yakutat	1 - 100	Middleton Shallows	8	4	4.30	2,889	0	7,179
Kodiak	1 - 100	Albatross Shallows	28	8	1.62	936	0	1,965
Yakutat	1 - 100	Yakutat Shallows	11	6	1.13	1,124	0	3,017
Chirikof	1 - 100	Chirikof Bank	37	11	0.70	751	0	1,882
Southeastern	101 - 200	Prince of Wales Shelf	15	3	0.70	479	0	1,043
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	2	0.59	248	0	739
Shumagin	1 - 100	Shumagin Bank	35	11	0.33	411	0	851
Kodiak	101 - 200	Albatross Gullies	26	2	0.27	210	0	631
Shumagin	1 - 100	Davidson Bank	47	5	0.24	333	0	909
Shumagin	1 - 100	Lower Alaska Peninsula	26	4	0.156	107	0	243
Southeastern	301 - 500	Southeastern Slope	7	1	0.129	10	0	34
Shumagin	101 - 200	Shumagin Outer Shelf	30	1	0.064	52	0	159
Chirikof	1 - 100	Upper Alaska Peninsula	17	3	0.06	46	0	111
Chirikof	101 - 200	Chirikof Outer Shelf	26	1	0.06	29	0	88
Kodiak	101 - 200	Portlock Flats	35	3	0.04	30	0	67
Yakutat	101 - 200	Middleton Shelf	10	1	0.04	29	0	95
Kodiak	101 - 200	Barren Islands	18	1	0.02	20	0	62
Chirikof	101 - 200	East Shumagin Gully	19	2	0.02	16	0	41
Kodiak	1 - 100	Albatross Banks	40	1	0.01	8	0	26

Table 25. -- Number of survey hauls, number of hauls with butter sole, mean CPUE, biomass, and mean weight, based on the 2009 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	127	23	0.22	902	300	1,505	0.448
	101 - 200	40	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	23	0.14	902	300	1,505	0.448
Chirikof	1 - 100	78	26	1.49	3,881	1,901	5,861	0.342
	101 - 200	72	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	26	0.57	3,881	1,901	5,861	0.342
Kodiak	1 - 100	100	29	1.54	5,945	821	11,070	0.334
	101 - 200	125	6	0.72	3,137	0	7,967	0.477
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	35	0.89	9,083	2,135	16,030	0.372
Yakutat	1 - 100	19	5	0.92	1,539	0	3,665	0.163
	101 - 200	36	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	5	0.27	1,539	0	3,665	0.163
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	0	---	---	---	---	---
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	0	---	---	---	---	---
All areas	1 - 100	335	83	0.95	12,268	6,452	18,084	0.302
	101 - 200	299	6	0.26	3,137	0	7,967	0.477
	201 - 300	109	0	---	---	---	---	---
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	89	0.48	15,405	7,975	22,835	0.326

Table 26. -- Catch per unit of effort by stratum for butter sole sorted by descending CPUE for the 2009 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	28	12	7.06	4,072	0	9,123
Kodiak	101 - 200	Albatross Gullies	26	5	3.95	3,126	0	7,965
Chirikof	1 - 100	Chirikof Bank	37	23	2.98	3,220	1,446	4,995
Kodiak	1 - 100	Lower Cook Inlet	15	9	1.57	1,552	535	2,569
Yakutat	1 - 100	Yakutat Shallows	11	3	1.40	1,394	0	3,534
Kodiak	1 - 100	Northern Kodiak Shallows	8	5	0.91	201	0	418
Chirikof	1 - 100	Upper Alaska Peninsula	17	2	0.83	659	0	1,618
Shumagin	1 - 100	Lower Alaska Peninsula	26	12	0.58	397	0	876
Shumagin	1 - 100	Davidson Bank	47	8	0.35	480	94	866
Yakutat	1 - 100	Middleton Shallows	8	2	0.22	144	0	391
Kodiak	1 - 100	Kenai Peninsula	9	2	0.14	73	0	188
Kodiak	1 - 100	Albatross Banks	40	1	0.03	48	0	146
Shumagin	1 - 100	Shumagin Bank	35	3	0.02	25	0	53
Kodiak	101 - 200	Barren Islands	18	1	0.01	11	0	34
Chirikof	1 - 100	Semidi Bank	24	1	0.003	2	0	6

ROUNDFISHES

Walleye pollock (*Theragra chalcogramma*)

Walleye pollock was the fourth most abundant species caught in the 2009 survey (Table 2). Pollock were caught throughout the survey area in 50 of the 59 survey strata and at all depths less than 500 m (Fig. 17, Table 27). They were most abundant at depths less than 200 m, where 93% of the estimated biomass occurred. They were caught in 74% of the tows less than 300 m deep, including 88% of the tows at depths between 201 and 300 m (Table 27). The highest densities occurred in bays around Kodiak Island and in scattered areas throughout the Shumagin and Chirikof INPFC areas, with particularly high CPUEs recorded in the Shumagin Outer Shelf (Table 28). Mean weight generally increased with depth to 500 m in three of the five INPFC areas (Shumagin, Yakutat, Southeastern), but there was no consistent trend in mean weight with depth in the Chirikof and Kodiak areas. A distinct length mode of young-of-the-year occurred around 10 cm at depths less than 100 m in the Shumagin and Chirikof INPFC areas and at depths between 201 and 300 m in the Chirikof and Kodiak INPFC areas. Other notable length modes occured for juveniles at approximately 20 cm in the Yakutat (depths less than 200 m) and Southeastern (depths less than 100 m) INPFC areas, and for females at 60 cm (depths between 101 and 200 m) and males at approximately 58 cm (depths between 201 and 300 m) in the Shumagin INPFC area (Fig. 18). Females were considerably more abundant in the survey area and accounted for approximately 58% of the total estimated walleye pollock population.

Table 27. -- Number of survey hauls, number of hauls with walleye pollock, mean CPUE, biomass, and mean weight, based on the 2009 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	127	83	14.43	59,563	36,088	83,039	1.056
	101 - 200	40	36	103.05	151,249	0	304,075	1.587
	201 - 300	17	13	7.68	2,140	668	3,612	1.629
	301 - 500	7	1	0.58	146	0	490	1.54
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	133	32.67	213,098	58,396	367,799	1.392
Chirikof	1 - 100	78	50	32.30	84,102	18,659	149,545	0.402
	101 - 200	72	65	54.75	130,571	30,229	230,912	0.904
	201 - 300	25	24	18.67	21,560	4,930	38,190	0.504
	301 - 500	7	1	0.17	27	0	90	1.543
	501 - 700	5	1	0.12	24	0	84	1.59
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	141	34.72	236,283	116,860	355,707	0.596
Kodiak	1 - 100	100	58	20.38	78,495	12,324	144,665	0.519
	101 - 200	125	89	24.90	107,911	40,222	175,599	1.078
	201 - 300	31	24	10.67	12,262	5,736	18,788	0.475
	301 - 500	16	2	0.14	40	0	116	1.155
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	173	19.58	198,707	105,783	291,631	0.717
Yakutat	1 - 100	19	14	4.15	6,919	3,307	10,531	0.199
	101 - 200	36	26	4.04	11,866	2,878	20,853	0.202
	201 - 300	17	16	10.56	5,459	1,247	9,672	0.735
	301 - 500	8	5	1.18	309	15	603	0.955
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	61	4.29	24,553	14,348	34,758	0.242
Southeastern	1 - 100	11	11	17.35	11,360	0	30,247	0.136
	101 - 200	26	22	12.46	13,808	5,545	22,072	0.522
	201 - 300	19	19	11.25	5,686	1,922	9,449	0.726
	301 - 500	14	3	0.48	149	0	346	1.315
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	55	11.06	31,003	10,372	51,634	0.263
All areas	1 - 100	335	216	18.63	240,439	144,829	336,049	0.449
	101 - 200	299	238	33.96	415,404	224,176	606,631	0.977
	201 - 300	109	96	13.07	47,107	28,543	65,670	0.553
	301 - 500	52	12	0.52	671	213	1,129	1.149
	501 - 700	16	1	0.03	24	0	84	1.59
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	563	21.99	703,644	489,098	918,190	0.673

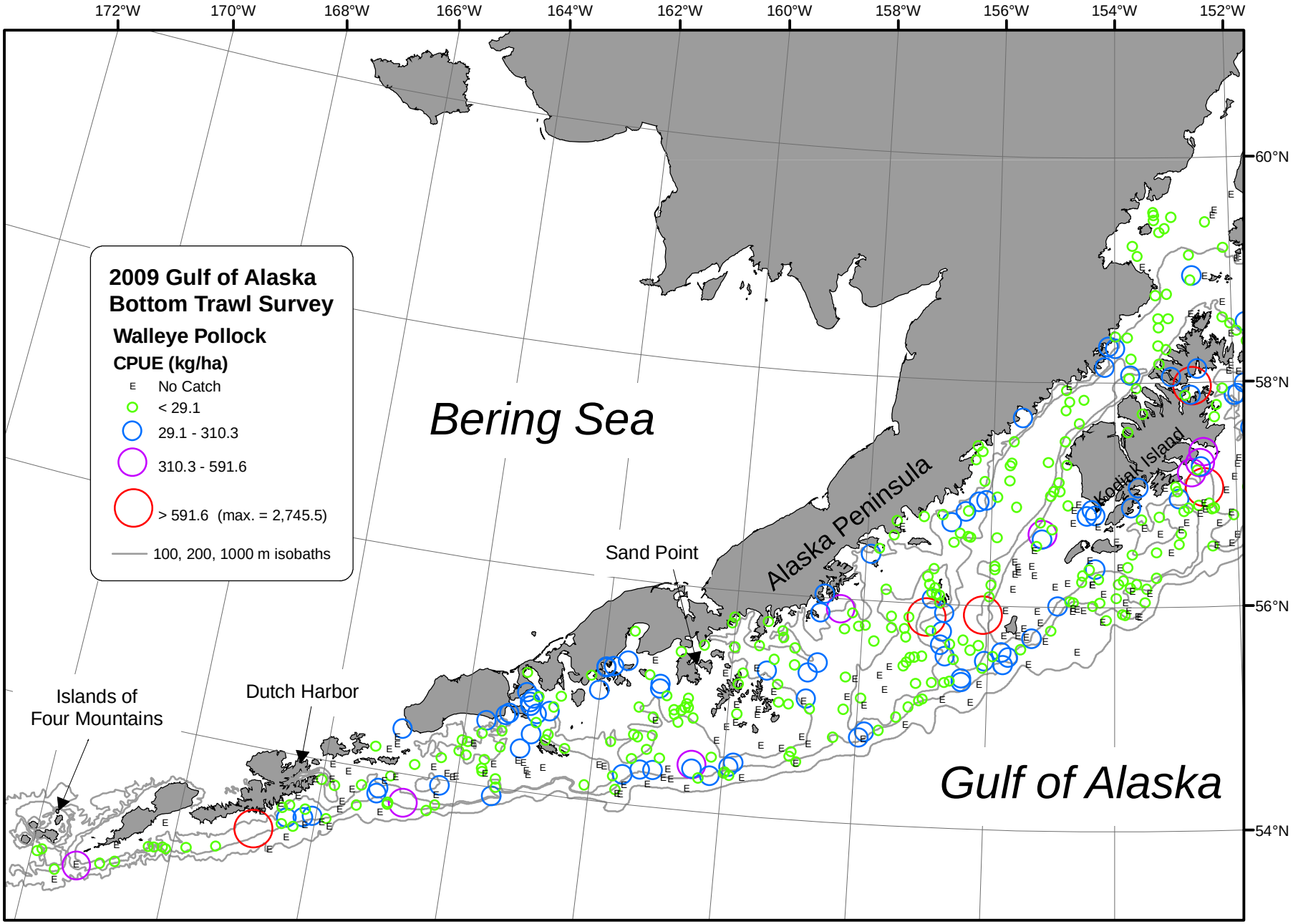

Figure 17. -- Distribution and relative abundance of a walleye pollock from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

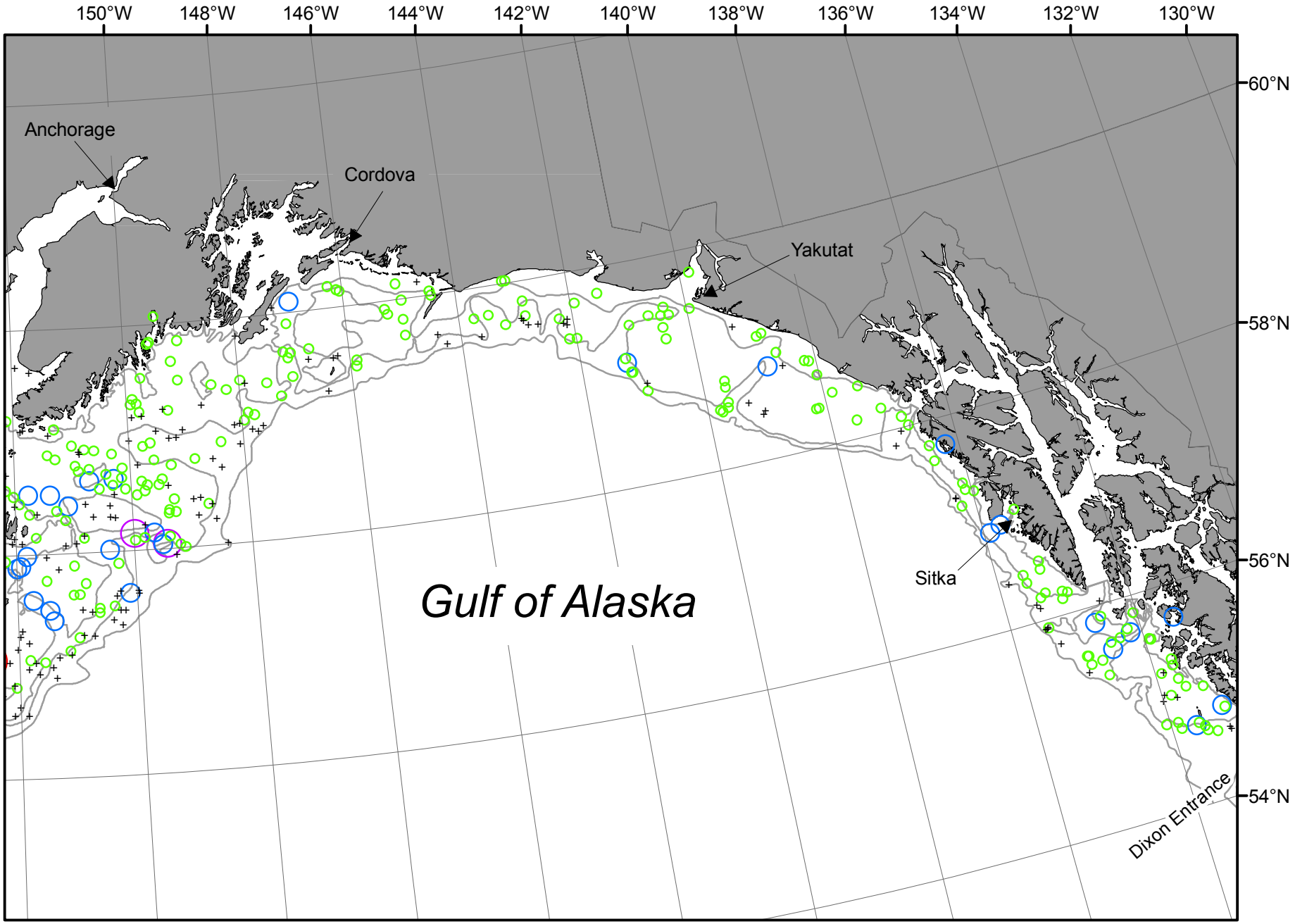

Figure 17. -- Continued (walleye pollock).

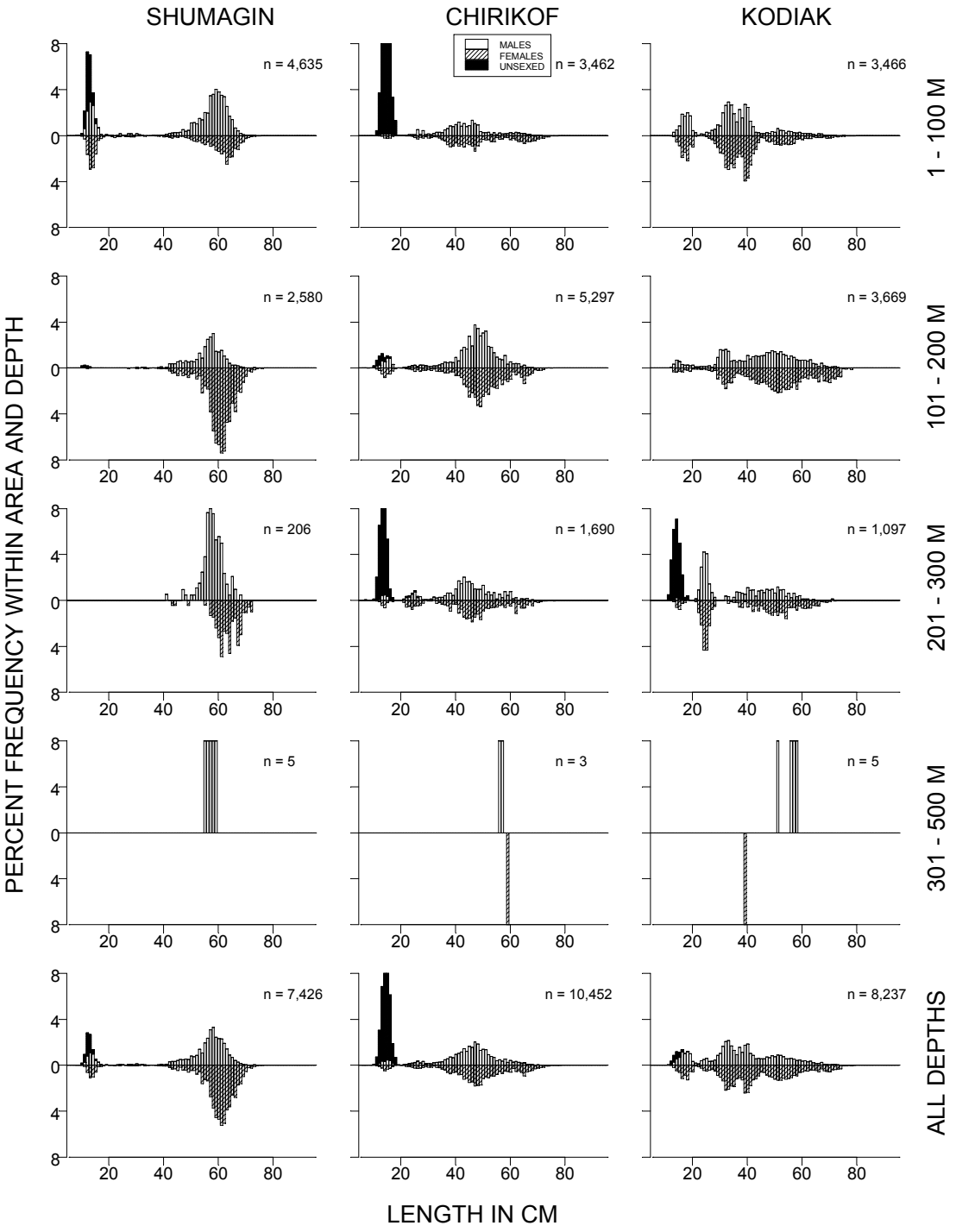

Figure 18. -- Size composition of walleye pollock from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

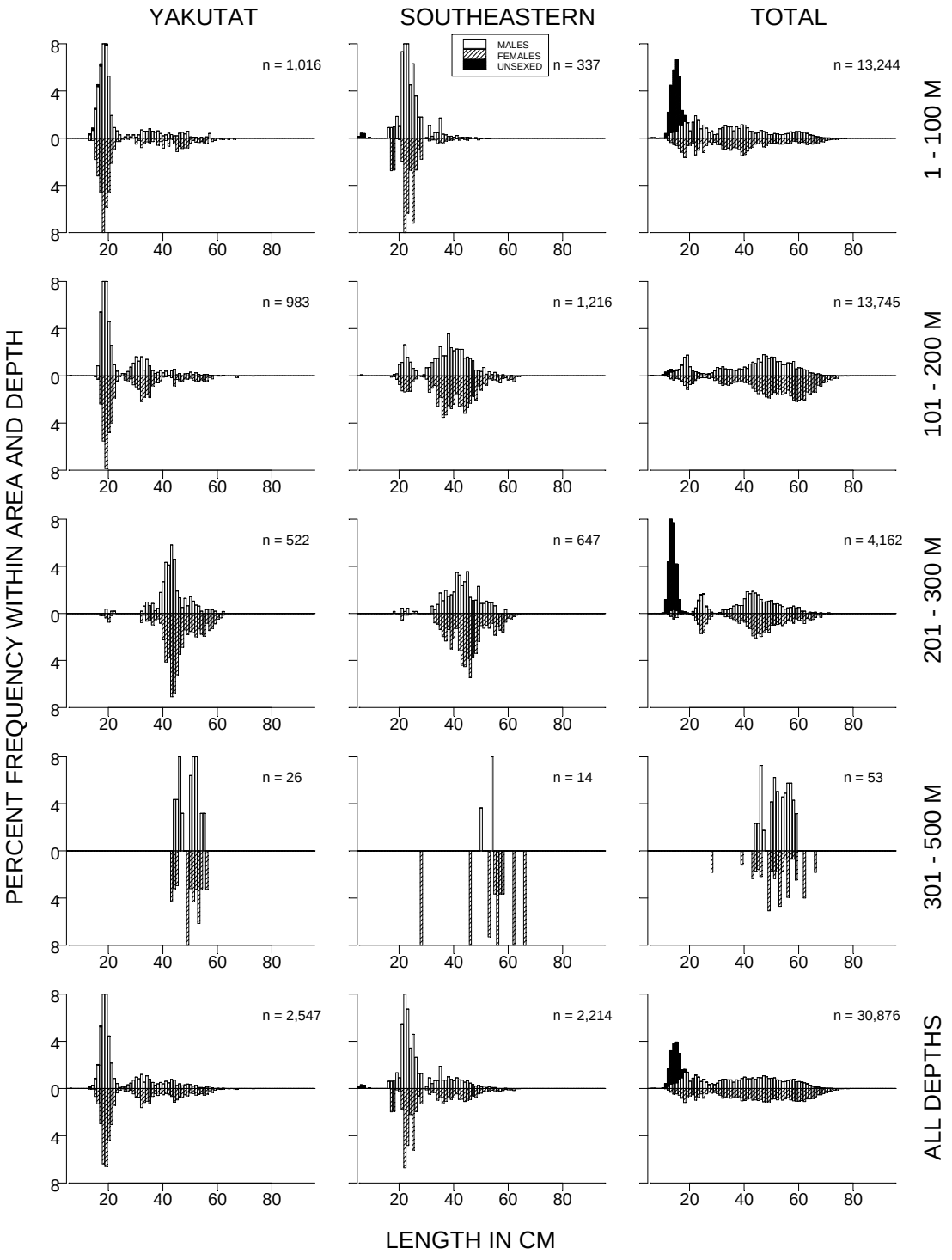

Figure 18. -- Continued (walleye pollock).

Table 28. -- Catch per unit of effort by stratum for walleye pollock sorted by descending CPUE for the 2009 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	Shumagin Outer Shelf	30	27	180.52	147,194	0	300,209
Chirikof	101 - 200	Shelikof Edge	27	27	126.00	97,453	0	197,175
Kodiak	1 - 100	Albatross Shallows	28	21	118.38	68,260	2,827	133,694
Kodiak	101 - 200	Albatross Gullies	26	17	85.40	67,567	3,601	131,533
Chirikof	1 - 100	Upper Alaska Peninsula	17	15	52.29	41,526	0	98,315
Chirikof	201 - 300	Chirikof Slope	8	7	44.63	6,821	0	20,532
Shumagin	1 - 100	Lower Alaska Peninsula	26	25	39.90	27,436	14,371	40,501
Chirikof	101 - 200	Chirikof Outer Shelf	26	22	39.39	19,735	7,676	31,794
Chirikof	1 - 100	Chirikof Bank	37	15	31.62	34,124	2,500	65,748
Kodiak	201 - 300	Kodiak Slope	7	6	29.45	4,778	0	11,132
Shumagin	1 - 100	Davidson Bank	47	29	18.44	25,232	5,791	44,673
Southeastern	1 - 100	Southeastern Shallows	11	11	17.35	11,360	0	30,479
Kodiak	101 - 200	Kodiak Outer Shelf	27	16	16.964	8,526	0	21,428
Kodiak	101 - 200	Barren Islands	18	15	16.345	17,948	4,000	31,896
Kodiak	101 - 200	Portlock Flats	35	28	15.787	11,582	0	26,119
Kodiak	201 - 300	Upper Shelikof Gully	4	4	15.001	4,813	1,285	8,341
Kodiak	1 - 100	Northern Kodiak Shallows	8	7	14.871	3,271	0	10,542
Chirikof	201 - 300	Lower Shelikof Gully	17	17	14.713	14,740	3,221	26,258
Yakutat	201 - 300	Yakutat Gullies	9	9	14.16	4,308	62	8,553
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	11	13.97	5,864	982	10,745
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	14	12.928	5,077	1,355	8,799
Shumagin	101 - 200	West Shumagin Gully	4	3	12.813	2,919	0	7,988
Chirikof	101 - 200	East Shumagin Gully	19	16	12.052	13,383	3,806	22,960
Chirikof	1 - 100	Semidi Bank	24	20	11.575	8,453	0	24,964
Southeastern	101 - 200	Prince of Wales Shelf	15	11	11.534	7,945	836	15,053
Shumagin	201 - 300	Shumagin Slope	17	13	7.68	2,140	661	3,619
Yakutat	101 - 200	Fairweather Shelf	10	8	7.21	5,571	0	12,765
Yakutat	101 - 200	Middleton Shelf	10	8	7.054	5,182	0	11,656
Yakutat	1 - 100	Yakutat Shallows	11	8	6.048	6,016	2,394	9,639
Yakutat	201 - 300	Yakutat Slope	8	7	5.415	1,152	135	2,169
Southeastern	201 - 300	Baranof-Chichagof Slope	5	5	5.41	609	0	1,528
Shumagin	1 - 100	Shumagin Bank	35	23	4.816	5,971	1,647	10,295
Kodiak	201 - 300	Kenai Gullies	20	14	4.01	2,671	0	5,535
Kodiak	1 - 100	Kenai Peninsula	9	4	3.48	1,830	0	4,613
Kodiak	1 - 100	Albatross Banks	40	16	3.158	4,864	0	14,515
Shumagin	101 - 200	Sanak Gully	6	6	2.676	1,136	314	1,959
Kodiak	101 - 200	Kenai Flats	19	13	1.894	2,288	338	4,238
Yakutat	301 - 500	Yakutat Slope	6	4	1.548	235	0	492
Yakutat	1 - 100	Middleton Shallows	8	6	1.344	903	137	1,668
Shumagin	1 - 100	Fox Islands	19	6	1.11	925	0	2,463
Yakutat	101 - 200	Yakutat Flats	7	6	0.88	799	0	1,936
Yakutat	301 - 500	Yakutat Gullies	2	1	0.668	74	0	1,014
Yakutat	101 - 200	Yakataga Shelf	9	4	0.595	314	0	787
Shumagin	301 - 500	Shumagin Slope	7	1	0.575	146	0	502
Southeastern	301 - 500	Southeastern Deep Gullies	7	2	0.486	114	0	299
Southeastern	301 - 500	Southeastern Slope	7	1	0.457	35	0	122
Kodiak	1 - 100	Lower Cook Inlet	15	10	0.27	270	113	427
Chirikof	301 - 500	Chirikof Slope	7	1	0.17	27	0	93
Kodiak	301 - 500	Kodiak Slope	16	2	0.137	40	0	117
Chirikof	501 - 700	Chirikof Slope	5	1	0.12	24	0	89

Pacific cod (*Gadus macrocephalus*)

Pacific cod was the second most abundant species caught in the 2009 survey, up from seventh most abundant in 2007 (Table 2). Cod were caught throughout the survey area in 42 of the 59 survey strata at depths less than 300 m, although CPUEs were low at depths greater than 200 m (Fig. 19, Table 30). Approximately 87% of the survey-wide biomass was estimated to be shallower than 100 m, compared to 63% in 2007. Cod occurred in about 87% of the tows at this depth range. Ninety-eight percent of the total Pacific cod biomass was estimated to be in the central and western Gulf of Alaska with very low densities in the Yakutat and Southeastern INPFC areas (Table 29). The highest densities were recorded at Albatross Banks in the Kodiak INPFC area and at Shumagin Banks near the Shumagin Islands (Fig. 19). Mean weight generally increased with depth. A very distinct length mode occurred for young-of-the-year around 10 cm FL at depths less than 100 m in the Chirikof INPFC area (Fig. 20). The sex ratio of the Pacific cod population in the survey area was almost even, with females accounting for approximately 51% of the total estimated population.

Table 29. -- Number of survey hauls, number of hauls with Pacific cod, mean CPUE, biomass, and mean weight, based on the 2009 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	127	126	45.38	187,365	105,383	269,346	1.273
	101 - 200	40	38	7.60	11,156	8,380	13,932	1.724
	201 - 300	17	7	1.69	471	86	856	1.891
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	171	30.51	198,992	116,964	281,020	1.293
Chirikof	1 - 100	78	70	43.09	112,182	66,044	158,321	0.562
	101 - 200	72	64	9.92	23,670	13,515	33,824	1.709
	201 - 300	25	14	3.72	4,296	1,153	7,440	2.287
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	148	20.59	140,148	92,834	187,462	0.65
Kodiak	1 - 100	100	81	89.35	344,131	0	794,220	2.06
	101 - 200	125	100	11.99	51,936	21,429	82,444	1.754
	201 - 300	31	8	2.84	3,261	0	6,998	2.707
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	189	39.35	399,329	0	850,442	2.018
Yakutat	1 - 100	19	9	4.46	7,423	1,897	12,948	2.604
	101 - 200	36	8	0.99	2,895	256	5,534	3.492
	201 - 300	17	1	0.69	359	0	1,187	2.403
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	18	1.87	10,677	4,694	16,659	2.789
Southeastern	1 - 100	11	7	2.25	1,475	251	2,699	1.262
	101 - 200	26	13	1.39	1,543	578	2,508	1.494
	201 - 300	19	10	0.91	458	163	752	1.867
	301 - 500	14	1	0.10	30	0	102	2.782
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	31	1.25	3,506	1,961	5,051	1.427
All areas	1 - 100	335	293	50.57	652,576	192,832	1,112,320	1.26
	101 - 200	299	223	7.46	91,200	59,449	122,950	1.761
	201 - 300	109	40	2.45	8,845	4,138	13,552	2.374
	301 - 500	52	1	0.02	30	0	102	2.782
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	557	23.52	752,651	291,766	1,213,536	1.312

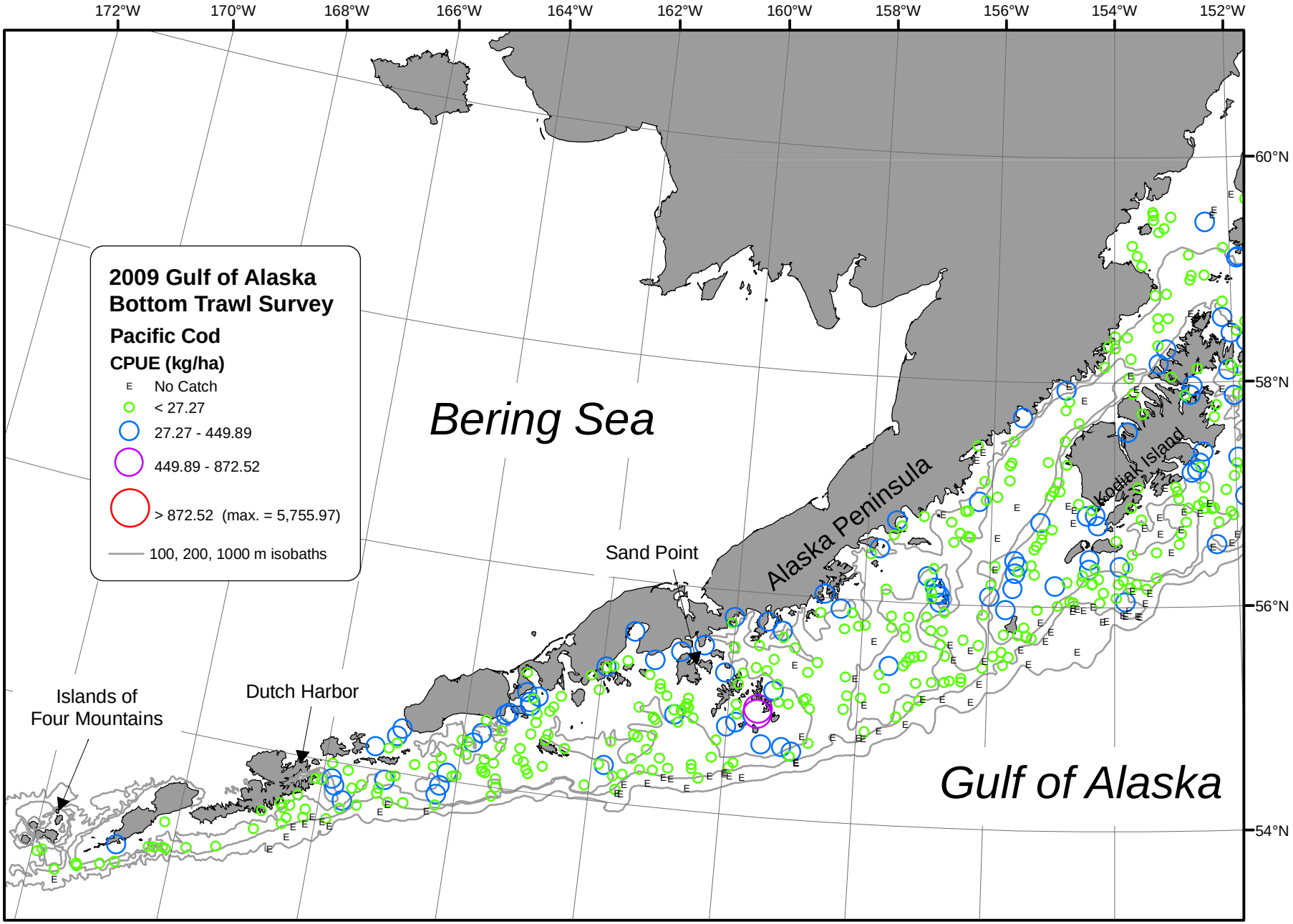

Figure 19. -- Distribution and relative abundance of a Pacific cod from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

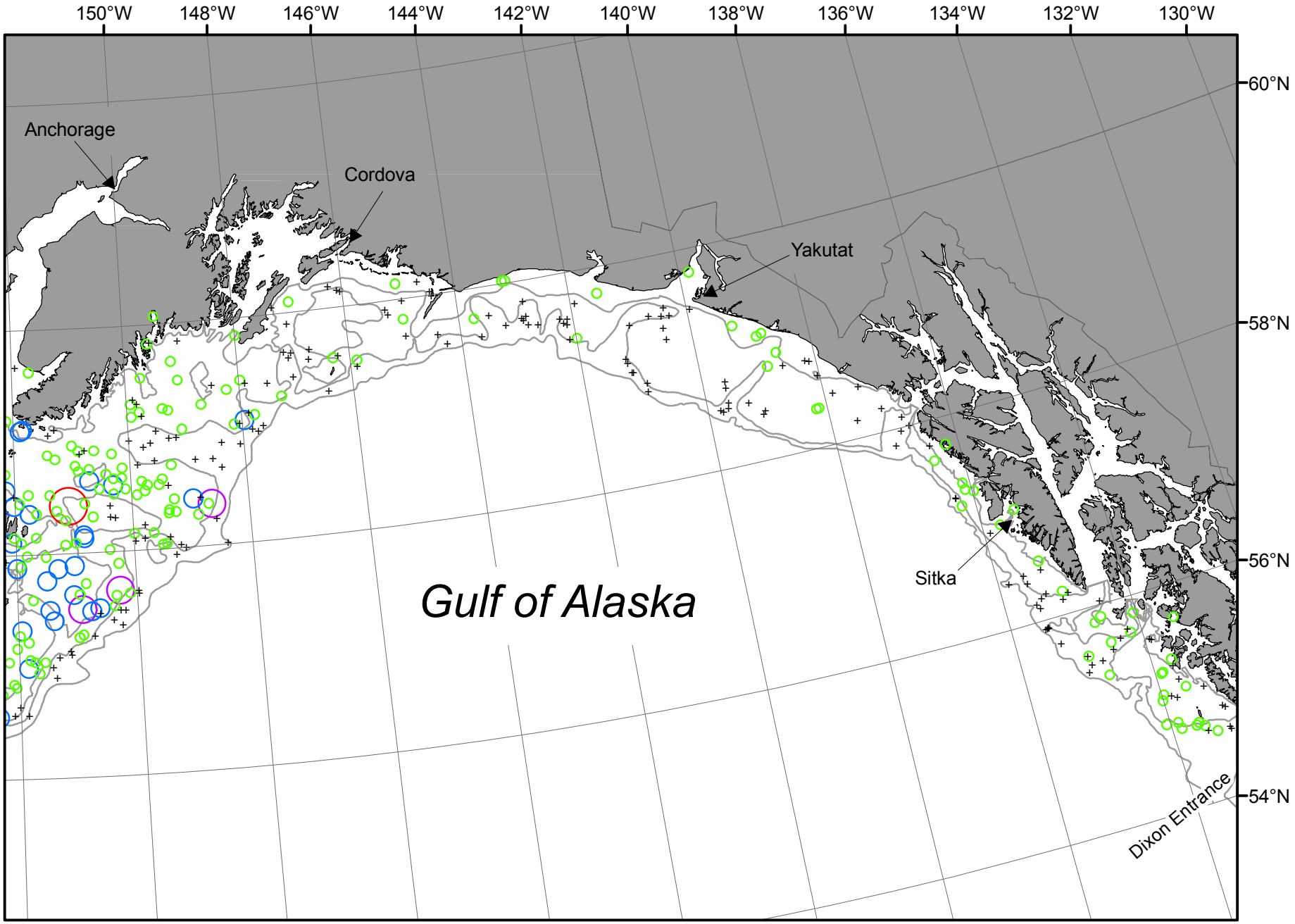

Figure 19. -- Continued (Pacific cod).

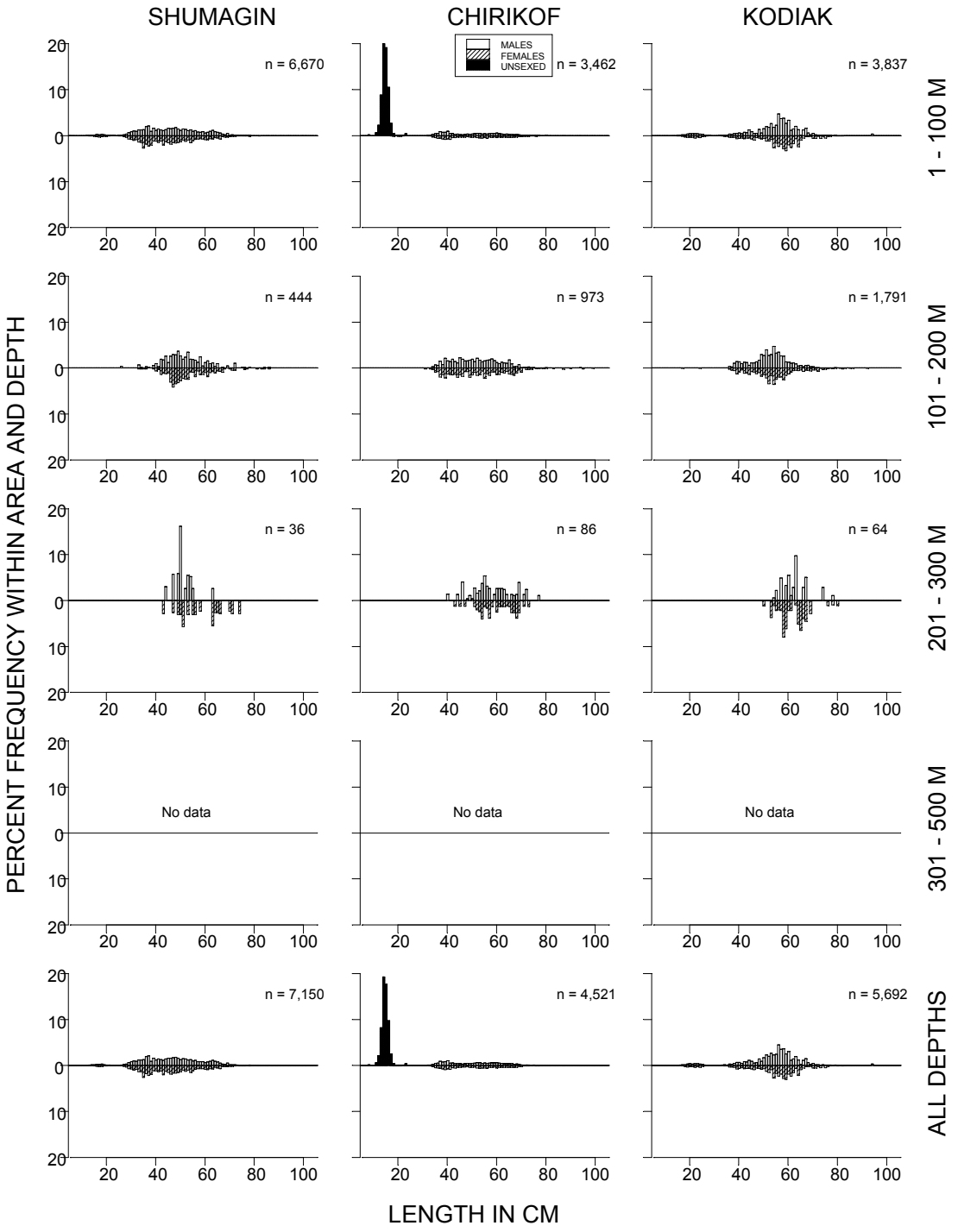

Figure 20. -- Size composition of Pacific cod from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

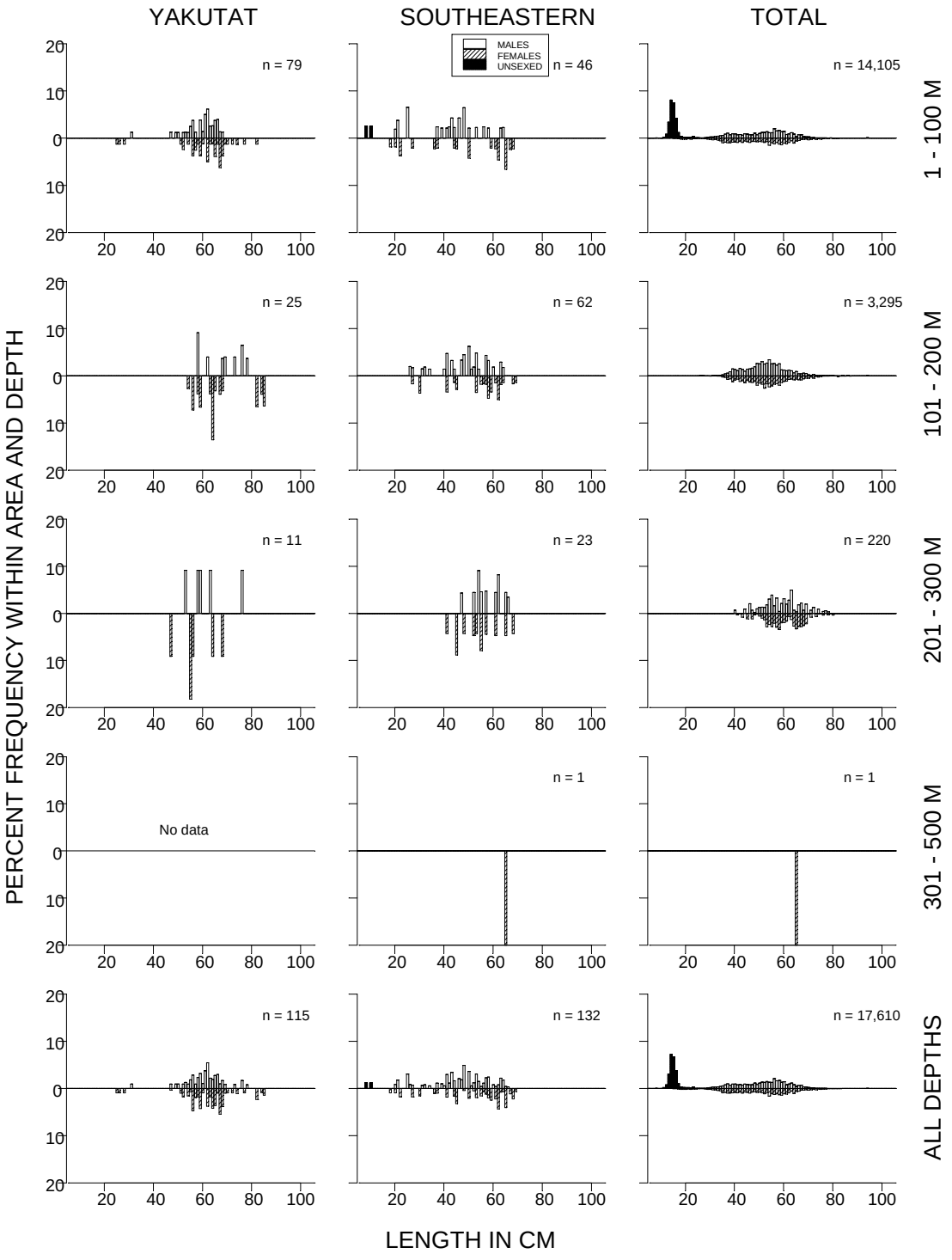

Figure 20. -- Continued (Pacific cod).

Table 30. -- Catch per unit of effort by stratum for Pacific cod sorted by descending CPUE for the 2009 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	40	31	185.93	286,383	0	740,107
Shumagin	1 - 100	Shumagin Bank	35	34	81.49	101,041	22,455	179,627
Kodiak	1 - 100	Albatross Shallows	28	25	58.26	33,594	9,531	57,656
Kodiak	101 - 200	Kodiak Outer Shelf	27	23	56.62	28,455	0	58,348
Chirikof	1 - 100	Semidi Bank	24	23	50.53	36,894	8,038	65,750
Shumagin	1 - 100	Lower Alaska Peninsula	26	26	45.03	30,962	14,008	47,916
Chirikof	1 - 100	Chirikof Bank	37	33	43.46	46,905	17,750	76,059
Chirikof	1 - 100	Upper Alaska Peninsula	17	14	35.74	28,384	3,858	52,909
Kodiak	1 - 100	Northern Kodiak Shallows	8	7	28.05	6,169	0	12,789
Kodiak	1 - 100	Kenai Peninsula	9	6	25.88	13,615	0	33,795
Shumagin	1 - 100	Davidson Bank	47	47	25.57	34,979	22,281	47,677
Shumagin	1 - 100	Fox Islands	19	19	24.46	20,383	10,193	30,572
Chirikof	101 - 200	Shelikof Edge	27	24	12.387	9,581	2,740	16,422
Kodiak	101 - 200	Albatross Gullies	26	20	11.196	8,858	4,341	13,376
Chirikof	101 - 200	Chirikof Outer Shelf	26	23	10.509	5,266	0	11,665
Kodiak	101 - 200	Portlock Flats	35	28	9.343	6,855	2,583	11,127
Shumagin	101 - 200	Shumagin Outer Shelf	30	29	8.403	6,852	5,099	8,604
Chirikof	101 - 200	East Shumagin Gully	19	17	7.946	8,823	4,355	13,291
Shumagin	101 - 200	Sanak Gully	6	6	7.42	3,150	1,219	5,082
Yakutat	1 - 100	Yakutat Shallows	11	7	6.47	6,432	1,042	11,821
Kodiak	201 - 300	Upper Shelikof Gully	4	3	5.43	1,742	0	5,579
Kodiak	101 - 200	Barren Islands	18	18	5.21	5,717	2,891	8,544
Shumagin	101 - 200	West Shumagin Gully	4	3	5.07	1,154	0	3,425
Kodiak	1 - 100	Lower Cook Inlet	15	12	4.419	4,369	0	9,234
Chirikof	201 - 300	Lower Shelikof Gully	17	12	4.165	4,172	1,019	7,326
Southeastern	1 - 100	Southeastern Shallows	11	7	2.254	1,475	237	2,714
Kodiak	201 - 300	Kenai Gullies	20	2	2.02	1,344	0	3,835
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	5	1.85	775	31	1,518
Yakutat	101 - 200	Fairweather Shelf	10	3	1.73	1,340	0	3,208
Kodiak	101 - 200	Kenai Flats	19	11	1.70	2,051	141	3,961
Shumagin	201 - 300	Shumagin Slope	17	7	1.69	471	85	858
Yakutat	201 - 300	Yakutat Slope	8	1	1.688	359	0	1,208
Yakutat	1 - 100	Middleton Shallows	8	2	1.476	991	0	2,789
Southeastern	101 - 200	Prince of Wales Shelf	15	8	1.116	769	63	1,474
Kodiak	201 - 300	Kodiak Slope	7	3	1.08	175	0	440
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	9	1.01	396	128	665
Yakutat	101 - 200	Yakutat Flats	7	1	0.91	821	0	2,831
Chirikof	201 - 300	Chirikof Slope	8	2	0.81	124	0	316
Yakutat	101 - 200	Middleton Shelf	10	2	0.62	458	0	1,362
Southeastern	201 - 300	Baranof-Chichagof Slope	5	1	0.545	61	0	232
Yakutat	101 - 200	Yakataga Shelf	9	2	0.522	275	0	696
Southeastern	301 - 500	Southeastern Deep Gullies	7	1	0.129	30	0	104

Atka mackerel (*Pleurogrammus monopterygius*)

Atka mackerel was the tenth most abundant species caught in the 2009 survey. Approximately 99.6% of the estimated Atka mackerel population was caught in the Shumagin INPFC area where local abundance was relatively high at Davidson Bank and in the Unimak Pass area (Fig. 21 and Tables 31- 32). Almost the entire population was confined to depths less than 200 m with about 97% in waters less than 100 m. Atka mackerel were caught in about 27% of tows at depths less than 200 m in the Shumagin INPFC area. No Atka mackerel were caught east of Prince William Sound. It appears that Atka mackerel segregated by depth with males relatively more common at depths less than 100 m and females relatively more common at depths between 101 and 200 m. Most of the fish captured were longer than 40 cm FL (Fig. 22). The sex ratio of the Atka mackerel population in the survey area was dominated by males, which accounted for approximately 57% of the total estimated population.

Table 31. -- Number of survey hauls, number of hauls with Atka mackerel, mean CPUE, biomass, and mean weight, based on the 2009 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	127	36	31.80	131,306	0	359,402	1.264
	101 - 200	40	9	2.56	3,753	0	10,361	1.375
	201 - 300	17	3	0.11	30	0	68	1.109
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	48	20.71	135,089	0	363,279	1.267
Chirikof	1 - 100	78	7	0.02	65	6	124	0.573
	101 - 200	72	7	0.07	159	0	319	1.339
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	14	0.03	224	55	393	0.965
Kodiak	1 - 100	100	7	0.01	53	1	105	0.459
	101 - 200	125	12	0.05	210	76	345	1.302
	201 - 300	31	2	0.03	31	0	76	1.492
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	21	0.03	294	144	444	0.99
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	0	---	---	---	---	---
	201 - 300	17	1	0.03	16	0	54	1.2
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	1	< 0.01	16	0	54	1.2
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	0	---	---	---	---	---
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	0	---	---	---	---	---
All areas	1 - 100	335	50	10.18	131,424	0	359,519	1.263
	101 - 200	299	28	0.34	4,123	0	10,734	1.37
	201 - 300	109	6	0.02	77	11	143	1.259
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	84	4.24	135,623	0	363,813	1.266

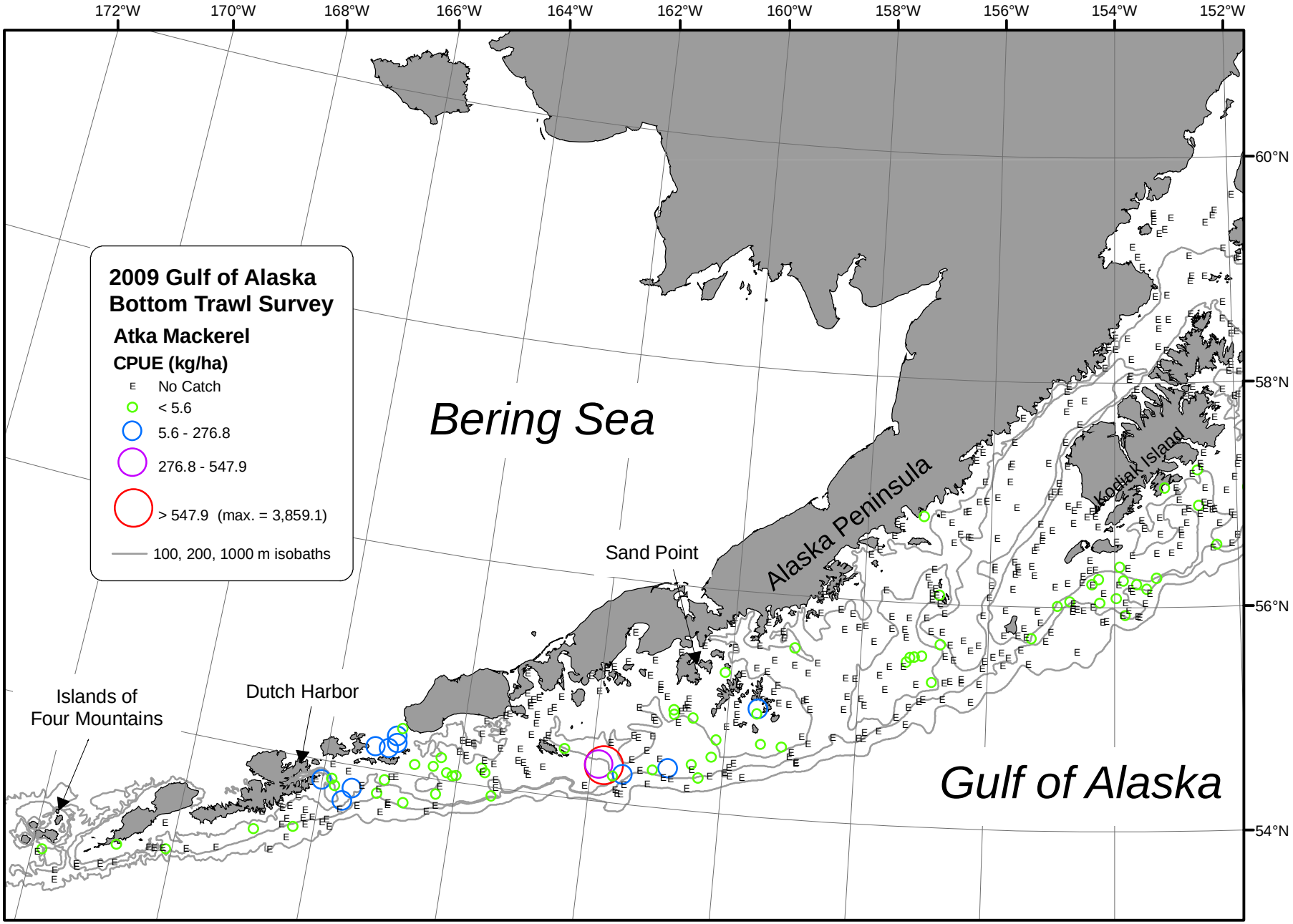

Figure 21. -- Distribution and relative abundance of a Atka mackerel from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

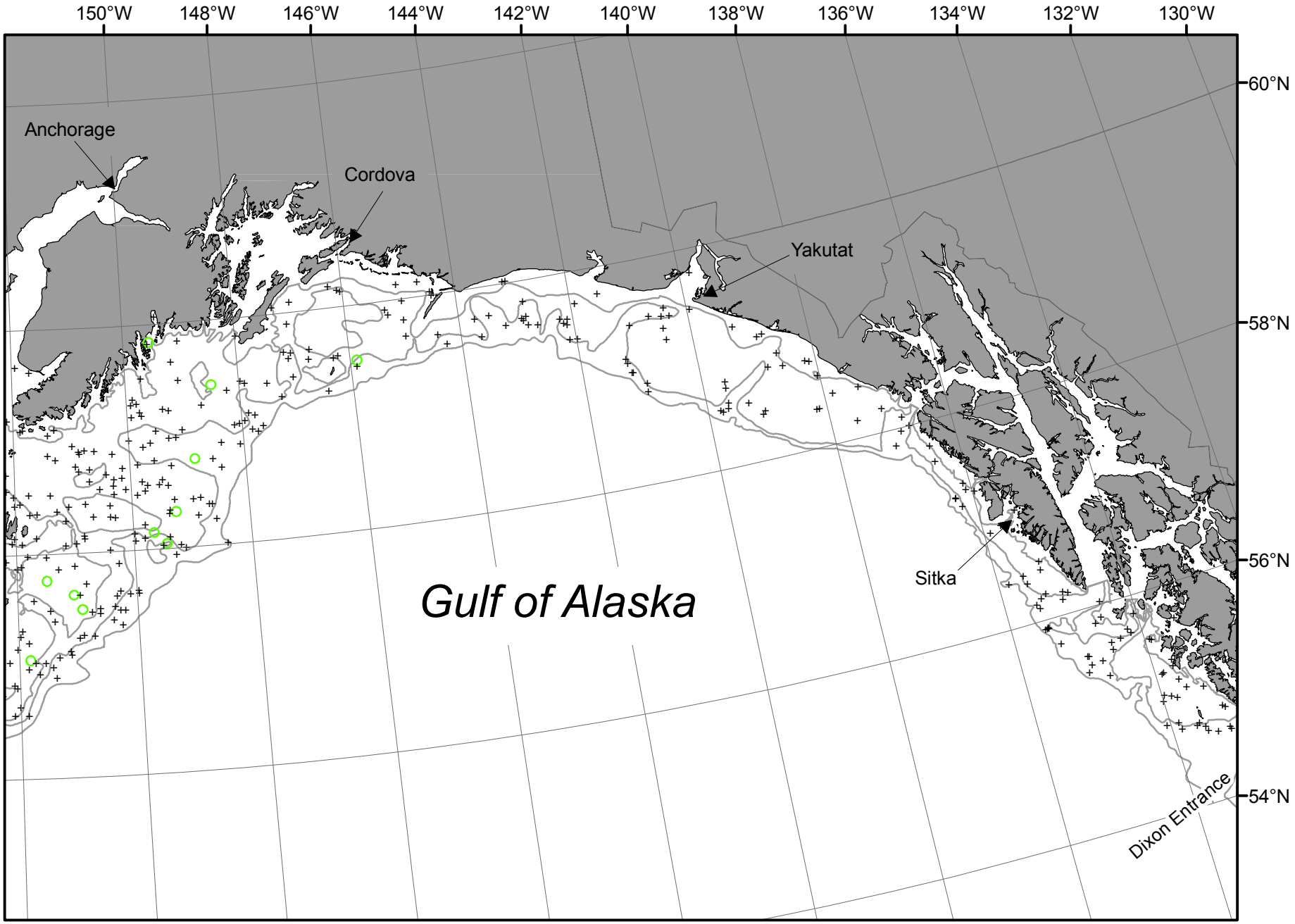

Figure 21. -- Continued (Atka mackerel).

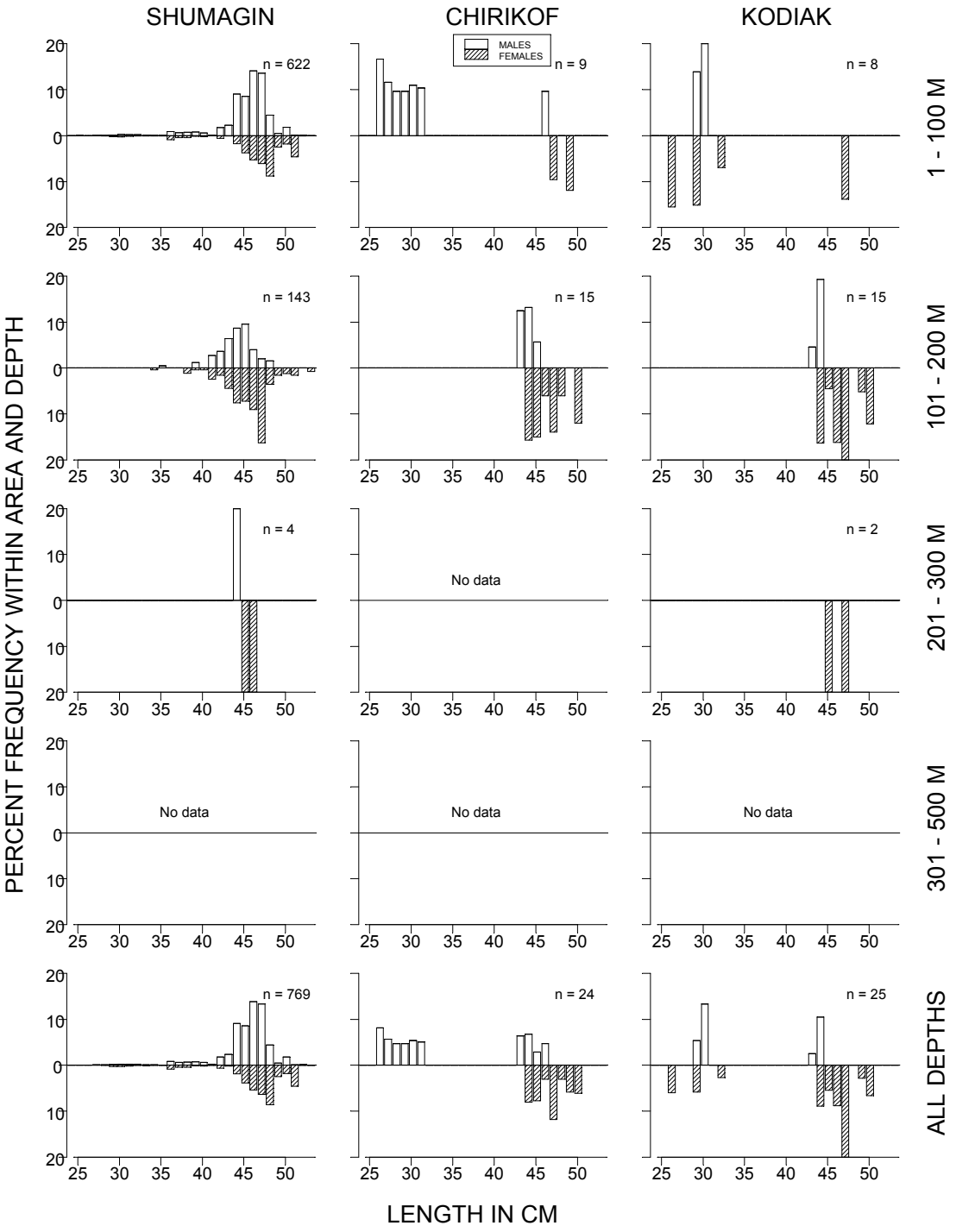

Figure 22. -- Size composition of Atka mackerel from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

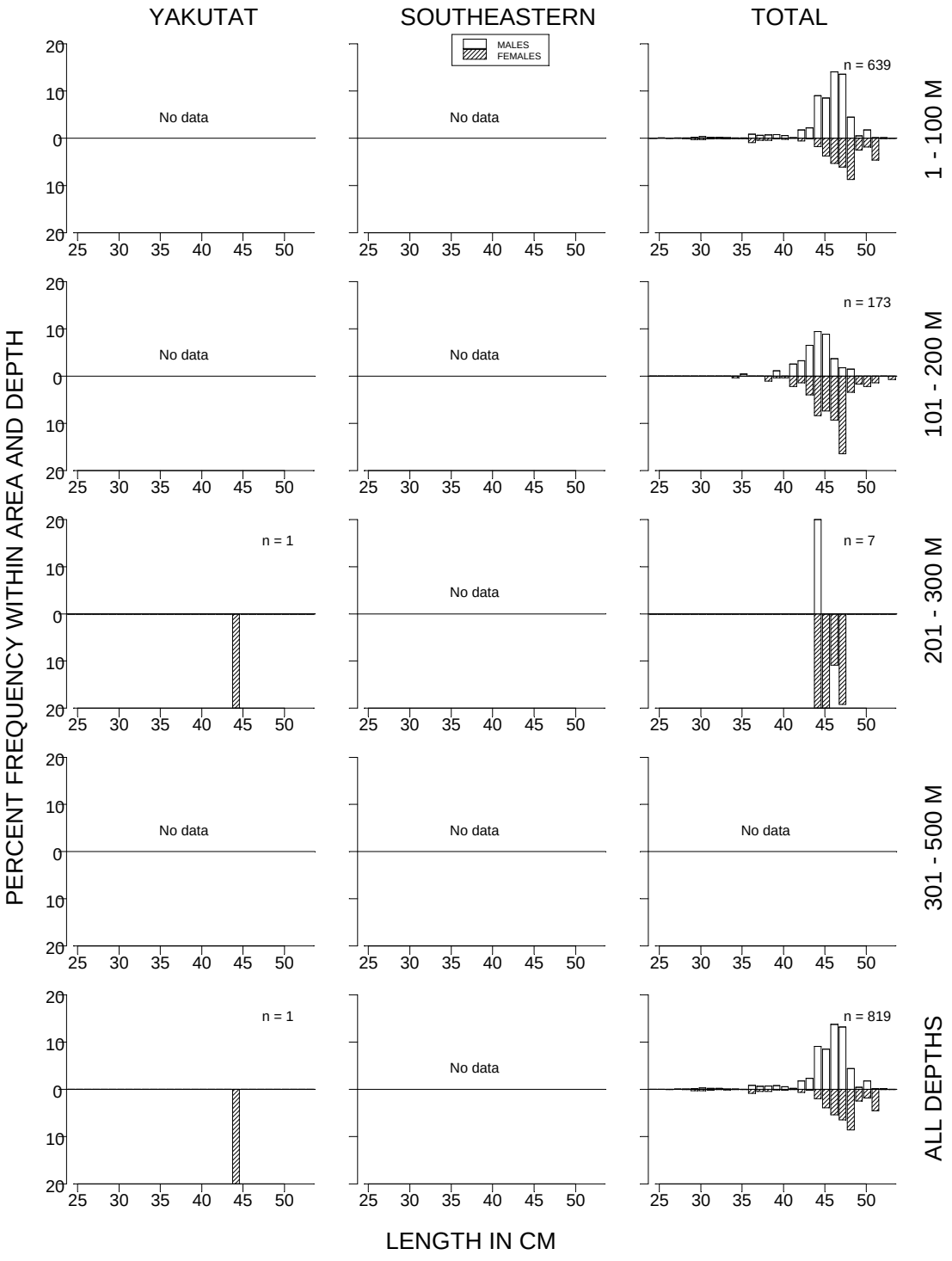

Figure 22. -- Continued (Atka mackerel).

Table 32. -- Catch per unit of effort by stratum for Atka mackerel sorted by descending CPUE for the 2009 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	47	17	93.25	127,576	0	355,653
Shumagin	101 - 200	Shumagin Outer Shelf	30	8	4.56	3,715	0	10,332
Shumagin	1 - 100	Fox Islands	19	9	3.73	3,105	193	6,018
Shumagin	1 - 100	Shumagin Bank	35	9	0.48	598	0	1,377
Chirikof	101 - 200	Chirikof Outer Shelf	26	6	0.29	146	0	306
Kodiak	101 - 200	Kodiak Outer Shelf	27	7	0.21	104	16	191
Shumagin	201 - 300	Shumagin Slope	17	3	0.11	30	0	68
Kodiak	201 - 300	Kodiak Slope	7	1	0.09	15	0	52
Shumagin	101 - 200	Sanak Gully	6	1	0.09	39	0	137
Chirikof	1 - 100	Semidi Bank	24	6	0.08	61	2	120
Yakutat	201 - 300	Yakutat Slope	8	1	0.08	16	0	55
Kodiak	101 - 200	Kenai Flats	19	2	0.05	61	0	150
Shumagin	1 - 100	Lower Alaska Peninsula	26	1	0.041	28	0	86
Kodiak	1 - 100	Albatross Banks	40	5	0.03	47	0	98
Kodiak	101 - 200	Portlock Flats	35	2	0.03	22	0	54
Kodiak	101 - 200	Albatross Gullies	26	1	0.03	23	0	71
Kodiak	201 - 300	Kenai Gullies	20	1	0.024	16	0	49
Chirikof	101 - 200	Shelikof Edge	27	1	0.016	13	0	39
Kodiak	1 - 100	Albatross Shallows	28	2	0.01	6	0	15
Chirikof	1 - 100	Upper Alaska Peninsula	17	1	0.00	3	0	10

Sablefish (*Anoplopoma fimbria*)

Sablefish was the eighth most abundant species caught in the 2009 survey (Table 2). They were caught throughout the survey area in 53 of the 59 survey strata and at all depths. Sablefish occurred in 90% of tows in waters deeper than 200 m, including all tows deeper than 500 m, and 90% of the estimated biomass was recorded at depths deeper than 200 m (Fig. 23, Table 33). CPUEs were consistently highest in the slope strata of all INPFC areas (Table 34). Mean weight generally increased with depth in all areas to 700 m and then remained relatively constant between 701 and 1,000 m (Table 33). A relatively distinct length mode for males occurred around 65 cm FL at depths between 301 and 500 m in the Chirikof, Kodiak, Yakutat, and Southeastern INPFC areas, and between 701 and 1,000 m in the Southeastern INPFC area (Fig. 24). No corresponding length mode occurred for females. Another distinct length mode occurred at approximately 40 cm FL for both males and females at depths less than 100 m in the Yakutat and Southeastern INPFC areas. Small fish (less than 50 cm FL) were almost exclusively confined to depths less than 300 m in all areas. The sex ratio of the sablefish population in the survey area was dominated by males, which accounted for approximately 64% of the total estimated population.

Table 33. -- Number of survey hauls, number of hauls with sablefish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	11	0.03	140	0	294	0.276
	101 - 200	40	4	0.17	248	0	676	0.682
	201 - 300	17	13	24.97	6,961	249	13,673	1.575
	301 - 500	7	7	9.73	2,462	0	5,588	1.95
	501 - 700	3	3	26.93	5,402	0	11,210	3.485
	701 - 1000	2	2	10.69	2,071	0	6,455	4.289
	All depths	196	40	2.65	17,283	8,728	25,838	2.013
Chirikof	1 - 100	78	5	0.03	71	0	144	0.312
	101 - 200	72	15	0.33	787	250	1,325	1.551
	201 - 300	25	22	8.98	10,372	5,442	15,302	2.487
	301 - 500	7	7	41.96	6,729	2,293	11,166	2.722
	501 - 700	5	5	80.22	15,669	7,993	23,346	3.403
	701 - 1000	3	3	18.58	5,697	2,508	8,885	3.001
	All depths	190	57	5.78	39,326	30,372	48,280	2.833
Kodiak	1 - 100	100	8	0.04	163	33	292	0.526
	101 - 200	125	50	2.83	12,282	0	25,779	1.272
	201 - 300	31	30	25.08	28,814	11,095	46,533	2.738
	301 - 500	16	16	41.96	12,217	6,521	17,914	3.114
	501 - 700	4	4	79.65	13,897	1,488	26,307	4.008
	701 - 1000	4	4	42.55	14,865	0	30,774	4.064
	All depths	280	112	8.10	82,239	55,287	109,190	2.608
Yakutat	1 - 100	19	8	0.11	181	44	318	0.467
	101 - 200	36	24	1.72	5,052	0	10,533	0.545
	201 - 300	17	16	6.75	3,490	1,057	5,923	2.359
	301 - 500	8	7	30.71	8,070	0	17,278	2.978
	501 - 700	2	2	114.90	16,882	7,471	26,292	3.468
	701 - 1000	1	1	39.79	7,509	---	---	3.529
	All depths	83	58	7.20	41,184	30,066	52,301	1.976
Southeastern	1 - 100	11	3	0.99	649	0	1,480	0.539
	101 - 200	26	12	0.83	916	316	1,517	0.719
	201 - 300	19	12	3.05	1,542	385	2,698	2.613
	301 - 500	14	12	19.34	6,029	386	11,672	2.954
	501 - 700	2	2	19.81	2,047	1,318	2,777	3.166
	701 - 1000	2	2	91.15	10,996	0	29,199	2.824
	All depths	74	43	7.91	22,178	8,536	35,820	2.299
All areas	1 - 100	335	35	0.09	1,203	347	2,060	0.457
	101 - 200	299	105	1.58	19,285	4,970	33,601	0.915
	201 - 300	109	93	14.20	51,179	31,849	70,509	2.416
	301 - 500	52	49	27.76	35,508	23,579	47,436	2.861
	501 - 700	16	16	65.68	53,897	40,635	67,159	3.561
	701 - 1000	12	12	35.49	41,137	22,459	59,815	3.411
	All depths	823	310	6.32	202,209	169,508	234,911	2.393

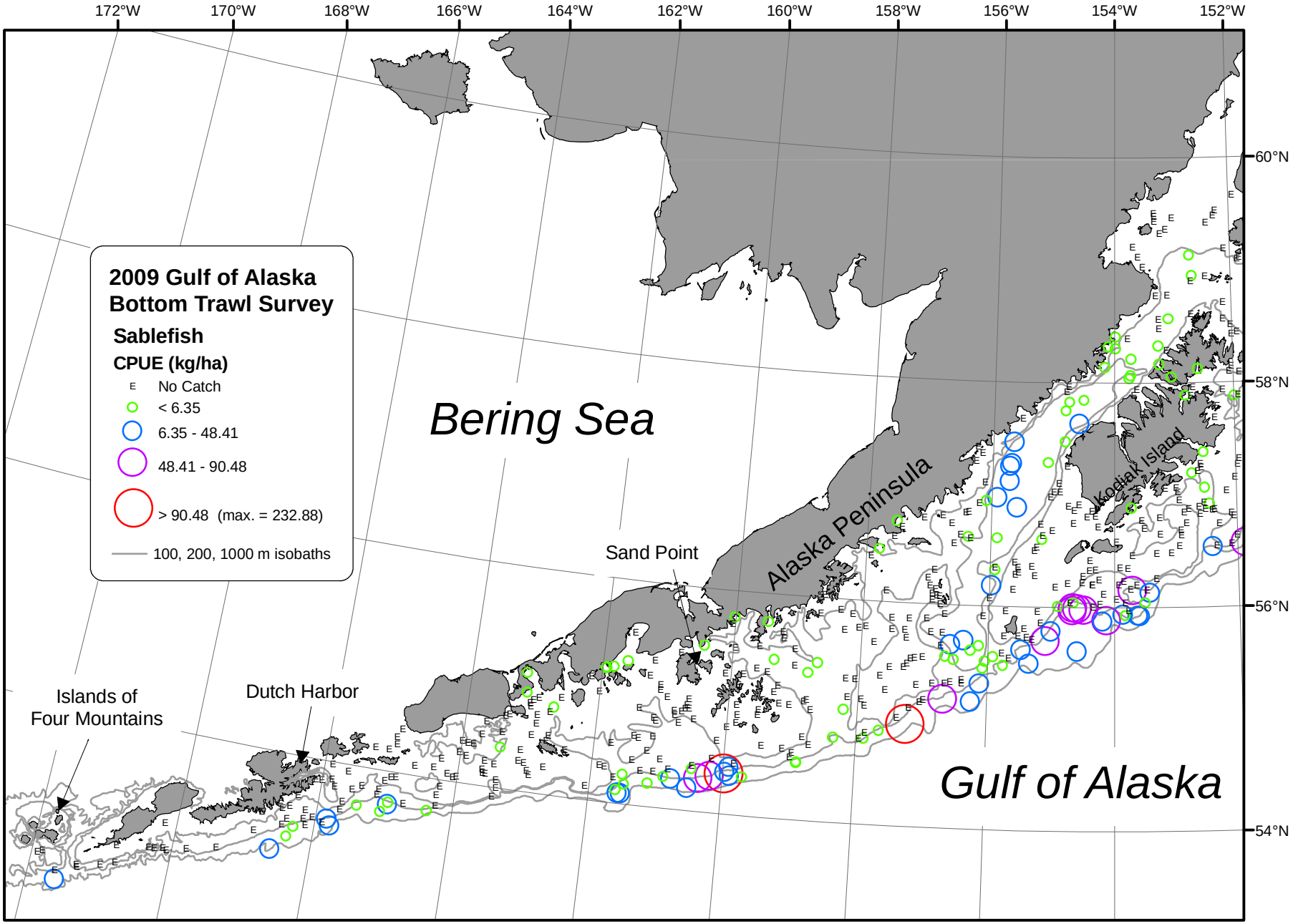

Figure 23. -- Distribution and relative abundance of a sablefish from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

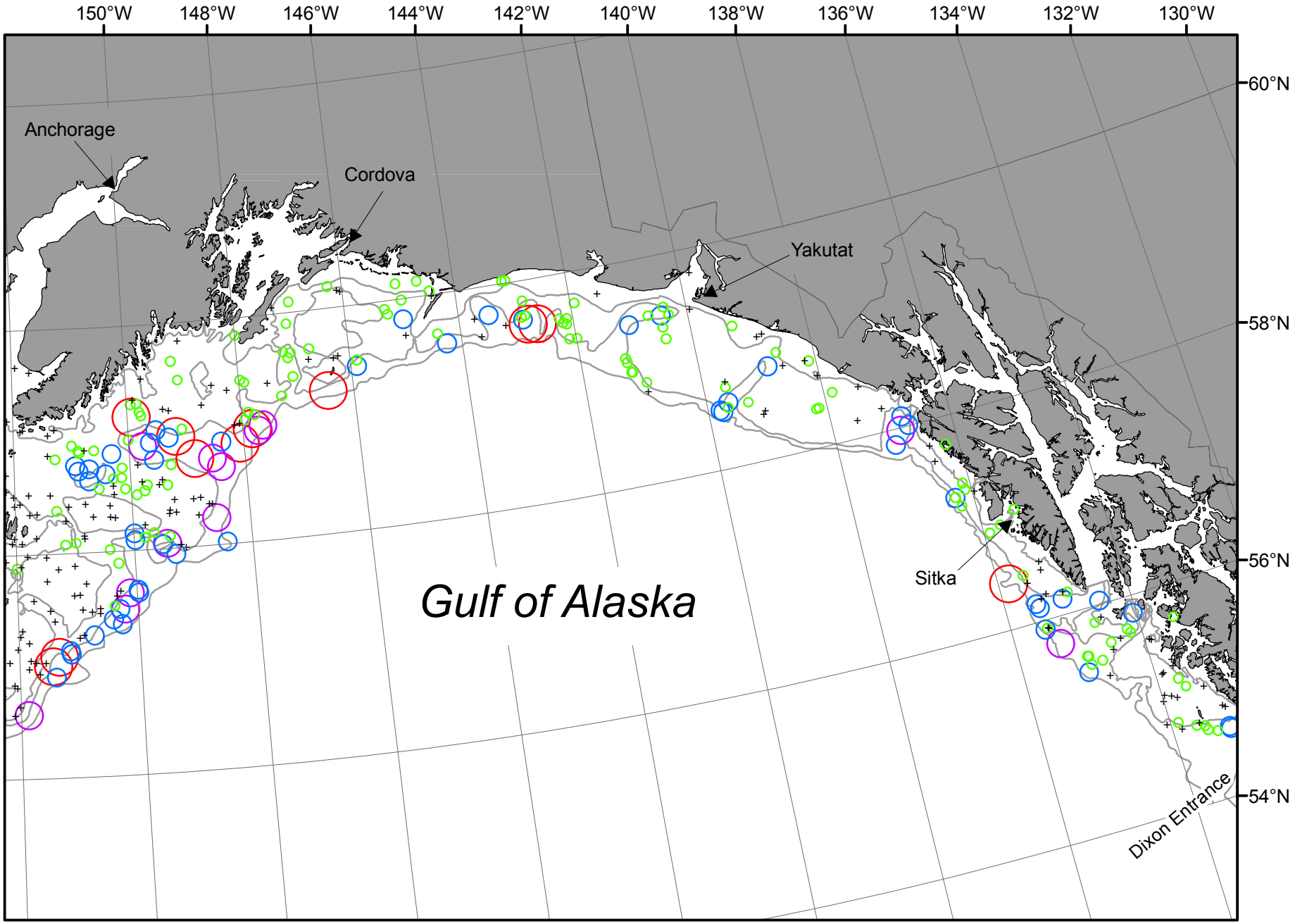

Figure 23. -- Continued (sablefish).

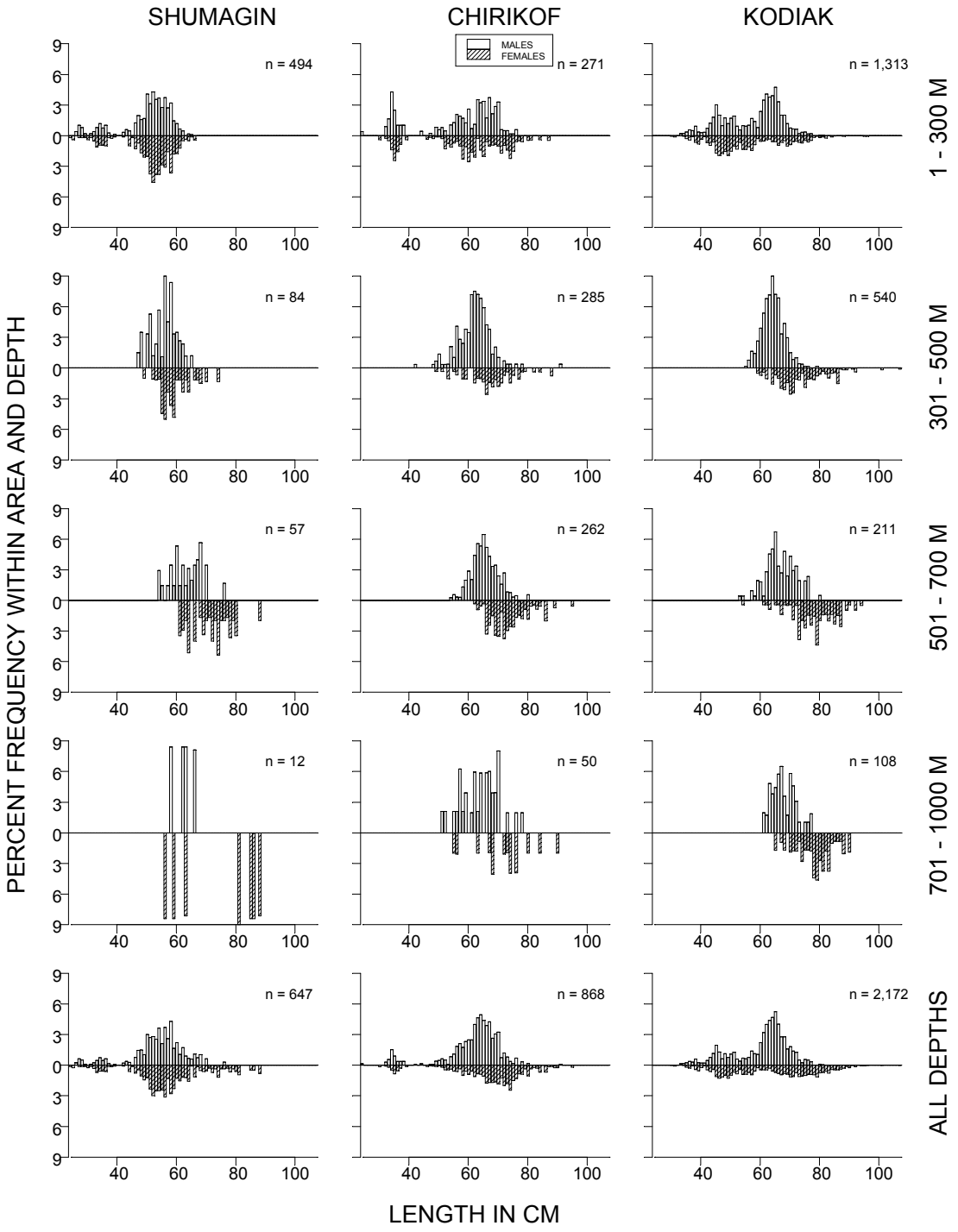

Figure 24. -- Size composition of sablefish from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

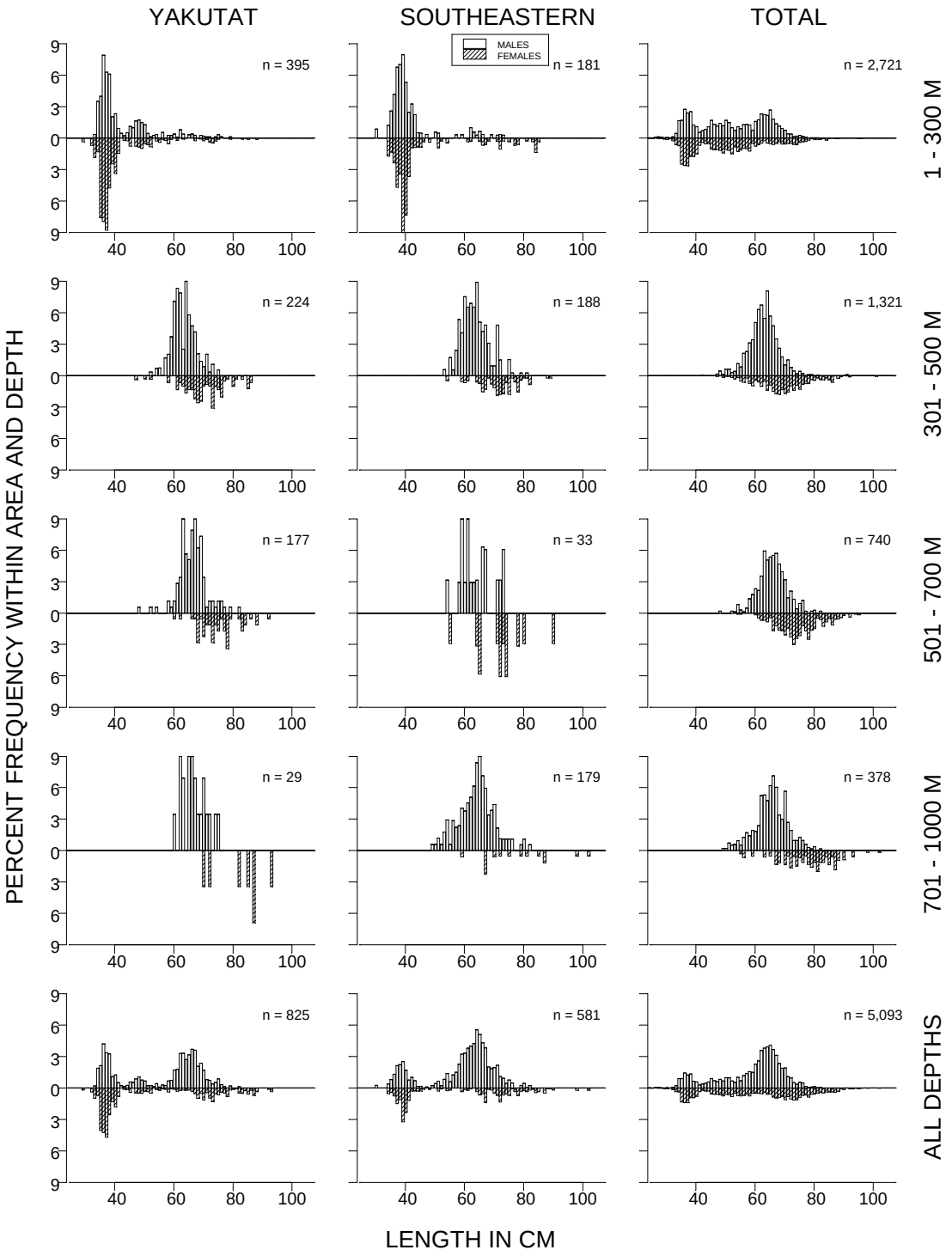

Figure 24. -- Continued (sablefish).

Table 34. -- Catch per unit of effort by stratum for sablefish sorted by descending CPUE for the 2009 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	2	2	114.90	16,882	0	44,669
Southeastern	701 - 1000	Southeastern Slope	2	2	91.15	10,996	0	64,747
Chirikof	501 - 700	Chirikof Slope	5	5	80.22	15,669	7,381	23,958
Kodiak	501 - 700	Kodiak Slope	4	4	79.65	13,897	0	28,122
Kodiak	701 - 1000	Kodiak Slope	4	4	42.55	14,865	0	33,100
Kodiak	301 - 500	Kodiak Slope	16	16	41.96	12,217	6,491	17,943
Chirikof	301 - 500	Chirikof Slope	7	7	41.96	6,729	2,139	11,320
Yakutat	701 - 1000	Yakutat Slope	1	1	39.79	7,509		
Kodiak	201 - 300	Kenai Gullies	20	20	34.80	23,175	5,895	40,455
Yakutat	301 - 500	Yakutat Slope	6	5	32.72	4,975	0	13,564
Yakutat	301 - 500	Yakutat Gullies	2	2	27.95	3,095	0	30,890
Shumagin	501 - 700	Shumagin Slope	3	3	26.93	5,402	0	13,256
Shumagin	201 - 300	Shumagin Slope	17	13	24.969	6,961	217	13,705
Kodiak	201 - 300	Kodiak Slope	7	6	23.433	3,802	0	8,561
Southeastern	301 - 500	Southeastern Deep Gullies	7	7	22.275	5,222	0	10,973
Southeastern	501 - 700	Southeastern Slope	2	2	19.81	2,047	0	4,201
Chirikof	701 - 1000	Chirikof Slope	3	3	18.583	5,697	1,385	10,009
Shumagin	701 - 1000	Shumagin Slope	2	2	10.69	2,071	0	15,016
Southeastern	301 - 500	Southeastern Slope	7	5	10.44	807	0	1,811
Shumagin	301 - 500	Shumagin Slope	7	7	9.73	2,462	0	5,696
Chirikof	201 - 300	Lower Shelikof Gully	17	15	9.42	9,432	4,603	14,261
Yakutat	201 - 300	Yakutat Gullies	9	9	8.62	2,624	189	5,058
Southeastern	201 - 300	Baranof-Chichagof Slope	5	4	7.78	875	0	1,990
Kodiak	101 - 200	Kenai Flats	19	10	6.23	7,528	0	20,718
Chirikof	201 - 300	Chirikof Slope	8	7	6.16	941	0	2,172
Kodiak	201 - 300	Upper Shelikof Gully	4	4	5.73	1,837	0	4,354
Yakutat	201 - 300	Yakutat Slope	8	7	4.07	866	381	1,351
Yakutat	101 - 200	Fairweather Shelf	10	5	3.59	2,771	0	8,113
Kodiak	101 - 200	Portlock Flats	35	21	3.23	2,368	599	4,138
Kodiak	101 - 200	Kodiak Outer Shelf	27	4	2.84	1,427	0	3,792
Yakutat	101 - 200	Middleton Shelf	10	7	1.992	1,463	0	3,378
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	8	1.696	666	0	1,486
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	6	1.524	640	78	1,202
Southeastern	1 - 100	Southeastern Shallows	11	3	0.991	649	0	1,490
Yakutat	101 - 200	Yakataga Shelf	9	7	0.875	462	158	766
Kodiak	101 - 200	Albatross Gullies	26	8	0.69	546	0	1,100
Chirikof	101 - 200	Chirikof Outer Shelf	26	4	0.51	254	0	533
Southeastern	101 - 200	Prince of Wales Shelf	15	6	0.40	277	0	584
Yakutat	101 - 200	Yakutat Flats	7	5	0.39	356	38	674
Kodiak	101 - 200	Barren Islands	18	7	0.38	412	64	761
Kodiak	1 - 100	Northern Kodiak Shallows	8	3	0.31	68	0	154
Chirikof	101 - 200	Shelikof Edge	27	8	0.30	229	14	443
Shumagin	101 - 200	Shumagin Outer Shelf	30	3	0.29	233	0	660
Chirikof	101 - 200	East Shumagin Gully	19	3	0.28	305	0	721
Yakutat	1 - 100	Middleton Shallows	8	4	0.17	116	0	251
Shumagin	1 - 100	Lower Alaska Peninsula	26	10	0.17	119	0	268
Kodiak	1 - 100	Albatross Shallows	28	4	0.10	56	0	118
Chirikof	1 - 100	Upper Alaska Peninsula	17	4	0.085	67	0	140
Kodiak	1 - 100	Kenai Peninsula	9	1	0.075	39	0	130
Yakutat	1 - 100	Yakutat Shallows	11	4	0.065	65	4	126
Shumagin	101 - 200	West Shumagin Gully	4	1	0.065	15	0	62
Shumagin	1 - 100	Davidson Bank	47	1	0.015	21	0	64
Chirikof	1 - 100	Chirikof Bank	37	1	0.00	4	0	11

Giant grenadier (*Albatrossia pectoralis*)

Giant grenadier was the third most abundant species caught in the 2009 survey (Table 2). They were caught throughout the survey area, although almost exclusively in slope strata at depths exceeding 300 m (Fig. 25, Tables 35-36). Approximately 97% of the biomass was found in the Shumagin, Chirikof, and Kodiak INPFC areas with most of the remainder in the Yakutat INPFC area. Giant grenadier occurred in 73% of tows in waters deeper than 300 m, including 27 out of 28 tows deeper than 500 m, and over 99% of the estimated biomass was recorded at depths deeper than 300 m (Table 35). Mean CPUEs were very high in most of the strata where giant grenadier occurred. Mean weight generally declined with depth to 700 m as the smaller males made up a larger fraction of the total population at deeper depths (Fig. 26, Table 35). A relatively distinct length mode occurred around 25-30 cm (snout to anal fin insertion) at all depths and INPFC areas (except for Southeastern) for females, whereas males exhibited no discernable length mode. The sex ratio of the giant grenadier population in the survey area was dominated by females which comprised approximately 86% of the total estimated population.

Table 35. -- Number of survey hauls, number of hauls with giant grenadier, mean CPUE, biomass, and mean weight, based on the 2009 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	127	0	---	---	---	---	---
	101 - 200	40	0	---	---	---	---	---
	201 - 300	17	2	5.81	1,620	0	4,807	3.314
	301 - 500	7	7	140.83	35,646	12,741	58,551	3.173
	501 - 700	3	3	373.48	74,905	0	176,865	2.505
	701 - 1000	2	2	380.36	73,684	0	240,235	2.914
	All depths	196	14	28.49	185,855	43,737	327,973	2.778
Chirikof	1 - 100	78	0	---	---	---	---	---
	101 - 200	72	0	---	---	---	---	---
	201 - 300	25	2	0.05	55	0	140	3.944
	301 - 500	7	7	179.73	28,827	8,926	48,729	3.237
	501 - 700	5	5	172.52	33,698	13,024	54,371	2.46
	701 - 1000	3	3	112.16	34,384	0	77,535	2.745
	All depths	190	17	14.25	96,964	47,354	146,574	2.759
Kodiak	1 - 100	100	0	---	---	---	---	---
	101 - 200	125	0	---	---	---	---	---
	201 - 300	31	4	0.62	711	0	1,792	3.667
	301 - 500	16	13	100.46	29,252	10,925	47,580	3.036
	501 - 700	4	4	291.35	50,836	0	111,257	2.405
	701 - 1000	4	4	949.15	331,621	0	1,079,807	3.21
	All depths	280	25	40.64	412,420	0	1,163,427	3.071
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	3	7.17	1,885	0	5,402	2.907
	501 - 700	2	2	73.81	10,845	4,022	17,667	2.266
	701 - 1000	1	1	35.63	6,725	---	---	1.554
	All depths	83	6	3.40	19,455	12,997	25,912	1.993
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	0	---	---	---	---	---
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	1	2.19	683	0	2,297	3.178
	501 - 700	2	1	12.65	1,307	0	6,930	2.138
	701 - 1000	2	2	13.56	1,636	0	3,428	1.84
	All depths	74	4	1.29	3,625	0	7,878	2.114
All areas	1 - 100	335	0	---	---	---	---	---
	101 - 200	299	0	---	---	---	---	---
	201 - 300	109	8	0.66	2,386	0	5,691	3.425
	301 - 500	52	31	75.28	96,294	63,509	129,078	3.143
	501 - 700	16	15	209.09	171,590	69,741	273,440	2.447
	701 - 1000	12	12	386.57	448,050	0	1,204,850	3.061
	All depths	823	66	22.45	718,320	0	1,484,296	2.899

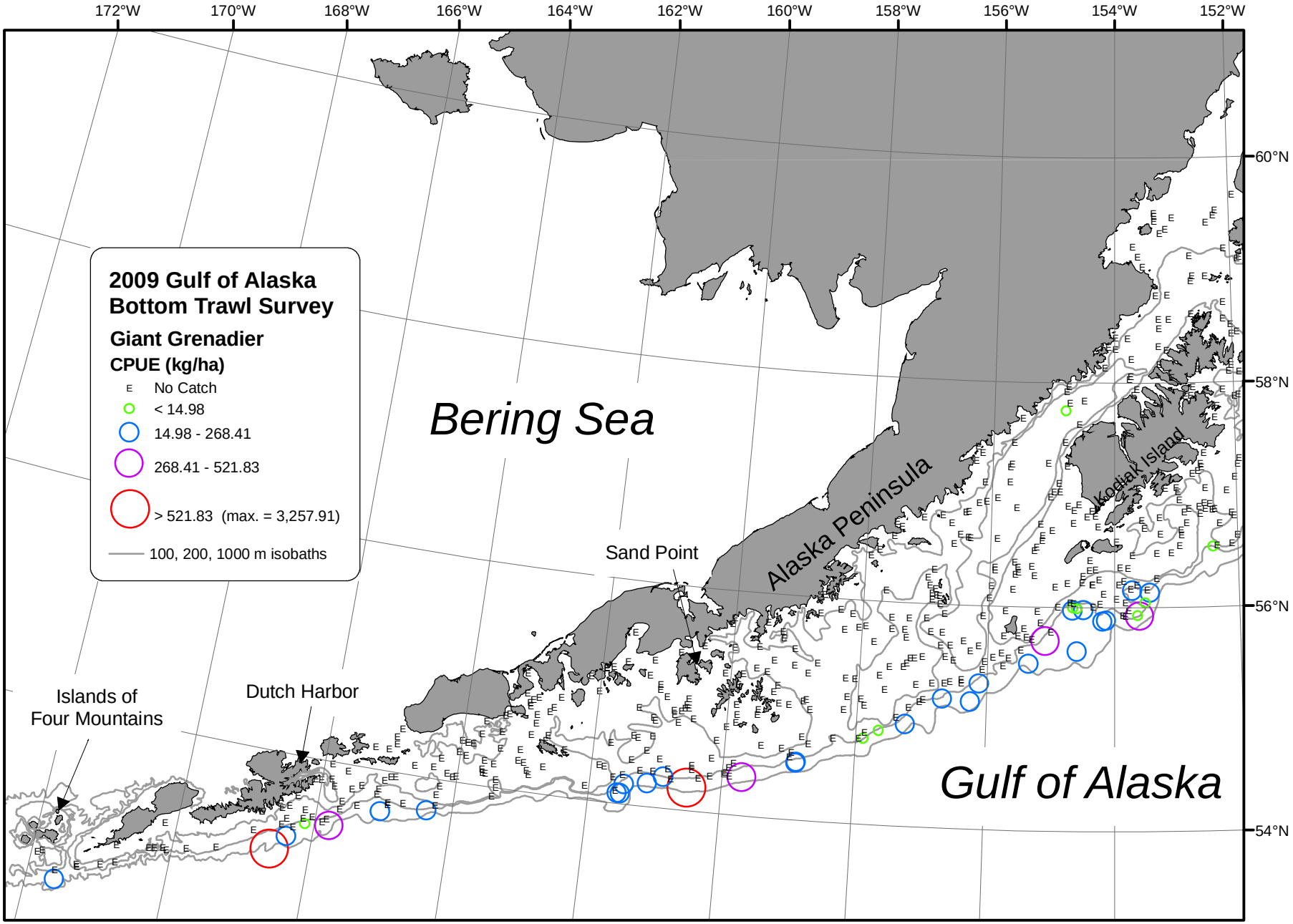

Figure 25. -- Distribution and relative abundance of a giant grenadier from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

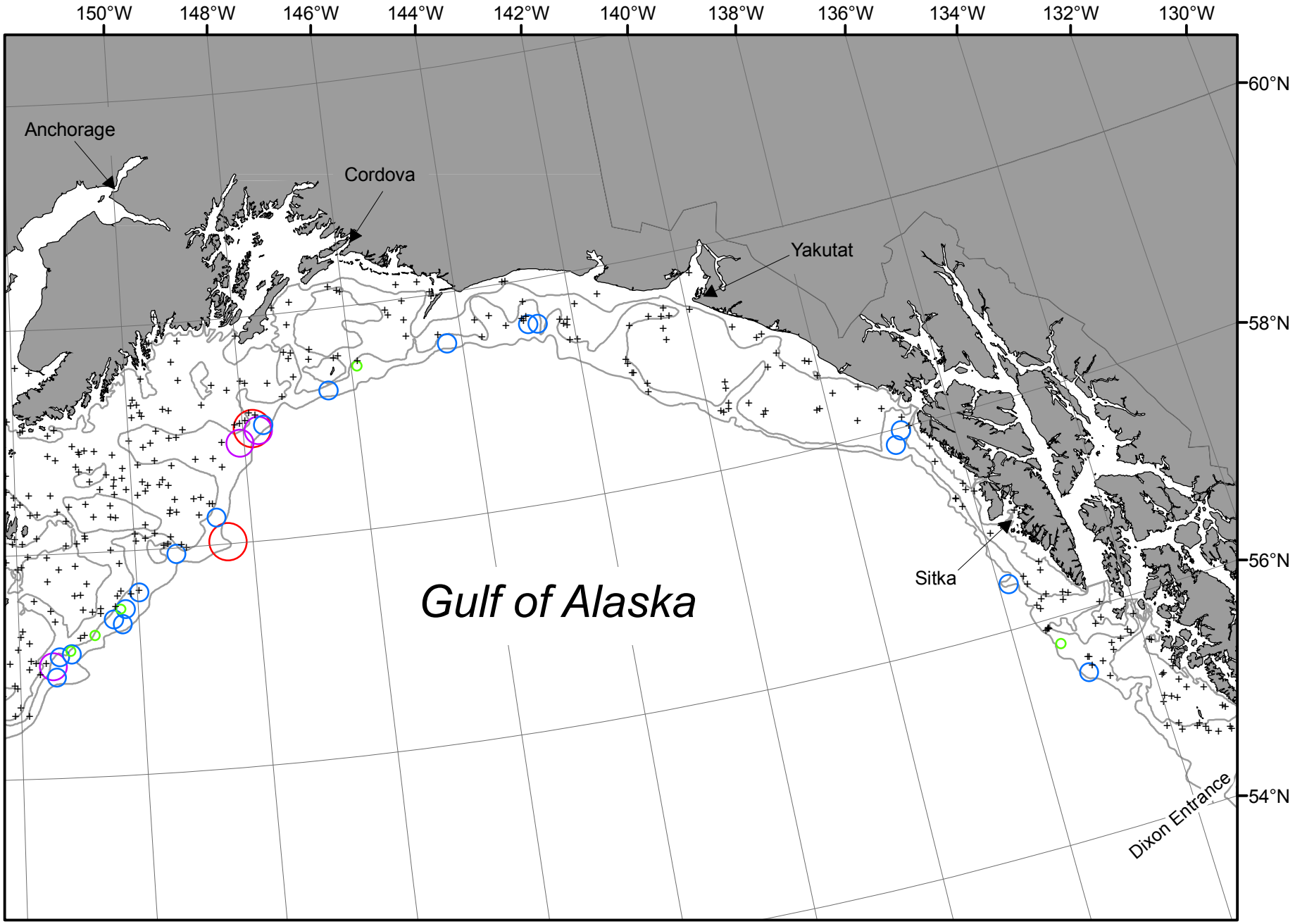

Figure 25. -- Continued (giant grenadier).

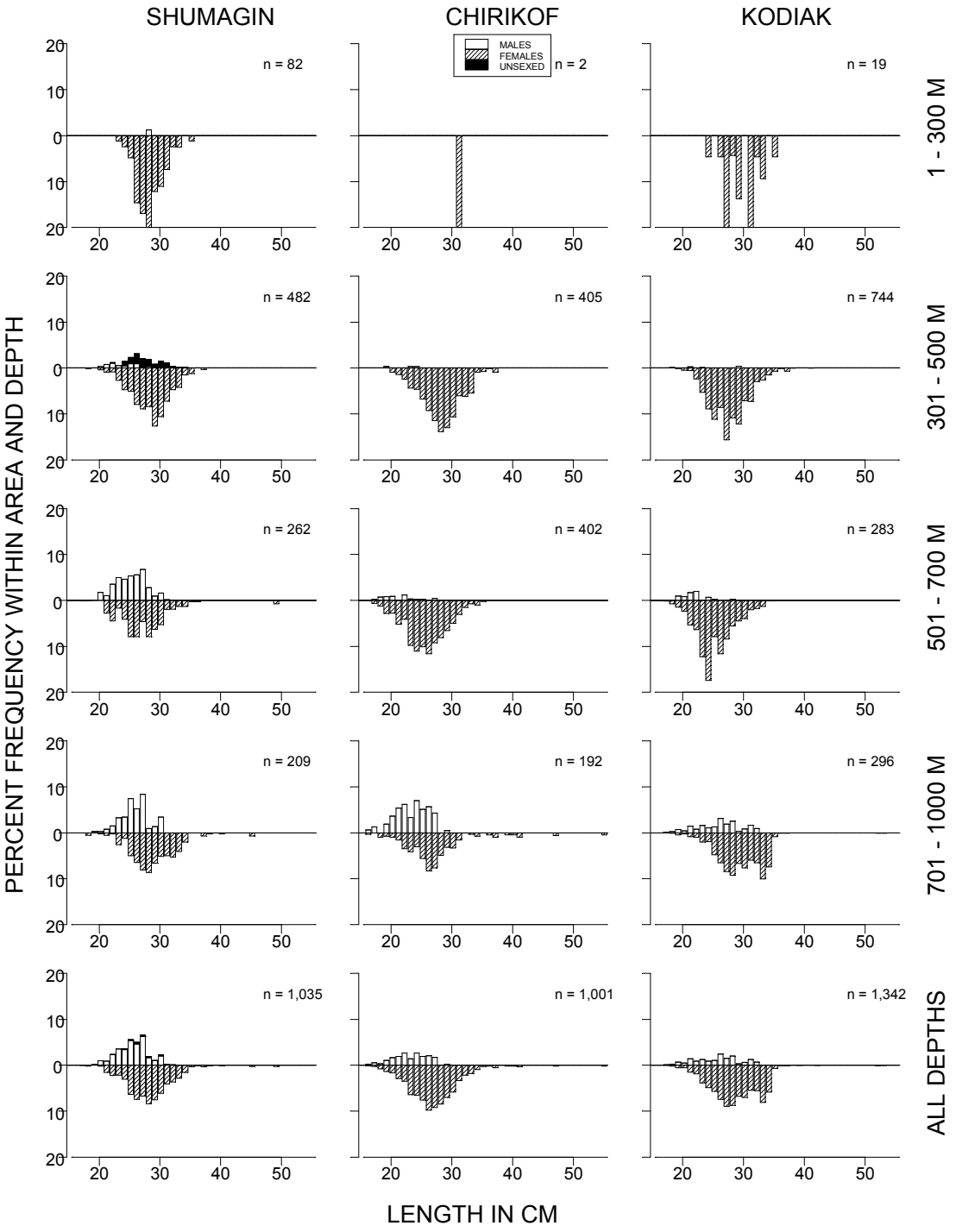

Figure 26. -- Size composition of giant grenadier from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

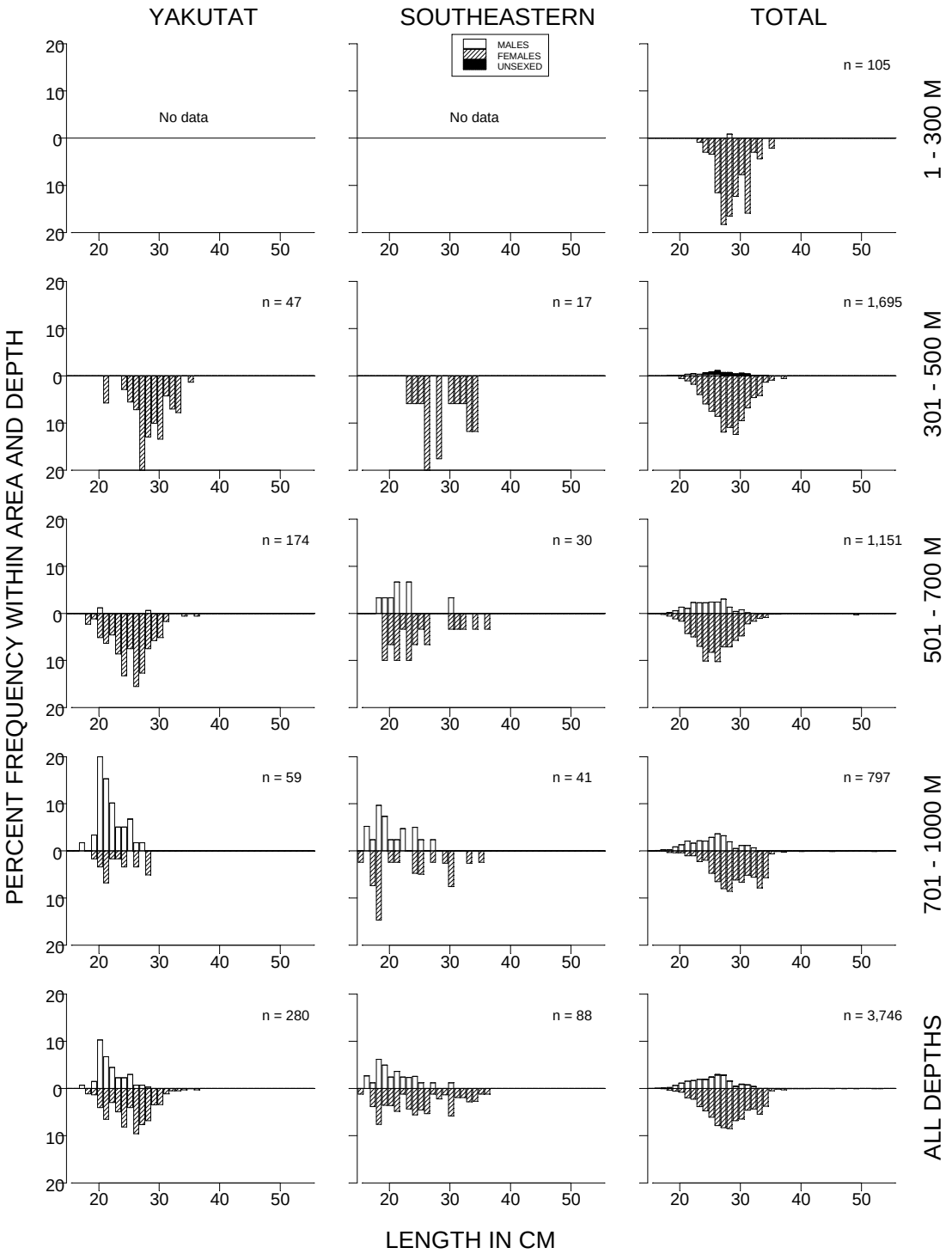

Figure 26. -- Continued (giant grenadier).

Table 36. -- Catch per unit of effort by stratum for giant grenadier sorted by descending CPUE for the 2009 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	701 - 1000	Kodiak Slope	4	4	949.15	331,621	0	1,189,232
Shumagin	701 - 1000	Shumagin Slope	2	2	380.36	73,684	0	565,480
Shumagin	501 - 700	Shumagin Slope	3	3	373.48	74,905	0	212,785
Kodiak	501 - 700	Kodiak Slope	4	4	291.35	50,836	0	120,093
Chirikof	301 - 500	Chirikof Slope	7	7	179.73	28,827	8,236	49,419
Chirikof	501 - 700	Chirikof Slope	5	5	172.52	33,698	11,376	56,019
Shumagin	301 - 500	Shumagin Slope	7	7	140.83	35,646	11,947	59,345
Chirikof	701 - 1000	Chirikof Slope	3	3	112.16	34,384	0	92,737
Kodiak	301 - 500	Kodiak Slope	16	13	100.46	29,252	10,830	47,675
Yakutat	501 - 700	Yakutat Slope	2	2	73.81	10,845	0	30,989
Yakutat	701 - 1000	Yakutat Slope	1	1	35.63	6,725		
Southeastern	701 - 1000	Southeastern Slope	2	2	13.56	1,636	0	6,929
Southeastern	501 - 700	Southeastern Slope	2	1	12.645	1,307	0	17,911
Yakutat	301 - 500	Yakutat Gullies	2	1	9.167	1,015	0	13,912
Shumagin	201 - 300	Shumagin Slope	17	2	5.81	1,620	0	4,823
Yakutat	301 - 500	Yakutat Slope	6	2	5.723	870	0	2,820
Kodiak	201 - 300	Kodiak Slope	7	3	3.551	576	0	1,732
Southeastern	301 - 500	Southeastern Deep Gullies	7	1	2.912	683	0	2,353
Kodiak	201 - 300	Upper Shelikof Gully	4	1	0.42	134	0	562
Chirikof	201 - 300	Chirikof Slope	8	2	0.36	55	0	142

ROCKFISHES

Pacific ocean perch (*Sebastes alutus*)

Pacific ocean perch was the fifth most abundant species caught in the 2009 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 51 of the 59 survey strata at all depths to 500 m, with the highest concentrations on the Chirikof slope and outer shelf (Fig. 27, Table 38). The CPUEs were by far highest in the 201-300 m depth range in all INPFC areas except the Chirikof area, where the densities were somewhat higher in the 101-200 m depth range (Table 37). Approximately 96% of the estimated population biomass was recorded in the 101-300 m depth range and over 99% in the 101-500 m range. Mean weight generally increased with depth to 700 m. The proportion of fish smaller than 30 cm was extremely small at depths greater than 200 m in the Shumagin, Chirikof, and Kodiak INPC areas and at depths greater than 300 m in the Yakutat and Southeastern INPFC areas (Fig. 28, Table 37). The sex ratio of the Pacific ocean perch population in the survey area was relatively close to even with males accounting for approximately 54% of the total estimated population.

Table 37. -- Number of survey hauls, number of hauls with Pacific ocean perch, mean CPUE, biomass, and mean weight, based on the 2009 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	127	30	0.98	4,041	0	11,913	0.173
	101 - 200	40	18	12.77	18,739	0	44,730	0.421
	201 - 300	17	16	31.47	8,772	4,619	12,925	0.616
	301 - 500	7	3	0.38	96	0	242	0.615
	501 - 700	3	1	0.13	27	0	111	0.861
	701 - 1000	2	1	0.33	64	0	341	0.547
	All depths	196	69	4.87	31,739	4,340	59,138	0.385
Chirikof	1 - 100	78	16	0.09	247	85	408	0.151
	101 - 200	72	41	60.61	144,554	26,931	262,176	0.652
	201 - 300	25	11	56.15	64,836	0	206,448	0.672
	301 - 500	7	4	0.75	120	0	295	0.641
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	72	30.82	209,756	38,062	381,451	0.656
Kodiak	1 - 100	100	10	0.04	143	0	332	0.213
	101 - 200	125	91	43.69	189,296	74,180	304,411	0.588
	201 - 300	31	27	50.20	57,681	16,551	98,811	0.67
	301 - 500	16	8	1.93	563	0	1,149	0.637
	501 - 700	4	1	0.31	54	0	205	0.716
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	137	24.41	247,737	126,843	368,631	0.604
Yakutat	1 - 100	19	5	0.01	10	1	18	0.047
	101 - 200	36	30	3.74	10,983	3,388	18,577	0.137
	201 - 300	17	17	148.42	76,734	0	195,809	0.459
	301 - 500	8	7	35.76	9,397	0	20,751	0.689
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	1	0.34	64	---	---	0.872
	All depths	83	60	16.99	97,188	0	215,209	0.372
Southeastern	1 - 100	11	4	0.03	19	0	41	0.082
	101 - 200	26	18	24.22	26,850	0	56,627	0.6
	201 - 300	19	17	47.31	23,901	9,916	37,886	0.583
	301 - 500	14	10	39.28	12,243	5,597	18,889	0.771
	501 - 700	2	1	0.16	17	0	88	0.88
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	50	22.48	63,029	30,256	95,802	0.619
All areas	1 - 100	335	65	0.35	4,459	0	12,336	0.171
	101 - 200	299	198	31.92	390,420	225,072	555,769	0.548
	201 - 300	109	88	64.34	231,925	56,951	406,899	0.573
	301 - 500	52	32	17.53	22,419	9,570	35,267	0.729
	501 - 700	16	3	0.12	98	0	246	0.776
	701 - 1000	12	2	0.11	128	0	405	0.672
	All depths	823	388	20.29	649,449	413,928	884,970	0.553

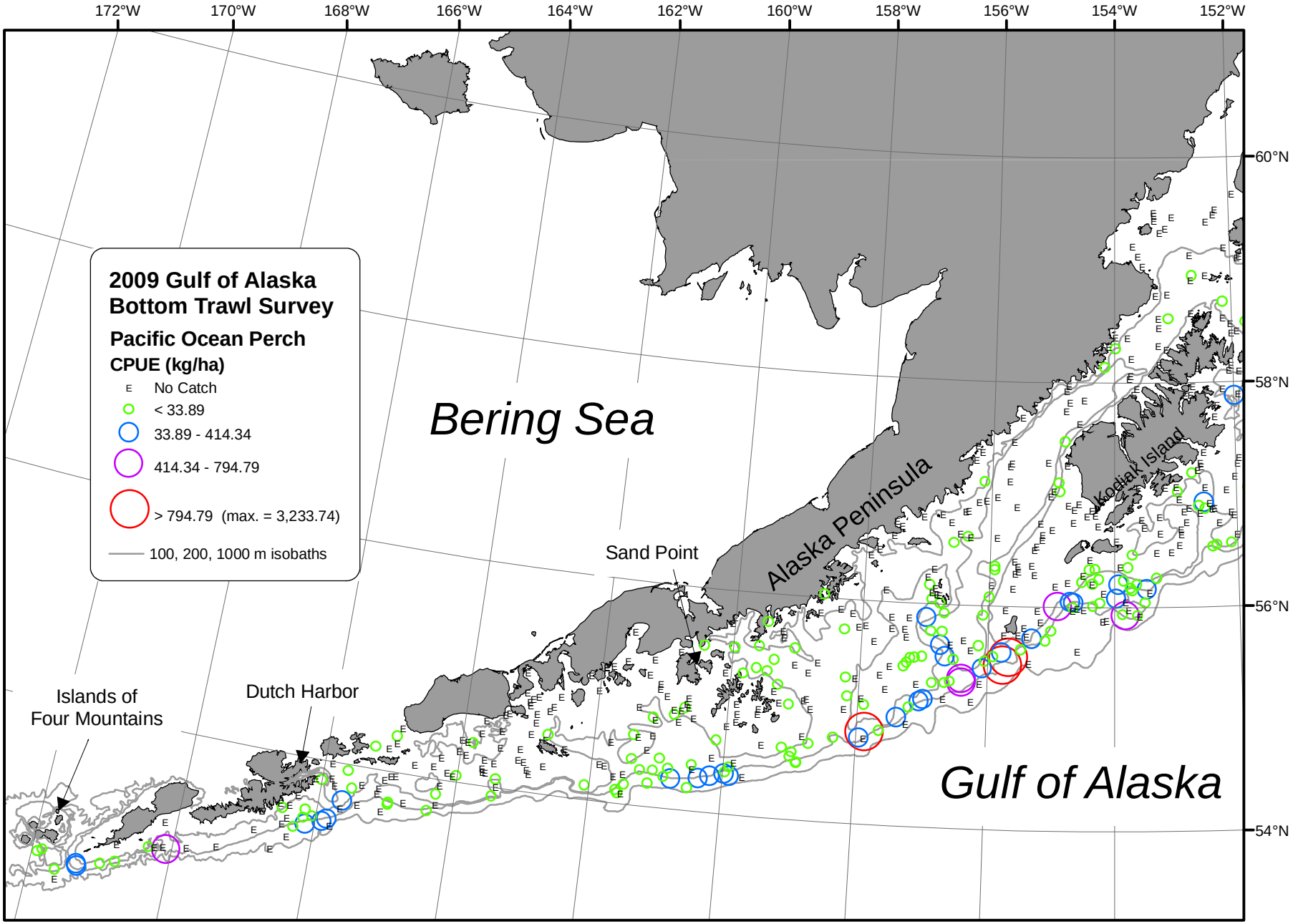

Figure 27. -- Distribution and relative abundance of a Pacific ocean perch from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

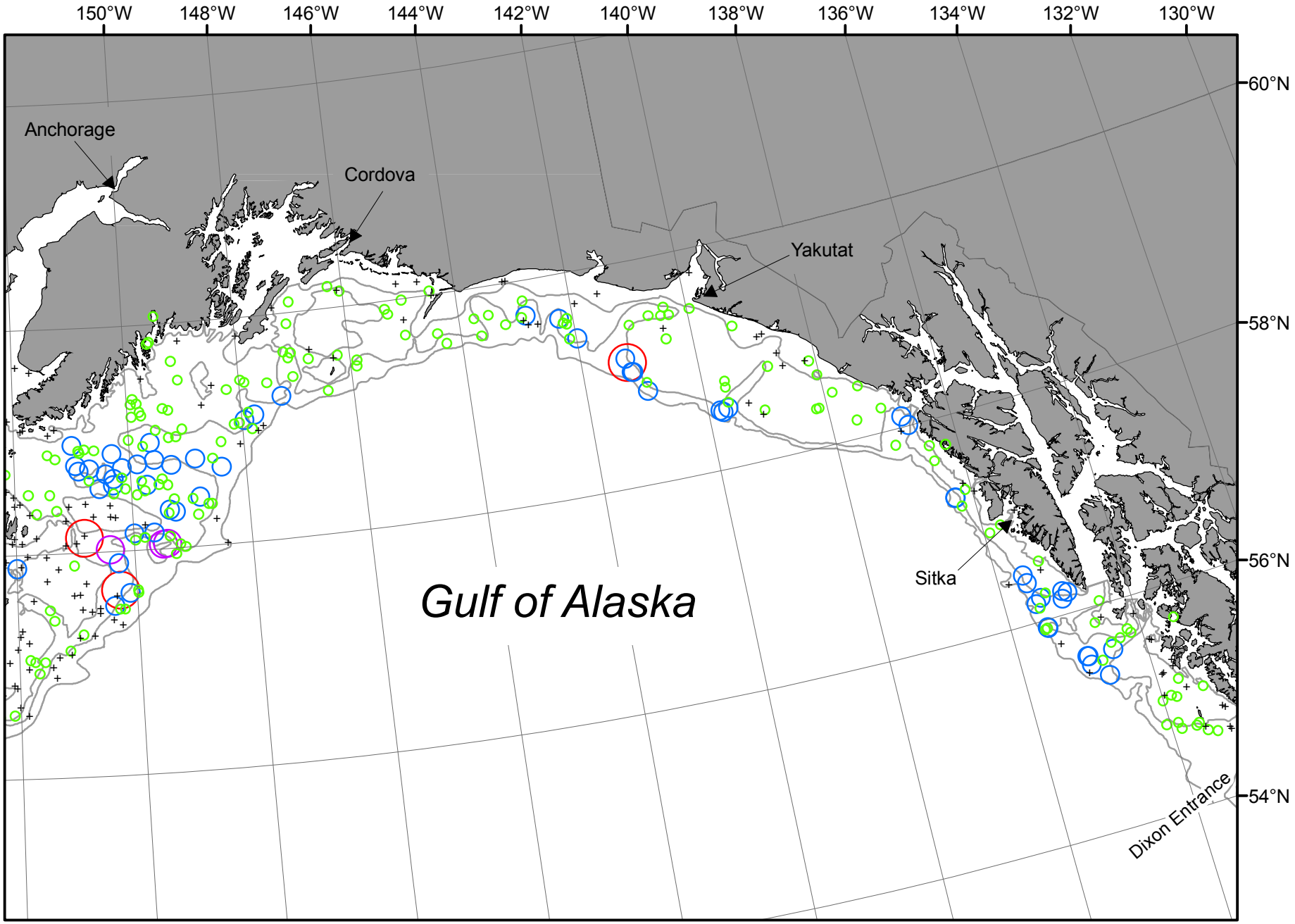

Figure 27. -- Continued (Pacific ocean perch).

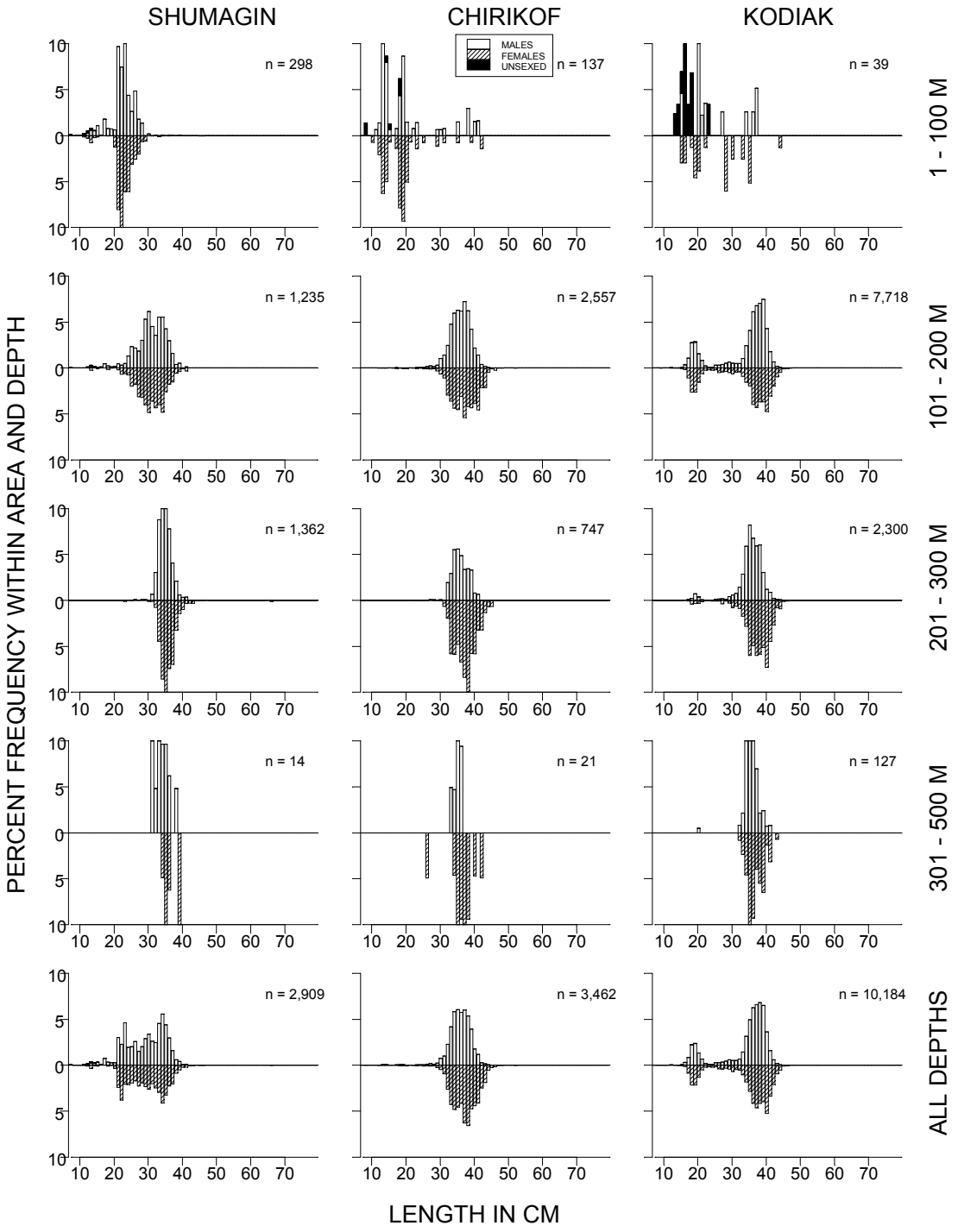

Figure 28. -- Size composition of Pacific ocean perch from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

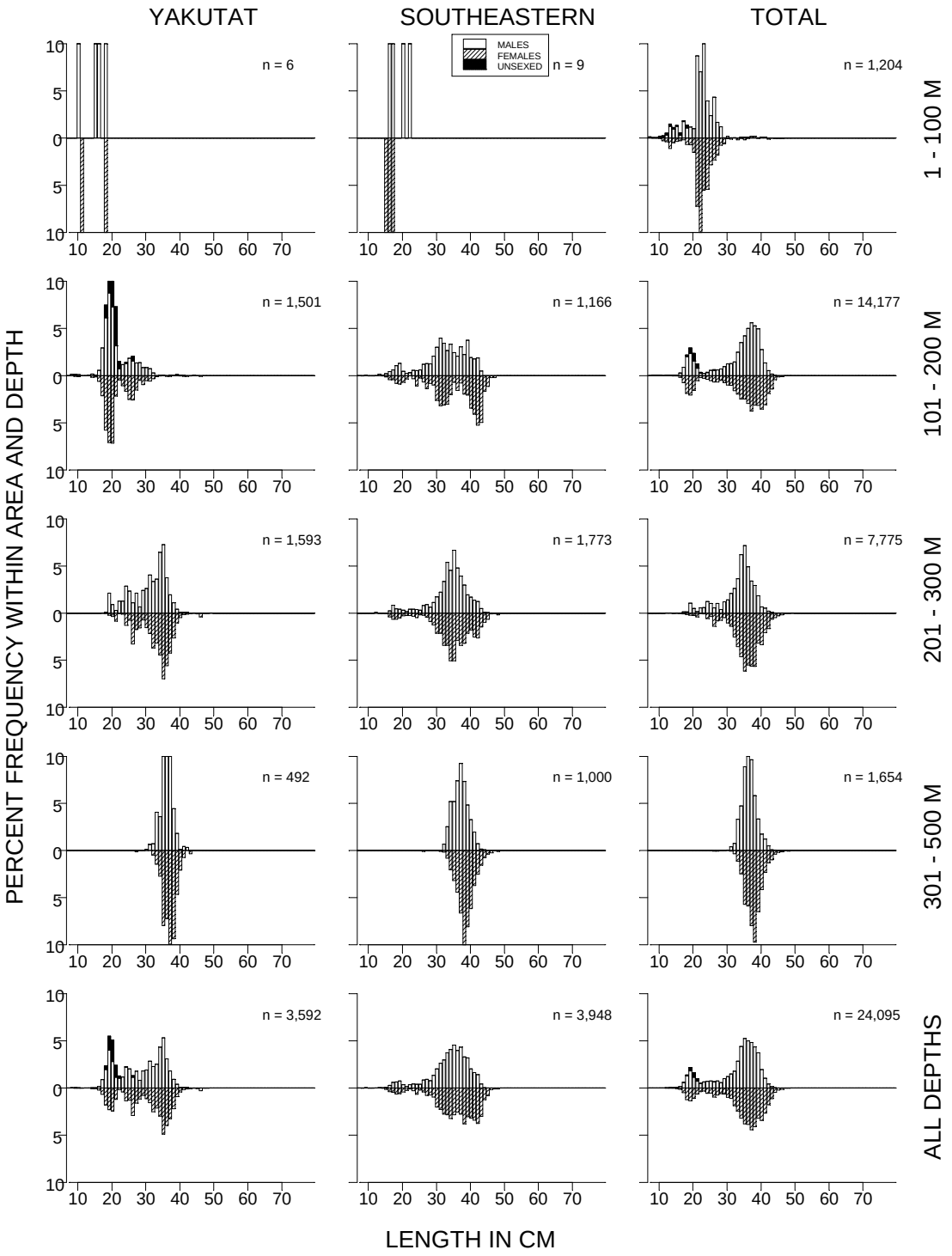

Figure 28. -- Continued (Pacific ocean perch).

Table 38. -- Catch per unit of effort by stratum for Pacific ocean perch sorted by descending CPUE for the 2009 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	Chirikof Slope	8	7	421.29	64,387	0	209,620
Chirikof	101 - 200	Chirikof Outer Shelf	26	24	264.50	132,534	15,219	249,850
Yakutat	201 - 300	Yakutat Gullies	9	9	188.65	57,400	0	177,436
Southeastern	301 - 500	Southeastern Slope	7	7	157.63	12,179	5,303	19,055
Kodiak	201 - 300	Kodiak Slope	7	7	156.23	25,350	0	62,077
Kodiak	101 - 200	Kodiak Outer Shelf	27	21	124.30	62,470	0	125,470
Kodiak	101 - 200	Albatross Gullies	26	10	91.64	72,502	0	167,414
Yakutat	201 - 300	Yakutat Slope	8	8	90.89	19,335	791	37,878
Kodiak	101 - 200	Portlock Flats	35	35	64.91	47,622	26,179	69,065
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	9	62.74	26,329	0	56,466
Yakutat	301 - 500	Yakutat Slope	6	5	61.12	9,294	0	21,224
Southeastern	201 - 300	Baranof-Chichagof Slope	5	5	59.91	6,742	3,237	10,246
Kodiak	201 - 300	Kenai Gullies	20	20	48.549	32,331	4,649	60,013
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	12	43.695	17,160	3,343	30,976
Shumagin	201 - 300	Shumagin Slope	17	16	31.465	8,772	4,600	12,945
Shumagin	101 - 200	Shumagin Outer Shelf	30	14	22.874	18,651	0	44,679
Chirikof	101 - 200	Shelikof Edge	27	14	15.468	11,964	0	27,258
Yakutat	101 - 200	Yakataga Shelf	9	8	7.728	4,078	0	10,008
Yakutat	101 - 200	Fairweather Shelf	10	8	5.78	4,470	0	10,014
Shumagin	1 - 100	Fox Islands	19	7	4.56	3,796	0	11,696
Kodiak	101 - 200	Kenai Flats	19	16	3.15	3,802	610	6,994
Kodiak	101 - 200	Barren Islands	18	9	2.64	2,901	0	6,976
Kodiak	301 - 500	Kodiak Slope	16	8	1.93	563	0	1,152
Yakutat	101 - 200	Middleton Shelf	10	9	1.75	1,283	0	2,749
Yakutat	101 - 200	Yakutat Flats	7	5	1.28	1,153	0	2,631
Yakutat	301 - 500	Yakutat Gullies	2	2	0.93	103	45	161
Southeastern	101 - 200	Prince of Wales Shelf	15	9	0.76	521	0	1,076
Chirikof	301 - 500	Chirikof Slope	7	4	0.75	120	0	302
Chirikof	201 - 300	Lower Shelikof Gully	17	4	0.449	450	0	956
Shumagin	101 - 200	West Shumagin Gully	4	3	0.386	88	0	361
Shumagin	301 - 500	Shumagin Slope	7	3	0.377	96	0	247
Yakutat	701 - 1000	Yakutat Slope	1	1	0.34	64		
Shumagin	701 - 1000	Shumagin Slope	2	1	0.33	64	0	883
Kodiak	501 - 700	Kodiak Slope	4	1	0.31	54	0	228
Southeastern	301 - 500	Southeastern Deep Gullies	7	3	0.27	64	0	148
Chirikof	1 - 100	Semidi Bank	24	10	0.25	184	42	326
Southeastern	501 - 700	Southeastern Slope	2	1	0.16	17	0	228
Shumagin	501 - 700	Shumagin Slope	3	1	0.13	27	0	140
Shumagin	1 - 100	Davidson Bank	47	8	0.10	132	0	264
Shumagin	1 - 100	Shumagin Bank	35	10	0.08	105	5	204
Kodiak	1 - 100	Albatross Banks	40	6	0.07	109	0	297
Chirikof	1 - 100	Chirikof Bank	37	4	0.05	54	0	137
Chirikof	101 - 200	East Shumagin Gully	19	3	0.05	55	0	160
Kodiak	1 - 100	Kenai Peninsula	9	2	0.038	20	0	53
Southeastern	1 - 100	Southeastern Shallows	11	4	0.029	19	0	42
Kodiak	1 - 100	Albatross Shallows	28	2	0.024	14	0	35
Shumagin	1 - 100	Lower Alaska Peninsula	26	5	0.01	9	0	18
Chirikof	1 - 100	Upper Alaska Peninsula	17	2	0.01	9	0	23
Yakutat	1 - 100	Middleton Shallows	8	2	0.01	4	0	11
Yakutat	1 - 100	Yakutat Shallows	11	3	0.01	5	0	12
Shumagin	101 - 200	Sanak Gully	6	1	0.00	1	0	2

Northern rockfish (*Sebastes polyspinis*)

Northern rockfish was the second most abundant rockfish species caught in the 2009 survey (Table 2). They were found primarily in the western and central Gulf of Alaska with about 91% of the estimated biomass in the Shumagin and Kodiak INPFC areas and almost all of the remainder in the Chirikof area (Fig. 29, Table 39). They were almost exclusively found in waters shallower than 200 m, with less than 1% deeper than 200 m (Table 39). The highest CPUEs of northern rockfish by far were in the 101-200 m depth range on the Shumagin Outer Shelf (Table 40). The length distribution of northern rockfish caught during the survey was confined to a relatively narrow range between approximately 30 and 45 cm in all areas and depth ranges with a mode around 40 cm for both sexes in the three westernmost INPFC areas (Fig. 30). Males were considerably more abundant in the survey area and accounted for approximately 57% of the total estimated northern rockfish population.

Table 39. -- Number of survey hauls, number of hauls with northern rockfish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	15	4.25	17,542	0	38,519	0.995
	101 - 200	40	17	18.45	27,075	0	63,801	0.962
	201 - 300	17	7	0.24	67	12	121	0.669
	301 - 500	7	1	0.04	10	0	34	0.681
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	40	6.85	44,693	3,161	86,224	0.974
Chirikof	1 - 100	78	11	2.48	6,468	0	13,904	1
	101 - 200	72	25	0.97	2,303	636	3,969	0.892
	201 - 300	25	6	0.06	72	9	134	0.67
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	42	1.30	8,842	1,230	16,455	0.966
Kodiak	1 - 100	100	6	4.33	16,671	0	49,819	1.104
	101 - 200	125	36	4.50	19,486	0	42,248	0.898
	201 - 300	31	3	0.11	130	0	321	0.642
	301 - 500	16	1	0.02	4	0	14	0.609
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	46	3.58	36,291	0	75,726	0.981
Yakutat	1 - 100	19	1	0.01	25	0	83	0.784
	101 - 200	36	1	0.01	20	0	66	0.702
	201 - 300	17	2	0.05	25	0	69	0.642
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	4	0.01	70	0	150	0.705
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	0	---	---	---	---	---
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	0	---	---	---	---	---
All areas	1 - 100	335	33	3.15	40,705	1,179	80,232	1.038
	101 - 200	299	79	4.00	48,883	6,303	91,463	0.932
	201 - 300	109	18	0.08	293	86	500	0.655
	301 - 500	52	2	0.01	15	0	40	0.658
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	132	2.81	89,896	32,121	147,671	0.976

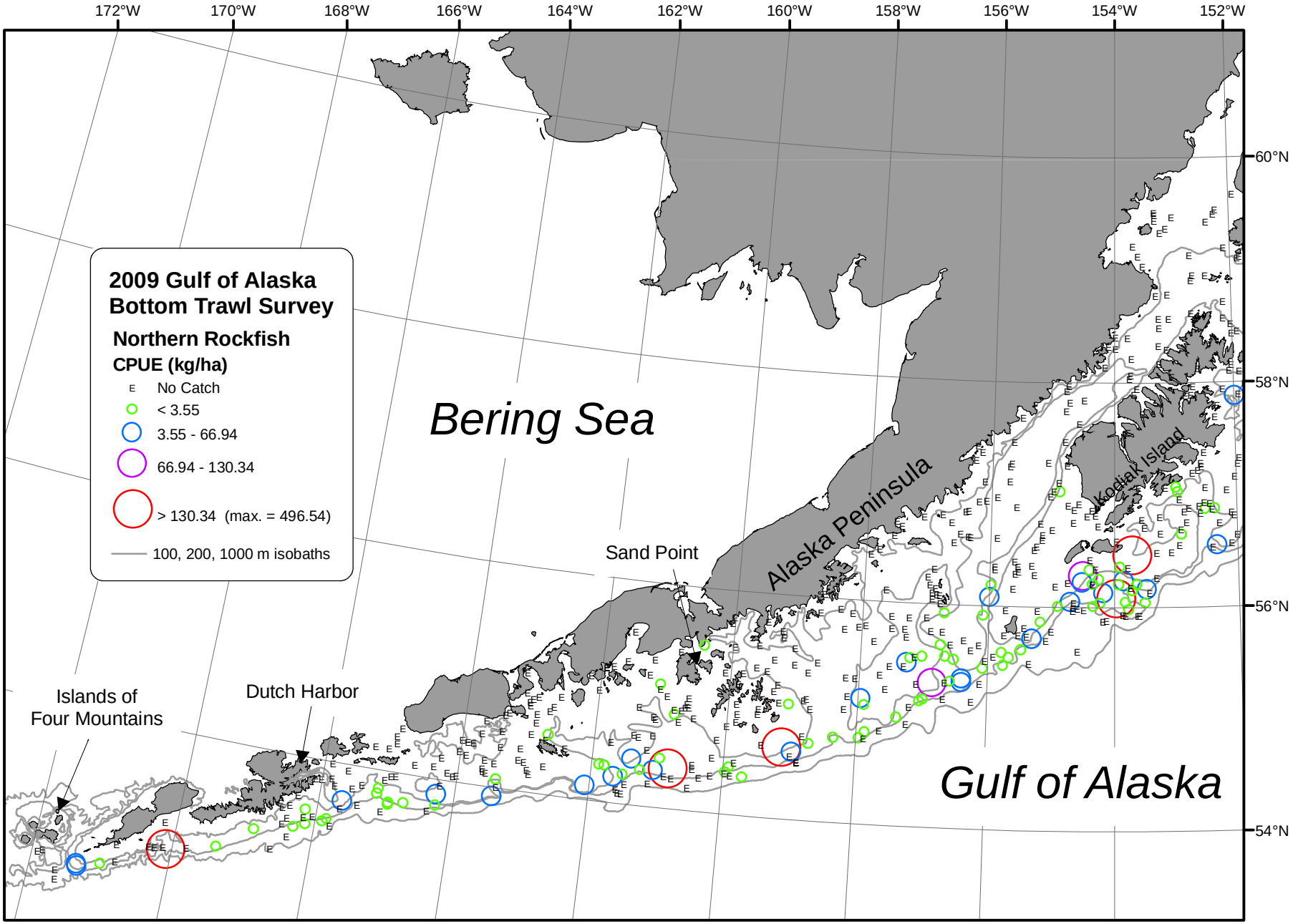

Figure 29. -- Distribution and relative abundance of a northern rockfish from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

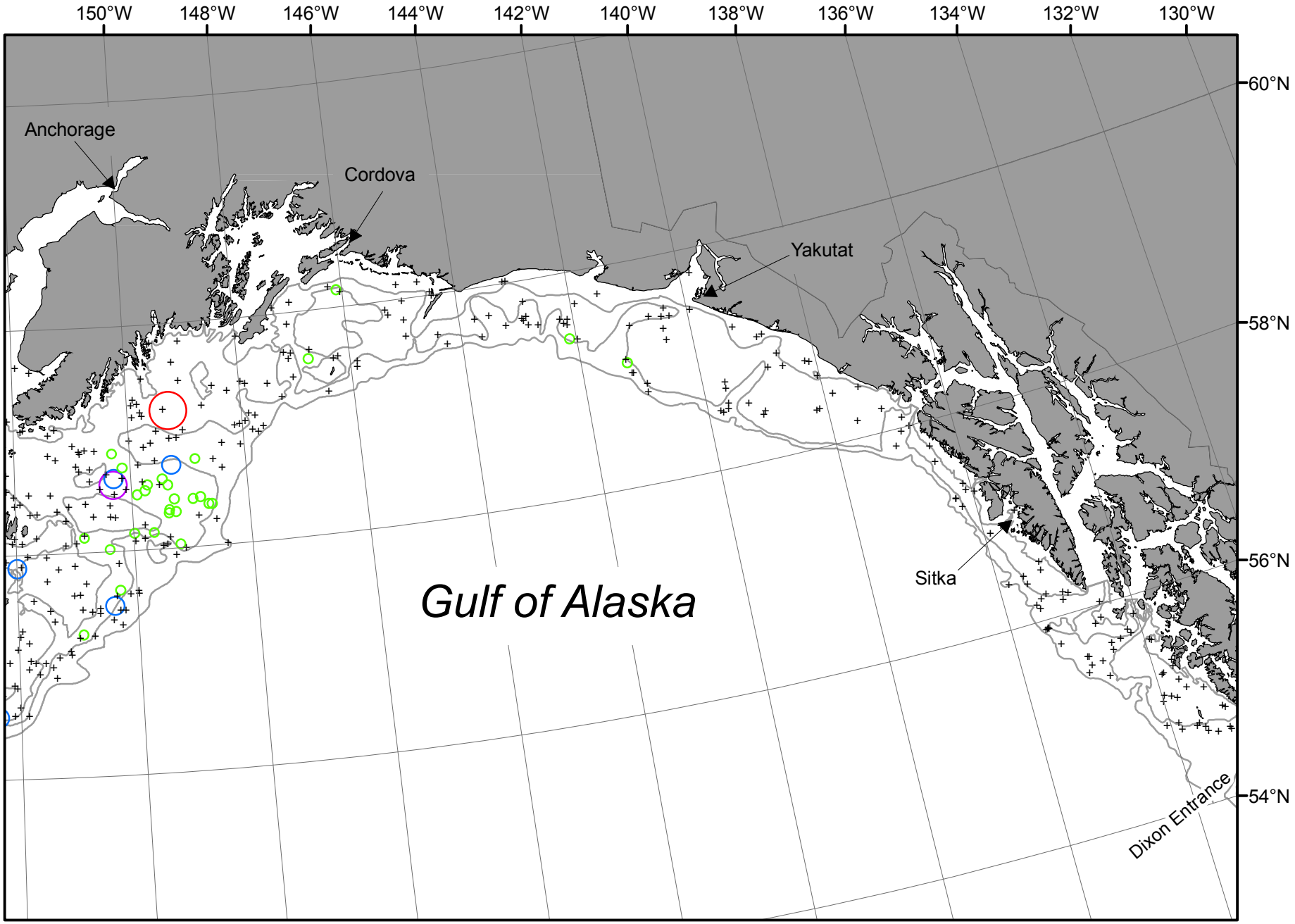

Figure 29. -- Continued (northern rockfish).

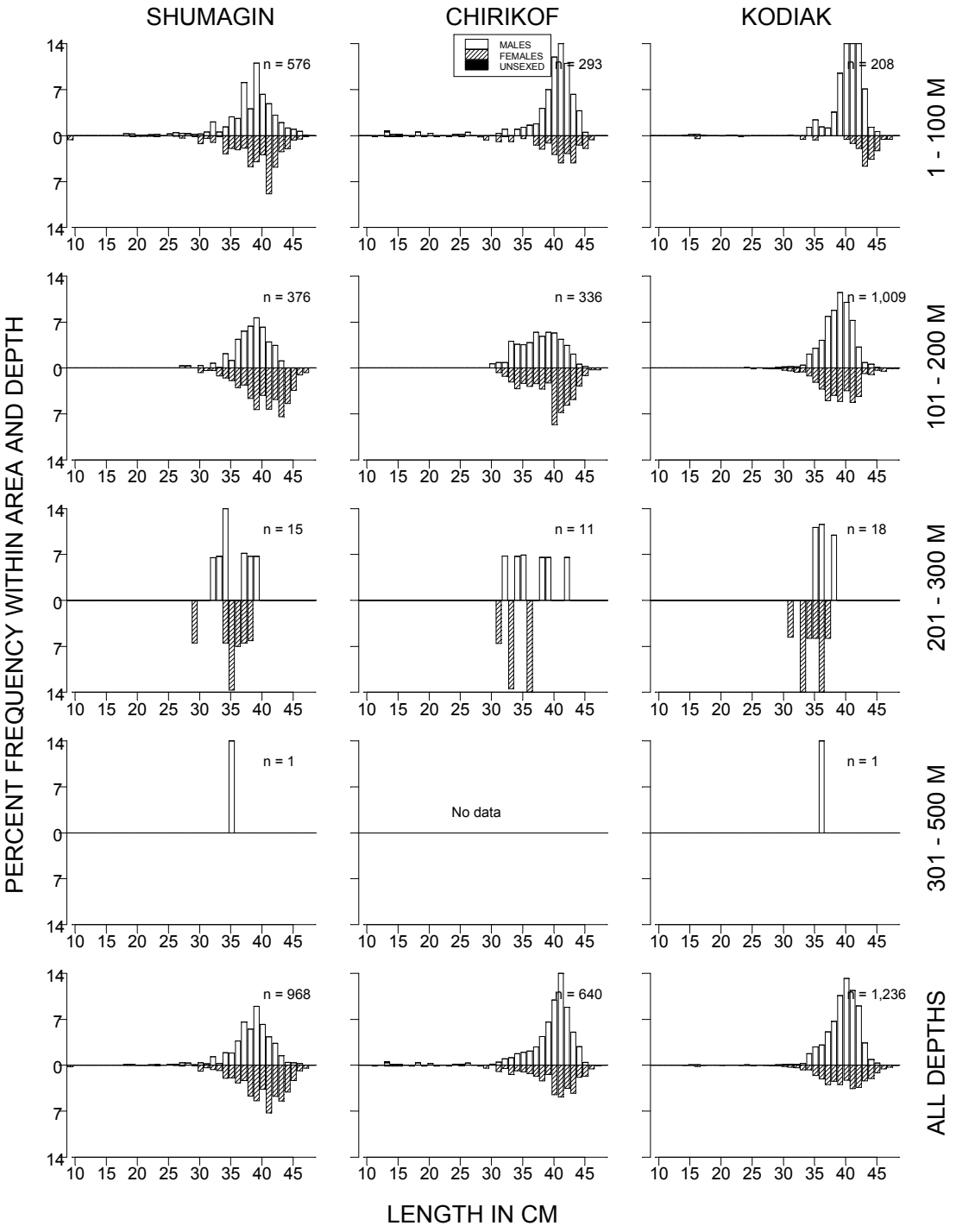

Figure 30. -- Size composition of northern rockfish from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

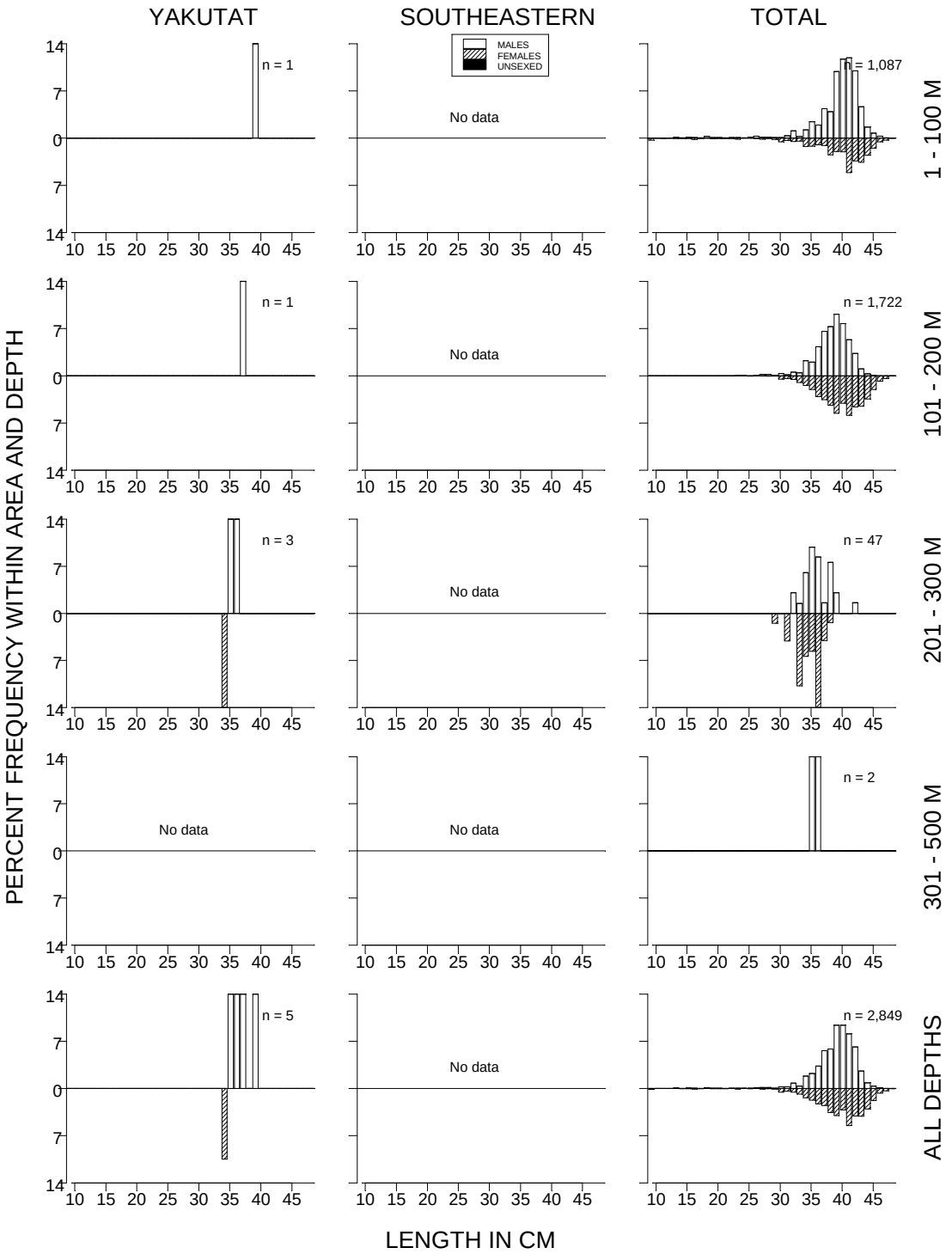

Figure 30. -- Continued (northern rockfish).

Table 40. -- Catch per unit of effort by stratum for northern rockfish sorted by descending CPUE for the 2009 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	Shumagin Outer Shelf	30	16	32.99	26,898	0	63,676
Kodiak	1 - 100	Albatross Banks	40	4	10.79	16,624	0	50,117
Kodiak	101 - 200	Kodiak Outer Shelf	27	12	10.04	5,046	0	13,733
Shumagin	1 - 100	Shumagin Bank	35	5	9.60	11,908	0	32,347
Kodiak	101 - 200	Kenai Flats	19	1	8.04	9,707	0	30,102
Kodiak	101 - 200	Portlock Flats	35	18	5.36	3,929	0	9,366
Chirikof	101 - 200	Chirikof Outer Shelf	26	20	4.21	2,111	453	3,770
Chirikof	1 - 100	Semidi Bank	24	6	4.20	3,069	0	8,067
Chirikof	1 - 100	Chirikof Bank	37	5	3.15	3,399	0	9,170
Shumagin	1 - 100	Davidson Bank	47	8	2.75	3,760	0	7,829
Shumagin	1 - 100	Fox Islands	19	1	2.25	1,871	0	5,801
Kodiak	101 - 200	Albatross Gullies	26	5	1.02	804	0	2,384
Kodiak	201 - 300	Kodiak Slope	7	2	0.566	92	0	297
Shumagin	101 - 200	Sanak Gully	6	1	0.416	177	0	631
Chirikof	201 - 300	Chirikof Slope	8	4	0.276	42	0	94
Chirikof	101 - 200	Shelikof Edge	27	5	0.247	191	0	449
Shumagin	201 - 300	Shumagin Slope	17	7	0.238	67	12	121
Kodiak	1 - 100	Albatross Shallows	28	2	0.08	46	0	139
Yakutat	201 - 300	Yakutat Gullies	9	1	0.06	19	0	62
Kodiak	201 - 300	Kenai Gullies	20	1	0.06	38	0	118
Shumagin	301 - 500	Shumagin Slope	7	1	0.04	10	0	35
Yakutat	1 - 100	Middleton Shallows	8	1	0.04	25	0	84
Chirikof	201 - 300	Lower Shelikof Gully	17	2	0.03	29	0	72
Yakutat	101 - 200	Middleton Shelf	10	1	0.03	20	0	67
Yakutat	201 - 300	Yakutat Slope	8	1	0.03	6	0	20
Kodiak	301 - 500	Kodiak Slope	16	1	0.02	4	0	14
Shumagin	1 - 100	Lower Alaska Peninsula	26	1	0.01	3	0	10

Rougheye rockfish (*Sebastes aleutianus*)

Rougheye rockfish were found throughout the survey area primarily on the upper continental slope and in the deeper gullies in the 201-500 m depth range, where approximately 78% of its biomass was estimated to be (Fig. 31, Tables 41-42). The highest CPUEs were generally recorded in the 301-500 m range where rougheye rockfish were caught in approximately 75% of the tows (Table 41). Fish size generally increased with depth to 700 m (Fig. 32, Table 41). The only relatively distinct length mode occurred at around 48 cm FL for both males and females captured between 301 and 500 m in the Kodiak and Southeastern INPFC areas. The sex ratio of the rougheye rockfish population in the survey area was very close to even with males making up approximately 51% of the total estimated population.

Table 41. -- Number of survey hauls, number of hauls with rougheye rockfish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	0	---	---	---	---	---
	101 - 200	40	3	0.03	50	0	120	0.763
	201 - 300	17	8	0.73	204	0	498	1.001
	301 - 500	7	4	2.00	506	0	1,400	1.909
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	15	0.12	760	0	1,692	1.422
Chirikof	1 - 100	78	1	---	13	0	41	0.69
	101 - 200	72	12	0.17	411	81	742	0.746
	201 - 300	25	15	0.51	595	219	970	0.99
	301 - 500	7	4	2.36	378	0	916	1.523
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	32	0.21	1,397	725	2,068	0.984
Kodiak	1 - 100	100	4	0.04	162	0	381	0.63
	101 - 200	125	33	0.79	3,419	1,319	5,518	0.531
	201 - 300	31	24	4.66	5,355	1,663	9,047	0.716
	301 - 500	16	13	35.89	10,451	0	22,057	1.723
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	74	1.91	19,387	7,570	31,205	0.958
Yakutat	1 - 100	19	3	0.07	114	0	325	0.08
	101 - 200	36	23	0.90	2,631	0	5,324	0.303
	201 - 300	17	14	2.08	1,077	274	1,879	0.642
	301 - 500	8	6	2.46	646	0	1,466	1.148
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	46	0.78	4,468	1,588	7,347	0.362
Southeastern	1 - 100	11	2	0.20	128	0	381	0.295
	101 - 200	26	4	0.11	122	0	269	0.196
	201 - 300	19	6	8.96	4,526	0	13,742	1.484
	301 - 500	14	12	5.04	1,572	518	2,626	1.44
	501 - 700	2	1	0.32	33	0	177	1.77
	701 - 1000	2	1	0.28	34	0	178	1.591
	All depths	74	26	2.29	6,415	0	15,725	1.224
All areas	1 - 100	335	10	0.03	418	42	794	0.195
	101 - 200	299	75	0.54	6,633	3,367	9,899	0.405
	201 - 300	109	67	3.26	11,756	3,429	20,084	0.904
	301 - 500	52	39	10.60	13,553	1,896	25,209	1.646
	501 - 700	16	1	0.04	33	0	177	1.77
	701 - 1000	12	1	0.03	34	0	178	1.591
	All depths	823	193	1.01	32,427	18,385	46,468	0.815

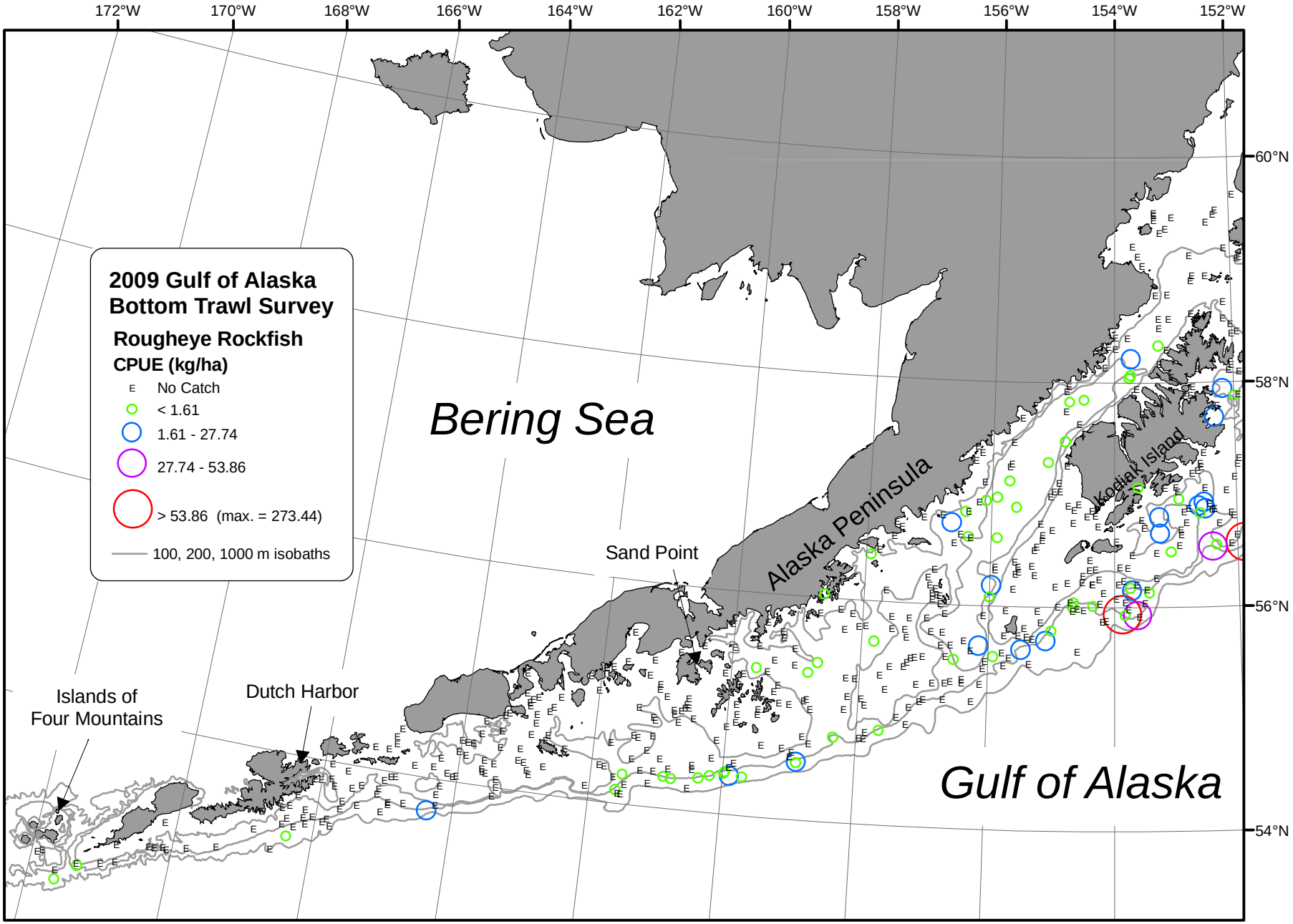

Figure 31. -- Distribution and relative abundance of a rougheye rockfish from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

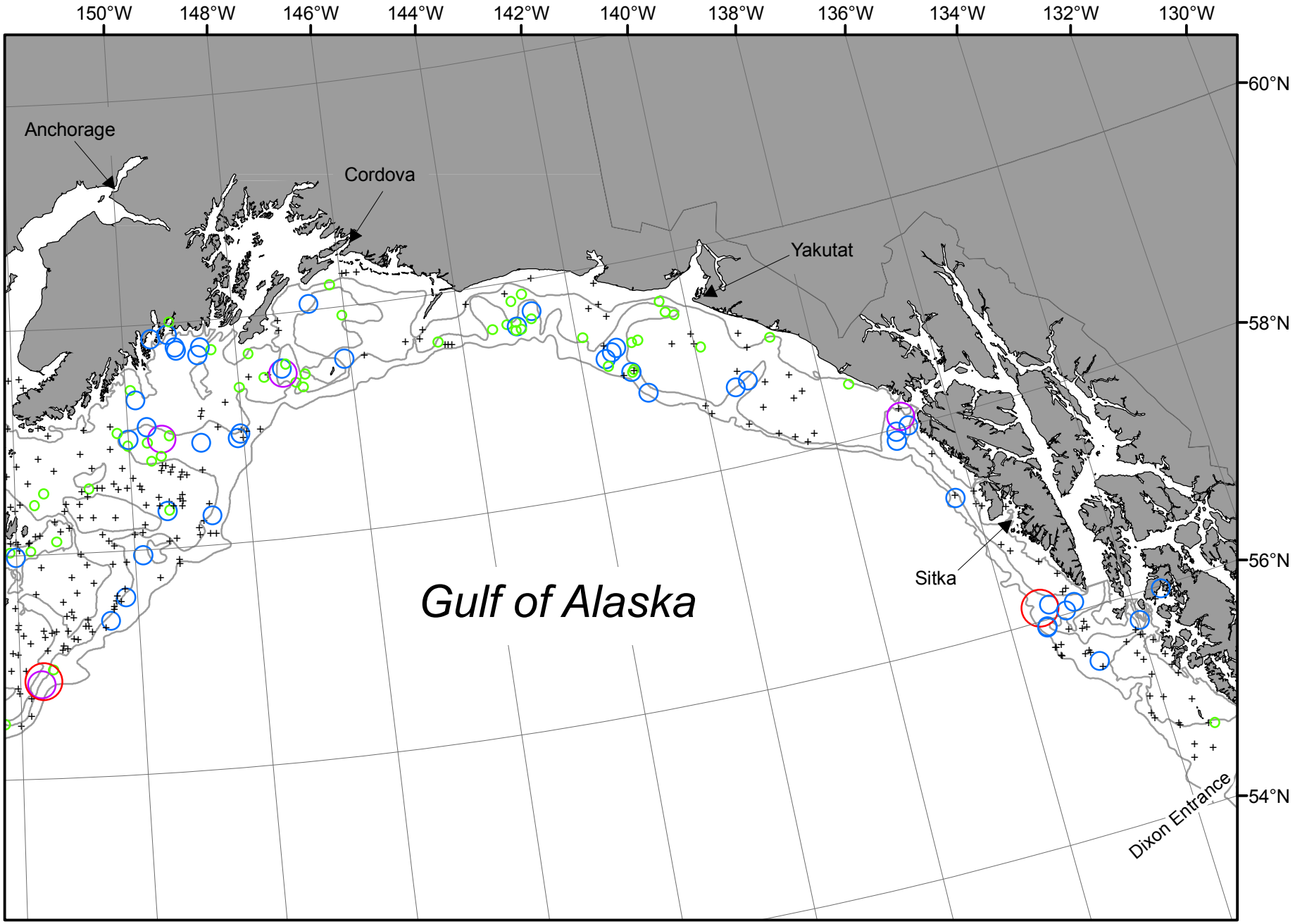

Figure 31. -- Continued (rougheye rockfish).

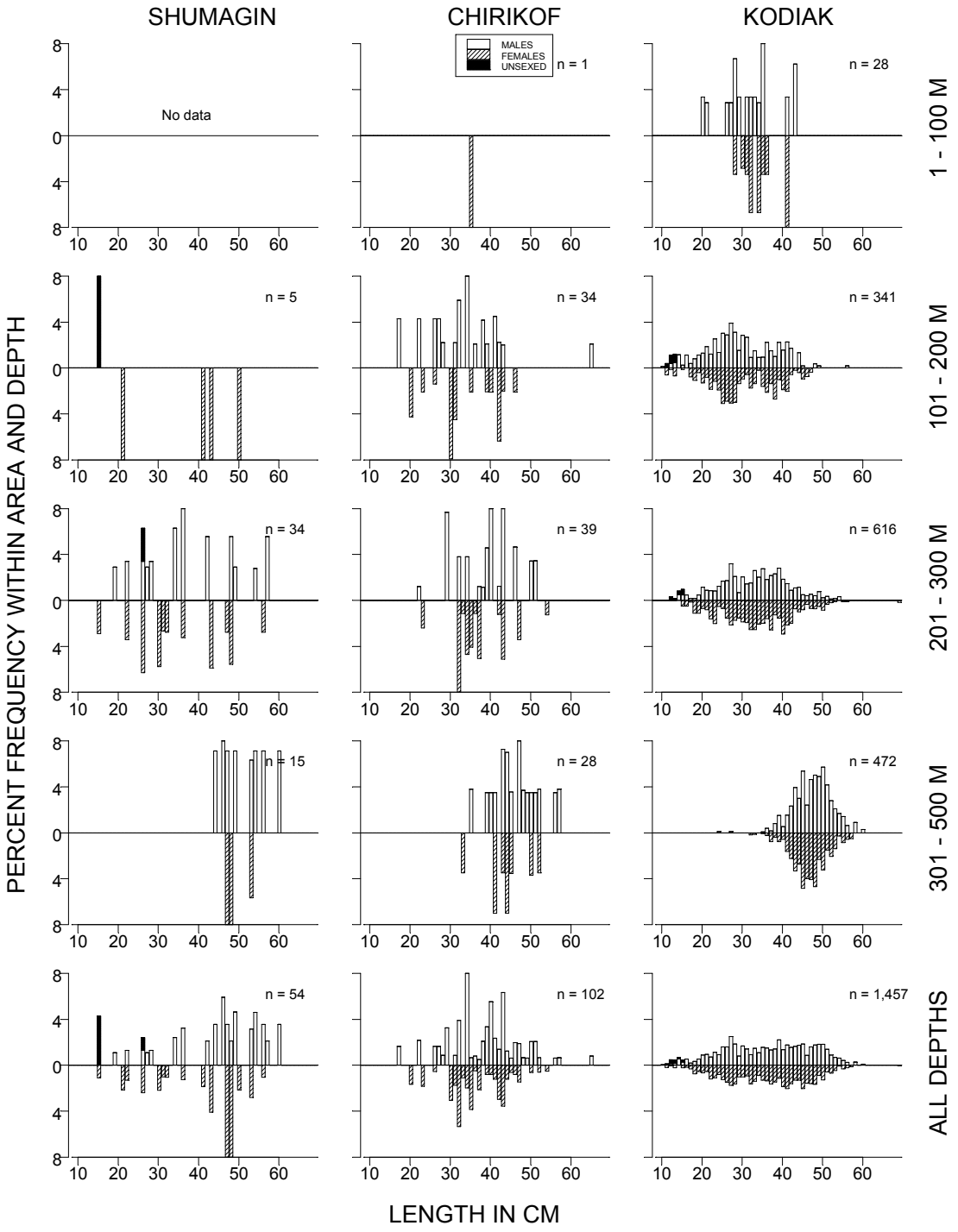

Figure 32. -- Size composition of rougheye rockfish from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

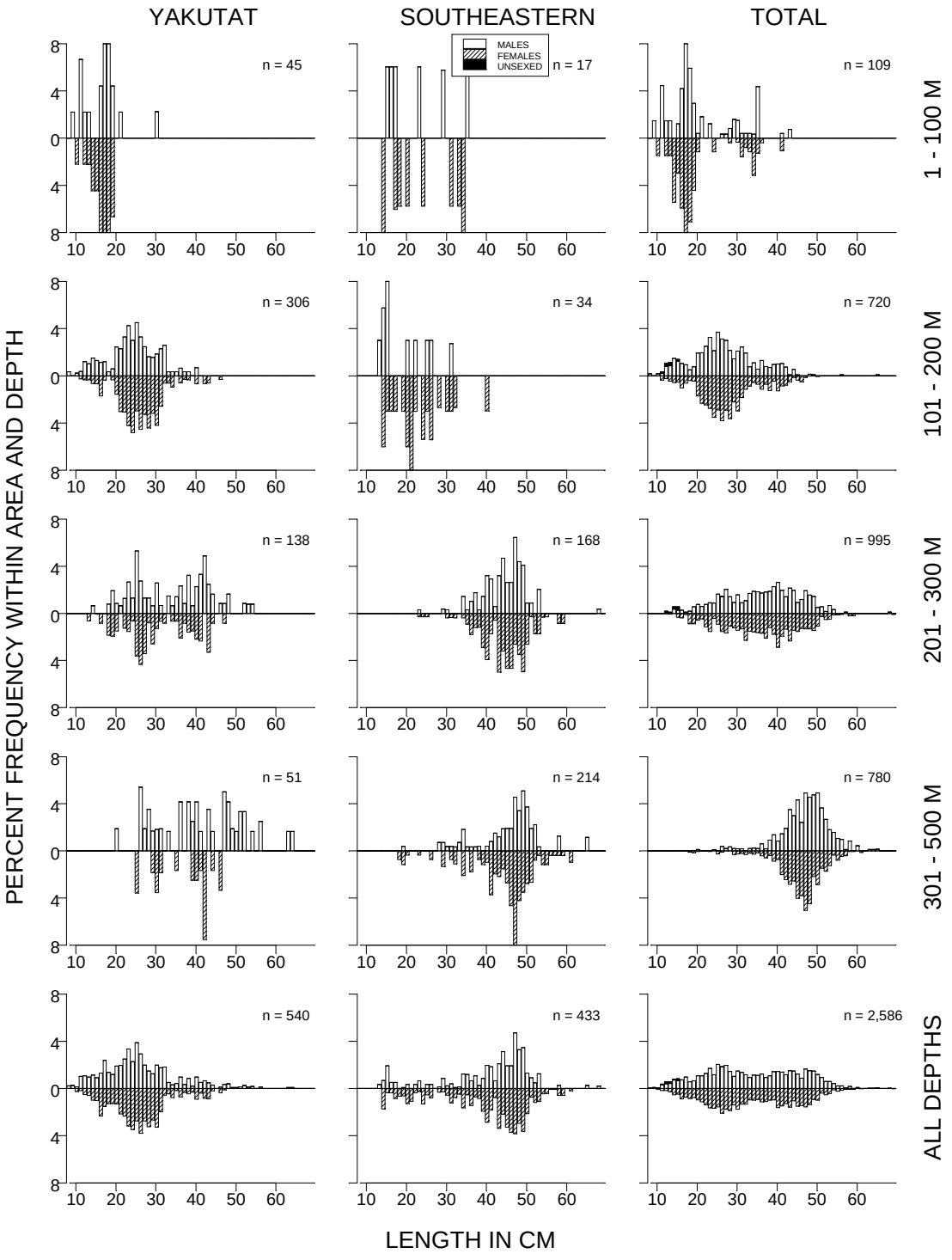

Figure 32. -- Continued (rougheye rockfish).

Table 42. -- Catch per unit of effort by stratum for rougheye rockfish sorted by descending CPUE for the 2009 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	5	3	38.79	4,365	0	14,312
Kodiak	301 - 500	Kodiak Slope	16	13	35.89	10,451	0	22,117
Southeastern	301 - 500	Southeastern Slope	7	6	14.62	1,130	0	2,271
Kodiak	201 - 300	Kodiak Slope	7	6	8.34	1,353	0	3,195
Kodiak	201 - 300	Kenai Gullies	20	16	5.86	3,905	533	7,277
Yakutat	301 - 500	Yakutat Slope	6	5	4.21	640	0	1,501
Yakutat	101 - 200	Middleton Shelf	10	10	3.17	2,328	0	5,052
Yakutat	201 - 300	Yakutat Gullies	9	7	2.77	843	43	1,643
Chirikof	301 - 500	Chirikof Slope	7	4	2.36	378	0	935
Shumagin	301 - 500	Shumagin Slope	7	4	2.00	506	0	1,431
Southeastern	301 - 500	Southeastern Deep Gullies	7	6	1.89	443	64	821
Kodiak	101 - 200	Kenai Flats	19	11	1.61	1,950	155	3,745
Kodiak	101 - 200	Albatross Gullies	26	12	1.514	1,198	97	2,299
Yakutat	201 - 300	Yakutat Slope	8	7	1.098	234	4	463
Chirikof	201 - 300	Chirikof Slope	8	6	0.826	126	0	266
Shumagin	201 - 300	Shumagin Slope	17	8	0.732	204	0	499
Chirikof	201 - 300	Lower Shelikof Gully	17	9	0.467	468	112	825
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	3	0.41	161	0	385
Southeastern	501 - 700	Southeastern Slope	2	1	0.32	33	0	458
Kodiak	201 - 300	Upper Shelikof Gully	4	2	0.31	98	0	357
Chirikof	101 - 200	Shelikof Edge	27	7	0.29	225	0	502
Southeastern	701 - 1000	Southeastern Slope	2	1	0.28	34	0	459
Yakutat	101 - 200	Yakataga Shelf	9	7	0.26	135	0	274
Kodiak	101 - 200	Barren Islands	18	3	0.20	221	0	539
Kodiak	1 - 100	Albatross Shallows	28	2	0.20	115	0	327
Southeastern	1 - 100	Southeastern Shallows	11	2	0.20	128	0	384
Southeastern	101 - 200	Prince of Wales Shelf	15	4	0.18	122	0	270
Yakutat	1 - 100	Middleton Shallows	8	3	0.17	114	0	330
Chirikof	101 - 200	East Shumagin Gully	19	4	0.16	177	0	371
Yakutat	101 - 200	Yakutat Flats	7	3	0.13	117	0	308
Yakutat	101 - 200	Fairweather Shelf	10	3	0.065	51	0	153
Shumagin	101 - 200	Shumagin Outer Shelf	30	2	0.06	49	0	119
Yakutat	301 - 500	Yakutat Gullies	2	1	0.056	6	0	86
Kodiak	1 - 100	Kenai Peninsula	9	1	0.05	27	0	88
Kodiak	101 - 200	Portlock Flats	35	6	0.04	32	3	61
Kodiak	101 - 200	Kodiak Outer Shelf	27	1	0.04	19	0	57
Chirikof	101 - 200	Chirikof Outer Shelf	26	1	0.02	10	0	29
Chirikof	1 - 100	Upper Alaska Peninsula	17	1	0.02	13	0	41
Kodiak	1 - 100	Albatross Banks	40	1	0.01	20	0	61
Shumagin	101 - 200	West Shumagin Gully	4	1	0.01	1	0	5

Blackspotted rockfish (*Sebastes melanostictus*)

Blackspotted rockfish were found throughout the survey area primarily on the upper continental slope and in the deeper gullies in the 201-500 m depth range, where approximately 97% of their biomass was estimated to be (Fig. 33, Tables 43-44). The highest CPUEs by far were recorded in the 301-500 m range in all INPFC areas where blackspotted rockfish were caught in approximately 73% of the tows (Table 43). Fish size generally increased with depth (Fig. 34, Table 43). The length mode for both males and females captured between 301 and 500 m was approximately 45 cm FL in all INPFC areas except Yakutat where it was difficult to discern a mode due to small sample size. The sex ratio of the blackspotted rockfish population in the survey area was almost exactly even.

Table 43. -- Number of survey hauls, number of hauls with blackspotted rockfish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	1	<.01	6	0	19	0.592
	101 - 200	40	6	0.25	374	0	792	0.416
	201 - 300	17	12	2.18	607	73	1,140	0.778
	301 - 500	7	5	3.84	972	0	2,191	1.33
	501 - 700	3	1	0.23	46	0	193	1.5
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	25	0.31	2,005	694	3,316	0.818
Chirikof	1 - 100	78	0	---	---	---	---	---
	101 - 200	72	5	0.03	72	1	143	0.906
	201 - 300	25	7	0.27	310	66	554	1.126
	301 - 500	7	4	7.66	1,229	0	2,934	1.39
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	16	0.24	1,611	19	3,203	1.3
Kodiak	1 - 100	100	0	---	---	---	---	---
	101 - 200	125	7	0.03	112	6	218	0.297
	201 - 300	31	15	2.30	2,645	582	4,708	0.829
	301 - 500	16	13	26.81	7,807	179	15,435	1.374
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	35	1.04	10,564	2,891	18,237	1.142
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	0	---	---	---	---	---
	201 - 300	17	5	0.53	273	0	716	0.434
	301 - 500	8	5	1.00	263	0	583	1.346
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	10	0.09	536	25	1,047	0.651
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	0	---	---	---	---	---
	201 - 300	19	6	1.38	699	0	1,696	0.731
	301 - 500	14	11	8.78	2,737	0	7,702	1.425
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	17	1.23	3,436	0	7,994	1.195
All areas	1 - 100	335	1	---	6	0	19	0.592
	101 - 200	299	18	0.05	558	125	990	0.411
	201 - 300	109	45	1.26	4,533	2,184	6,882	0.778
	301 - 500	52	38	10.17	13,009	4,146	21,872	1.382
	501 - 700	16	1	0.06	46	0	193	1.5
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	103	0.57	18,152	9,131	27,172	1.091

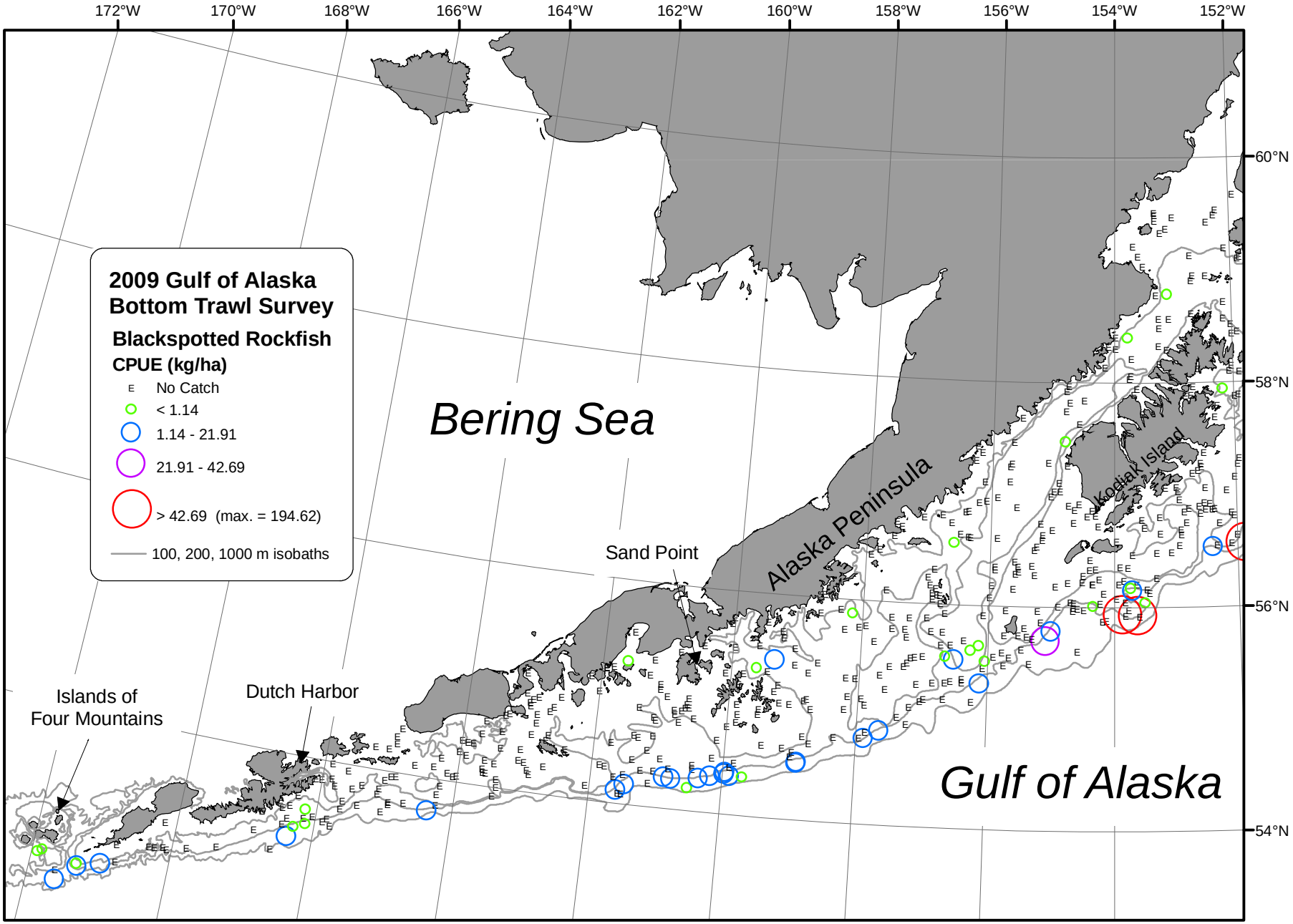

Figure 33. -- Distribution and relative abundance of a blackspotted rockfish from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

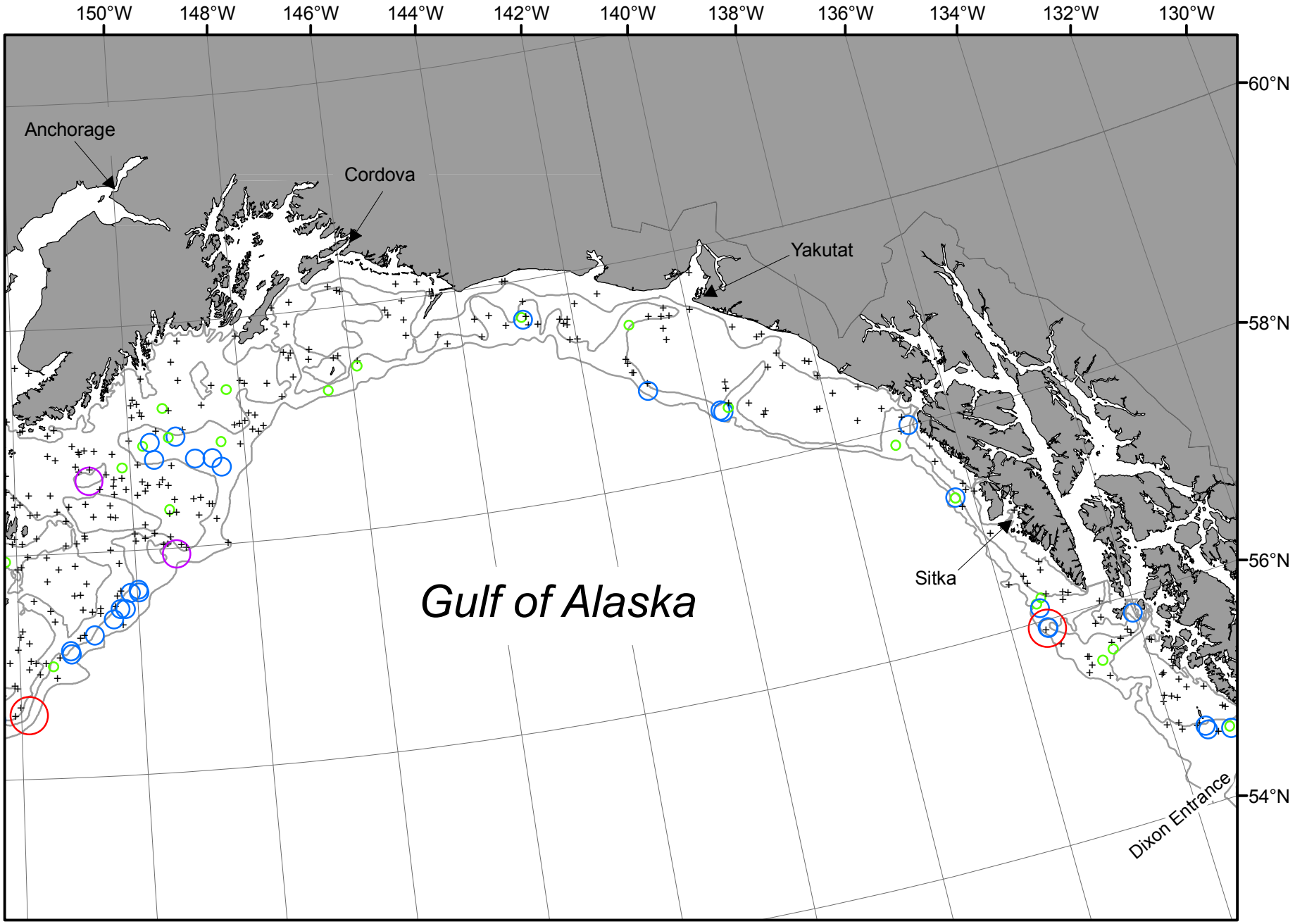

Figure 33. -- Continued (blackspotted rockfish).

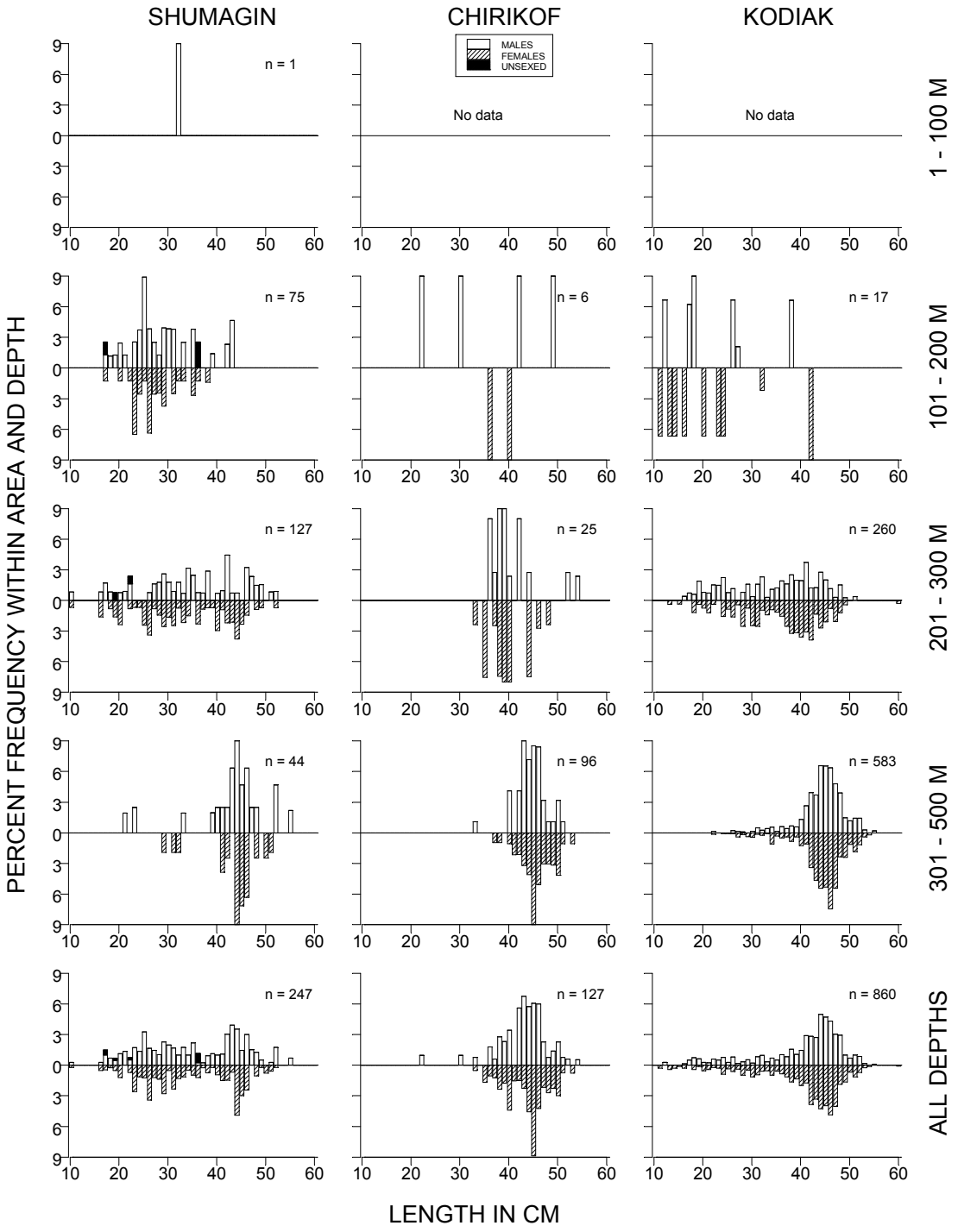

Figure 34. -- Size composition of blackspotted rockfish from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

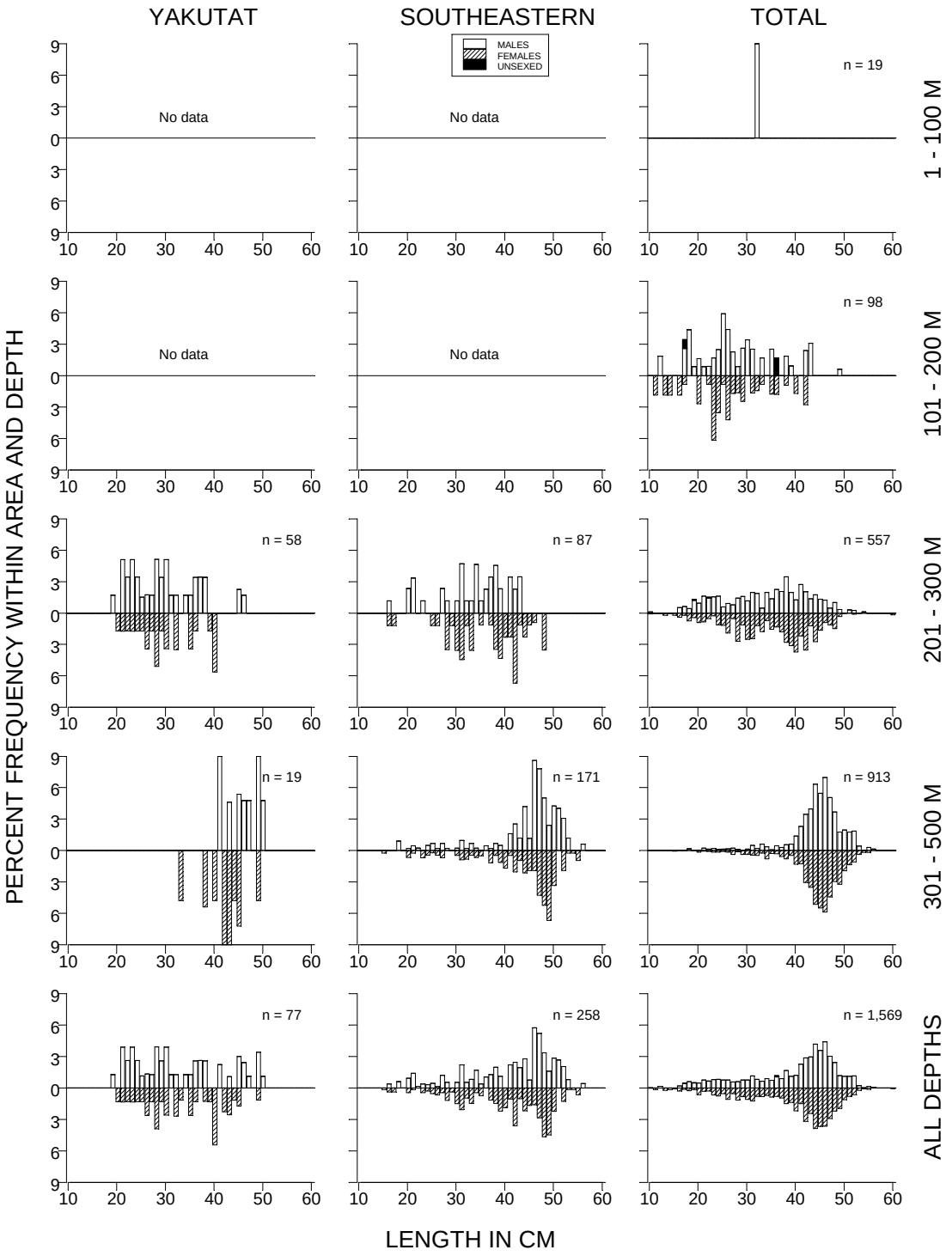

Figure 34. -- Continued (blackspotted rockfish).

Table 44. -- Catch per unit of effort by stratum for blackspotted rockfish sorted by descending CPUE for the 2009 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	7	7	32.22	2,490	0	7,621
Kodiak	301 - 500	Kodiak Slope	16	13	26.81	7,807	139	15,475
Chirikof	301 - 500	Chirikof Slope	7	4	7.66	1,229	0	2,993
Shumagin	301 - 500	Shumagin Slope	7	5	3.84	972	0	2,233
Kodiak	201 - 300	Kenai Gullies	20	10	3.54	2,359	303	4,415
Shumagin	201 - 300	Shumagin Slope	17	12	2.18	607	70	1,143
Kodiak	201 - 300	Kodiak Slope	7	5	1.76	286	7	566
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	4	1.69	664	0	1,665
Yakutat	301 - 500	Yakutat Slope	6	4	1.50	229	0	564
Yakutat	201 - 300	Yakutat Slope	8	4	1.12	238	0	695
Southeastern	301 - 500	Southeastern Deep Gullies	7	4	1.06	248	6	490
Chirikof	201 - 300	Chirikof Slope	8	4	0.89	135	0	291
Shumagin	101 - 200	West Shumagin Gully	4	2	0.493	112	0	399
Shumagin	101 - 200	Shumagin Outer Shelf	30	4	0.321	262	0	638
Yakutat	301 - 500	Yakutat Gullies	2	1	0.316	35	0	479
Southeastern	201 - 300	Baranof-Chichagof Slope	5	2	0.309	35	0	128
Shumagin	501 - 700	Shumagin Slope	3	1	0.23	46	0	245
Chirikof	201 - 300	Lower Shelikof Gully	17	3	0.175	175	0	378
Yakutat	201 - 300	Yakutat Gullies	9	1	0.11	34	0	114
Kodiak	101 - 200	Barren Islands	18	2	0.05	59	0	145
Chirikof	101 - 200	Shelikof Edge	27	3	0.04	30	0	67
Chirikof	101 - 200	Chirikof Outer Shelf	26	1	0.03	16	0	48
Kodiak	101 - 200	Kenai Flats	19	2	0.02	29	0	84
Chirikof	101 - 200	East Shumagin Gully	19	1	0.02	26	0	79
Kodiak	101 - 200	Albatross Gullies	26	1	0.02	17	0	52
Shumagin	1 - 100	Lower Alaska Peninsula	26	1	0.01	6	0	19
Kodiak	101 - 200	Portlock Flats	35	2	0.01	7	0	17

Dusky rockfish (*Sebastes variabilis*)

Dusky rockfish was the fourth most abundant rockfish species caught in the 2009 survey (Table 2). Dusky rockfish were found throughout the survey area, exclusively in water depths less than 300 m, with approximately 91% of its estimated biomass in the 101 to 200 m depth range (Fig. 35, Table 45). The highest CPUEs were recorded on the Kodiak Outer Shelf, Yakutat Flats and the Portlock Flats which, combined, accounted for over 58% of the estimated biomass even though these three strata constitute less than 7% of the survey area (Table 46). There was no general trend in size with depth although fish smaller than about 40 cm FL were confined almost exclusively to depths less than 100 m (Fig. 36). The sex ratio of the dusky rockfish population in the survey area was relatively even with males accounting for approximately 52% of the total estimated population.

Table 45. -- Number of survey hauls, number of hauls with dusky rockfish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	12	0.27	1,131	31	2,231	1.167
	101 - 200	40	5	0.18	264	7	521	1.365
	201 - 300	17	1	0.03	9	0	27	1.42
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	18	0.22	1,404	275	2,532	1.201
Chirikof	1 - 100	78	5	0.18	475	0	953	0.934
	101 - 200	72	19	1.49	3,556	0	7,968	1.52
	201 - 300	25	3	0.04	44	0	107	1.235
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	27	0.60	4,075	0	8,508	1.413
Kodiak	1 - 100	100	6	0.58	2,243	0	5,732	0.419
	101 - 200	125	34	8.83	38,242	6,076	70,408	1.726
	201 - 300	31	4	0.31	351	0	746	1.539
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	44	4.02	40,836	8,475	73,197	1.472
Yakutat	1 - 100	19	1	0.02	36	0	116	0.928
	101 - 200	36	6	7.81	22,936	0	67,264	1.729
	201 - 300	17	8	4.08	2,110	0	5,178	1.648
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	15	4.39	25,082	0	69,522	1.72
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	7	0.63	695	0	1,714	1.469
	201 - 300	19	2	0.06	31	0	78	1.536
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	9	0.26	726	0	1,747	1.472
All areas	1 - 100	335	24	0.30	3,886	231	7,540	0.565
	101 - 200	299	71	5.37	65,692	11,585	119,800	1.709
	201 - 300	109	18	0.71	2,545	0	5,585	1.62
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	113	2.25	72,123	17,786	126,460	1.539

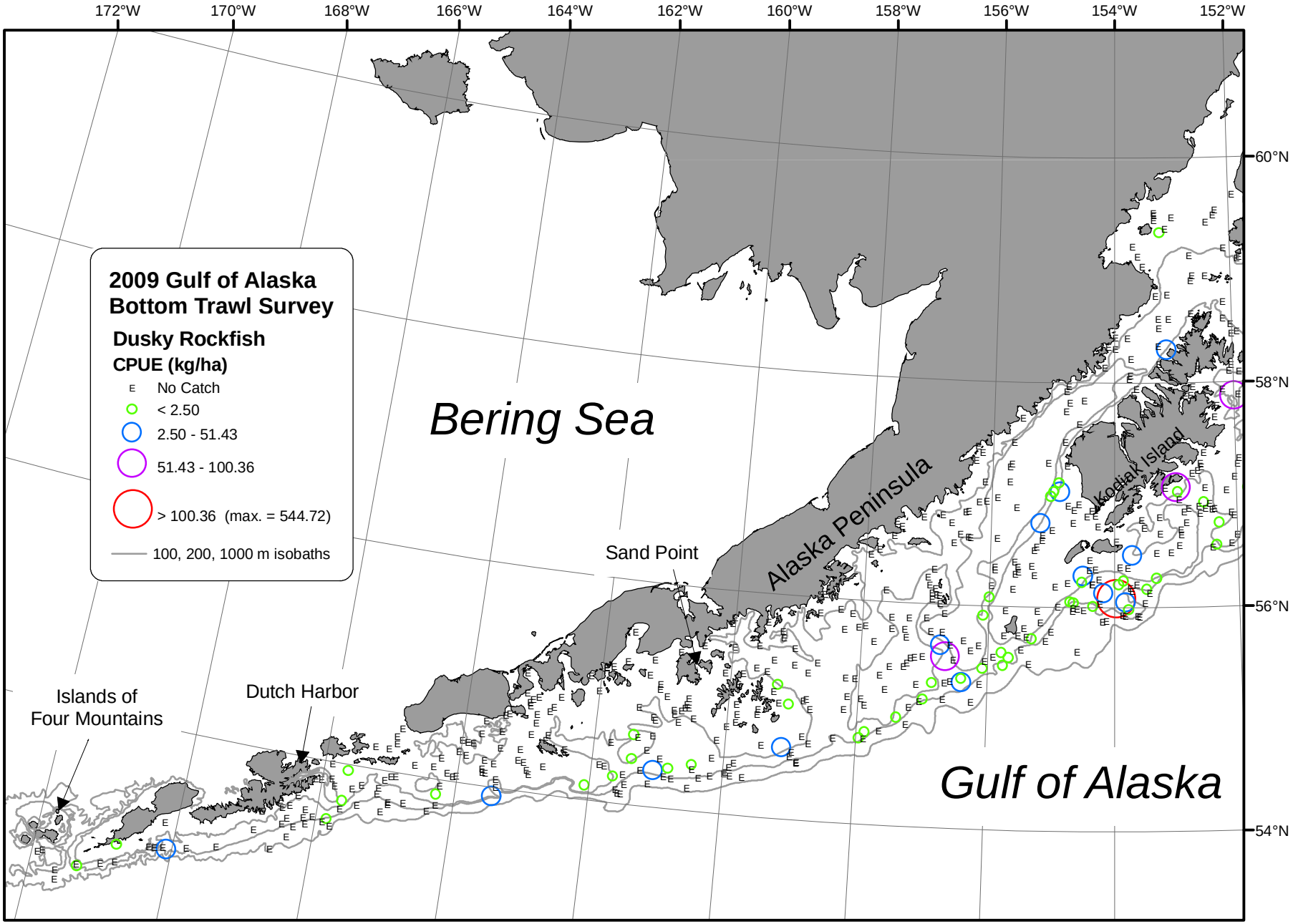

Figure 35. -- Distribution and relative abundance of a dusky rockfish from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

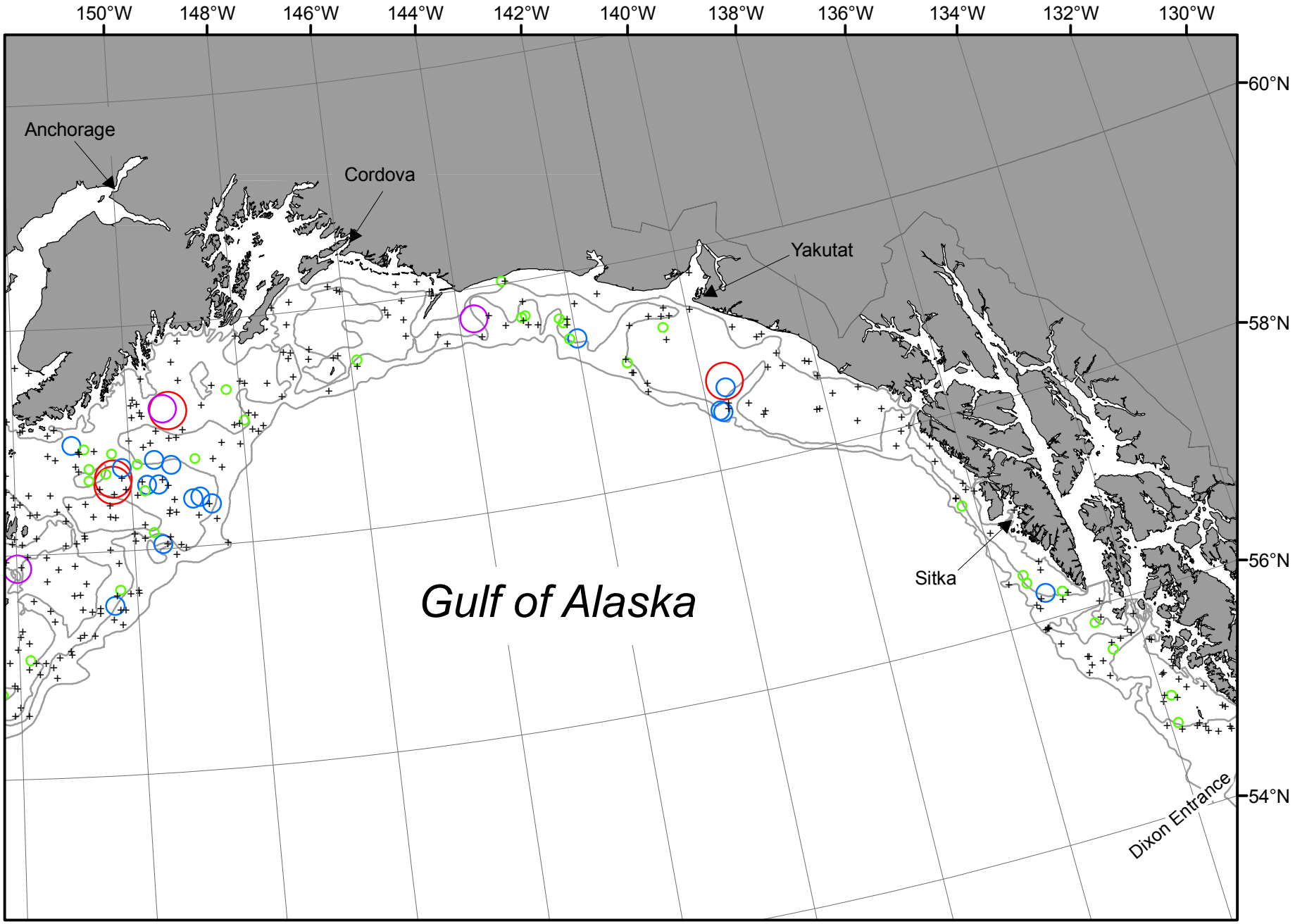

Figure 35. -- Continued (dusky rockfish).

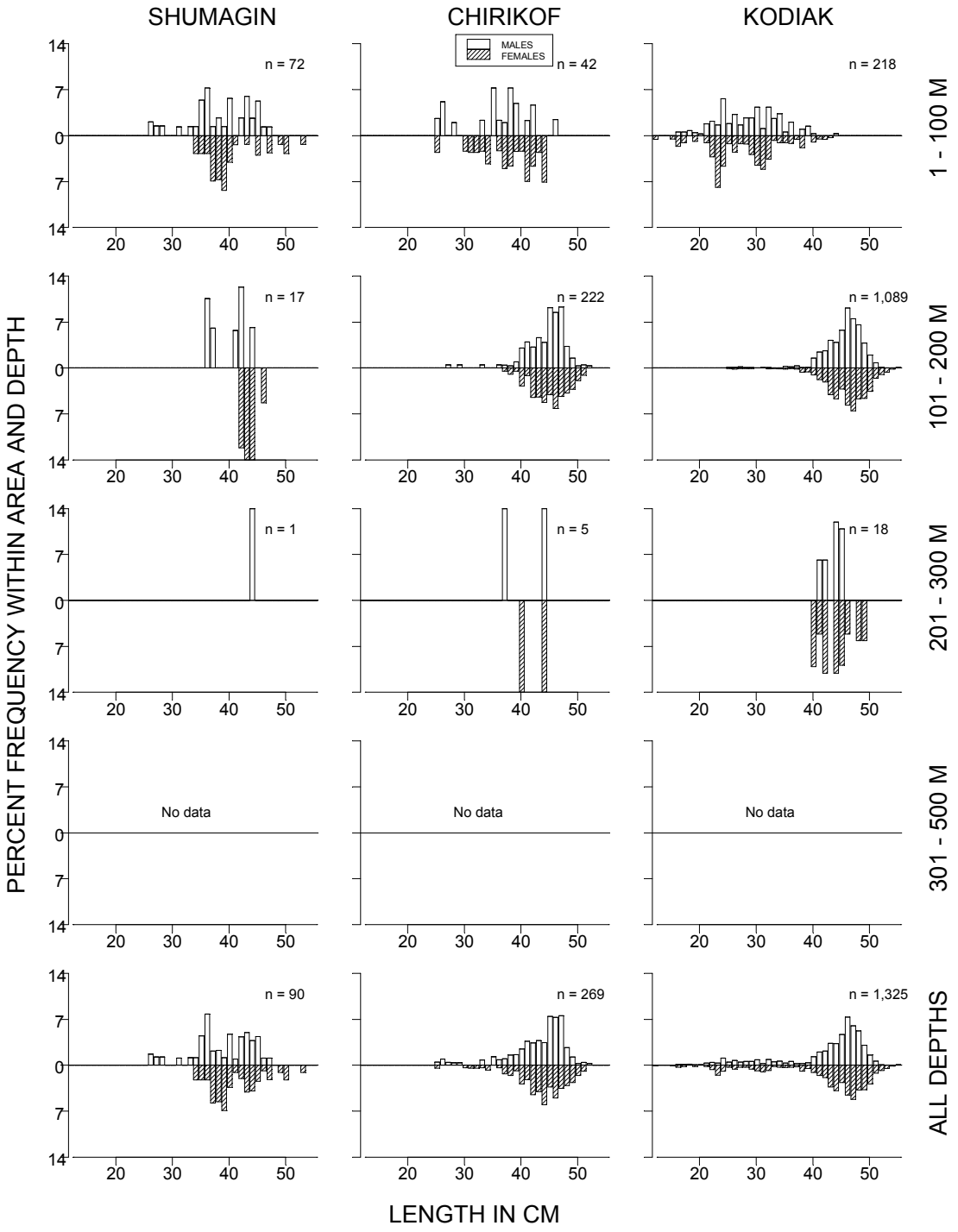

Figure 36. -- Size composition of dusky rockfish from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

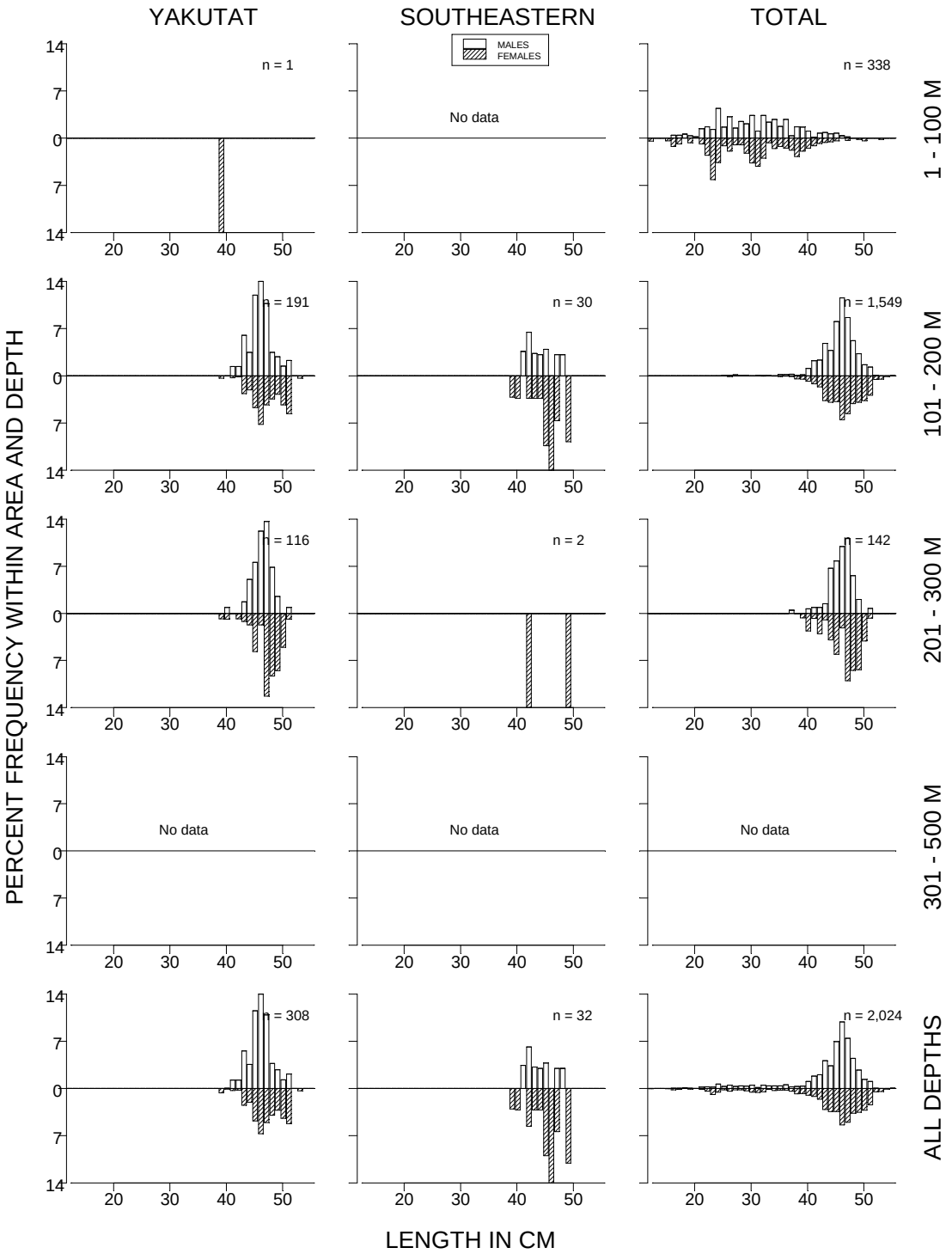

Figure 36. -- Continued (dusky rockfish).

Table 46. -- Catch per unit of effort by stratum for dusky rockfish sorted by descending CPUE for the 2009 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	27	12	22.41	11,261	0	32,059
Yakutat	101 - 200	Yakutat Flats	7	3	20.87	18,850	0	63,741
Kodiak	101 - 200	Portlock Flats	35	16	16.19	11,881	0	27,137
Kodiak	101 - 200	Kenai Flats	19	3	11.15	13,471	0	33,123
Yakutat	201 - 300	Yakutat Slope	8	6	9.41	2,001	0	5,142
Yakutat	101 - 200	Yakataga Shelf	9	3	7.74	4,085	0	12,947
Chirikof	101 - 200	Shelikof Edge	27	7	3.69	2,854	0	7,210
Kodiak	1 - 100	Albatross Shallows	28	2	2.96	1,708	0	5,126
Kodiak	101 - 200	Albatross Gullies	26	3	2.06	1,630	0	4,881
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	4	1.48	622	0	1,650
Chirikof	101 - 200	Chirikof Outer Shelf	26	12	1.40	702	0	1,508
Kodiak	201 - 300	Kodiak Slope	7	1	0.47	77	0	265
Shumagin	1 - 100	Davidson Bank	47	4	0.438	599	0	1,538
Kodiak	201 - 300	Kenai Gullies	20	3	0.411	274	0	638
Chirikof	1 - 100	Chirikof Bank	37	4	0.383	413	0	879
Kodiak	1 - 100	Northern Kodiak Shallows	8	1	0.36	79	0	266
Yakutat	201 - 300	Yakutat Gullies	9	2	0.36	110	0	282
Shumagin	1 - 100	Shumagin Bank	35	5	0.338	419	0	995
Shumagin	101 - 200	Shumagin Outer Shelf	30	5	0.32	264	7	521
Kodiak	1 - 100	Albatross Banks	40	2	0.30	456	0	1,365
Chirikof	201 - 300	Chirikof Slope	8	3	0.29	44	0	108
Shumagin	1 - 100	Fox Islands	19	3	0.14	113	0	290
Southeastern	201 - 300	Baranof-Chichagof Slope	5	1	0.13	15	0	57
Southeastern	101 - 200	Prince of Wales Shelf	15	3	0.11	73	0	159
Chirikof	1 - 100	Semidi Bank	24	1	0.09	62	0	190
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	1	0.04	16	0	51
Yakutat	1 - 100	Yakutat Shallows	11	1	0.04	36	0	117
Shumagin	201 - 300	Shumagin Slope	17	1	0.03	9	0	27
Kodiak	1 - 100	Lower Cook Inlet	15	1	0.001	1	0	2

Dark rockfish (*Sebastes ciliatus*)

Dark rockfish were rarely caught over the course of the survey (Fig. 37, Table 47). Modest CPUEs were recorded along the Alaska Peninsula and near Kodiak Island at depths less than 200 m, but only two catches were recorded in the Yakutat and Southeastern INPFC areas. Seventy-eight percent of the estimated biomass was found in the Shumagin Outer Shelf, Lower Alaska Peninsula, and Shumagin Bank strata, which combined account for less than 9% of the survey area (Table 48). This estimate was based on only 5 hauls out of the 91 conducted in these three strata. A relatively distinct length mode for females occurred at 37 cm in the 101-200 m depth zone in the Shumagin INPFC area. The small amount of length data make it difficult to discern a clear mode in the length distribution in the other INPFC areas and depth zones.

Table 47. -- Number of survey hauls, number of hauls with dark rockfish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	9	0.32	1,321	0	2,750	1.367
	101 - 200	40	1	0.85	1,251	0	3,807	0.92
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	10	0.39	2,572	0	5,484	1.105
Chirikof	1 - 100	78	1	0.01	38	0	117	1.163
	101 - 200	72	1	0.01	35	0	109	1.512
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	2	0.01	74	0	180	1.308
Kodiak	1 - 100	100	3	0.01	39	0	90	0.88
	101 - 200	125	2	0.01	37	0	94	1.078
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	5	0.01	76	1	152	0.967
Yakutat	1 - 100	19	1	0.13	211	0	676	2.163
	101 - 200	36	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	1	0.04	211	0	676	2.163
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	1	0.02	25	0	81	1.673
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	1	0.01	25	0	81	1.673
All areas	1 - 100	335	14	0.12	1,609	116	3,102	1.41
	101 - 200	299	5	0.11	1,349	0	3,907	0.941
	201 - 300	109	0	---	---	---	---	---
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	19	0.09	2,958	42	5,875	1.149

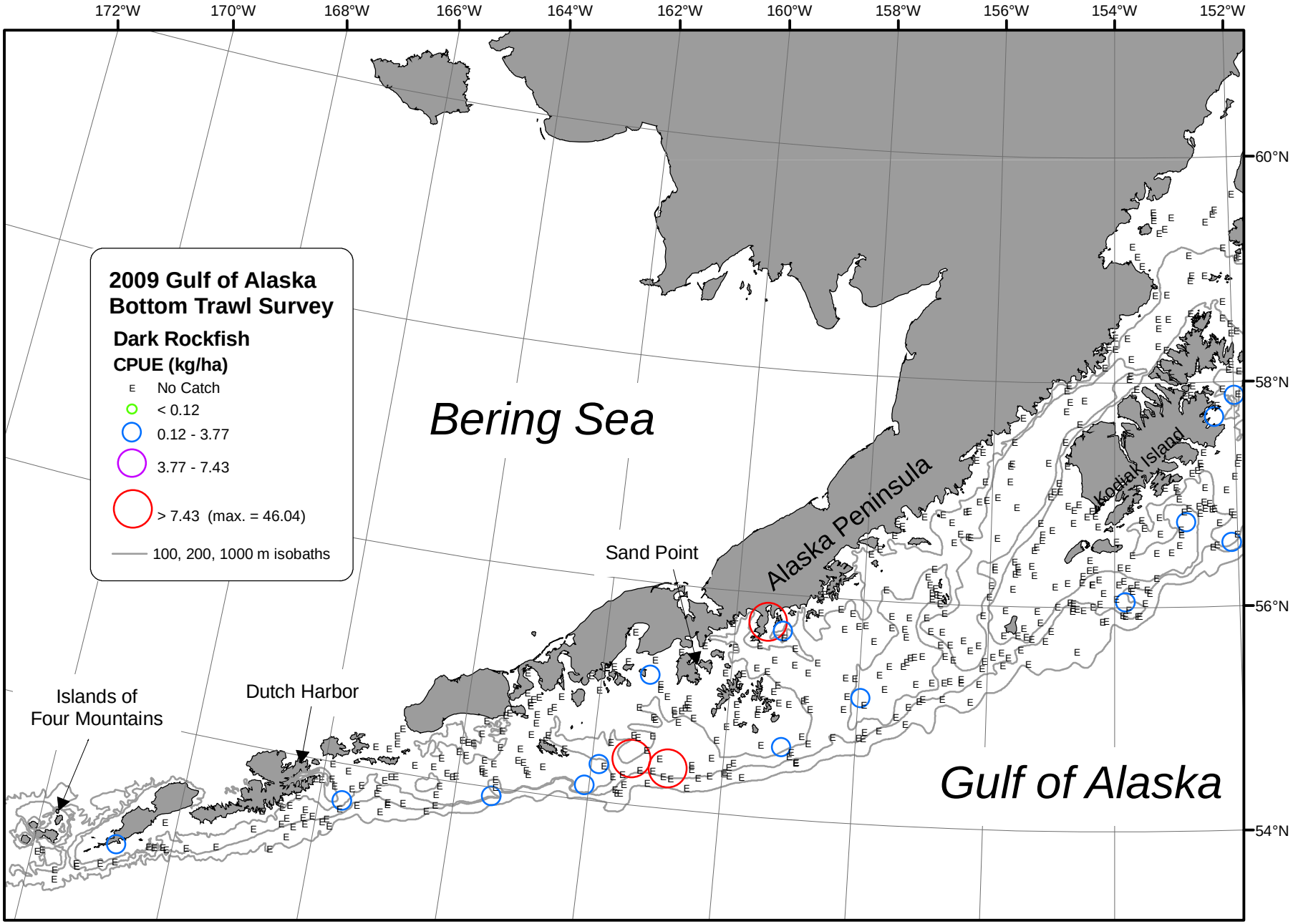

Figure 37. -- Distribution and relative abundance of a dark rockfish from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

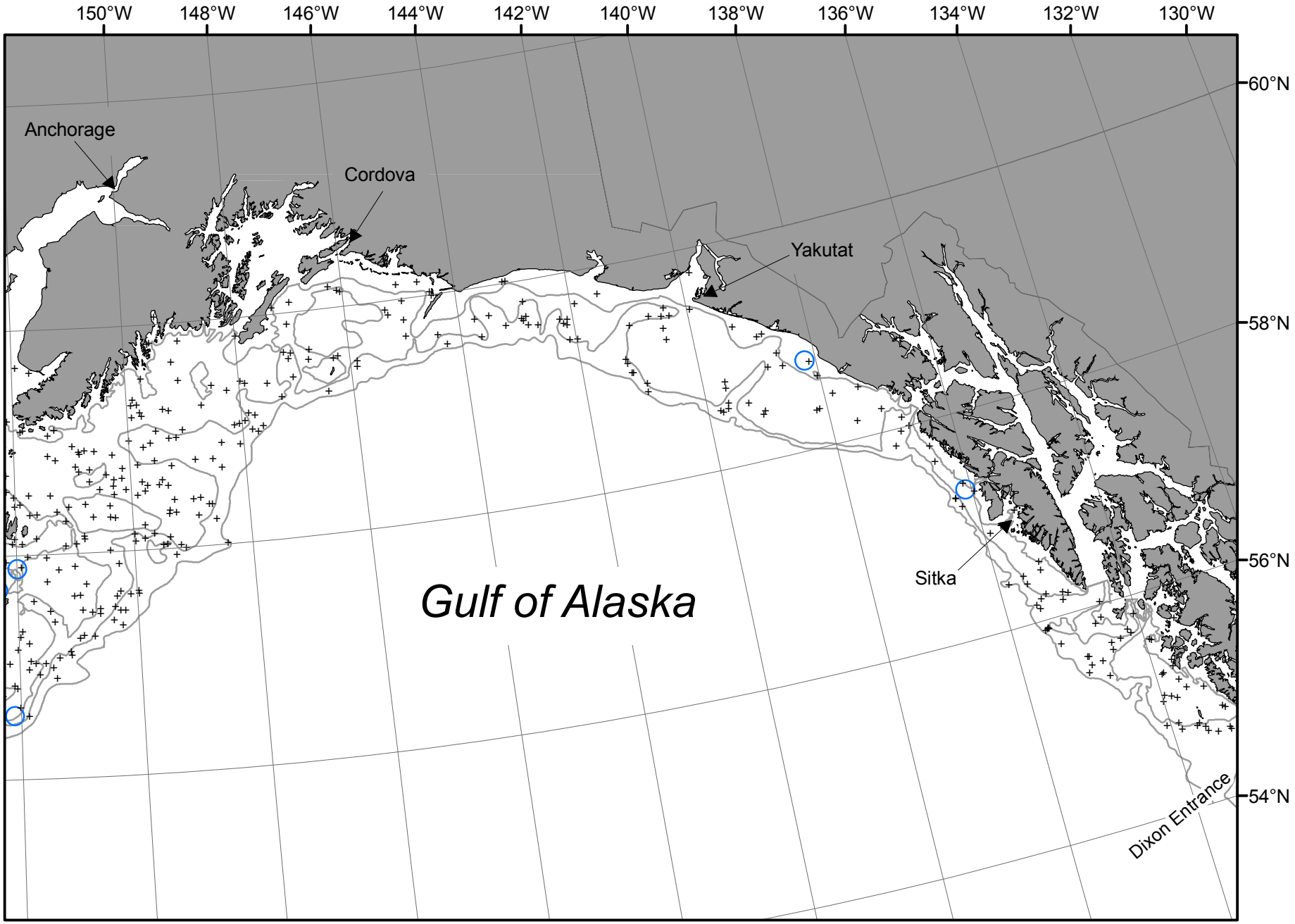

Figure 37. -- Continued (dark rockfish).

Table 48. -- Catch per unit of effort by stratum for dark rockfish sorted by descending CPUE for the 2009 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	Shumagin Outer Shelf	30	1	1.54	1,251	0	3,810
Shumagin	1 - 100	Lower Alaska Peninsula	26	1	0.85	584	0	1,788
Shumagin	1 - 100	Shumagin Bank	35	3	0.39	479	0	1,272
Yakutat	1 - 100	Yakutat Shallows	11	1	0.21	211	0	682
Shumagin	1 - 100	Fox Islands	19	2	0.16	134	0	348
Shumagin	1 - 100	Davidson Bank	47	3	0.09	124	0	311
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	1	0.06	25	0	82
Chirikof	1 - 100	Semidi Bank	24	1	0.05	38	0	117
Chirikof	101 - 200	East Shumagin Gully	19	1	0.03	35	0	110
Kodiak	101 - 200	Albatross Gullies	26	1	0.03	25	0	77
Kodiak	101 - 200	Kodiak Outer Shelf	27	1	0.02	12	0	37
Kodiak	1 - 100	Albatross Banks	40	2	0.02	35	0	86
Kodiak	1 - 100	Albatross Shallows	28	1	0.007	4	0	13

Sharpchin rockfish (*Sebastes zacentrus*)

Sharpchin rockfish was rarely captured west of Kodiak Island (Fig. 38). Over 99% of its biomass estimate occurred in the Kodiak, Yakutat, and Southeastern INPFC areas (Table 49). The highest CPUEs by far were recorded in the Baranof-Chichagof Shelf and Yakutat slope strata, which accounted for approximately 75% of the total biomass estimate even though they make up only about 2% of the survey area (Table 50). Sharpchin rockfish were almost exclusively confined to depths between 101 and 300 m where over 99% of the estimated biomass was located (Table 49). The size composition of females was substantially broader than that of males throughout the survey area (Fig. 39). The sex ratio of the sharpchin rockfish population in the survey area was close to even with males accounting for approximately 52% of the estimated population.

Table 49. -- Number of survey hauls, number of hauls with sharpchin rockfish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	0	---	---	---	---	---
	101 - 200	40	0	---	---	---	---	---
	201 - 300	17	1	0.05	15	0	46	0.625
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	1	---	15	0	46	0.625
Chirikof	1 - 100	78	0	---	---	---	---	---
	101 - 200	72	1	< 0.01	4	0	12	0.511
	201 - 300	25	1	0.01	8	0	25	0.356
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	2	---	12	0	30	0.397
Kodiak	1 - 100	100	0	---	---	---	---	---
	101 - 200	125	11	0.15	637	75	1,198	0.266
	201 - 300	31	1	0.01	6	0	19	0.221
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	12	0.06	643	81	1,204	0.265
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	3	0.01	34	0	84	0.171
	201 - 300	17	4	5.28	2,729	0	6,903	0.326
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	7	0.48	2,763	0	6,938	0.322
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	13	6.21	6,880	0	15,491	0.269
	201 - 300	19	9	4.29	2,169	148	4,190	0.231
	301 - 500	14	4	0.04	11	0	22	0.198
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	26	3.23	9,061	289	17,832	0.259
All areas	1 - 100	335	0	---	---	---	---	---
	101 - 200	299	28	0.62	7,555	0	16,187	0.268
	201 - 300	109	16	1.37	4,927	594	9,259	0.276
	301 - 500	52	4	0.01	11	0	22	0.198
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	48	0.39	12,493	3,006	21,979	0.271

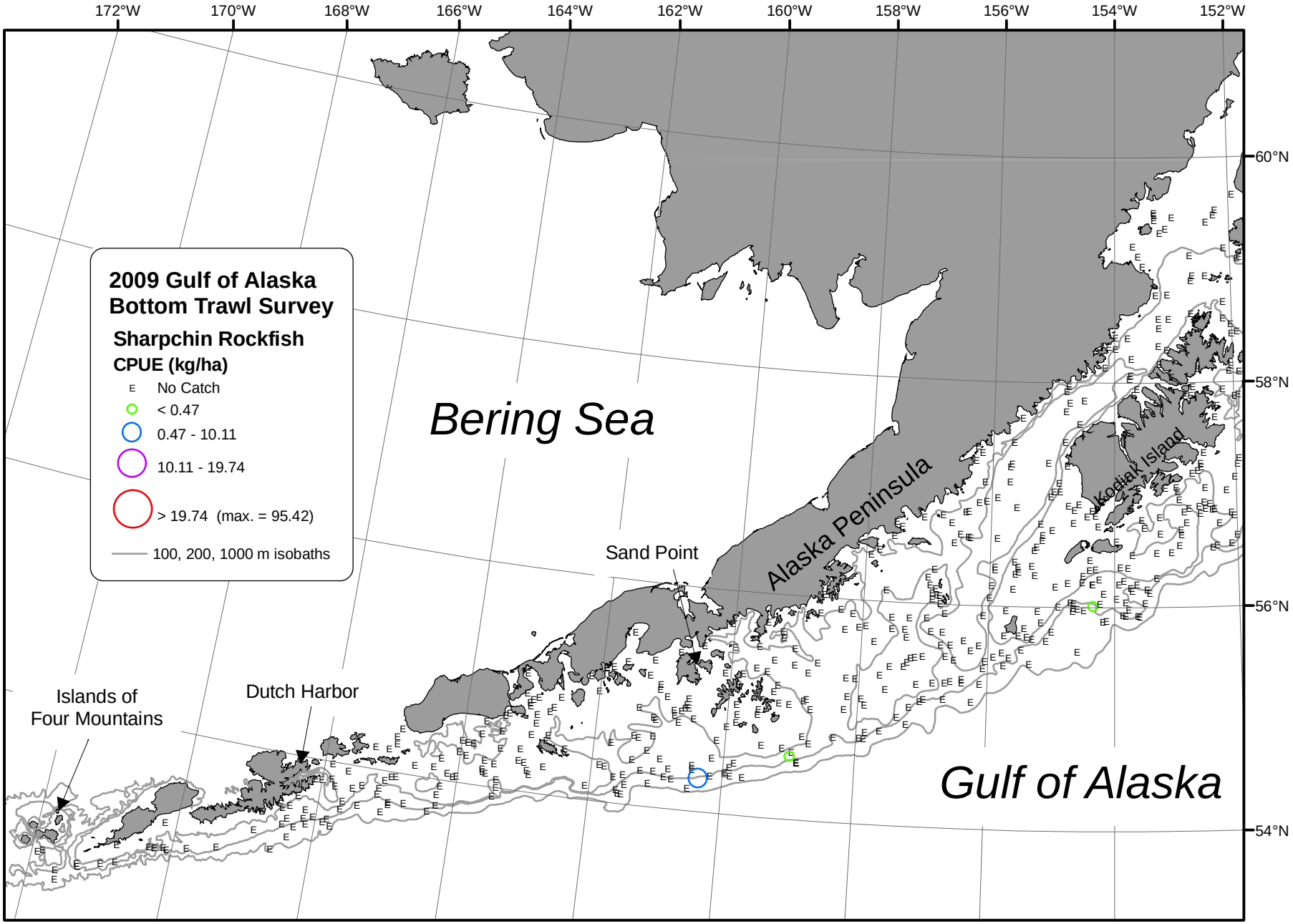

Figure 38. -- Distribution and relative abundance of a sharpchin rockfish from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

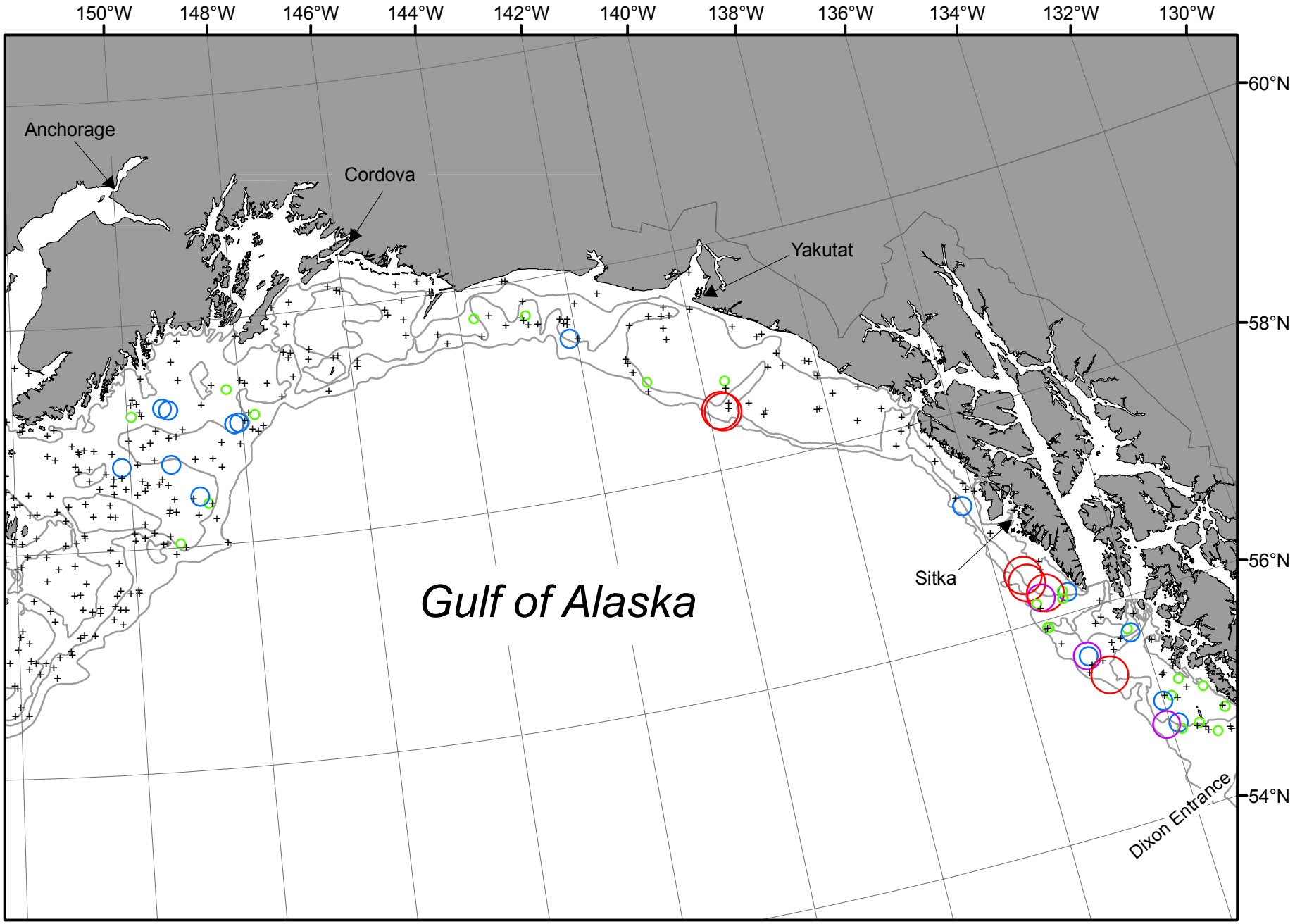

Figure 38. -- Continued (sharpchin rockfish).

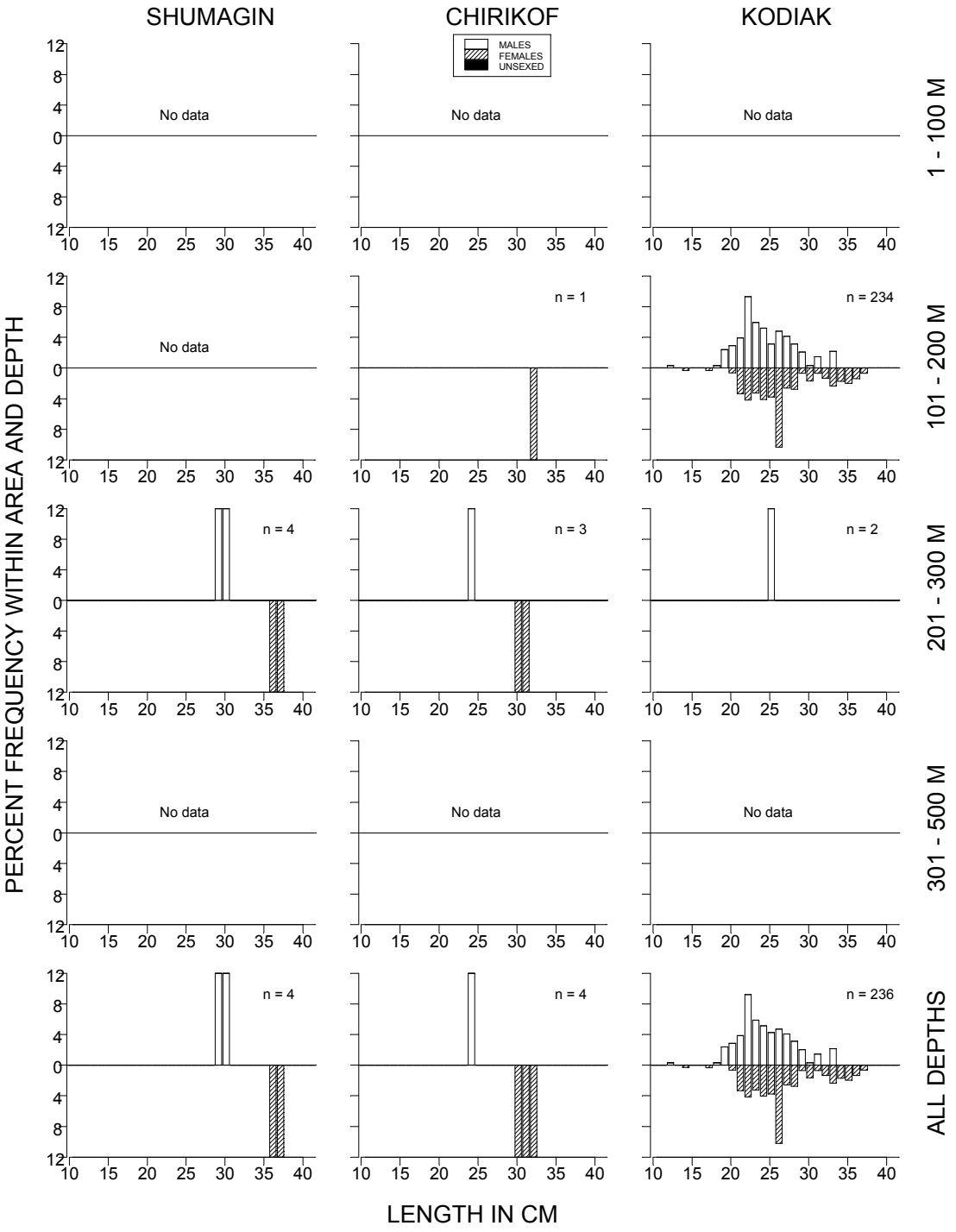

Figure 39. -- Size composition of sharpchin rockfish from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

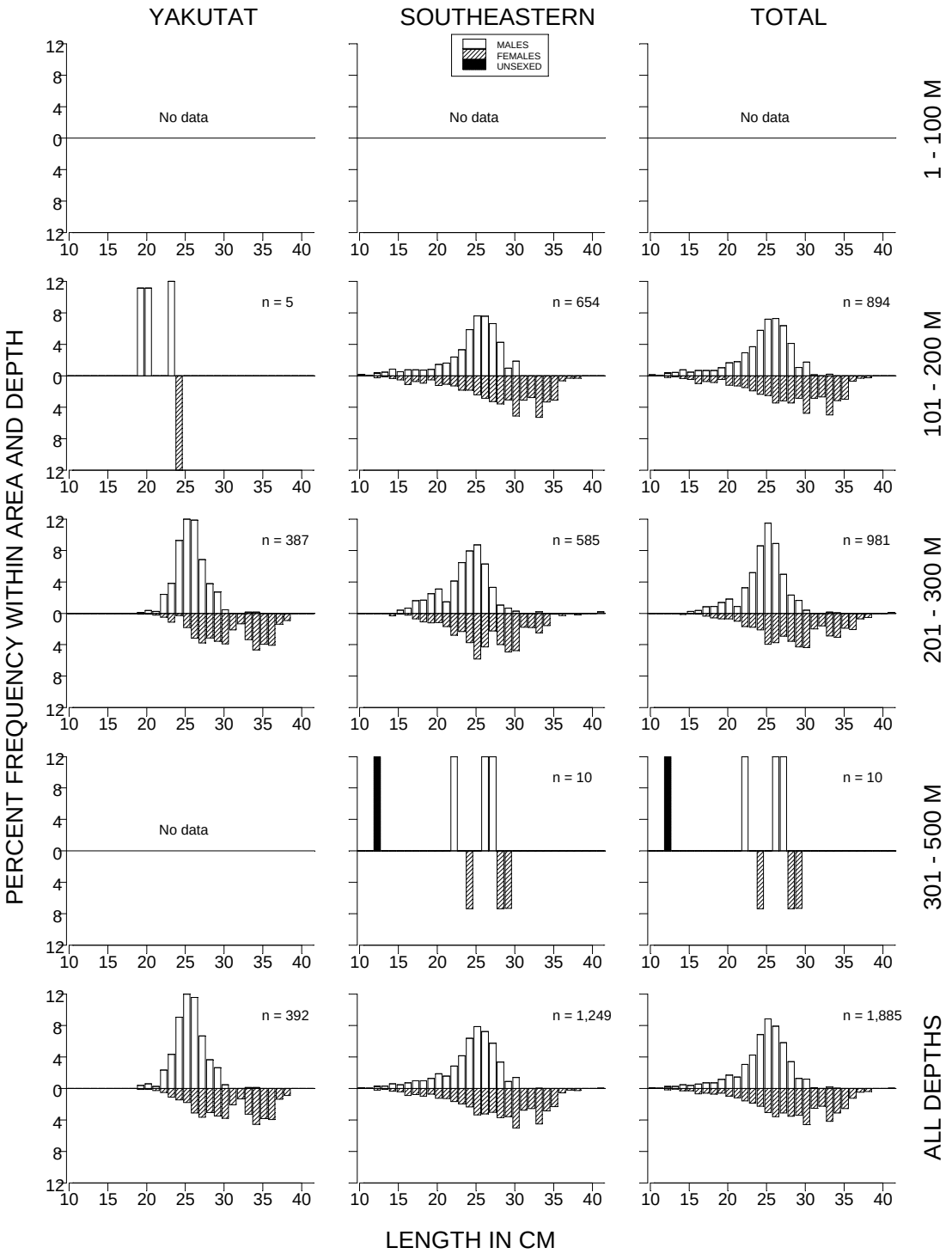

Figure 39. -- Continued (sharpchin rockfish).

Table 50. -- Catch per unit of effort by stratum for sharpchin rockfish sorted by descending CPUE for the 2009 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	11	5	15.79	6,627	0	15,336
Yakutat	201 - 300	Yakutat Slope	8	4	12.83	2,729	0	7,010
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	6	4.38	1,719	0	3,666
Southeastern	201 - 300	Baranof-Chichagof Slope	5	3	4.00	450	0	1,268
Kodiak	101 - 200	Portlock Flats	35	4	0.50	365	0	827
Southeastern	101 - 200	Prince of Wales Shelf	15	8	0.37	253	0	609
Kodiak	101 - 200	Kenai Flats	19	4	0.17	209	0	524
Kodiak	101 - 200	Kodiak Outer Shelf	27	3	0.13	63	0	152
Southeastern	301 - 500	Southeastern Slope	7	3	0.10	8	0	17
Shumagin	201 - 300	Shumagin Slope	17	1	0.05	15	0	46
Chirikof	201 - 300	Chirikof Slope	8	1	0.05	8	0	26
Yakutat	101 - 200	Yakutat Flats	7	2	0.03	29	0	80
Southeastern	301 - 500	Southeastern Deep Gullies	7	1	0.013	3	0	11
Yakutat	101 - 200	Yakataga Shelf	9	1	0.009	5	0	15
Kodiak	201 - 300	Kenai Gullies	20	1	0.009	6	0	19
Chirikof	101 - 200	Chirikof Outer Shelf	26	1	0.008	4	0	12

Shortraker rockfish (*Sebastes borealis*)

Shortraker rockfish were found throughout the survey area, although almost exclusively on the continental slope in the 200 to 700 m depth range (Fig. 40, Table 51). The highest CPUEs were consistently recorded in the 301 and 500 m depth range, which accounted for approximately 75% of the total biomass (Table 51). In this depth range, shortraker rockfish were caught in about 87% of the tows. Shortraker rockfish were considerably more densely populated in the central and eastern Gulf of Alaska than in the western Gulf of Alaska. Approximately 60% of the estimated biomass was found in the Kodiak and Yakutat INPFC areas. The highest concentrations of shortraker rockfish were in the Southeastern Slope stratum, although considerably larger abundances were recorded in four bigger strata (Table 52). Mean weight and length generally increased from west to east (Fig. 41, Table 51). The sex ratio of the shortraker rockfish population in the survey area was almost exactly even.

Table 51. -- Number of survey hauls, number of hauls with shortraker rockfish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	0	---	---	---	---	---
	101 - 200	40	0	---	---	---	---	---
	201 - 300	17	4	2.71	757	0	1,732	2.613
	301 - 500	7	6	31.82	8,053	0	23,923	2.336
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	10	1.35	8,810	0	24,718	2.357
Chirikof	1 - 100	78	0	---	---	---	---	---
	101 - 200	72	4	0.10	228	0	506	2.341
	201 - 300	25	4	0.95	1,102	0	3,124	4.234
	301 - 500	7	6	11.71	1,879	0	5,004	2.132
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	14	0.47	3,209	0	6,623	2.59
Kodiak	1 - 100	100	1	0.01	38	0	115	2.204
	101 - 200	125	0	---	---	---	---	---
	201 - 300	31	10	3.57	4,100	1,354	6,847	4.03
	301 - 500	16	15	31.66	9,217	1,213	17,222	3.359
	501 - 700	4	2	1.06	185	0	482	2.276
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	28	1.33	13,541	5,237	21,845	3.508
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	1	0.30	878	0	2,954	5.5
	201 - 300	17	9	11.40	5,894	0	11,925	2.615
	301 - 500	8	8	21.86	5,746	0	11,737	3.883
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	18	2.19	12,518	4,604	20,432	3.215
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	0	---	---	---	---	---
	201 - 300	19	4	1.54	777	0	1,603	6.21
	301 - 500	14	10	16.53	5,154	2,353	7,954	5.862
	501 - 700	2	2	1.72	178	0	439	2.981
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	16	2.18	6,109	3,266	8,951	5.742
All areas	1 - 100	335	1	< 0.01	38	0	115	2.204
	101 - 200	299	5	0.09	1,106	0	3,207	4.303
	201 - 300	109	31	3.50	12,630	5,799	19,461	3.2
	301 - 500	52	45	23.49	30,048	11,537	48,560	3.186
	501 - 700	16	4	0.44	363	47	679	2.574
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	86	1.38	44,185	25,332	63,039	3.203

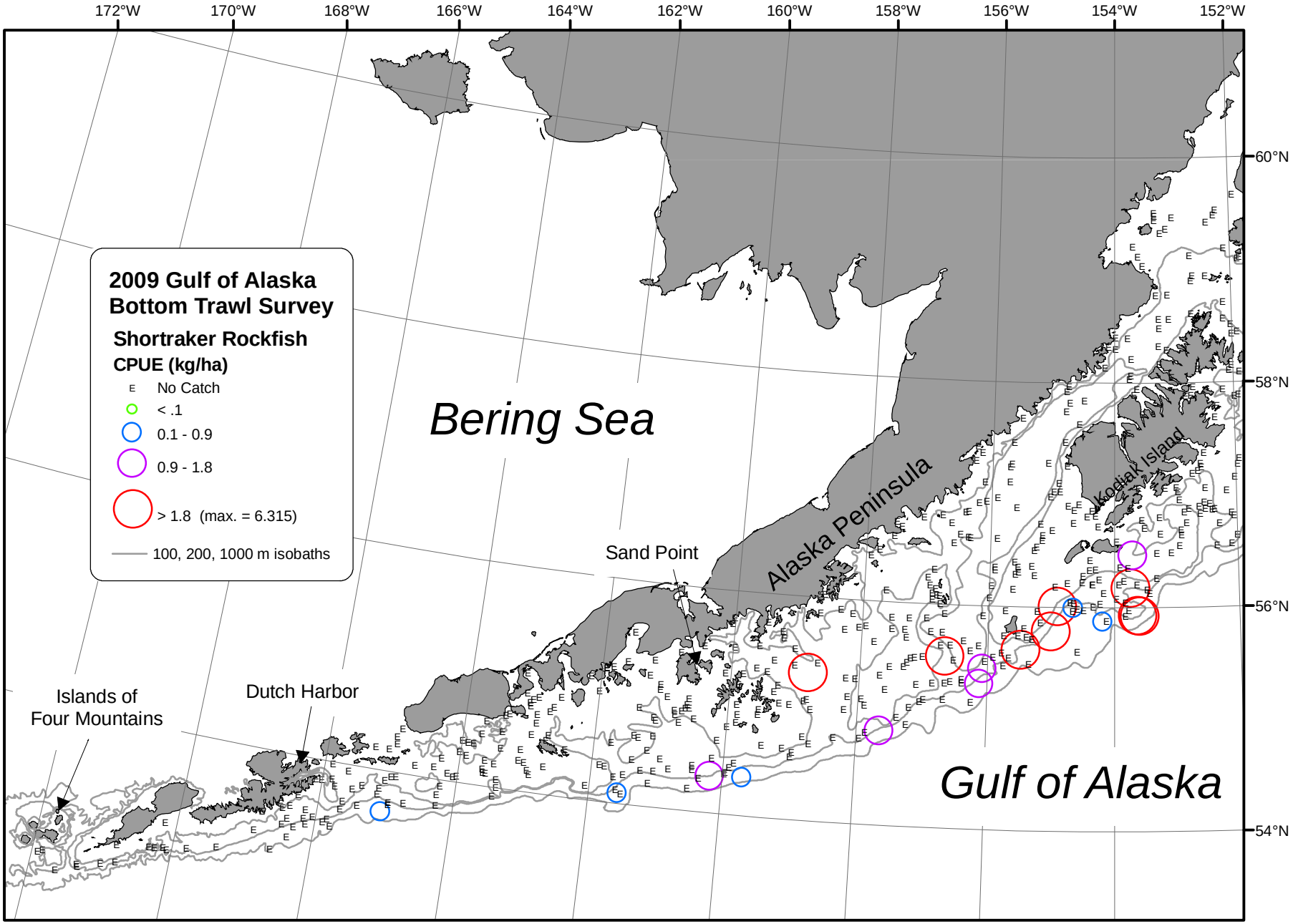

Figure 40. -- Distribution and relative abundance of a shortraker rockfish from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

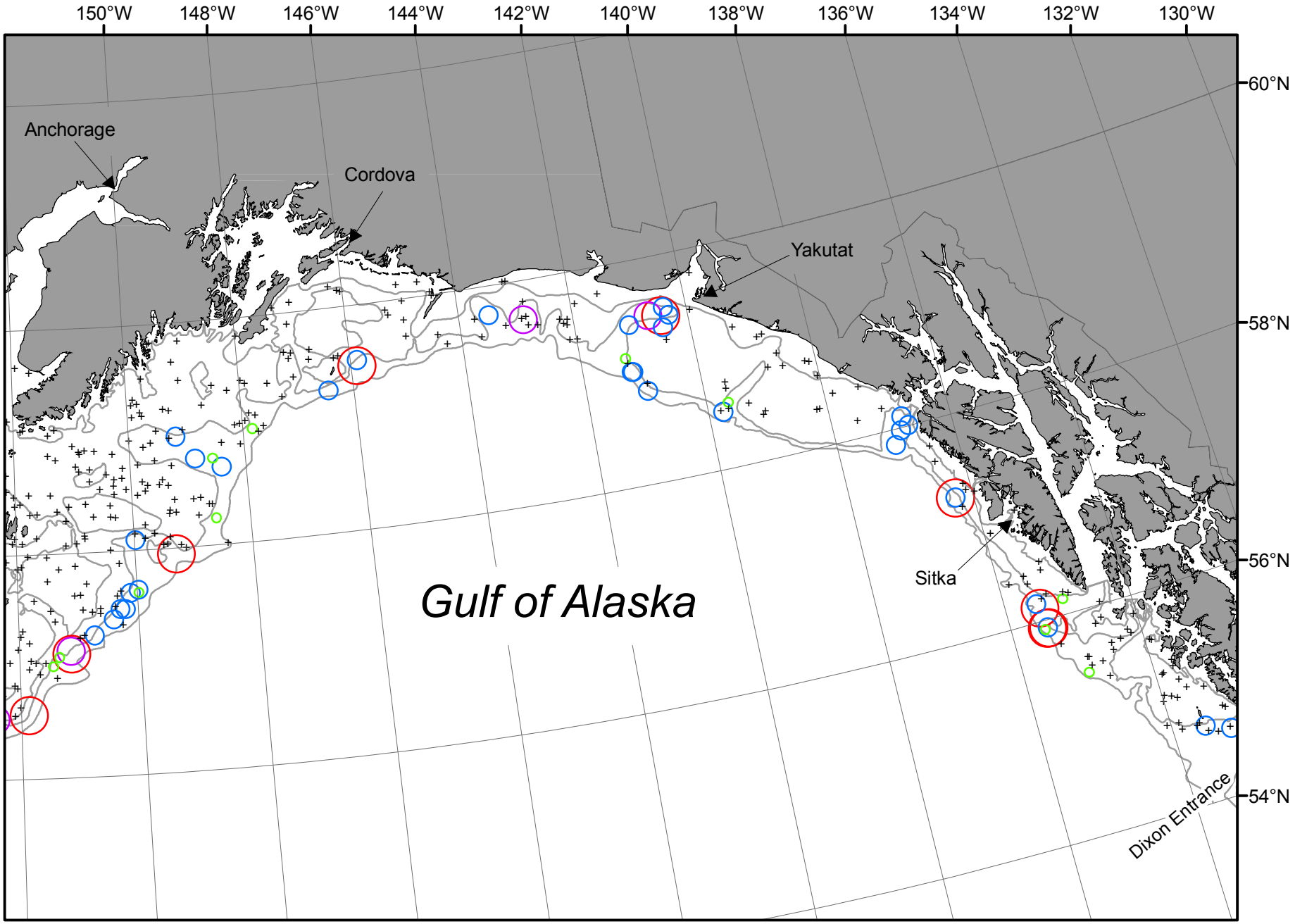

Figure 40. -- Continued (shortraker rockfish).

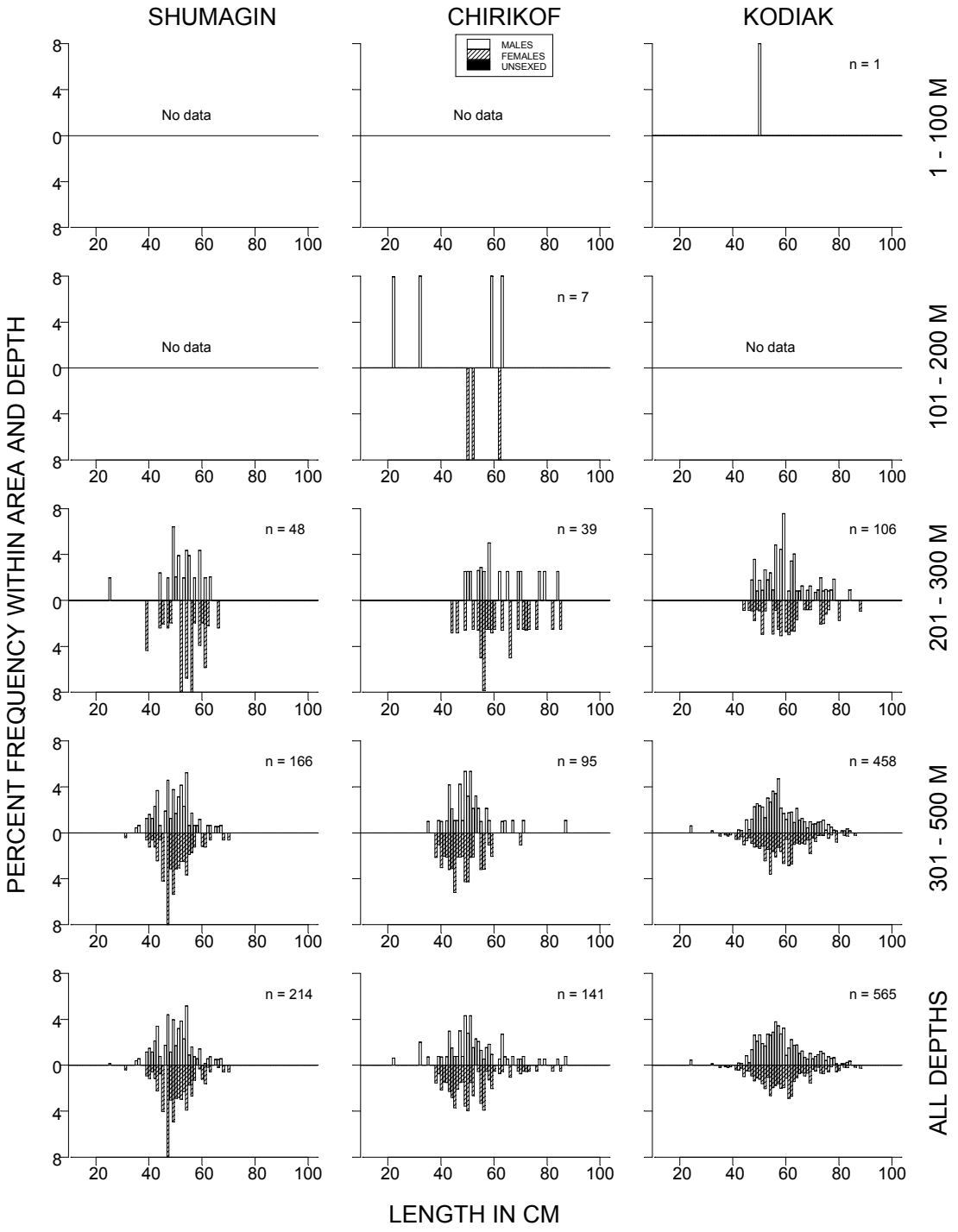

Figure 41. -- Size composition of shortraker rockfish from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

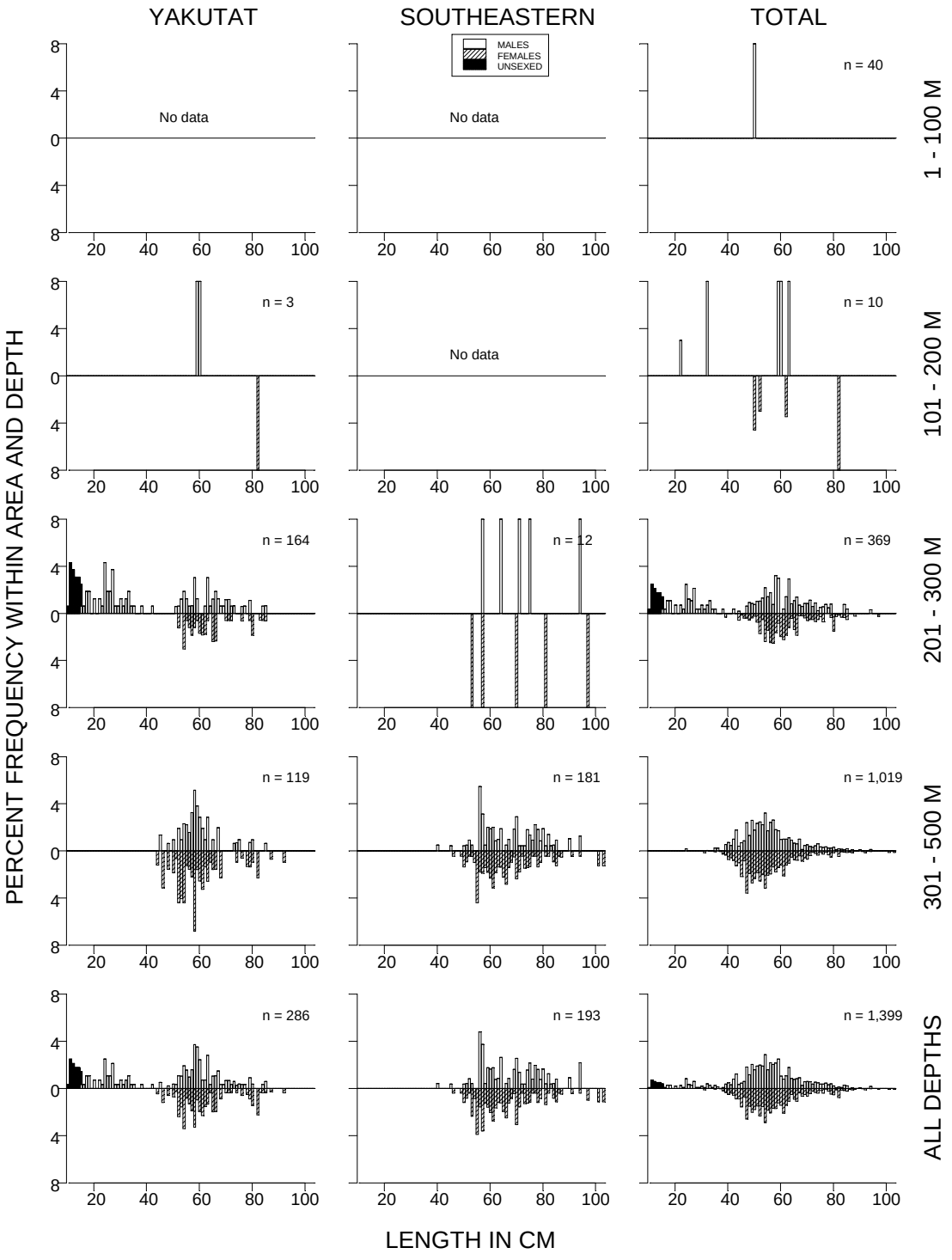

Figure 41. -- Continued (shortraker rockfish).

Table 52. -- Catch per unit of effort by stratum for shortraker rockfish sorted by descending CPUE for the 2009 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	7	7	50.54	3,905	1,418	6,391
Yakutat	301 - 500	Yakutat Slope	6	6	32.13	4,886	0	11,243
Shumagin	301 - 500	Shumagin Slope	7	6	31.82	8,053	0	24,474
Kodiak	301 - 500	Kodiak Slope	16	15	31.66	9,217	1,172	17,263
Kodiak	201 - 300	Kodiak Slope	7	5	18.61	3,020	67	5,972
Yakutat	201 - 300	Yakutat Gullies	9	7	18.44	5,609	0	11,738
Chirikof	301 - 500	Chirikof Slope	7	6	11.71	1,879	0	5,113
Yakutat	301 - 500	Yakutat Gullies	2	2	7.77	860	0	7,852
Chirikof	201 - 300	Chirikof Slope	8	4	7.21	1,102	0	3,176
Southeastern	201 - 300	Baranof-Chichagof Slope	5	3	5.45	613	0	1,581
Southeastern	301 - 500	Southeastern Deep Gullies	7	3	5.33	1,249	0	3,060
Shumagin	201 - 300	Shumagin Slope	17	4	2.71	757	0	1,737
Southeastern	501 - 700	Southeastern Slope	2	2	1.719	178	0	949
Kodiak	201 - 300	Kenai Gullies	20	5	1.623	1,081	0	2,240
Yakutat	201 - 300	Yakutat Slope	8	2	1.339	285	0	781
Kodiak	501 - 700	Kodiak Slope	4	2	1.06	185	0	525
Yakutat	101 - 200	Yakutat Flats	7	1	0.97	878	0	3,026
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	1	0.42	164	0	517
Chirikof	101 - 200	Chirikof Outer Shelf	26	2	0.11	54	0	136
Chirikof	101 - 200	East Shumagin Gully	19	1	0.10	114	0	354
Chirikof	101 - 200	Shelikof Edge	27	1	0.08	60	0	183
Kodiak	1 - 100	Albatross Banks	40	1	0.03	38	0	116

Shortspine thornyhead (*Sebastolobus alascanus*)

Shortspine thornyhead was the third most abundant rockfish species caught in the 2009 survey (Table 2). Shortspine thornyhead were found throughout the survey area at all depths deeper than 100 m, including all tows greater than 300 m (Fig. 42, Table 53). The highest CPUEs were generally recorded on the continental slope and deeper gullies in the 301 and 700 m depth range, which accounted for approximately 51% of its total biomass (Tables 53 and 54). Population length distributions were similar in all areas and at all depths, with both males and females exhibiting length modes between approximately 25 and 30 cm FL (Fig. 43). The sex ratio of the shortspine thornyhead population in the survey area was about even, with females making up approximately 51% of the total estimated population.

Table 53. -- Number of survey hauls, number of hauls with shortspine thornyhead, mean CPUE, biomass, and mean weight, based on the 2009 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	127	0	---	---	---	---	---
	101 - 200	40	2	0.06	84	0	236	0.504
	201 - 300	17	15	25.45	7,094	2,845	11,343	0.206
	301 - 500	7	7	20.89	5,286	1,457	9,115	0.271
	501 - 700	3	3	27.95	5,605	1,644	9,567	0.276
	701 - 1000	2	2	3.71	719	0	2,418	0.357
	All depths	196	29	2.88	18,789	12,704	24,874	0.246
Chirikof	1 - 100	78	0	---	---	---	---	---
	101 - 200	72	6	0.03	63	3	124	0.266
	201 - 300	25	13	1.77	2,039	659	3,420	0.315
	301 - 500	7	7	16.18	2,595	1,392	3,797	0.315
	501 - 700	5	5	12.77	2,494	120	4,868	0.339
	701 - 1000	3	3	1.55	474	0	949	0.467
	All depths	190	34	1.13	7,665	5,090	10,240	0.329
Kodiak	1 - 100	100	1	< 0.01	13	0	38	0.145
	101 - 200	125	12	0.11	496	0	1,101	0.29
	201 - 300	31	25	8.56	9,841	7,268	12,414	0.273
	301 - 500	16	16	16.06	4,676	2,920	6,431	0.218
	501 - 700	4	4	16.45	2,871	704	5,038	0.183
	701 - 1000	4	4	8.57	2,995	0	6,449	0.398
	All depths	280	62	2.06	20,891	16,326	25,456	0.253
Yakutat	1 - 100	19	1	0.04	67	0	220	0.7
	101 - 200	36	20	0.66	1,948	651	3,245	0.193
	201 - 300	17	17	7.49	3,872	2,811	4,933	0.242
	301 - 500	8	8	12.53	3,293	2,290	4,296	0.222
	501 - 700	2	2	23.09	3,393	1,404	5,381	0.241
	701 - 1000	1	1	23.03	4,347	---	---	0.4
	All depths	83	49	2.96	16,920	14,819	19,021	0.257
Southeastern	1 - 100	11	1	0.01	6	0	20	0.25
	101 - 200	26	7	0.37	410	154	666	0.169
	201 - 300	19	18	7.22	3,648	2,208	5,087	0.184
	301 - 500	14	14	21.06	6,566	5,105	8,026	0.212
	501 - 700	2	2	33.17	3,428	0	6,979	0.42
	701 - 1000	2	2	3.93	474	86	861	0.526
	All depths	74	44	5.18	14,531	11,653	17,408	0.233
All areas	1 - 100	335	3	0.01	85	0	239	0.413
	101 - 200	299	47	0.25	3,002	1,567	4,436	0.205
	201 - 300	109	88	7.35	26,494	21,300	31,688	0.235
	301 - 500	52	52	17.52	22,415	17,852	26,978	0.236
	501 - 700	16	16	21.68	17,790	13,232	22,348	0.271
	701 - 1000	12	12	7.77	9,009	5,623	12,395	0.404
	All depths	823	218	2.46	78,795	70,445	87,146	0.254

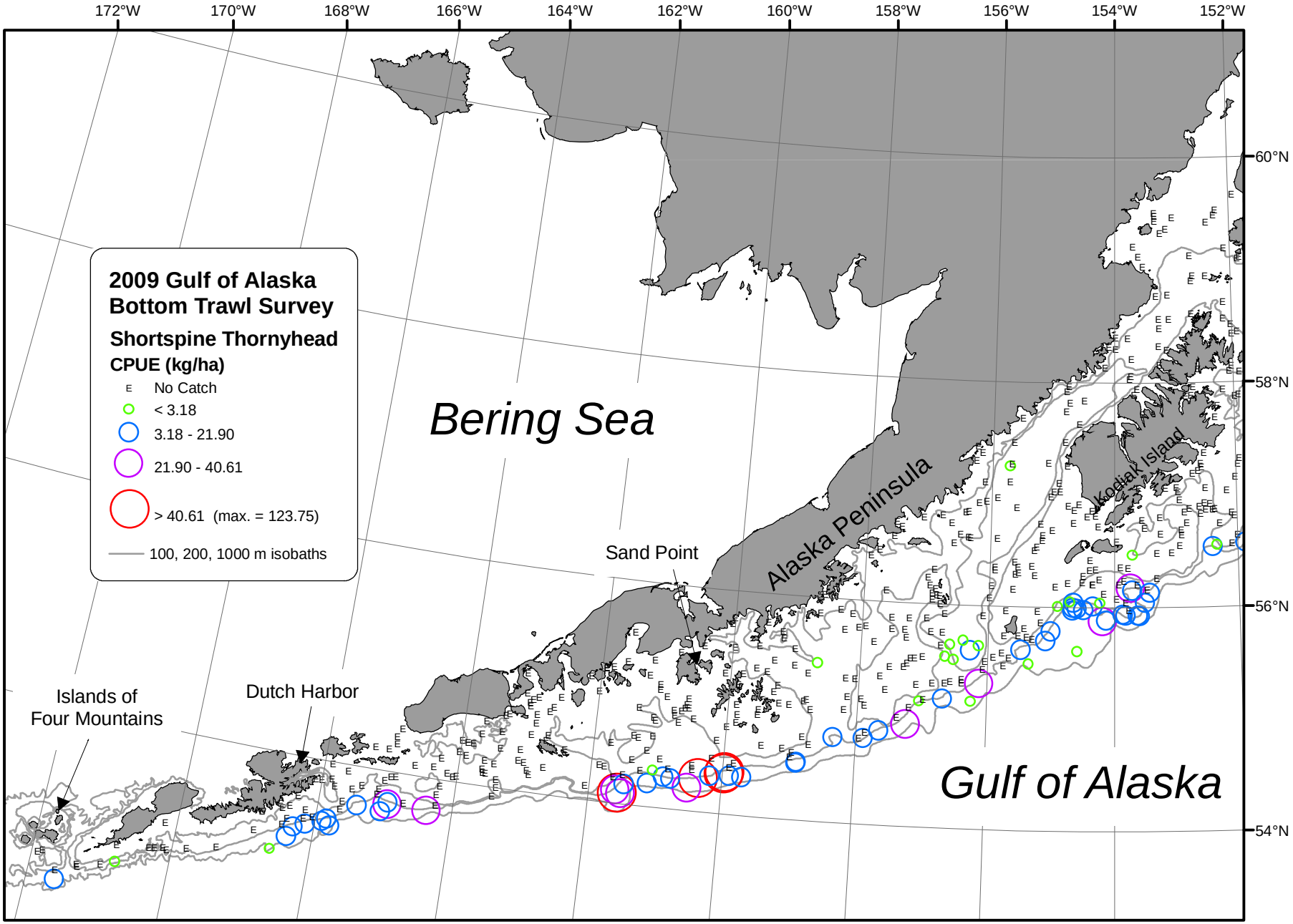

Figure 42. -- Distribution and relative abundance of a shortspine thornyhead from the 2009 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above the mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

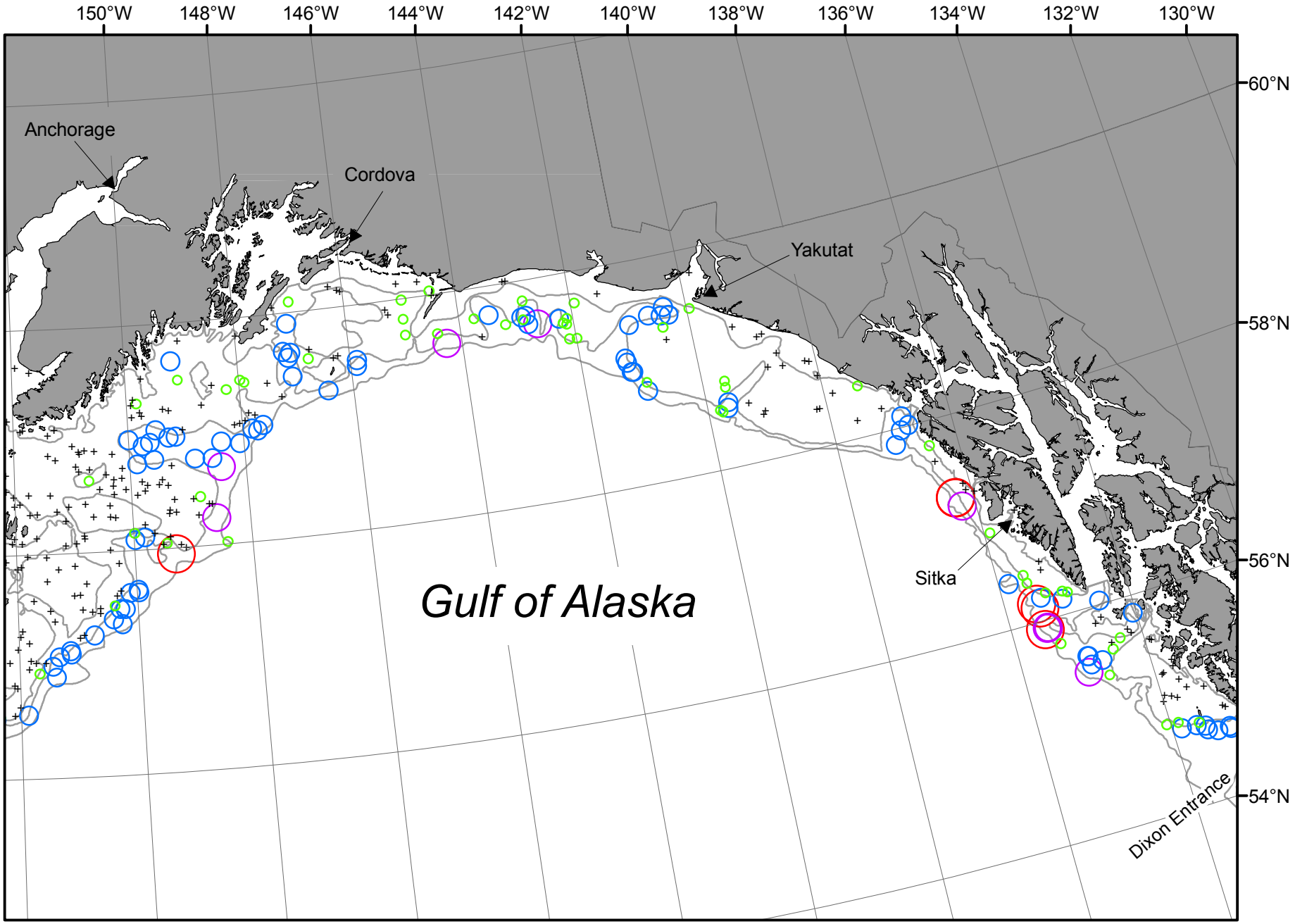

Figure 42. -- Continued (shortspine thornyhead).

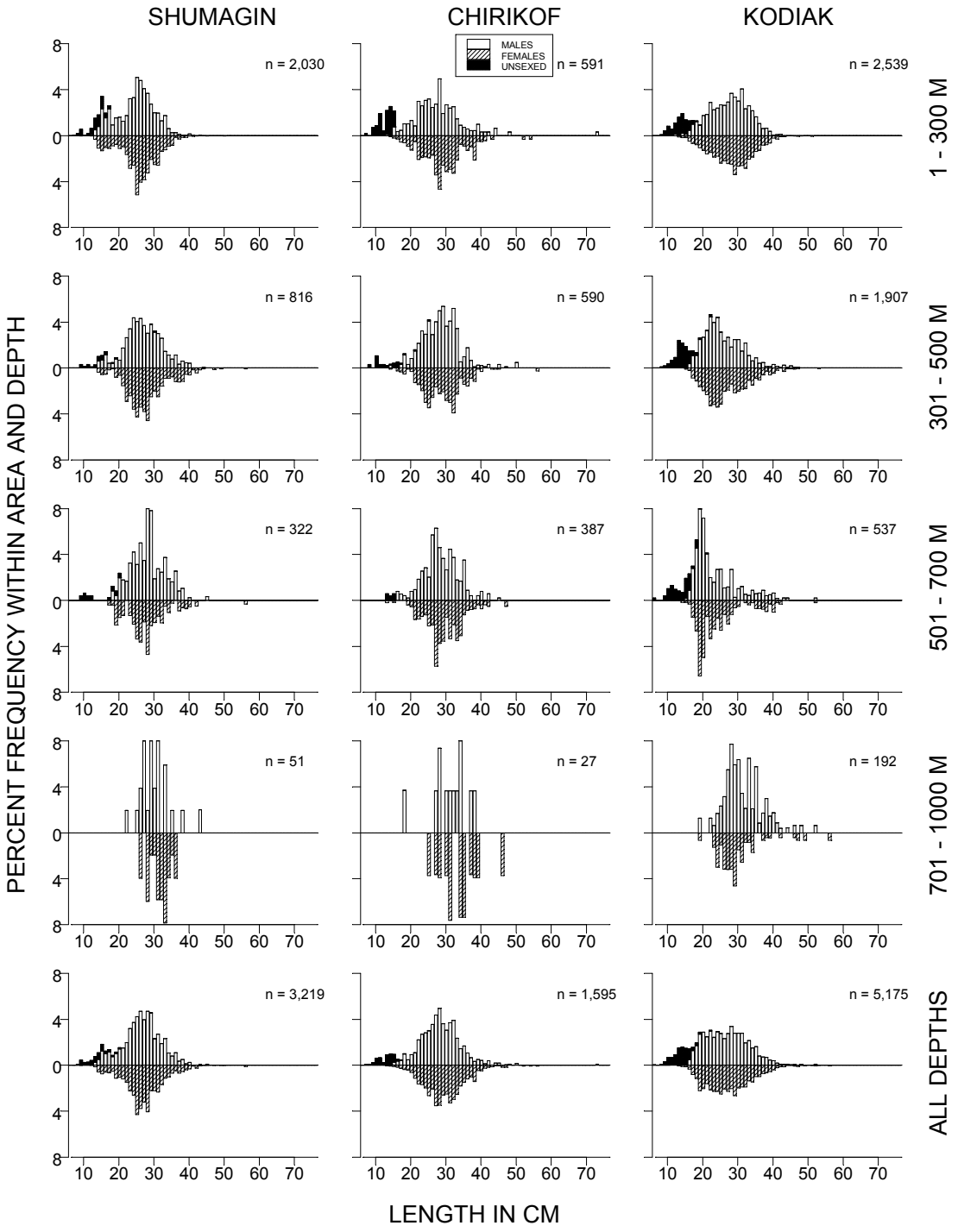

Figure 43. -- Size composition of shortspine thornyhead from the 2009 Gulf of Alaska bottom trawl survey, by International North Pacific Fisheries Commission statistical areas and depth intervals.

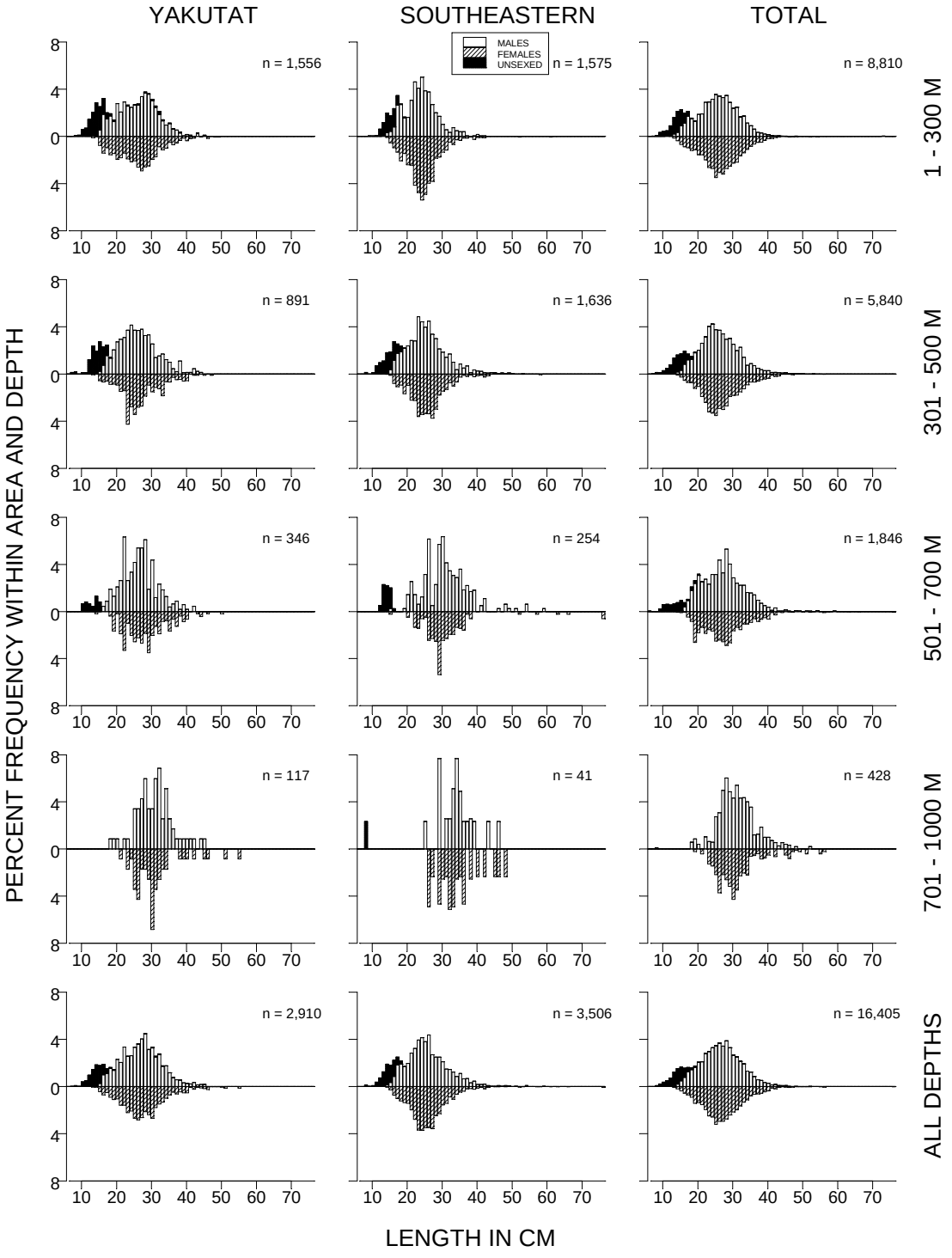

Figure 43. -- Continued (shortspine thornyhead).

Table 54. -- Catch per unit of effort by stratum for shortspine thornyhead sorted by descending CPUE for the 2009 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	7	7	49.73	3,842	2,477	5,208
Southeastern	501 - 700	Southeastern Slope	2	2	33.17	3,428	0	13,914
Shumagin	501 - 700	Shumagin Slope	3	3	27.95	5,605	248	10,963
Shumagin	201 - 300	Shumagin Slope	17	15	25.45	7,094	2,824	11,363
Yakutat	501 - 700	Yakutat Slope	2	2	23.09	3,393	0	9,264
Yakutat	701 - 1000	Yakutat Slope	1	1	23.03	4,347		
Shumagin	301 - 500	Shumagin Slope	7	7	20.89	5,286	1,325	9,248
Kodiak	501 - 700	Kodiak Slope	4	4	16.45	2,871	387	5,355
Southeastern	201 - 300	Baranof-Chichagof Slope	5	5	16.41	1,847	310	3,384
Chirikof	301 - 500	Chirikof Slope	7	7	16.18	2,595	1,351	3,838
Kodiak	301 - 500	Kodiak Slope	16	16	16.06	4,676	2,911	6,440
Yakutat	301 - 500	Yakutat Slope	6	6	15.09	2,294	1,298	3,290
Kodiak	201 - 300	Kodiak Slope	7	7	14.439	2,343	966	3,720
Chirikof	501 - 700	Chirikof Slope	5	5	12.767	2,494	0	5,057
Southeastern	301 - 500	Southeastern Deep Gullies	7	7	11.616	2,723	1,845	3,602
Kodiak	201 - 300	Kenai Gullies	20	18	11.259	7,498	5,184	9,812
Yakutat	201 - 300	Yakutat Gullies	9	9	9.419	2,866	2,000	3,732
Yakutat	301 - 500	Yakutat Gullies	2	2	9.025	999	0	3,516
Kodiak	701 - 1000	Kodiak Slope	4	4	8.57	2,995	0	6,954
Chirikof	201 - 300	Chirikof Slope	8	7	8.10	1,238	488	1,988
Yakutat	201 - 300	Yakutat Slope	8	8	4.73	1,006	233	1,780
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	13	4.59	1,801	919	2,683
Southeastern	701 - 1000	Southeastern Slope	2	2	3.93	474	0	1,618
Shumagin	701 - 1000	Shumagin Slope	2	2	3.71	719	0	5,736
Yakutat	101 - 200	Middleton Shelf	10	6	1.76	1,292	95	2,489
Chirikof	701 - 1000	Chirikof Slope	3	3	1.55	474	0	1,116
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	6	0.82	346	110	582
Chirikof	201 - 300	Lower Shelikof Gully	17	6	0.80	801	0	2,015
Yakutat	101 - 200	Yakataga Shelf	9	8	0.46	244	0	509
Yakutat	101 - 200	Yakutat Flats	7	5	0.39	349	0	1,059
Kodiak	101 - 200	Kenai Flats	19	6	0.31	368	0	934
Kodiak	101 - 200	Portlock Flats	35	2	0.15	107	0	324
Shumagin	101 - 200	Shumagin Outer Shelf	30	2	0.10	84	0	236
Yakutat	1 - 100	Middleton Shallows	8	1	0.10	67	0	224
Southeastern	101 - 200	Prince of Wales Shelf	15	1	0.09	64	0	202
Yakutat	101 - 200	Fairweather Shelf	10	1	0.08	63	0	206
Chirikof	101 - 200	Chirikof Outer Shelf	26	4	0.07	35	0	80
Kodiak	101 - 200	Kodiak Outer Shelf	27	3	0.04	20	0	53
Chirikof	101 - 200	Shelikof Edge	27	1	0.02	16	0	50
Chirikof	101 - 200	East Shumagin Gully	19	1	0.01	12	0	38
Southeastern	1 - 100	Southeastern Shallows	11	1	0.01	6	0	20
Kodiak	1 - 100	Albatross Banks	40	1	0.01	13	0	38
Kodiak	101 - 200	Albatross Gullies	26	1	0.00	1	0	2

Other Rockfishes

Redstripe rockfish (*Sebastes proriger*)

Redstripe rockfish were extremely rare outside the Southeastern INPFC area and were not captured in the Yakutat INPFC area (Table 55). Approximately 97% of the total survey area biomass was estimated to be in the Southeastern INPFC area, with most of the remainder in the Chirikof and Kodiak INPFC areas. Seven tows in the Baranof-Chichagof Shelf and Prince of Wales Slope/Gullies strata accounted for almost 91% of the total biomass estimate even though these strata represent only a little over 2% of the entire survey area (Table 56).

Silvergray rockfish (*Sebastes brevispinis*)

Silvergray rockfish were rare outside the Yakutat and Southeastern INPFC areas and were not captured in the Shumagin INPFC area (Table 57). The highest mean CPUEs were recorded in the Prince of Wales Slope and Gullies and Prince of Wales Shelf strata, which accounted for 51% of the total survey biomass estimate (Table 58). These two strata comprise just over 3% of the total survey area. Although silvergray rockfish are typically caught almost exclusively in the 101 to 300 m depth range, one unusually large catch in less than 100 m in the Yakutat INPFC area resulted in the shallowest depth zone accounting for almost 35% of the survey biomass estimate. No fish were caught deeper than 500 m. Mean fish weight generally increased with depth.

Harlequin rockfish (*Sebastes variegatus*)

Harlequin rockfish were caught infrequently and in modest numbers throughout the survey area, primarily in the 101 to 200 m depth range, which accounted for approximately 80% of its total biomass estimate (Table 59). The highest mean CPUEs were recorded in the Baranof-Chichagof Shelf and Yakutat Slope strata, which accounted for approximately 57% of the estimated biomass. These strata represent less than 2% of the total survey area (Table 60).

Redbanded rockfish (*Sebastes babcocki*)

Redbanded rockfish were caught infrequently and in relatively modest numbers in the Shumagin, Chirikof, and the western part of the Kodiak INPFC areas (Table 61). Approximately 68% of the total estimated biomass was in the Yakutat and Southeastern INPFC areas, with the highest mean CPUEs recorded in the 201 to 300 m depth range, which accounted for approximately 58% of its total biomass. Most of the remaining biomass was estimated to be in the 101 to 200 m depth range. No redbanded rockfish were caught deeper than 500 m. The highest mean CPUEs were noted in the Prince of Wales Slope/Gullies stratum, which accounted for about 33% of the total biomass (Table 62).

Yelloweye rockfish (*Sebastes ruberrimus*)

Yelloweye rockfish were caught very infrequently and in very modest numbers throughout the survey area (Table 63). No yelloweye rockfish were caught deeper than 300 m. The highest mean CPUEs were generally recorded in the 101 to 200 m depth range, which accounted for almost 79% of its total biomass.

Rosethorn rockfish (*Sebastes helvomaculatus*)

Except for a single haul with an extremely low CPUE in the Kodiak INPFC area, rosethorn rockfish were caught only in the Yakutat and Southeastern INPFC areas (Table 65). Mean CPUEs were modest in all strata where rosethorn rockfish were caught, with the highest values recorded in the Prince of Wales Slope/Gullies, Yakutat Gullies, and Southeast Slope strata (Table 66). Rosethorn rockfish were captured almost exclusively in the 101 to 300 m depth range, which accounted for more than 95% of its estimated biomass.

Table 55. -- Number of survey hauls, number of hauls with redstripe rockfish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	0	---	---	---	---	---
	101 - 200	40	1	< 0.01	1	0	4	0.102
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	1	< 0.01	1	0	4	0.102
Chirikof	1 - 100	78	0	---	---	---	---	---
	101 - 200	72	2	0.01	26	0	64	0.633
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	2	< 0.01	26	0	64	0.633
Kodiak	1 - 100	100	0	---	---	---	---	---
	101 - 200	125	1	0.01	22	0	68	0.919
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	1	< 0.01	22	0	68	0.919
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	0	---	---	---	---	---
Southeastern	1 - 100	11	1	0.03	19	0	62	0.261
	101 - 200	26	6	0.88	972	0	2,328	0.645
	201 - 300	19	3	1.09	551	0	1,373	0.503
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	10	0.55	1,542	0	3,085	0.576
All areas	1 - 100	335	1	< 0.01	19	0	62	0.261
	101 - 200	299	10	0.08	1,021	0	2,379	0.645
	201 - 300	109	3	0.15	551	0	1,373	0.503
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	14	0.05	1,592	47	3,136	0.578

Table 56. -- Catch per unit of effort by stratum for redstripe rockfish sorted by descending CPUE for the 2009 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	11	4	2.12	890	0	2,269
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	3	1.40	551	0	1,379
Southeastern	101 - 200	Prince of Wales Shelf	15	2	0.12	82	0	229
Chirikof	101 - 200	Chirikof Outer Shelf	26	1	0.03	16	0	49
Kodiak	101 - 200	Portlock Flats	35	1	0.03	22	0	68
Southeastern	1 - 100	Southeastern Shallows	11	1	0.03	19	0	63
Chirikof	101 - 200	Shelikof Edge	27	1	0.01	10	0	31
Shumagin	101 - 200	Shumagin Outer Shelf	30	1	0.00	1	0	4

Table 57. -- Number of survey hauls, number of hauls with silvergray rockfish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	0	---	---	---	---	---
	101 - 200	40	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	0	---	---	---	---	---
Chirikof	1 - 100	78	0	---	---	---	---	---
	101 - 200	72	1	< 0.01	8	0	25	0.686
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	1	< 0.01	8	0	25	0.686
Kodiak	1 - 100	100	2	0.01	23	0	57	0.477
	101 - 200	125	5	0.01	63	0	132	0.848
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	7	0.01	86	10	163	0.701
Yakutat	1 - 100	19	1	1.97	3,284	0	10,512	0.962
	101 - 200	36	3	0.04	127	0	321	1.341
	201 - 300	17	5	1.56	806	0	1,943	1.466
	301 - 500	8	1	0.05	12	0	42	1.293
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	10	0.74	4,229	0	11,556	1.039
Southeastern	1 - 100	11	4	0.21	139	0	345	0.446
	101 - 200	26	8	2.85	3,156	0	8,379	1.401
	201 - 300	19	14	4.26	2,150	530	3,770	1.68
	301 - 500	14	4	0.26	83	0	203	1.855
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	30	1.97	5,528	86	10,970	1.421
All areas	1 - 100	335	7	0.27	3,447	0	10,678	0.913
	101 - 200	299	17	0.27	3,354	0	8,581	1.378
	201 - 300	109	19	0.82	2,956	1,038	4,873	1.616
	301 - 500	52	5	0.07	95	0	216	1.756
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	48	0.31	9,851	939	18,763	1.217

Table 58. -- Catch per unit of effort by stratum for silvergray rockfish sorted by descending CPUE for the 2009 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	14	12	5.26	2,067	441	3,693
Southeastern	101 - 200	Prince of Wales Shelf	15	6	4.23	2,912	0	8,150
Yakutat	1 - 100	Yakutat Shallows	11	1	3.30	3,284	0	10,601
Yakutat	201 - 300	Yakutat Slope	8	4	2.46	523	0	1,602
Yakutat	201 - 300	Yakutat Gullies	9	1	0.93	283	0	935
Southeastern	201 - 300	Baranof-Chichagof Slope	5	2	0.74	83	0	260
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	2	0.58	244	0	711
Southeastern	301 - 500	Southeastern Slope	7	3	0.46	36	0	87
Yakutat	101 - 200	Yakataga Shelf	9	3	0.24	127	0	325
Southeastern	1 - 100	Southeastern Shallows	11	4	0.21	139	0	347
Southeastern	301 - 500	Southeastern Deep Gullies	7	1	0.20	47	0	161
Yakutat	301 - 500	Yakutat Slope	6	1	0.08	12	0	44
Kodiak	101 - 200	Albatross Gullies	26	1	0.035	28	0	85
Kodiak	1 - 100	Albatross Shallows	28	1	0.025	15	0	44
Kodiak	101 - 200	Kodiak Outer Shelf	27	2	0.021	11	0	26
Kodiak	101 - 200	Kenai Flats	19	1	0.014	17	0	52
Chirikof	101 - 200	Shelikof Edge	27	1	0.011	8	0	25
Kodiak	101 - 200	Portlock Flats	35	1	0.01	8	0	23
Kodiak	1 - 100	Albatross Banks	40	1	0.006	9	0	27

Table 59. -- Number of survey hauls, number of hauls with harlequin rockfish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	0	---	---	---	---	---
	101 - 200	40	2	0.03	41	0	104	0.503
	201 - 300	17	1	0.01	3	0	10	0.506
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	3	0.01	44	0	107	0.503
Chirikof	1 - 100	78	1	< 0.01	6	0	19	0.535
	101 - 200	72	7	0.03	65	0	138	0.364
	201 - 300	25	1	< 0.01	3	0	8	0.348
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	9	0.01	74	0	148	0.374
Kodiak	1 - 100	100	2	< 0.01	10	0	24	0.117
	101 - 200	125	14	0.17	742	0	1,582	0.232
	201 - 300	31	2	0.01	15	0	36	0.61
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	18	0.08	766	0	1,607	0.232
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	3	0.08	243	0	582	0.289
	201 - 300	17	4	0.92	474	0	1,154	0.326
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	7	0.13	716	1	1,431	0.313
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	6	0.96	1,063	0	3,308	0.191
	201 - 300	19	5	0.04	22	2	43	0.18
	301 - 500	14	1	< 0.01	1	0	2	0.1
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	12	0.39	1,086	0	3,331	0.191
All areas	1 - 100	335	3	< 0.01	16	0	35	0.17
	101 - 200	299	32	0.18	2,154	0	4,485	0.218
	201 - 300	109	13	0.14	516	0	1,198	0.32
	301 - 500	52	1	< 0.01	1	0	2	0.1
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	49	0.08	2,686	274	5,099	0.232

Table 60. -- Catch per unit of effort by stratum for harlequin rockfish sorted by descending CPUE for the 2009 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	11	4	2.50	1,049	0	3,321
Yakutat	201 - 300	Yakutat Slope	8	4	2.23	474	0	1,172
Kodiak	101 - 200	Portlock Flats	35	6	0.59	433	0	1,223
Yakutat	101 - 200	Yakataga Shelf	9	2	0.22	117	0	306
Kodiak	101 - 200	Albatross Gullies	26	1	0.17	135	0	413
Southeastern	201 - 300	Baranof-Chichagof Slope	5	3	0.15	17	0	41
Yakutat	101 - 200	Yakutat Flats	7	1	0.14	126	0	433
Chirikof	101 - 200	Chirikof Outer Shelf	26	7	0.13	65	0	138
Kodiak	101 - 200	Kodiak Outer Shelf	27	5	0.12	61	0	136
Kodiak	101 - 200	Kenai Flats	19	2	0.09	113	0	293
Shumagin	101 - 200	Shumagin Outer Shelf	30	2	0.05	41	0	104
Kodiak	201 - 300	Kenai Gullies	20	2	0.02	15	0	36
Southeastern	101 - 200	Prince of Wales Shelf	15	2	0.021	14	0	40
Chirikof	201 - 300	Chirikof Slope	8	1	0.016	3	0	9
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	2	0.013	5	0	13
Shumagin	201 - 300	Shumagin Slope	17	1	0.01	3	0	10
Chirikof	1 - 100	Chirikof Bank	37	1	0.01	6	0	19
Southeastern	301 - 500	Southeastern Slope	7	1	0.01	1	0	2
Kodiak	1 - 100	Albatross Shallows	28	1	0.01	3	0	8
Kodiak	1 - 100	Albatross Banks	40	1	0.00	7	0	21

Table 61. -- Number of survey hauls, number of hauls with redbanded rockfish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	0	---	---	---	---	---
	101 - 200	40	0	---	---	---	---	---
	201 - 300	17	5	0.12	34	0	83	0.683
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	5	0.01	34	0	83	0.683
Chirikof	1 - 100	78	0	---	---	---	---	---
	101 - 200	72	7	0.09	209	0	440	1.304
	201 - 300	25	6	0.38	435	0	1,083	1.747
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	13	0.09	643	0	1,329	1.574
Kodiak	1 - 100	100	0	---	---	---	---	---
	101 - 200	125	11	0.21	893	0	1,795	1.418
	201 - 300	31	13	0.41	472	0	1,138	0.93
	301 - 500	16	3	0.04	13	0	28	0.658
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	27	0.14	1,377	271	2,483	1.191
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	6	0.21	626	0	1,534	1.056
	201 - 300	17	13	1.02	527	251	804	0.489
	301 - 500	8	4	0.36	95	0	209	0.734
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	23	0.22	1,249	303	2,194	0.694
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	7	0.23	250	0	575	0.665
	201 - 300	19	13	4.45	2,247	724	3,770	1.005
	301 - 500	14	10	2.06	642	0	1,353	1.056
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	30	1.12	3,139	1,496	4,783	0.975
All areas	1 - 100	335	0	---	---	---	---	---
	101 - 200	299	31	0.16	1,978	636	3,319	1.124
	201 - 300	109	50	1.03	3,715	2,002	5,427	0.902
	301 - 500	52	17	0.59	750	30	1,470	0.991
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	98	0.20	6,442	4,215	8,669	0.971

Table 62. -- Catch per unit of effort by stratum for redbanded rockfish sorted by descending CPUE for the 2009 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	14	9	5.34	2,098	573	3,623
Southeastern	301 - 500	Southeastern Slope	7	6	2.18	168	30	307
Southeastern	301 - 500	Southeastern Deep Gullies	7	4	2.02	474	0	1,196
Yakutat	201 - 300	Yakutat Slope	8	8	1.80	383	105	661
Southeastern	201 - 300	Baranof-Chichagof Slope	5	4	1.33	149	0	364
Chirikof	201 - 300	Chirikof Slope	8	4	0.72	109	0	262
Yakutat	301 - 500	Yakutat Slope	6	4	0.62	95	0	215
Kodiak	201 - 300	Kenai Gullies	20	8	0.59	392	0	1,057
Kodiak	101 - 200	Portlock Flats	35	5	0.57	416	0	1,189
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	6	0.56	235	0	562
Kodiak	201 - 300	Kodiak Slope	7	5	0.49	80	6	153
Yakutat	201 - 300	Yakutat Gullies	9	5	0.47	144	29	260
Yakutat	101 - 200	Yakutat Flats	7	2	0.413	373	0	1,199
Kodiak	101 - 200	Kodiak Outer Shelf	27	2	0.384	193	0	529
Chirikof	201 - 300	Lower Shelikof Gully	17	2	0.33	325	0	962
Yakutat	101 - 200	Fairweather Shelf	10	2	0.31	237	0	752
Chirikof	101 - 200	Shelikof Edge	27	4	0.23	175	0	403
Kodiak	101 - 200	Albatross Gullies	26	2	0.21	168	0	462
Shumagin	201 - 300	Shumagin Slope	17	5	0.12	34	0	83
Kodiak	101 - 200	Kenai Flats	19	2	0.10	116	0	357
Chirikof	101 - 200	Chirikof Outer Shelf	26	3	0.07	34	0	78
Kodiak	301 - 500	Kodiak Slope	16	3	0.04	13	0	28
Yakutat	101 - 200	Yakataga Shelf	9	2	0.03	17	0	44
Southeastern	101 - 200	Prince of Wales Shelf	15	1	0.02	15	0	48

Table 63. -- Number of survey hauls, number of hauls with yelloweye rockfish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	0	---	---	---	---	---
	101 - 200	40	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	0	---	---	---	---	---
Chirikof	1 - 100	78	1	0.01	19	0	57	1.698
	101 - 200	72	1	< 0.01	9	0	27	1.155
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	2	< 0.01	27	0	70	1.475
Kodiak	1 - 100	100	1	0.02	80	0	242	4.022
	101 - 200	125	9	0.15	669	148	1,191	3.678
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	10	0.07	750	208	1,291	3.712
Yakutat	1 - 100	19	1	0.16	264	0	846	3.76
	101 - 200	36	1	0.05	151	0	488	5.741
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	2	0.07	416	0	1,061	4.3
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	7	0.45	500	108	893	2.746
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	7	0.18	500	108	893	2.746
All areas	1 - 100	335	3	0.03	363	0	961	3.588
	101 - 200	299	18	0.11	1,330	623	2,037	3.34
	201 - 300	109	0	---	---	---	---	---
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	21	0.05	1,693	782	2,604	3.39

Table 64. -- Catch per unit of effort by stratum for yelloweye rockfish sorted by descending CPUE for the 2009 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	11	4	0.70	292	19	566
Kodiak	101 - 200	Kodiak Outer Shelf	27	4	0.39	195	3	388
Southeastern	101 - 200	Prince of Wales Shelf	15	3	0.30	208	0	520
Yakutat	1 - 100	Yakutat Shallows	11	1	0.27	264	0	853
Kodiak	101 - 200	Kenai Flats	19	2	0.26	311	0	760
Kodiak	101 - 200	Portlock Flats	35	3	0.22	163	0	354
Yakutat	101 - 200	Fairweather Shelf	10	1	0.20	151	0	493
Kodiak	1 - 100	Albatross Banks	40	1	0.05	80	0	244
Chirikof	1 - 100	Semidi Bank	24	1	0.03	19	0	57
Chirikof	101 - 200	Chirikof Outer Shelf	26	1	0.02	9	0	27

Table 65. -- Number of survey hauls, number of hauls with rosethorn rockfish, mean CPUE, biomass, and mean weight, based on the 2009 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	127	0	---	---	---	---	---
	101 - 200	40	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	0	---	---	---	---	---
Chirikof	1 - 100	78	0	---	---	---	---	---
	101 - 200	72	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	0	---	---	---	---	---
Kodiak	1 - 100	100	0	---	---	---	---	---
	101 - 200	125	1	< 0.01	4	0	11	0.43
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	1	< 0.01	4	0	11	0.43
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	2	0.02	47	0	140	0.192
	201 - 300	17	3	0.20	106	0	278	0.261
	301 - 500	8	1	< 0.01	1	0	4	0.126
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	6	0.03	154	0	342	0.234
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	7	0.07	77	0	164	0.21
	201 - 300	19	6	0.54	274	13	534	0.208
	301 - 500	14	2	0.08	25	0	75	0.273
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	15	0.13	376	106	646	0.211
All areas	1 - 100	335	0	---	---	---	---	---
	101 - 200	299	10	0.01	128	2	254	0.206
	201 - 300	109	9	0.11	379	81	678	0.22
	301 - 500	52	3	0.02	26	0	76	0.26
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	22	0.02	533	215	852	0.218

Table 66. -- Catch per unit of effort by stratum for rosethorn rockfish sorted by descending CPUE for the 2009 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	14	6	0.70	274	11	536
Yakutat	201 - 300	Yakutat Slope	8	2	0.48	101	0	277
Southeastern	301 - 500	Southeastern Slope	7	2	0.32	25	0	77
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	3	0.08	32	0	73
Southeastern	101 - 200	Prince of Wales Shelf	15	4	0.07	46	0	125
Yakutat	101 - 200	Yakutat Flats	7	2	0.05	47	0	143
Yakutat	201 - 300	Yakutat Gullies	9	1	0.02	5	0	16
Yakutat	301 - 500	Yakutat Slope	6	1	0.01	1	0	4
Kodiak	101 - 200	Portlock Flats	35	1	0.01	4	0	11

SKATES

Alaska skate (*Bathyraja parmifera*)

Alaska skate were caught infrequently and in modest numbers in the three westernmost INPFC areas in only 10 out of the 59 survey strata (Tables 67 and 68). No Alaska skate were caught in the Yakutat and Southeastern INPFC areas. CPUEs were generally highest in the less than 100 m depth range, which accounted for approximately 82% of the estimated survey biomass. However, the highest CPUEs were recorded in the 201-300 m depth range of the Chirikof INPFC area. No fish were caught deeper than 300 m.

Aleutian skate (*Bathyraja aleutica*)

Aleutian skate were caught in fewer than 10% of all survey hauls and in moderate numbers in the three westernmost INPFC areas (Table 69). Only four catches of Aleutian skates were recorded east of Prince William Sound. The highest mean CPUEs were recorded in the Upper and Lower Shelikof Gully strata, which accounted for approximately 38% of the total estimated biomass even though they comprise only 4% of the total survey area (Table 70). Aleutian skate were caught in all depths to 700 m, but the highest CPUEs were recorded in depths less than 300 m. Mean fish weight generally decreased with depth.

Bering skate (*Bathyraja interrupta*)

Bering skate were caught in modest numbers throghout the survey area (Table 71). The highest CPUEs were recorded in the Upper Shelikof Gully in the Kodiak INPFC area (Table 72). Bering skate were caught in all depths to 500 m but the highest CPUEs were generally recorded in the 101 to 300 m depth range. No Bering skate were caught deeper than 500 m.

Big skate (*Raja binoculata*)

Big skate were caught in modest numbers in approximately 9% of all survey hauls in all five of the INPFC areas (Table 73). The highest CPUEs were recorded in several of the shallowest strata of the survey area in waters less than 100 m (Table 74). Approximately 90% of the estimated biomass was located shallower than 100 m, with all of the remainder in waters between 101 and 200 m deep.

Longnose skate (*Raja rhina*)

Longnose skate were caught in relatively modest numbers in approximately 21% of all survey hauls in all five of the INPFC areas (Table 75). Approximately 50% of the estimated biomass was located in the Kodiak INPFC area. Longnose skate were caught in all depths to 700 m, with the highest densities in the 101 to 300 m depth range. The highest CPUEs were recorded in the Yakutat Slope and Kenai Flats strata (Table 76).

Table 67. -- Number of survey hauls, number of hauls with Alaska skate, mean CPUE, biomass, and mean weight, based on the 2009 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	127	9	0.42	1,728	4	3,453	5.161
	101 - 200	40	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	9	0.26	1,728	4	3,453	5.161
Chirikof	1 - 100	78	1	0.04	104	0	317	8.758
	101 - 200	72	1	0.04	94	0	292	4.009
	201 - 300	25	2	0.29	332	0	1,030	6.687
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	4	0.08	530	0	1,276	6.235
Kodiak	1 - 100	100	3	0.11	424	0	976	7.918
	101 - 200	125	1	0.02	67	0	204	5.721
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	4	0.05	491	0	1,059	7.525
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	0	---	---	---	---	---
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	0	---	---	---	---	---
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	0	---	---	---	---	---
All areas	1 - 100	335	13	0.17	2,257	456	4,057	5.637
	101 - 200	299	2	0.01	161	0	399	4.577
	201 - 300	109	2	0.09	332	0	1,030	6.687
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	17	0.09	2,750	817	4,682	5.667

Table 68. -- Catch per unit of effort by stratum for Alaska skate sorted by descending CPUE for the 2009 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	47	7	1.22	1,668	0	3,390
Chirikof	201 - 300	Lower Shelikof Gully	17	1	0.33	331	0	1,033
Kodiak	1 - 100	Lower Cook Inlet	15	1	0.23	226	0	711
Kodiak	1 - 100	Albatross Shallows	28	1	0.15	84	0	255
Chirikof	1 - 100	Chirikof Bank	37	1	0.10	104	0	317
Shumagin	1 - 100	Lower Alaska Peninsula	26	2	0.09	61	0	148
Chirikof	101 - 200	East Shumagin Gully	19	1	0.09	94	0	293
Kodiak	101 - 200	Albatross Gullies	26	1	0.08	67	0	204
Kodiak	1 - 100	Albatross Banks	40	1	0.07	115	0	348
Chirikof	201 - 300	Chirikof Slope	8	1	0.00	0	0	2

Table 69. -- Number of survey hauls, number of hauls with Aleutian skate, mean CPUE, biomass, and mean weight, based on the 2009 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	127	12	0.43	1,756	714	2,798	9.384
	101 - 200	40	6	0.77	1,123	0	2,454	8.129
	201 - 300	17	3	0.55	155	0	369	4.675
	301 - 500	7	1	0.07	17	0	57	1.338
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	22	0.47	3,051	1,418	4,683	8.222
Chirikof	1 - 100	78	5	0.65	1,696	0	3,723	11.562
	101 - 200	72	14	1.09	2,595	601	4,589	7.799
	201 - 300	25	13	4.5	5,201	1,766	8,637	6.59
	301 - 500	7	2	1.32	212	0	683	5.069
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	34	1.43	9,704	5,327	14,081	7.405
Kodiak	1 - 100	100	6	0.48	1,837	190	3,485	12.927
	101 - 200	125	6	0.47	2,029	0	4,501	9.319
	201 - 300	31	5	1.87	2,150	0	5,634	8.694
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	1	0.03	5	0	20	0.349
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	18	0.59	6,021	2,142	9,901	9.676
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	1	0.04	106	0	345	4.4
	201 - 300	17	1	0.01	6	0	18	0.536
	301 - 500	8	1	0.6	157	0	542	11.169
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	3	0.05	269	0	678	5.532
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	0	---	---	---	---	---
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	1	0.25	26	0	137	1.271
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	1	0.01	26	0	137	1.271
All areas	1 - 100	335	23	0.41	5,289	2,565	8,013	11.113
	101 - 200	299	27	0.48	5,852	2,481	9,224	8.213
	201 - 300	109	22	2.08	7,511	3,230	11,793	6.955
	301 - 500	52	4	0.3	386	0	935	5.631
	501 - 700	16	2	0.04	31	0	145	0.877
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	78	0.6	19,070	13,122	25,018	8.037

Table 70. -- Catch per unit of effort by stratum for Aleutian skate sorted by descending CPUE for the 2009 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	4	2	6.22	1,995	0	5,979
Chirikof	201 - 300	Lower Shelikof Gully	17	12	5.19	5,201	1,749	8,652
Kodiak	1 - 100	Kenai Peninsula	9	3	2.44	1,281	0	2,929
Chirikof	101 - 200	Shelikof Edge	27	11	2.42	1,868	97	3,640
Chirikof	1 - 100	Upper Alaska Peninsula	17	2	1.66	1,320	0	3,312
Kodiak	101 - 200	Barren Islands	18	3	1.58	1,739	0	4,197
Chirikof	301 - 500	Chirikof Slope	7	2	1.32	212	0	699
Shumagin	101 - 200	Sanak Gully	6	1	1.20	511	0	1,824
Yakutat	301 - 500	Yakutat Slope	6	1	1.04	157	0	562
Kodiak	201 - 300	Kodiak Slope	7	2	0.84	136	0	350
Shumagin	101 - 200	Shumagin Outer Shelf	30	5	0.75	612	0	1,245
Chirikof	101 - 200	Chirikof Outer Shelf	26	2	0.75	374	0	1,049
Shumagin	1 - 100	Shumagin Bank	35	5	0.728	903	76	1,729
Shumagin	201 - 300	Shumagin Slope	17	3	0.554	155	0	370
Shumagin	1 - 100	Fox Islands	19	3	0.553	461	0	999
Kodiak	1 - 100	Albatross Banks	40	3	0.361	556	0	1,216
Kodiak	101 - 200	Kodiak Outer Shelf	27	2	0.361	182	0	441
Chirikof	101 - 200	East Shumagin Gully	19	1	0.317	352	0	1,093
Shumagin	1 - 100	Davidson Bank	47	4	0.29	393	0	806
Southeastern	501 - 700	Southeastern Slope	2	1	0.25	26	0	355
Chirikof	1 - 100	Chirikof Bank	37	2	0.24	254	0	627
Yakutat	101 - 200	Yakataga Shelf	9	1	0.20	106	0	350
Chirikof	1 - 100	Semidi Bank	24	1	0.17	121	0	372
Kodiak	101 - 200	Albatross Gullies	26	1	0.14	108	0	331
Shumagin	301 - 500	Shumagin Slope	7	1	0.07	17	0	59
Kodiak	501 - 700	Kodiak Slope	4	1	0.03	5	0	22
Kodiak	201 - 300	Kenai Gullies	20	1	0.03	20	0	60
Yakutat	201 - 300	Yakutat Slope	8	1	0.03	6	0	19
Chirikof	201 - 300	Chirikof Slope	8	1	0.004	1	0	2

Table 71. -- Number of survey hauls, number of hauls with Bering skate, mean CPUE, biomass, and mean weight, based on the 2009 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	127	7	0.05	217	32	401	2.044
	101 - 200	40	5	0.05	66	0	146	1.003
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	12	0.04	283	83	483	1.644
Chirikof	1 - 100	78	10	0.30	776	0	1,680	3.294
	101 - 200	72	14	0.23	553	268	838	1.705
	201 - 300	25	7	0.30	343	110	575	1.212
	301 - 500	7	1	0.05	8	0	28	0.894
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	32	0.25	1,680	715	2,645	1.972
Kodiak	1 - 100	100	5	0.06	240	2	477	2.176
	101 - 200	125	26	0.21	920	490	1,349	1.497
	201 - 300	31	9	0.46	530	185	875	1.518
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	40	0.17	1,690	1,126	2,253	1.574
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	2	0.09	252	0	636	1.236
	201 - 300	17	2	0.05	26	0	68	1.024
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	4	0.05	278	0	665	1.212
Southeastern	1 - 100	11	1	0.03	23	0	72	0.899
	101 - 200	26	2	0.03	39	0	95	1.204
	201 - 300	19	2	0.02	8	0	20	0.393
	301 - 500	14	6	0.40	126	9	242	1.356
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	11	0.07	195	70	319	1.149
All areas	1 - 100	335	23	0.10	1,255	311	2,200	2.632
	101 - 200	299	49	0.15	1,829	1,203	2,456	1.474
	201 - 300	109	20	0.25	907	531	1,283	1.339
	301 - 500	52	7	0.10	134	19	249	1.313
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	99	0.13	4,126	2,943	5,308	1.652

Table 72. -- Catch per unit of effort by stratum for Bering skate sorted by descending CPUE for the 2009 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	4	3	1.14	367	0	759
Chirikof	1 - 100	Semidi Bank	24	1	0.58	421	0	1,291
Chirikof	101 - 200	Shelikof Edge	27	11	0.52	401	167	635
Southeastern	301 - 500	Southeastern Deep Gullies	7	4	0.44	103	0	215
Kodiak	101 - 200	Barren Islands	18	7	0.42	457	105	809
Yakutat	101 - 200	Middleton Shelf	10	2	0.34	252	0	642
Chirikof	201 - 300	Lower Shelikof Gully	17	7	0.34	343	109	577
Southeastern	301 - 500	Southeastern Slope	7	2	0.30	23	0	66
Kodiak	201 - 300	Kenai Gullies	20	6	0.25	163	20	307
Chirikof	1 - 100	Upper Alaska Peninsula	17	3	0.22	173	0	393
Kodiak	101 - 200	Albatross Gullies	26	5	0.20	160	16	305
Kodiak	101 - 200	Portlock Flats	35	9	0.18	130	22	239
Chirikof	1 - 100	Chirikof Bank	37	6	0.17	183	0	366
Kodiak	101 - 200	Kenai Flats	19	5	0.143	172	0	368
Chirikof	101 - 200	East Shumagin Gully	19	3	0.137	152	0	326
Kodiak	1 - 100	Kenai Peninsula	9	1	0.123	65	0	214
Shumagin	1 - 100	Davidson Bank	47	3	0.101	138	0	306
Kodiak	1 - 100	Albatross Shallows	28	2	0.09	52	0	126
Yakutat	201 - 300	Yakutat Slope	8	1	0.08	17	0	59
Shumagin	101 - 200	Shumagin Outer Shelf	30	4	0.08	65	0	145
Kodiak	1 - 100	Lower Cook Inlet	15	1	0.08	77	0	243
Shumagin	1 - 100	Lower Alaska Peninsula	26	2	0.07	47	0	115
Chirikof	301 - 500	Chirikof Slope	7	1	0.05	8	0	29
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	1	0.05	20	0	64
Southeastern	1 - 100	Southeastern Shallows	11	1	0.03	23	0	73
Kodiak	1 - 100	Albatross Banks	40	1	0.03	46	0	140
Yakutat	201 - 300	Yakutat Gullies	9	1	0.03	9	0	30
Southeastern	101 - 200	Prince of Wales Shelf	15	1	0.03	19	0	59
Shumagin	1 - 100	Shumagin Bank	35	2	0.03	32	0	79
Southeastern	201 - 300	Baranof-Chichagof Slope	5	1	0.02	3	0	10
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	1	0.013	5	0	16
Shumagin	101 - 200	West Shumagin Gully	4	1	0.004	1	0	4

Table 73. -- Number of survey hauls, number of hauls with big skate, mean CPUE, biomass, and mean weight, based on the 2009 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	127	15	0.87	3,594	1,328	5,859	14.431
	101 - 200	40	4	2.08	3,058	0	7,489	24.772
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	19	1.02	6,652	1,756	11,547	17.858
Chirikof	1 - 100	78	20	4.76	12,391	3,267	21,515	15.003
	101 - 200	72	2	0.06	144	0	387	4.161
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	22	1.84	12,535	3,408	21,662	14.567
Kodiak	1 - 100	100	19	3.57	13,746	6,143	21,349	15.064
	101 - 200	125	1	0.09	410	0	1,253	35.12
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	20	1.39	14,156	6,504	21,808	15.317
Yakutat	1 - 100	19	12	6.03	10,044	2,772	17,315	5.98
	101 - 200	36	1	0.24	712	0	2,299	24.591
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	13	1.88	10,756	3,326	18,186	6.296
Southeastern	1 - 100	11	0	---	---	---	---	---
	101 - 200	26	1	0.23	251	0	785	14.058
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	1	0.09	251	0	785	14.058
All areas	1 - 100	335	66	3.08	39,774	26,109	53,440	10.847
	101 - 200	299	9	0.37	4,575	0	9,298	21.127
	201 - 300	109	0	---	---	---	---	---
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	75	1.39	44,349	30,041	58,658	11.42

Table 74. -- Catch per unit of effort by stratum for big skate sorted by descending CPUE for the 2009 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	9	10.09	9,972	2,921	17,022
Yakutat	1 - 100	Yakutat Shallows	11	8	8.01	7,965	1,044	14,887
Chirikof	1 - 100	Upper Alaska Peninsula	17	5	7.69	6,110	0	13,451
Chirikof	1 - 100	Chirikof Bank	37	12	5.28	5,695	0	11,420
Kodiak	1 - 100	Northern Kodiak Shallows	8	2	3.40	747	0	2,347
Shumagin	101 - 200	Shumagin Outer Shelf	30	3	3.39	2,766	0	7,163
Kodiak	1 - 100	Albatross Shallows	28	5	3.26	1,880	0	4,020
Yakutat	1 - 100	Middleton Shallows	8	4	3.10	2,079	0	5,287
Shumagin	1 - 100	Shumagin Bank	35	7	1.04	1,286	207	2,364
Yakutat	101 - 200	Middleton Shelf	10	1	0.97	712	0	2,324
Shumagin	1 - 100	Davidson Bank	47	3	0.91	1,250	0	2,717
Chirikof	1 - 100	Semidi Bank	24	3	0.80	586	0	1,281
Shumagin	1 - 100	Fox Islands	19	1	0.792	660	0	2,047
Kodiak	1 - 100	Albatross Banks	40	3	0.745	1,147	0	2,775
Shumagin	101 - 200	Sanak Gully	6	1	0.688	292	0	1,043
Shumagin	1 - 100	Lower Alaska Peninsula	26	4	0.58	399	0	821
Kodiak	101 - 200	Albatross Gullies	26	1	0.518	410	0	1,255
Southeastern	101 - 200	Prince of Wales Shelf	15	1	0.364	251	0	788
Chirikof	101 - 200	East Shumagin Gully	19	1	0.10	112	0	346
Chirikof	101 - 200	Shelikof Edge	27	1	0.04	32	0	99

Table 75. -- Number of survey hauls, number of hauls with longnose skate, mean CPUE, biomass, and mean weight, based on the 2009 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	127	2	0.08	324	0	790	11.891
	101 - 200	40	2	0.55	811	0	2,612	8.096
	201 - 300	17	1	0.15	43	0	133	7.193
	301 - 500	7	1	0.15	37	0	123	2.503
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	6	0.19	1,214	0	2,997	8.205
Chirikof	1 - 100	78	10	0.63	1,634	508	2,759	9.63
	101 - 200	72	21	1.54	3,676	2,062	5,289	9.05
	201 - 300	25	9	1.79	2,063	489	3,637	6.699
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	40	1.08	7,373	4,905	9,840	8.342
Kodiak	1 - 100	100	23	1.08	4,146	2,254	6,037	10.06
	101 - 200	125	45	2.74	11,883	7,790	15,977	9.822
	201 - 300	31	11	1.82	2,088	790	3,385	9.079
	301 - 500	16	1	0.05	15	0	45	2.006
	501 - 700	4	1	0.17	30	0	114	1.987
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	81	1.79	18,161	13,523	22,799	9.689
Yakutat	1 - 100	19	5	1.44	2,397	17	4,777	9.732
	101 - 200	36	12	1.67	4,910	2,066	7,753	8.225
	201 - 300	17	8	2.53	1,308	544	2,071	9.509
	301 - 500	8	1	0.40	105	0	361	5.599
	501 - 700	2	1	0.18	27	0	142	0.975
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	27	1.53	8,746	5,077	12,414	8.516
Southeastern	1 - 100	11	1	0.35	231	0	739	0.765
	101 - 200	26	4	0.33	371	0	777	4.335
	201 - 300	19	4	0.68	343	0	803	5.7
	301 - 500	14	6	0.31	98	1	195	1.905
	501 - 700	2	1	1.13	116	0	617	5.708
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	16	0.41	1,159	358	1,959	2.231
All areas	1 - 100	335	41	0.68	8,731	5,503	11,959	7.546
	101 - 200	299	84	1.77	21,650	16,313	26,987	9.026
	201 - 300	109	33	1.62	5,844	3,691	7,997	7.881
	301 - 500	52	9	0.20	254	0	511	2.758
	501 - 700	16	3	0.21	173	0	565	2.748
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	170	1.15	36,652	30,100	43,205	8.232

Table 76. -- Catch per unit of effort by stratum for longnose skate sorted by descending CPUE for the 2009 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	8	6	5.32	1,132	363	1,901
Kodiak	101 - 200	Kenai Flats	19	15	4.87	5,882	2,551	9,212
Yakutat	101 - 200	Yakataga Shelf	9	4	3.02	1,592	0	3,487
Yakutat	101 - 200	Middleton Shelf	10	4	2.81	2,061	39	4,082
Chirikof	101 - 200	Shelikof Edge	27	13	2.79	2,160	1,087	3,234
Kodiak	101 - 200	Barren Islands	18	7	2.73	2,993	921	5,066
Kodiak	201 - 300	Kenai Gullies	20	9	2.45	1,628	638	2,618
Kodiak	101 - 200	Portlock Flats	35	14	2.14	1,568	738	2,397
Yakutat	1 - 100	Yakutat Shallows	11	4	2.10	2,093	0	4,430
Chirikof	201 - 300	Lower Shelikof Gully	17	9	2.06	2,063	482	3,645
Kodiak	1 - 100	Kenai Peninsula	9	3	1.99	1,045	0	2,382
Shumagin	101 - 200	Sanak Gully	6	1	1.72	732	0	2,614
Kodiak	1 - 100	Northern Kodiak Shallows	8	2	1.549	341	0	912
Kodiak	101 - 200	Albatross Gullies	26	5	1.474	1,166	0	2,382
Southeastern	201 - 300	Baranof-Chichagof Slope	5	2	1.357	153	0	446
Kodiak	1 - 100	Albatross Shallows	28	9	1.339	772	305	1,239
Kodiak	1 - 100	Albatross Banks	40	9	1.291	1,988	650	3,326
Kodiak	201 - 300	Upper Shelikof Gully	4	1	1.166	374	0	1,565
Southeastern	501 - 700	Southeastern Slope	2	1	1.13	116	0	1,595
Chirikof	101 - 200	Chirikof Outer Shelf	26	5	1.06	533	18	1,048
Yakutat	101 - 200	Yakutat Flats	7	2	1.04	940	0	2,426
Chirikof	101 - 200	East Shumagin Gully	19	3	0.89	982	0	2,113
Chirikof	1 - 100	Chirikof Bank	37	5	0.74	795	46	1,543
Chirikof	1 - 100	Upper Alaska Peninsula	17	2	0.71	562	0	1,378
Yakutat	301 - 500	Yakutat Slope	6	1	0.69	105	0	374
Yakutat	201 - 300	Yakutat Gullies	9	2	0.58	176	0	497
Kodiak	101 - 200	Kodiak Outer Shelf	27	4	0.55	274	0	616
Kodiak	201 - 300	Kodiak Slope	7	1	0.53	85	0	294
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	2	0.48	190	0	599
Southeastern	101 - 200	Prince of Wales Shelf	15	3	0.46	315	0	708
Yakutat	1 - 100	Middleton Shallows	8	1	0.453	304	0	1,023
Yakutat	101 - 200	Fairweather Shelf	10	2	0.41	317	0	850
Chirikof	1 - 100	Semidi Bank	24	3	0.38	278	0	622
Southeastern	301 - 500	Southeastern Slope	7	3	0.363	28	0	63
Southeastern	1 - 100	Southeastern Shallows	11	1	0.353	231	0	745
Southeastern	301 - 500	Southeastern Deep Gullies	7	3	0.298	70	0	164
Shumagin	1 - 100	Shumagin Bank	35	2	0.26	324	0	790
Yakutat	501 - 700	Yakutat Slope	2	1	0.18	27	0	367
Kodiak	501 - 700	Kodiak Slope	4	1	0.17	30	0	126
Shumagin	201 - 300	Shumagin Slope	17	1	0.15	43	0	133
Shumagin	301 - 500	Shumagin Slope	7	1	0.15	37	0	126
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	1	0.13	56	0	179
Shumagin	101 - 200	Shumagin Outer Shelf	30	1	0.10	79	0	241
Kodiak	301 - 500	Kodiak Slope	16	1	0.05	15	0	46

MISCELLANEOUS SPECIES

Capelin (*Mallotus villosus*)

Capelin were caught in modest numbers in approximately 25% of hauls less than 100 m deep and in about 12% of hauls in the 101 to 300 m depth range. No capelin were caught deeper than 300 m (Table 77). The highest CPUEs were recorded in the Middleton Shallows and Upper Alaska Peninsula strata, which together accounted for approximately 35% of the estimated biomass (Table 78).

Eulachon (*Thaleichthys pacificus*)

Eulachon were caught in moderate numbers in approximately 30% of hauls less than 300 m deep but in less than 4% of hauls deeper than 300 m. No catches were recorded deeper than 500 m (Table 79). The biomass was primarily confined to the Chirikof and Kodiak INPFC areas, which accounted for approximately 85% of its biomass estimate. The highest CPUEs were recorded in the Barren Islands and Kenai Gullies strata, which accounted for approximately 48% of the biomass estimate even though these strata represent less than 6% of the survey area (Table 80).

Pacific hake (*Merluccius productus*)

Pacific hake were caught almost exclusively in the Yakutat and Southeastern INPFC areas, which accounted for over 99% of the estimated biomass (Table 81). The biomass estimate may have been unduly influenced by two unusually large catches at less than 100 m depth in the Southeastern Shallows stratum, which accounted for almost 84% of the survey biomass estimate (Table 82). No hake were caught deeper than 700 m.

Table 77. -- Number of survey hauls, number of hauls with capelin, mean CPUE, biomass, and mean weight, based on the 2009 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	127	36	0.01	51	26	76	0.016
	101 - 200	40	6	0.02	31	0	69	0.015
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	42	0.01	82	38	125	0.016
Chirikof	1 - 100	78	16	0.03	71	0	163	0.002
	101 - 200	72	13	0.02	38	5	71	0.011
	201 - 300	25	7	0.03	31	0	83	0.011
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	36	0.02	140	32	247	0.003
Kodiak	1 - 100	100	24	0.03	126	30	221	0.011
	101 - 200	125	13	0.01	26	0	57	0.007
	201 - 300	31	6	< 0.01	4	1	7	0.009
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	43	0.02	155	55	256	0.01
Yakutat	1 - 100	19	8	0.07	109	0	235	0.015
	101 - 200	36	2	< 0.01	1	0	3	0.009
	201 - 300	17	1	< 0.01	1	0	4	0.013
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	11	0.02	111	0	237	0.015
Southeastern	1 - 100	11	1	< 0.01	<1	0	1	0.013
	101 - 200	26	0	---	---	---	---	---
	201 - 300	19	0	---	---	---	---	---
	301 - 500	14	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	1	< 0.01	<1	0	1	0.013
All areas	1 - 100	335	85	0.03	357	181	533	0.006
	101 - 200	299	34	0.01	96	39	153	0.01
	201 - 300	109	14	0.01	36	0	88	0.011
	301 - 500	52	0	---	---	---	---	---
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	133	0.02	488	298	679	0.007

Table 78. -- Catch per unit of effort by stratum for capelin sorted by descending CPUE for the 2009 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	1 - 100	Middleton Shallows	8	5	0.16	104	0	233
Chirikof	1 - 100	Upper Alaska Peninsula	17	8	0.08	66	0	159
Kodiak	1 - 100	Albatross Shallows	28	7	0.07	43	0	108
Shumagin	101 - 200	West Shumagin Gully	4	2	0.07	16	0	61
Kodiak	1 - 100	Kenai Peninsula	9	2	0.06	29	0	96
Shumagin	1 - 100	Lower Alaska Peninsula	26	16	0.05	34	12	56
Shumagin	101 - 200	Sanak Gully	6	4	0.04	15	0	39
Chirikof	101 - 200	Shelikof Edge	27	9	0.03	25	5	45
Kodiak	1 - 100	Lower Cook Inlet	15	6	0.03	30	0	64
Chirikof	201 - 300	Lower Shelikof Gully	17	7	0.03	31	0	83
Kodiak	101 - 200	Albatross Gullies	26	4	0.02	14	0	42
Kodiak	1 - 100	Albatross Banks	40	9	0.02	24	1	48
Kodiak	101 - 200	Portlock Flats	35	5	0.014	11	0	25
Chirikof	101 - 200	East Shumagin Gully	19	3	0.012	14	0	41
Kodiak	201 - 300	Upper Shelikof Gully	4	4	0.01	3	0	7
Shumagin	1 - 100	Shumagin Bank	35	11	0.009	11	0	23
Chirikof	1 - 100	Chirikof Bank	37	7	0.005	5	0	10
Yakutat	1 - 100	Yakutat Shallows	11	3	0.005	5	0	12
Shumagin	1 - 100	Davidson Bank	47	8	0.00	6	0	11
Yakutat	201 - 300	Yakutat Gullies	9	1	0.00	1	0	4
Shumagin	1 - 100	Fox Islands	19	1	0.00	1	0	2
Yakutat	101 - 200	Yakataga Shelf	9	1	0.00	1	0	2
Kodiak	201 - 300	Kenai Gullies	20	2	0.00	1	0	2
Yakutat	101 - 200	Middleton Shelf	10	1	0.00	1	0	2
Chirikof	1 - 100	Semidi Bank	24	1	0.00	0	0	1
Kodiak	101 - 200	Barren Islands	18	1	0.00	0	0	1
Kodiak	101 - 200	Kenai Flats	19	2	0.00	0	0	1
Kodiak	101 - 200	Kodiak Outer Shelf	27	1	0.00	0	0	0
Chirikof	101 - 200	Chirikof Outer Shelf	26	1	0.00	0	0	0
Southeastern	1 - 100	Southeastern Shallows	11	1	0	0	0	1

Table 79. -- Number of survey hauls, number of hauls with eulachon, mean CPUE, biomass, and mean weight, based on the 2009 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	127	12	< 0.01	20	5	34	0.04
	101 - 200	40	4	0.43	635	0	2,057	0.011
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	17	0.10	654	0	2,077	0.011
Chirikof	1 - 100	78	10	0.02	54	0	114	0.063
	101 - 200	72	31	6.28	14,970	2,172	27,768	0.035
	201 - 300	25	15	4.98	5,749	2,100	9,398	0.043
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	56	3.05	20,773	7,580	33,965	0.037
Kodiak	1 - 100	100	12	0.01	56	0	131	0.039
	101 - 200	125	44	8.83	38,242	4,076	72,408	0.036
	201 - 300	31	21	12.91	14,831	688	28,973	0.026
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	0	---	---	---	---	---
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	77	5.24	53,129	16,212	90,046	0.032
Yakutat	1 - 100	19	12	0.40	662	66	1,259	0.04
	101 - 200	36	30	2.98	8,767	4,108	13,426	0.03
	201 - 300	17	15	1.09	562	285	838	0.041
	301 - 500	8	1	< 0.01	1	0	5	0.045
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	58	1.75	9,992	5,283	14,701	0.031
Southeastern	1 - 100	11	1	3.38	2,215	0	7,089	0.03
	101 - 200	26	7	0.39	429	0	913	0.028
	201 - 300	19	5	0.05	25	0	53	0.038
	301 - 500	14	2	0.03	11	0	31	0.049
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	15	0.96	2,679	0	7,579	0.03
All areas	1 - 100	335	47	0.23	3,006	0	7,871	0.032
	101 - 200	299	116	5.15	63,043	26,620	99,466	0.034
	201 - 300	109	57	5.87	21,167	6,766	35,567	0.03
	301 - 500	52	3	0.01	12	0	32	0.048
	501 - 700	16	0	---	---	---	---	---
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	223	2.73	87,227	47,891	126,563	0.033

Table 80. -- Catch per unit of effort by stratum for eulachon sorted by descending CPUE for the 2009 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	Barren Islands	18	9	28.81	31,639	0	65,806
Kodiak	201 - 300	Kenai Gullies	20	17	15.89	10,585	0	24,275
Kodiak	201 - 300	Upper Shelikof Gully	4	4	13.23	4,246	0	10,564
Chirikof	101 - 200	Shelikof Edge	27	22	12.57	9,719	2,442	16,995
Chirikof	201 - 300	Lower Shelikof Gully	17	15	5.74	5,749	2,083	9,416
Chirikof	101 - 200	East Shumagin Gully	19	8	4.73	5,251	0	16,009
Kodiak	101 - 200	Kenai Flats	19	11	4.37	5,281	1,097	9,466
Yakutat	101 - 200	Yakutat Flats	7	5	3.69	3,335	0	7,668
Yakutat	101 - 200	Middleton Shelf	10	10	3.63	2,670	1,561	3,779
Southeastern	1 - 100	Southeastern Shallows	11	1	3.38	2,215	0	7,149
Shumagin	101 - 200	West Shumagin Gully	4	3	2.78	633	0	2,263
Yakutat	101 - 200	Fairweather Shelf	10	7	2.18	1,683	0	3,885
Yakutat	101 - 200	Yakataga Shelf	9	8	2.047	1,080	576	1,584
Yakutat	201 - 300	Yakutat Slope	8	7	1.39	296	100	491
Kodiak	101 - 200	Portlock Flats	35	9	1.163	853	0	1,833
Yakutat	201 - 300	Yakutat Gullies	9	8	0.874	266	36	496
Southeastern	101 - 200	Prince of Wales Shelf	15	6	0.622	429	0	916
Yakutat	1 - 100	Middleton Shallows	8	4	0.567	381	0	955
Kodiak	101 - 200	Albatross Gullies	26	10	0.55	436	0	945
Yakutat	1 - 100	Yakutat Shallows	11	8	0.28	281	0	592
Chirikof	1 - 100	Upper Alaska Peninsula	17	6	0.065	52	0	112
Kodiak	101 - 200	Kodiak Outer Shelf	27	5	0.065	33	0	86
Kodiak	1 - 100	Kenai Peninsula	9	1	0.063	33	0	109
Southeastern	201 - 300	Baranof-Chichagof Slope	5	1	0.053	6	0	22
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	4	0.049	19	0	45
Southeastern	301 - 500	Southeastern Deep Gullies	7	2	0.05	11	0	32
Kodiak	1 - 100	Lower Cook Inlet	15	4	0.02	18	0	39
Kodiak	1 - 100	Northern Kodiak Shallows	8	3	0.014	3	0	7
Shumagin	1 - 100	Shumagin Bank	35	8	0.011	13	1	26
Shumagin	1 - 100	Lower Alaska Peninsula	26	4	0.009	6	0	14
Yakutat	301 - 500	Yakutat Gullies	2	1	0.008	1	0	13
Kodiak	1 - 100	Albatross Shallows	28	3	0.004	2	0	4
Shumagin	101 - 200	Sanak Gully	6	1	0.00	2	0	6
Chirikof	1 - 100	Chirikof Bank	37	3	0.00	2	0	4
Chirikof	1 - 100	Semidi Bank	24	1	0.001	1	0	2
Chirikof	101 - 200	Chirikof Outer Shelf	26	1	0.001	0	0	1
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	1	0.001	1	0	2
Shumagin	201 - 300	Shumagin Slope	17	1	0.001	0	0	1
Kodiak	1 - 100	Albatross Banks	40	1	0	0	0	1

Table 81. -- Number of survey hauls, number of hauls with Pacific hake, mean CPUE, biomass, and mean weight, based on the 2009 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	127	0	---	---	---	---	---
	101 - 200	40	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	2	0	---	---	---	---	---
	All depths	196	0	---	---	---	---	---
Chirikof	1 - 100	78	0	---	---	---	---	---
	101 - 200	72	0	---	---	---	---	---
	201 - 300	25	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	501 - 700	5	0	---	---	---	---	---
	701 - 1000	3	0	---	---	---	---	---
	All depths	190	0	---	---	---	---	---
Kodiak	1 - 100	100	0	---	---	---	---	---
	101 - 200	125	0	---	---	---	---	---
	201 - 300	31	0	---	---	---	---	---
	301 - 500	16	0	---	---	---	---	---
	501 - 700	4	1	0.10	17	0	65	1.015
	701 - 1000	4	0	---	---	---	---	---
	All depths	280	1	< 0.01	17	0	65	1.015
Yakutat	1 - 100	19	0	---	---	---	---	---
	101 - 200	36	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	8	3	1.53	402	0	1,981	0.989
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	1	0	---	---	---	---	---
	All depths	83	3	0.07	402	0	1,981	0.989
Southeastern	1 - 100	11	2	61.59	40,319	0	129,045	1.841
	101 - 200	26	3	0.19	209	0	456	1.018
	201 - 300	19	13	7.61	3,843	735	6,951	0.939
	301 - 500	14	13	10.48	3,268	472	6,063	0.902
	501 - 700	2	2	0.77	80	76	84	1.019
	701 - 1000	2	0	---	---	---	---	---
	All depths	74	33	17.02	47,718	0	136,542	1.596
All areas	1 - 100	335	2	3.12	40,319	0	129,045	1.841
	101 - 200	299	3	0.02	209	0	456	1.018
	201 - 300	109	13	1.07	3,843	735	6,951	0.939
	301 - 500	52	16	2.87	3,670	816	6,524	0.91
	501 - 700	16	3	0.12	97	49	145	1.019
	701 - 1000	12	0	---	---	---	---	---
	All depths	823	37	1.50	48,137	0	136,965	1.587

Table 82. -- Catch per unit of effort by stratum for Pacific hake sorted by descending CPUE for the 2009 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	1 - 100	Southeastern Shallows	11	2	61.59	40,319	0	130,133
Southeastern	201 - 300	Baranof-Chichagof Slope	5	5	15.71	1,768	0	4,063
Southeastern	301 - 500	Southeastern Deep Gullies	7	7	12.06	2,827	0	5,684
Southeastern	301 - 500	Southeastern Slope	7	6	5.71	441	0	894
Southeastern	201 - 300	Prince of Wales Slope/Gullies	14	8	5.28	2,075	0	4,709
Yakutat	301 - 500	Yakutat Gullies	2	1	3.31	366	0	5,019
Southeastern	501 - 700	Southeastern Slope	2	2	0.77	80	69	91
Yakutat	301 - 500	Yakutat Slope	6	2	0.23	36	0	94
Southeastern	101 - 200	Prince of Wales Shelf	15	2	0.21	147	0	365
Southeastern	101 - 200	Baranof-Chichagof Shelf	11	1	0.15	62	0	199
Kodiak	501 - 700	Kodiak Slope	4	1	0.10	17	0	72

CITATIONS

Alverson, D.L., and W.T. Pereyra. 1969. Demersal fish explorations in the northeastern Pacific Ocean -- An evaluation of exploratory fishing methods and analytical approaches to stock size and yield forecasts. J. Fish. Res. Board Can. 26:1985-2001.

Berendzen, P.B. 1997. Phylogenetic analysis of the Order Pleuronectiformes using molecular and morphological evidence. Abstracts of the 1997 Annual Meeting of the American Society of Ichthyologists and Herpetologists, Seattle, Washington.

Britt, L., and M.H. Martin. 2000. Data report: 1999 Gulf of Alaska bottom trawl survey. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-121, 249 p.

Cochran, W.G. 1977. Sampling Techniques. 3rd ed. Wiley Series in Probability and Mathematical Statistics - Applied. John Wiley & Sons. N.Y., NY 428 p.

Cooper, J., and F. Chapleau 1998. The monophyletic status of Pleuronectes (Pleuronectidae: Pleuronectiformes). Abstracts of the 1996 Annual Meeting of the American Society of Ichthyologists and Herpetologists, New Orleans, Louisiana.

Ivankov, V.N. 1996. Review of the book by G.U. Lindberg and V.V. Fedorov, The fishes of the Sea of Japan and adjacent parts of the Sea of Okhotsk and the Yellow Sea. Part 6. Teleostomi, Osteichthyes, Actinopterygii. XXXI. Pleuronectiformes—Family

Psettodidae-CCI—Family Cynoglossidae. J.Ichthyol. 36(7):549-550. [Transl. By P.A. Aleinikov.]

Martin, M.H., and D.M. Clausen. 1995. Data report: 1993 Gulf of Alaska bottom trawl survey. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-59, 217 p.

Munro, P.T., and R.Z. Hoff. 1995. Two demersal trawl surveys in the Gulf of Alaska: Implications of survey design and methods. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-50, 139 p.

Orr, J.W., and A.C. Matarese. 2000. Revision of the genus Lepidopsetta Gill, 1862 (Teleostei: Pleuronectidae) based on larval and adult morphology, with a description of a new species from the North Pacific Ocean and Bering Sea. Fish. Bull., U.S. 98:539-582.

Orr, J.W., and J.E. Blackburn. 2004. The dusky rockfishes (Teleostei: Scorpaeniformes) of the North Pacific Ocean: resurrection of *Sebastes variabilis* (Pallas, 1814) and a redescription of *Sebastes ciliatus* (Tilesius, 1813). Fish. Bull., U.S. 102:328-348.

Orr, J.W., and S. Hawkins. 2008. Species of the rougheye rockfish complex: resurrection of *Sebastes melanostictus* (Matsubara, 1934) and a redescription of *Sebastes aleutianus* (Jordan and Evermann, 1898) (Teleostei: Scorpaeniformes). Fish. Bull., U.S. 106:111-134.

Rass, T.S. 1996. On taxonomy of Pleuronectini (Pleuronectidae). J. Ichthyol. 36:546-548.

Robins, C.R., R.M. Bailey, C.E. Bond, J.R. Brooker, E.A. Lachner, R.N. Lea, and W.B. Scott. 1991. Common and scientific names of fishes from the United States and Canada. Fifth ed. Am. Fish. Soc. Spec. Publ. No. 20. 183 p.

Stark, J.W., and D.M. Clausen. 1995. Data report: 1990 Gulf of Alaska bottom trawl survey. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-49, 221 p.

Stauffer, G. 2004. NOAA protocols for groundfish bottom trawl surveys of the Nation's fishery resources. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/SPO-65, 205 p. Available online at http://spo.nmfs.noaa.gov/tm/tm65.pdf.

von Szalay, P.G., M.E. Wilkins, and M.H. Martin. 2008. Data report: 2007 Gulf of Alaska bottom trawl survey. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-189, 247 p.

Wakabayashi, K., R.G. Bakkala, and M.S. Alton. 1985. Methods of the U.S.-Japan demersal trawl surveys, p. 7-29. *In* R. G. Bakkala and K. Wakabayashi (eds.), Results of cooperative U.S.-Japan groundfish investigations in the Bering Sea during May-August 1979. Int. North Pac. Fish. Comm. Bull. 44.

APPENDIX A

Strata Specifications and Locations

Appendix Table A-1 presents the survey strata definitions for the 2009 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 strata code definitions. Appendix Figures A-1 through A-5 are charts showing the locations and extent of the strata as defined.

Appendix Table A-1. -- Survey strata used for the 2009 Gulf of Alaska biennial survey including depth, stratum code, name and area in square nautical miles (nmi^2) and square kilometers (km^2).

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 (nmi^2)	Area (km^2)
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**
701 – 1,000	510	Shumagin Slope	565	1,937
	520	Chirikof Slope	894	3,066
	530	Kodiak Slope	1,019	3,494
	540	Yakutat Slope	550	1,887
	550	Southeastern Slope	352	1,206
	996	**Subtotal**	**3,380**	**11,590**
1 – 1,000	**999**	**Grand Total**	**93,309**	**320,006**

Appendix Table A-2. -- Summary codes used for the 2009 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
916	701 – 1,000		565	1,937	510
919	1 -1,000		19,020	65,228	
921	1 - 100	**Chirikof**	7,591	26,035	20-22
922	101 - 200		6,954	23,850	120-122
923	201 - 300		3,350	11,490	230, 231
924	301 - 500		468	1,604	320
925	501 - 700		570	1,953	420
926	701 – 1,000		894	3,066	520
929	1 -1,000		19,827	67,998	
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
936	701 – 1,000		1,019	3,494	530
939	1 -1,000		29,591	101,489	

Summary code number	Depth range (m)	INPFC area	Area (nmi^2)	Area (km^2)	Strata included
941	1- 100	**Yakutat**	4,858	16,661	240, 241
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
946	701 – 1,000		550	1,887	540
949	1 -1,000		16,677	57,198	
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
956	701 – 1,000		352	1,206	550
959	1 -1,000		8,176	28,039	
999	1 – 1,000	**All Areas**	93,309	320,006	

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APPENDIX B

Fish and Invertebrate Taxa Encountered

Appendix Tables B-1 and B-2 list fish and invertebrate taxa encountered and identified during the 2009 Gulf of Alaska biennial bottom trawl survey. Most common and scientific names are from Robins et al. (1991). 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 2009 Gulf of Alaska bottom trawl survey.

Family	Scientific name	Common name
Chimaeridae	*Hydrolagus colliei*	spotted ratfish
Squalidae	*Squalus acanthias*	spiny dogfish
	Somniosus pacificus	Pacific sleeper shark
Rajidae	*Bathyraja abyssicola*	deepsea skate
	Raja binoculata	big skate
	Bathyraja interrupta	Bering skate
	Raja rhina	longnose skate
	Bathyraja taranetzi	mud skate
	Bathyraja trachura	roughtail skate
	Bathyraja parmifera	Alaska skate
	Bathyraja aleutica	Aleutian skate
	Bathyraja lindbergi	commander skate
	Bathyraja maculata	whiteblotched skate
Nemichthyidae	*Nemichthyidae*	snipe eel unident.
Clupeidae	*Clupea pallasi*	Pacific herring
Bathylagidae	*Bathylagus pacificus*	Pacific blacksmelt
	Leuroglossus schmidti	northern smoothtongue
	Bathylagus ochotensis	popeye blacksmelt
Opisthoproctidae	*Macropinna microstoma*	barreleye
Alepocephalidae	*Alepocephalus tenebrosus*	California slickhead
Osmeridae	*Thaleichthys pacificus*	eulachon
	Mallotus villosus	capelin
	Osmerus mordax	rainbow smelt
	Spirinchus thaleichthys	longfin smelt
Salmonidae	*Oncorhynchus tshawytscha*	chinook salmon
	Oncorhynchus kisutch	coho salmon
	Oncorhynchus gorbuscha	pink salmon
	Oncorhynchus keta	chum salmon
	Oncorhynchus nerka	sockeye salmon
	Salvelinus malma	Dolly Varden
Gonostomatidae	*Sigmops gracilis*	slender fangjaw
Stomiidae	Stomiidae	barbeled dragonfish
Melanostomiidae	*Tactostoma macropus*	longfin dragonfish

Chauliodontidae	*Chauliodus macouni*	Pacific viperfish
Scopelarchidae	*Benthalbella dentata*	northern pearleye
Paralepidae	Paralepididae	barracudina unident.
Myctophidae	*Stenobrachius leucopsarus*	northern lampfish
	Stenobrachius nannochir	garnet lampfish
	Diaphus theta	California headlightfish
	Lampanyctus sp.	
	Nannobrachium ritteri	broadfin lanternfish
	Lampanyctus jordani	brokenline lampfish
	Protomyctophum thompsoni	northern flashlightfish
Macrouridae	*Coryphaenoides acrolepis*	Pacific grenadier
	Albatrossia pectoralis	giant grenadier
	Coryphaenoides cinereus	popeye grenadier
Moridae	*Antimora microlepis*	Pacific flatnose
Merluccidae	*Merluccius productus*	Pacific hake
Gadidae	*Microgadus proximus*	Pacific tomcod
	Gadus macrocephalus	Pacific cod
	Eleginus gracilis	saffron cod
	Theragra chalcogramma	walleye pollock
Oneirodidae	*Oneirodes* sp.	
Melamphaeidae	*Poromitra curilensis*	crested bigscale
	Melamphaes lugubris	highsnout bigscale
Gasterosteidae	*Gasterosteus aculeatus*	threespine stickleback
Scorpaenidae	*Sebastolobus alascanus*	shortspine thornyhead
	Sebastolobus altivelis	longspine thornyhead
	Sebastes aleutianus	rougheye rockfish
	Sebastes melanostictus	blackspotted rockfish
	Sebastes alutus	Pacific ocean perch
	Sebastes aurora	aurora rockfish
	Sebastes brevispinis	silvergray rockfish
	Sebastes ciliatus	dark rockfish
	Sebastes variabilis	dusky rockfish
	Sebastes crameri	darkblotched rockfish
	Sebastes diploproa	splitnose rockfish
	Sebastes elongatus	greenstriped rockfish

	Sebastes entomelas	widow rockfish
	Sebastes flavidus	yellowtail rockfish
	Sebastes helvomaculatus	rosethorn rockfish
	Sebastes maliger	quillback rockfish
	Sebastes melanops	black rockfish
	Sebastes pinniger	canary rockfish
	Sebastes polyspinis	northern rockfish
	Sebastes proriger	redstripe rockfish
	Sebastes ruberrimus	yelloweye rockfish
	Sebastes babcocki	redbanded rockfish
	Sebastes saxicola	stripetail rockfish
	Sebastes variegatus	harlequin rockfish
	Sebastes wilsoni	pygmy rockfish
	Sebastes zacentrus	sharpchin rockfish
	Sebastes borealis	shortraker rockfish
	Sebastes reedi	yellowmouth rockfish
Anoplopomatidae	*Anoplopoma fimbria*	sablefish
Hexagrammidae	*Ophiodon elongatus*	lingcod
	Pleurogrammus monopterygius	Atka mackerel
	Hexagrammos stelleri	whitespotted greenling
	Hexagrammos decagrammus	kelp greenling
Cottidae	*Thyriscus anoplus*	sponge sculpin
	Icelinus borealis	northern sculpin
	Gymnocanthus pistilliger	threaded sculpin
	Gymnocanthus galeatus	armorhead sculpin
	Bolinia euryptera	broadfin sculpin
	Malacocottus zonurus	darkfin sculpin
	Hemilepidotus hemilepidotus	red Irish lord
	Hemilepidotus jordani	yellow Irish lord
	Triglops forficata	scissortail sculpin
	Triglops scepticus	spectacled sculpin
	Triglops pingeli	ribbed sculpin
	Triglops macellus	roughspine sculpin
	Myoxocephalus polyacanthocephalus	great sculpin
	Myoxocephalus jaok	plain sculpin

	Leptocottus armatus	Pacific staghorn sculpin
	Dasycottus setiger	spinyhead sculpin
	Psychrolutes paradoxus	tadpole sculpin
	Rhamphocottus richardsoni	grunt sculpin
	Hemitripterus bolini	bigmouth sculpin
	Triglops xenostethus	scalybreasted sculpin
	Icelus spiniger	thorny sculpin
	Icelus euryops	wide-eye sculpin
	Icelus spatula	spatulate sculpin
	Rastrinus scutiger	roughskin sculpin
Agonidae	*Leptagonus frenatus*	sawback poacher
	Bathyagonus alascanus	gray starsnout
	Bathyagonus infraspinatus	spinycheek starsnout
	Bathyagonus pentacanthus	bigeye poacher
	Bathyagonus nigripinnis	blackfin poacher
	Podothecus accipenserinus	sturgeon poacher
	Hypsagonus quadricornis	fourhorn poacher
Cyclopteridae	*Aptocyclus ventricosus*	smooth lumpsucker
	Lethotremus muticus	docked snailfish
	Eumicrotremus birulai	round lumpsucker
	Eumicrotremus orbis	Pacific spiny lumpsucker
	Cyclopteropsis phrynoides	toad lumpsucker
	Liparis dennyi	marbled snailfish
	Liparis gibbus	variegated snailfish
	Crystallichthys cyclospilus	blotched snailfish
	Elassodiscus caudatus	humpback snailfish
	Elassodiscus tremebundus	blacklip snailfish
	Careproctus melanurus	blacktail snailfish
	Careproctus cypselurus	blackfin snailfish
	Careproctus furcellus	emarginate snailfish
	Careproctus gilberti	smalldisk snailfish
	Careproctus colletti	Alaska snailfish
	Careproctus rastrinus	salmon snailfish
	Paraliparis dactylosus	red snailfish
	Careproctus comus	comic snailfish

Bathymasteridae	*Ronquilus jordani*	northern ronquil
	Bathymaster signatus	searcher
Zoarcidae	*Bothrocara brunneum*	twoline eelpout
	Bothrocara pusillum	Alaska eelpout
	Lycenchelys crotalinus	snakehead eelpout
	Lycodes cortezianus	bigfin eelpout
	Lycodes palearis	wattled eelpout
	Lycodes concolor	ebony eelpout
	Lycodes polaris	Canadian eelpout
	Lycodes diapterus	black eelpout
	Lycodes brevipes	shortfin eelpout
	Lycodes beringi	Bering eelpout
	Lycodes pacificus	blackbelly eelpout
Stichaeidae	*Lumpenus maculatus*	daubed shanny
	Lumpenus fabricii	slender eelblenny
	Lumpenus sagitta	snake prickleback
	Lumpenella longirostris	longsnout prickleback
	Chirolophis snyderi	bearded warbonnet
	Chirolophis tarsodes	
	Poroclinus rothrocki	whitebarred prickleback
	Chirolophis nugator	mosshead warbonnet
	Bryozoichthys lysimus	nutcracker prickleback
Cryptacanthodidae	*Cryptacanthodes giganteus*	giant wrymouth
Anarhichadidae	*Anarrhichthys ocellatus*	wolf-eel
	Anarhichas orientalis	Bering wolffish
Zaproridae	*Zaprora silenus*	prowfish
Trichodontidae	*Trichodon trichodon*	Pacific sandfish
Ammodytidae	*Ammodytes hexapterus*	Pacific sand lance
Bothidae	*Citharichthys sordidus*	Pacific sanddab
Pleuronectidae	*Atheresthes stomias*	arrowtooth flounder
	Atheresthes evermanni	Kamchatka flounder
	Hippoglossus stenolepis	Pacific halibut
	Hippoglossoides elassodon	flathead sole
	Lyopsetta exilis	slender sole
	Eopsetta jordani	petrale sole

Parophrys vetulus	English sole
Microstomus pacificus	Dover sole
Embassichthys bathybius	deepsea sole
Glyptocephalus zachirus	rex sole
Limanda aspera	yellowfin sole
Platichthys stellatus	starry flounder
Psettichthys melanostictus	sand sole
Lepidopsetta polyxystra	northern rock sole
Lepidopsetta bilineata	southern rock sole
Isopsetta isolepis	butter sole
Pleuronichthys decurrens	curlfin sole
Pleuronectes quadrituberculatus	Alaska plaice

Appendix Table B-2. -- Invertebrate species encountered during the 2009 Gulf of Alaska bottom trawl.

Phylum	Scientific name	Common name
Porifera	*Suberites ficus*	
	Suberites montinger	peach sponge
	Suberites domuncula	hermit sponge
	Aphrocallistes vastus	clay pipe sponge
	Phakellia sp.	
	Mycale loveni	tree sponge
	Coelospaeridae	ginseng sponge
	Geodia mesotriaena	
	Acanthascus sp.	
	Halichondria panicea	barrel sponge
	Rhabdocalyptus sp.	cloud sponge
	Mycale bellabellensis	lampshade sponge
	Myxilla incrustans	scallop sponge
	Myxilla brunnea	soft brown sponge
	Phakellia beringensis	hat sponge
	Plicatellopsis amphispicula	firm finger sponge
	Histodermella sp. A	spud sponge
	Leucosolenia blanca	yellow leafy sponge
	Tethya sp.	ball sponge
	Hyalonema sp.	fiberoptic sponge
	Halichondria cf. sitiens	yellow green papillate sponge
	Yellow papillate sponge	
	Stylissa sp.	drumstick sponge
	Neoesperiopsis rigida	soft finger sponge
	Neoesperiopsis infundibula	rough China hat sponge
	Neoesperiopsis digitata	
	Esperiopsis flagrum	
	Inflatella sp. 1	orange papillate sponge
	Stelletta sp.	stone sponge
	Polymastia fluegeli	Flugel's nippled spong
	Weberella bursa	pale mammilated sponge
	Vulcanella sp.	
	Tentorum semisuberites	two nipple sponge
	Craniella villosa	

	Cliona sp. A	rough bread crumb sponge
	Latrunculia sp. A	green papillate sponge
	Stelodoryx alaskaensis	Alaskan lobed sponge
	Hexactinellida	glass sponge unident.
	Staurocalyptus sp.	
	Geodinella robusta	calcareous finger sponge
	Aulosaccus schulzei	vase sponge
	Farrea beringiana	Bering lace sponge
	Regadrella okinoseana	lacy basket sponge
	Craniella cranium	baseball sponge
	Craniella spinosa	furry ball sponge
Porifera	*Tetilla* sp.	
Cnidaria	*Aglaophenia* sp.	
	Abietinaria sp.	
	Periphylla periphylla	
	Chrysaora melanaster	
	Phacellophora camtschatica	egg yolk jelly
	Aequorea sp.	
	Atolla sp.	
	Aurelia labiata	
	Chrysaora fuscescens	sea nettle
	Cyanea capillata	lion's mane
	Gersemia sp.	sea raspberry
	Anthomastus sp.	
	Primnoa pacifica	
	Primnoa willeyi	red tree coral
	Swiftia pacifica	
	Swiftia simplex	
	Paragorgia pacifica	
	Paragorgia nodosa	
	Parastenella sp. A	sugar coral
	Virgularia sp.	smoothstem seawhip
	Stylatula sp.	slender seawhips
	Protoptilum sp.	
	Halipteris willemoesi	
	Umbellula sp.	
	Ptilosarcus gurneyi	orange sea pen

	Anthoptilum grandiflorum	
	Actinauge verrilli	reticulate anemone
	Paractinostola faeculenta	rough purple sea anemone
	Actinoscyphia sp.	
	Corallimorphus sp.	
	Metridium farcimen	gigantic anemone
	Stomphia didemon	cowardly anemone
	Stomphia coccinea	swimming anemone
	Urticina crassicornis	mottled anemone
	Bathyphelia australis	hot dog sea anemone
	Oractis diomedeae	grape anemone
	Actiniidae unid.	actinid sea anemones unid.
	Cribrinopsis fernaldi	chevron-tentacled anemone
	Liponema brevicornis	tentacle-shedding anemone
	Actinostola sp.	
	Hormathiidae	
	Scleractinia unident.	stony coral unident.
	Caryophyllia arnoldi	
	Stylaster sp.	
	Stylaster campylecus	
	Plumarella sp.	
	Isidella sp.	articulated bamboo coral
	Thouarella sp.	
	Fanellia compressa	
	Fanellia fraseri	
	Muriceides nigra	
	Amphilaphis sp.	
	Arthrogorgia sp.	
Ctenophora	Ctenophora	comb jelly unident.
Annelida	*Eunice valens*	
	Spinther sp. A	
	Aphrodita negligens	
	Euphrosine multibranchiata	
	Travisia pupa	
	Nereidae	
	Eunoe nodosa	giant scale worm
	Eunoe depressa	depressed scale worm

	Serpula columbiana	
	Notostombdella	striped sea leech
Platyhelminthes	*Platyhelminthes*	flatworm unident.
Rhynchocoela	Nemertea	nemertean worm unident.
Rhynchocoela	*Emplectonema* sp.	
Sipuncula	Sipuncula	peanut worm unid.
Echiura	Echiura	echiuroid worm unident.
Arthropoda	*Rocinella angusta*	
	Neognathophausia gigas	giant red mysid
	Neognathophausia ingens	red mysid
	Balanus evermanni	giant barnacle
	Balanus rostratus	beaked barnacle
	Scalpellum columbiana	
	Sergestes similis	Pacific sergestid
	Pandalus danae	dock shrimp
	Pandalus jordani	ocean shrimp
	Pandalus eous	Alaskan pink
	Pandalus tridens	yellowleg pandalid
	Pandalus platyceros	spot shrimp
	Pandalus goniurus	humpy shrimp
	Pandalus hypsinotus	coonstripe shrimp
	Pandalus stenolepis	roughpatch shrimp
	Pandalopsis dispar	sidestripe shrimp
	Pandalopsis ampla	
	Eualus barbatus	barbed eualid
	Eualus macrophthalmus	bigeye eualid
	Eualus suckleyi	shortscale eualid
	Lebbeus groenlandicus	spiny lebbeid
	Crangon communis	twospine crangon
	Crangon dalli	ridged crangon
	Crangon septemspinosa	sevenspine bay shrimp
	Argis alaskensis	common argid
	Argis dentata	Arctic argid
	Sclerocrangon boreas	sculptured shrimp
	Argis levior	Nelson's argid
	Argis ovifer	split-eye argid
	Paracrangon echinata	horned shrimp

Pasiphaea pacifica	Pacific glass shrimp
Hymenodora frontalis	Pacific ambereye
Cancer branneri	
Cancer magister	Dungeness crab
Cancer oregonensis	Oregon rock crab
Oregonia bifurca	
Oregonia gracilis	graceful decorator crab
Chorilia longipes	Longhorned decorator crab
Chionoecetes tanneri	grooved Tanner crab
Chionoecetes bairdi	Tanner crab
Hyas lyratus	Pacific lyre crab
Telmessus cheiragonus	helmet crab
Pagurus brandti	sponge hermit
Pagurus townsendi	Townsend hermit crab
Pagurus aleuticus	Aleutian hermit
Labidochirus splendescens	splendid hermit
Pagurus confragosus	knobbyhand hermit
Pagurus cornutus	
Pagurus dalli	whiteknee hermit
Pagurus kennerlyi	bluespine hermit
Pagurus trigonocheirus	fuzzy hermit crab
Pagurus beringanus	Bering hermit
Pagurus ochotensis	Alaskan hermit
Pagurus rathbuni	longfinger hermit
Pagurus tanneri	longhand hermit
Elassochirus tenuimanus	widehand hermit crab
Pagurus capillatus	hairy hermit crab
Elassochirus cavimanus	purple hermit
Elassochirus gilli	Pacific red hermit
Lopholithodes foraminatus	box crab
Acantholithodes hispidus	fuzzy crab
Lithodes couesi	scarlet king crab
Lithodes aequispinus	golden king crab
Hapalogaster grebnitzkii	
Rhinolithodes wosnessenskii	rhinoceros crab
Paralithodes brevipes	Kurile king crab
Cryptolithodes typica	

	Placetron wosnessenskii	scaled crab
	Erimacrus isenbeckii	horsehair crab
	Munida quadrispina	pinchbug
	Colossendeis sp.	
Mollusca	*Neomenia cf. yamamoti*	
	Lepidozona trifida	
	Amicula vestita	
	Tochuina tetraquetra	giant orange tochui
	Dendronotus dalli	Dall's dendronotid
	Tritonia festiva	festive Tritonia
	Tritonia diomedea	rosy tritonia
	Triopha catalinae	sea-clown triopha
	Armina californica	California armina
	Colga pacifica	Pacific Colga
	Cadlina modesta	
	Anisodoris nobilis	Pacific sea lemon
	Anisodoris lentiginosa	mottled pale sea-lemon
	Archidoris odhneri	white night doris
	Diaulula sp. A	
	Cranopsis major	great puncturella
	Scelitoboma bella	
	Bulbus fragilis	fragile moonsnail
	Cryptonatica	Aleutian moonsnail
	Cryptonatica	rusty moonsnail
	Nucella lamellosa	frilled dogwinkle
	Euspira sp.	pale moonsnail
	Lamellaria sp.	
	Crepidula sp.	slipper shell
	Japelion aleutica	
	Pyrulofusus dexius	
	Pyrulofusus deformis	warped whelk
	Pyrulofusus harpa	left-hand whelk
	Volutopsius fragilis	fragile whelk
	Volutopsius filosus	threaded whelk
	Volutopsius castaneus	volute whelk
	Beringius kennicottii	
	Neptunea amianta	white neptune

Neptunea pribiloffensis	Pribilof whelk
Neptunea borealis	
Neptunea lyrata	lyre whelk
Plicifusus griseus	gray whelk
Boreotrophon alaskanus	Alaskan trophon
Boreotrophon stuarti	winged trophon
Fusitriton oregonensis	Oregon triton
Bathybembix bairdii	
Cidarina cidaris	
Buccinum oedematum	swollen whelk
Buccinum plectrum	sinuous whelk
Buccinum scalariforme	ladder whelk
Buccinum cnismatum	
Volutomitra sp.	
Arctomelon stearnsii	Alaska volute
Arctomelon borealis	
Arctomelon tamikoae	
Acharax johnsoni	
Modiolus modiolus	northern horsemussel
Chlamys rubida	reddish scallop
Patinopecten caurinus	weathervane scallop
Delectopecten vancouverensis	Vancouver scallop
Cyclopecten davidsoni	salmon glass-scallop
Hiatella arctica	Arctic hiatella
Yoldia thraciaeformis	broad yoldia
Yoldia hyperborea	northern yoldia
Empleconia vaginata	vaginated limops
Musculus niger	black mussel
Astarte compacta	
Astarte arctica	
Cyclocardia sp. *cf. borealis*	northern carditid
Clinocardium ciliatum	hairy cockle
Clinocardium blandum	strait cockle
Humilaria kennerleyi	Kennerleys venus
Macoma calcarea	chalky macoma
Serripes groenlandicus	Greenland cockle
Serripes notabilis	oblique smoothcockle

	Pododesmus macrochisma	Alaska falsejingle
	Benthoctopus leioderma	smoothskin octopus
	Japatella sp.	
	Opisthoteuthis californiana	flapjack devilfish
	Octopus dofleini	giant octopus
	Benthoctopus sp.	
	Rossia pacifica	eastern Pacific bobtail
	Gonatus sp.	
	Berryteuthis magister	magistrate armhook squid
	Gonatopsis borealis	boreopacific armhook squid
	Moroteuthis robusta	robust clubhook squid
	Chiroteuthis calyx	
	Taonius pavo	
	Octopoteuthis deletron	
Bryozoa	*Flustrellidra corniculata*	
	Alcyonidium pedunculatum	
	Myriozoum subgracile	
	Rhamphostomella costata	ribbed bryozoan
	Hippodiplosia insculpta	
	Microporina borealis	
	Dendrobeania sp.	
Brachiopoda	*Terebratalia transversa*	common brachiopod
	Terebratulina unguicula	snakeshead brachiopod
	Laqueus californianus	California lamp shell
	Laqueus vancouverensis	Vancouver lampshell
Echinodermata	*Evasterias retifera*	
	Evasterias troschelii	mottled sea star
	Evasterias echinosoma	giant sea star
	Orthasterias koehleri	redbanded sea star
	Leptasterias hylodes	Aleutian sea star
	Leptasterias coei	
	Rathbunaster californicus	
	Pycnopodia helianthoides	sunflower sea star
	Stylasterias forreri	long-rayed star
	Ampheraster marianus	
	Tarsaster alaskanus	
	Lethasterias nanimensis	blackspined sea star

Pedicellaster magister	majestic sea star
Pisaster brevispinus	giant pink star
Poraniopsis inflata	thorny sea star
Henricia aspera	ridged blood star
Henricia leviuscula	blood sea star
Henricia asthenactis	
Henricia longispina	
Henricia spiculifera	spiny Henricia
Odontohenricia fisheri	
Leptasterias katharinae	
Gephyreaster swifti	Swift's sea star
Pseudarchaster alascensis	
Hippasteria californica	
Hippasteria heathi	
Hippasteria spinosa	spiny red sea star
Pseudarchaster parelii	scarlet sea star
Mediaster tenellus	
Mediaster aequalis	vermilion sea star
Ceramaster japonicus	red bat star
Ceramaster patagonicus	orange bat sea star
Ceramaster stellatus	
Luidia foliolata	sand sea star
Dermasterias imbricata	leather sea star
Solaster endeca	northern sun sea star
Solaster dawsoni	morning sun sea star
Solaster stimpsoni	striped sun sea star
Crossaster borealis	grooved sea star
Crossaster papposus	rose sea star
Lophaster vexator	crested star
Pteraster tesselatus	
Pteraster jordani	
Pteraster militaris	wrinkled star
Pteraster marssipus	
Pteraster obscurus	obscure sea star
Diplopteraster multipes	pincushion sea star
Asterias amurensis	purple-orange sea star
Ctenodiscus crispatus	common mud star

Leptychaster anomalus	
Leptychaster arcticus	North Pacific sea star
Cladaster validus	
Dipsacaster borealis	northern sea star
Dipsacaster eximus	
Cheiraster dawsoni	fragile sea star
Nearchaster variabilis	
Nearchaster pedicellaris	
Brisingidae	brisingid sea star
Strongylocentrotus droebachiensis	green sea urchin
Strongylocentrotus franciscanus	red sea urchin
Strongylocentrotus polyacanthus	
Strongylocentrotus purpuratus	purple sea urchin
Strongylocentrotus pallidus	white sea urchin
Allocentrotus fragilis	orange-pink sea urchin
Brisaster townsendi	
Brisaster latifrons	heart urchin
Echinarachnius parma	parma sand dollar
Dendraster excentricus	
Florometra acririma	
Florometra inexpectata	
Florometra serratissima	featherstar crinoid
Florometra asperrima	common northern feather star
Psathyrometra fragilis	
Gorgonocephalus eucnemis	basketstar
Asteronyx loveni	serpent sea star
Ophiura quadrispina	four spined brittle star
Ophiura sarsi	notched brittlestar
Stegophiura ponderosa	
Ophiacantha normani	
Ophiacantha cataleimmoida	
Ophiopholis longispina	
Ophiopholis aculeata	ubiquitous brittle star
Ophioscolex corynetes	
Amphiodia sp.	
Parastichopus leukothele	giant orange cucumber
Parastichopus californicus	California sea cucumber

	Pseudostichopus mollis	sandy sea cucumber
	Molpadia intermedia	sweet sea potato
	Bathyplotes sp.	
	Cucumaria fallax	sea football
	Cucumaria frondosa	
	Psolus phantapus	
	Psolus squamatus	whitescaled sea cucumber
	Psolus japonicus	
	Thylonidium sp.	
	Pannychia moseleyi	deep sea papillate cucumber
	Synallactes challengeri	
Chordata	*Thaliacea unident.*	salp unident.
	Styela rustica	sea potato
	Halocynthia igaboja	
	Halocynthia aurantium	sea peach
	Cnemidocarpa finmarkiensis	broad base tunicate
	Pyura haustor	wrinkled tunicate
	Distaplia occidentalis	
	Distaplia smithi	
	Amaroucium soldatovi	
	Aplidium sp. A	sea glob
	Tridemnum opacum	
	Ascidia paratropa	glassy tunicate
	Halocynthia hispidus	hairy tunicate
	Chelysoma productum	
	Molgula grifithsii	sea grape

APPENDIX C

Weight-length 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
Arrowtooth flounder	Male	3.821E-06	3.131	448
	Female	4.141E-06	3.122	710
	Both	3.869E-06	3.132	1160
Atka mackerel	Male	4.291E-07	3.584	168
	Female	4.451E-06	3.177	166
	Both	1.578E-06	3.358	334
Blackspotted rockfish	Male	5.543E-06	3.166	228
	Female	4.684E-06	3.195	192
	Both	5.161E-06	3.178	420
Pacific cod	Male	5.048E-06	3.116	267
	Female	4.925E-06	3.120	294
	Both	4.937E-06	3.121	561
Dover sole	Male	2.646E-06	3.214	231
	Female	2.550E-06	3.221	239
	Both	2.554E-06	3.221	470
Dusky rockfish	Male	9.436E-06	3.102	322
	Female	8.028E-06	3.128	421
	Both	8.724E-06	3.115	743
Flathead sole	Male	1.878E-06	3.263	320
	Female	2.299E-06	3.229	372
	Both	2.393E-06	3.221	704
Giant grenadier	Male	3.221E-03	2.408	129
	Female	6.978E-04	2.697	218
	Both	9.549E-04	2.639	347
Northern rockfish	Male	8.954E-06	3.090	320
	Female	9.277E-06	3.086	338
	Both	8.977E-06	3.091	658
Northern rock sole	Male	5.083E-06	3.136	224
	Female	3.480E-06	3.207	290
	Both	3.899E-06	3.186	514
Walleye pollock	Male	4.149E-06	3.104	676
	Female	4.658E-06	3.078	875
	Both	4.704E-06	3.079	1570
Pacific ocean perch	Male	8.128E-06	3.089	213
	Female	7.409E-06	3.104	205
	Both	7.486E-06	3.103	422
Rex sole	Male	5.451E-07	3.417	221
	Female	5.955E-07	3.407	275
	Both	5.524E-07	3.417	496
Rougheye rockfish	Male	8.619E-06	3.095	235
	Female	7.562E-06	3.121	256
	Both	7.616E-06	3.119	495
Sablefish	Male	1.691E-06	3.272	365
	Female	1.960E-06	3.247	277
	Both	1.776E-06	3.263	645
Sharpchin rockfish	Male	4.290E-06	3.210	232
	Female	3.866E-06	3.229	266
	Both	4.044E-06	3.221	498
Shortraker rockfish	Male	8.303E-06	3.105	141
	Female	6.630E-06	3.143	140
	Both	7.507E-06	3.122	281
Southern rock sole	Male	4.595E-06	3.164	220
	Female	4.030E-06	3.193	292
	Both	4.478E-06	3.172	513
Shortspine thornyhead	Male	4.160E-06	3.178	276
	Female	2.480E-06	3.268	283
	Both	3.294E-06	3.218	630

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205 CAHALAN, J., J. MONDRAGON, and J. GASPER. 2010. Catch sampling and estimation in the Federal groundfish fisheries off Alaska, 42 p. NTIS No. PB2010-105918.

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203 LAAKE, J., A. PUNT, R. HOBBS, M. FERGUSON, D. RUGH, and J. BREIWICK. 2009. Re-analysis of gray whale southbound migration surveys 1967-2006, 55 p. NTIS No. PB2010-103939.

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199 CONNERS, M. E., J. CAHALAN, S. GAICHAS, W. A. KARP, T. LOOMIS, and J. WATSON. 2009. Sampling for estimation of catch composition in Bering Sea trawl fisheries, 77 p. NTIS No. PB2010-100895.

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