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Data Report: 2017 Gulf of Alaska Bottom Trawl Survey

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March 2018

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PREFACE

This report presents data from the 2017 Gulf of Alaska groundfish survey conducted by the Alaska Fisheries Science Center of the National Marine Fisheries Service. It contains detailed descriptions of the survey planning and operations, species distribution and abundance charts, length frequency plots, tables of estimated biomass, catch per unit effort, average weight and length estimates, length-weight regression parameters, lists 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 tenth Gulf of Alaska Biennial Bottom Trawl Survey during the summer of 2017. This survey extends to 15 the series of surveys, previously conducted every 3 years between 1984 and 1999, which constitute the time series used in stock assessments of Gulf of Alaska groundfish resources. The survey area covered the continental shelf and upper continental slope to 700 m in the Gulf of Alaska from Islands of Four Mountains (170°W long.) and approximately 2,800 km across the Gulf of Alaska to Dixon Entrance (133°25'W long.). The survey was conducted aboard two chartered commercial trawlers, the FV *Ocean Explorer and* FV *Sea Storm*. Trawl haul samples were successfully collected at 536 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 species within the survey area, and to collect data to estimate biological parameters useful to groundfish researchers and managers including 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 161 fish and 364 invertebrate species were captured in the survey. Species with the highest total catch abundance (by weight) over the entire survey area were Pacific ocean perch (*Sebastes alutus*), arrowtooth flounder (*Atheresthes stomias*), walleye pollock (*Gadus*

chalcogrammus), Pacific halibut (*Hippoglossus stenolepis*), flathead sole (*Hippoglossoides elassodon*), giant grenadier (*Coryphaenoides pectoralis*), northern rockfish (*Sebastes polyspinis*), and sablefish (*Anoplopoma fimbria*). Survey results presented here include estimates of catch per unit of effort, biomass, population size composition, and length-weight relationships, as well as charts depicting the distribution of catch for commercially important species encountered during the survey.

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INTRODUCTION

The tenth biennial Gulf of Alaska (GOA) Bottom Trawl Survey of groundfish and invertebrate resources was conducted between 23 May and 8 August 2017 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. This biennial survey extends to 15, the series begun in 1984, previously conducted every 3 years between 1984 and 1999, which has provided a 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 2017 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 former International North Pacific Fisheries Commission (INPFC) statistical areas[1] sampled in the GOA during this survey: Shumagin, Chirikof, Kodiak, Yakutat, and Southeastern (Fig. 1). These results provide stock assessment scientists and resource managers the most current information for use in stock assessments. Only the 2017 survey results are presented and comparisons are not made to the results of previous GOA surveys.

The survey objectives were to:

1 The International North Pacific Fisheries Commission (INPFC) existed from 1952 to 1993 to facilitate the coordination, cooperation, and exchange of scientific information for marine species. It was replaced by the North Pacific Anadromous Fish Commission (NPAFC). The INPFC established reporting regions that were used to stratify the Aleutian Islands and Gulf of Alaska bottom trawl surveys and have been kept for consistency.

1) Collect data used to estimate the abundance of the major groundfish species.

2) 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

3) Delineate the distributions of major groundfish and commercially important invertebrate species inhabiting the continental shelf and upper continental slope of the GOA in depths ≤ 700 m.

4) Collect specimens and related information for special research projects on behalf of researchers at the AFSC's RACE and Resource Ecology and Fisheries Management (REFM) Divisions as well as several other scientific and academic organizations. The projects were:

- A population genetics and age structure study of Pacific sleeper (*Somniosus pacificus*) and salmon sharks (*Lamna ditropis*);
- A study for assessing deep-sea corals and sponges as nurseries for fish larvae;
- A study on lingcod (*Ophiodon elongates*) population genetics;
- Examining the feasibility of collecting Pacific cod (*Gadus macrocephalus*) and northern rockfish (*Sebastes polyspinis*) maturity samples;
- A study of interannual reproductive variability and summer maturity assessment of Pacific ocean perch (*Sebastes alutus*);
- A study of light levels at trawl stations;

- A study on molecular species identification of deepwater corals;
- A study of Gulf of Alaska Pacific lamprey spawning locations;
- Collection of miscellaneous snailfish species for taxonomic research;
- A study to identify untrawlable areas with ES 60 acoustic data;
- A study of mollusk distribution and zoogeography;
- A study of trophic food webs involving groundfish, squid, and sperm whales;
- A genetic study of Pacific ocean perch (*Sebastes alutus*);
- A genetic study of pygmy (*Sebastes wilsoni*), Puget sound (*Sebastes emphaeus*), stripetail (*Sebastes saxicola*), darkblotched (*Sebastes crameri*), and yellowmouth (*Sebastes reedi*) rockfishes;
- A study of the phylogeography of *Metridium* (plumose anemone);
- A genetic study of flatfishes: flathead sole (*Hippoglossoides elassodon*), arrowtooth flounder (*Atheresthes stomias*), yellowfin sole (*Limanda aspera*), southern (*Lepidopsetta bilineata*) and northern (*L. polyxystra*) rock soles;
- A pilot study to test a touch screen ID guide for deck use;
- A study of spawning behavior of yellow Irish lord (*Hemilepidotus jordani*);
- A tagging study of Pacific halibut (*Hippoglossus stenolepis*);
- A study to validate smooth sheet soundings with modern sonar;
- Collection of sponges for taxonomic research;
- Collection of Stylasteridae hard corals;
- Forensic collection of miscellaneous marine fishes;
- Forensic collection of sea cucumbers

METHODS

Survey Area

The Gulf of Alaska (Fig. 1) 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. Prevailing rough bottom conditions in many areas require the standard use of rubber bobbin roller gear for all survey bottom trawling operations. The 2017 GOA survey area included the portion of the continental shelf from the Islands of Four Mountains eastward approximately 2,800 km to Dixon Entrance and from nearshore waters (minimum depth approximately 15 m) to a depth of 700 m.

The total 2017 survey area was 308,415 km², or 11,590 km^2 smaller than the standard survey area, which also inludes depth strata between 700 and 1,000 m. The deepest strata were eliminated from the 2017 survey due to funding constraints. Continental shelf waters shallower than 200 m made up 82% of the survey area. The width of the shelf varies from approximately 20 km (11 nautical miles (nmi)) off the Islands of Four Mountains to approximately 220 km (120 nautical miles (nmi)) off Cook Inlet. Gullies intrude onto the shelf in many areas, and extend from the upper slope to the inner shore. The outer shelf is bordered by the continental slope, a region approximately 20 km in width, which descends steeply to the abyssal Aleutian Trench in the western and central GOA and to the Alaska Plain in the eastern GOA. The survey assessed only that portion of the slope between 200 and 700 m, which represented 18% of the total survey area. The survey was initially stratified by statistical areas erected by the former International North Pacific Fisheries Commission (INPFC). While this commission was

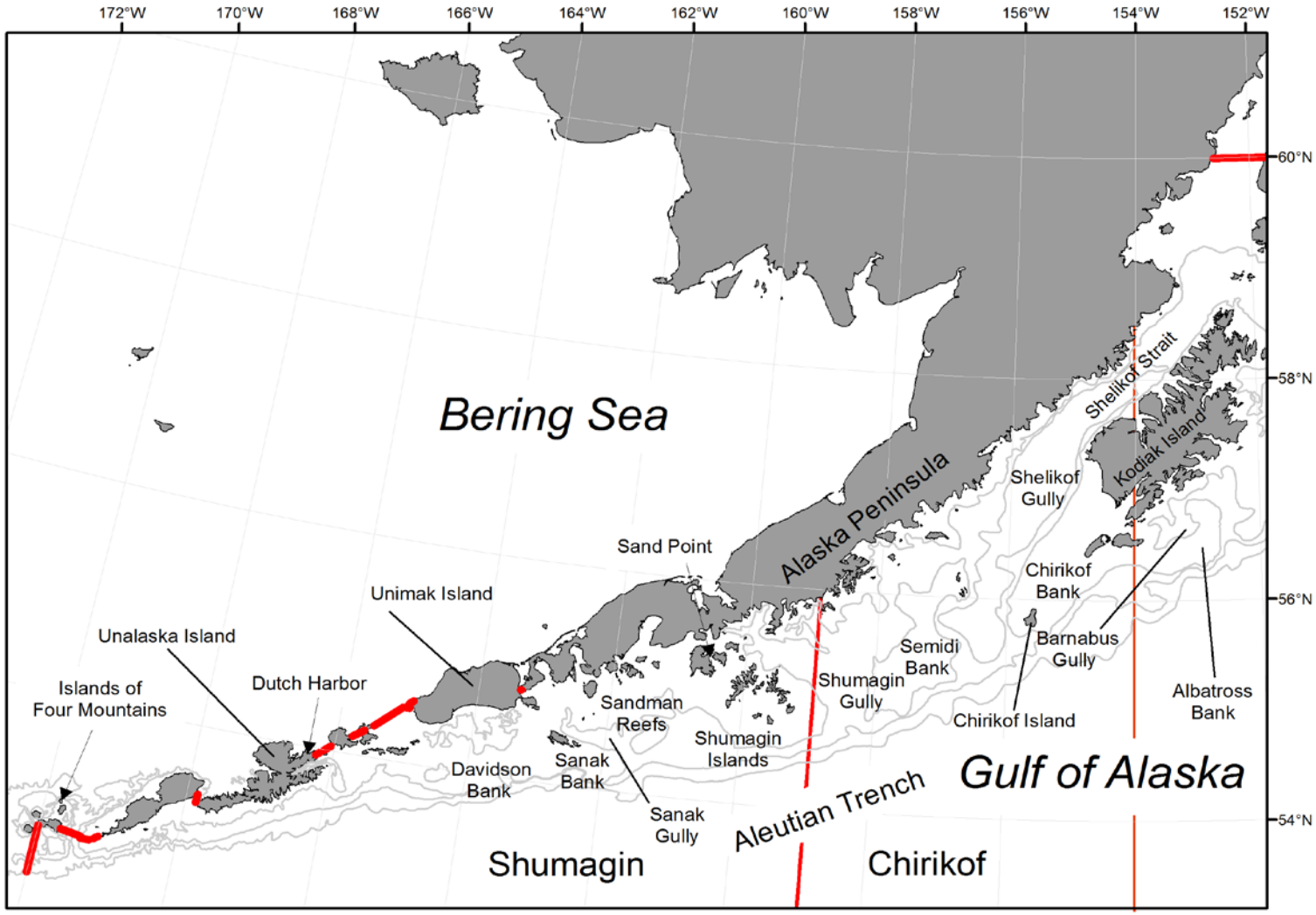

Figure 1 -- The 2017 Gulf of Alaska Biennial Groundfish Survey sampling area, including bathymetry, geographic features and North Pacific Fisheries Management Council (NPFMC) management areas. The thick red line marks the boundary of the survey area and the thin red lines mark the boundaries between the management areas.

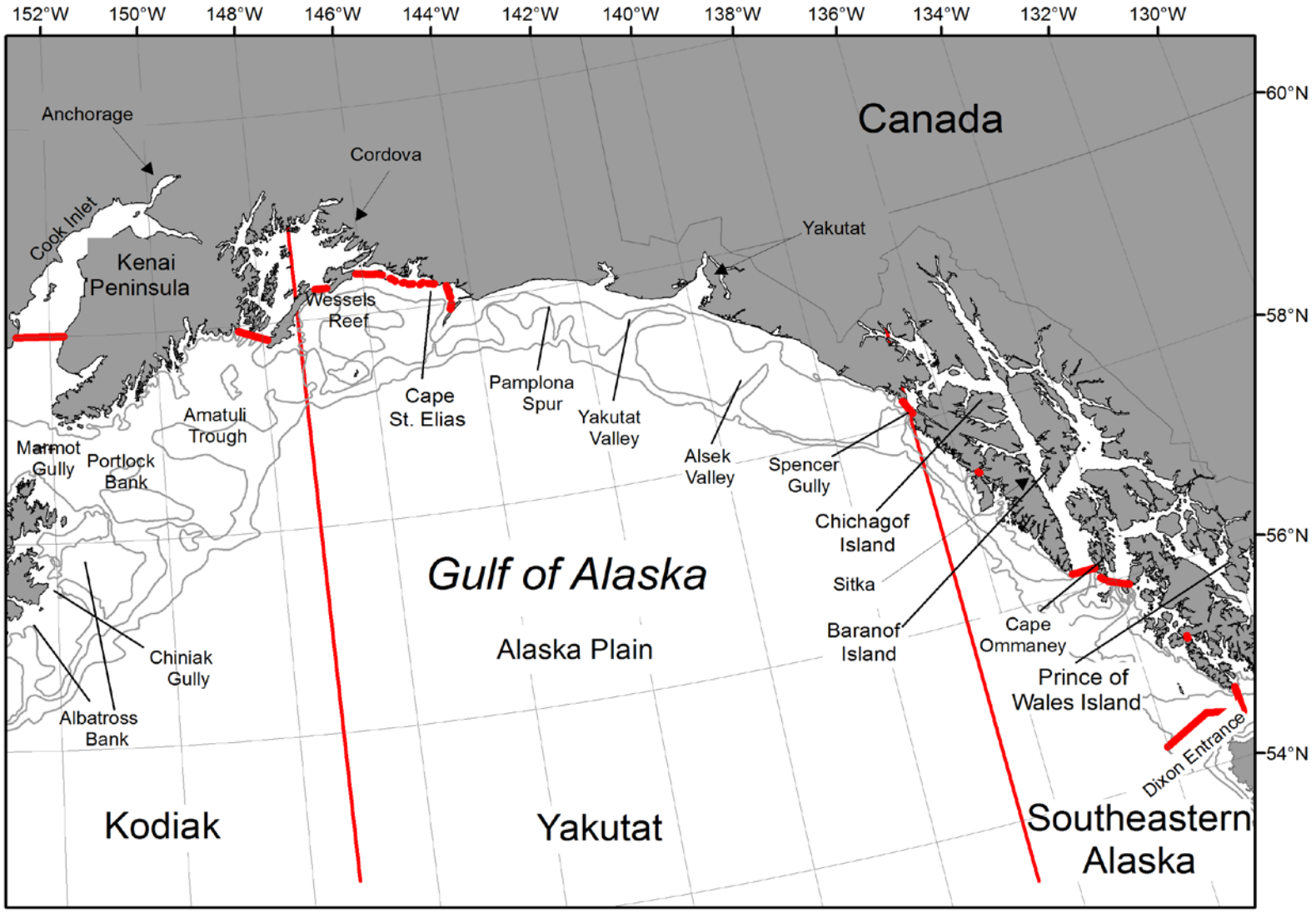

Figure 1. -- Continued.

dissolved in 1992 and replaced by the North Pacific Anadromous Fish Commission (NPAFC) in 1993, reference to the original INPFC statistical survey areas has been maintained for survey consistency. Some of the INPFC areas directly correspond to the NMFS Reporting Areas: Shumagin--610; Chirikof—620; and Kodiak—630. The INPFC Yakutat and Southeastern areas divide at the 137°W meridian, while the NMFS Reporting Areas Yakutat—640 and Southeastern—650 divide at the 140°W meridian.

About 32% (97,995 km²) of the total survey area is within the Kodiak INPFC statistical area (Table 1). The portion of the survey area contained within the Chirikof INPFC area and the Shumagin INPFC area are approximately equal at about 21% (64,987 km²) and 20% (63,291 km²), respectively, while the Yakutat INPFC survey area makes up about 18% (55,310 km²). The Southeastern INPFC survey area is the smallest portion, of the total survey area at about 9% (26,832 km²).

Vessels

Since the inception of the Gulf of Alaska bottom trawl survey series in 1984, commercial trawlers and crews have been chartered to conduct the survey operations under the supervision and guidance of RACE Groundfish Assessment Program staff. In most years, three vessels (occasionally two) have been chartered for the survey, but funding constraints in 2017 limited the number to two vessels, each of which was originally chartered for 75 days. However, as it became clear by the midpoint of the survey that the survey progress was behind schedule; two extra charter days were added for a total of 76 charter days per vessel.

In 2017, 550 stations were allocated for a two-vessel survey that typically targets 820 stations in all depth strata for three vessels. 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.

The two U.S. commercial fishing vessels chartered for the 2017 GOA bottom trawl survey were the FV *Ocean Explorer* and the FV *Sea Storm*. Both vessels are house-forward stern trawlers with hydraulic net reels and paired constant tension hydraulic trawl winches containing between 1,280 and 1,460 m of 2.60 cm diameter steel cable. Both vessels have articulating hydraulic cranes for handling catches and gear. The *Sea Storm* is 37.5 m in overall length (LOA) and is powered by a single 1,710 continuous horsepower (HP) main engine. The *Ocean Explorer* is 47.2 m LOA with a 1,800 HP main engine. Both vessels are equipped with global positioning systems (GPS) integrated with radar, computerized plotting, and autopilots. Other essential electronics supplied by the vessels include color video fish finders, recording depth profilers, and trawl warp measuring systems.

Fishing Gear

Both vessels used standard RACE Division Poly Nor'Eastern four-seam bottom trawls with 24.2 m roller gear constructed with 36 cm rubber bobbins separated by 10 cm rubber disks.

The fishing dimensions of the trawls during fishing operations were monitored and recorded using Marport® acoustic net mensuration equipment mounted on the wing-tips and headrope of the trawl. Each trawl and associated rigging was measured and certified as conforming to standard measurements similar to those called for in Stauffer (2004).

Survey Design

The 2017 biennial survey was designed based upon stratified random sampling consistent with previous GOA surveys (von Szalay et al. 2008, 2010; 2016; Raring et al. 2011, 2016a, 2016b, 2016c; Britt and Martin 2001; Martin 1997; Martin and Clausen 1995; Stark and Clausen 1995; Munro and Hoff 1995). The survey area was divided into 54 strata defined by water depth, bottom terrain (e.g., shelf, gully, and slope), and INPFC statistical area (Appendix A). As in previous surveys, the number of stations per stratum was determined from a modified Neyman optimal allocation strategy (Cochran 1977):

$$n_h = \frac{\frac{nN_h\sigma_h a_h}{\sqrt{c}_h}}{\sum_i \frac{N_i\sigma_i a_i}{\sqrt{c_i}}},$$

where n_h is the sample size for stratum h, n is the total sample size, N_h is the population size for stratum h, σ_h is the standard deviation of stratum h, and c_h is the cost to conduct a haul in stratum h. Catch rates, stratum variances, and stratum areas from the 1990-2015 surveys were used to allocate sampling effort among strata for each of the principal groundfish species for each previous survey year. The estimated time to perform a tow in a given stratum was used as a cost variable because trawl hauls in deeper strata have a greater probability of unacceptable gear

performance and take longer to complete. A mean sample size was estimated for each species across years and then a weighted mean of the estimated sample sizes was calculated. This was done using each species' mean biomass multiplied by its ex-vessel value as the weighting variable. These were rounded to whole numbers representing the number of stations allocated to each stratum with an additional constraint that each stratum was required to have at least two samples.

Within each stratum, the allocated stations were randomly selected without replacement from polygons formed from the intersection of a grid composed of cells 5×5 km cells 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 (< 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 *Ocean Explorer* was assigned to sample the middle to outer shelf and slope stations, and the *Sea Storm* the nearshore and middle shelf stations.

We initially allocated 550 stations among the 54 survey strata, but as it became clear during the third leg that the survey was behind schedule, a decision was made to drop stations in a manner that would expedite efficiency and maximize the total number of stations completed by the end of the survey. Stations to be dropped were randomly selected from strata with four or more assigned stations. No more than one station was dropped from any one stratum. Because of the relatively small number of stations assigned to the deeper strata in the Southeastern region, a priority was made to complete all of those. A total of 14 stations were eliminated in this

manner: 8 from Southeastern, 4 from Yakutat, and 2 from the Kodiak region.

Geographic center points of the assigned station polygon were considered to define the location of the station. Vessels were assigned stations, and skippers 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 Captain, no trawlable grounds could be found in 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

To minimize fishing power differences between the survey vessels, standardized trawling and gear handling methods were practiced, including the use of trawl warp relative to bottom depth relationships as described in 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. NOAA Fisheries-supplied GPS receivers recorded trawling position, time, and trackline position. Water temperature profiles were recorded every 1 to 3 seconds during most tows using a Seabird® SBE-39 bathythermograph placed on the headrope of the net. An accelerometer was attached to the midpoint of the roller gear to record the date, time, and

acceleration in three dimensions of the footrope, indicating the degree of contact with the bottom. The vertical and horizontal net openings were monitored with Marport® net mensuration equipment. To ensure that the Marport sensors were calibrated correctly, a 12 m long restrictor cable was attached to the wing tips of the net on each vessel prior to the official start of the survey, and the Marport readings were carefully monitored for any substantial deviations from 12 m.

A trawl sample was considered successful if horizontal and vertical net openings remained within established tolerances (spread: 8-22 m; height: 3-10 m), the roller gear maintained consistent contact with the bottom (based on MBT depth readings and variability in acceleration), 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 (except in cases where the catch was sufficiently large to affect net performance).

Collection and Processing of Samples

Numbers and weights in catch of all taxa were recorded for each haul. 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. Pacific halibut was an exception to this weighing process as their weights were estimated from the lengths so they

could be discarded as quickly as possible after being measured, in accordance with an agreement with the International Pacific Halibut Commission. Larger catches were processed using several different techniques depending upon the catch size and sea state. Catches greater than 2 metric tons (t), but less than about 8 t, were processed in one of three ways at the discretion of the deck lead: 1) by repeatedly filling the sorting table from the codend, sorting, and weighing until the entire catch had been processed, or 2) by weighing at least 30 approximately evenly-filled baskets of the dominant species to obtain a mean basket weight and then counting and discarding the remaining baskets of the dominant species without weighing the individual baskets. Total weight estimates for the dominant species under this method were calculated by adding the weight of the weighed baskets to the product of the number of discarded baskets and the mean basket weight. All other species were sorted and weighed in a manner similar to that of the first method, or 3) by weighing the entire catch and net with a Measurement System's International Portaweigh® Model 4300 crane scale. Afterwards, the sorting table was filled with a portion of the catch and the excess catch was dumped into a deck bin. The dominant species, usually three or fewer, making up the bulk of the catch were identified. The contents of the deck bin were sorted and the dominant species were discarded. The remaining species were retained, sorted, and weighed with those from the table. Total weight estimates for the dominant 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. Extreme large catches (> 8 t) were processed by unloading the net into the deck bin and determining the volume of the catch by measuring the length and width of the bin and taking the average height of the catch. Samples of the catch were then taken from the volume to determine the species composition of dominant species and the density of the catch. The density of the catch, which

was estimated by filling a tote with a known volume with a representative catch sample, was multiplied by the volume to obtain the total catch weight. Non-dominant species were individually collected, counted, and weighed and their total weight was subtracted from the total catch weight. The species composition in terms of weight was then applied to the remaining catch weight to estimate the catch weight of each dominant species. Pacific halibut were measured and discarded as quickly as possible and their weights were estimated from their lengths.

Additional biological information was collected from species of commercial value, ecological importance, or abundance in the survey area. A random subsample of 100-300 individuals (target sample size was species-dependent) of each of these species was sorted by sex, and individual length measurements in 1 cm intervals were collected with barcode-reader data loggers and length boards, downloaded to the data entry computer, and appended to the length database after each tow.

Species or species group	Target sample size
Walleye pollock	200
Pacific cod	150
Arrowtooth flounder	150
All rockfish species	150
Sablefish	150
Atka mackerel	100
All species of flatfish (except ATF)	100
Skates and Sharks (total length)	50
Grenadiers (tip of snout to insertion of first anal ray)	50
Prowfish	*
Lingcod	*
Salmon	*
Yellow Irish lord (*Hemilepidotus jordani*)	*
Bigmouth sculpin (*Hemilepidotus bolini*)	*
Great sculpin (*Myoxocephalus polyacnthocephalus*)	*
Plain sculpin (*Myoxocephalus jaok*)	*
Warty sculpin (*Myoxocephalus verrucosus*)	*
Forage fish (herring, eulachon, capelin, sand lance)	*
Commander squid (*Berryteuthis magister*)	*

When recording fish length, the most common measurement used was fork length (FL), however sharks and skates were measured using total length (TL) and giant grenadier were measured from the tip of the snout to the insertion of the anal fin. Fish that could not be readily sexed were classified as unsexed and measured. Age structures were collected in several ways to meet the needs of stock assessment scientiests. Walleye pollock, Pacific cod, sablefish, arrowtooth flounder, rex sole, Dover sole, flathead sole, and shortspine thornyhead (See Appendix Table B-1 for scientific names of fish species), were randomly selected. Otoliths for Atka mackerel and rock soles were collected from fishes stratified by haul, sex, and length among western, central, and southeasten INPFC regions. Rockfish otolith collections were

stratified by area, sex, length, and haul. 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 aboard the FV *Ocean Explorer* while stomach contents were scanned aboard the FV *Sea Storm* by biologists from the AFSC's Resource Ecology and Ecosystem Modeling (REEM) Program. Ancillary data and specimens were collected for several other research projects as described previously.

Abundance, Length Composition, and Length-Weight Relationship

Biomass estimates were calculated using the area-swept method (Alverson and Pereyra 1969). The area swept was calculated as the product of observed distance towed and the observed 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 determined by smoothing the GPS location data and measuring the distance along this line. The mean net spread was calculated by averaging the smoothed net spread readings from the Marport® units between on-bottom and off-bottom positions. Net spread readings below 8 m and above 22 m were rejected as outliers. Net spreads for tows with insufficient Marport data (fewer than 50 readings not evenly spaced throughout the duration of the tow) 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) of a tow was calculated as catch weight (kg) per area swept by the trawl in hectares (ha). Mean CPUE was estimated for each stratum by the sample average of all valid observations of CPUE in that stratum, including tows with CPUE=0. Mean CPUE values for the total survey area were calculated as the weighted average CPUE of the component strata using the stratum areas as the weighting factor. 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 by calculating the simple standard erorrs and multiplying by 2. 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 each sex-length category from the summed station data. Population length composition estimates were summed over strata to derive estimates by area. Percent frequencies were calculated for each sex and length by dividing by the total population of fish for each area-depth category.

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

$$W = a \times L^b,$$

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

Survey Limitations

The assumption of constant catchability is an important survey limitation because research suggests that the three multiplicative components of catchability (gear sampling efficiency, spatial and vertical availability) are in fact variable. Gear sampling efficiency, defined as the proportion of fish in the trawl path that were caught, has been shown to be density dependent for walleye pollock (*Gadus chalcogrammus*) in the eastern Bering Sea (Kotwicki et al. 2014). It has also been shown to decrease with net spread for northern rock sole (*Lepidopsetta polyxystra*) due to escapement under the net as the footrope clearance with the bottom increases with net spread (von Szalay and Somerton 2005). Because of these and other findings, gear deployment is standardized and intentionally not modified over time to ensure the methodological consistency and statistical continuity of the time series necessary to reliably monitor the status of fish stocks and forecast trends.

Factors that affect availability of fish to bottom trawl surveys include bottom depth, light conditions, fish size, migration, and trawlability (Kotwicki et al. 2015). For example, areas that are deemed untrawlable will, by definition, not be sampled by a bottom trawl, rendering fish in those areas unavailable to the survey. The different functional groups of fishes (flatfishes, roundfishes, and roundfishes) 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.

RESULTS

A total of 550 stations were originally assigned, 576 tows were attempted, but only 536 (93%) were successfully completed and included in the biomass and length composition analyses (Table 1). Headrope depth and temperature measurements were successfully collected for 573 attempted tows (>99%). Bottom temperatures ranged from 2.1° to 12.0° C. Sea surface temperatures ranged from 4.7° to 15.8° C. Average net spread for successfully completed tows ranged from 13.7 to 20.4 m. Average net heights ranged from 4.6 to 9.5 m.

Table 1. -- Number of stations allocated, attempted, and successfully completed, and sampling density for the 2017 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/1000 km^2)
Shumagin	1 - 100	74	76	74	41,289	1.79
	101 - 200	32	33	32	14,677	2.18
	201 - 300	13	13	13	2,788	4.66
	301 - 500	4	5	4	2,531	1.58
	501 - 700	2	3	2	2,006	1.00
	701 - 1000	0	0	0	NA	-
	All depths	**125**	**130**	**125**	**63,291**	**1.98**
Chirikof	1 - 100	41	43	41	26,035	1.57
	101 - 200	54	56	54	23,849	2.26
	201 - 300	16	16	16	11,546	1.39
	301 - 500	4	4	4	1,604	2.49
	501 - 700	3	3	3	1,953	1.54
	701 - 1000	0	0	0	NA	-
	All depths	**118**	**122**	**118**	**64,987**	**1.82**
Kodiak	1 - 100	62	64	61	38,516	1.58
	101 - 200	91	93	90	43,332	2.08
	201 - 300	20	20	20	11,490	1.74
	301 - 500	5	6	5	2,912	1.72
	501 - 700	2	3	2	1,745	1.15
	701 - 1000	0	0	0	NA	-
	All depths	**180**	**186**	**178**	**97,995**	**1.82**
Yakutat	1 - 100	17	17	17	16,661	1.02
	101 - 200	31	31	29	29,382	0.99
	201 - 300	17	17	17	5,170	3.29
	301 - 500	7	5	5	2,628	1.90
	501 - 700	2	2	2	1,469	1.36
	701 - 1000	0	0	0	NA	-
	All depths	**74**	**72**	**70**	**55,310**	**1.27**
Southeastern	1 - 100	7	8	7	6,546	1.07
	101 - 200	22	18	18	11,084	1.62
	201 - 300	13	10	10	5,052	1.98
	301 - 500	9	11	8	3,117	2.57
	501 - 700	2	2	2	1,033	1.94
	701 - 1000	0	0	0	NA	-
	All depths	**53**	**49**	**45**	**26,832**	**1.68**
All areas	1 - 100	201	208	200	129,047	1.55
	101 - 200	230	231	223	122,324	1.82
	201 - 300	79	76	76	36,046	2.11
	301 - 500	29	31	26	12,792	2.03
	501 - 700	11	13	11	8,206	1.34
	701 - 1000	0	0	0	NA	-
	All depths	**550**	**559**	**536**	**308,415**	**1.74**

Catch Results by Area

A total of 161 fish species from 39 families was captured during the 2017 survey. Appendix B presents lists of fish (Appendix Table B-1) and invertebrate (Appendix Table B-2) species encountered during the survey. Relative abundance estimates, reported as CPUE, are presented in Table 2 for the 20 most abundant groundfish species in each of the five INPFC areas.

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

In the Shumagin INPFC area, arrowtooth flounder had the greatest CPUE of any species. Walleye pollock, Pacific ocean perch, and flathead sole were also relatively abundant in this area. In the Chirikof, Kodiak, and Yakutat INPFC areas, Pacific ocean perch and arrowtooth flounder dominated all other species in terms of CPUE, and in the Southeastern INPFC area Pacific ocean perch was the dominant species.

Table 2. -- Mean CPUE (kg/ha) for the 20 most abundant groundfish in each International North Pacific Fisheries Commission area during the 2017 biennial Gulf of Alaska bottom trawl survey.

Shumagin area		Chirikof area		Kodiak area	
Species	CPUE	Species	CPUE	Species	CPUE
arrowtooth flounder	49.2	Pacific ocean perch	56.5	Pacific ocean perch	67.8
walleye pollock	33.9	arrowtooth flounder	38.8	arrowtooth flounder	27.3
Pacific ocean perch	30.8	northern rockfish	16.6	Pacific halibut	11.6
flathead sole	15.6	Pacific halibut	9.6	giant grenadier	6.4
Pacific halibut	9.1	flathead sole	9.3	flathead sole	6.4
Pacific cod	7.6	giant grenadier	7.8	sablefish	5.0
southern rock sole	6.4	sablefish	6.2	walleye pollock	4.5
yellowfin sole	6.2	rex sole	5.2	southern rock sole	3.6
northern rockfish	6.1	Pacific cod	4.1	spiny dogfish	2.7
northern rock sole	4.6	southern rock sole	3.7	Pacific cod	2.5
rex sole	3.2	walleye pollock	3.6	Atka mackerel	2.4
giant grenadier	2.6	dusky rockfish	3.0	rex sole	2.4
shortspine thornyhead	2.4	northern rock sole	2.9	longnose skate	2.2
sablefish	2.3	big skate	2.8	shortspine thornyhead	2.1
dusky rockfish	2.3	longnose skate	2.8	lingcod	2.0
harlequin rockfish	1.9	shortspine thornyhead	2.0	redstripe rockfish	1.6
starry flounder	1.6	starry flounder	1.8	dusky rockfish	1.6
yellow Irish lord	1.6	Alaska plaice	1.1	Dover sole	1.5
Atka mackerel	1.6	Pacific herring	1.0	shortraker rockfish	1.2
big skate	0.8	Pacific sleeper shark	1.0	northern rock sole	0.7
Number of hauls	125	Number of hauls	118	Number of hauls	178

Yakutat area		Southeastern area		All areas	
Species	CPUE	Species	CPUE	Species	CPUE
arrowtooth flounder	27.8	Pacific ocean perch	91.9	Pacific ocean perch	50.9
Pacific ocean perch	17.7	arrowtooth flounder	25.8	arrowtooth flounder	34.2
sablefish	4.7	Pacific halibut	17.5	walleye pollock	10.2
spiny dogfish	4.5	silvergray rockfish	11.6	Pacific halibut	9.7
giant grenadier	4.2	spotted ratfish	9.7	flathead sole	7.7
Dover sole	4.1	walleye pollock	8.8	giant grenadier	5.0
Pacific halibut	3.2	Pacific herring	7.3	northern rockfish	4.9
shortspine thornyhead	2.9	shortspine thornyhead	5.9	sablefish	4.7
shortraker rockfish	2.4	Dover sole	5.6	southern rock sole	3.5
flathead sole	2.2	sablefish	5.5	Pacific cod	3.5
rougheye rockfish	2.1	redstripe rockfish	5.3	rex sole	3.2
Pacific herring	2.0	rex sole	4.7	shortspine thornyhead	2.6
walleye pollock	1.7	sharpchin rockfish	3.9	Dover sole	1.9
rex sole	1.4	lingcod	3.6	northern rock sole	1.8
lingcod	1.2	southern rock sole	2.8	spiny dogfish	1.8
longnose skate	1.1	Pacific cod	2.4	yellowfin sole	1.7
eulachon	0.9	rougheye rockfish	2.2	dusky rockfish	1.7
big skate	0.9	English sole	1.5	longnose skate	1.6
starry flounder	0.7	blackspotted rockfish	1.4	Pacific herring	1.4
butter sole	0.6	redbanded rockfish	1.0	Atka mackerel	1.2
Number of hauls	70	Number of hauls	45	Number of hauls	536

Catch Results by Species

Results for each selected groundfish species are organized as follows:

1. A brief synopsis of the data collected.

2. A summary of the number of trawl hauls attempted, the number of catches containing the species of interest, mean CPUE, estimated biomass with 95% confidence intervals, and mean catch weight by INPFC area and depth.

3. A map of the distribution and relative abundance of the species.

4. Estimated population length composition of the the species.

5. A breakdown of stratum-specific CPUE and biomass estimates (with 95% confidence intervals) for that species.

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

Naming convention used in this document are based on common scientific usage and the following published resources: Names of Fishes (Page et al. 2013), Names of Decapod Crustaceans (Williams et al., 1989), Names of Mollusks (Turgeon et al., 1998), Names of Cnidaria and Ctenophora (Cairns et al., 2002), and the Integrated Taxonomic Information System (ITIS) database (http://www.itis.usda.gov/). Names used in this document may differ on the basis of the most recent research.

FLATFISHES

Arrowtooth flounder (*Atheresthes stomias*)

Arrowtooth flounder was the second most abundant species caught in the 2017 survey (Table 2), and was also the most abundant species in the Shumagin and Yakutat regions. It ranked second in all of the other regions. Arrowtooth flounder were caught throughout the survey area at all surveyed depths (Table 3). The highest densities occurred at depths between 101 and 200 m in all but one INPFC area; the Kodiak region being the sole exception (Fig. 2 and Table 4). Particularly high densities occurred in the Sanak Gully in the Shumagin INPFC area. Size generally increased with depth, but was relatively constant going from west to east (Fig. 3). The estimated biomass of arrowtooth flounder was 1,053,695 t, and the highest regional biomass was in the Shumagin region. Approximately 55% of the estimated biomass was concentrated in the 101-200 m depth interval, with most of the remaining biomass (37%) confined to depths less than 100 m (Table 3).

Table 3. -- Number of survey hauls, number of hauls with arrowtooth flounder, mean CPUE, biomass, and mean weight, based on the 2017 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	74	66	42.40	175,075	124,547	225,604	0.436
	101 - 200	32	31	89.77	131,765	54,789	208,740	0.562
	201 - 300	13	13	9.53	2,656	1,099	4,212	0.463
	301 - 500	4	4	5.65	1,429	931	1,928	0.776
	501 - 700	2	2	1.96	393	0	1,102	1.851
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	116	49.19	311,318	233,051	389,585	0.483
Chirikof	1 - 100	41	36	24.27	63,183	11,816	114,551	0.792
	101 - 200	54	53	63.41	151,222	114,850	187,593	0.596
	201 - 300	16	16	32.03	36,978	17,867	56,089	0.903
	301 - 500	4	4	3.09	495	45	945	0.911
	501 - 700	3	1	0.98	192	0	802	2.040
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	110	38.79	252,070	188,313	315,827	0.672
Kodiak	1 - 100	61	53	31.29	120,534	62,725	178,343	0.651
	101 - 200	90	89	28.63	124,069	84,333	163,806	0.623
	201 - 300	20	20	18.66	21,437	10,838	32,037	0.676
	301 - 500	5	4	3.67	1,070	76	2,064	1.185
	501 - 700	2	2	0.75	131	100	162	2.154
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	168	27.27	267,242	198,252	336,232	0.641
Yakutat	1 - 100	17	12	8.94	14,903	7,109	22,697	0.643
	101 - 200	29	29	44.14	129,700	30,530	228,869	0.588
	201 - 300	17	17	12.65	6,542	3,051	10,033	0.865
	301 - 500	5	5	10.34	2,717	0	5,475	1.101
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	63	27.82	153,862	54,238	253,486	0.606
Southeastern	1 - 100	7	2	21.61	14,149	0	47,358	1.470
	101 - 200	18	18	37.82	41,919	16,262	67,576	0.687
	201 - 300	10	10	18.46	9,325	3,324	15,326	0.517
	301 - 500	8	7	12.22	3,810	0	11,727	1.073
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	37	25.79	69,203	29,321	109,084	0.750
All areas	1 - 100	200	169	30.05	387,844	293,112	482,576	0.555
	101 - 200	223	220	47.31	578,674	454,756	702,593	0.597
	201 - 300	76	76	21.34	76,938	55,612	98,263	0.740
	301 - 500	26	24	7.44	9,522	1,895	17,149	1.023
	501 - 700	11	5	0.87	716	14	1,418	1.949
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	494	34.16	1,053,695	898,114	1,209,276	0.591

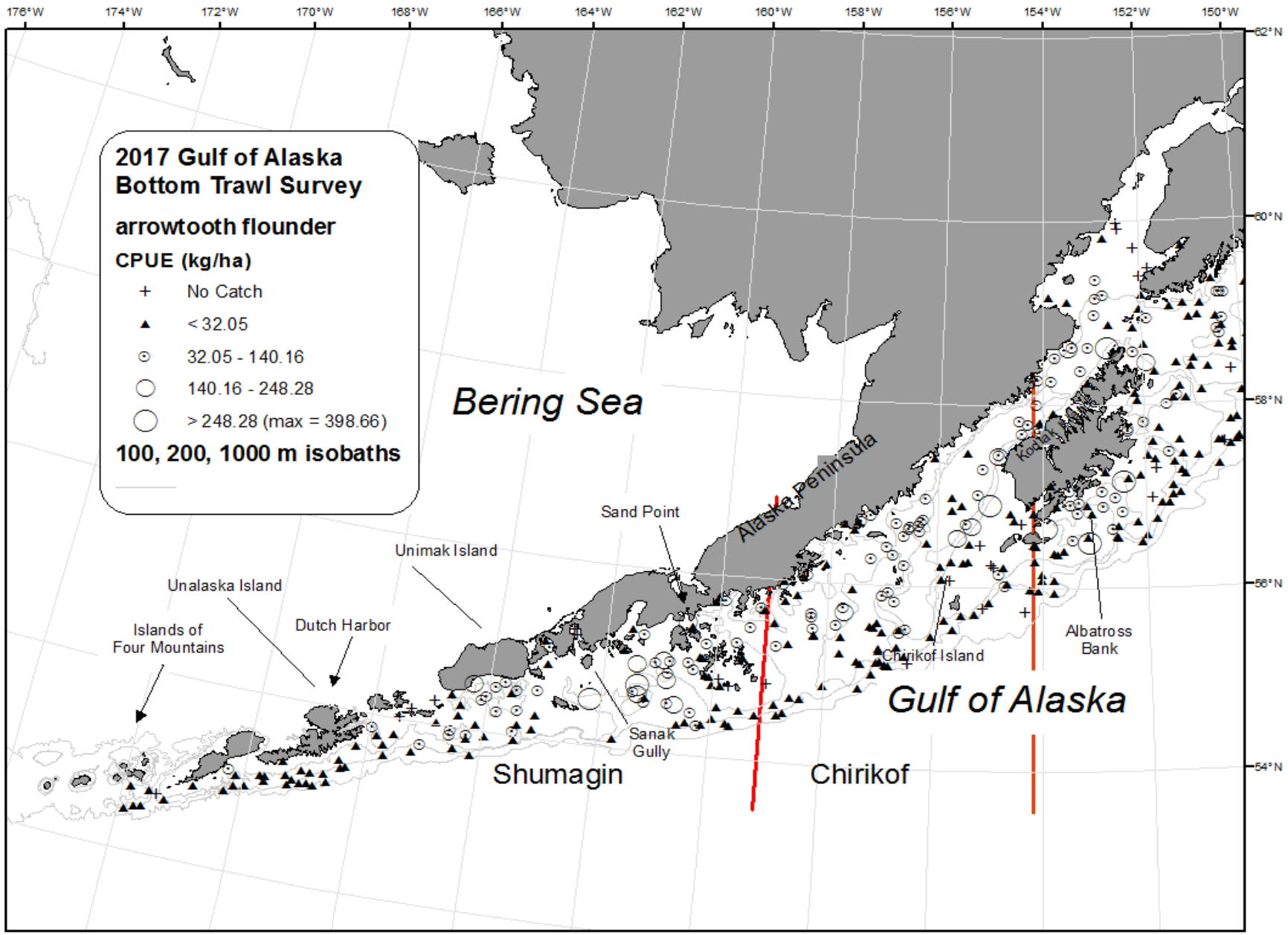

Figure 2. -- Distribution and relative abundance of arrowtooth flounder from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

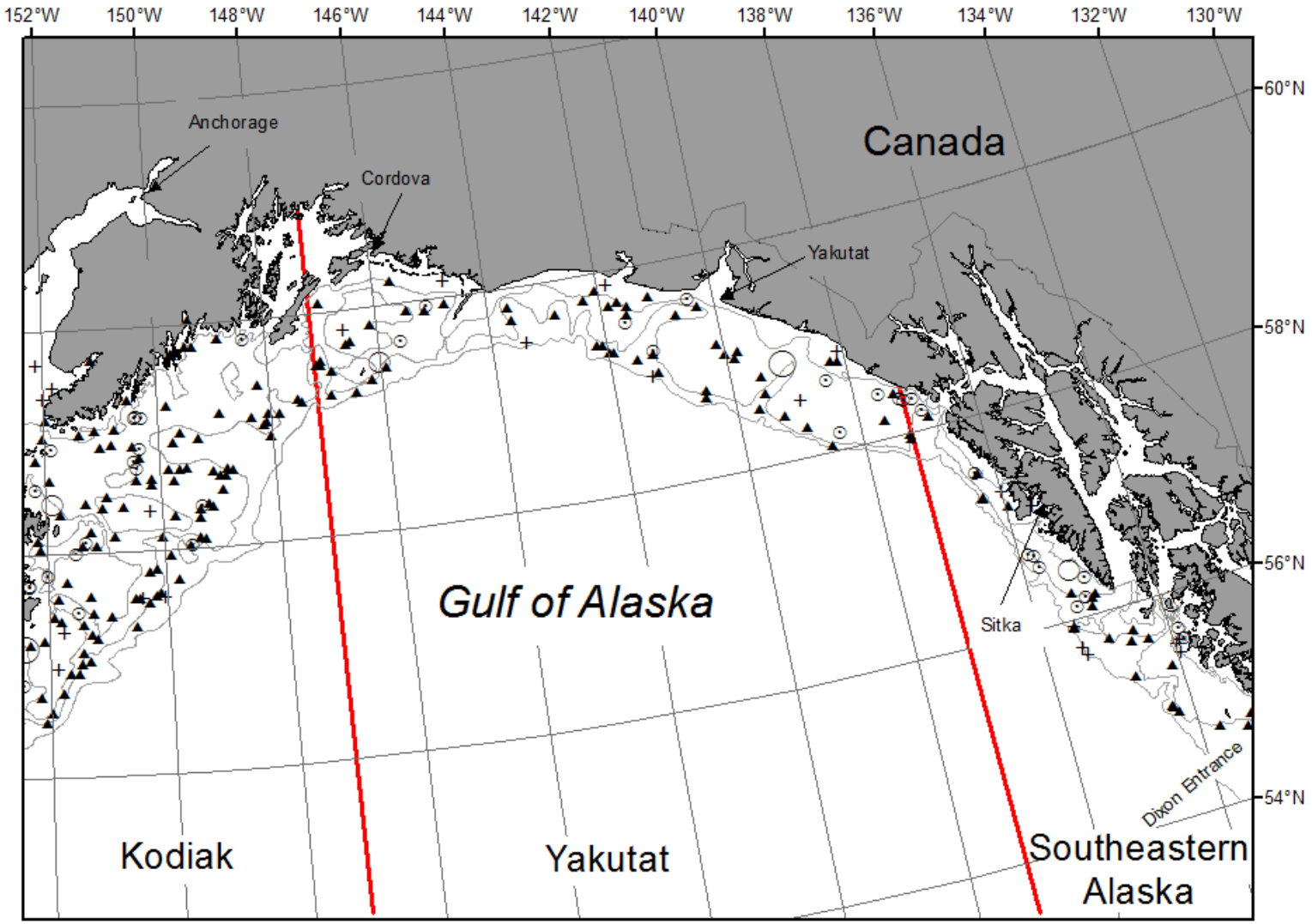

Figure 2.-- Continued (arrowtooth flounder).

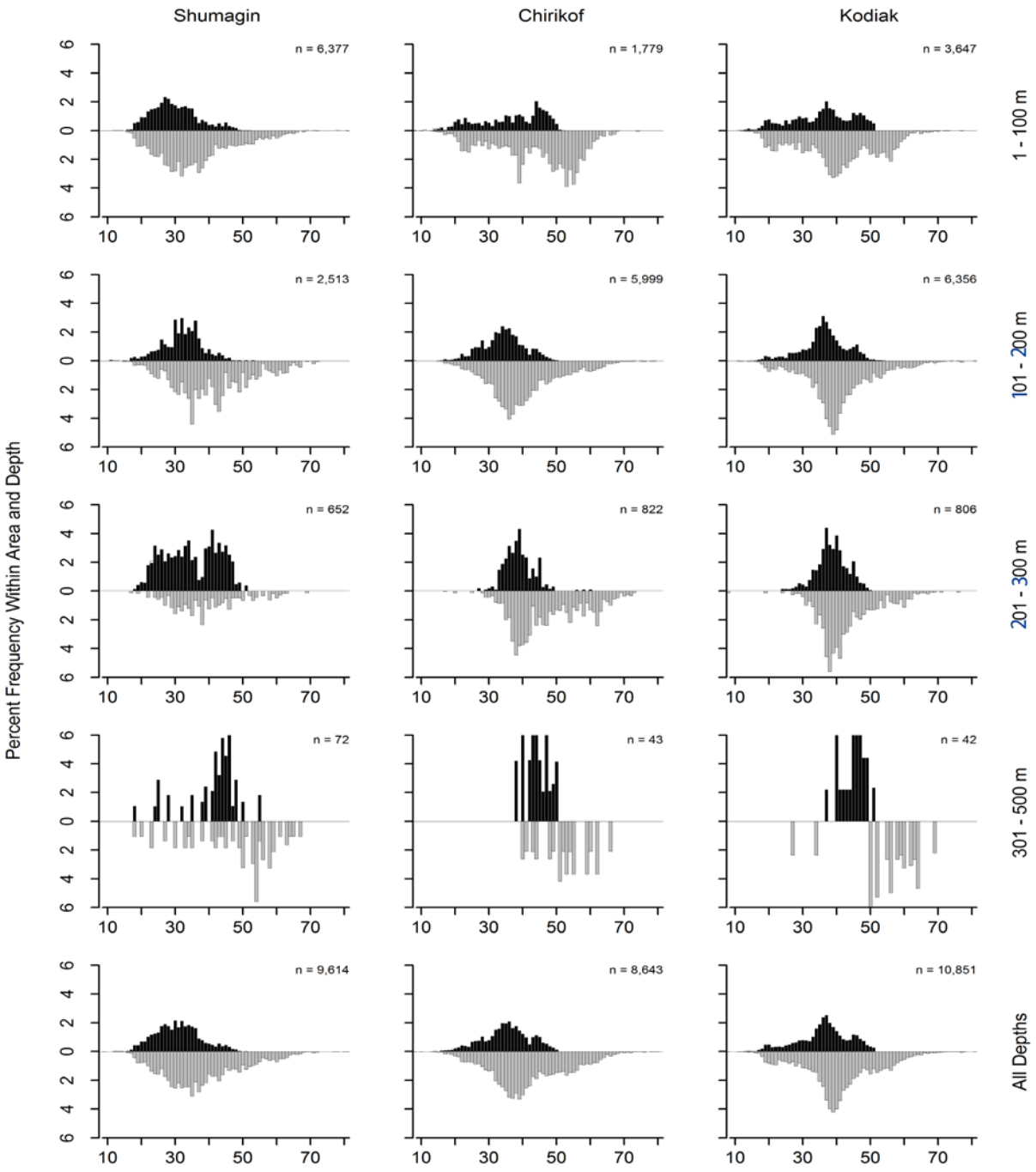

Figure 3. -- Size composition of arrowtooth flounder from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray.

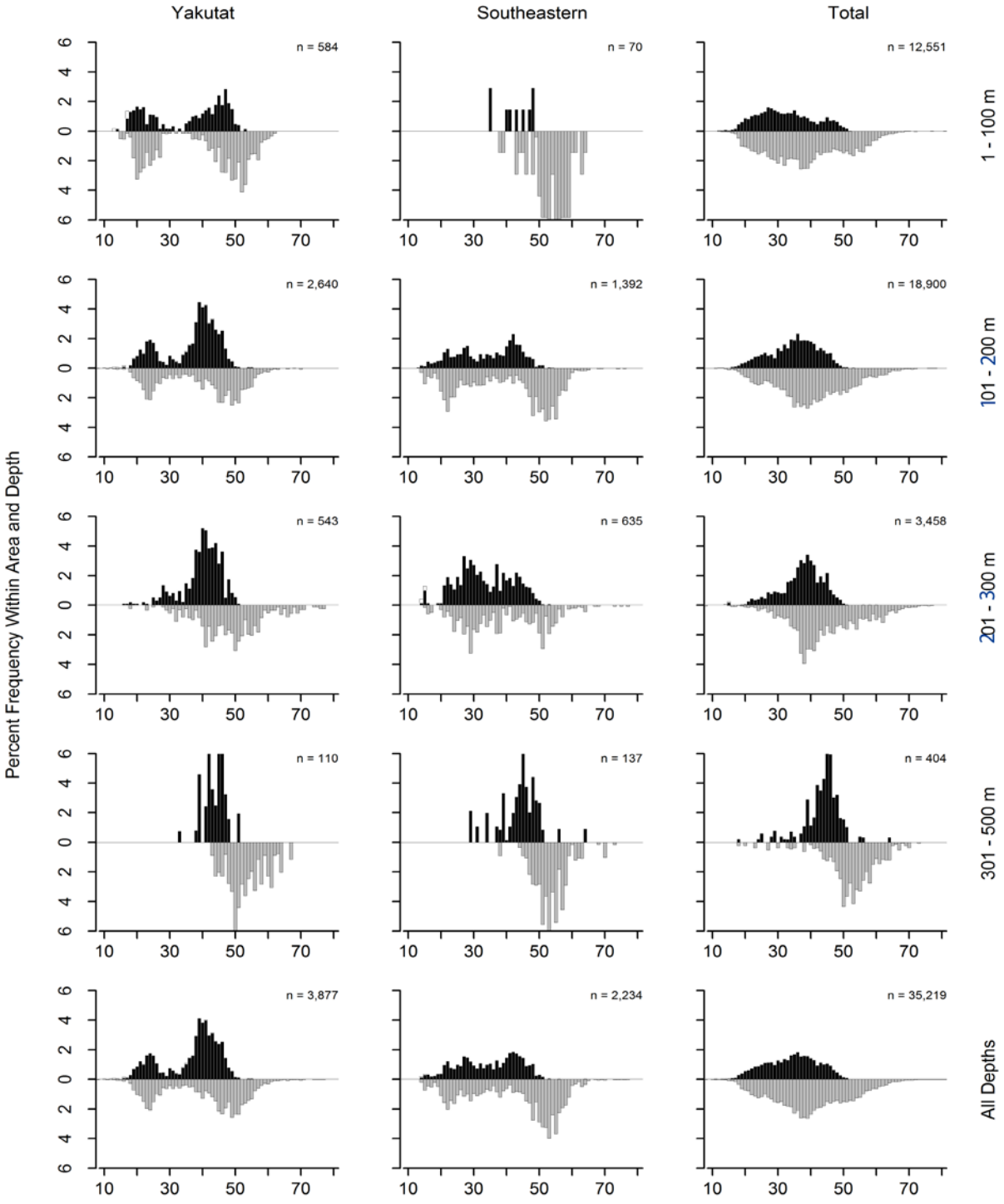

Figure 3. -- Continued (arrowtooth flounder).

Table 4. -- Catch per unit of effort by stratum for arrowtooth flounder sorted by descending CPUE for the 2017 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	Sanak Gully	4	4	244.78	103,916	18,351	189,482
Kodiak	1 - 100	Albatross Shallows	13	13	89.52	51,620	13,700	89,540
Chirikof	101 - 200	Shelikof Edge	23	23	88.43	68,398	50,037	86,759
Shumagin	101 - 200	West Shumagin Gully	3	3	83.23	18,963	0	46,439
Chirikof	101 - 200	East Shumagin Gully	15	15	72.47	80,472	48,428	112,516
Yakutat	101 - 200	Yakutat Flats	7	7	62.18	56,157	0	153,744
Shumagin	1 - 100	Shumagin Bank	25	22	55.94	69,356	34,432	104,281
Kodiak	201 - 300	Upper Shelikof Gully	3	3	53.32	17,107	3,249	30,964
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	9	51.39	21,565	7,597	35,532
Kodiak	1 - 100	Northern Kodiak Shallows	6	6	46.47	10,223	0	23,848
Shumagin	1 - 100	Davidson Bank	26	25	44.09	60,318	34,557	86,078
Chirikof	1 - 100	Upper Alaska Peninsula	12	12	40.32	32,016	8,791	55,241
Yakutat	101 - 200	Fairweather Shelf	9	9	40.12	31,003	15,455	46,551
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	38.96	4,384	0	9,633
Shumagin	1 - 100	Lower Alaska Peninsula	14	12	37.65	25,888	0	51,943
Yakutat	101 - 200	Middleton Shelf	7	7	37.26	27,368	0	60,169
Chirikof	201 - 300	Lower Shelikof Gully	9	9	35.63	35,697	16,300	55,093
Kodiak	101 - 200	Barren Islands	15	15	35.63	39,126	20,251	58,001
Kodiak	101 - 200	Albatross Gullies	22	22	35.48	28,073	10,043	46,103
Kodiak	101 - 200	Kenai Flats	11	11	32.28	38,985	7,254	70,716
Southeastern	101 - 200	Prince of Wales Shelf	9	9	29.55	20,354	0	43,321
Yakutat	101 - 200	Yakataga Shelf	6	6	28.75	15,172	207	30,136
Chirikof	1 - 100	Chirikof Bank	19	14	27.10	29,246	0	76,691
Kodiak	1 - 100	Albatross Banks	25	22	24.30	37,424	896	73,953
Shumagin	1 - 100	Fox Islands	9	7	23.42	19,513	3,194	35,833
Southeastern	1 - 100	Southeastern Shallows	7	2	21.61	14,149	0	48,510
Kodiak	101 - 200	Portlock Flats	25	25	16.47	12,080	8,402	15,757
Yakutat	201 - 300	Yakutat Gullies	7	7	16.10	4,899	1,332	8,466
Southeastern	301 - 500	Southeastern Deep Gullies	3	3	15.15	3,552	0	14,244
Kodiak	1 - 100	Kenai Peninsula	7	7	14.44	7,594	2,806	12,382
Kodiak	1 - 100	Lower Cook Inlet	10	5	13.83	13,673	0	43,186
Yakutat	301 - 500	Yakutat Gullies	2	2	12.65	1,400	0	9,296
Southeastern	201 - 300	Prince of Wales Slope/Gullies	6	6	12.58	4,941	0	9,898
Kodiak	101 - 200	Kodiak Outer Shelf	17	16	11.55	5,806	2,909	8,702
Shumagin	101 - 200	Shumagin Outer Shelf	25	24	10.90	8,886	4,261	13,510
Yakutat	1 - 100	Middleton Shallows	7	5	10.53	7,068	1,409	12,727
Shumagin	201 - 300	Shumagin Slope	13	13	9.53	2,656	1,086	4,226
Yakutat	301 - 500	Yakutat Slope	3	3	8.66	1,317	0	5,080
Chirikof	201 - 300	Chirikof Slope	7	7	8.39	1,281	0	3,222
Yakutat	1 - 100	Yakutat Shallows	10	7	7.88	7,835	1,320	14,350
Yakutat	201 - 300	Yakutat Slope	10	10	7.73	1,643	1,117	2,170
Shumagin	301 - 500	Shumagin Slope	4	4	5.65	1,429	858	2,001
Kodiak	201 - 300	Kenai Gullies	11	11	5.39	3,587	1,736	5,439
Chirikof	101 - 200	Chirikof Outer Shelf	16	15	4.69	2,352	940	3,764
Kodiak	201 - 300	Kodiak Slope	6	6	4.58	743	272	1,215
Kodiak	301 - 500	Kodiak Slope	5	4	3.67	1,070	0	2,143
Southeastern	301 - 500	Southeastern Slope	5	4	3.34	258	0	598
Chirikof	301 - 500	Chirikof Slope	4	4	3.09	495	0	1,011
Chirikof	1 - 100	Semidi Bank	10	10	2.63	1,921	337	3,505
Shumagin	501 - 700	Shumagin Slope	2	2	1.96	393	0	2,486
Chirikof	501 - 700	Chirikof Slope	3	1	0.98	192	0	1,017
Kodiak	501 - 700	Kodiak Slope	2	2	0.75	131	40	223

Pacific halibut (*Hippoglossus stenolepis*)

Pacific halibut was the fourth most abundant species caught in the 2017 survey (Table 2) and was among the seventh most abundant species in all five INPFC areas. Pacific halibut were caught throughout the survey area at depths less than 500 m (Table 5). The highest densities occurred in the Southeastern and Kodiak regions at depths less than 200 m (Fig. 4 and Table 6). Size generally increased with depth, but was relatively constant going from west to east (Fig. 5). The estimated biomass of Pacific halibut was 298,407 t, and the highest regional biomass was in the Kodiak region, where 38% of the estimated biomass was concentrated (Table 5).

Table 5. -- Number of survey hauls, number of hauls with Pacific halibut, mean CPUE, biomass, and mean weight, based on the 2017 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	74	74	10.75	44,374	36,069	52,680	2.250
	101 - 200	32	30	8.51	12,484	6,918	18,049	3.530
	201 - 300	13	8	2.15	600	182	1,018	4.299
	301 - 500	4	1	0.73	186	0	701	4.897
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	113	9.11	57,643	47,725	67,562	2.460
Chirikof	1 - 100	41	41	15.37	40,006	31,020	48,993	2.110
	101 - 200	54	45	7.43	17,712	12,278	23,147	4.104
	201 - 300	16	13	4.08	4,711	2,362	7,060	5.557
	301 - 500	4	2	1.14	183	0	481	6.709
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	101	9.63	62,612	52,114	73,110	2.593
Kodiak	1 - 100	61	55	15.77	60,758	44,059	77,458	1.861
	101 - 200	90	79	11.55	50,061	39,512	60,610	4.925
	201 - 300	20	9	2.21	2,540	630	4,451	4.259
	301 - 500	5	1	1.48	431	0	1,539	6.372
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	144	11.61	113,791	94,168	133,413	2.617
Yakutat	1 - 100	17	13	3.51	5,848	2,065	9,630	1.644
	101 - 200	29	14	2.57	7,561	2,782	12,339	4.184
	201 - 300	17	13	6.81	3,521	1,207	5,836	7.545
	301 - 500	5	2	2.05	539	0	1,628	9.339
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	42	3.16	17,468	11,316	23,621	2.967
Southeastern	1 - 100	7	7	56.57	37,029	10,848	63,210	2.533
	101 - 200	18	13	7.33	8,129	2,397	13,861	3.896
	201 - 300	10	6	3.43	1,735	0	3,485	11.575
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	26	17.48	46,893	19,875	73,910	2.782
All areas	1 - 100	200	190	14.57	188,015	156,857	219,173	2.101
	101 - 200	223	181	7.84	95,946	81,352	110,540	4.379
	201 - 300	76	49	3.64	13,107	9,322	16,891	5.957
	301 - 500	26	6	1.05	1,339	0	2,705	7.025
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	426	9.68	298,407	263,844	332,969	2.622

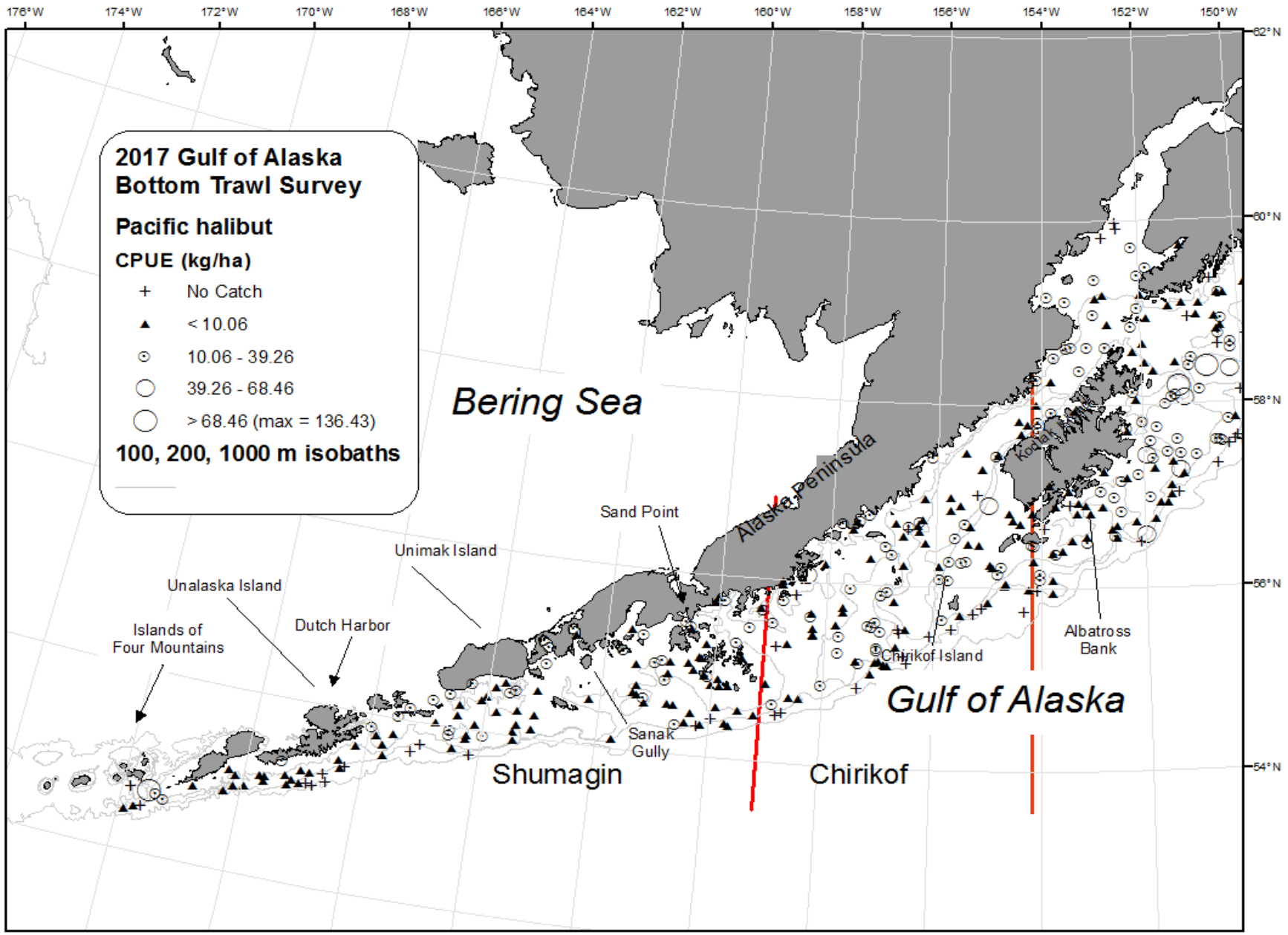

Figure 4. -- Distribution and relative abundance of Pacific halibut from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

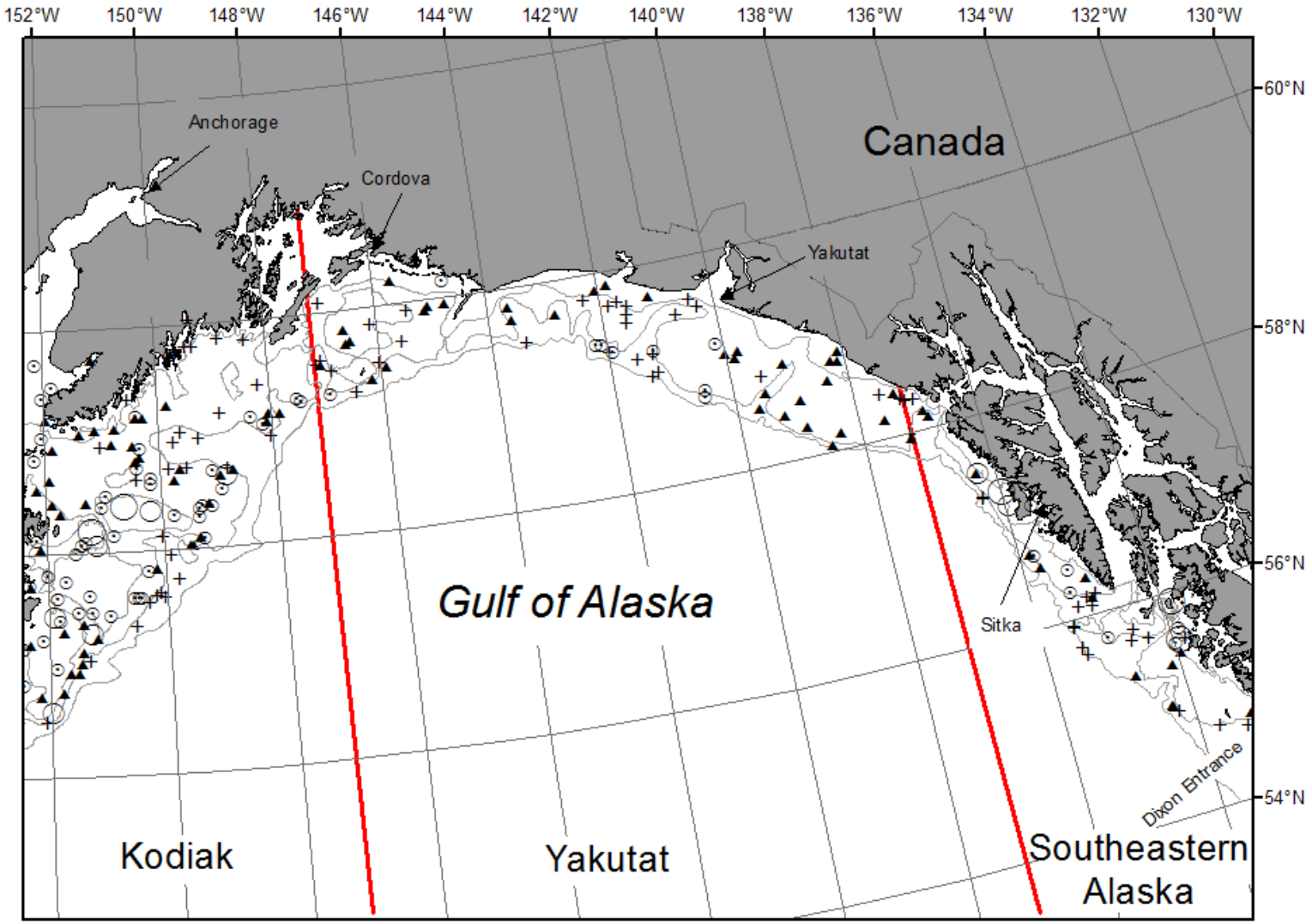

Figure 4. -- Continued (Pacific halibut).

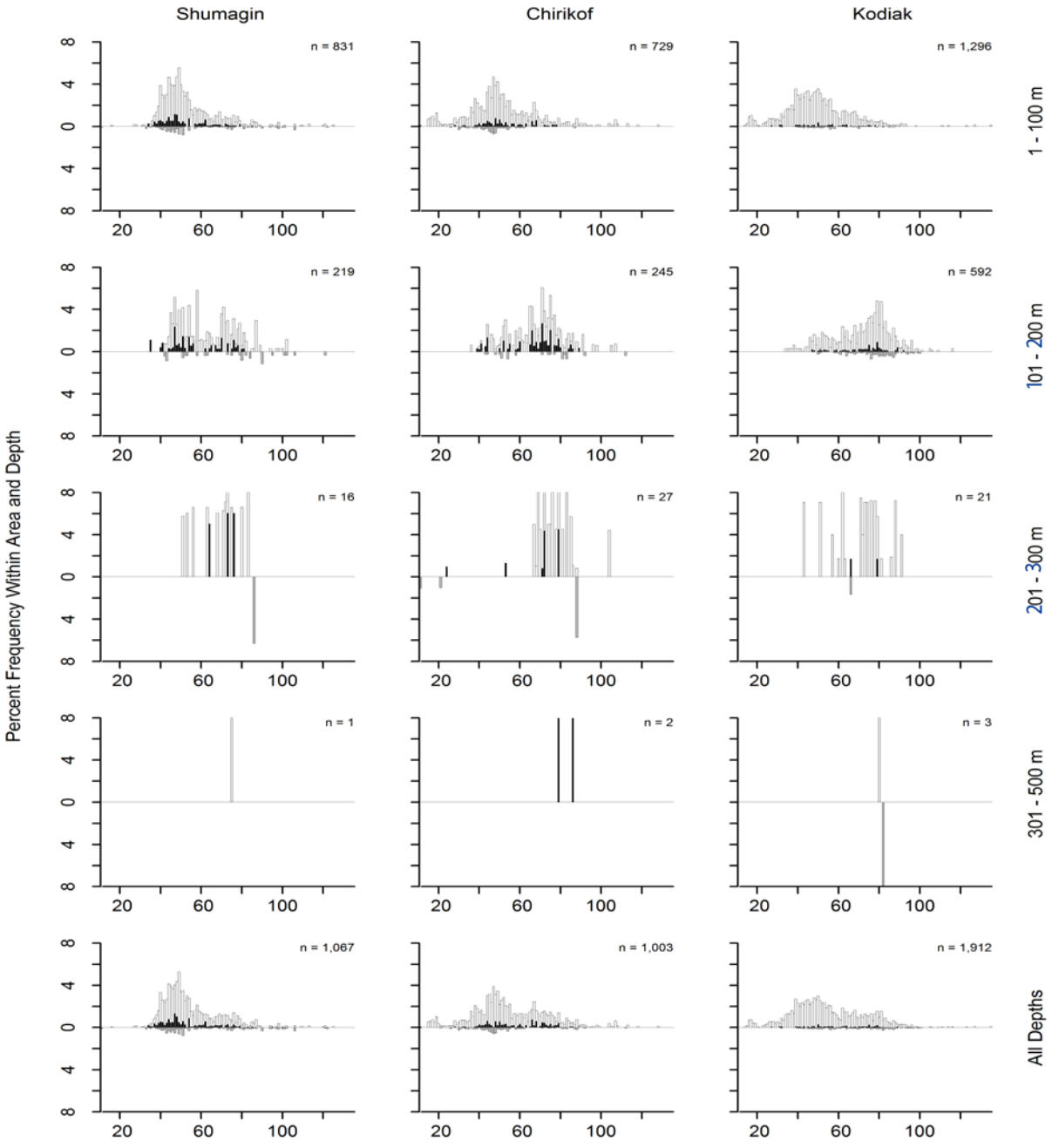

Figure 5. -- Size composition of Pacific halibut from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

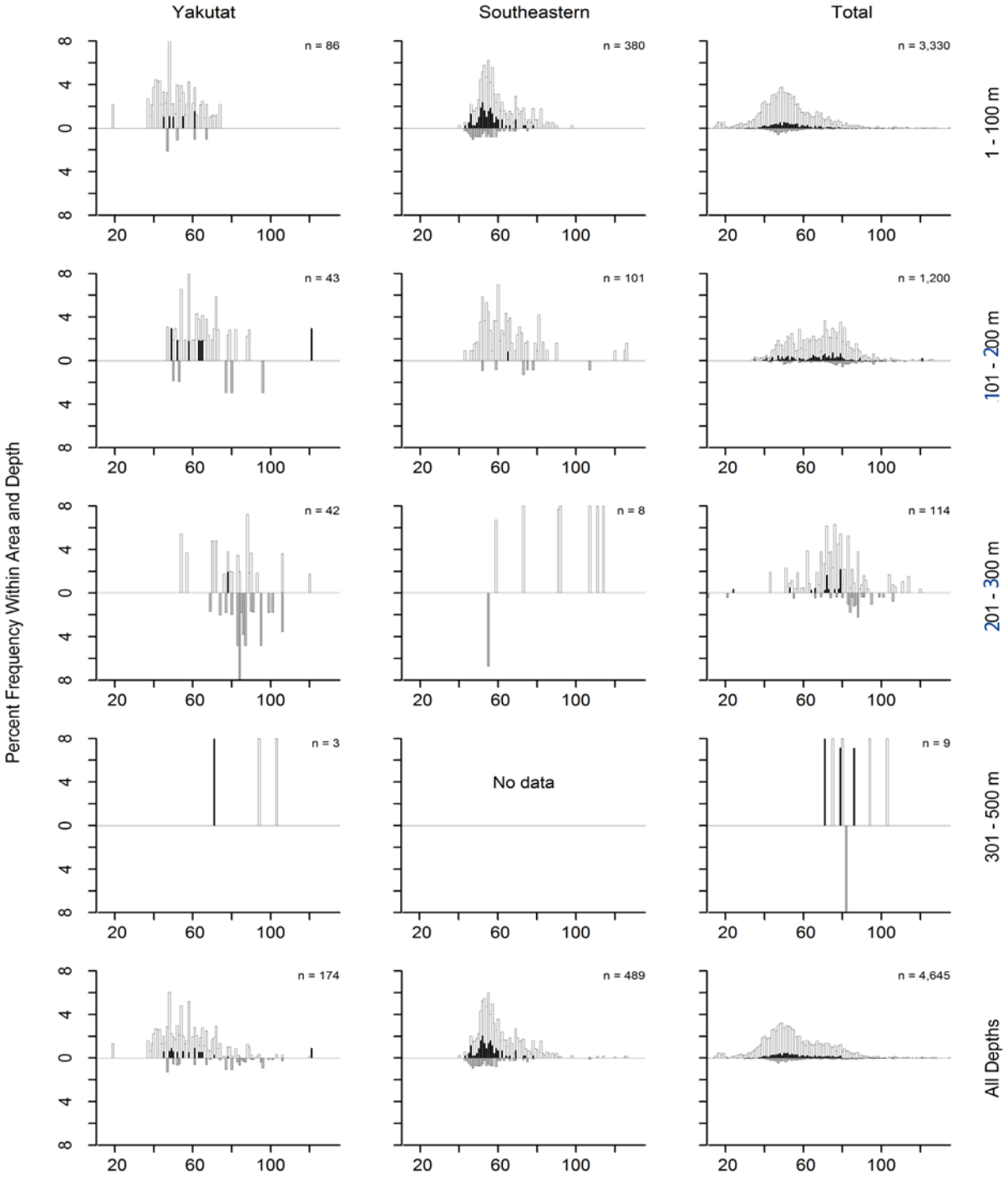

Figure 5. -- Continued (Pacific halibut).

Table 6. -- Catch per unit of effort by stratum for Pacific halibut sorted by descending CPUE for the 2017 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	7	7	56.57	37,029	9,941	64,118
Kodiak	1 - 100	Northern Kodiak Shallows	6	6	40.21	8,846	0	20,074
Kodiak	101 - 200	Albatross Gullies	22	21	22.33	17,666	10,401	24,932
Kodiak	1 - 100	Albatross Banks	25	25	20.23	31,162	19,034	43,290
Shumagin	1 - 100	Lower Alaska Peninsula	14	14	17.88	12,290	8,030	16,551
Chirikof	1 - 100	Upper Alaska Peninsula	12	12	16.42	13,036	7,203	18,869
Chirikof	1 - 100	Semidi Bank	10	10	16.30	11,902	7,233	16,571
Kodiak	101 - 200	Portlock Flats	25	22	14.88	10,919	6,823	15,015
Chirikof	1 - 100	Chirikof Bank	19	19	13.96	15,068	8,947	21,189
Kodiak	101 - 200	Kodiak Outer Shelf	17	17	13.69	6,882	3,528	10,235
Shumagin	101 - 200	West Shumagin Gully	3	3	13.49	3,073	1,996	4,149
Shumagin	1 - 100	Fox Islands	9	9	13.40	11,163	4,483	17,843
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	8	12.07	5,064	0	10,425
Yakutat	201 - 300	Yakutat Slope	10	9	10.78	2,294	1,237	3,351
Kodiak	1 - 100	Lower Cook Inlet	10	7	10.58	10,455	4,156	16,754
Kodiak	1 - 100	Albatross Shallows	13	12	10.32	5,952	2,945	8,960
Kodiak	101 - 200	Barren Islands	15	14	8.94	9,811	5,795	13,827
Shumagin	101 - 200	Shumagin Outer Shelf	25	23	8.90	7,253	1,834	12,671
Chirikof	101 - 200	Shelikof Edge	23	20	8.56	6,619	4,673	8,564
Shumagin	1 - 100	Davidson Bank	26	26	8.49	11,613	8,669	14,557
Kodiak	1 - 100	Kenai Peninsula	7	5	8.26	4,343	0	9,826
Shumagin	1 - 100	Shumagin Bank	25	25	7.51	9,308	6,547	12,069
Chirikof	101 - 200	East Shumagin Gully	15	13	7.04	7,813	3,020	12,606
Chirikof	101 - 200	Chirikof Outer Shelf	16	12	6.55	3,281	1,353	5,210
Yakutat	101 - 200	Yakutat Flats	7	6	5.34	4,818	231	9,406
Kodiak	201 - 300	Upper Shelikof Gully	3	3	5.30	1,702	0	4,478
Shumagin	101 - 200	Sanak Gully	4	4	5.08	2,158	17	4,299
Yakutat	1 - 100	Middleton Shallows	7	5	4.63	3,109	0	6,872
Chirikof	201 - 300	Lower Shelikof Gully	9	8	4.50	4,504	2,119	6,889
Southeastern	101 - 200	Prince of Wales Shelf	9	5	4.45	3,065	0	6,358
Yakutat	201 - 300	Yakutat Gullies	7	4	4.03	1,227	0	3,401
Kodiak	101 - 200	Kenai Flats	11	5	3.96	4,783	0	9,813
Southeastern	201 - 300	Prince of Wales Slope/Gullies	6	3	3.52	1,383	0	3,163
Southeastern	201 - 300	Baranof-Chichagof Slope	4	3	3.13	352	0	921
Yakutat	1 - 100	Yakutat Shallows	10	8	2.75	2,739	1,006	4,472
Yakutat	101 - 200	Fairweather Shelf	9	5	2.30	1,777	0	3,653
Yakutat	301 - 500	Yakutat Slope	3	1	2.20	335	0	1,776
Shumagin	201 - 300	Shumagin Slope	13	8	2.15	600	178	1,021
Kodiak	201 - 300	Kodiak Slope	6	3	2.05	332	0	865
Yakutat	301 - 500	Yakutat Gullies	2	1	1.85	204	0	2,799
Kodiak	301 - 500	Kodiak Slope	5	1	1.48	431	0	1,627
Chirikof	201 - 300	Chirikof Slope	7	5	1.35	207	0	436
Yakutat	101 - 200	Middleton Shelf	7	3	1.32	966	0	2,272
Chirikof	301 - 500	Chirikof Slope	4	2	1.14	183	0	524
Kodiak	201 - 300	Kenai Gullies	11	3	0.76	507	0	1,186
Shumagin	301 - 500	Shumagin Slope	4	1	0.73	186	0	777

Flathead sole (*Hippoglossoides elassodon*)

Flathead sole was the fifth most abundant species caught in the 2017 survey (Table 2), and was the fourth most abundant species in the Shumagin area. Although caught throughout the survey area, flathead sole were relatively rare in the Southeastern region and were only caught at depths less than 300 m (Table 7). The highest densities occurred at depths less than 200 m in all INPFC areas (Fig. 6 and Table 8). Size was somewhat smaller in the Yakutat and Southeastern regions than in the three western-most regions (Fig. 7). The estimated biomass of flathead sole was 236,588 t, and the highest regional biomass was in the Shumagin region. Ninety-seven percent of the biomass was concentrated in the less than 200 m depth interval (Table 7).

Table 7. -- Number of survey hauls, number of hauls with flathead sole, mean CPUE, biomass, and mean weight, based on the 2017 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	74	62	21.02	86,797	49,150	124,445	0.289
	101 - 200	32	21	8.29	12,169	4,118	20,220	0.212
	201 - 300	13	2	0.15	42	0	122	0.272
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	85	15.64	99,009	60,766	137,251	0.277
Chirikof	1 - 100	41	26	13.58	35,351	14,417	56,284	0.329
	101 - 200	54	45	9.02	21,508	13,663	29,353	0.258
	201 - 300	16	8	3.35	3,870	0	8,260	0.356
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	79	9.34	60,728	38,421	83,035	0.301
Kodiak	1 - 100	61	36	9.21	35,464	10,248	60,681	0.339
	101 - 200	90	57	5.41	23,426	10,320	36,531	0.276
	201 - 300	20	12	3.02	3,469	774	6,164	0.327
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	105	6.36	62,359	34,604	90,114	0.312
Yakutat	1 - 100	17	10	1.92	3,197	297	6,096	0.255
	101 - 200	29	20	2.9	8,510	1,066	15,953	0.263
	201 - 300	17	4	0.51	265	0	614	0.352
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	34	2.16	11,971	4,254	19,689	0.262
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	4	2.27	2,520	0	8,097	0.237
	201 - 300	10	1	<0.01	1	0	3	0.029
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	5	0.94	2,521	0	8,098	0.236
All areas	1 - 100	200	134	12.46	160,809	112,437	209,180	0.306
	101 - 200	223	147	5.57	68,133	49,860	86,406	0.254
	201 - 300	76	27	2.12	7,647	2,724	12,570	0.341
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	308	7.67	236,588	184,687	288,490	0.290

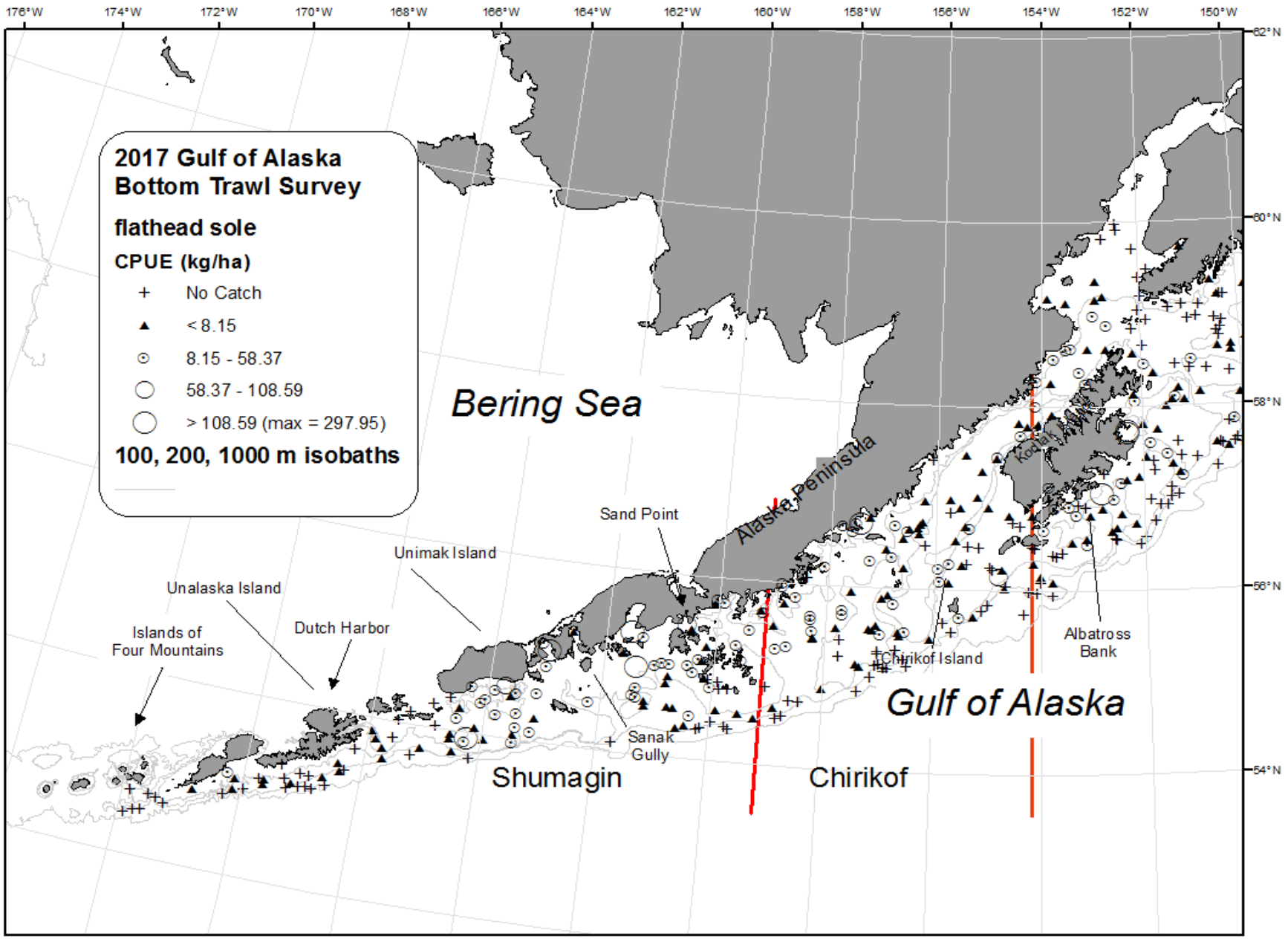

Figure 6. -- Distribution and relative abundance of flathead sole from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

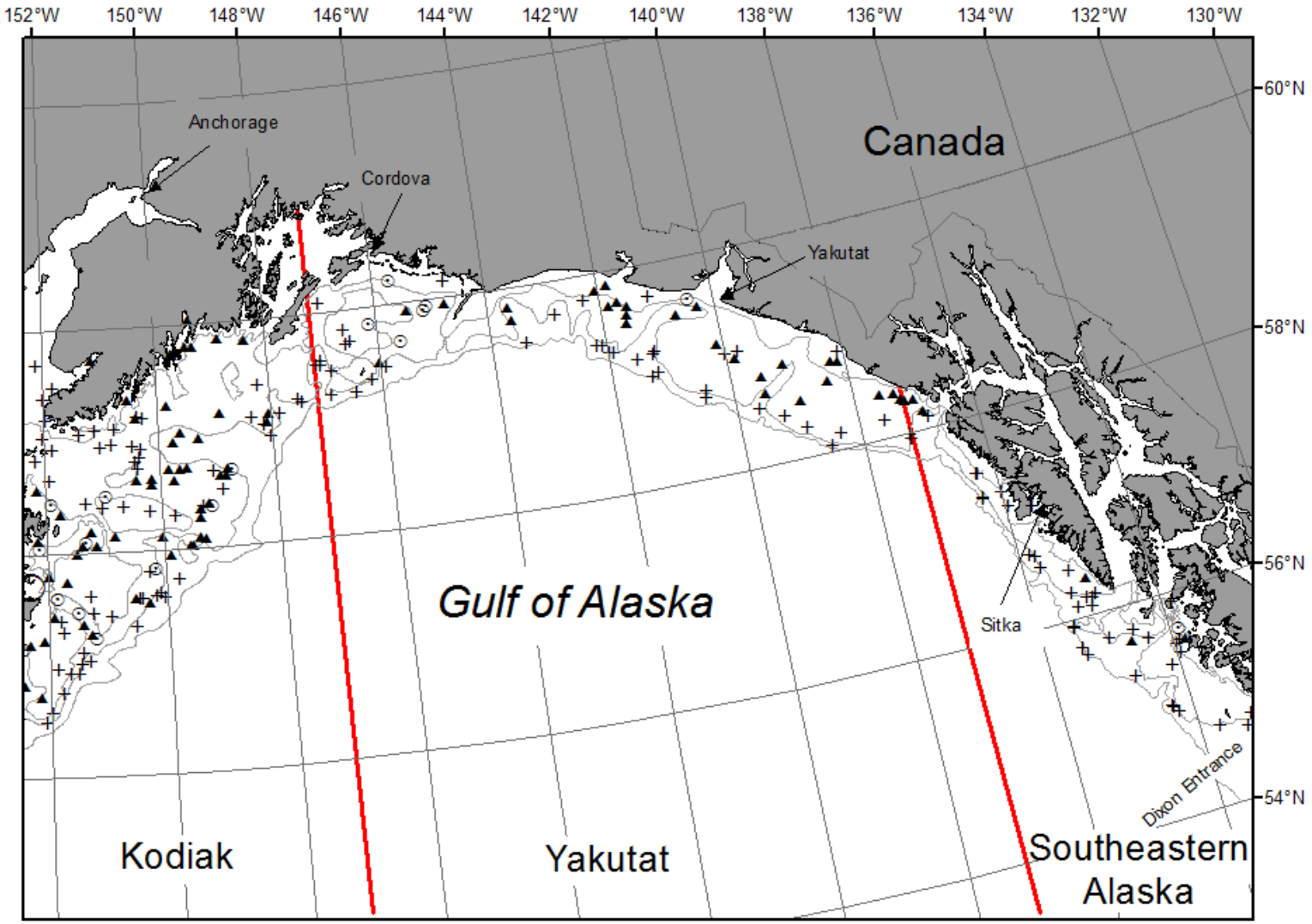

Figure 6. -- Continued (flathead sole).

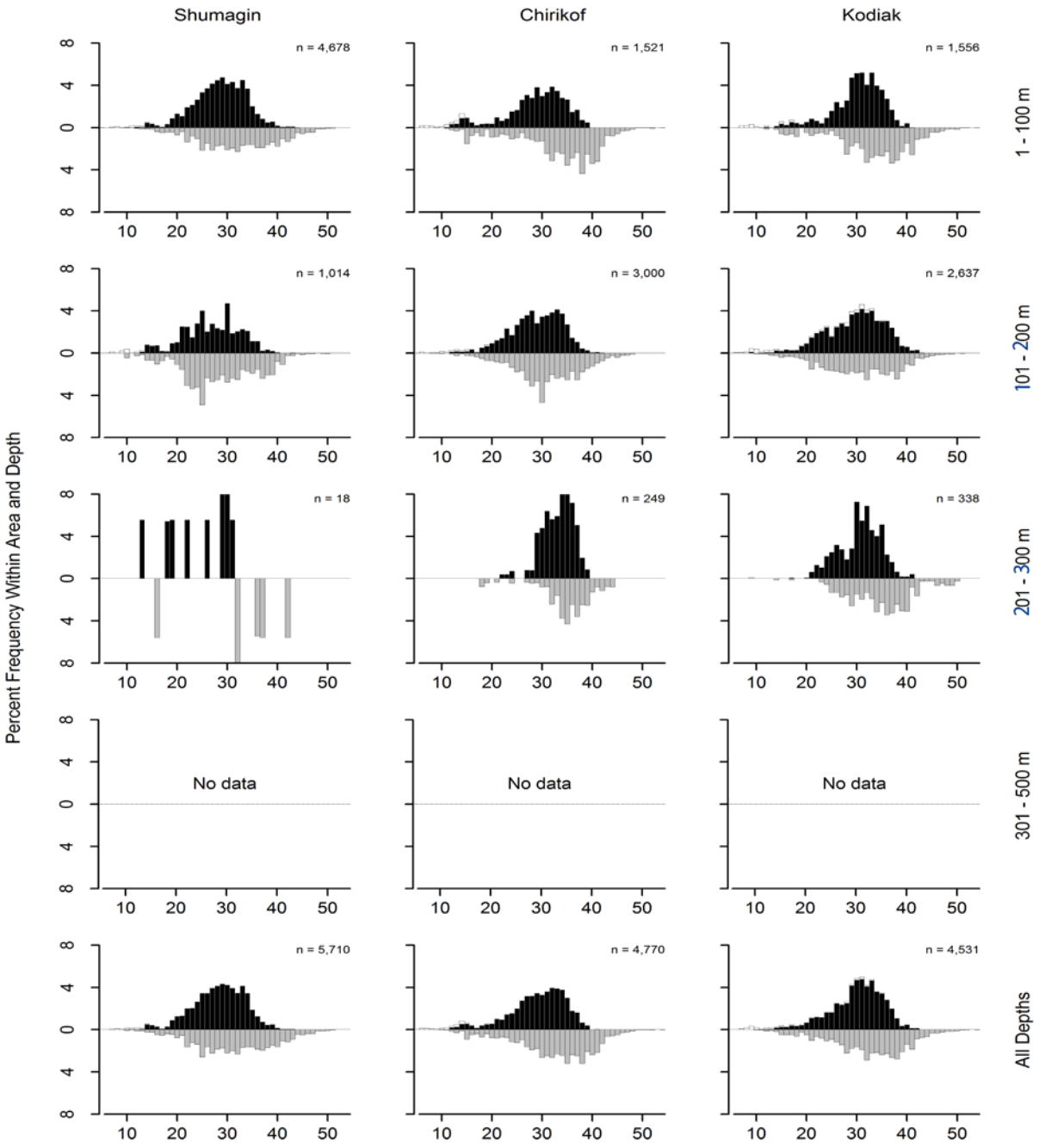

Figure 7. -- Size composition of flathead sole from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

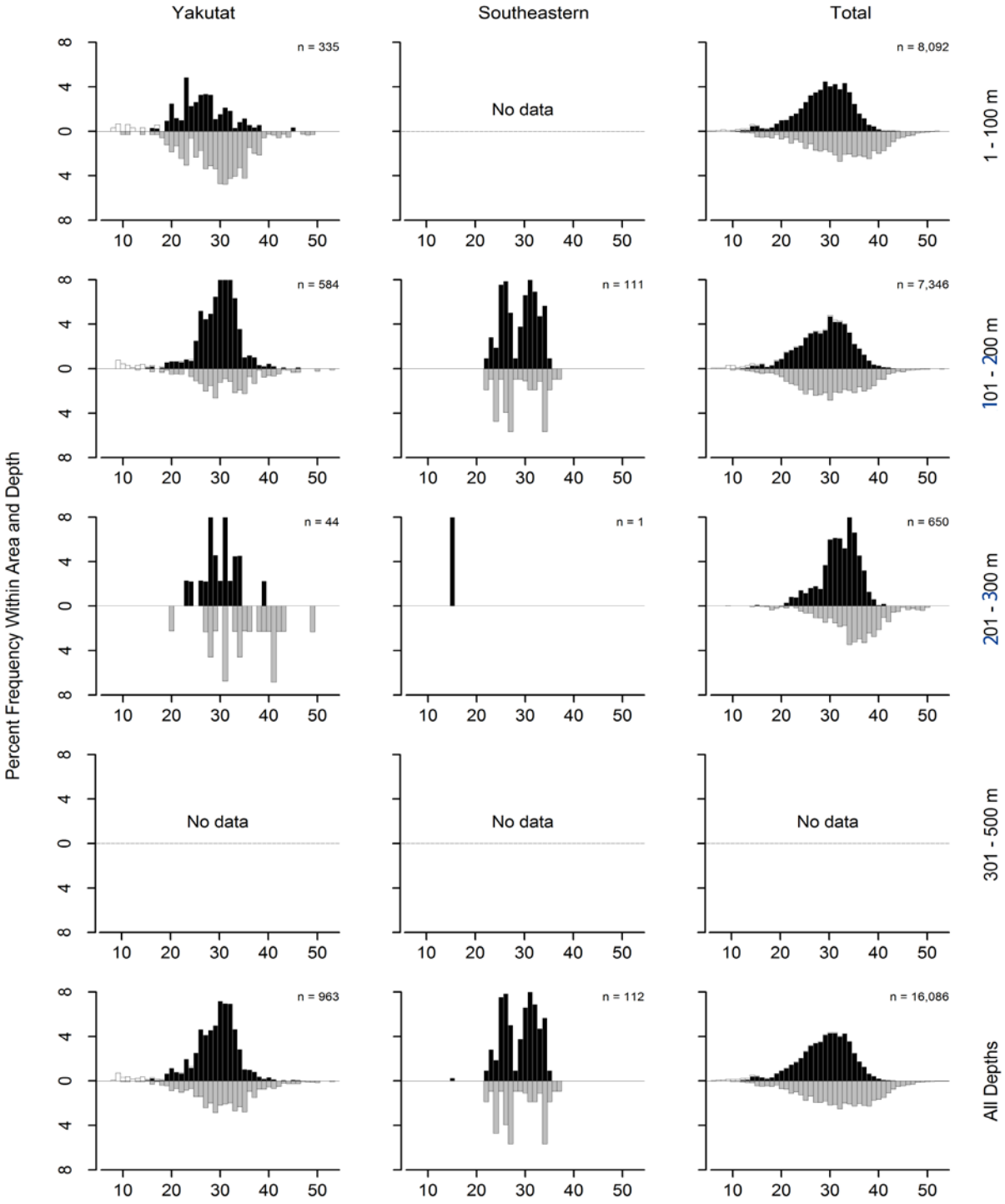

Figure 7. -- Continued (flathead sole).

Table 8. -- Catch per unit of effort by stratum for flathead sole sorted by descending CPUE for the 2017 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	14	14	60.99	41,939	7,257	76,620
Kodiak	1 - 100	Albatross Shallows	13	11	39.90	23,009	0	47,653
Kodiak	1 - 100	Northern Kodiak Shallows	6	6	31.78	6,990	0	14,940
Chirikof	1 - 100	Upper Alaska Peninsula	12	10	30.76	24,425	5,109	43,740
Shumagin	101 - 200	West Shumagin Gully	3	3	25.15	5,730	0	15,413
Shumagin	1 - 100	Davidson Bank	26	23	20.47	28,003	13,587	42,419
Kodiak	101 - 200	Albatross Gullies	22	20	14.95	11,828	0	23,867
Chirikof	101 - 200	East Shumagin Gully	15	15	13.85	15,374	7,785	22,963
Shumagin	101 - 200	Sanak Gully	4	4	13.14	5,576	0	13,134
Shumagin	1 - 100	Shumagin Bank	25	20	12.57	15,585	3,896	27,274
Yakutat	101 - 200	Middleton Shelf	7	5	8.53	6,264	0	13,456
Chirikof	1 - 100	Chirikof Bank	19	10	8.10	8,739	0	19,009
Kodiak	201 - 300	Upper Shelikof Gully	3	3	6.65	2,135	0	6,032
Chirikof	101 - 200	Shelikof Edge	23	23	6.60	5,107	3,857	6,357
Kodiak	101 - 200	Barren Islands	15	8	5.60	6,153	879	11,428
Chirikof	201 - 300	Lower Shelikof Gully	9	7	3.85	3,861	0	8,337
Southeastern	101 - 200	Prince of Wales Shelf	9	2	3.63	2,503	0	8,187
Yakutat	101 - 200	Yakataga Shelf	6	5	3.35	1,767	0	5,543
Yakutat	1 - 100	Middleton Shallows	7	3	3.18	2,133	0	5,091
Chirikof	1 - 100	Semidi Bank	10	6	3.00	2,187	0	4,411
Kodiak	101 - 200	Portlock Flats	25	16	2.25	1,651	690	2,612
Kodiak	1 - 100	Albatross Banks	25	11	2.24	3,450	0	7,242
Kodiak	101 - 200	Kenai Flats	11	7	2.22	2,681	294	5,069
Kodiak	101 - 200	Kodiak Outer Shelf	17	6	2.21	1,113	0	3,372
Chirikof	101 - 200	Chirikof Outer Shelf	16	7	2.05	1,027	0	2,947
Kodiak	1 - 100	Kenai Peninsula	7	4	2.03	1,069	0	2,257
Kodiak	201 - 300	Kenai Gullies	11	7	1.96	1,308	0	2,703
Shumagin	1 - 100	Fox Islands	9	5	1.53	1,271	0	3,641
Yakutat	1 - 100	Yakutat Shallows	10	7	1.07	1,064	0	2,153
Shumagin	101 - 200	Shumagin Outer Shelf	25	14	1.06	863	148	1,579
Kodiak	1 - 100	Lower Cook Inlet	10	4	0.96	948	0	2,357
Yakutat	201 - 300	Yakutat Gullies	7	4	0.87	265	0	626
Yakutat	101 - 200	Fairweather Shelf	9	6	0.29	222	0	469
Yakutat	101 - 200	Yakutat Flats	7	4	0.28	257	0	621
Kodiak	201 - 300	Kodiak Slope	6	2	0.16	26	0	90
Shumagin	201 - 300	Shumagin Slope	13	2	0.15	42	0	123
Chirikof	201 - 300	Chirikof Slope	7	1	0.05	8	0	29
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	2	0.04	18	0	47
Southeastern	201 - 300	Prince of Wales Slope/Gullie	6	1	0.00	1	0	3

Southern rock sole (*Lepidopsetta bilineata*)

Southern rock sole was the ninth most abundant species caught in the 2017 survey (Table 2). Although caught throughout the survey area, southern rock sole was rare in the Yakutat region, and was almost exclusively caught in depths less than 200 m (Table 9). The highest densities occurred in the less than 100 m depth interval in all INPFC areas, but especially in the three western regions (Fig. 8 and Table 10). Size was relatively constant going from west to east for the three westernmost regions, but noticeably smaller in the Yakutat and Southeastern regions (Fig. 9). The estimated biomass for southern rock sole was 107,985 t, and the highest regional biomass was in the Shumagin region. Ninety-five percent of the biomass was concentrated in the less than 100 m depth interval (Table 9).

Table 9. -- Number of survey hauls, number of hauls with southern rock sole, mean CPUE, biomass, and mean weight, based on the 2017 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	74	59	8.92	36,848	28,153	45,542	0.672
	101 - 200	32	18	2.48	3,640	1,749	5,530	0.705
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	77	6.40	40,487	31,601	49,374	0.675
Chirikof	1 - 100	41	33	9.07	23,616	13,314	33,918	0.588
	101 - 200	54	5	0.09	220	0	477	1.141
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	38	3.67	23,836	13,532	34,141	0.591
Kodiak	1 - 100	61	43	8.91	34,313	23,436	45,190	0.566
	101 - 200	90	15	0.27	1,163	0	2,511	0.783
	201 - 300	20	2	0.02	23	0	93	0.435
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	60	3.62	35,499	24,540	46,458	0.571
Yakutat	1 - 100	17	4	0.34	567	0	1,276	0.673
	101 - 200	29	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	4	0.10	567	0	1,276	0.673
Southeastern	1 - 100	7	6	10.38	6,792	0	16,561	0.300
	101 - 200	18	3	0.73	804	0	2,162	0.378
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	9	2.83	7,596	0	17,471	0.307
All areas	1 - 100	200	145	7.91	102,135	83,173	121,097	0.570
	101 - 200	223	41	0.48	5,827	3,225	8,429	0.650
	201 - 300	76	2	0.01	23	0	93	0.435
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	188	3.50	107,985	88,849	127,121	0.574

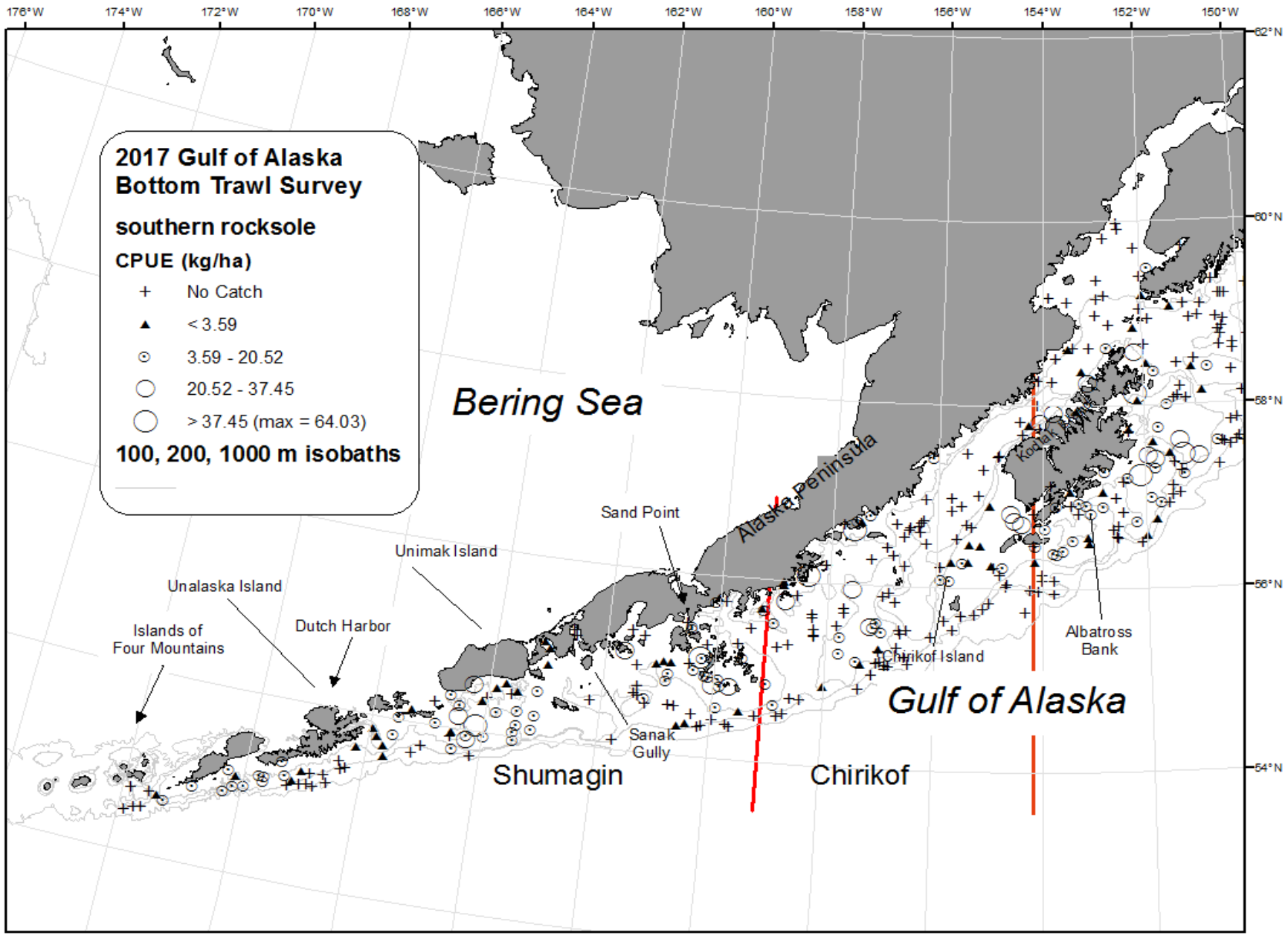

Figure 8. -- Distribution and relative abundance of southern rock sole from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

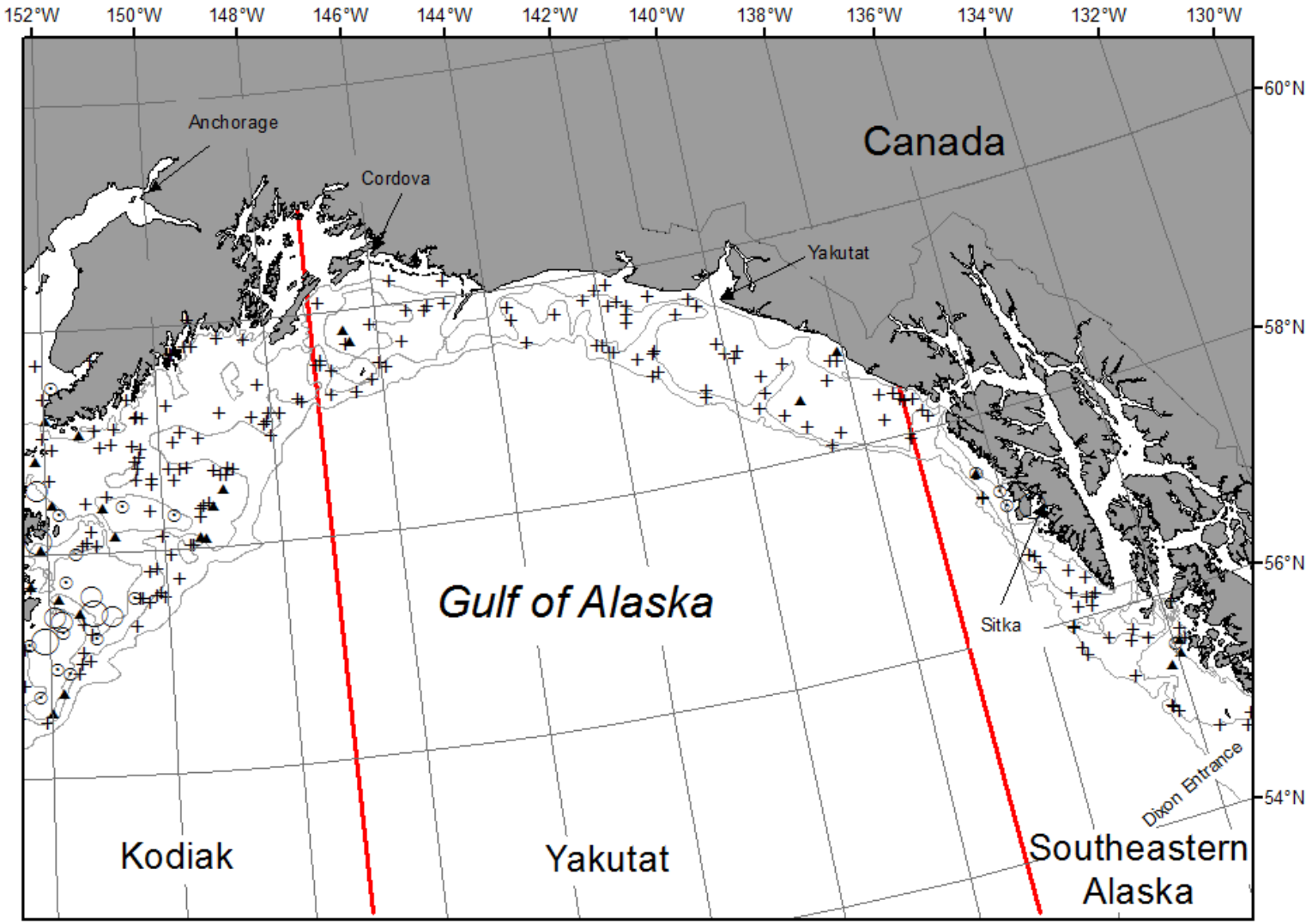

Figure 8. -- Continued (southern rock sole).

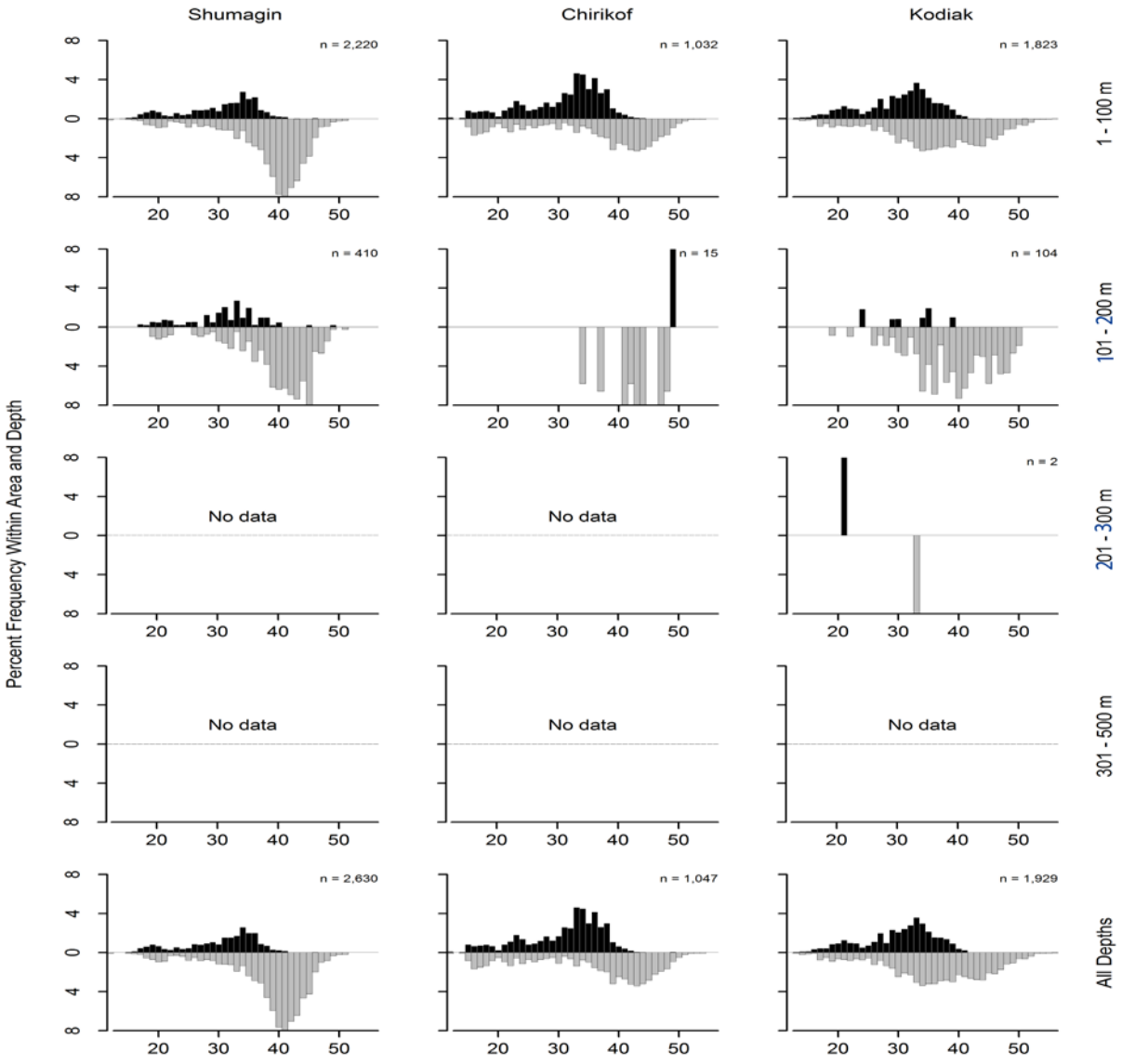

Figure 9. -- Size composition of southern rock sole from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

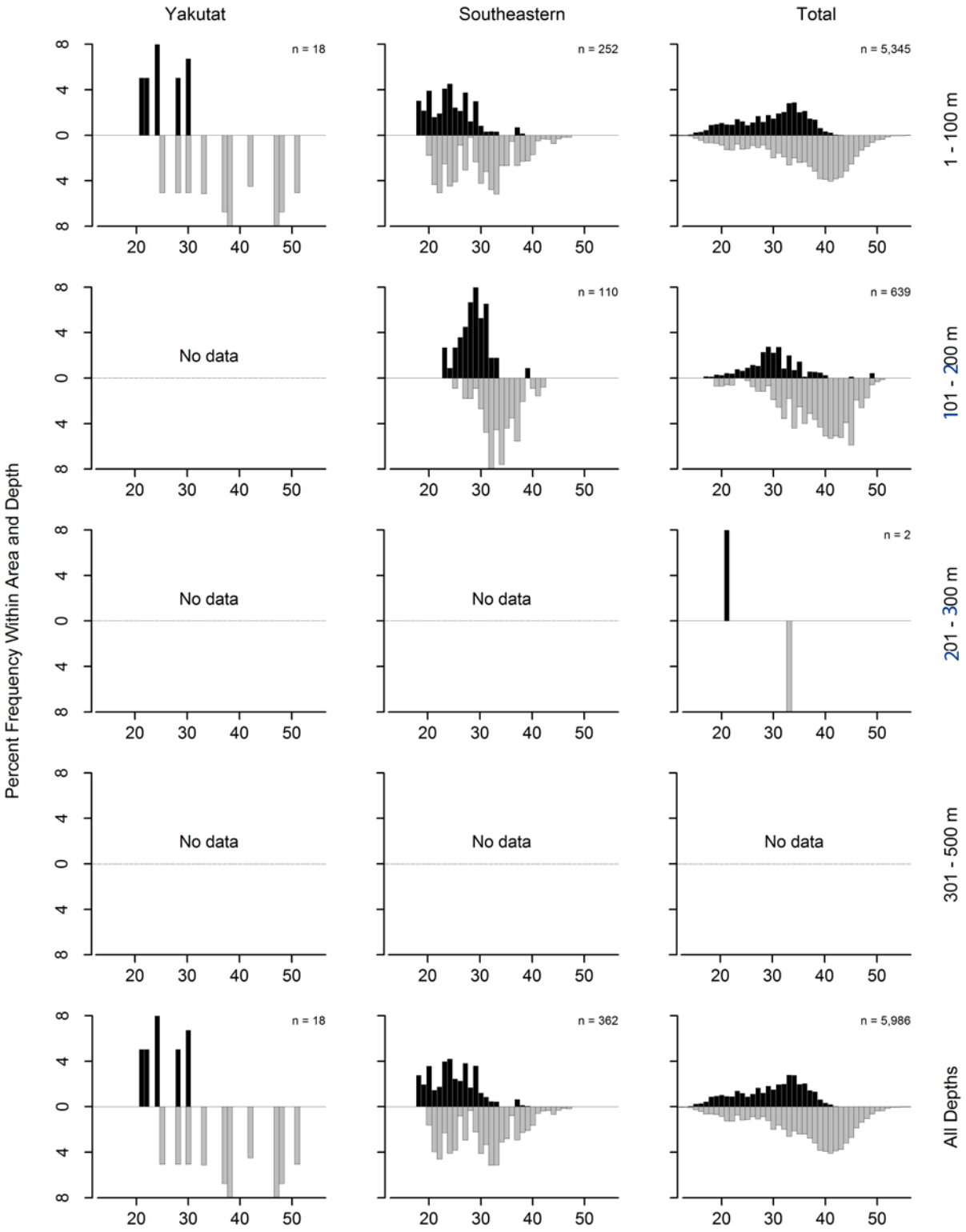

Figure 9. -- Continued (southern rock sole).

Table 10. -- Catch per unit of effort by stratum for southern rock sole sorted by descending CPUE for the 2017 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	13	12	15.79	9,104	2,407	15,801
Kodiak	1 - 100	Northern Kodiak Shallows	6	4	14.98	3,295	0	7,143
Kodiak	1 - 100	Albatross Banks	25	24	13.73	21,147	12,770	29,524
Chirikof	1 - 100	Upper Alaska Peninsula	12	10	11.42	9,068	410	17,726
Chirikof	1 - 100	Semidi Bank	10	9	11.21	8,187	3,381	12,993
Shumagin	1 - 100	Davidson Bank	26	22	10.44	14,283	8,779	19,788
Southeastern	1 - 100	Southeastern Shallows	7	6	10.38	6,792	0	16,900
Shumagin	1 - 100	Shumagin Bank	25	19	10.27	12,734	7,485	17,983
Shumagin	1 - 100	Fox Islands	9	9	7.22	6,012	2,136	9,889
Chirikof	1 - 100	Chirikof Bank	19	14	5.89	6,361	1,450	11,271
Shumagin	1 - 100	Lower Alaska Peninsula	14	9	5.55	3,818	426	7,210
Shumagin	101 - 200	Shumagin Outer Shelf	25	18	4.46	3,640	1,745	5,534
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	2	1.74	729	0	2,123
Kodiak	101 - 200	Albatross Gullies	22	6	0.84	668	0	1,958
Kodiak	1 - 100	Kenai Peninsula	7	2	0.75	393	0	1,055
Kodiak	101 - 200	Kodiak Outer Shelf	17	3	0.58	291	0	680
Yakutat	1 - 100	Middleton Shallows	7	2	0.57	380	0	1,072
Kodiak	1 - 100	Lower Cook Inlet	10	1	0.38	375	0	1,223
Chirikof	101 - 200	Chirikof Outer Shelf	16	4	0.35	174	0	422
Kodiak	101 - 200	Portlock Flats	25	4	0.21	155	0	349
Yakutat	1 - 100	Yakutat Shallows	10	2	0.19	186	0	564
Southeastern	101 - 200	Prince of Wales Shelf	9	1	0.11	75	0	249
Kodiak	201 - 300	Upper Shelikof Gully	3	1	0.07	22	0	116
Kodiak	101 - 200	Barren Islands	15	2	0.04	49	0	120
Chirikof	101 - 200	East Shumagin Gully	15	1	0.04	47	0	147
Kodiak	201 - 300	Kodiak Slope	6	1	0.01	1	0	4

Northern rock sole (*Lepidopsetta polyxystra*)

Northern rock sole was the fourteenth most abundant species caught in the 2017 survey area, with the tenth highest mean CPUE in the Shumagin area (Table 2). Northen rock sole were caught exclusively in the Shumagin, Chirikof, and Kodiak INPFC areas (Table 11), and were almost exclusively concentrated in depths less than 100 m (Fig. 10 and Table 12). Size was variable for both sexes with no distinct depth or longitudinal trends (Fig. 11). The estimated biomass of northern rock sole was 55,047 t and the highest regional biomass was in the Shumagin area, where over 52% of the survey-wide biomass was concentrated. More than 97% of the biomass was concentrated in the less than 100 m depth interval (Table 11).

Table 11. -- Number of survey hauls, number of hauls with northern rock sole, mean CPUE, biomass, and mean weight, based on the 2017 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	74	65	6.65	27,468	18,874	36,062	0.383
	101 - 200	32	19	0.90	1,323	700	1,947	0.568
	201 - 300	13	3	0.10	28	0	63	0.800
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	87	4.55	28,820	20,204	37,436	0.389
Chirikof	1 - 100	41	34	7.23	18,836	4,628	33,044	0.421
	101 - 200	54	4	0.03	60	0	124	0.549
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	38	2.91	18,896	4,688	33,104	0.422
Kodiak	1 - 100	61	35	1.89	7,287	3,673	10,901	0.400
	101 - 200	90	2	<0.01	15	0	37	0.579
	201 - 300	20	1	0.02	29	0	120	0.641
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	38	0.75	7,331	3,716	10,945	0.401
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	0	---	---	---	---	---
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	0	---	---	---	---	---
All areas	1 - 100	200	134	4.15	53,592	36,909	70,275	0.398
	101 - 200	223	25	0.11	1,398	773	2,024	0.567
	201 - 300	76	4	0.02	57	0	161	0.711
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	163	1.78	55,047	38,352	71,742	0.401

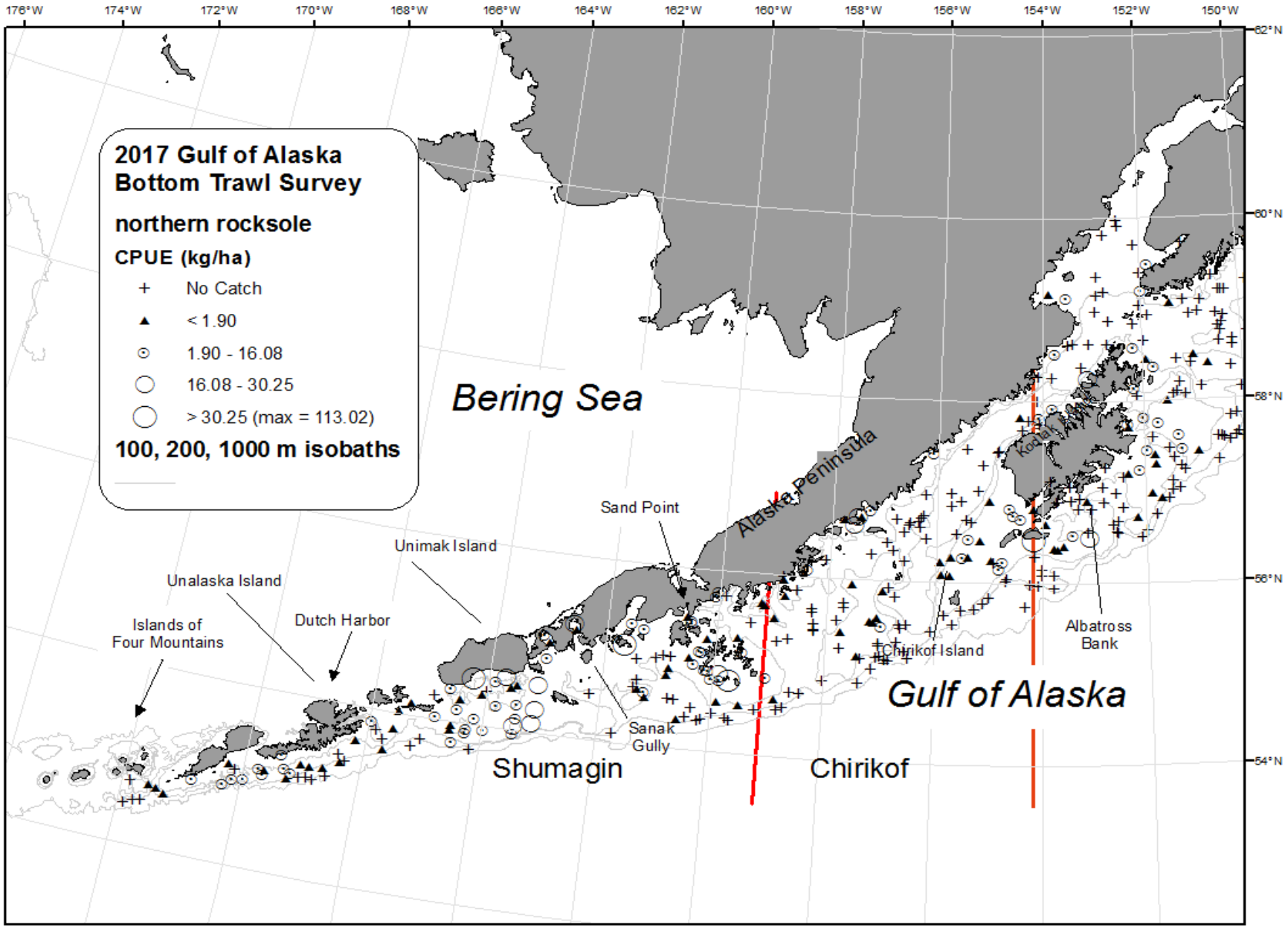

Figure 10. -- Distribution and relative abundance of northern rock sole from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

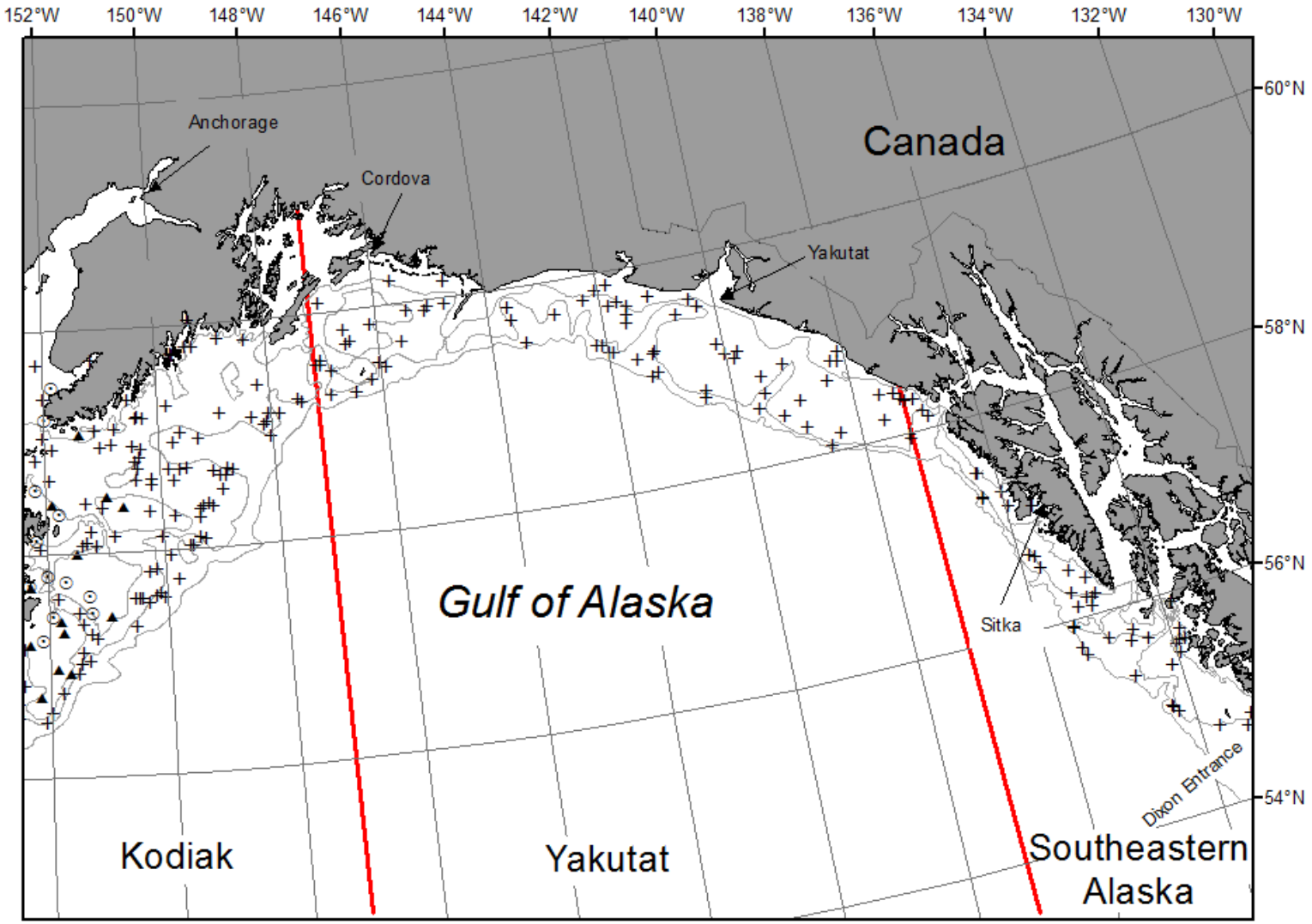

Figure 10. -- Continued (northern rock sole).

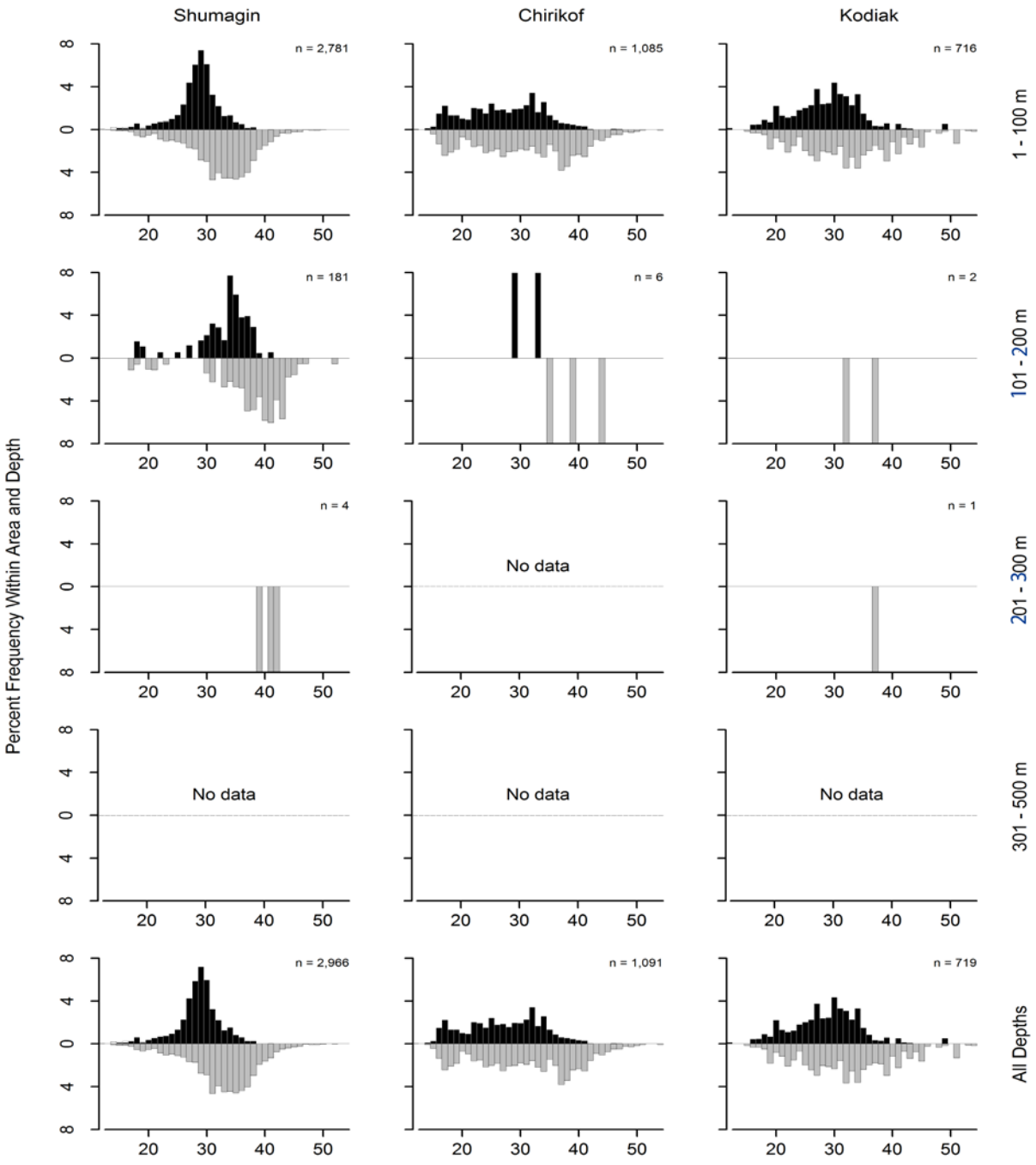

Figure 11. -- Size composition of northern rock sole from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

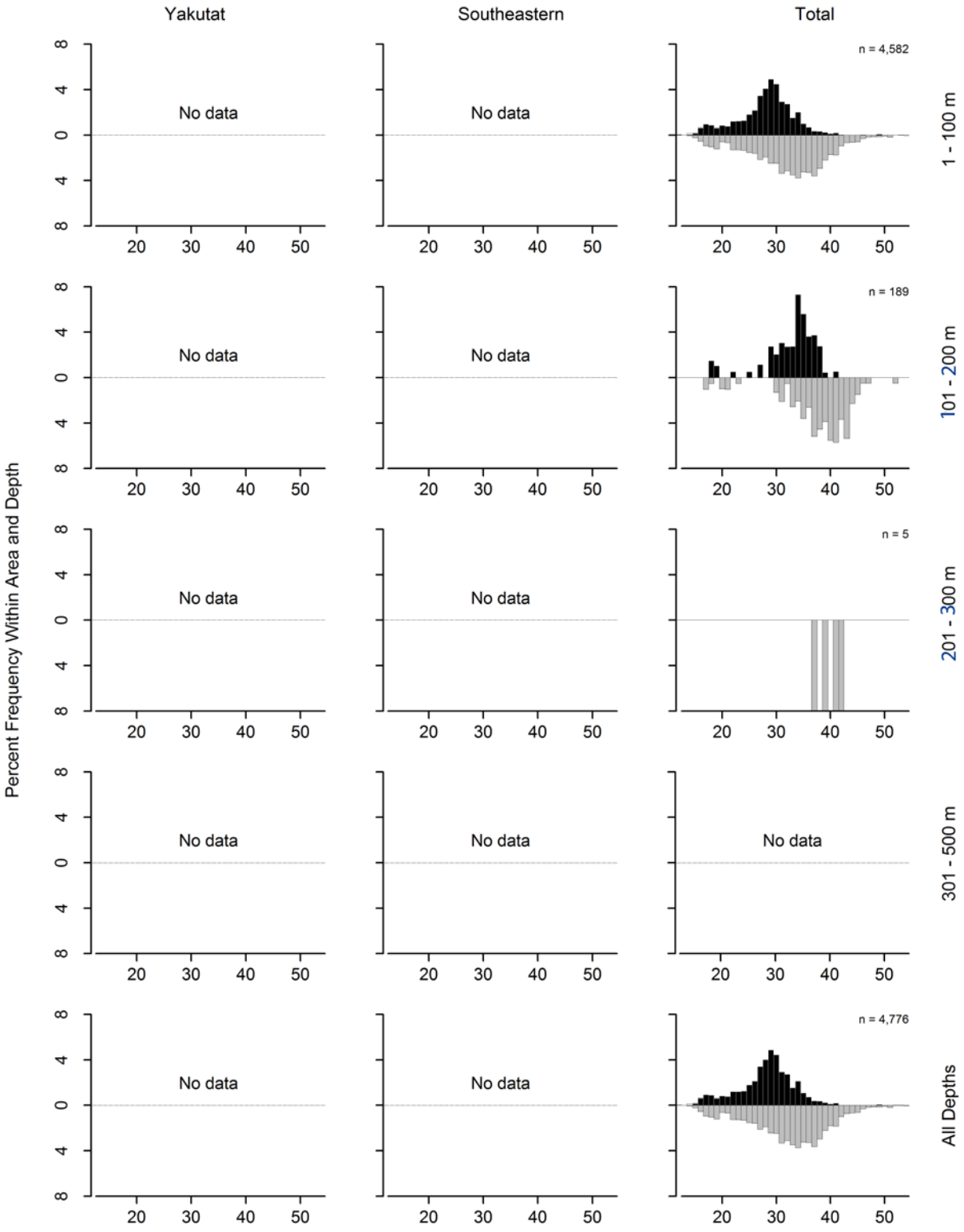

Figure 11. -- Continued (northern rock sole).

Table 12. -- Catch per unit of effort by stratum for northern rock sole sorted by descending CPUE for the 2017 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	1 - 100	Chirikof Bank	19	17	12.14	13,101	0	26,823
Shumagin	1 - 100	Lower Alaska Peninsula	14	14	9.85	6,774	2,338	11,209
Shumagin	1 - 100	Davidson Bank	26	24	8.92	12,207	5,888	18,526
Chirikof	1 - 100	Upper Alaska Peninsula	12	10	6.45	5,123	631	9,616
Shumagin	1 - 100	Shumagin Bank	25	20	5.26	6,516	2,639	10,394
Kodiak	1 - 100	Northern Kodiak Shallows	6	3	4.30	945	0	2,463
Kodiak	1 - 100	Albatross Shallows	13	8	3.30	1,905	334	3,476
Shumagin	1 - 100	Fox Islands	9	7	2.37	1,972	0	4,191
Kodiak	1 - 100	Albatross Banks	25	19	2.36	3,631	650	6,612
Shumagin	101 - 200	Shumagin Outer Shelf	25	18	1.61	1,314	690	1,938
Chirikof	1 - 100	Semidi Bank	10	7	0.84	612	0	1,360
Kodiak	1 - 100	Kenai Peninsula	7	2	0.61	319	0	1,047
Kodiak	1 - 100	Lower Cook Inlet	10	3	0.49	488	0	1,164
Shumagin	201 - 300	Shumagin Slope	13	3	0.10	28	0	64
Kodiak	201 - 300	Upper Shelikof Gully	3	1	0.09	29	0	152
Shumagin	101 - 200	West Shumagin Gully	3	1	0.04	9	0	49
Chirikof	101 - 200	Shelikof Edge	23	2	0.03	25	0	65
Chirikof	101 - 200	Chirikof Outer Shelf	16	1	0.03	15	0	46
Chirikof	101 - 200	East Shumagin Gully	15	1	0.02	20	0	63
Kodiak	101 - 200	Portlock Flats	25	1	0.01	9	0	29
Kodiak	101 - 200	Kodiak Outer Shelf	17	1	0.01	6	0	18

Rex sole (*Glyptocephalus zachirus*)

Rex sole was the eleventh most abundant species caught in the 2017 survey, and was among the twenty most abundant species in all five INPFC areas (Table 2). Rex sole were caught throughout the survey area in all depth intervals (Table 13). Although the biomass was by far highest in the 101-200 m depth interval, the highest concentrations occurred in the 301-500 m and 201-300m depth intervals of the Southeastern Deep Gullies and Lower Shelikof Gully strata, respectively. No single stratum was dominant in terms of density (Fig. 12 and Table 14). Females were on average somewhat larger than males, and size for both sexes was relatively constant with depth (Fig. 13). The estimated biomass of rex sole was 97,720 t, and the highest regional biomass was in the Chirikof region, where 34% of the estimated biomass was concentrated (Table 13).

Table 13. -- Number of survey hauls, number of hauls with rex sole, mean CPUE, biomass, and mean weight, based on the 2017 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	74	41	1.92	7,916	2,940	12,891	0.523
	101 - 200	32	26	6.90	10,132	3,993	16,272	0.489
	201 - 300	13	9	5.37	1,498	391	2,605	0.520
	301 - 500	4	3	2.55	646	0	1,673	0.507
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	79	3.19	20,192	12,332	28,053	0.505
Chirikof	1 - 100	41	18	0.45	1,172	0	2,459	0.227
	101 - 200	54	53	7.13	17,006	9,762	24,249	0.447
	201 - 300	16	16	13.04	15,055	0	38,555	0.463
	301 - 500	4	4	2.98	477	0	1,264	0.364
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	91	5.19	33,710	9,204	58,216	0.437
Kodiak	1 - 100	61	21	0.69	2,665	531	4,799	0.175
	101 - 200	90	79	3.13	13,575	9,212	17,937	0.372
	201 - 300	20	17	5.52	6,337	1,179	11,495	0.344
	301 - 500	5	5	2.74	799	0	1,796	0.327
	501 - 700	2	2	0.51	90	66	114	0.326
	701 - 1000	0	0		---	---	---	---
	All depths	178	124	2.39	23,466	16,614	30,317	0.322
Yakutat	1 - 100	17	12	0.76	1,265	237	2,292	0.155
	101 - 200	29	22	1.67	4,903	140	9,665	0.221
	201 - 300	17	17	2.68	1,385	68	2,702	0.254
	301 - 500	5	5	0.63	166	0	417	0.202
	501 - 700	2	1	0.84	123	0	651	0.249
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	57	1.42	7,840	2,990	12,691	0.211
Southeastern	1 - 100	7	3	0.04	26	0	60	0.116
	101 - 200	18	18	5.35	5,934	1,212	10,657	0.210
	201 - 300	10	10	5.75	2,904	0	5,833	0.244
	301 - 500	8	8	11.7	3,648	0	7,625	0.305
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	39	4.66	12,512	6,568	18,456	0.239
All areas	1 - 100	200	95	1.01	13,044	7,475	18,612	0.297
	101 - 200	223	198	4.21	51,550	39,644	63,455	0.354
	201 - 300	76	69	7.54	27,179	2,850	51,507	0.382
	301 - 500	26	25	4.48	5,736	1,873	9,598	0.322
	501 - 700	11	3	0.26	213	0	741	0.277
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	390	3.17	97,720	70,329	125,112	0.350

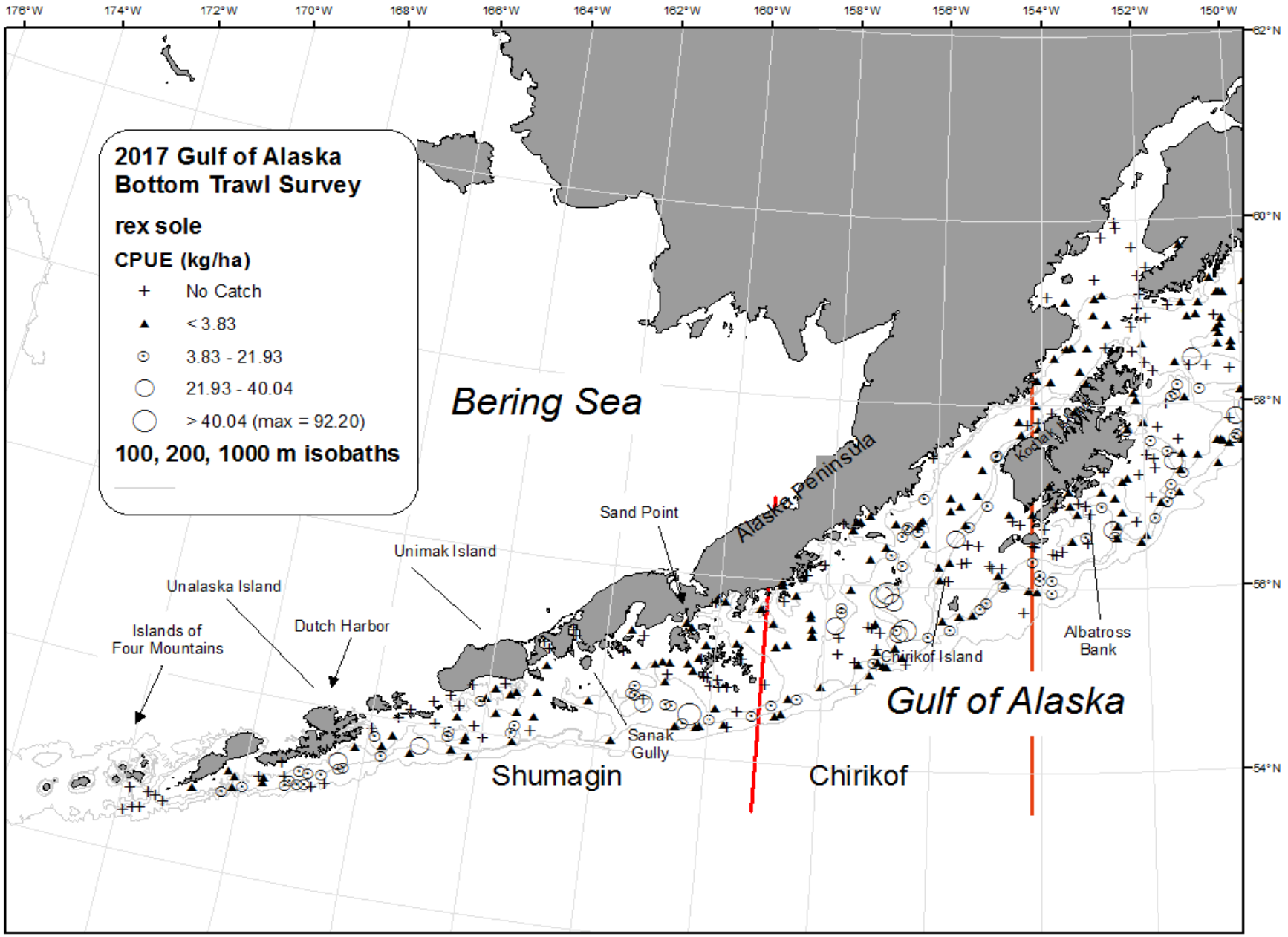

Figure 12. -- Distribution and relative abundance of rex sole from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

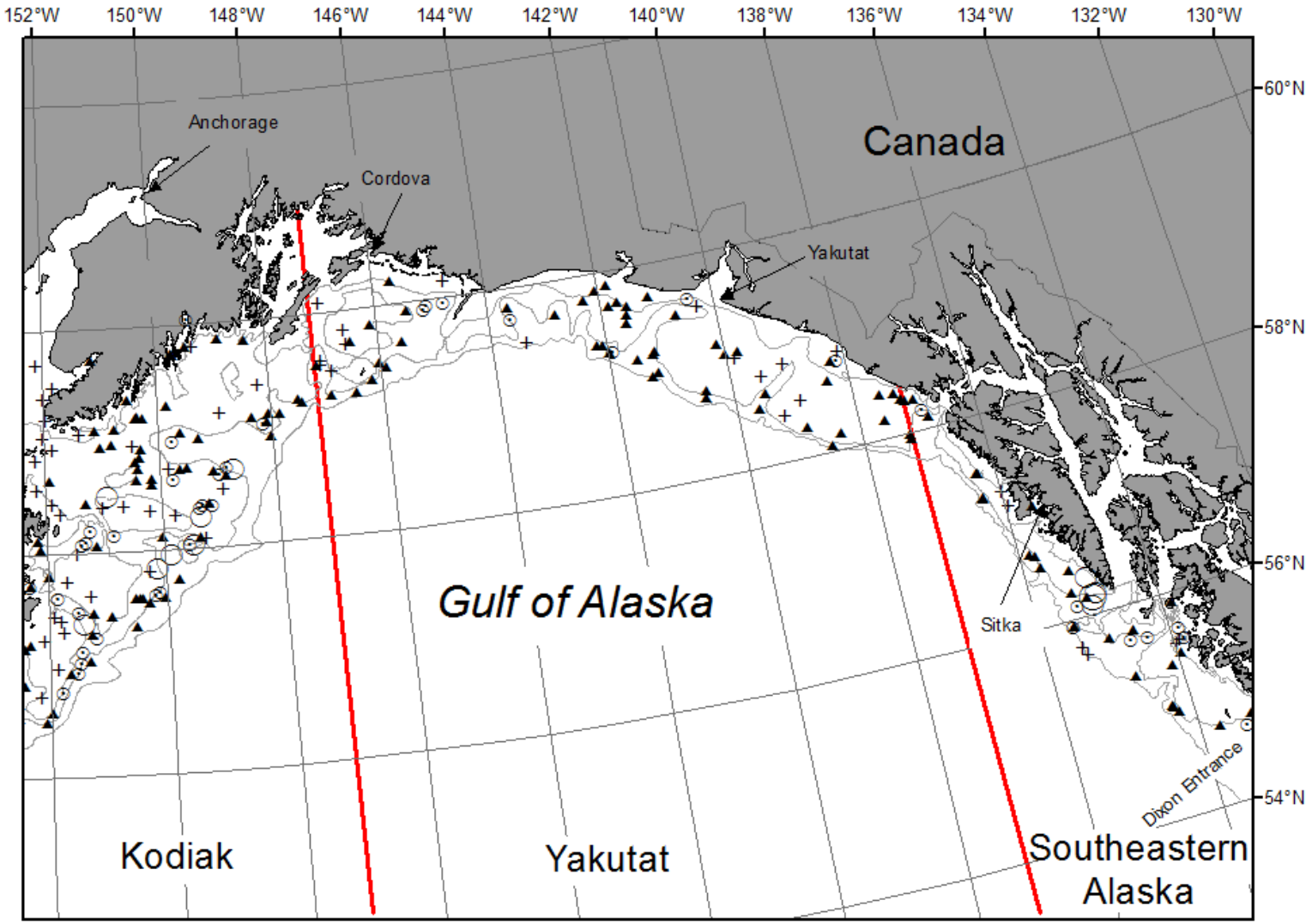

Figure 12. -- Continued (rex sole).

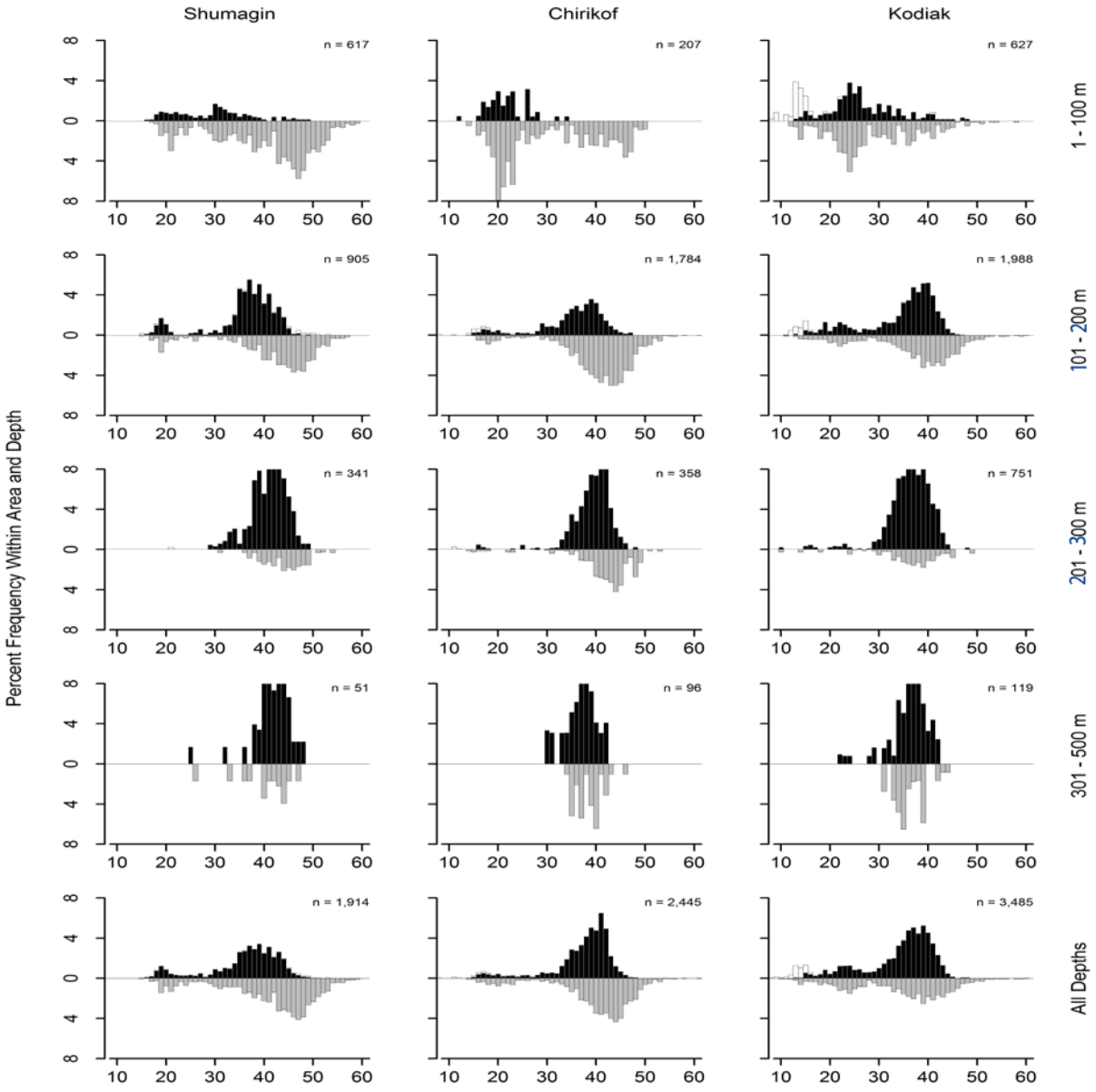

Figure 13. -- Size composition of rex sole from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

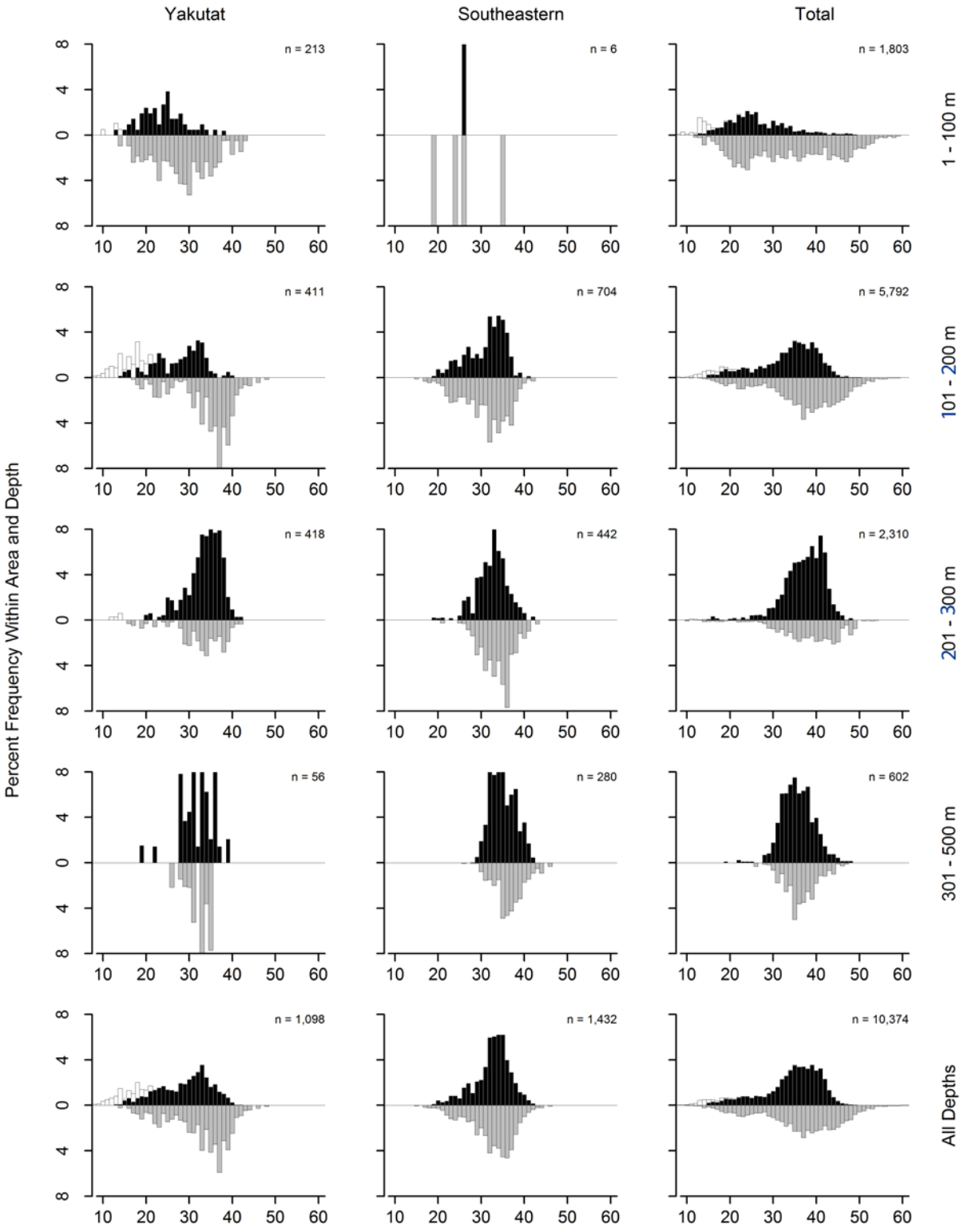

Figure 13. -- Continued (rex sole).

Table 14. -- Catch per unit of effort by stratum for rex sole sorted by descending CPUE for the 2017 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 Deep Gullies	3	3	15.12	3,545	0	8,917
Chirikof	201 - 300	Lower Shelikof Gully	9	9	14.28	14,308	0	38,244
Chirikof	101 - 200	Shelikof Edge	23	23	12.43	9,615	3,909	15,321
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	11.49	1,293	0	4,861
Shumagin	101 - 200	Shumagin Outer Shelf	25	19	10.02	8,173	2,138	14,208
Kodiak	201 - 300	Kodiak Slope	6	6	8.73	1,416	391	2,442
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	9	8.40	3,524	0	7,935
Kodiak	101 - 200	Albatross Gullies	22	21	7.67	6,066	2,880	9,252
Kodiak	201 - 300	Kenai Gullies	11	9	7.35	4,893	0	10,038
Chirikof	101 - 200	Chirikof Outer Shelf	16	16	6.06	3,036	1,336	4,737
Yakutat	101 - 200	Middleton Shelf	7	5	5.53	4,061	0	8,894
Shumagin	201 - 300	Shumagin Slope	13	9	5.37	1,498	381	2,615
Kodiak	101 - 200	Kodiak Outer Shelf	17	17	5.19	2,608	586	4,630
Chirikof	201 - 300	Chirikof Slope	7	7	4.89	748	0	1,809
Kodiak	101 - 200	Portlock Flats	25	21	4.46	3,271	923	5,618
Shumagin	101 - 200	Sanak Gully	4	4	4.25	1,805	0	3,890
Southeastern	201 - 300	Prince of Wales Slope/Gullie	6	6	4.10	1,610	0	3,277
Chirikof	101 - 200	East Shumagin Gully	15	14	3.92	4,355	0	8,843
Southeastern	101 - 200	Prince of Wales Shelf	9	9	3.50	2,410	0	5,132
Yakutat	201 - 300	Yakutat Gullies	7	7	3.05	929	0	2,239
Chirikof	301 - 500	Chirikof Slope	4	4	2.98	477	0	1,379
Shumagin	1 - 100	Shumagin Bank	25	13	2.77	3,432	0	7,431
Kodiak	301 - 500	Kodiak Slope	5	5	2.74	799	0	1,875
Shumagin	1 - 100	Davidson Bank	26	17	2.61	3,570	774	6,366
Shumagin	301 - 500	Shumagin Slope	4	3	2.55	646	0	1,823
Yakutat	201 - 300	Yakutat Slope	10	10	2.14	455	107	804
Southeastern	301 - 500	Southeastern Slope	5	5	1.34	103	0	266
Kodiak	1 - 100	Kenai Peninsula	7	5	1.18	619	0	1,700
Yakutat	1 - 100	Yakutat Shallows	10	8	1.11	1,105	73	2,137
Yakutat	301 - 500	Yakutat Slope	3	3	0.99	151	0	490
Kodiak	1 - 100	Albatross Banks	25	6	0.95	1,465	0	3,340
Kodiak	101 - 200	Kenai Flats	11	8	0.94	1,137	173	2,101
Kodiak	1 - 100	Albatross Shallows	13	5	0.87	503	0	1,083
Shumagin	1 - 100	Fox Islands	9	5	0.87	723	0	2,257
Yakutat	101 - 200	Yakataga Shelf	6	5	0.84	445	0	1,321
Yakutat	501 - 700	Yakutat Slope	2	1	0.84	123	0	1,683
Chirikof	1 - 100	Chirikof Bank	19	7	0.72	773	0	2,010
Shumagin	101 - 200	West Shumagin Gully	3	3	0.68	154	0	512
Kodiak	501 - 700	Kodiak Slope	2	2	0.51	90	19	161
Kodiak	101 - 200	Barren Islands	15	12	0.45	494	179	808
Chirikof	1 - 100	Semidi Bank	10	3	0.38	280	0	696
Shumagin	1 - 100	Lower Alaska Peninsula	14	6	0.28	191	0	513
Yakutat	101 - 200	Yakutat Flats	7	4	0.25	222	0	650
Yakutat	1 - 100	Middleton Shallows	7	4	0.24	160	0	326
Yakutat	101 - 200	Fairweather Shelf	9	8	0.23	175	0	360
Kodiak	1 - 100	Northern Kodiak Shallows	6	3	0.18	39	0	101
Chirikof	1 - 100	Upper Alaska Peninsula	12	8	0.15	119	0	296
Yakutat	301 - 500	Yakutat Gullies	2	2	0.13	14	0	102
Kodiak	201 - 300	Upper Shelikof Gully	3	2	0.09	27	0	125
Southeastern	1 - 100	Southeastern Shallows	7	3	0.04	26	0	61
Kodiak	1 - 100	Lower Cook Inlet	10	2	0.04	39	0	98

Dover sole (*Microstomus pacificus*)

Dover sole was the thirteenth most abundant species caught in the 2017 survey area, with the sixth highest mean CPUE in the Yakutat area (Table 2). Although caught throughout the survey area and in all depth intervals, Dover sole was relatively rare in the Shumagin region (Table 15). The highest densities occurred in the 101-500 m depth range, with a particularly high concentration in the Southeastern Deep Gullies stratum (Fig. 14, Table 16). Size was relatively constant with depth and longitude except at depths less than 100 m, where size was considerably smaller (Fig. 15). The estimated biomass of Dover sole was 58,307 t, and the highest regional biomass was in the Yakutat region. Approximately 96% of the biomass was concentrated at depths between 101 and 500 m (Table 15).

Table 15. -- Number of survey hauls, number of hauls with Dover sole, mean CPUE, biomass, and mean weight, based on the 2017 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	74	2	0.01	37	0	100	0.606
	101 - 200	32	3	0.09	134	0	414	1.743
	201 - 300	13	4	0.22	62	0	146	1.347
	301 - 500	4	1	0.11	27	0	103	0.720
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	10	0.04	260	0	543	1.174
Chirikof	1 - 100	41	5	0.02	55	0	147	0.240
	101 - 200	54	23	0.74	1,775	1,020	2,529	0.989
	201 - 300	16	10	2.56	2,960	0	6,718	0.902
	301 - 500	4	3	1.72	276	0	614	0.815
	501 - 700	3	3	2.76	540	0	1,836	0.813
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	44	0.86	5,605	1,635	9,575	0.889
Kodiak	1 - 100	61	10	0.03	115	14	217	0.265
	101 - 200	90	53	1.38	5,978	2,235	9,722	0.815
	201 - 300	20	14	6.25	7,183	0	17,750	0.984
	301 - 500	5	4	4.76	1,387	0	3,058	0.780
	501 - 700	2	2	1.29	226	0	825	0.661
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	83	1.52	14,890	3,697	26,083	0.866
Yakutat	1 - 100	17	8	0.37	620	0	1,282	0.409
	101 - 200	29	24	5.67	16,665	168	33,162	0.753
	201 - 300	17	17	5.71	2,954	752	5,156	0.817
	301 - 500	5	5	7.75	2,037	0	6,141	0.705
	501 - 700	2	2	1.63	239	0	995	0.876
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	56	4.07	22,516	5,603	39,428	0.740
Southeastern	1 - 100	7	2	0.09	57	0	151	0.189
	101 - 200	18	14	3.53	3,918	534	7,302	0.518
	201 - 300	10	10	4.99	2,520	612	4,429	0.479
	301 - 500	8	8	26.83	8,362	0	18,859	0.750
	501 - 700	2	2	1.74	179	132	227	1.153
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	36	5.6	15,037	5,388	24,686	0.615
All areas	1 - 100	200	27	0.07	885	210	1,559	0.348
	101 - 200	223	117	2.33	28,470	11,289	45,652	0.732
	201 - 300	76	55	4.35	15,680	4,595	26,765	0.804
	301 - 500	26	21	9.45	12,089	623	23,555	0.746
	501 - 700	11	9	1.44	1,184	0	2,380	0.825
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	229	1.89	58,307	37,251	79,364	0.742

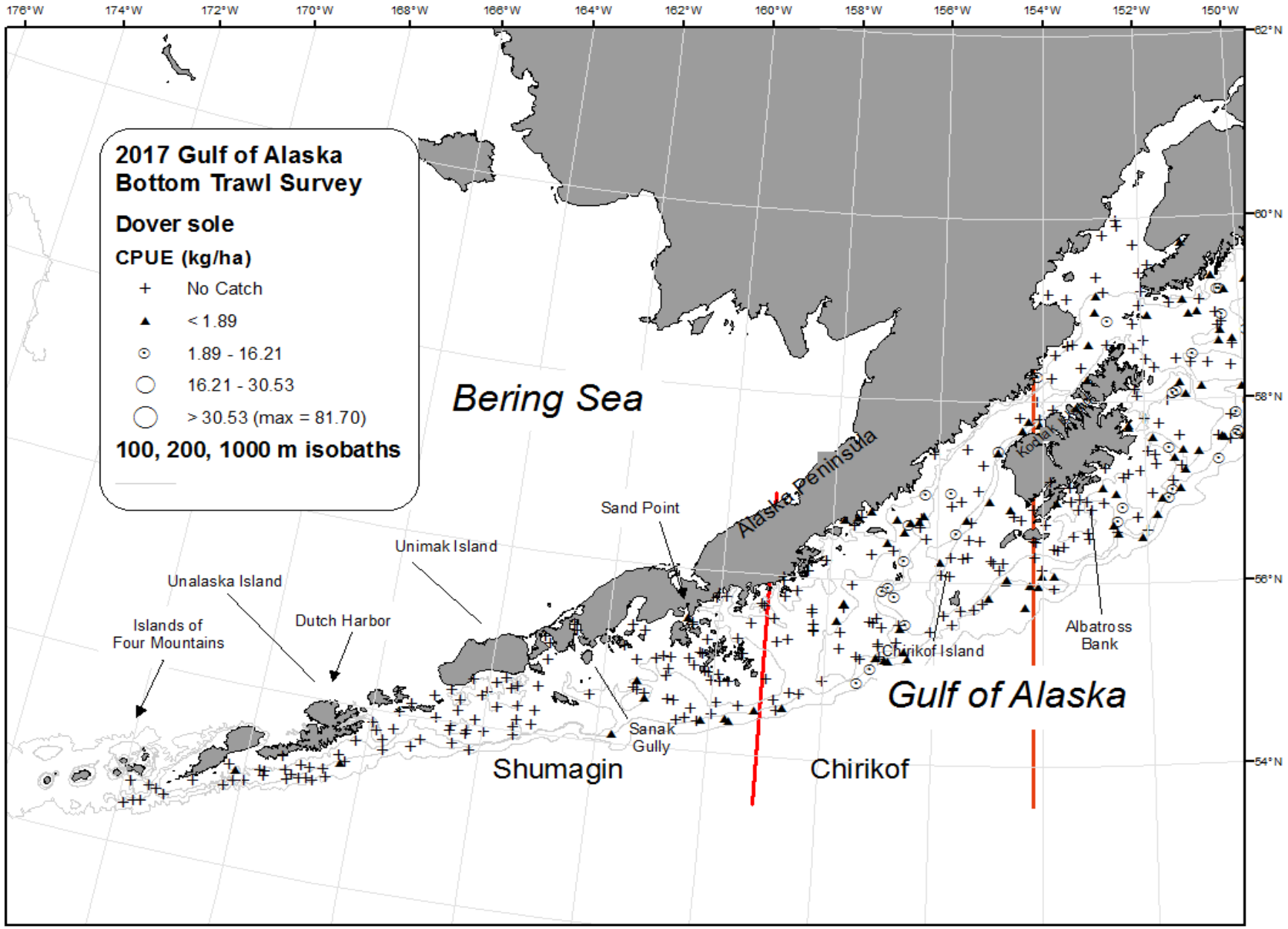

Figure 14. -- Distribution and relative abundance of Dover sole from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

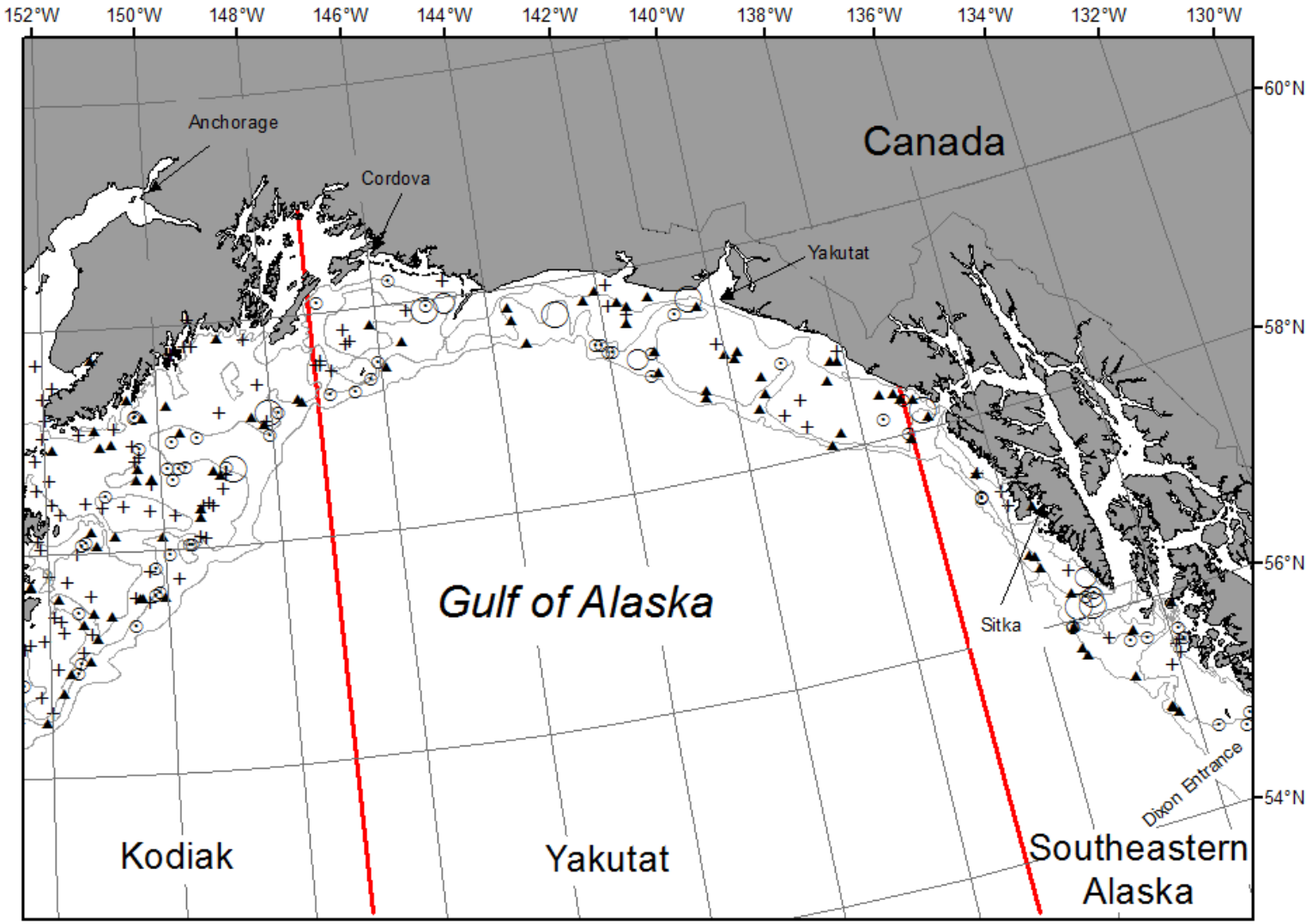

Figure 14. -- Continued (Dover sole).

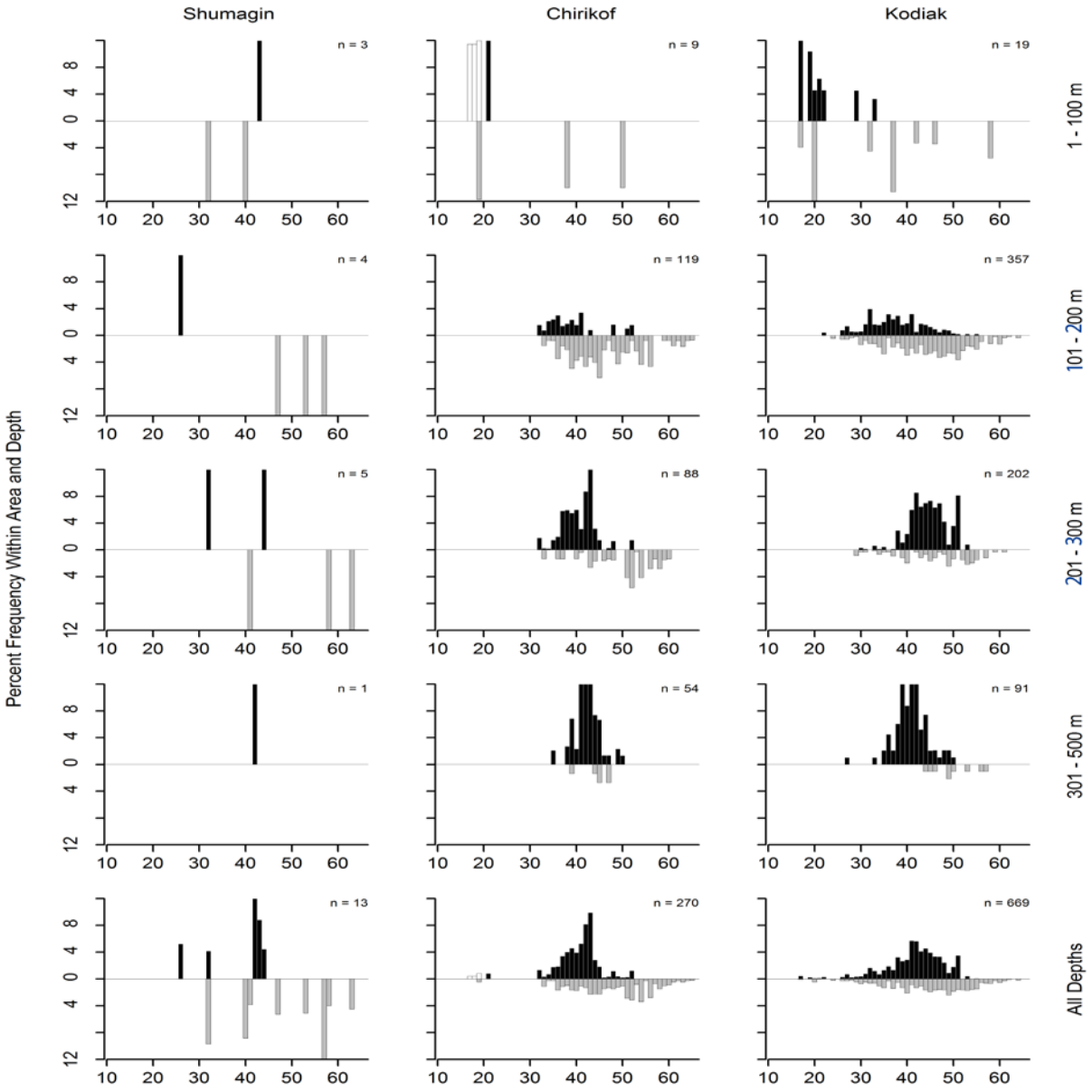

Figure 15. -- Size composition of Dover sole from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

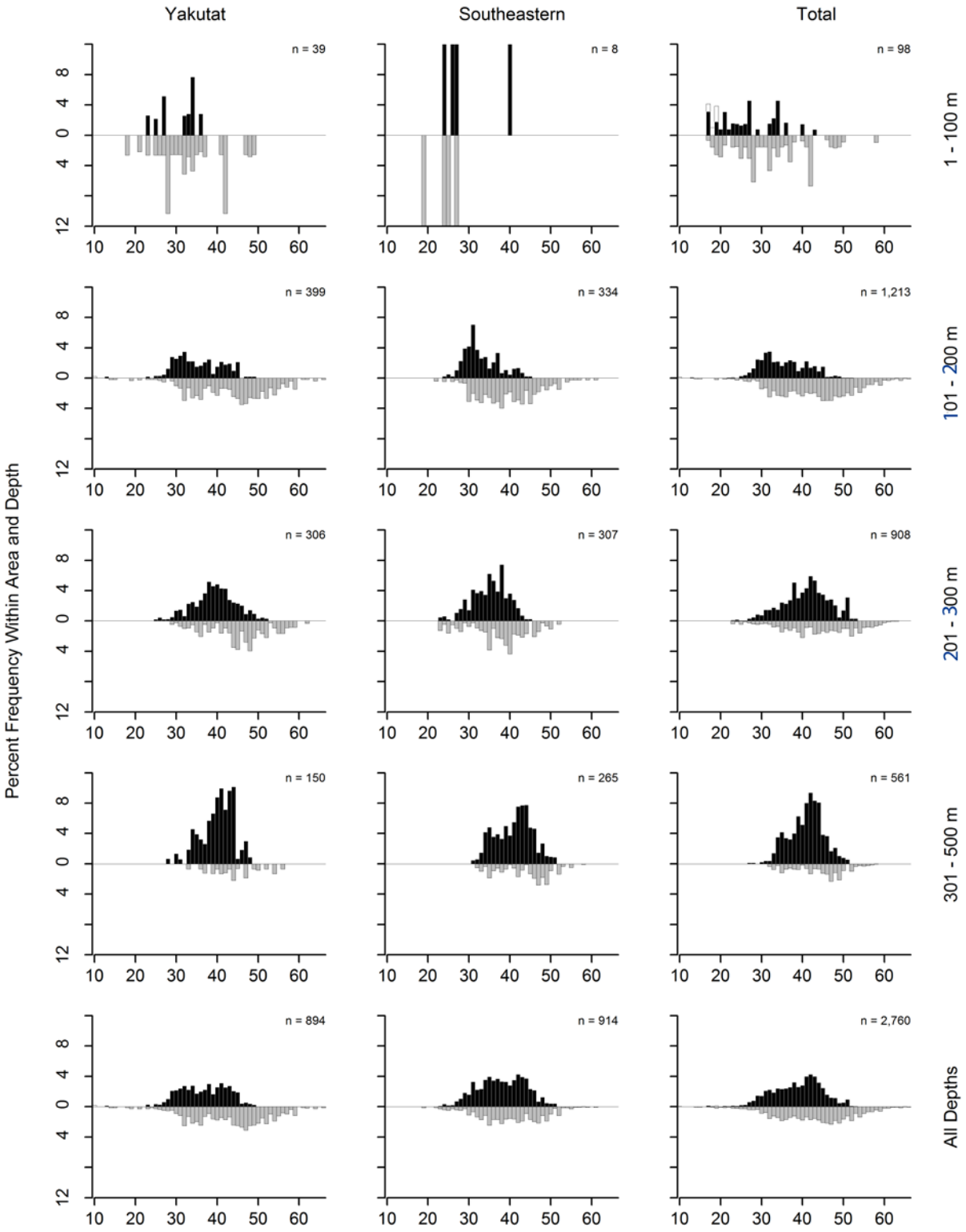

Figure 15. -- Continued (Dover sole).

Table 16. -- Catch per unit of effort by stratum for Dover sole sorted by descending CPUE for the 2017 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 Deep Gullies	3	3	34.20	8,017	0	22,207
Yakutat	101 - 200	Yakataga Shelf	6	4	12.97	6,845	0	24,108
Yakutat	301 - 500	Yakutat Gullies	2	2	12.22	1,353	0	16,259
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	10.93	1,230	0	3,525
Kodiak	201 - 300	Kenai Gullies	11	8	10.34	6,884	0	17,577
Yakutat	101 - 200	Middleton Shelf	7	6	10.05	7,384	0	15,064
Yakutat	201 - 300	Yakutat Slope	10	10	8.23	1,751	0	3,743
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	7	6.20	2,602	0	6,072
Kodiak	301 - 500	Kodiak Slope	5	4	4.76	1,387	0	3,191
Yakutat	301 - 500	Yakutat Slope	3	3	4.50	684	0	2,992
Southeastern	301 - 500	Southeastern Slope	5	5	4.46	345	85	604
Kodiak	101 - 200	Kodiak Outer Shelf	17	12	4.25	2,135	0	5,694
Yakutat	201 - 300	Yakutat Gullies	7	7	3.96	1,204	0	2,551
Southeastern	201 - 300	Prince of Wales Slope/Gullie	6	6	3.29	1,291	166	2,415
Chirikof	201 - 300	Lower Shelikof Gully	9	3	2.82	2,829	0	6,660
Chirikof	501 - 700	Chirikof Slope	3	3	2.76	540	0	2,293
Yakutat	101 - 200	Fairweather Shelf	9	8	1.95	1,506	0	3,678
Southeastern	101 - 200	Prince of Wales Shelf	9	7	1.91	1,316	223	2,409
Chirikof	101 - 200	Shelikof Edge	23	18	1.90	1,470	772	2,169
Southeastern	501 - 700	Southeastern Slope	2	2	1.74	179	38	321
Chirikof	301 - 500	Chirikof Slope	4	3	1.72	276	0	663
Kodiak	201 - 300	Kodiak Slope	6	5	1.71	277	0	554
Kodiak	101 - 200	Portlock Flats	25	14	1.65	1,209	312	2,107
Yakutat	501 - 700	Yakutat Slope	2	2	1.63	239	0	2,471
Kodiak	101 - 200	Albatross Gullies	22	14	1.36	1,077	384	1,770
Kodiak	501 - 700	Kodiak Slope	2	2	1.29	226	0	1,996
Yakutat	101 - 200	Yakutat Flats	7	6	1.03	931	0	2,389
Kodiak	101 - 200	Kenai Flats	11	6	0.99	1,195	158	2,232
Chirikof	201 - 300	Chirikof Slope	7	7	0.86	131	55	206
Yakutat	1 - 100	Middleton Shallows	7	2	0.42	280	0	944
Yakutat	1 - 100	Yakutat Shallows	10	6	0.34	340	47	634
Kodiak	101 - 200	Barren Islands	15	7	0.33	362	18	706
Shumagin	101 - 200	Sanak Gully	4	1	0.23	98	0	408
Shumagin	201 - 300	Shumagin Slope	13	4	0.22	62	0	147
Chirikof	101 - 200	East Shumagin Gully	15	3	0.22	245	0	559
Kodiak	1 - 100	Northern Kodiak Shallows	6	3	0.17	37	0	97
Chirikof	101 - 200	Chirikof Outer Shelf	16	2	0.12	59	0	151
Shumagin	301 - 500	Shumagin Slope	4	1	0.11	27	0	114
Southeastern	1 - 100	Southeastern Shallows	7	2	0.09	57	0	155
Kodiak	201 - 300	Upper Shelikof Gully	3	1	0.07	23	0	121
Shumagin	101 - 200	Shumagin Outer Shelf	25	2	0.05	36	0	89
Chirikof	1 - 100	Chirikof Bank	19	2	0.04	46	0	138
Kodiak	1 - 100	Albatross Banks	25	2	0.03	45	0	129
Kodiak	1 - 100	Kenai Peninsula	7	1	0.03	14	0	47
Kodiak	1 - 100	Albatross Shallows	13	3	0.02	14	0	30
Shumagin	1 - 100	Shumagin Bank	25	1	0.02	30	0	92
Chirikof	1 - 100	Upper Alaska Peninsula	12	3	0.01	9	0	21
Shumagin	1 - 100	Lower Alaska Peninsula	14	1	0.01	7	0	21
Kodiak	1 - 100	Lower Cook Inlet	10	1	0.01	6	0	20

Yellowfin sole (*Limanda aspera*)

Yellowfin sole the sixteenth most abundant species caught in the 2017 survey, and was the eighth most abundant species in the Shumagin region (Table 2). Yellowfin sole were almost exclusively caught at depths less than 100 m and were only caught in the Shumagin, Chirikof, and Kodiak INPFC areas (Table 17). The highest density by far was in the Lower Alaska Peninsula stratum, where 76% of the estimated biomass was concentrated (Fig. 16 and Table 18). Size was highly variable for both sexes and did not exhibit any longitudinal trends (Fig. 17). The estimated biomass of yellowfin sole was 51,547 t, and the highest regional biomass by far was in the Shumagin region, where 77% was concentrated (Table 17).

Table 17. -- Number of survey hauls, number of hauls with yellowfin sole, mean CPUE, biomass, and mean weight, based on the 2017 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	74	15	9.55	39,443	11,505	67,381	0.375
	101 - 200	32	2	0.08	111	0	303	0.370
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	17	6.25	39,554	11,616	67,493	0.375
Chirikof	1 - 100	41	8	1.99	5,180	259	10,102	0.417
	101 - 200	54	0	---	---	---	---	---
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	8	0.80	5,180	259	10,102	0.417
Kodiak	1 - 100	61	7	1.77	6,813	0	14,770	0.273
	101 - 200	90	0	---	---	---	---	---
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	7	0.70	6,813	0	14,770	0.273
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	0	---	---	---	---	---
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	0	---	---	---	---	---
All areas	1 - 100	200	30	3.99	51,436	22,866	80,006	0.361
	101 - 200	223	2	0.01	111	0	303	0.370
	201 - 300	76	0	---	---	---	---	---
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	32	1.67	51,547	22,977	80,118	0.361

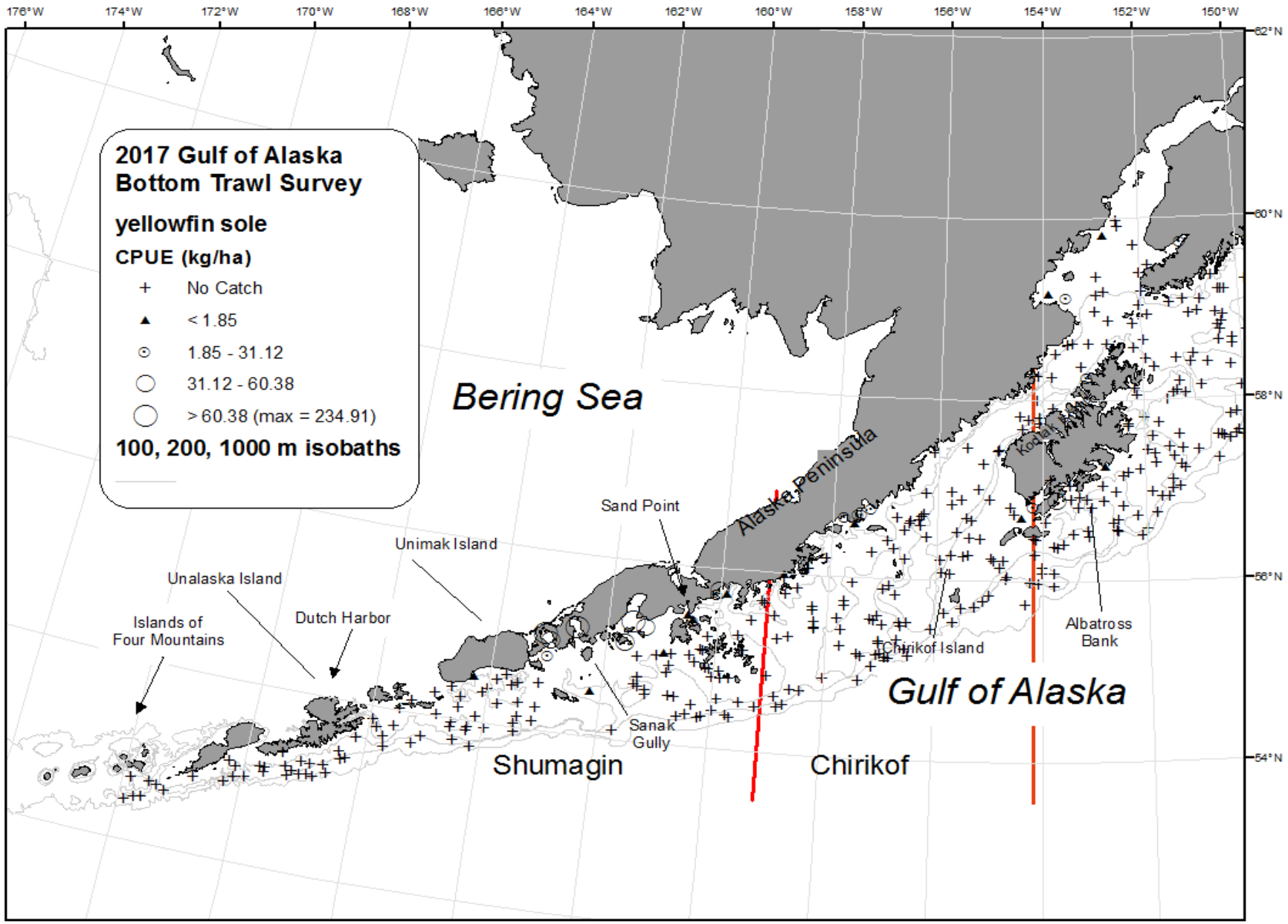

Figure 16. -- Distribution and relative abundance of yellowfin sole from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

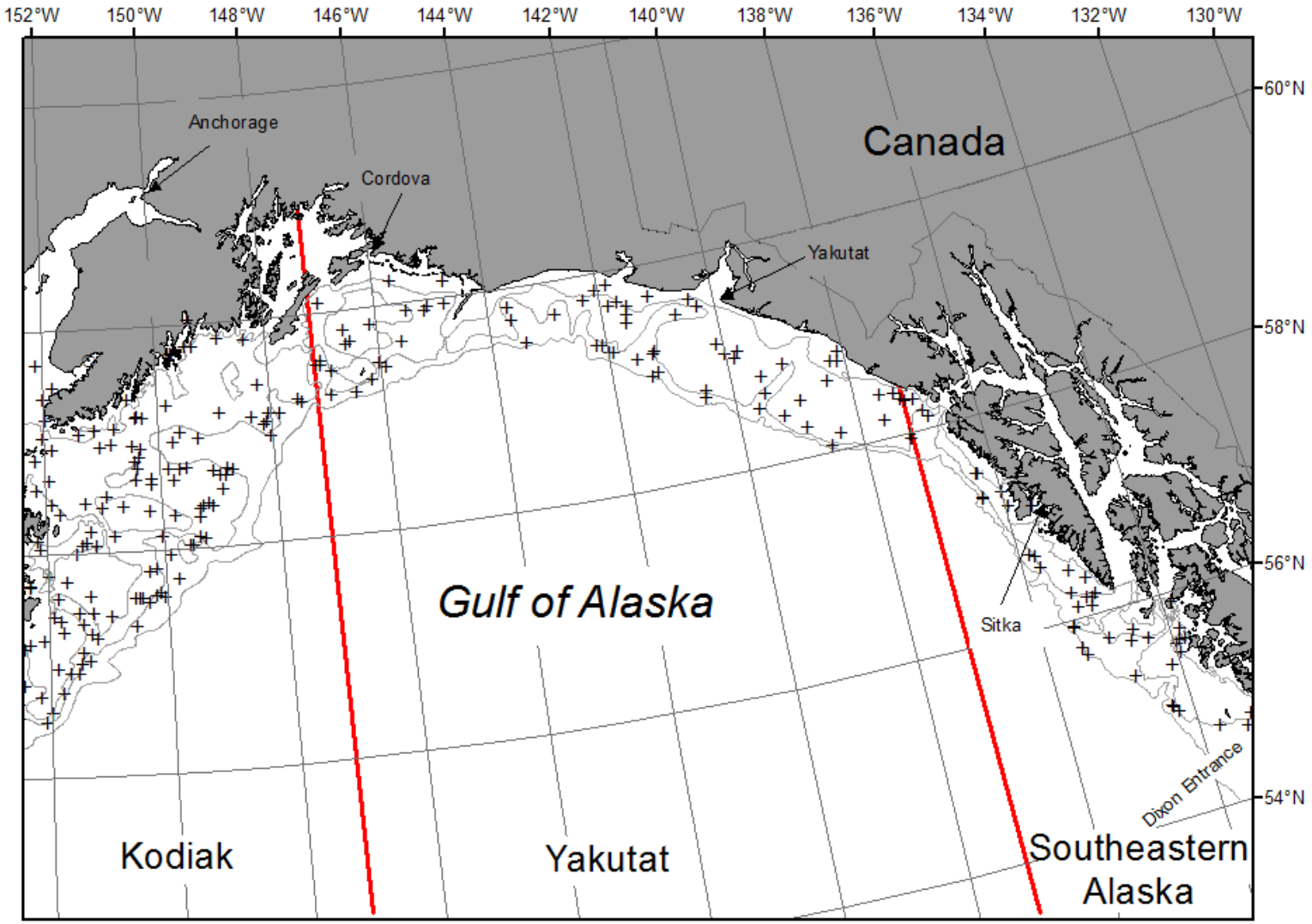

Figure 16. -- Continued (yellowfin sole).

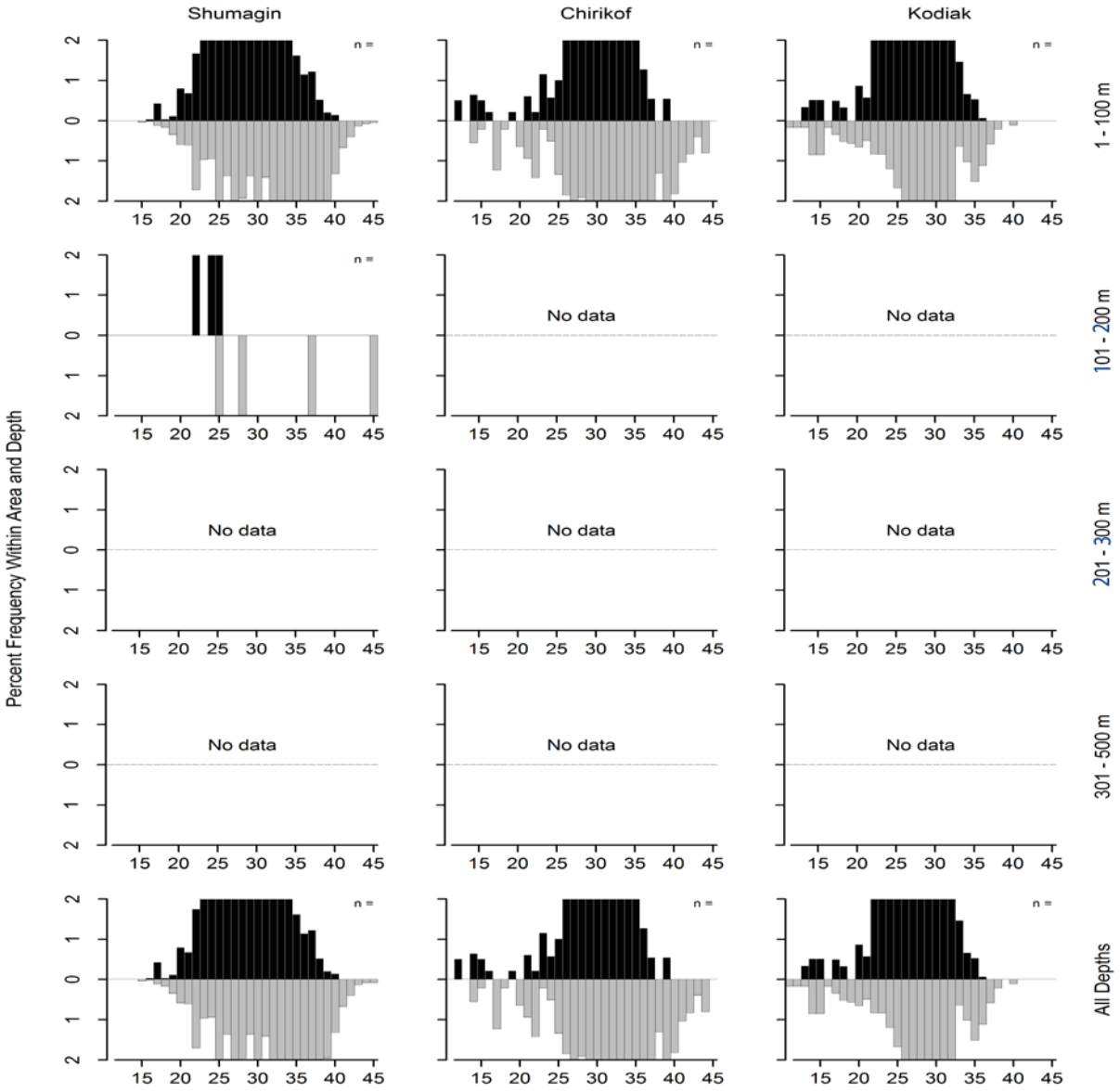

Figure 17. -- Size composition of yellowfin sole from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

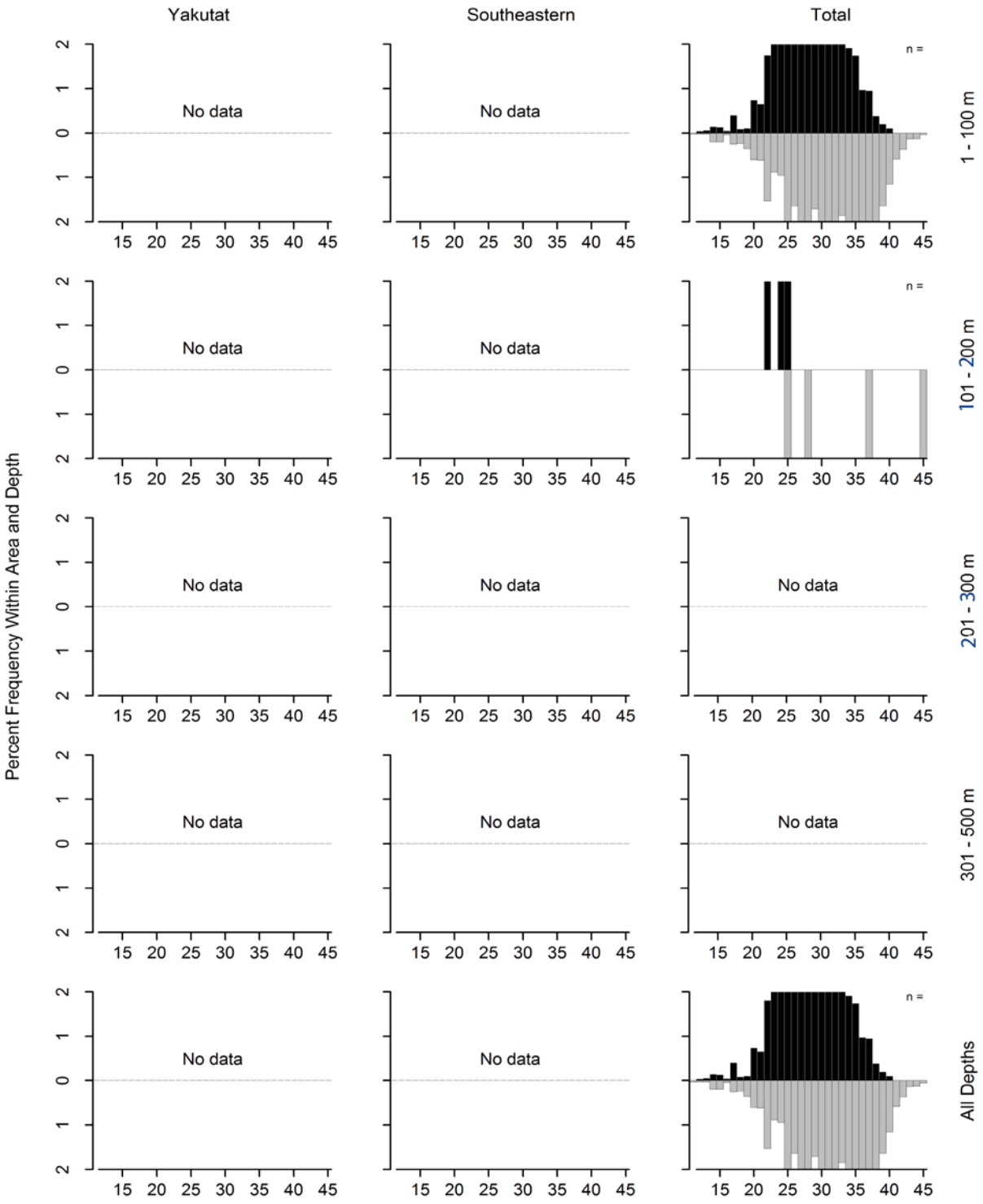

Figure 17. -- Continued (yellowfin sole).

Table 18. -- Catch per unit of effort by stratum for yellowfin sole sorted by descending CPUE for the 2017 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	14	12	57.03	39,216	11,085	67,346
Chirikof	1 - 100	Upper Alaska Peninsula	12	6	5.74	4,555	0	9,424
Kodiak	1 - 100	Albatross Shallows	13	2	4.29	2,472	0	7,797
Kodiak	1 - 100	Lower Cook Inlet	10	4	4.00	3,952	0	10,204
Kodiak	1 - 100	Northern Kodiak Shallows	6	1	1.77	389	0	1,389
Chirikof	1 - 100	Chirikof Bank	19	2	0.58	625	0	1,904
Shumagin	101 - 200	West Shumagin Gully	3	1	0.31	70	0	371
Shumagin	1 - 100	Shumagin Bank	25	2	0.16	198	0	573
Shumagin	101 - 200	Sanak Gully	4	1	0.10	41	0	172
Shumagin	1 - 100	Davidson Bank	26	1	0.02	30	0	91

Other Flatfishes

Alaska plaice (*Pleuronectes quadrituberculatus*)

Alaska plaice was not among the 20 most abundant species caught in the 2017 survey, but it was the eighteenth most abundant species the Chirikof INPFC area (Table 2). Alaska plaice was only caught in the Shumagin, Chirikof, and Kodiak regions at depths less than 200 m (Table 19). The highest densities by far occurred in the Upper and Lower Alaska Peninsula strata at depths less than 100 m, where 74% of the biomass was concentrated (Table 20). The estimated biomass of Alaska plaice was 13,784 t, and the highest regional biomass was in the Chirikof region, where approximately 50% of the biomass was concentrated (Table 19).

Starry flounder (*Platichthys stellatus*)

Starry flounder was not among the 20 most abundant species caught in the 2017 survey, but was among the 20 most abundant species in the Shumagin, Chirikof, and Yakutat INPFC areas (Table 2). Starry flounder were caught throughout the survey area except for the Southeastern region, and almost exclusively at depths less than 100 m (Table 21). The highest densities by far occurred in the Lower and Upper Alakas Peninusuala strata at depths less than 100 m (Table 22). The estimated biomass of starry flounder was 28,013 t, and the highest regional biomass was essentially tied between the Shumagin and Chirikof regions (Table 21).

English sole (*Parophrys vetulus*)

English sole was not among the 20 most abundant species caught in the 2017 survey, but it was eighteenth most abundant species in the Southeastern INPFC area (Table 2). English sole

were caught throughout the survey area but almost exclusively at depths less than 200 m (Table 23). The highest densities occurred in the Prince of Wales Shelf, Northern Kodiak Shallows, Lower Alaska Peninsula, and Yakutat Shallows strata at depths less than 200 m (Table 24). The estimated biomass of English sole was 12,789 t, and the highest regional biomass was in the Southeastern region, where approximately 32% of the biomass was concentrated (Table 23).

Butter sole (*Isopsetta isolepis*)

Butter sole was not among the 20 most abundant species caught in the 2017 survey, but it was the twentieth most abundant species in the Yakutat INPFC area (Table 2). Butter sole were caught throughout the survey area except for the Southeastern region, and almost exclusively at depths less than 200 m (Table 25). The highest densities occurred in 5 different strata from all INPFC areas except Southeastern, all but one at depths less than 100 m (Table 26). The estimated biomass of butter sole was 13,862 t, and the highest regional biomass were in the Chirikof region (Table 25).

Table 19. -- Number of survey hauls, number of hauls with Alaska plaice, mean CPUE, biomass, and mean weight, based on the 2017 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	74	14	1.16	4,785	757	8,813	0.798
	101 - 200	32	0	---	---	---	---	---
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	14	0.76	4,785	757	8,813	0.798
Chirikof	1 - 100	41	9	2.63	6,839	0	14,976	1.288
	101 - 200	54	0	---	---	---	---	---
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	9	1.05	6,839	0	14,976	1.288
Kodiak	1 - 100	61	6	0.55	2,110	0	5,182	0.948
	101 - 200	90	1	0.01	50	0	155	1.699
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	7	0.22	2,159	0	5,234	0.958
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	0	---	---	---	---	---
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	0	---	---	---	---	---
All areas	1 - 100	200	29	1.06	13,734	4,573	22,895	1.015
	101 - 200	223	1	<0.01	50	0	155	1.699
	201 - 300	76	0	---	---	---	---	---
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	30	0.45	13,784	4,622	22,945	1.017

Table 20. -- Catch per unit of effort by stratum for Alaska plaice sorted by descending CPUE for the 2017 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	1 - 100	Upper Alaska Peninsula	12	6	7.03	5,584	0	13,593
Shumagin	1 - 100	Lower Alaska Peninsula	14	12	6.80	4,673	623	8,723
Kodiak	1 - 100	Lower Cook Inlet	10	3	1.85	1,830	0	4,919
Chirikof	1 - 100	Chirikof Bank	19	3	1.16	1,255	0	3,689
Kodiak	1 - 100	Northern Kodiak Shallows	6	1	0.84	184	0	657
Kodiak	1 - 100	Albatross Shallows	13	2	0.17	95	0	236
Shumagin	1 - 100	Davidson Bank	26	1	0.07	96	0	293
Kodiak	101 - 200	Barren Islands	15	1	0.05	50	0	156
Shumagin	1 - 100	Shumagin Bank	25	1	0.01	16	0	50

Table 21. -- Number of survey hauls, number of hauls with starry flounder, mean CPUE, biomass, and mean weight, based on the 2017 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	74	13	2.44	10,064	0	20,265	1.657
	101 - 200	32	1	0.09	132	0	552	4.069
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	14	1.61	10,196	0	20,400	1.669
Chirikof	1 - 100	41	13	4.43	11,535	0	24,913	1.780
	101 - 200	54	0	---	---	---	---	---
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	13	1.78	11,535	0	24,913	1.780
Kodiak	1 - 100	61	12	0.67	2,587	148	5,026	1.921
	101 - 200	90	1	0.01	29	0	88	1.852
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	13	0.27	2,616	176	5,055	1.920
Yakutat	1 - 100	17	4	2.20	3,665	0	8,394	1.431
	101 - 200	29	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	4	0.66	3,665	0	8,394	1.431
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	0	---	---	---	---	---
All areas	1 - 100	200	42	2.16	27,852	10,880	44,824	1.692
	101 - 200	223	2	0.01	161	0	535	3.353
	201 - 300	76	0	---	---	---	---	---
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	44	0.91	28,013	11,039	44,986	1.697

Table 22. -- Catch per unit of effort by stratum for starry flounder sorted by descending CPUE for the 2017 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	14	9	11.71	8,050	0	18,117
Chirikof	1 - 100	Upper Alaska Peninsula	12	5	8.26	6,559	0	19,297
Chirikof	1 - 100	Chirikof Bank	19	8	4.61	4,977	0	10,555
Yakutat	1 - 100	Yakutat Shallows	10	3	3.01	2,997	0	7,668
Kodiak	1 - 100	Albatross Shallows	13	4	2.01	1,160	0	3,234
Shumagin	1 - 100	Davidson Bank	26	3	1.35	1,843	0	4,871
Kodiak	1 - 100	Lower Cook Inlet	10	5	1.30	1,289	0	2,803
Yakutat	1 - 100	Middleton Shallows	7	1	1.00	668	0	2,302
Kodiak	1 - 100	Northern Kodiak Shallows	6	3	0.63	138	0	301
Shumagin	101 - 200	West Shumagin Gully	3	1	0.58	132	0	700
Shumagin	1 - 100	Shumagin Bank	25	1	0.14	171	0	524
Kodiak	101 - 200	Albatross Gullies	22	1	0.04	29	0	88

Table 23. -- Number of survey hauls, number of hauls with English sole, mean CPUE, biomass, and mean weight, based on the 2017 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	74	19	0.59	2,439	0	6,664	0.381
	101 - 200	32	0	---	---	---	---	---
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	19	0.39	2,439	0	6,664	0.381
Chirikof	1 - 100	41	12	0.43	1,111	237	1,985	0.123
	101 - 200	54	3	0.02	53	0	153	0.688
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	15	0.18	1,164	285	2,043	0.128
Kodiak	1 - 100	61	14	0.53	2,029	256	3,801	0.485
	101 - 200	90	6	0.12	523	0	1,059	1.147
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	20	0.26	2,552	721	4,382	0.550
Yakutat	1 - 100	17	8	1.35	2,252	0	4,722	0.490
	101 - 200	29	4	0.08	250	0	718	0.648
	201 - 300	17	1	0.02	10	0	35	0.603
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	13	0.45	2,511	5	5,018	0.502
Southeastern	1 - 100	7	2	0.98	639	0	1,618	0.268
	101 - 200	18	5	3.14	3,482	0	9,172	0.436
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	1	0.01	2	0	8	0.381
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	8	1.54	4,123	0	9,803	0.398
All areas	1 - 100	200	55	0.66	8,469	3,378	13,560	0.319
	101 - 200	223	18	0.35	4,307	0	10,045	0.484
	201 - 300	76	1	<0.01	10	0	35	0.603
	301 - 500	26	1	<0.01	2	0	8	0.381
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	75	0.41	12,789	5,505	20,073	0.360

Table 24. -- Catch per unit of effort by stratum for English sole sorted by descending CPUE for the 2017 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	Prince of Wales Shelf	9	3	4.62	3,179	0	8,957
Kodiak	1 - 100	Northern Kodiak Shallows	6	3	3.11	684	0	2,321
Shumagin	1 - 100	Lower Alaska Peninsula	14	7	3.08	2,121	0	6,364
Yakutat	1 - 100	Yakutat Shallows	10	6	2.08	2,070	0	4,561
Southeastern	1 - 100	Southeastern Shallows	7	2	0.98	639	0	1,652
Chirikof	1 - 100	Upper Alaska Peninsula	12	5	0.78	615	0	1,264
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	2	0.72	303	0	811
Kodiak	1 - 100	Albatross Shallows	13	3	0.59	338	0	854
Kodiak	1 - 100	Albatross Banks	25	5	0.53	818	0	1,883
Chirikof	1 - 100	Chirikof Bank	19	7	0.46	496	0	1,148
Yakutat	101 - 200	Yakataga Shelf	6	2	0.41	217	0	704
Yakutat	1 - 100	Middleton Shallows	7	2	0.27	182	0	491
Kodiak	101 - 200	Barren Islands	15	2	0.26	287	0	709
Kodiak	101 - 200	Albatross Gullies	22	2	0.21	169	0	503
Kodiak	1 - 100	Lower Cook Inlet	10	2	0.17	165	0	524
Shumagin	1 - 100	Fox Islands	9	2	0.15	126	0	376
Shumagin	1 - 100	Shumagin Bank	25	6	0.12	149	0	321
Kodiak	101 - 200	Portlock Flats	25	1	0.06	47	0	144
Kodiak	1 - 100	Kenai Peninsula	7	1	0.05	24	0	81
Yakutat	101 - 200	Fairweather Shelf	9	2	0.04	33	0	91
Chirikof	101 - 200	East Shumagin Gully	15	2	0.04	48	0	149
Yakutat	201 - 300	Yakutat Gullies	7	1	0.03	10	0	36
Shumagin	1 - 100	Davidson Bank	26	4	0.03	43	0	88
Southeastern	301 - 500	Southeastern Slope	5	1	0.03	2	0	9
Kodiak	101 - 200	Kenai Flats	11	1	0.02	20	0	65
Chirikof	101 - 200	Chirikof Outer Shelf	16	1	0.01	5	0	15

Table 25. -- Number of survey hauls, number of hauls with butter sole, mean CPUE, biomass, and mean weight, based on the 2017 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	74	12	0.51	2,114	0	4,872	0.447
	101 - 200	32	1	<0.01	5	0	20	0.151
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	13	0.33	2,119	0	4,877	0.445
Chirikof	1 - 100	41	18	1.78	4,622	1,442	7,802	0.321
	101 - 200	54	0	---	---	---	---	---
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	18	0.71	4,622	1,442	7,802	0.321
Kodiak	1 - 100	61	11	0.41	1,571	0	3,328	0.255
	101 - 200	90	4	0.53	2,284	0	5,752	0.244
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	15	0.39	3,856	54	7,657	0.248
Yakutat	1 - 100	17	5	1.95	3,252	0	8,986	0.301
	101 - 200	29	0	---	---	---	---	---
	201 - 300	17	1	0.03	14	0	46	0.401
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	6	0.59	3,266	0	9,000	0.301
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	0	---	---	---	---	---
All areas	1 - 100	200	46	0.90	11,559	4,481	18,637	0.320
	101 - 200	223	5	0.19	2,289	0	5,757	0.244
	201 - 300	76	1	<0.01	14	0	46	0.401
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	52	0.45	13,862	6,187	21,536	0.304

Table 26. -- Catch per unit of effort by stratum for butter sole sorted by descending CPUE for the 2017 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	Yakutat Shallows	10	4	2.92	2,900	0	8,667
Shumagin	1 - 100	Lower Alaska Peninsula	14	7	2.55	1,751	0	4,520
Chirikof	1 - 100	Chirikof Bank	19	11	2.50	2,697	321	5,072
Chirikof	1 - 100	Upper Alaska Peninsula	12	7	2.43	1,926	0	4,283
Kodiak	101 - 200	Barren Islands	15	2	2.05	2,253	0	5,743
Kodiak	1 - 100	Albatross Shallows	13	4	1.37	792	0	2,147
Kodiak	1 - 100	Northern Kodiak Shallows	6	2	0.96	212	0	745
Kodiak	1 - 100	Lower Cook Inlet	10	3	0.56	555	0	1,716
Yakutat	1 - 100	Middleton Shallows	7	1	0.52	352	0	1,213
Shumagin	1 - 100	Shumagin Bank	25	3	0.21	259	0	674
Shumagin	1 - 100	Fox Islands	9	1	0.11	95	0	315
Yakutat	201 - 300	Yakutat Gullies	7	1	0.05	14	0	47
Kodiak	101 - 200	Albatross Gullies	22	2	0.04	31	0	87
Shumagin	101 - 200	West Shumagin Gully	3	1	0.02	5	0	26
Kodiak	1 - 100	Albatross Banks	25	2	0.01	12	0	30
Shumagin	1 - 100	Davidson Bank	26	1	0.01	8	0	25

ROUNDFISHES

Walleye pollock (*Gadus chalcogramma*)

Walleye pollock was the third most abundant species caught in the 2017 survey, including the second most abundant species in the Shumagin INPFC area, and ranked among the top 20 most abundant species in all INPFC areas (Table 2). Although walleye pollock were caught throughout the survey area and at all survey depths, the bulk of the estimated biomass was concentrated at depths less than 200 m (Table 27). The highest densitiy by far occurred in the Davidson Bank stratum at depths less than 100 m, where 55% of the estimated biomass was concentrated (Fig. 18 and Table 28). Size generally increased with depth, although multiple length modes were common (Fig. 19). The estimated biomass of walleye pollock was 315,116 t, and the highest regional biomass by far was in the Shumagin region, where 68% of the estimated biomass was concentrated (Table 27).

Table 27. -- Number of survey hauls, number of hauls with walleye pollock, mean CPUE, biomass, and mean weight, based on the 2017 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	74	55	49.97	206,327	0	485,687	0.681
	101 - 200	32	27	4.06	5,960	2,452	9,469	0.590
	201 - 300	13	13	5.77	1,609	414	2,805	0.867
	301 - 500	4	1	2.80	708	0	2,673	0.698
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	96	33.91	214,605	0	493,993	0.679
Chirikof	1 - 100	41	32	6.12	15,936	6,052	25,820	0.539
	101 - 200	54	45	1.85	4,414	311	8,518	0.477
	201 - 300	16	14	2.77	3,197	1,603	4,791	0.119
	301 - 500	4	3	0.41	65	0	130	0.737
	501 - 700	3	1	0.23	46	0	191	0.650
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	95	3.64	23,658	13,002	34,314	0.359
Kodiak	1 - 100	61	39	2.52	9,715	4,361	15,069	0.112
	101 - 200	90	77	6.95	30,099	3,761	56,438	0.475
	201 - 300	20	19	3.42	3,928	1,045	6,812	0.217
	301 - 500	5	2	0.21	60	0	174	0.557
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	137	4.47	43,803	16,810	70,795	0.260
Yakutat	1 - 100	17	14	0.67	1,111	434	1,788	0.053
	101 - 200	29	27	2.05	6,029	1,261	10,797	0.153
	201 - 300	17	16	3.83	1,979	406	3,553	0.136
	301 - 500	5	4	1.20	315	0	705	0.947
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	61	1.71	9,435	4,458	14,411	0.125
Southeastern	1 - 100	7	4	17.85	11,683	0	39,277	0.071
	101 - 200	18	18	8.25	9,146	0	20,557	0.109
	201 - 300	10	10	4.97	2,511	1,276	3,746	0.625
	301 - 500	8	3	0.88	276	0	932	1.255
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	35	8.80	23,616	0	52,398	0.094
All areas	1 - 100	200	144	18.97	244,773	0	525,381	0.405
	101 - 200	223	194	4.55	55,649	26,929	84,369	0.270
	201 - 300	76	72	3.67	13,225	9,491	16,960	0.202
	301 - 500	26	13	1.11	1,423	0	3,357	0.808
	501 - 700	11	1	0.06	46	0	191	0.650
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	424	10.22	315,116	32,936	597,296	0.359

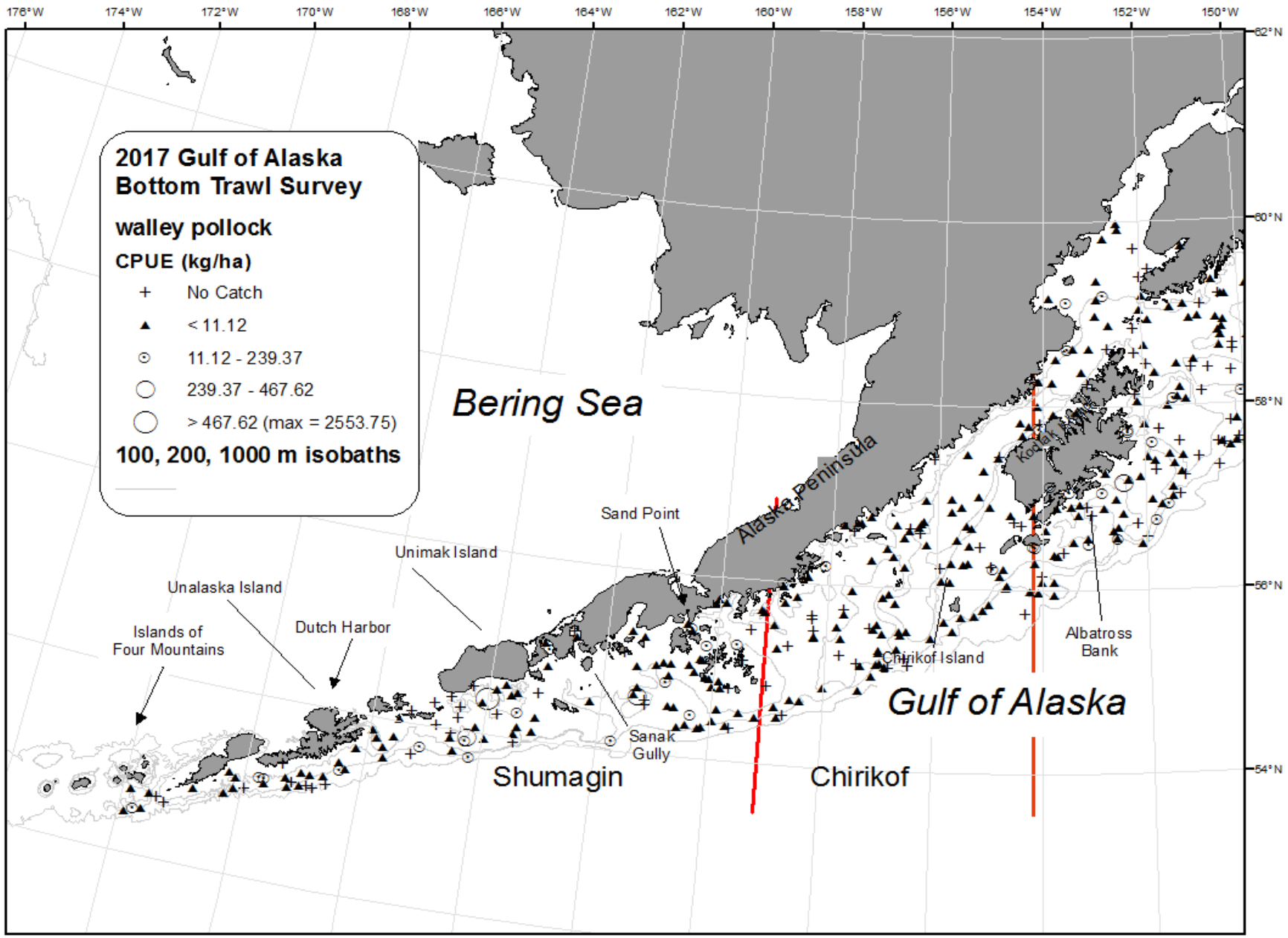

Figure 18. -- Distribution and relative abundance of walleye pollock from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

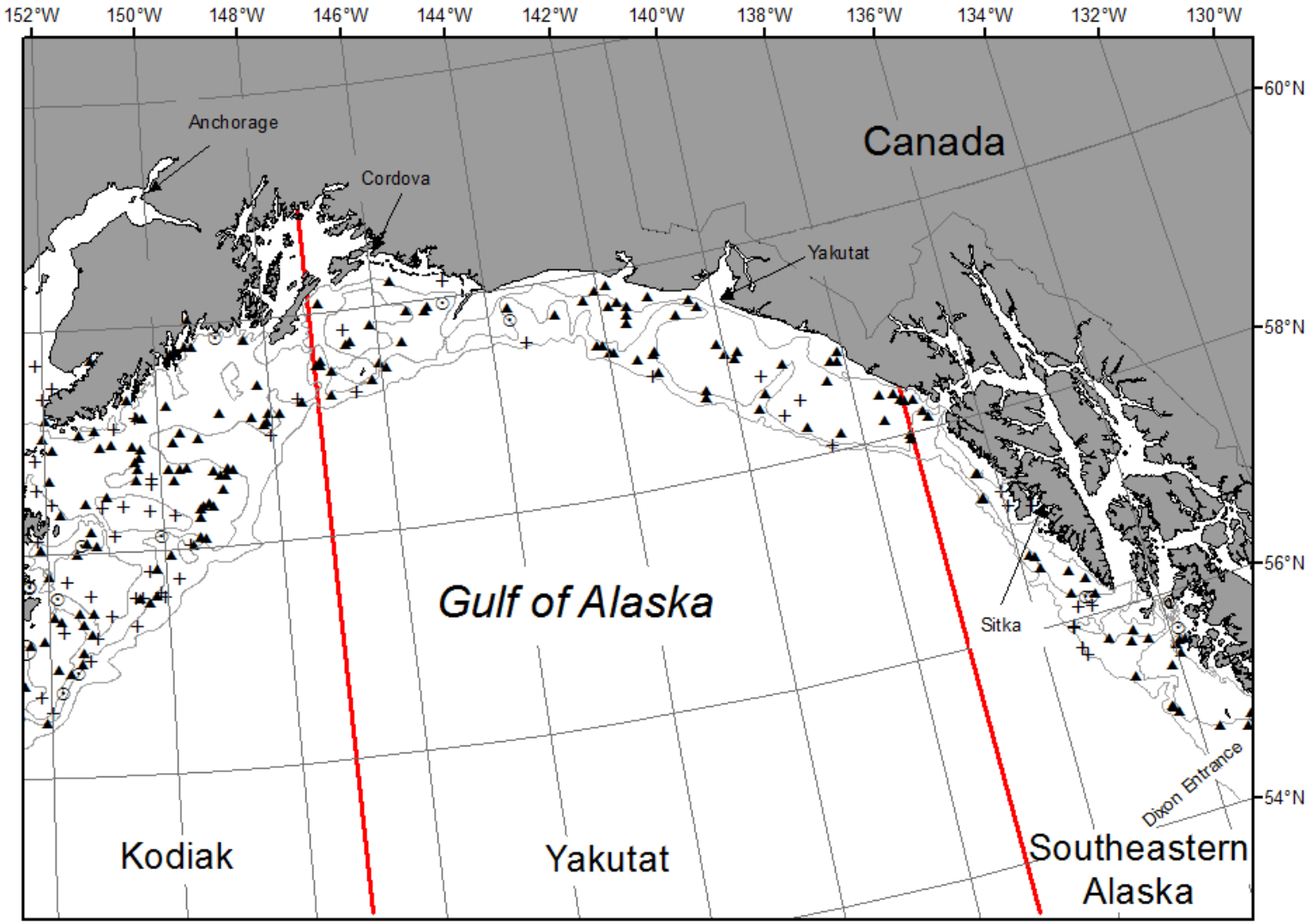

Figure 18. -- Continued (walleye pollock).

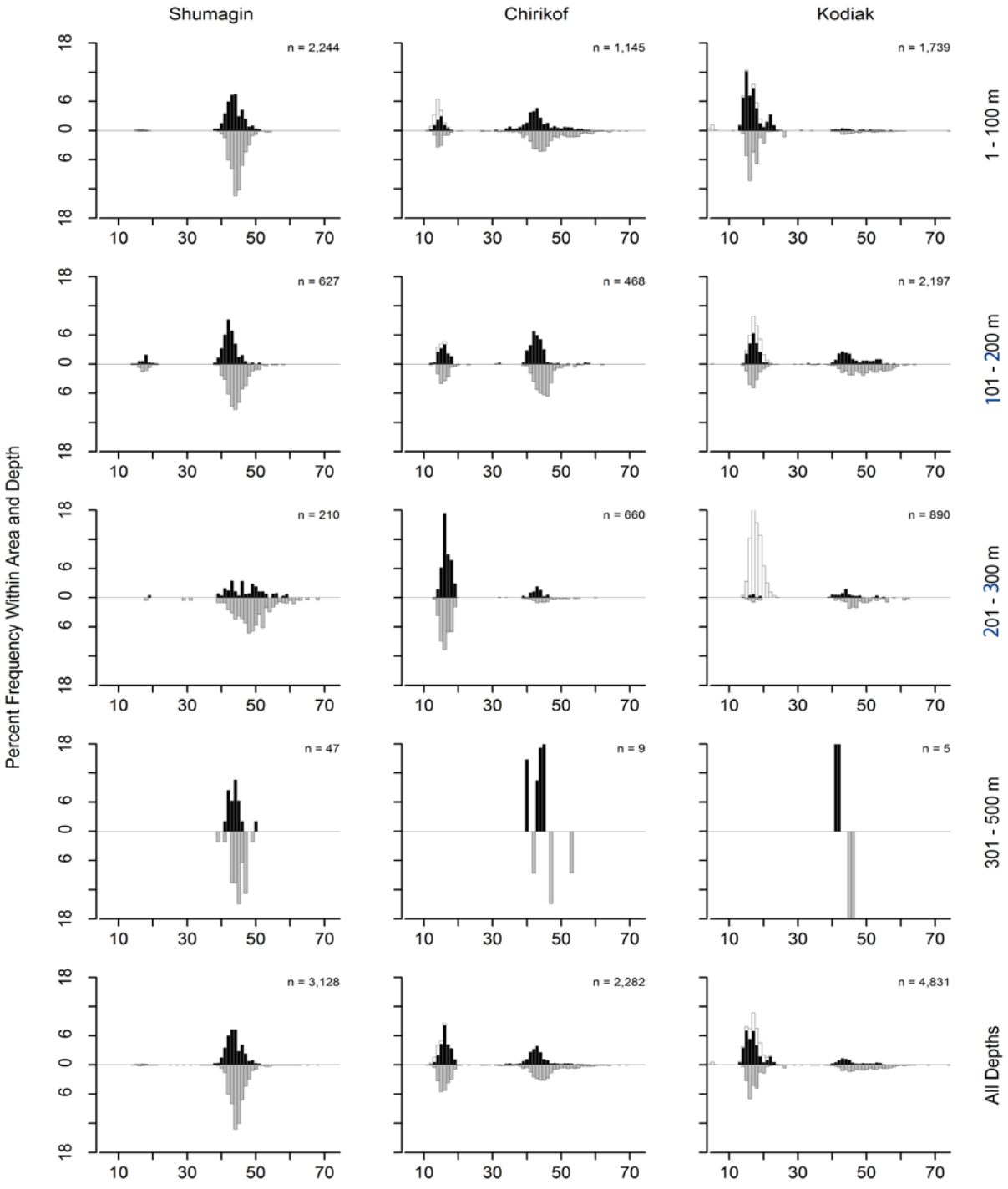

Figure 19. -- Size composition of walleye pollock from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

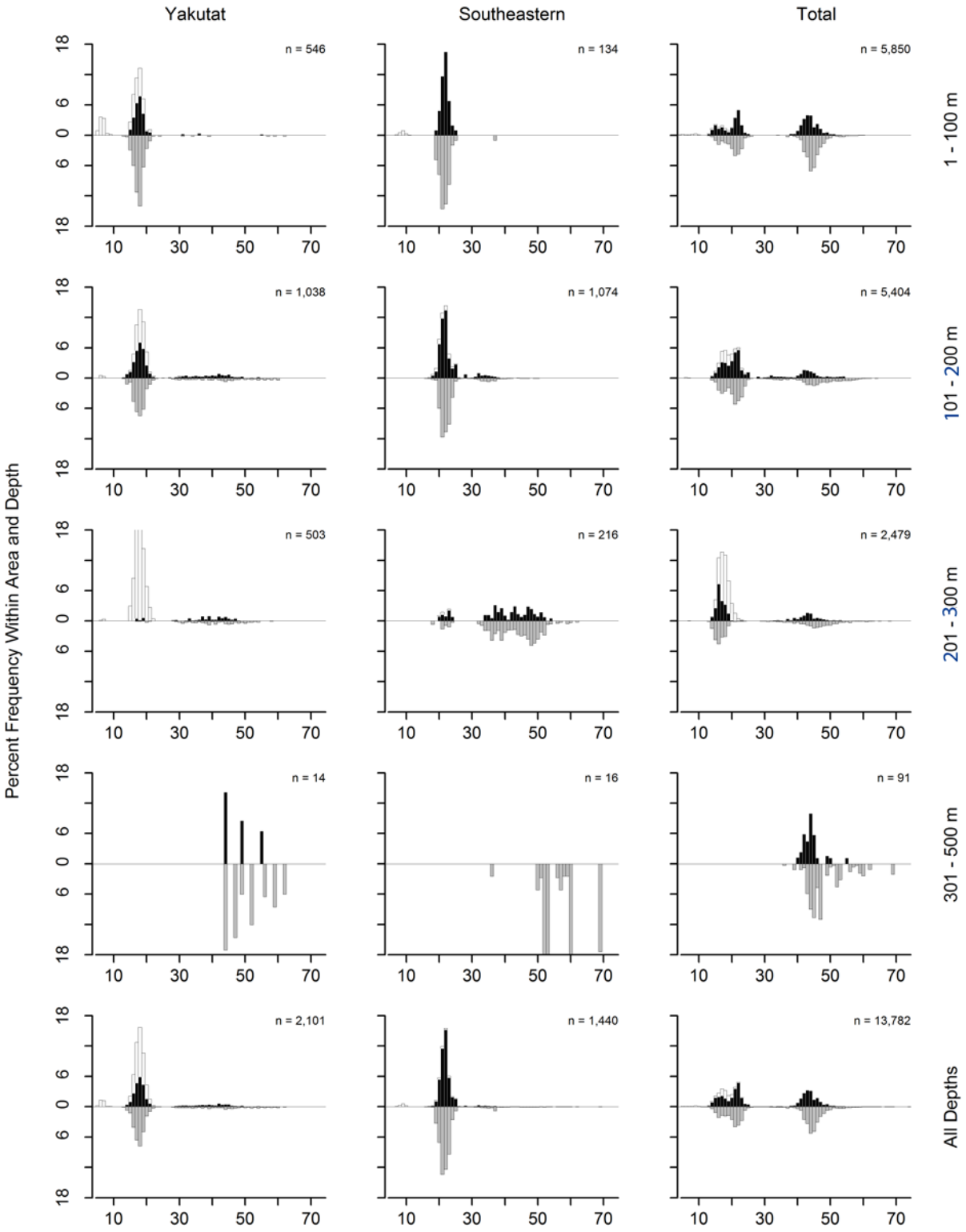

Figure 19. -- Continued (walleye pollock).

Table 28. -- Catch per unit of effort by stratum for walleye pollock sorted by descending CPUE for the 2017 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	26	16	127.41	174,308	0	452,932
Kodiak	101 - 200	Albatross Gullies	22	19	21.73	17,195	0	41,182
Shumagin	1 - 100	Shumagin Bank	25	20	19.48	24,156	0	54,262
Southeastern	1 - 100	Southeastern Shallows	7	4	17.85	11,683	0	40,234
Southeastern	101 - 200	Prince of Wales Shelf	9	9	11.52	7,933	0	19,521
Shumagin	1 - 100	Lower Alaska Peninsula	14	12	10.24	7,042	0	18,317
Chirikof	1 - 100	Chirikof Bank	19	15	9.49	10,243	1,046	19,441
Kodiak	201 - 300	Kodiak Slope	6	5	8.30	1,347	0	3,377
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	7.72	869	0	1,840
Kodiak	101 - 200	Barren Islands	15	14	6.80	7,461	0	18,118
Chirikof	1 - 100	Upper Alaska Peninsula	12	10	6.68	5,302	1,014	9,591
Shumagin	101 - 200	West Shumagin Gully	3	2	6.36	1,450	0	5,074
Kodiak	1 - 100	Northern Kodiak Shallows	6	4	5.98	1,316	0	3,382
Shumagin	201 - 300	Shumagin Slope	13	13	5.77	1,609	403	2,815
Yakutat	201 - 300	Yakutat Gullies	7	7	5.30	1,612	18	3,206
Shumagin	101 - 200	Shumagin Outer Shelf	25	21	5.16	4,205	1,153	7,258
Yakutat	101 - 200	Middleton Shelf	7	7	4.94	3,629	0	8,439
Kodiak	1 - 100	Albatross Shallows	13	9	4.65	2,683	0	5,423
Southeastern	201 - 300	Prince of Wales Slope/Gullie	6	6	4.18	1,642	552	2,732
Kodiak	101 - 200	Kenai Flats	11	10	3.35	4,044	0	11,715
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	9	2.89	1,213	196	2,230
Chirikof	201 - 300	Lower Shelikof Gully	9	9	2.85	2,859	1,291	4,426
Shumagin	301 - 500	Shumagin Slope	4	1	2.80	708	0	2,960
Kodiak	201 - 300	Upper Shelikof Gully	3	3	2.62	841	0	2,205
Kodiak	201 - 300	Kenai Gullies	11	11	2.61	1,740	0	4,059
Kodiak	1 - 100	Kenai Peninsula	7	6	2.61	1,370	0	2,767
Chirikof	101 - 200	East Shumagin Gully	15	10	2.60	2,887	0	6,916
Kodiak	1 - 100	Lower Cook Inlet	10	7	2.31	2,283	0	6,051
Chirikof	201 - 300	Chirikof Slope	7	5	2.22	339	0	794
Yakutat	101 - 200	Fairweather Shelf	9	8	1.91	1,477	164	2,791
Yakutat	201 - 300	Yakutat Slope	10	9	1.73	368	63	673
Yakutat	301 - 500	Yakutat Gullies	2	2	1.53	169	0	977
Kodiak	1 - 100	Albatross Banks	25	13	1.34	2,063	0	4,506
Chirikof	101 - 200	Chirikof Outer Shelf	16	16	1.34	669	80	1,258
Kodiak	101 - 200	Kodiak Outer Shelf	17	11	1.23	617	0	1,628
Chirikof	101 - 200	Shelikof Edge	23	19	1.11	859	188	1,529
Kodiak	101 - 200	Portlock Flats	25	23	1.07	782	176	1,389
Yakutat	101 - 200	Yakataga Shelf	6	6	1.03	545	0	1,180
Shumagin	1 - 100	Fox Islands	9	7	0.99	822	0	2,154
Southeastern	301 - 500	Southeastern Slope	5	2	0.98	76	0	211
Yakutat	301 - 500	Yakutat Slope	3	2	0.96	146	0	685
Southeastern	301 - 500	Southeastern Deep Gullies	3	1	0.85	200	0	1,062
Shumagin	101 - 200	Sanak Gully	4	4	0.72	305	0	923
Yakutat	1 - 100	Middleton Shallows	7	5	0.70	467	0	1,031
Yakutat	1 - 100	Yakutat Shallows	10	9	0.65	644	139	1,149
Chirikof	1 - 100	Semidi Bank	10	7	0.54	390	0	950
Yakutat	101 - 200	Yakutat Flats	7	6	0.42	379	0	777
Chirikof	301 - 500	Chirikof Slope	4	3	0.41	65	0	140
Chirikof	501 - 700	Chirikof Slope	3	1	0.23	46	0	243
Kodiak	301 - 500	Kodiak Slope	5	2	0.21	60	0	183

Pacific cod (*Gadus macrocephalus*)

Pacific cod was the tenth most abundant species caught in the 2017 survey and was among the 20 most abundant species in all INPFC areas except Yakutat (Table 2). Pacific cod were caught almost exclusively at depths less than 300 m (Table 29). The highest densities occurred at depths less than 200 m in the Shumagin and Chirikof regions (Fig. 20 and Table 30). Size was relatively constant with depth and region (Fig. 21). The estimated biomass of Pacific cod was 107,324 t, with 98% concentrated at depths less than 200 m (Table 29).

Table 29. -- Number of survey hauls, number of hauls with Pacific cod, mean CPUE, biomass, and mean weight, based on the 2017 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	74	55	9.03	37,302	17,475	57,129	2.029
	101 - 200	32	29	6.90	10,122	5,835	14,409	2.757
	201 - 300	13	6	2.39	666	0	1,519	2.031
	301 - 500	4	1	0.96	242	0	914	11.081
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	91	7.64	48,332	28,084	68,580	2.157
Chirikof	1 - 100	41	21	6.78	17,660	411	34,909	1.723
	101 - 200	54	37	3.71	8,857	2,634	15,079	3.024
	201 - 300	16	2	0.11	128	0	377	2.453
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	60	4.10	26,644	8,383	44,906	2.014
Kodiak	1 - 100	61	32	2.11	8,110	3,564	12,655	1.008
	101 - 200	90	58	3.76	16,290	11,230	21,350	1.906
	201 - 300	20	1	0.15	172	0	594	1.832
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	91	2.51	24,572	17,855	31,289	1.472
Yakutat	1 - 100	17	2	0.46	759	0	1,902	3.840
	101 - 200	29	2	0.22	659	0	1,872	2.930
	201 - 300	17	1	0.04	20	0	66	2.606
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	5	0.26	1,439	0	2,983	3.342
Southeastern	1 - 100	7	2	3.98	2,606	0	8,707	1.776
	101 - 200	18	12	2.09	2,320	895	3,746	1.798
	201 - 300	10	6	2.79	1,411	0	3,083	2.078
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	20	2.36	6,337	0	12,676	1.844
All areas	1 - 100	200	112	5.15	66,438	40,065	92,810	1.732
	101 - 200	223	138	3.13	38,248	29,164	47,333	2.295
	201 - 300	76	16	0.66	2,396	551	4,241	2.065
	301 - 500	26	1	0.19	242	0	914	11.081
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	267	3.48	107,324	79,603	135,046	1.910

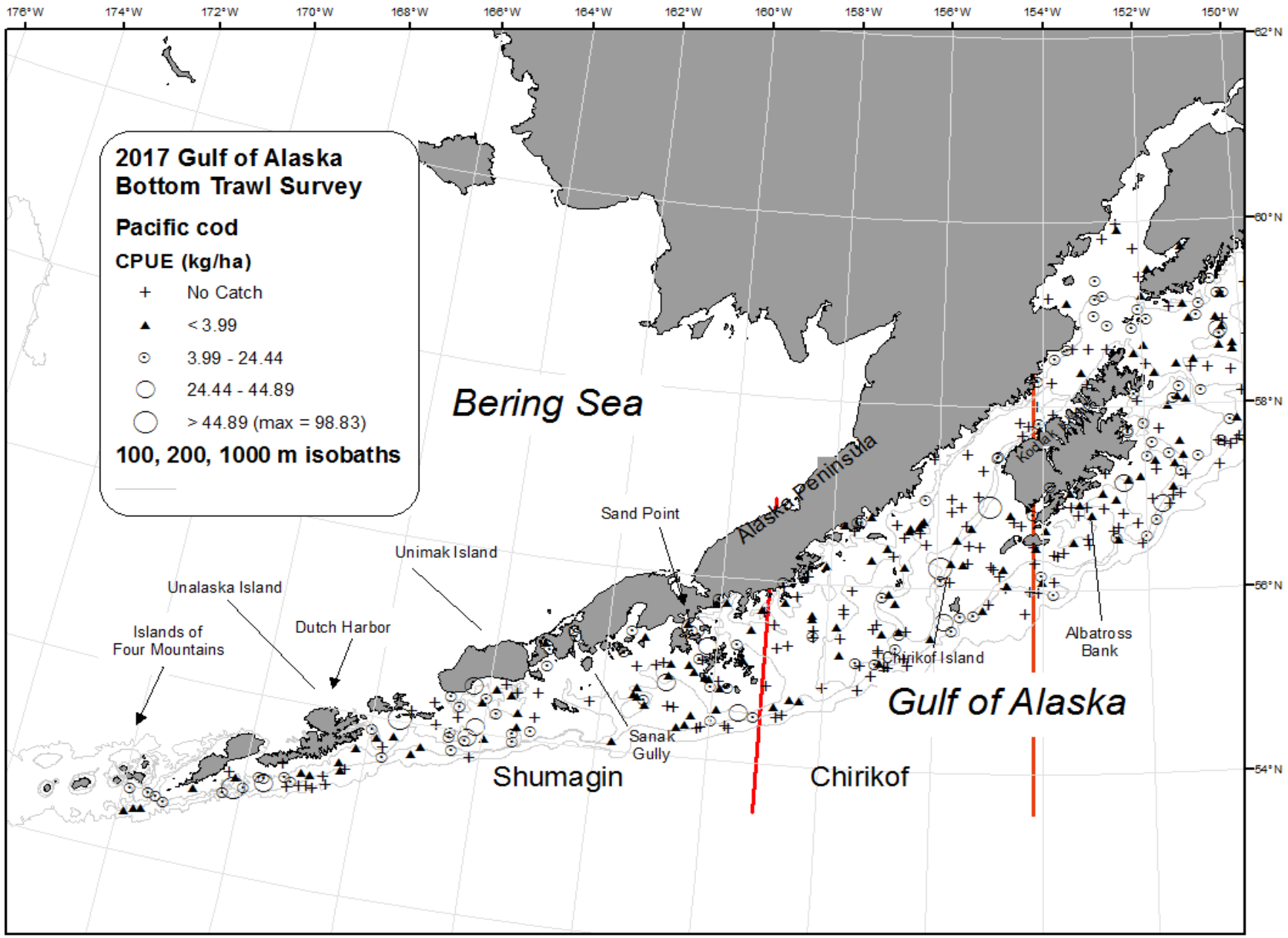

Figure 20. -- Distribution and relative abundance of Pacific cod from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

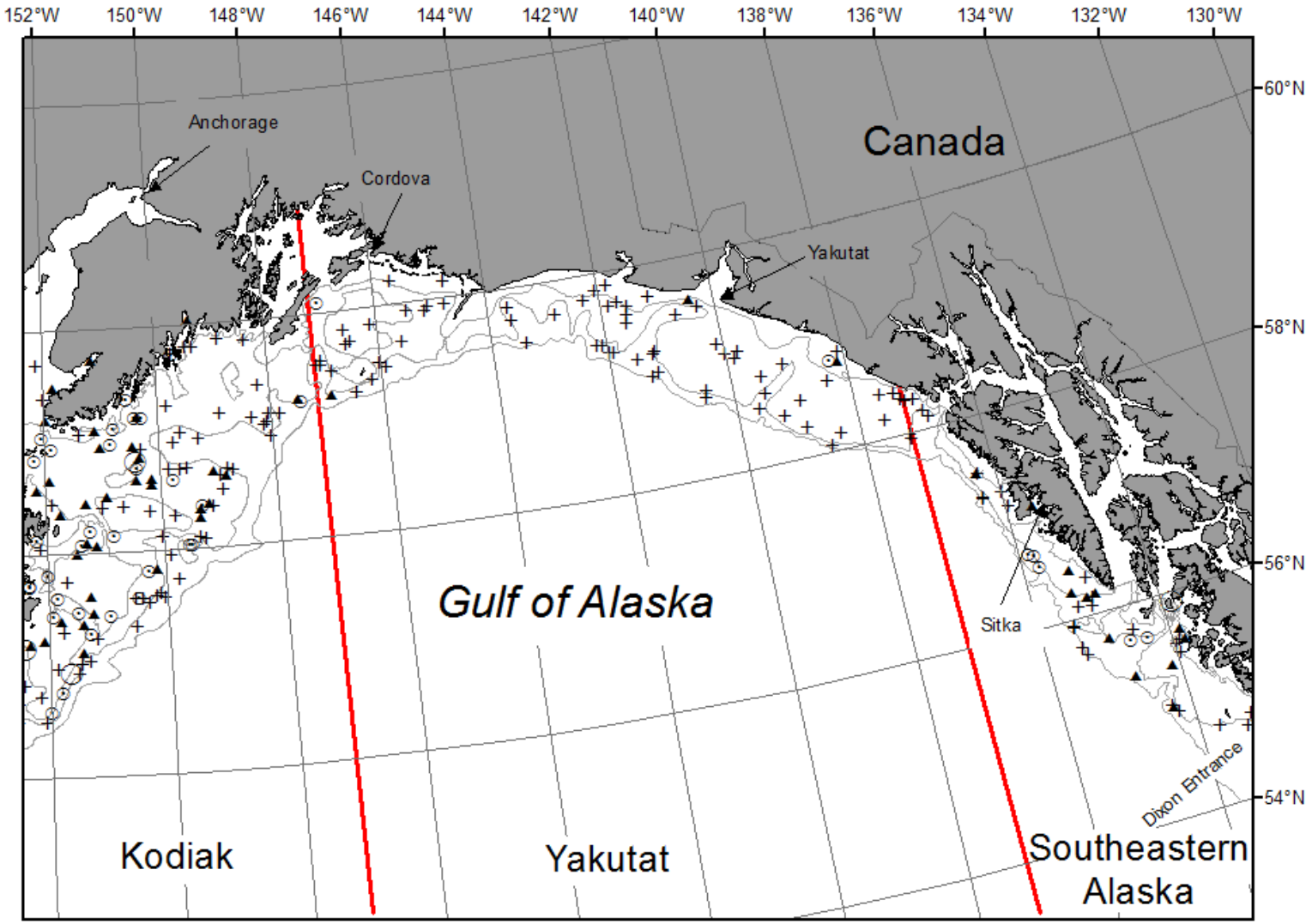

Figure 20. -- Continued (Pacific cod).

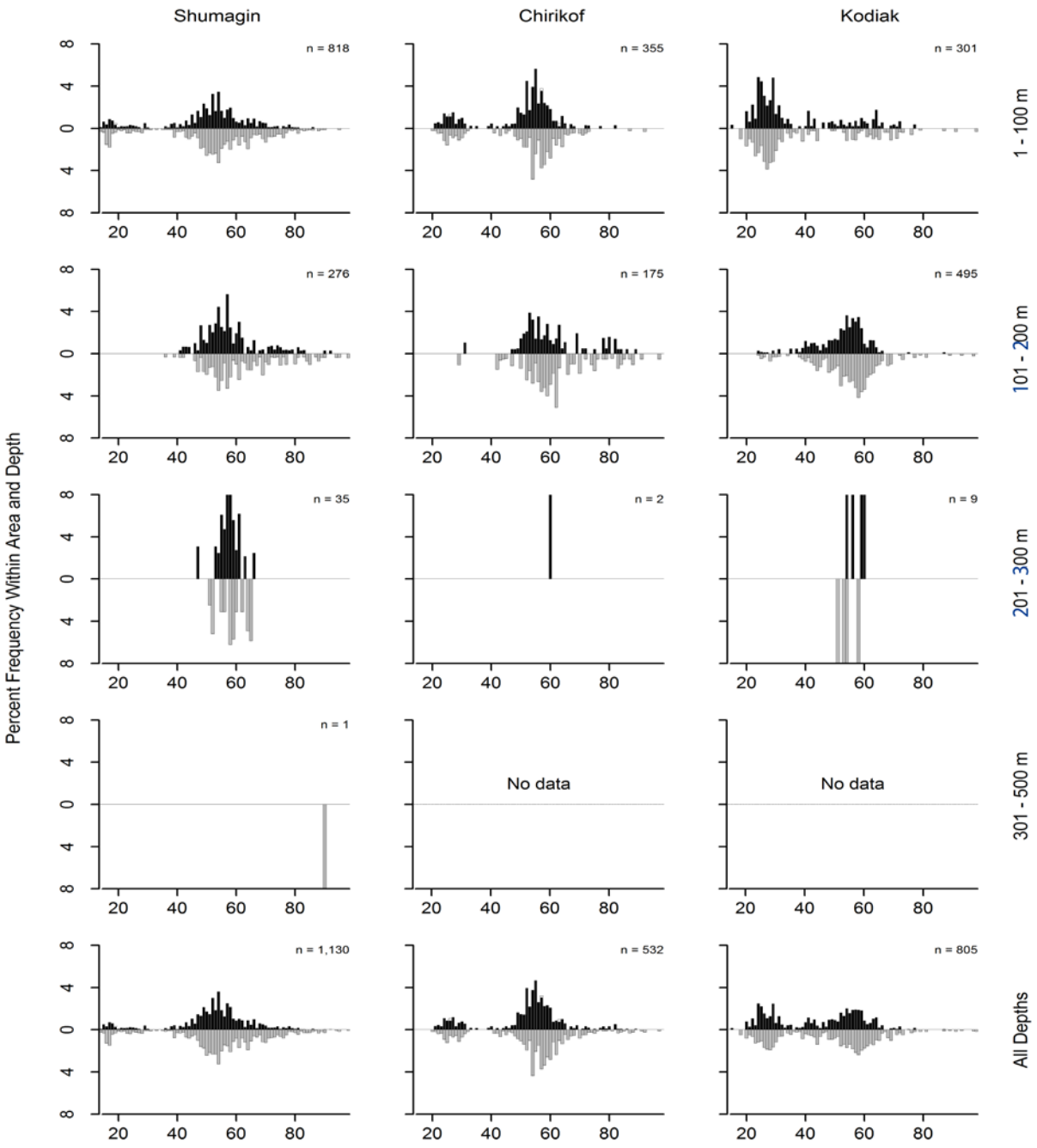

Figure 21. -- Size composition of Pacific cod from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

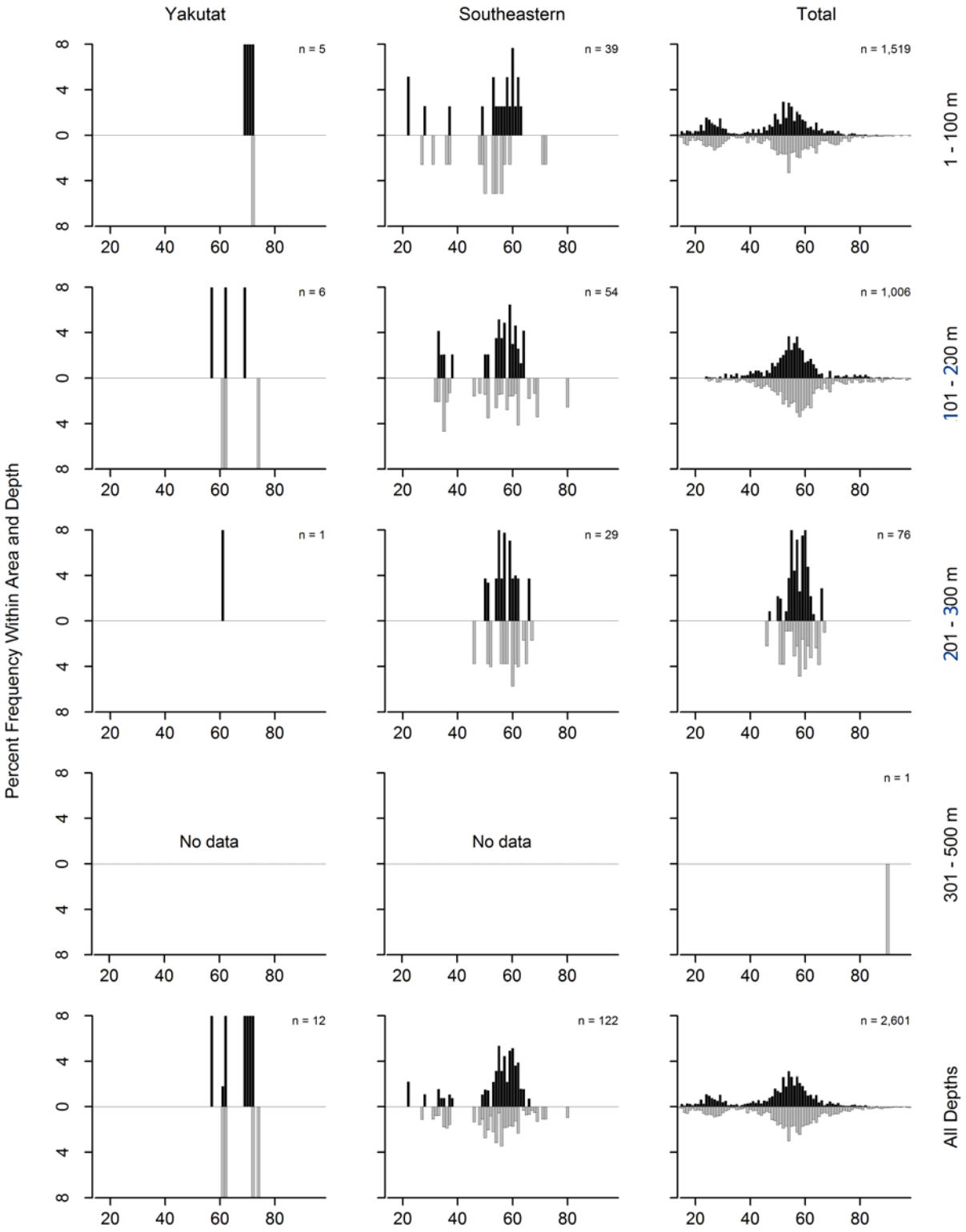

Figure 21. -- Continued (Pacific cod).

Table 30. -- Catch per unit of effort by stratum for Pacific cod sorted by descending CPUE for the 2017 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	14	12	12.95	8,902	1,172	16,631
Shumagin	1 - 100	Fox Islands	9	5	11.65	9,708	0	27,220
Chirikof	1 - 100	Semidi Bank	10	4	11.21	8,187	0	24,382
Shumagin	101 - 200	Shumagin Outer Shelf	25	25	11.11	9,060	4,848	13,273
Shumagin	1 - 100	Davidson Bank	26	19	9.00	12,318	5,035	19,600
Kodiak	101 - 200	Kodiak Outer Shelf	17	12	6.58	3,305	935	5,675
Chirikof	101 - 200	Shelikof Edge	23	17	6.08	4,706	0	10,533
Kodiak	101 - 200	Albatross Gullies	22	15	6.03	4,768	1,949	7,587
Chirikof	1 - 100	Chirikof Bank	19	9	5.39	5,817	0	13,468
Chirikof	101 - 200	Chirikof Outer Shelf	16	12	5.17	2,591	275	4,908
Shumagin	1 - 100	Shumagin Bank	25	19	5.14	6,374	1,611	11,138
Chirikof	1 - 100	Upper Alaska Peninsula	12	8	4.61	3,657	317	6,997
Kodiak	1 - 100	Albatross Shallows	13	9	3.98	2,297	99	4,495
Southeastern	1 - 100	Southeastern Shallows	7	2	3.98	2,606	0	8,919
Kodiak	101 - 200	Barren Islands	15	12	3.87	4,253	2,041	6,465
Shumagin	101 - 200	West Shumagin Gully	3	3	3.48	792	0	2,320
Kodiak	101 - 200	Portlock Flats	25	16	3.36	2,465	0	4,951
Southeastern	201 - 300	Prince of Wales Slope/Gullie	6	4	3.23	1,269	0	3,001
Kodiak	1 - 100	Kenai Peninsula	7	5	2.98	1,569	0	3,287
Kodiak	1 - 100	Northern Kodiak Shallows	6	3	2.52	554	0	1,578
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	6	2.40	1,005	33	1,977
Shumagin	201 - 300	Shumagin Slope	13	6	2.39	666	0	1,527
Kodiak	1 - 100	Lower Cook Inlet	10	5	1.94	1,920	0	5,406
Southeastern	101 - 200	Prince of Wales Shelf	9	6	1.91	1,315	144	2,486
Chirikof	101 - 200	East Shumagin Gully	15	8	1.40	1,560	579	2,540
Southeastern	201 - 300	Baranof-Chichagof Slope	4	2	1.26	142	0	504
Kodiak	101 - 200	Kenai Flats	11	3	1.24	1,500	0	3,321
Kodiak	1 - 100	Albatross Banks	25	10	1.15	1,770	40	3,501
Kodiak	201 - 300	Kodiak Slope	6	1	1.06	172	0	615
Shumagin	301 - 500	Shumagin Slope	4	1	0.96	242	0	1,012
Yakutat	1 - 100	Yakutat Shallows	10	2	0.76	759	0	1,920
Yakutat	101 - 200	Middleton Shelf	7	1	0.68	502	0	1,730
Shumagin	101 - 200	Sanak Gully	4	1	0.64	270	0	1,130
Yakutat	101 - 200	Yakataga Shelf	6	1	0.30	157	0	562
Chirikof	201 - 300	Chirikof Slope	7	1	0.12	19	0	65
Chirikof	201 - 300	Lower Shelikof Gully	9	1	0.11	109	0	359
Yakutat	201 - 300	Yakutat Slope	10	1	0.10	20	0	66

Atka mackerel (*Pleurogrammus monopterygius*)

Atka mackerel was the twentieth most abundant species caught in the 2017 survey, and it was the eleventh most abundant species in the Kodiak INPFC area (Table 2). The bulk of the estimated biomass was concentrated in the Kodiak region (63%), with most of the remainder in the Shumagin region (Table 31). The highest densities by far occurred at depths less than 100 m, with a particularly high concentration in the Albatross Banks stratum in the Kodiak INPFC area (Fig. 22 and Table 32). Size increased from west to east in the three westernmost strata where they occurred (Fig. 23). The estimated biomass of Atka mackerel was 37,704 t, and 97% of it was concentrated at depths less than 100 m (Table 31).

Table 31. -- Number of survey hauls, number of hauls with Atka mackerel, mean CPUE, biomass, and mean weight, based on the 2017 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	74	6	2.23	9,208	0	22,244	0.919
	101 - 200	32	8	0.48	707	0	1,488	0.848
	201 - 300	13	3	0.27	76	0	178	0.776
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	17	1.58	9,991	0	23,052	0.913
Chirikof	1 - 100	41	3	1.34	3,481	0	10,933	1.035
	101 - 200	54	5	0.09	216	0	458	1.019
	201 - 300	16	3	0.06	74	0	201	1.068
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	11	0.58	3,771	0	11,229	1.034
Kodiak	1 - 100	61	3	6.22	23,941	0	72,840	1.067
	101 - 200	90	0	---	---	---	---	---
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	3	2.44	23,941	0	72,840	1.067
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	0	---	---	---	---	---
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	0	---	---	---	---	---
All areas	1 - 100	200	12	2.84	36,630	0	87,383	1.023
	101 - 200	223	13	0.08	923	114	1,733	0.883
	201 - 300	76	6	0.04	151	0	313	0.897
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	31	1.22	37,704	0	88,464	1.018

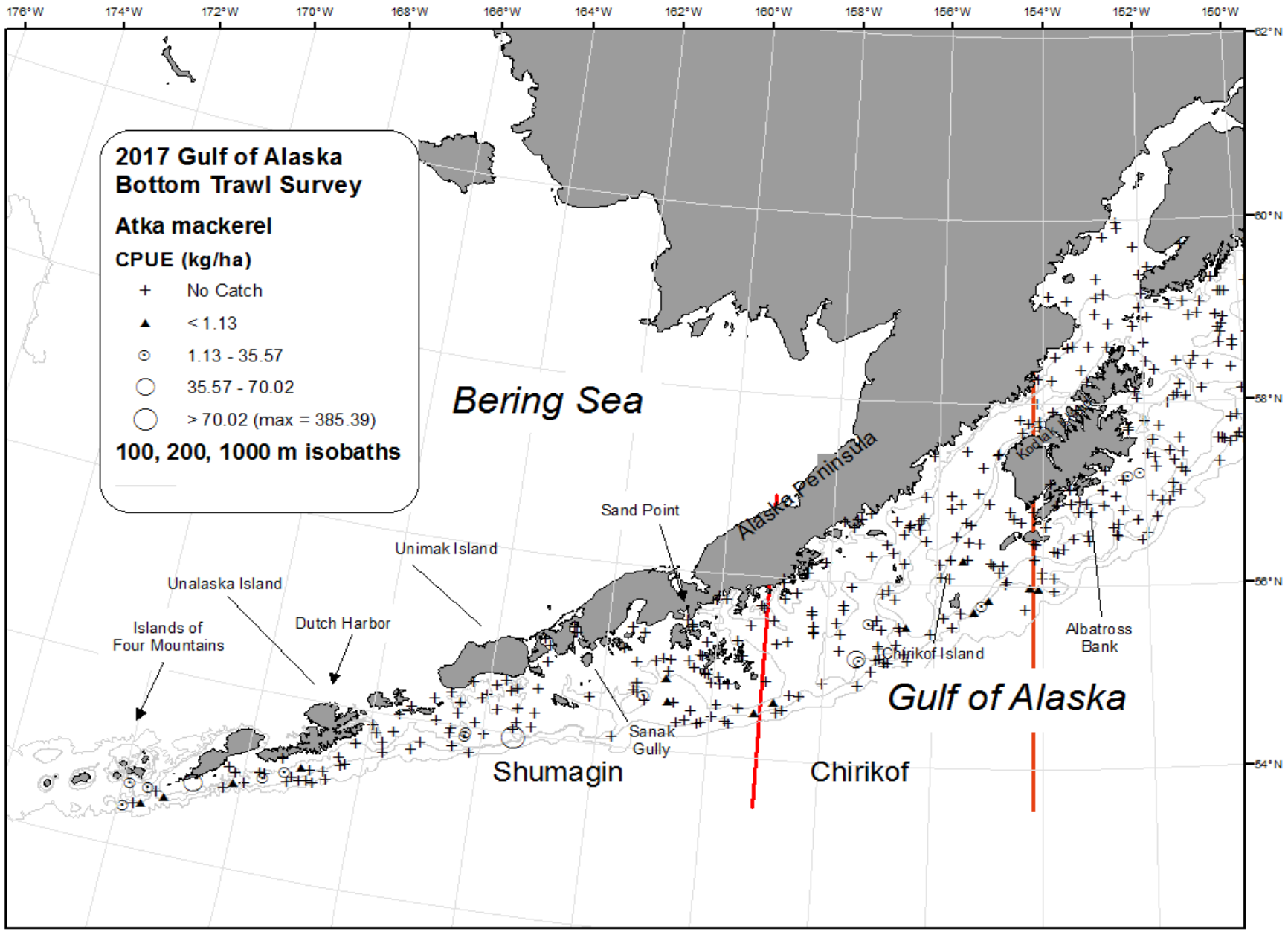

Figure 22. -- Distribution and relative abundance of Atka mackerel from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

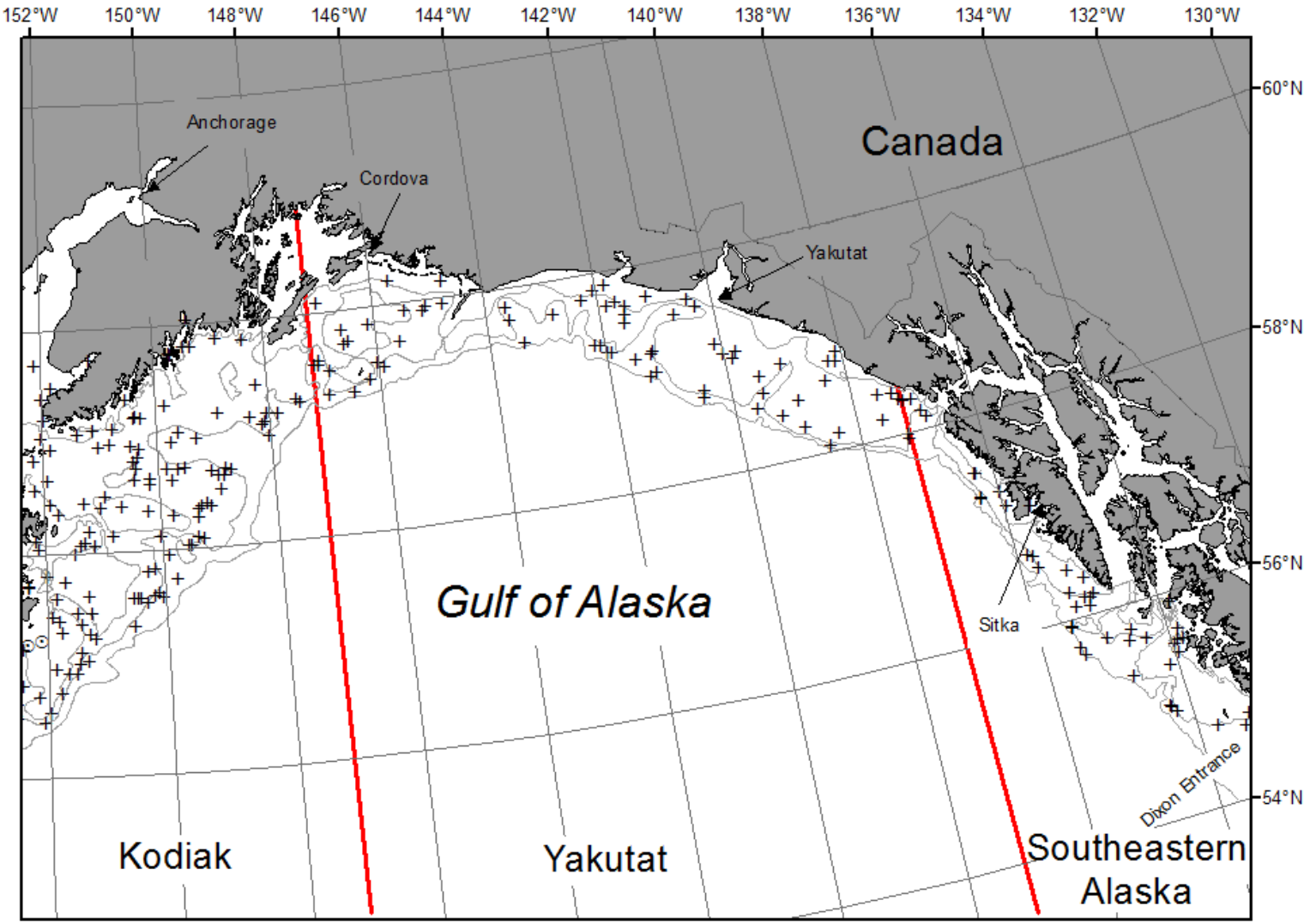

Figure 22. -- Continued (Atka mackerel).

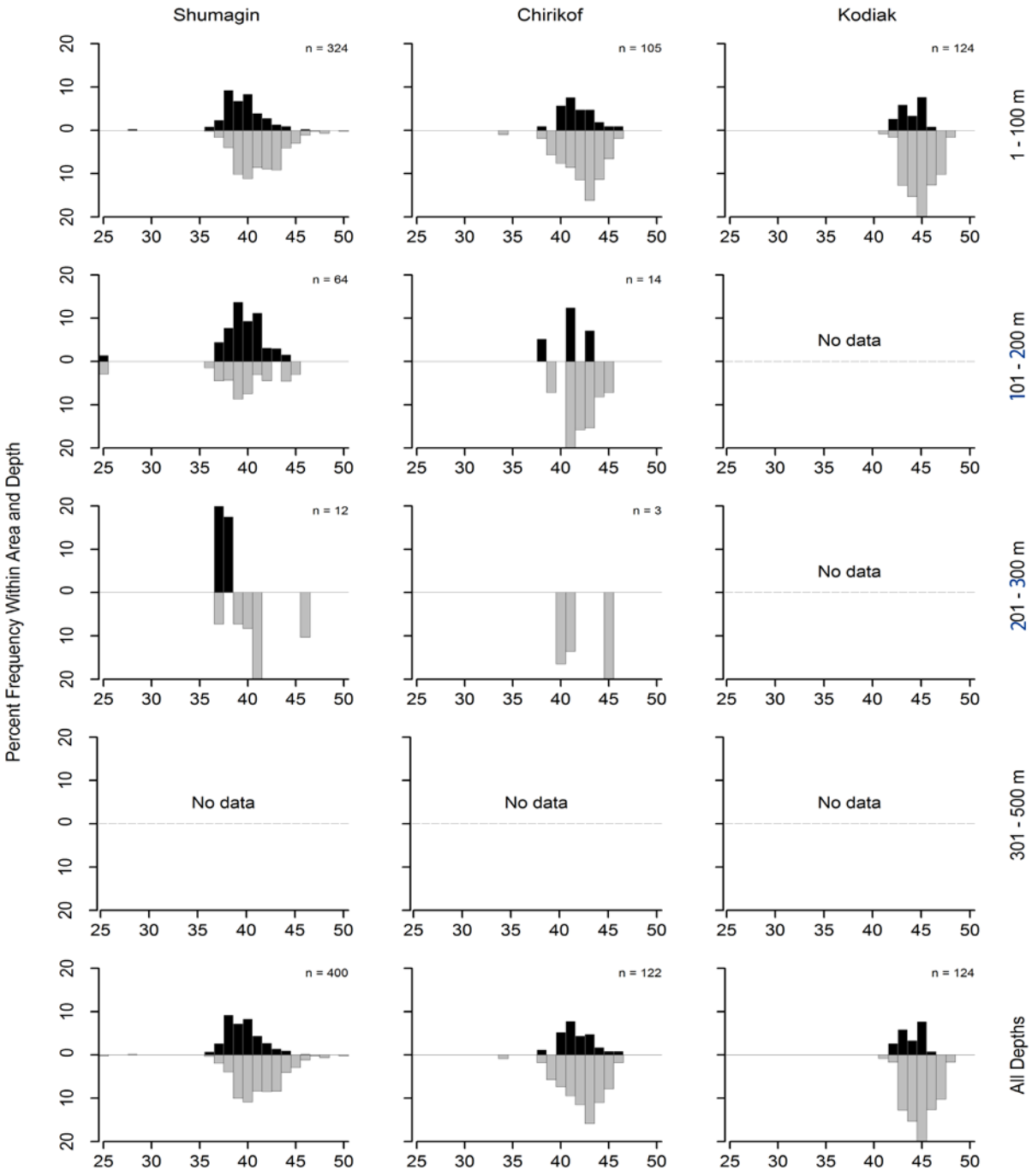

Figure 23. -- Size composition of Atka mackerel from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

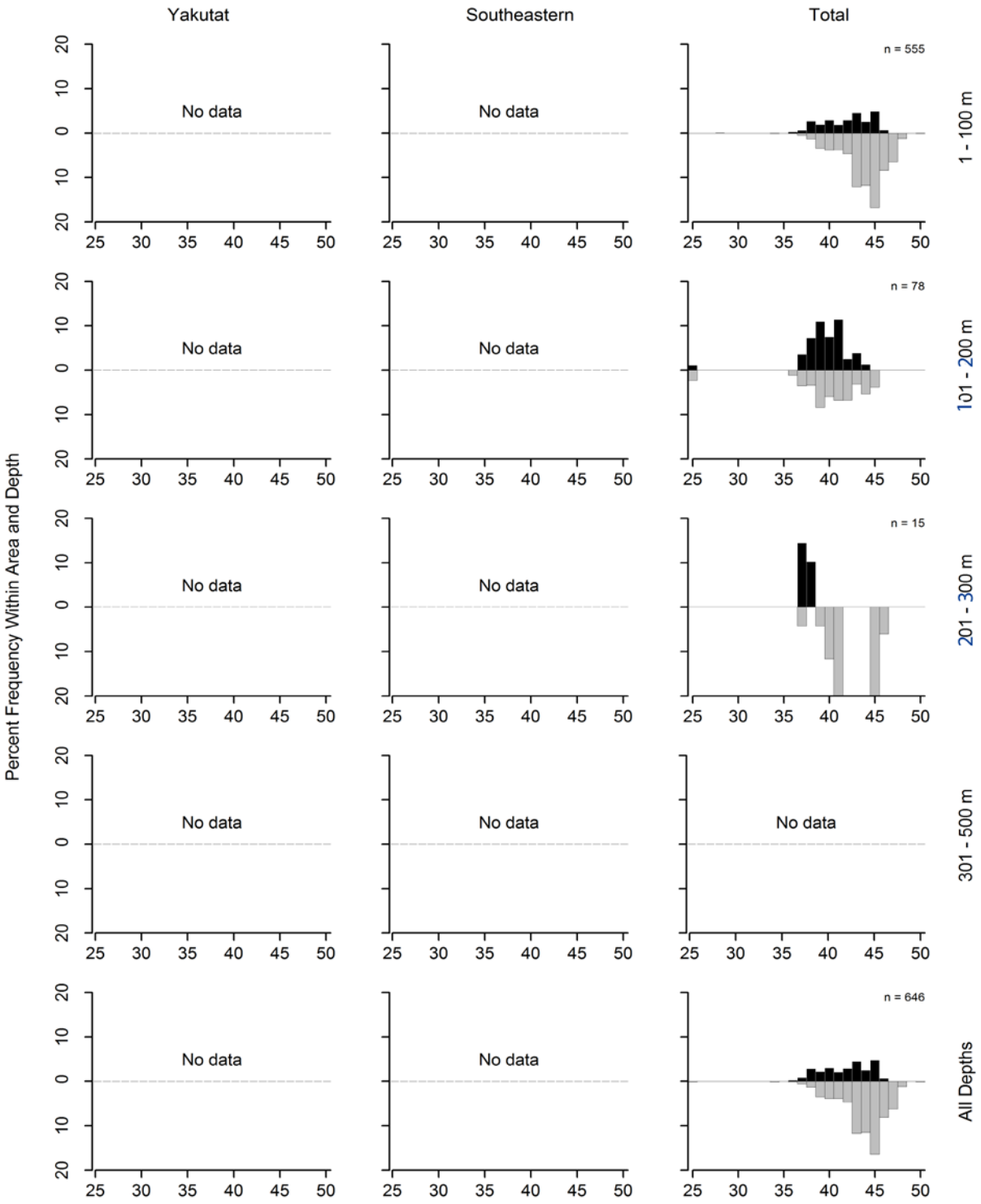

Figure 23. -- Continued (Atka mackerel).

Table 32. -- Catch per unit of effort by stratum for Atka mackerel sorted by descending CPUE for the 2017 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	25	3	15.54	23,941	0	72,935
Shumagin	1 - 100	Fox Islands	9	1	5.81	4,839	0	15,999
Chirikof	1 - 100	Semidi Bank	10	2	4.72	3,448	0	11,014
Shumagin	1 - 100	Davidson Bank	26	3	3.07	4,197	0	12,456
Shumagin	101 - 200	Shumagin Outer Shelf	25	7	0.81	662	0	1,440
Chirikof	101 - 200	Chirikof Outer Shelf	16	5	0.43	216	0	459
Shumagin	201 - 300	Shumagin Slope	13	3	0.27	76	0	179
Shumagin	1 - 100	Shumagin Bank	25	2	0.14	172	0	451
Chirikof	201 - 300	Chirikof Slope	7	2	0.13	20	0	51
Shumagin	101 - 200	Sanak Gully	4	1	0.11	45	0	188
Chirikof	201 - 300	Lower Shelikof Gully	9	1	0.05	54	0	180
Chirikof	1 - 100	Chirikof Bank	19	1	0.03	33	0	101

Sablefish (*Anoplopoma fimbria*)

Sablefish was the eighth most abundant species caught in the 2017 survey, and was the third most abundant species in the Yakutat INPFC area (Table 2). Sablefish were relatively abundant throughout the survey area and in all depth intervals (Table 33). Unlike the findings of previous surveys, the highest densities were more evenly distributed throughout the depth range and INPFC areas (Fig. 24 and Table 34). Size generally increased with depth in all regions, but did not exhibit a consistent trend going from west to east (Fig. 25). Most sablefish were less than 60 cm. The estimated biomass of sablefish was 144,280 t, and the highest regional biomass was in the Kodiak region. The biomass was highest in the 201-300 m depth range (28%), but was relatively evenly distributed in all other depth ranges (Table 33).

Table 33. -- Number of survey hauls, number of hauls with sablefish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	21	1.07	4,399	0	11,929	0.200
	101 - 200	32	14	1.02	1,491	658	2,323	0.654
	201 - 300	13	12	8.24	2,298	684	3,912	1.225
	301 - 500	4	4	6.66	1,686	0	3,920	1.364
	501 - 700	2	2	22.83	4,579	953	8,204	1.060
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	53	2.28	14,452	6,406	22,498	0.456
Chirikof	1 - 100	41	10	1.48	3,844	0	10,041	0.434
	101 - 200	54	29	1.28	3,053	0	6,170	0.998
	201 - 300	16	16	23.06	26,630	0	56,397	1.445
	301 - 500	4	4	14.92	2,393	867	3,919	1.572
	501 - 700	3	3	21.66	4,230	0	9,434	2.449
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	62	6.18	40,149	9,666	70,632	1.195
Kodiak	1 - 100	61	13	4.63	17,838	0	54,684	1.178
	101 - 200	90	55	2.89	12,543	6,469	18,617	1.076
	201 - 300	20	18	4.11	4,723	2,759	6,687	1.415
	301 - 500	5	5	35.21	10,252	6,135	14,369	2.210
	501 - 700	2	2	21.49	3,750	3,162	4,337	1.721
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	93	5.01	49,106	14,672	83,539	1.329
Yakutat	1 - 100	17	10	0.83	1,381	334	2,428	0.481
	101 - 200	29	25	2.52	7,394	252	14,535	0.564
	201 - 300	17	15	4.25	2,198	1,178	3,217	0.993
	301 - 500	5	5	15.3	4,021	0	10,204	1.881
	501 - 700	2	2	74.52	10,949	0	38,986	3.119
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	57	4.69	25,942	9,296	42,588	1.088
Southeastern	1 - 100	7	2	0.03	22	0	56	0.289
	101 - 200	18	15	3.53	3,915	849	6,981	0.588
	201 - 300	10	9	9.40	4,750	206	9,294	1.125
	301 - 500	8	7	14.43	4,498	0	9,338	2.467
	501 - 700	2	2	13.99	1,446	883	2,009	2.624
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	35	5.45	14,631	8,531	20,731	1.097
All areas	1 - 100	200	56	2.13	27,484	0	61,275	0.561
	101 - 200	223	138	2.32	28,396	18,467	38,325	0.772
	201 - 300	76	70	11.26	40,598	10,352	70,844	1.350
	301 - 500	26	25	17.86	22,850	16,097	29,602	2.012
	501 - 700	11	11	30.41	24,952	0	54,097	2.031
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	300	4.68	144,280	96,813	191,747	1.035

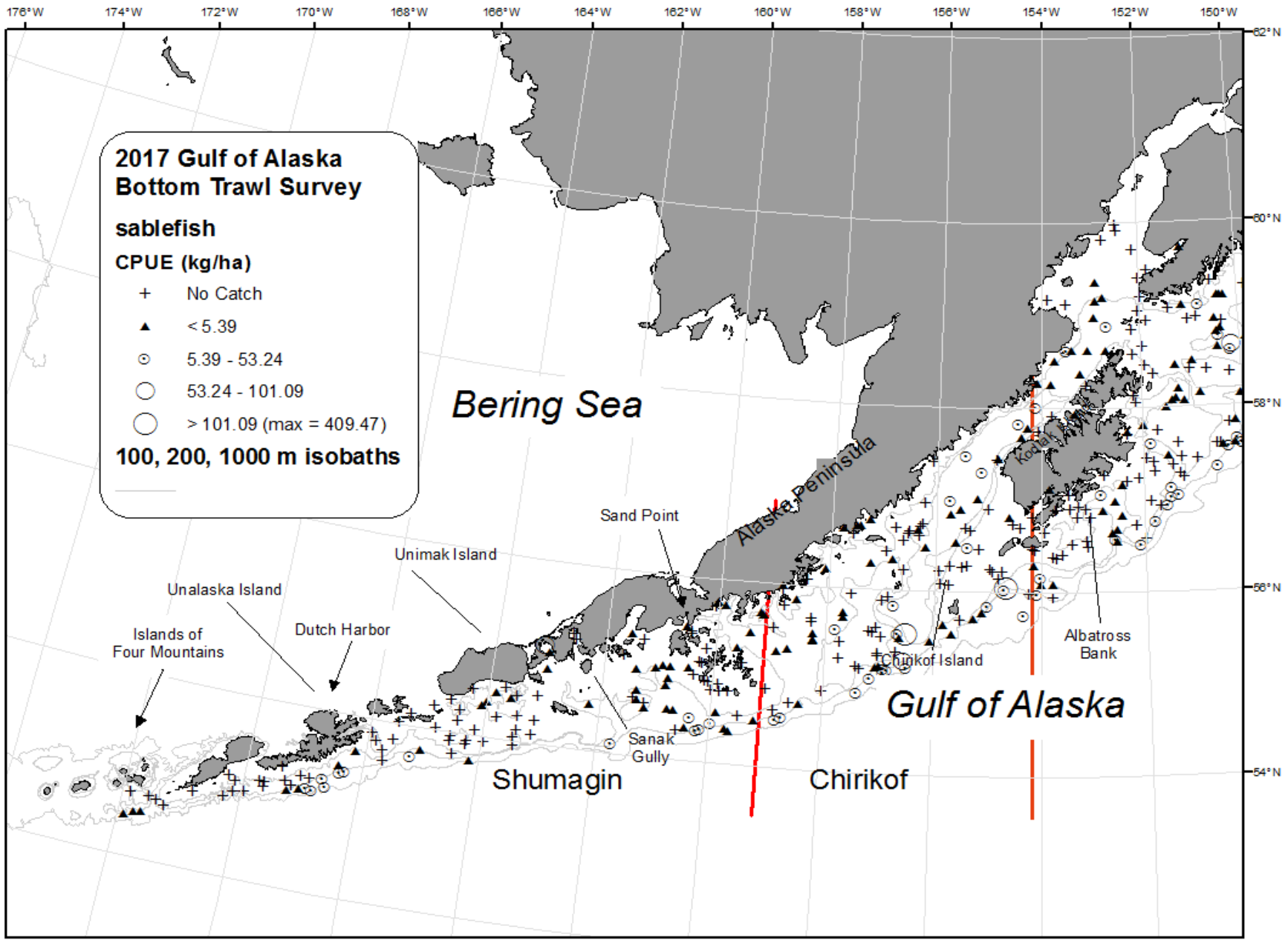

Figure 24. -- Distribution and relative abundance of sablefish from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

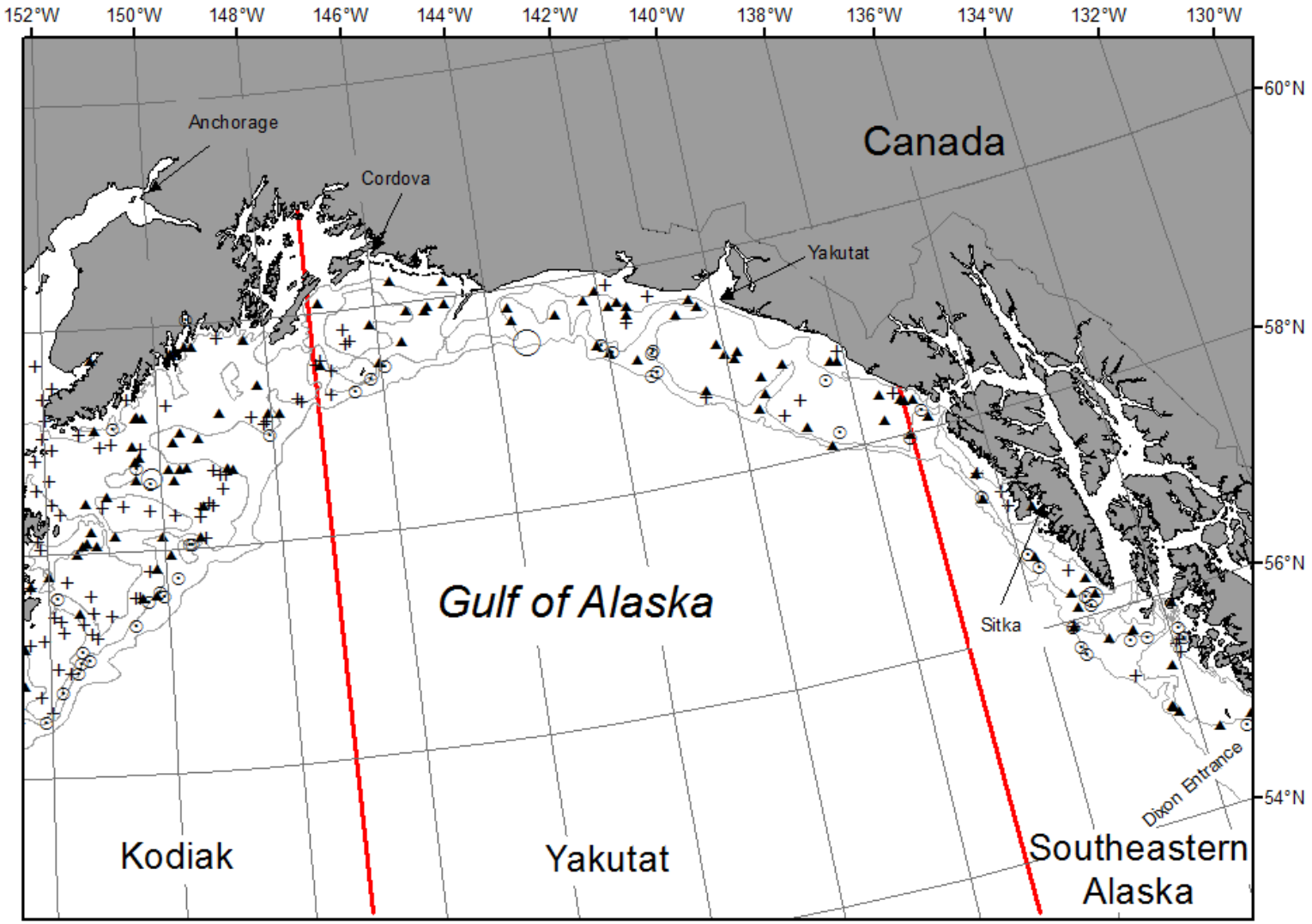

Figure 24. -- Continued (sablefish).

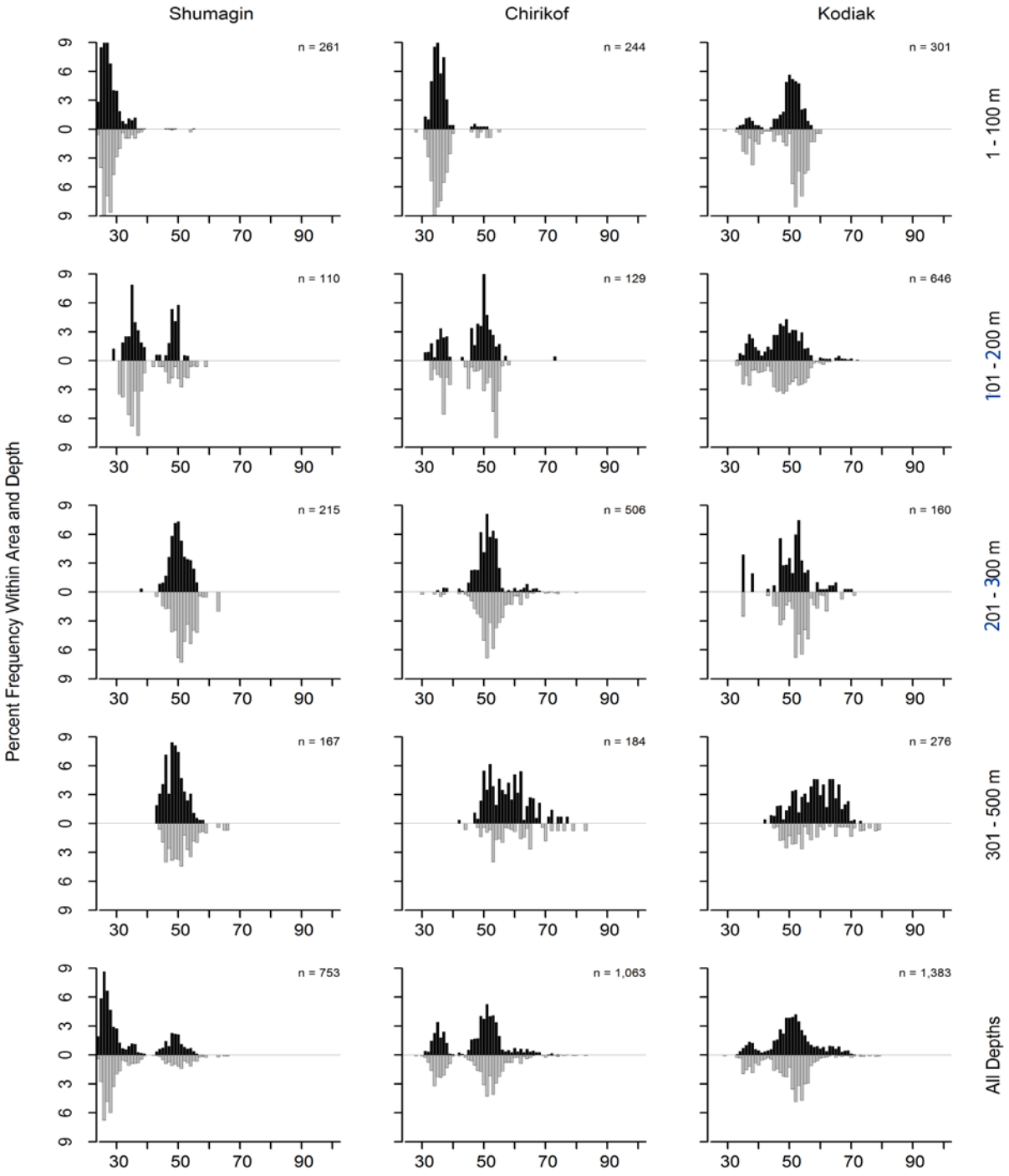

Figure 25. -- Size composition of sablefish from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

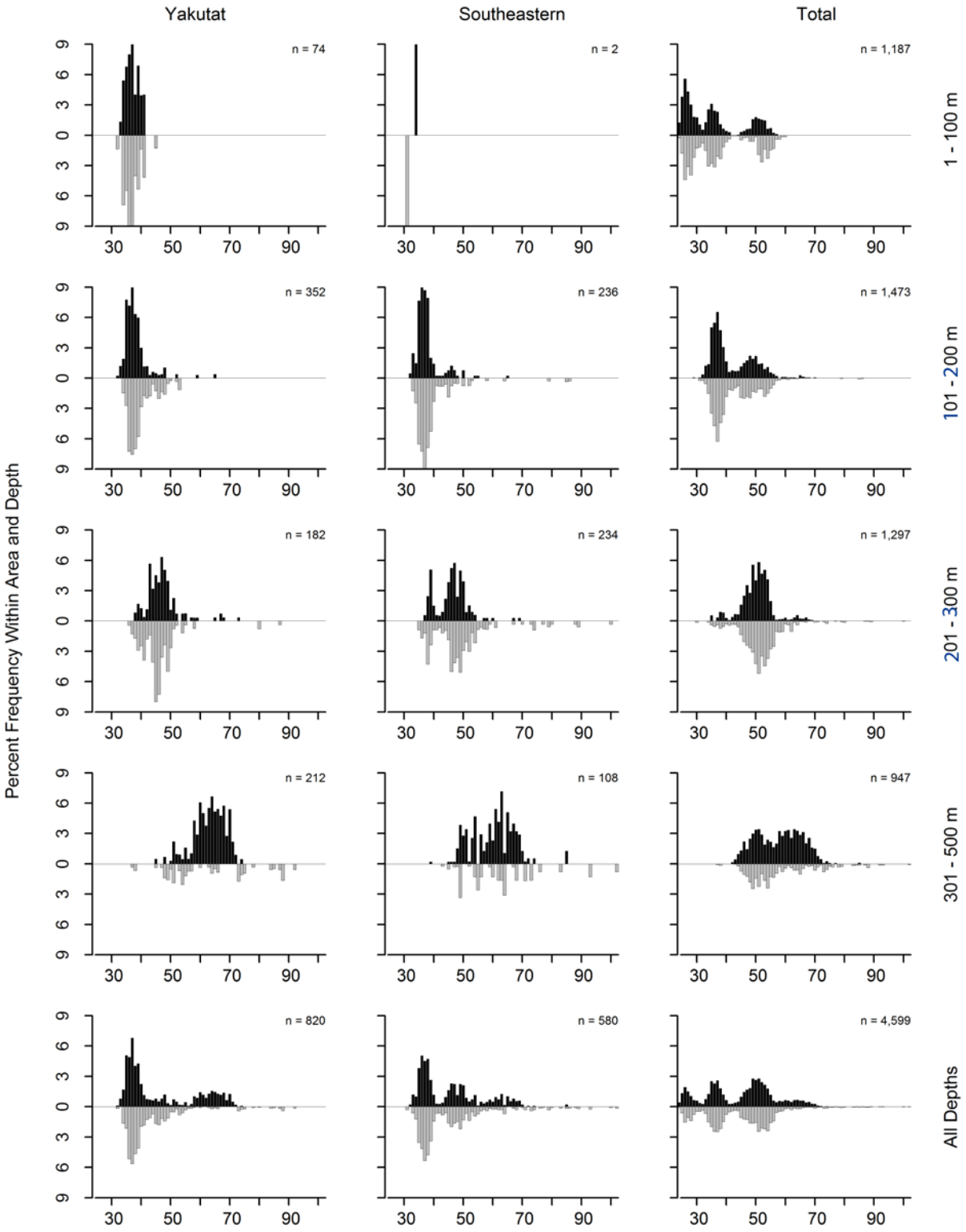

Figure 25. -- Continued (sablefish).

Table 34. -- Catch per unit of effort by stratum for sablefish sorted by descending CPUE for the 2017 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	74.52	10,949	0	93,738
Kodiak	1 - 100	Northern Kodiak Shallows	6	2	68.46	15,059	0	53,629
Chirikof	201 - 300	Chirikof Slope	7	7	60.80	9,292	0	23,080
Kodiak	301 - 500	Kodiak Slope	5	5	35.21	10,252	5,807	14,697
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	23.50	2,645	0	8,280
Shumagin	501 - 700	Shumagin Slope	2	2	22.83	4,579	0	15,283
Chirikof	501 - 700	Chirikof Slope	3	3	21.66	4,230	0	11,267
Kodiak	501 - 700	Kodiak Slope	2	2	21.49	3,750	2,016	5,483
Southeastern	301 - 500	Southeastern Deep Gullies	3	3	17.49	4,100	0	10,602
Chirikof	201 - 300	Lower Shelikof Gully	9	9	17.31	17,338	0	44,761
Yakutat	301 - 500	Yakutat Gullies	2	2	17.10	1,893	0	25,331
Chirikof	301 - 500	Chirikof Slope	4	4	14.92	2,393	643	4,142
Yakutat	301 - 500	Yakutat Slope	3	3	14.00	2,129	0	4,755
Southeastern	501 - 700	Southeastern Slope	2	2	13.99	1,446	0	3,108
Kodiak	201 - 300	Kodiak Slope	6	6	8.95	1,453	194	2,712
Shumagin	201 - 300	Shumagin Slope	13	12	8.24	2,298	669	3,927
Shumagin	301 - 500	Shumagin Slope	4	4	6.66	1,686	0	4,246
Kodiak	201 - 300	Upper Shelikof Gully	3	3	6.34	2,035	0	4,492
Yakutat	101 - 200	Fairweather Shelf	9	7	5.86	4,531	0	11,763
Shumagin	1 - 100	Lower Alaska Peninsula	14	7	5.39	3,706	0	11,274
Southeastern	201 - 300	Prince of Wales Slope/Gullie	6	5	5.36	2,105	0	4,705
Southeastern	301 - 500	Southeastern Slope	5	4	5.15	398	0	887
Kodiak	101 - 200	Kodiak Outer Shelf	17	8	5.13	2,576	0	5,435
Yakutat	201 - 300	Yakutat Slope	10	8	4.71	1,003	272	1,734
Kodiak	1 - 100	Kenai Peninsula	7	4	4.33	2,277	0	5,403
Kodiak	101 - 200	Portlock Flats	25	14	4.04	2,962	0	6,471
Yakutat	201 - 300	Yakutat Gullies	7	7	3.93	1,195	383	2,007
Southeastern	101 - 200	Prince of Wales Shelf	9	8	3.65	2,515	0	5,368
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	7	3.34	1,400	0	2,877
Kodiak	101 - 200	Barren Islands	15	10	3.05	3,349	0	7,051
Chirikof	1 - 100	Chirikof Bank	19	3	2.69	2,908	0	8,978
Kodiak	101 - 200	Albatross Gullies	22	15	2.65	2,096	402	3,790
Kodiak	201 - 300	Kenai Gullies	11	9	1.86	1,235	450	2,020
Yakutat	101 - 200	Yakutat Flats	7	7	1.79	1,616	55	3,176
Chirikof	101 - 200	East Shumagin Gully	15	12	1.75	1,942	0	5,002
Shumagin	101 - 200	West Shumagin Gully	3	3	1.45	331	0	712
Kodiak	101 - 200	Kenai Flats	11	8	1.29	1,560	0	3,131
Yakutat	101 - 200	Middleton Shelf	7	6	1.20	880	0	2,132
Chirikof	101 - 200	Chirikof Outer Shelf	16	9	1.18	592	185	1,000
Yakutat	1 - 100	Yakutat Shallows	10	6	1.18	1,175	141	2,208
Chirikof	1 - 100	Upper Alaska Peninsula	12	7	1.18	936	0	2,534
Shumagin	101 - 200	Shumagin Outer Shelf	25	7	1.01	825	34	1,616
Shumagin	101 - 200	Sanak Gully	4	4	0.79	334	0	678
Yakutat	101 - 200	Yakataga Shelf	6	5	0.69	366	0	762
Chirikof	101 - 200	Shelikof Edge	23	8	0.67	519	0	1,139
Shumagin	1 - 100	Shumagin Bank	25	10	0.43	536	134	938
Yakutat	1 - 100	Middleton Shallows	7	4	0.31	207	0	531
Kodiak	1 - 100	Albatross Shallows	13	3	0.30	171	0	379
Kodiak	1 - 100	Lower Cook Inlet	10	2	0.15	153	0	437
Kodiak	1 - 100	Albatross Banks	25	2	0.12	179	0	487
Shumagin	1 - 100	Davidson Bank	26	4	0.12	157	0	359
Southeastern	1 - 100	Southeastern Shallows	7	2	0.03	22	0	57

Giant grenadier (*Albatrossia pectoralis*)

Giant grenadier was the sixth most abundant species caught in the 2017 survey and was among the 20 most abundant species in all INPFC areas except Southeastern (Table 2). Giant grenadier was almost exclusively caught at depths deeper than 300 m and was consistently caught at depths deeper than 500 m (Table 35). The highest densities occurred in a variety of slope strata throughout the three westernmost INPFC areas at depths between 301 and 700 m. No single stratum was dominant (Fig. 26 and Table 36). Size was relatively constant with depth and longitude, and females were considerably more abundant than males (Fig. 27). The estimated biomass of giant grenadier was 153,690 t, and the highest regional biomass was in the Kodiak region, where 41% of it was concentrated (Table 35).

Table 35. -- Number of survey hauls, number of hauls with giant grenadier, mean CPUE, biomass, and mean weight, based on the 2017 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	74	0	---	---	---	---	---
	101 - 200	32	0	---	---	---	---	---
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	2	49.37	12,497	0	33,378	2.720
	501 - 700	2	2	19.21	3,853	0	9,242	1.954
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	4	2.58	16,350	0	37,518	2.490
Chirikof	1 - 100	41	0	---	---	---	---	---
	101 - 200	54	0	---	---	---	---	---
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	4	172.71	27,701	7,797	47,605	2.692
	501 - 700	3	3	116.45	22,746	0	46,471	2.116
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	7	7.76	50,447	25,135	75,759	2.398
Kodiak	1 - 100	61	0	---	---	---	---	---
	101 - 200	90	0	---	---	---	---	---
	201 - 300	20	1	0.37	422	0	1,455	3.804
	301 - 500	5	5	141.97	41,338	0	88,663	2.606
	501 - 700	2	2	121.74	21,242	0	87,948	2.041
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	8	6.43	63,002	6,078	119,925	2.388
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	1	2.71	713	0	2,982	3.423
	501 - 700	2	2	153.41	22,540	0	57,893	2.320
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	3	4.20	23,253	0	58,739	2.343
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	2	6.18	638	0	2,949	2.817
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	2	0.24	638	0	2,949	2.817
All areas	1 - 100	200	0	---	---	---	---	---
	101 - 200	223	0	---	---	---	---	---
	201 - 300	76	1	0.12	422	0	1,455	3.804
	301 - 500	26	12	64.30	82,249	32,229	132,269	2.657
	501 - 700	11	11	86.54	71,019	17,963	124,074	2.148
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	24	4.98	153,690	90,941	216,438	2.396

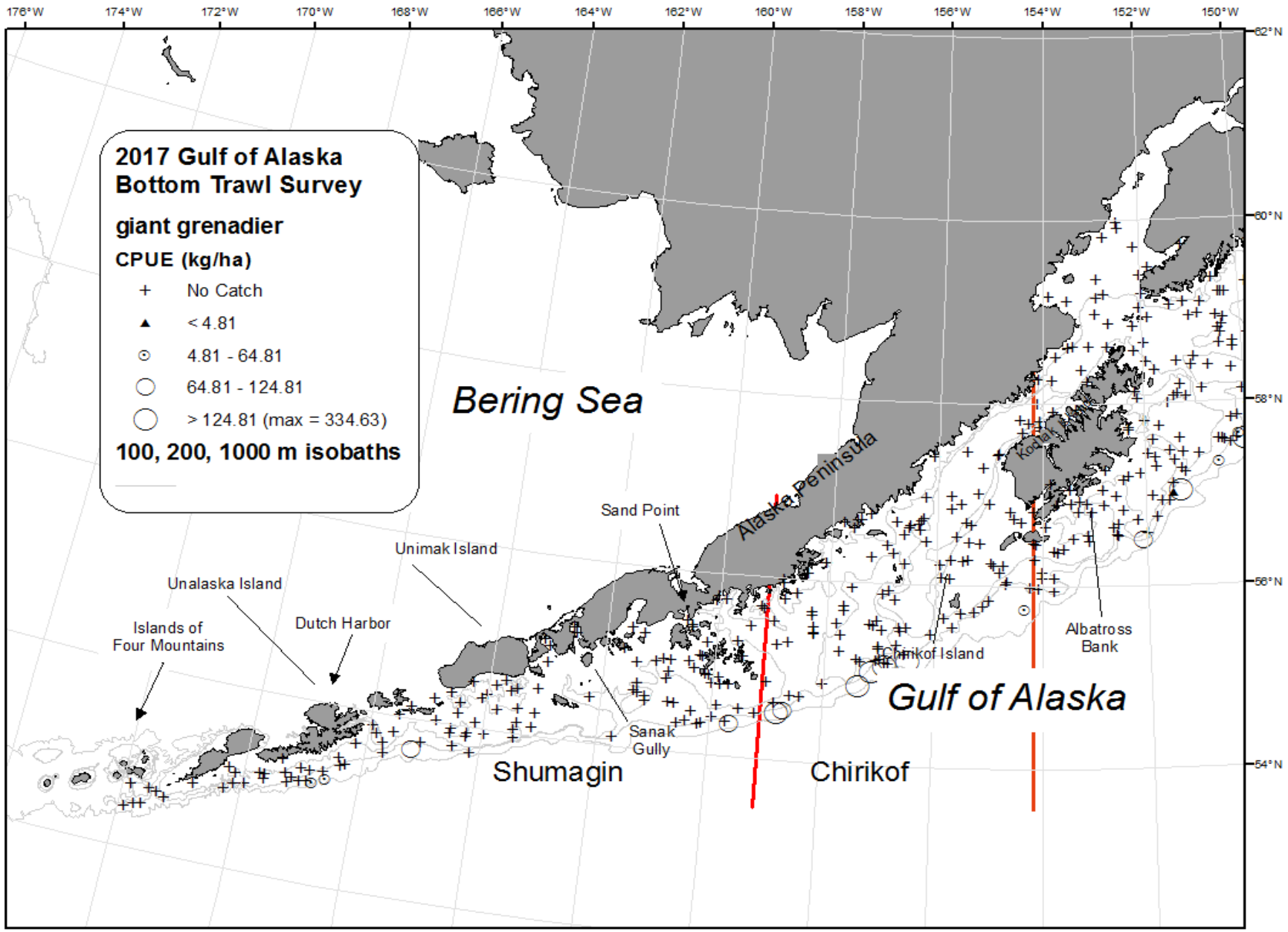

Figure 26. -- Distribution and relative abundance of giant grenadier from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

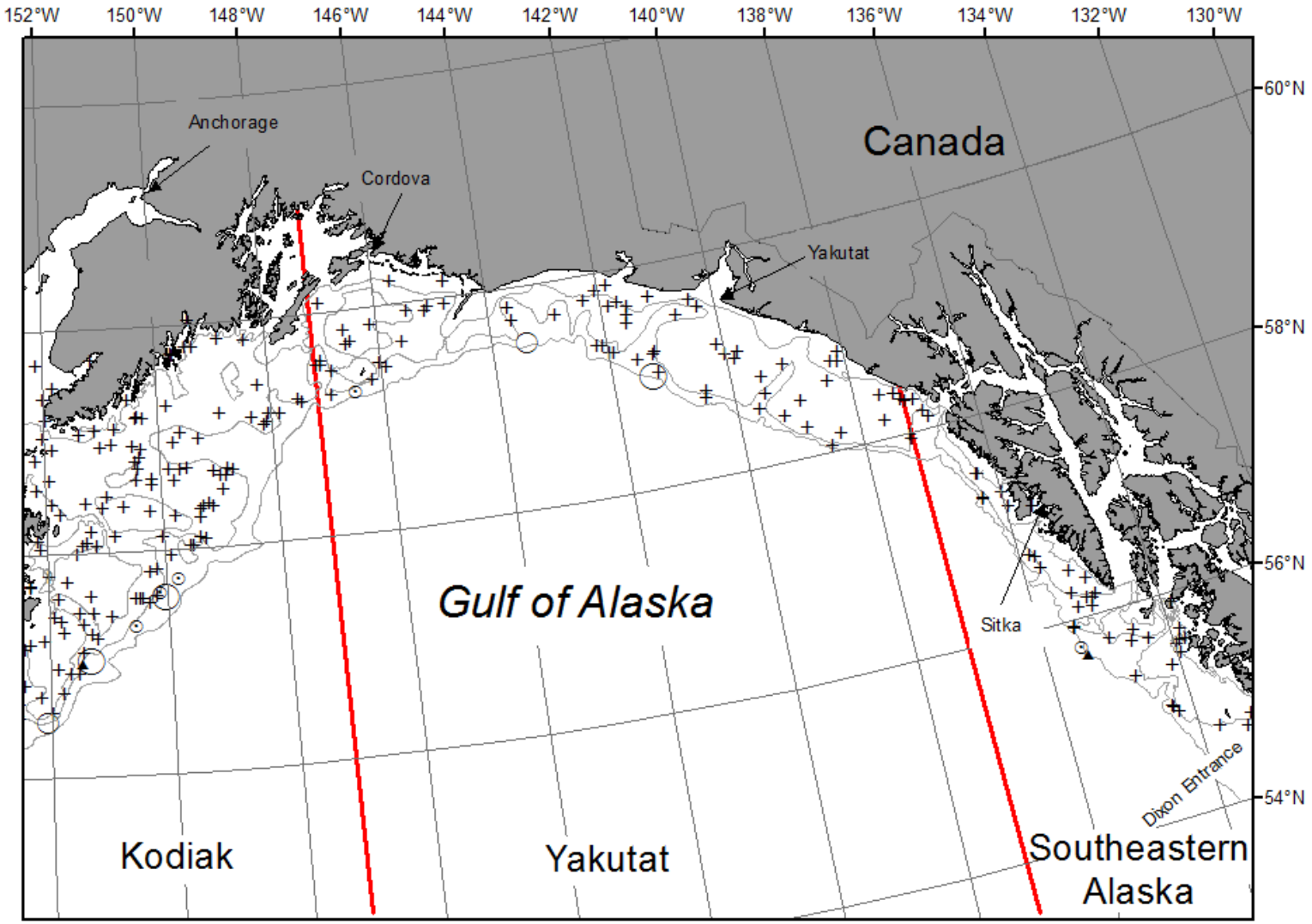

Figure 26. -- Continued (giant grenadier).

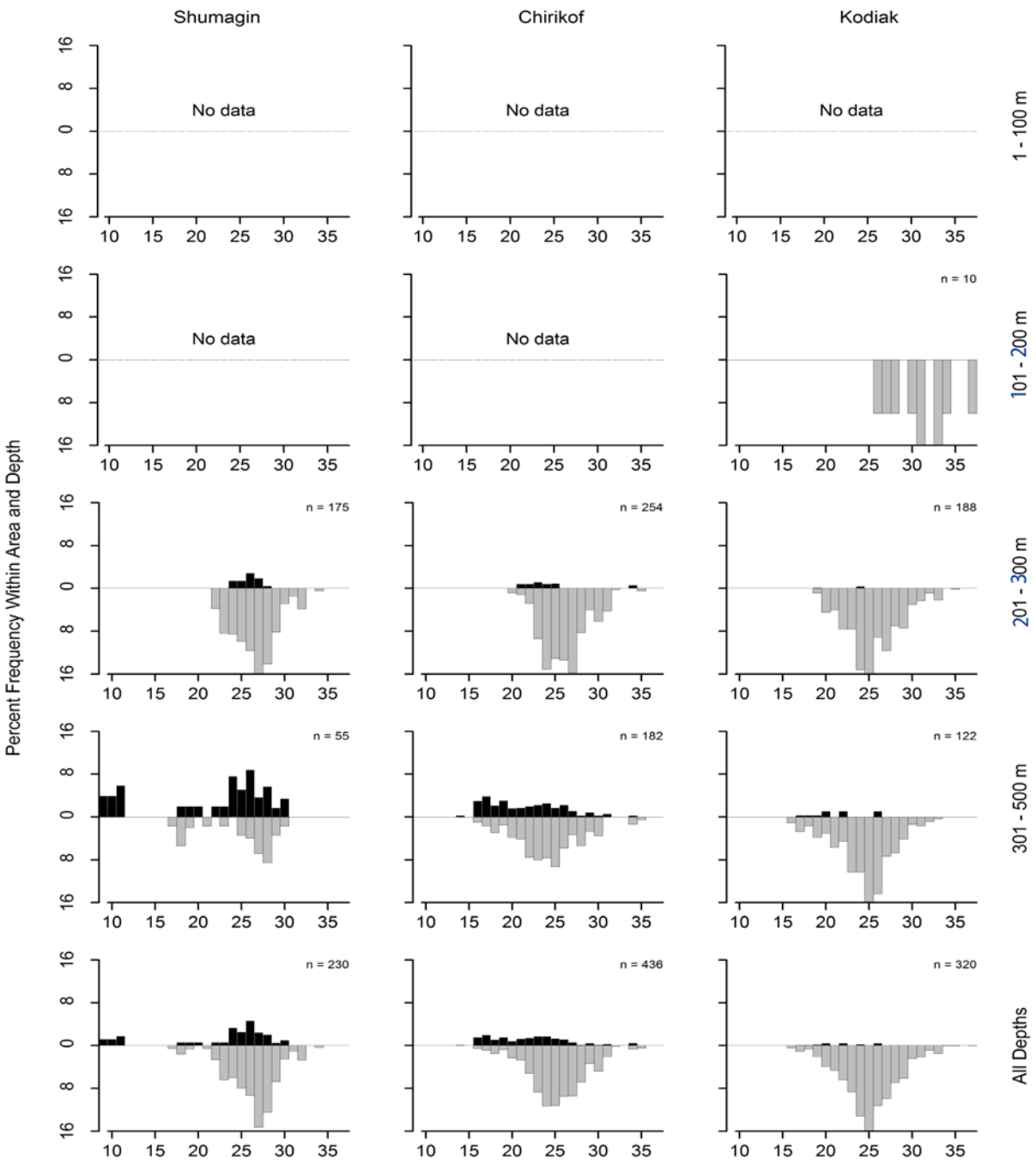

Figure 27. -- Size composition of giant grenadier from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

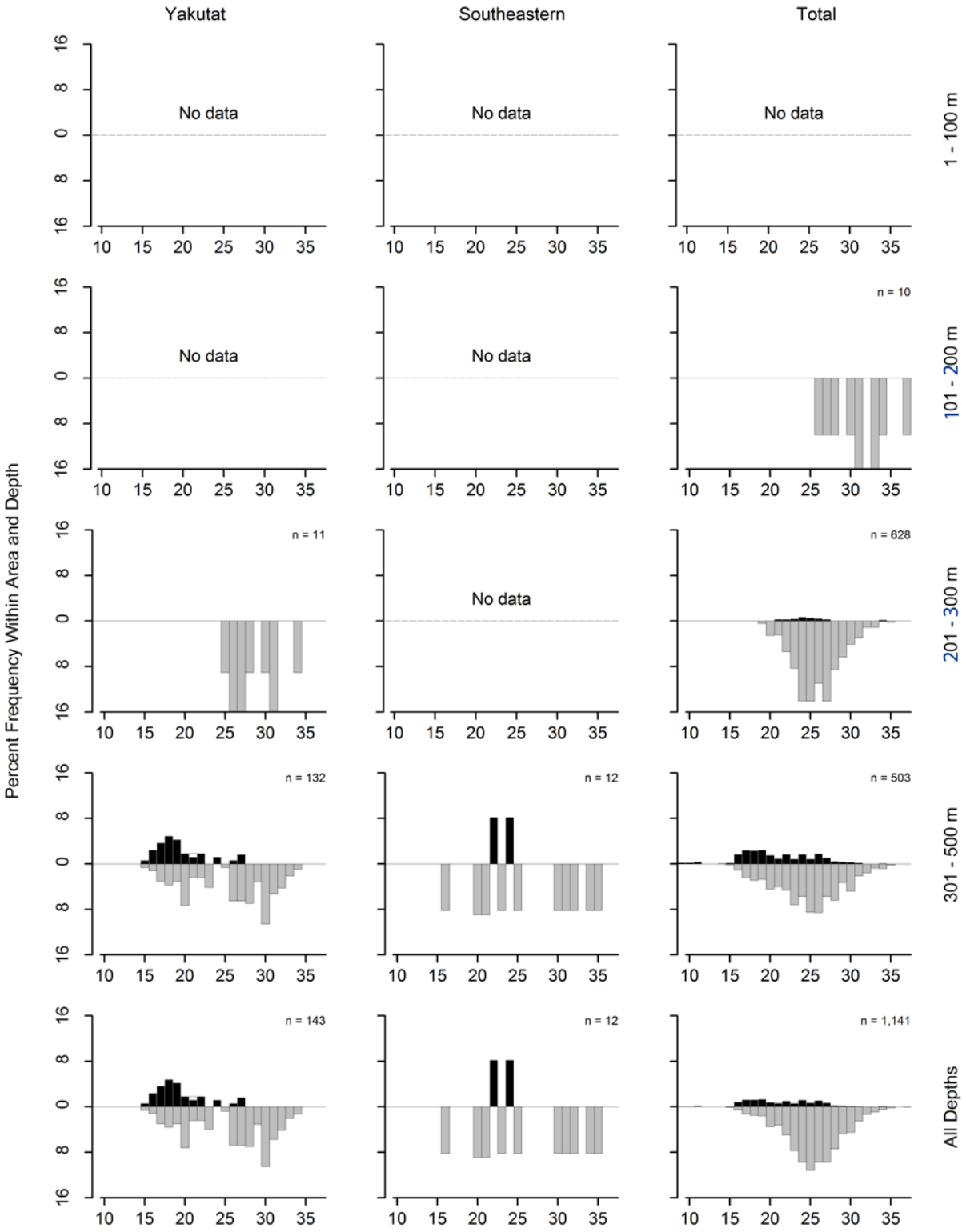

Figure 27. -- Continued (giant grenadier).

Table 36. -- Catch per unit of effort by stratum for giant grenadier sorted by descending CPUE for the 2017 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Chirikof	301 - 500	Chirikof Slope	4	4	172.71	27,701	4,886	50,516
Yakutat	501 - 700	Yakutat Slope	2	2	153.41	22,540	0	126,931
Kodiak	301 - 500	Kodiak Slope	5	5	141.97	41,338	0	92,437
Kodiak	501 - 700	Kodiak Slope	2	2	121.74	21,242	0	218,213
Chirikof	501 - 700	Chirikof Slope	3	3	116.45	22,746	0	54,829
Shumagin	301 - 500	Shumagin Slope	4	2	49.37	12,497	0	36,432
Shumagin	501 - 700	Shumagin Slope	2	2	19.21	3,853	0	19,766
Southeastern	501 - 700	Southeastern Slope	2	2	6.18	638	0	7,461
Yakutat	301 - 500	Yakutat Slope	3	1	4.69	713	0	3,782
Kodiak	201 - 300	Kodiak Slope	6	1	2.60	422	0	1,507

ROCKFISHES

Pacific ocean perch (*Sebastes alutus*)

Pacific ocean perch was the most abundant species caught in the 2017 survey, and was also the most abundant species in three of the INPFC areas (Table 2). Pacific ocean perch were caught throughout the survey area at all survey depths (Table 37). The highest densities occurred in all depth intervals less than 300m in all regions except for the Yakutat region where the highest densitites occurred at depths between 201 and 500 m (Fig. 28 and Table 38). Particularly high concentrations occurred on the Shumagin and Chirikof slope and on the Kenai Peninsula shelf. Size did not exhibit a clear trend with depth and longitude except in the Shumagin and Yakutat INPFC areas where size increased with depth (Fig. 29). The estimated biomass of Pacific ocean perch was 1,570,359 t, and the highest regional biomass by far was in the Kodiak region. More than 97% of the estimated biomass was concentrated at depths less than 300 m (Table 37).

Table 37. -- Number of survey hauls, number of hauls with Pacific ocean perch, mean CPUE, biomass, and mean weight, based on the 2017 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	74	14	1.41	5,818	0	16,094	0.286
	101 - 200	32	14	15.68	23,018	0	52,259	0.353
	201 - 300	13	13	590.66	164,674	0	377,037	0.665
	301 - 500	4	4	4.42	1,118	0	2,704	0.747
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	45	30.75	194,627	0	405,443	0.582
Chirikof	1 - 100	41	9	68.87	179,316	0	553,214	0.818
	101 - 200	54	38	49.74	118,616	40,629	196,604	0.724
	201 - 300	16	12	60.00	69,273	0	160,985	0.630
	301 - 500	4	2	1.46	234	0	801	0.662
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	61	56.54	367,439	0	758,491	0.745
Kodiak	1 - 100	61	6	88.41	340,525	0	901,110	0.813
	101 - 200	90	75	68.27	295,833	165,460	426,206	0.698
	201 - 300	20	17	23.68	27,208	5,579	48,838	0.736
	301 - 500	5	3	1.33	388	0	1,075	0.692
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	101	67.75	663,955	91,013	1,236,897	0.754
Yakutat	1 - 100	17	3	0.06	106	0	330	0.315
	101 - 200	29	19	1.17	3,426	403	6,448	0.182
	201 - 300	17	17	142.6	73,725	5,040	142,409	0.567
	301 - 500	5	4	77.53	20,373	0	74,971	0.714
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	43	17.65	97,629	21,570	173,687	0.549
Southeastern	1 - 100	7	1	0.04	24	0	79	0.622
	101 - 200	18	12	94.48	104,721	0	254,299	0.702
	201 - 300	10	10	244.32	123,439	0	248,218	0.810
	301 - 500	8	7	59.39	18,513	0	39,039	0.756
	501 - 700	2	1	0.11	12	0	62	0.623
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	31	91.94	246,709	66,921	426,496	0.756
All areas	1 - 100	200	33	40.74	525,788	0	1,167,966	0.798
	101 - 200	223	158	44.6	545,614	336,951	754,277	0.664
	201 - 300	76	69	127.15	458,319	203,021	713,617	0.677
	301 - 500	26	20	31.76	40,626	0	87,786	0.733
	501 - 700	11	1	0.01	12	0	62	0.623
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	281	50.92	1,570,359	854,180	2,286,537	0.710

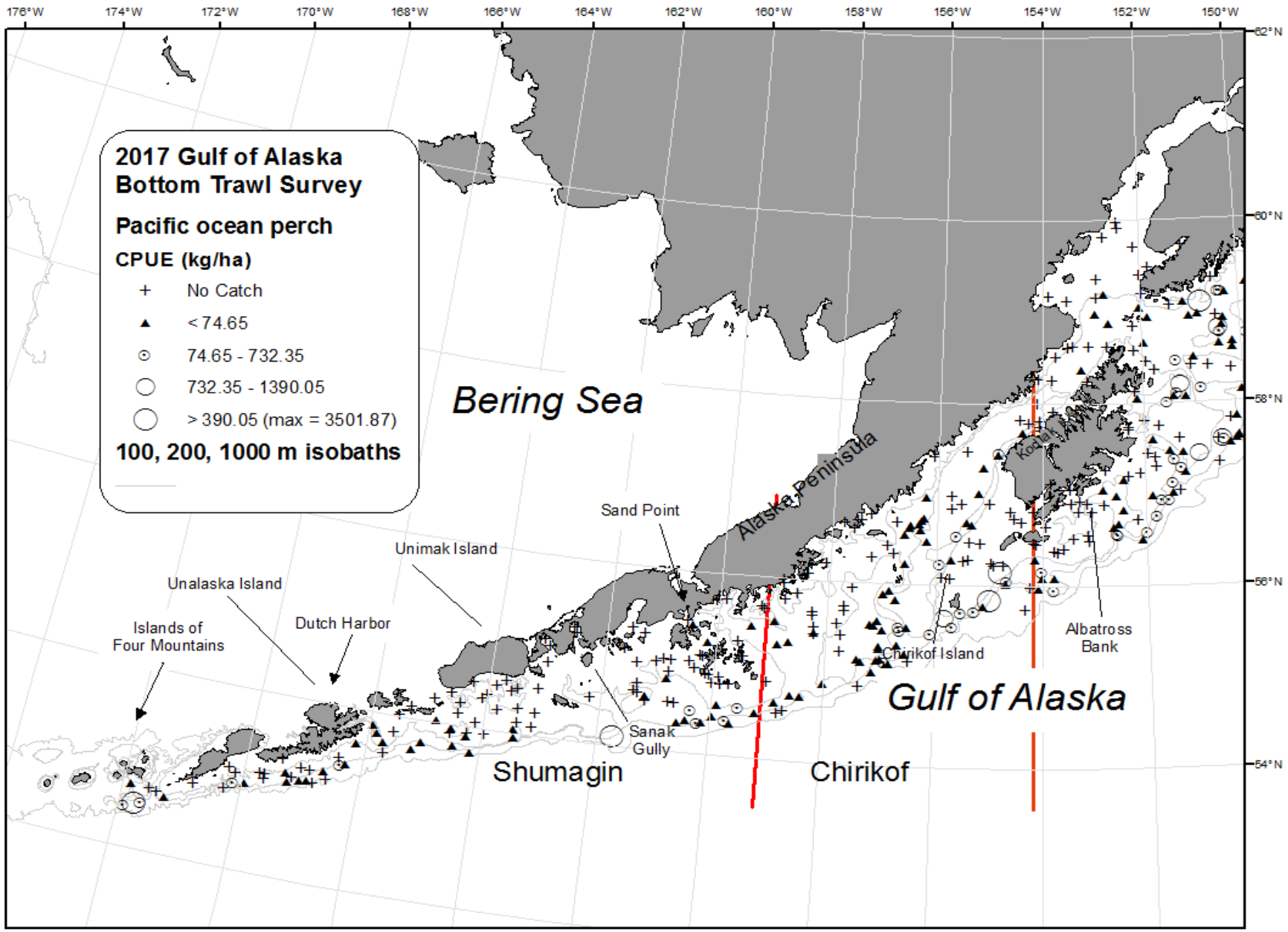

Figure 28. -- Distribution and relative abundance of Pacific ocean perch from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

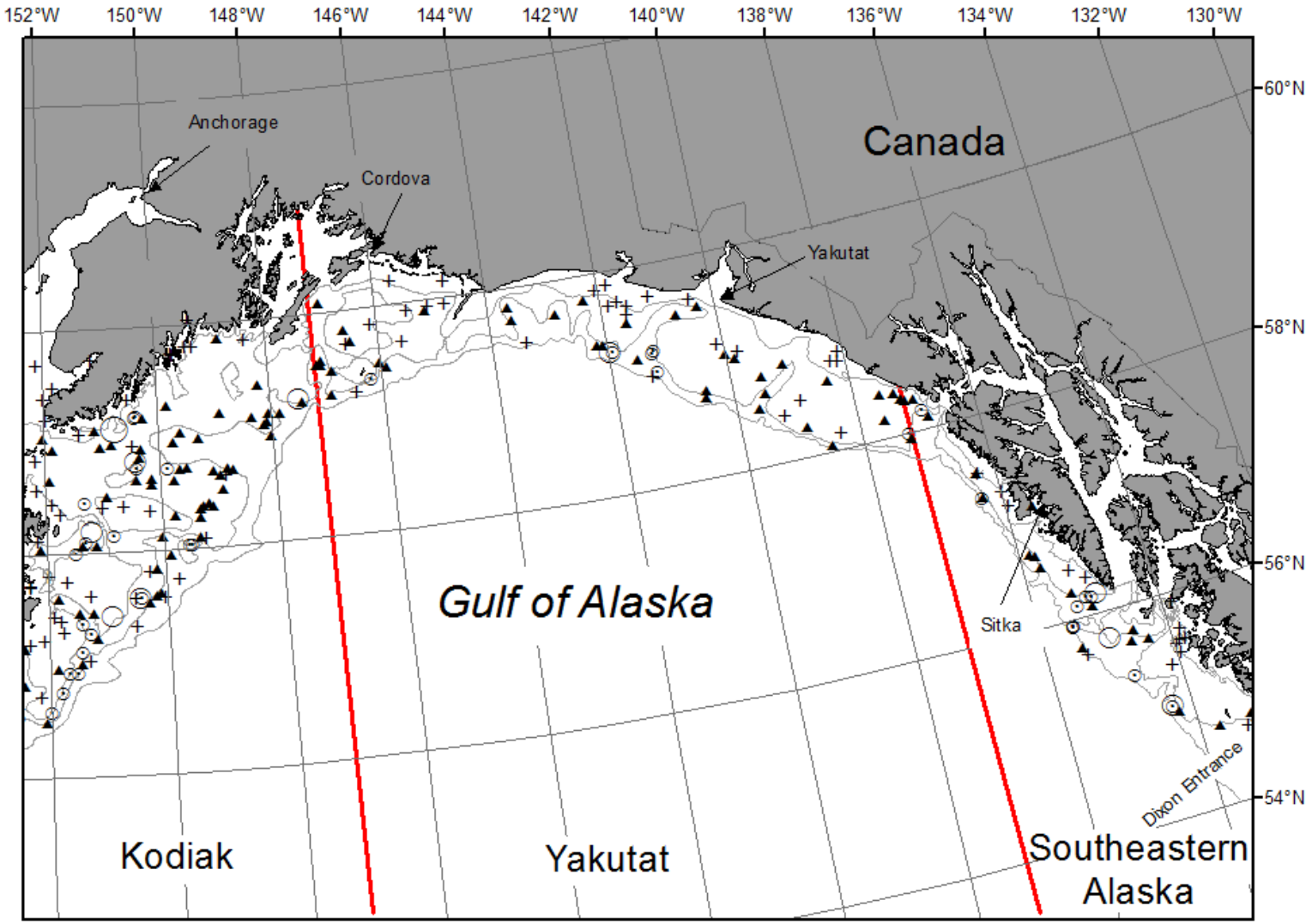

Figure 28. -- Continued (Pacific ocean perch).

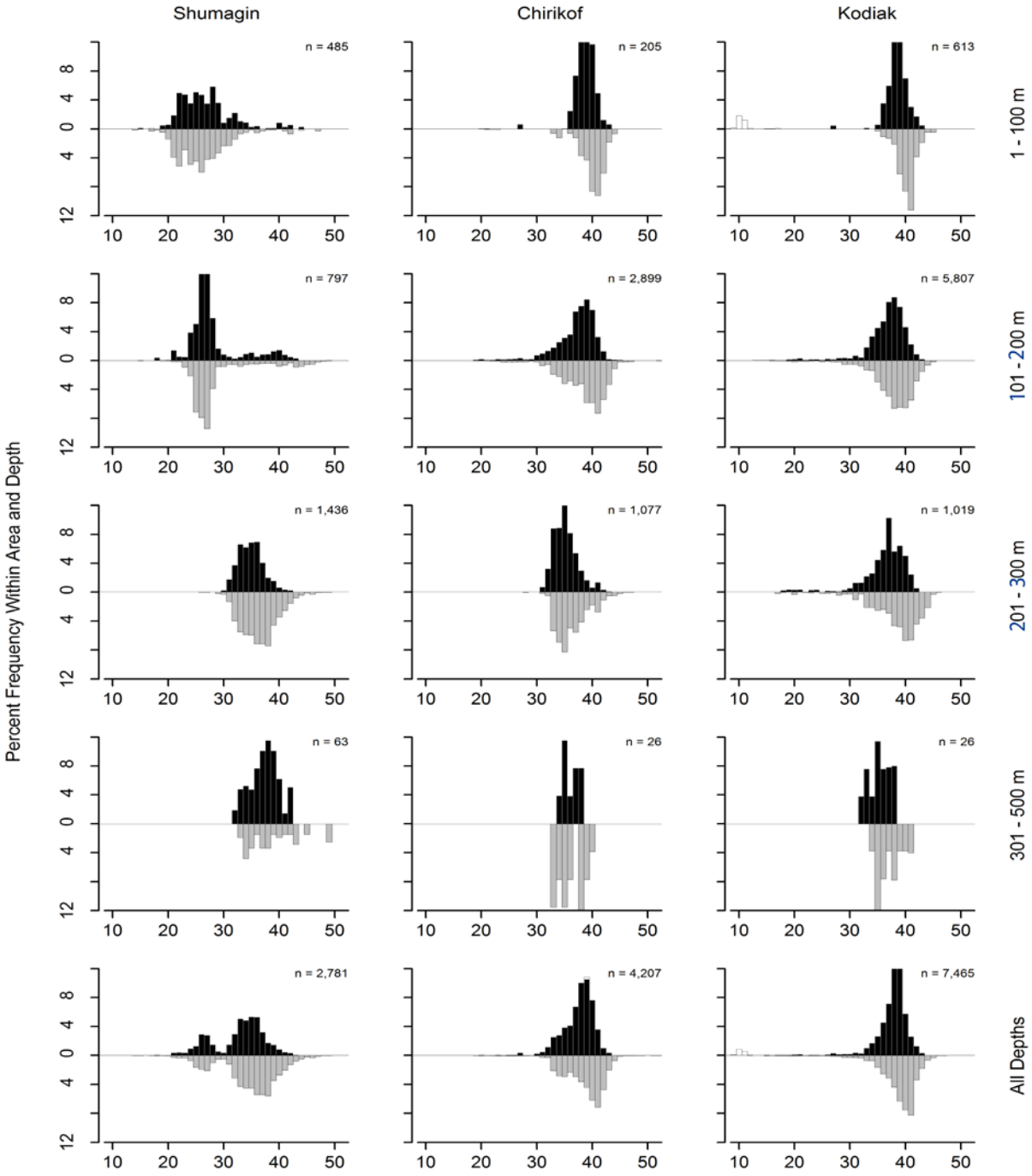

Figure 29. -- Size composition of Pacific ocean perch from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

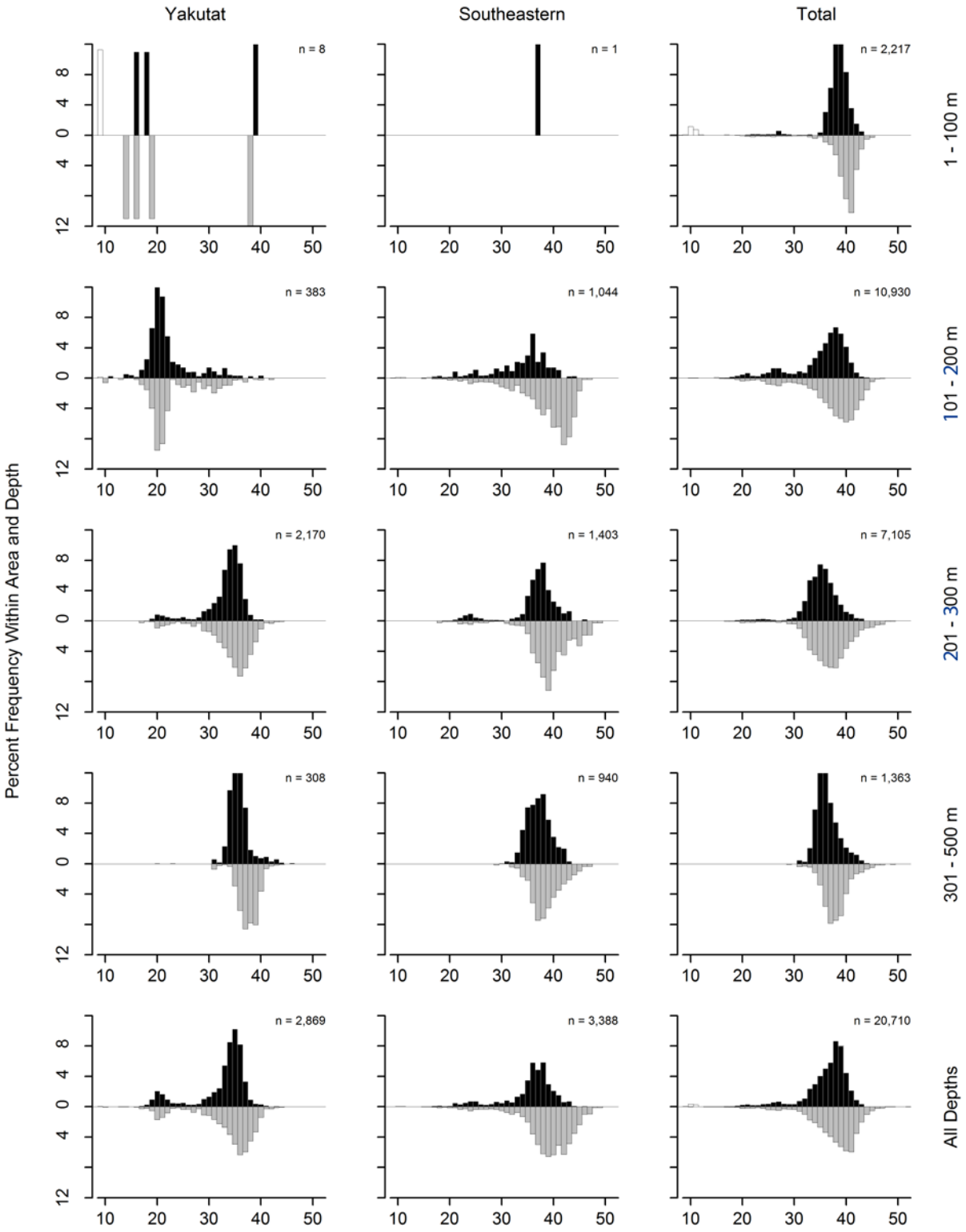

Figure 29. -- Continued (Pacific ocean perch).

Table 38. -- Catch per unit of effort by stratum for Pacific ocean perch sorted by descending CPUE for the 2017 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	201 - 300	Shumagin Slope	13	13	590.66	164,674	0	378,905
Kodiak	1 - 100	Kenai Peninsula	7	1	460.98	242,480	0	835,827
Chirikof	201 - 300	Chirikof Slope	7	7	414.67	63,374	0	165,589
Southeastern	201 - 300	Prince of Wales Slope/Gullie	6	6	272.30	106,935	0	236,469
Kodiak	101 - 200	Kodiak Outer Shelf	17	17	235.49	118,350	41,192	195,508
Chirikof	1 - 100	Chirikof Bank	19	2	165.55	178,661	0	553,988
Southeastern	301 - 500	Southeastern Slope	5	5	157.13	12,141	5,545	18,736
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	146.67	16,505	0	41,525
Yakutat	201 - 300	Yakutat Slope	10	10	145.51	30,955	0	69,788
Yakutat	201 - 300	Yakutat Gullies	7	7	140.57	42,770	0	104,057
Chirikof	101 - 200	Chirikof Outer Shelf	16	15	126.53	63,399	361	126,437
Yakutat	301 - 500	Yakutat Slope	3	2	112.93	17,172	0	90,410
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	6	108.24	45,423	0	128,921
Kodiak	201 - 300	Kodiak Slope	6	6	106.55	17,289	0	41,487
Kodiak	101 - 200	Albatross Gullies	22	18	91.30	72,231	1,520	142,942
Southeastern	101 - 200	Prince of Wales Shelf	9	6	86.09	59,298	0	191,915
Kodiak	101 - 200	Portlock Flats	25	22	75.43	55,336	0	121,506
Chirikof	101 - 200	Shelikof Edge	23	20	71.29	55,136	5,036	105,237
Kodiak	1 - 100	Albatross Banks	25	5	63.65	98,046	0	258,899
Yakutat	301 - 500	Yakutat Gullies	2	2	28.91	3,201	0	30,813
Kodiak	101 - 200	Kenai Flats	11	8	28.78	34,758	0	89,012
Shumagin	101 - 200	Shumagin Outer Shelf	25	13	28.18	22,977	0	52,275
Southeastern	301 - 500	Southeastern Deep Gullies	3	2	27.18	6,373	0	32,179
Kodiak	201 - 300	Kenai Gullies	11	11	14.90	9,919	870	18,969
Kodiak	101 - 200	Barren Islands	15	10	13.80	15,158	0	31,821
Chirikof	201 - 300	Lower Shelikof Gully	9	5	5.89	5,899	0	17,800
Shumagin	1 - 100	Fox Islands	9	3	5.84	4,867	0	15,258
Shumagin	301 - 500	Shumagin Slope	4	4	4.42	1,118	0	2,936
Yakutat	101 - 200	Fairweather Shelf	9	7	2.13	1,644	0	3,783
Yakutat	101 - 200	Yakutat Flats	7	5	1.51	1,365	0	3,872
Chirikof	301 - 500	Chirikof Slope	4	2	1.46	234	0	884
Kodiak	301 - 500	Kodiak Slope	5	3	1.33	388	0	1,130
Chirikof	1 - 100	Semidi Bank	10	7	0.90	655	133	1,177
Shumagin	1 - 100	Shumagin Bank	25	4	0.65	803	0	1,991
Yakutat	101 - 200	Middleton Shelf	7	4	0.53	386	0	916
Shumagin	101 - 200	West Shumagin Gully	3	1	0.18	41	0	218
Yakutat	1 - 100	Middleton Shallows	7	2	0.14	94	0	325
Southeastern	501 - 700	Southeastern Slope	2	1	0.11	12	0	159
Shumagin	1 - 100	Davidson Bank	26	5	0.10	133	12	254
Chirikof	101 - 200	East Shumagin Gully	15	3	0.07	81	0	176
Yakutat	101 - 200	Yakataga Shelf	6	3	0.06	32	0	82
Southeastern	1 - 100	Southeastern Shallows	7	1	0.04	24	0	81
Shumagin	1 - 100	Lower Alaska Peninsula	14	2	0.02	16	0	44
Yakutat	1 - 100	Yakutat Shallows	10	1	0.01	11	0	37

Northern rockfish (*Sebastes polyspinis*)

Northern rockfish was the seventh most abundant species caught in the 2017 survey, and was the third and ninth most abundant species in the Chirikof and Shumagin INPFC areas, respectively (Table 2). Northern rockfish were almost exclusively caught in the Shumagin, Chirikof, and Kodiak INPFC areas at depths less than 200 m (Table 39). The highest densities by far occurred in the Semidi Bank, Chirikof Bank, Shumagin Outer Shelf and the Chirikof Outer Shelf strata, where 89% of the estimated biomass was concentrated (Fig. 30 and Table 40). Size was relatively constant with depth and INPFC area and was similar for males and females (Fig. 31). The estimated biomass of northern rockfish was 150,326 t, and the highest regional biomass by far was in the Chirikof area, where 72% was concentrated (Table 39).

Table 39. -- Number of survey hauls, number of hauls with northern rockfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	10	2.73	11,259	0	25,991	0.997
	101 - 200	32	11	18.46	27,097	0	59,443	1.053
	201 - 300	13	7	0.25	71	8	133	0.636
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	28	6.07	38,426	3,503	73,350	1.034
Chirikof	1 - 100	41	5	35.14	91,494	0	227,680	1.051
	101 - 200	54	19	6.73	16,046	1,576	30,516	0.919
	201 - 300	16	2	0.07	79	0	230	0.723
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	26	16.56	107,618	0	244,153	1.028
Kodiak	1 - 100	61	3	0.21	795	0	2,095	1.105
	101 - 200	90	32	0.79	3,415	1,187	5,643	0.927
	201 - 300	20	2	0.05	52	0	134	0.659
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	37	0.44	4,262	1,693	6,831	0.951
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	1	0.01	19	0	64	0.444
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	1	<0.01	19	0	64	0.444
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	0	---	---	---	---	---
All areas	1 - 100	200	18	8.02	103,548	0	240,175	1.045
	101 - 200	223	63	3.81	46,577	11,543	81,611	0.993
	201 - 300	76	11	0.06	201	36	366	0.674
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	92	4.87	150,326	9,522	291,130	1.027

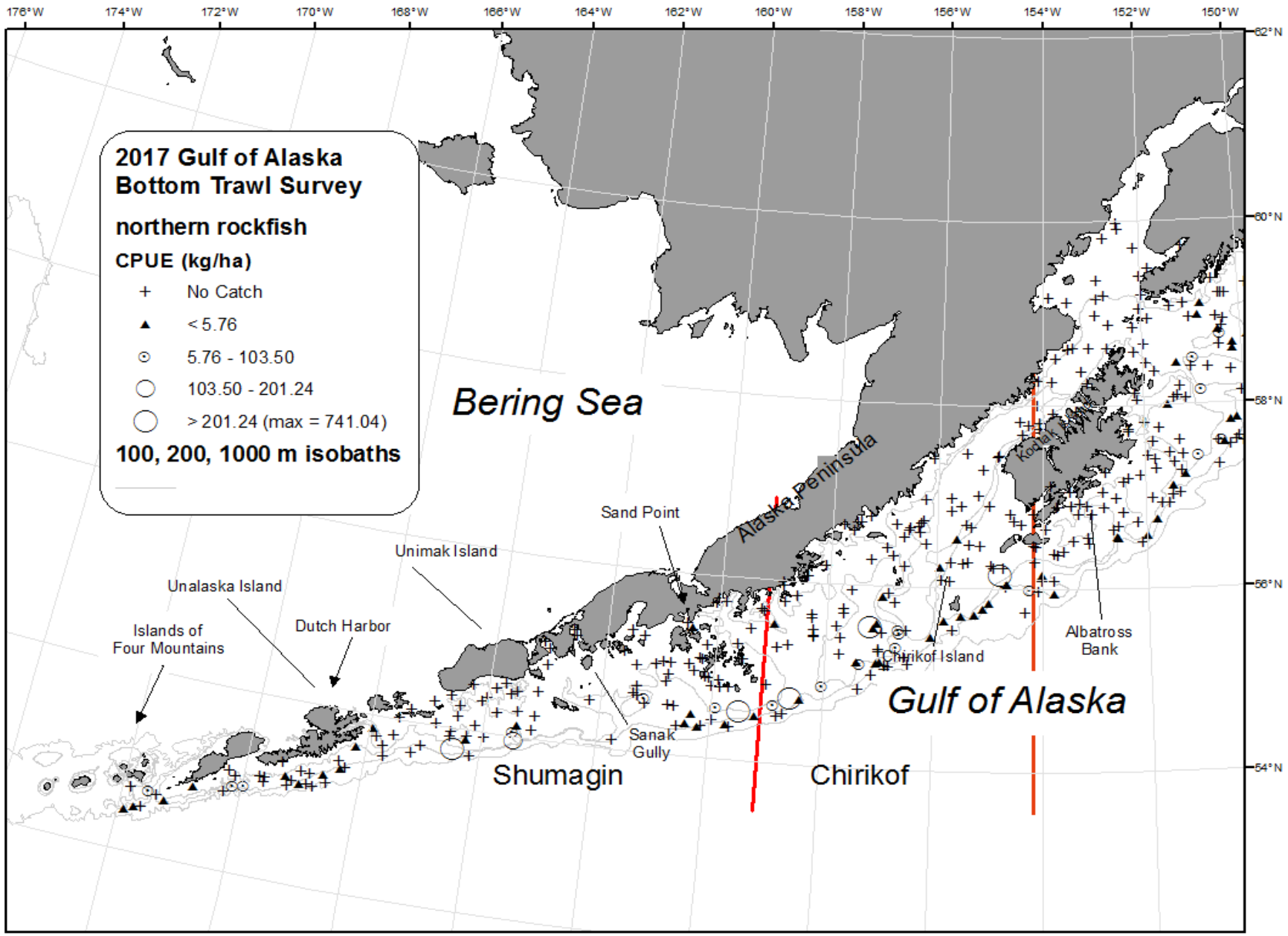

Figure 30. -- Distribution and relative abundance of northern rockfish from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

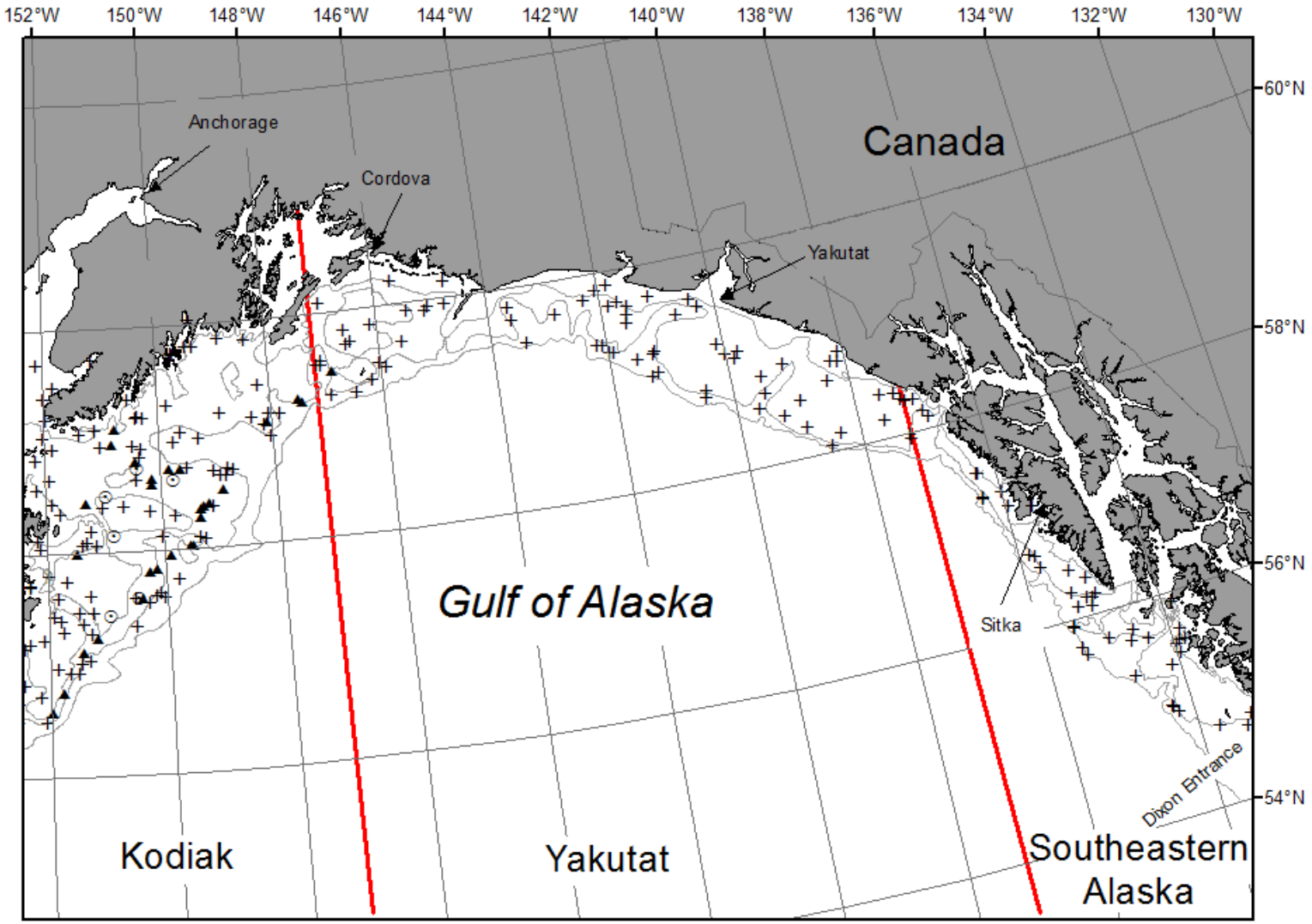

Figure 30. -- Continued (northern rockfish).

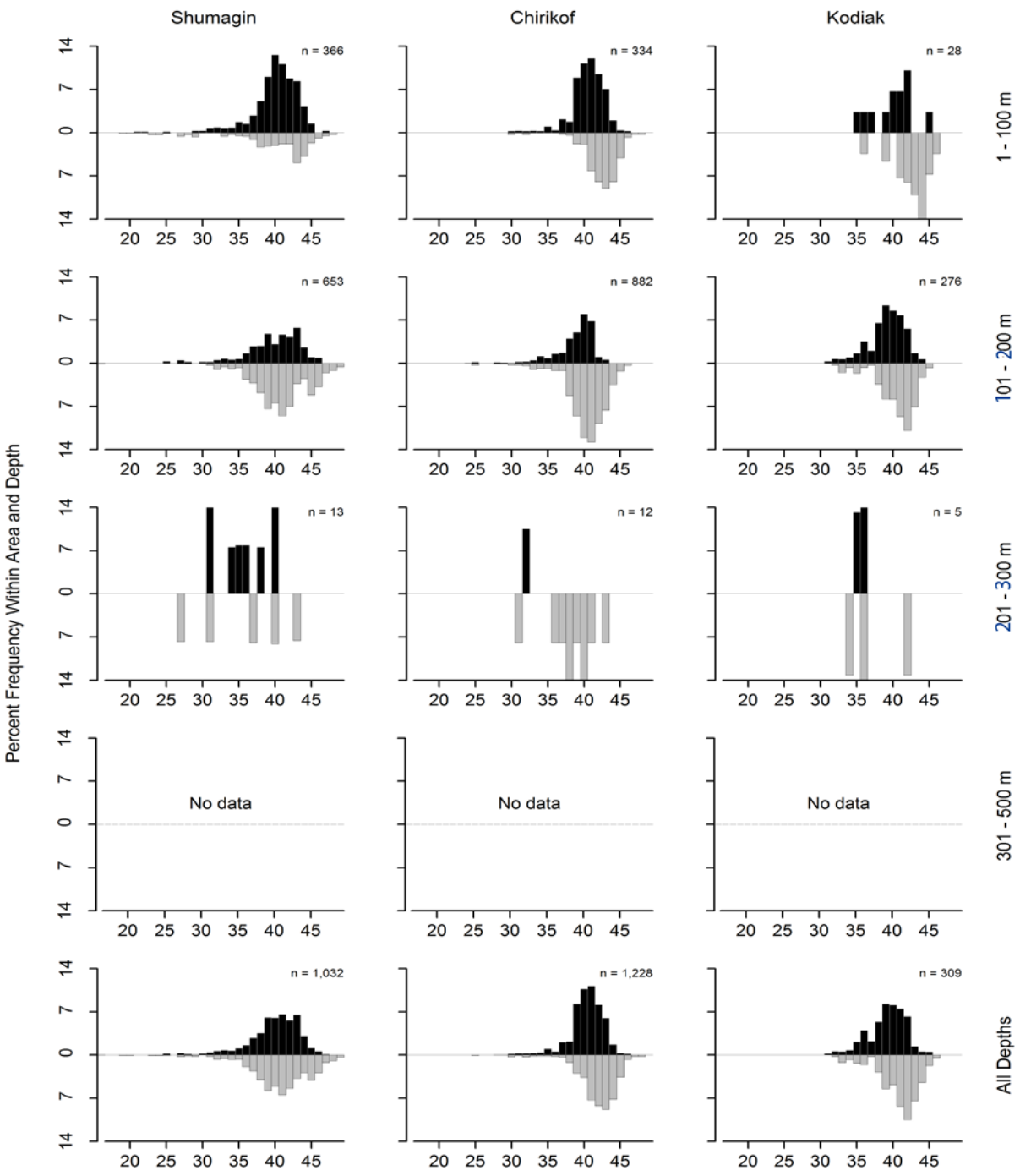

Figure 31. -- Size composition of northern rockfish from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

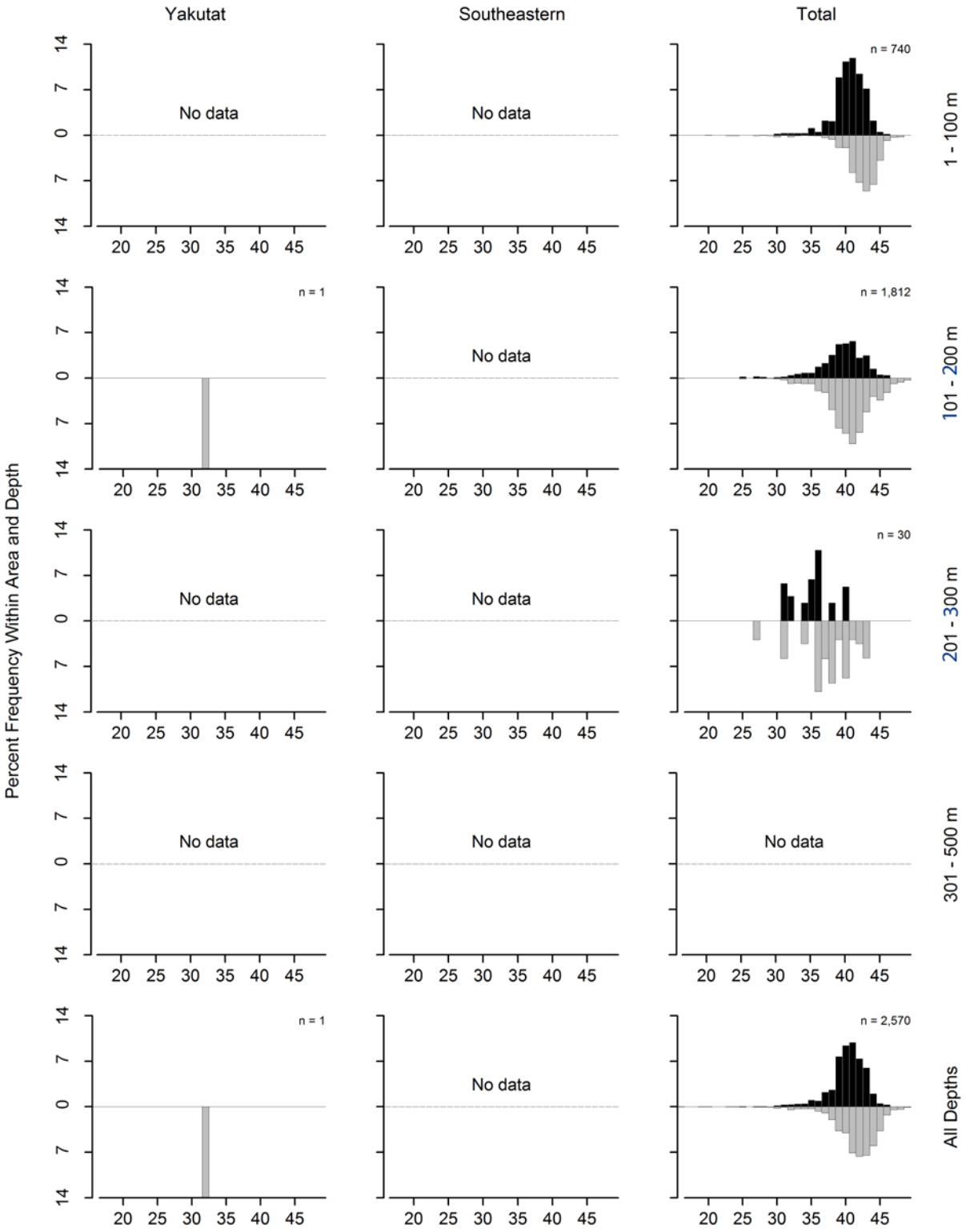

Figure 31. -- Continued (northern rockfish).

Table 40. -- Catch per unit of effort by stratum for northern rockfish sorted by descending CPUE for the 2017 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	1 - 100	Semidi Bank	10	4	75.11	54,848	0	177,067
Chirikof	1 - 100	Chirikof Bank	19	1	33.96	36,646	0	113,638
Shumagin	101 - 200	Shumagin Outer Shelf	25	11	33.23	27,097	0	59,506
Chirikof	101 - 200	Chirikof Outer Shelf	16	14	30.03	15,045	544	29,546
Shumagin	1 - 100	Davidson Bank	26	4	5.04	6,891	0	20,062
Shumagin	1 - 100	Shumagin Bank	25	2	3.45	4,282	0	11,182
Kodiak	101 - 200	Kodiak Outer Shelf	17	13	2.79	1,404	0	3,309
Kodiak	101 - 200	Portlock Flats	25	14	1.90	1,391	361	2,420
Chirikof	101 - 200	Shelikof Edge	23	5	1.30	1,001	0	2,104
Chirikof	201 - 300	Chirikof Slope	7	2	0.51	79	0	235
Kodiak	101 - 200	Albatross Gullies	22	4	0.49	385	0	1,055
Kodiak	1 - 100	Albatross Banks	25	2	0.42	644	0	1,910
Kodiak	1 - 100	Kenai Peninsula	7	1	0.29	151	0	522
Shumagin	201 - 300	Shumagin Slope	13	7	0.25	71	8	134
Kodiak	101 - 200	Barren Islands	15	1	0.22	236	0	741
Kodiak	201 - 300	Kodiak Slope	6	1	0.13	21	0	75
Shumagin	1 - 100	Fox Islands	9	2	0.08	70	0	176
Kodiak	201 - 300	Kenai Gullies	11	1	0.05	31	0	100
Yakutat	101 - 200	Middleton Shelf	7	1	0.03	19	0	66
Shumagin	1 - 100	Lower Alaska Peninsula	14	2	0.02	15	0	38

Rougheye rockfish (*Sebastes aleutianus*)

Rougheye rockfish was not among the 20 most abundant species in the 2017 survey, but was the eleventh most abundant species in the Yakutat region and the seventeenth most abundant in the Southeastern region (Table 2). Rougheye rockfish were caught throughout the survey area and at all depths less than 500 m (Table 41). The highest densities occurred in the 301-500 m depth interval, with particularly high concentrations on the slope and in gullies of the Yakutat and Southeastern regions (Fig. 32 and Table 42). Size was variable for both sexes with the largest sizes occurring in the 301-500 m depth range (Fig. 33). The estimated biomass of rougheye rockfish was 28,436 t, and the highest regional biomass was in the Yakutat region. Approximately 83% of the biomass was concentrated in the 101-200 m and 301-500 m depth intervals (Table 41).

Table 41. -- Number of survey hauls, number of hauls with rougheye rockfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	1	<0.01	3	0	8	0.120
	101 - 200	32	3	2.02	2,962	0	10,933	1.513
	201 - 300	13	1	0.03	7	0	23	0.393
	301 - 500	4	3	1.23	312	0	719	1.857
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	8	0.52	3,284	0	11,266	1.517
Chirikof	1 - 100	41	1	0.02	41	0	132	1.049
	101 - 200	54	9	0.11	262	47	476	0.900
	201 - 300	16	11	0.88	1,021	58	1,983	0.863
	301 - 500	4	2	1.25	200	0	631	1.134
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	23	0.23	1,523	483	2,563	0.902
Kodiak	1 - 100	61	6	0.14	531	6	1,056	0.708
	101 - 200	90	18	0.36	1,579	411	2,747	0.521
	201 - 300	20	12	1.99	2,281	299	4,263	0.780
	301 - 500	5	2	6.88	2,004	0	7,055	1.468
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	38	0.65	6,395	1,675	11,116	0.792
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	15	1.82	5,359	0	10,887	0.415
	201 - 300	17	9	1.43	740	130	1,349	0.602
	301 - 500	5	4	20.08	5,276	0	14,640	1.480
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	28	2.06	11,375	2,463	20,286	0.642
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	2	0.24	272	0	693	0.312
	201 - 300	10	2	0.17	87	0	238	3.741
	301 - 500	8	8	17.65	5,501	0	13,220	1.713
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	12	2.18	5,860	0	13,597	1.427
All areas	1 - 100	200	8	0.04	575	51	1,098	0.709
	101 - 200	223	47	0.85	10,432	2,158	18,707	0.547
	201 - 300	76	35	1.15	4,136	1,953	6,318	0.769
	301 - 500	26	19	10.39	13,293	2,552	24,034	1.567
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	109	0.92	28,436	15,296	41,576	0.843

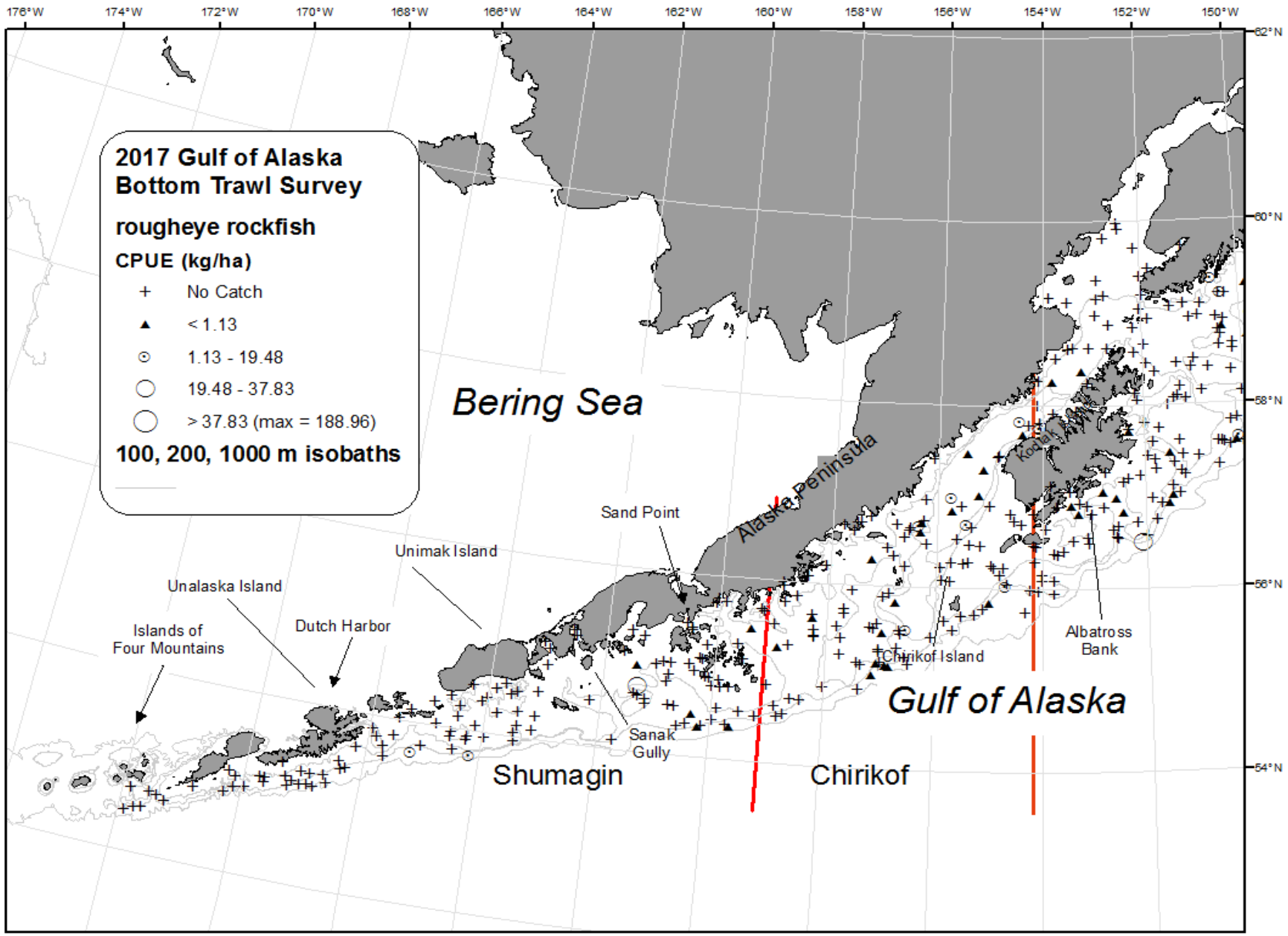

Figure 32. -- Distribution and relative abundance of rougheye rockfish from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

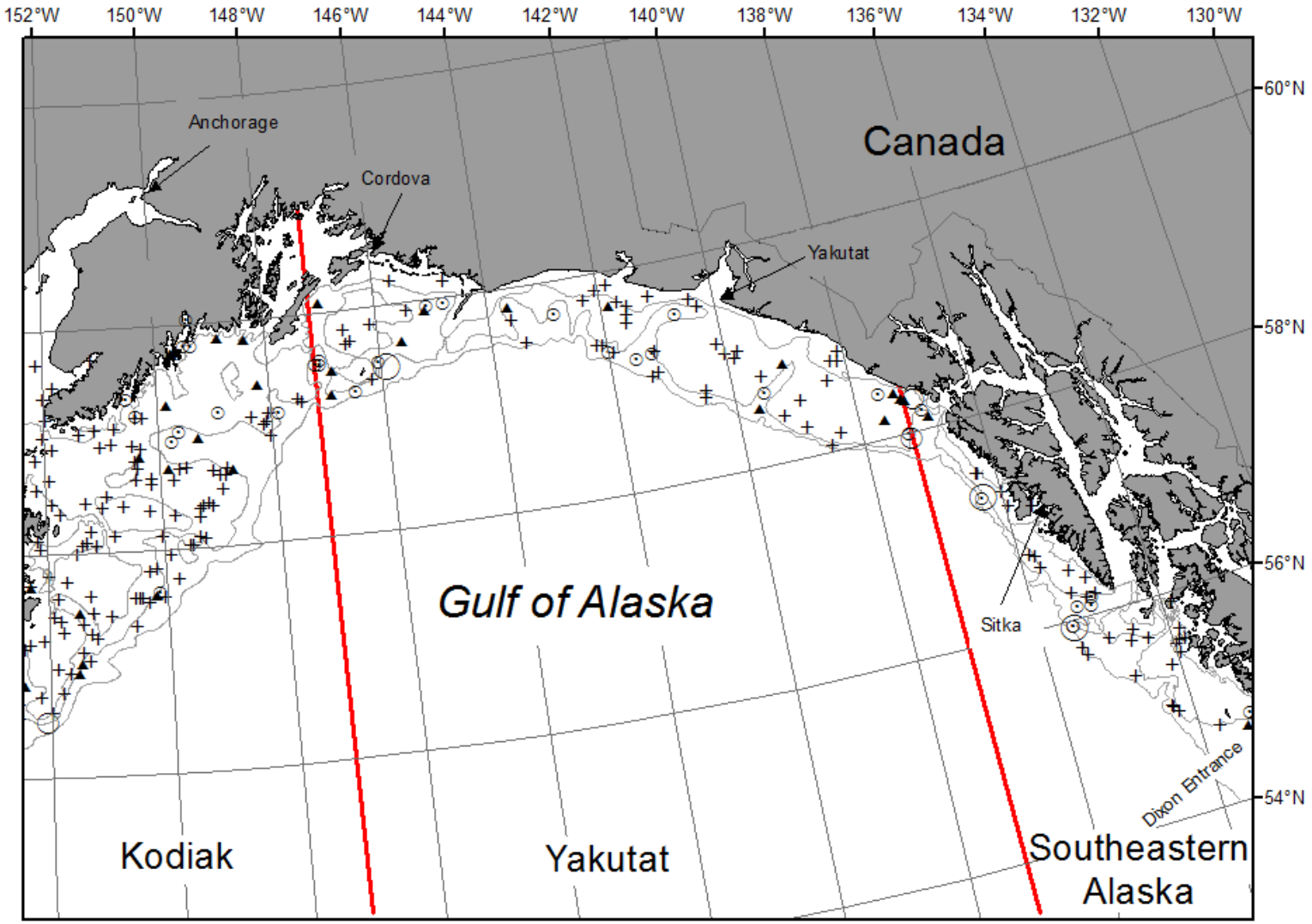

Figure 32. -- Continued (rougheye rockfish).

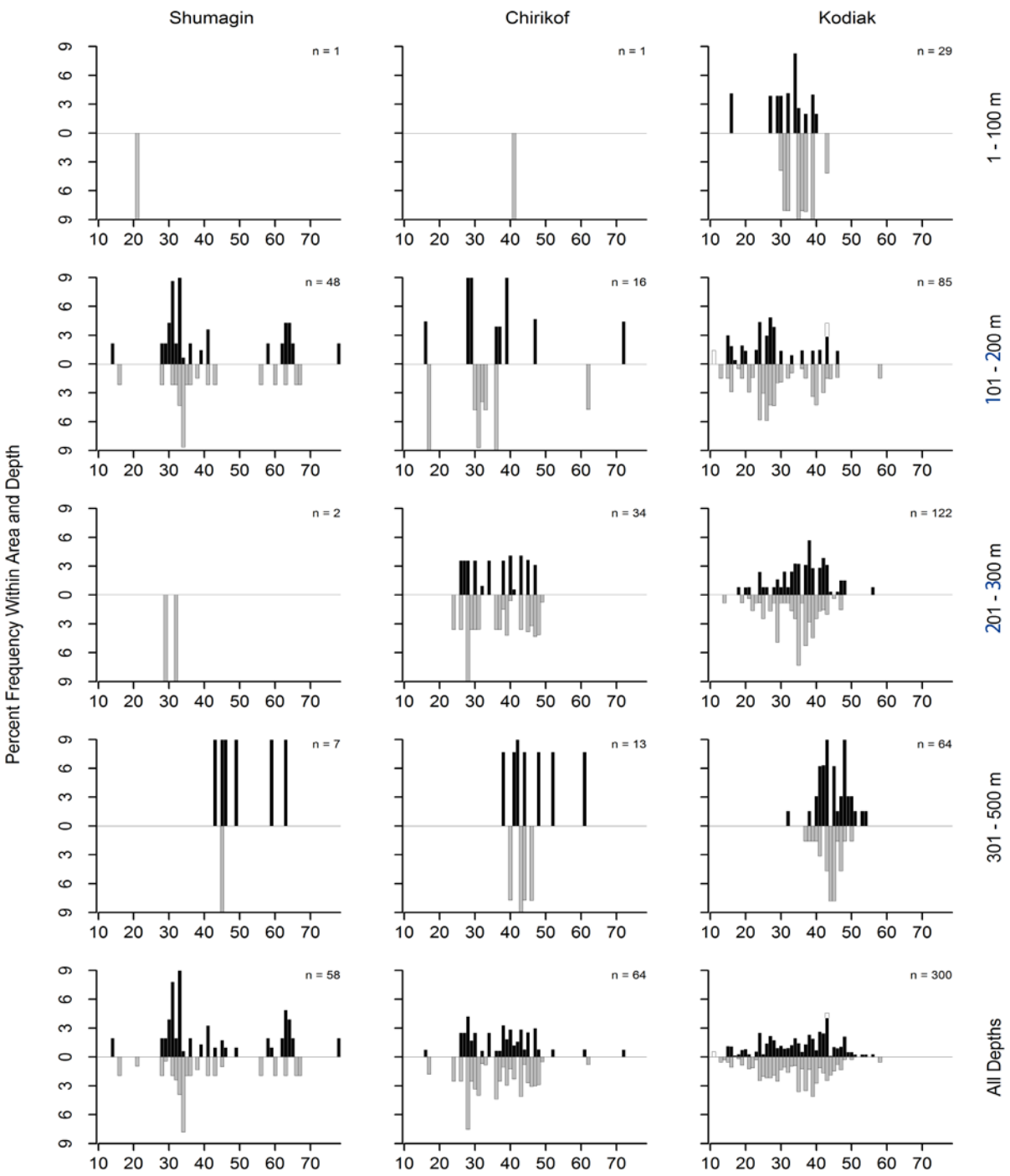

Figure 33. -- Size composition of rougheye rockfish from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

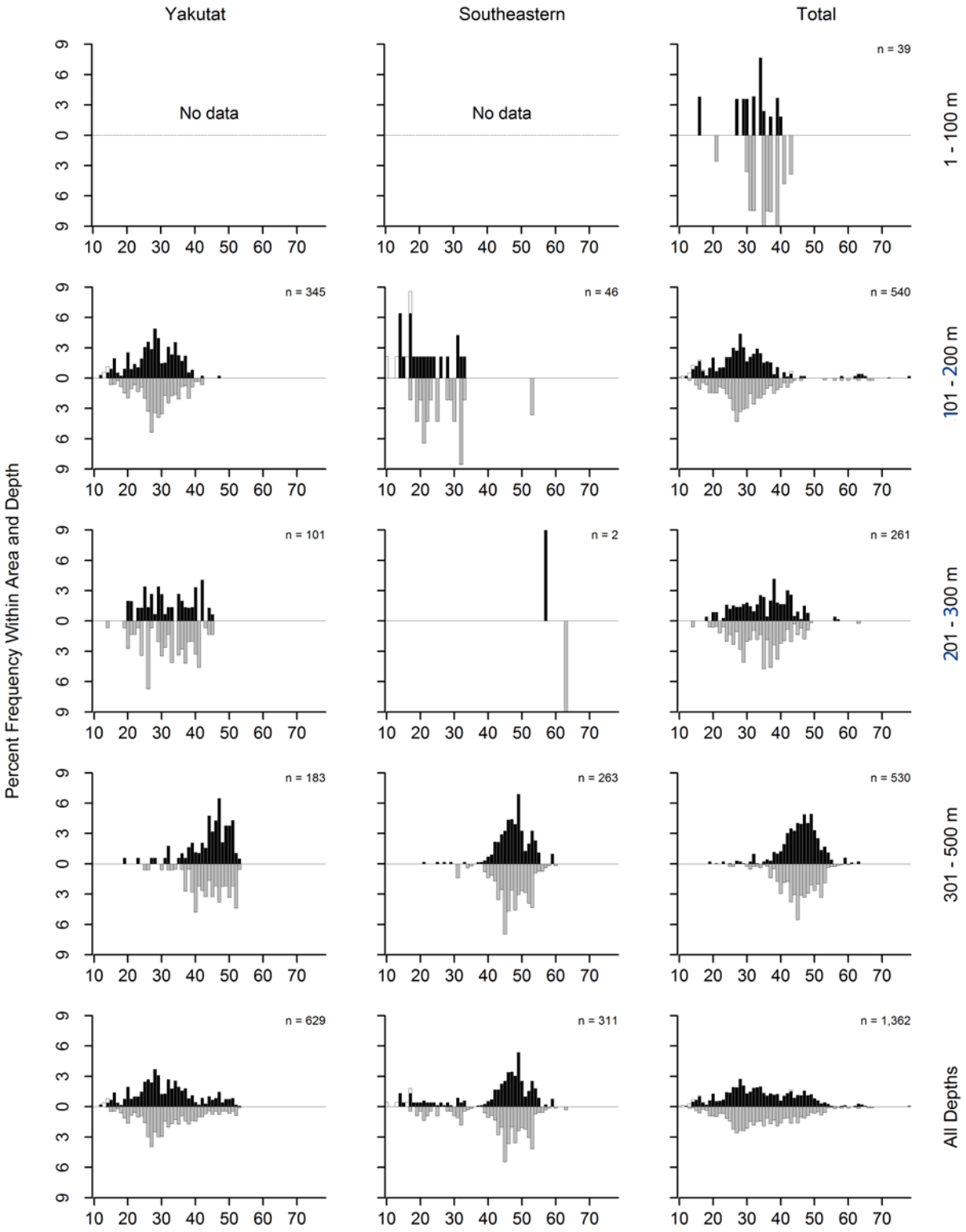

Figure 33. -- Continued (rougheye rockfish).

Table 42. -- Catch per unit of effort by stratum for rougheye rockfish sorted by descending CPUE for the 2017 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	5	5	48.10	3,717	0	11,424
Yakutat	301 - 500	Yakutat Slope	3	2	20.98	3,191	0	15,984
Yakutat	301 - 500	Yakutat Gullies	2	2	18.83	2,085	0	22,333
Southeastern	301 - 500	Southeastern Deep Gullies	3	3	7.61	1,784	0	6,703
Kodiak	301 - 500	Kodiak Slope	5	2	6.88	2,004	0	7,458
Shumagin	101 - 200	Sanak Gully	4	1	6.76	2,870	0	12,004
Yakutat	101 - 200	Fairweather Shelf	9	6	3.58	2,768	0	7,173
Yakutat	101 - 200	Middleton Shelf	7	7	3.39	2,491	0	6,830
Kodiak	201 - 300	Kenai Gullies	11	8	2.48	1,649	0	3,363
Yakutat	201 - 300	Yakutat Gullies	7	5	1.67	507	0	1,042
Kodiak	201 - 300	Upper Shelikof Gully	3	1	1.56	500	0	2,651
Chirikof	301 - 500	Chirikof Slope	4	2	1.25	200	0	694
Shumagin	301 - 500	Shumagin Slope	4	3	1.23	312	0	779
Kodiak	101 - 200	Kenai Flats	11	8	1.18	1,424	248	2,599
Yakutat	201 - 300	Yakutat Slope	10	4	1.10	233	0	605
Chirikof	201 - 300	Lower Shelikof Gully	9	7	0.95	947	0	1,924
Kodiak	201 - 300	Kodiak Slope	6	3	0.81	132	0	417
Southeastern	201 - 300	Baranof-Chichagof Slope	4	2	0.77	87	0	260
Kodiak	1 - 100	Kenai Peninsula	7	4	0.76	399	0	873
Kodiak	1 - 100	Northern Kodiak Shallows	6	1	0.54	119	0	425
Chirikof	201 - 300	Chirikof Slope	7	4	0.48	74	0	171
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	1	0.42	177	0	586
Shumagin	101 - 200	West Shumagin Gully	3	1	0.37	84	0	444
Chirikof	101 - 200	Shelikof Edge	23	5	0.21	164	0	340
Kodiak	101 - 200	Albatross Gullies	22	6	0.16	124	20	227
Southeastern	101 - 200	Prince of Wales Shelf	9	1	0.14	94	0	311
Yakutat	101 - 200	Yakutat Flats	7	1	0.08	71	0	245
Chirikof	101 - 200	East Shumagin Gully	15	3	0.07	79	0	205
Chirikof	1 - 100	Semidi Bank	10	1	0.06	41	0	133
Yakutat	101 - 200	Yakataga Shelf	6	1	0.05	29	0	102
Chirikof	101 - 200	Chirikof Outer Shelf	16	1	0.04	18	0	58
Kodiak	101 - 200	Barren Islands	15	2	0.03	30	0	86
Shumagin	201 - 300	Shumagin Slope	13	1	0.03	7	0	23
Kodiak	1 - 100	Albatross Shallows	13	1	0.02	13	0	42
Shumagin	101 - 200	Shumagin Outer Shelf	25	1	0.01	8	0	23
Kodiak	101 - 200	Portlock Flats	25	2	0.00	2	0	4
Shumagin	1 - 100	Shumagin Bank	25	1	0.00	3	0	8

Blackspotted rockfish (*Sebastes melanostictus*)

Blackspotted rockfish was not among the 20 most abundant species caught in the 2017 survey, but was the nineteenth most abundant species in the Southeastern INPFC area (Table 2). Blackspotted rockfish were caught throughout the survey area primarily at depths less than 500 m (Table 43). The highest densities by far occurred at depths between 301 and 500 m in all INPFC areas, and they were present in 33 of the 54 survey strata sampled (Fig. 34 and Table 44). The largest fish occurred in the 301-500 m depth zone (Fig. 35). The estimated biomass of blackspotted rockfish was 11,456 t, and the highest regional biomass was in the Southeastern region, where 32% of it was concentrated (Table 43).

Table 43. -- Number of survey hauls, number of hauls with blackspotted rockfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	3	0.02	84	0	197	1.076
	101 - 200	32	5	0.15	215	0	443	0.546
	201 - 300	13	11	2.39	665	119	1,211	0.547
	301 - 500	4	4	9.78	2,475	0	5,021	1.051
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	23	0.54	3,438	972	5,905	0.850
Chirikof	1 - 100	41	0		---	---	---	---
	101 - 200	54	9	0.14	344	20	667	0.672
	201 - 300	16	7	0.23	264	94	435	0.720
	301 - 500	4	4	1.97	317	0	715	1.156
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	20	0.14	925	464	1,385	0.803
Kodiak	1 - 100	61	8	0.25	955	232	1,679	0.767
	101 - 200	90	14	0.15	638	200	1,076	0.464
	201 - 300	20	9	0.14	157	36	277	0.460
	301 - 500	5	3	2.42	704	0	2,061	1.047
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	34	0.25	2,454	1,104	3,803	0.675
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	7	0.06	165	4	327	0.163
	201 - 300	17	2	0.49	255	0	818	0.727
	301 - 500	5	4	2.16	568	0	1,736	1.210
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	13	0.18	988	0	2,031	0.538
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	1	0.14	157	0	511	0.210
	201 - 300	10	2	0.05	24	0	76	0.554
	301 - 500	8	7	10.96	3,417	0	10,819	1.447
	501 - 700	2	1	0.52	54	0	285	2.648
	701 - 1000	0	0		---	---	---	---
	All depths	45	11	1.36	3,651	0	11,065	1.151
All areas	1 - 100	200	11	0.08	1,039	315	1,763	0.785
	101 - 200	223	36	0.12	1,518	844	2,193	0.376
	201 - 300	76	31	0.38	1,365	607	2,122	0.589
	301 - 500	26	22	5.85	7,480	506	14,455	1.220
	501 - 700	11	1	0.07	54	0	285	2.648
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	101	0.37	11,456	4,679	18,233	0.828

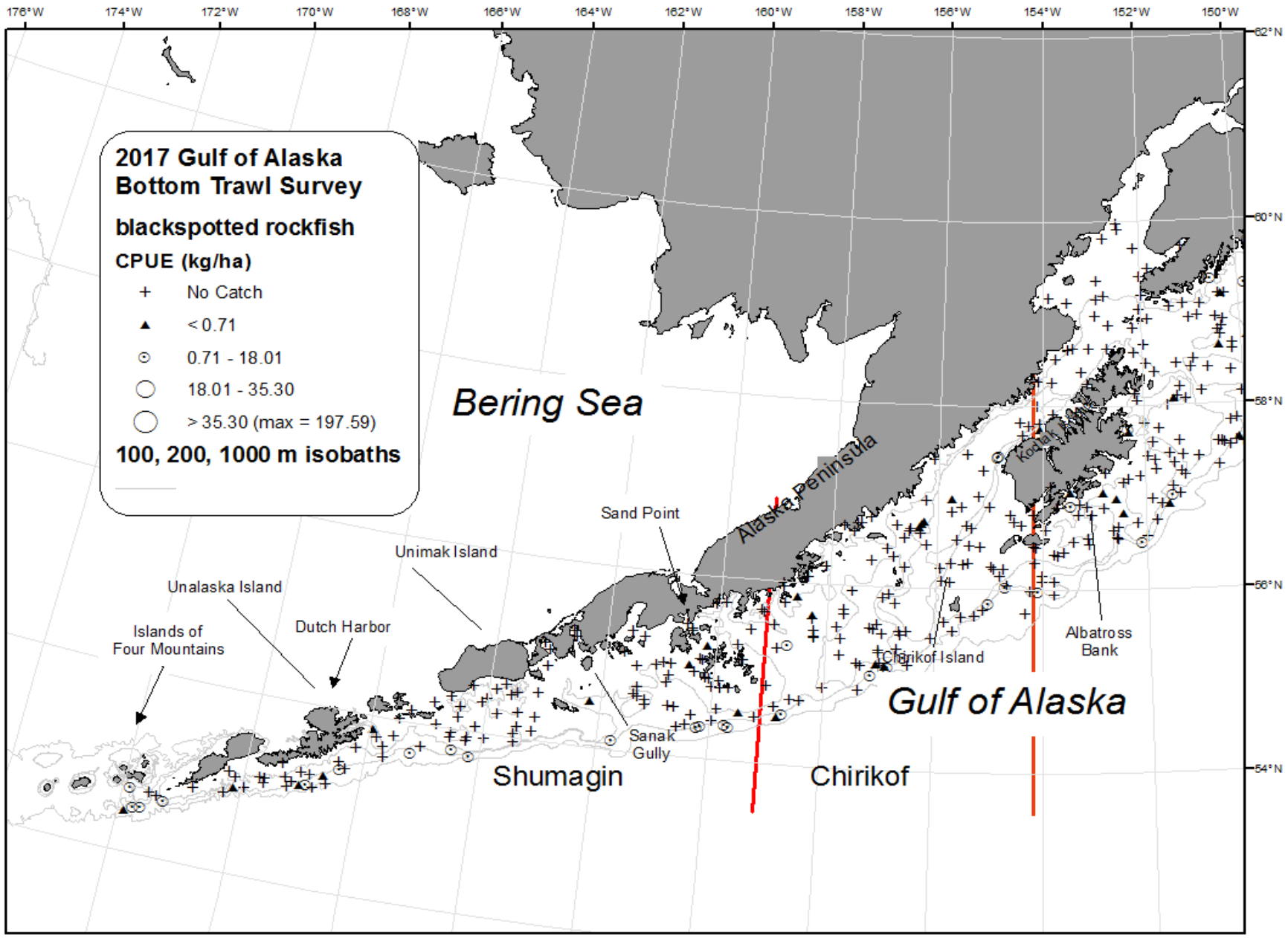

Figure 34. -- Distribution and relative abundance of blackspotted rockfish from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

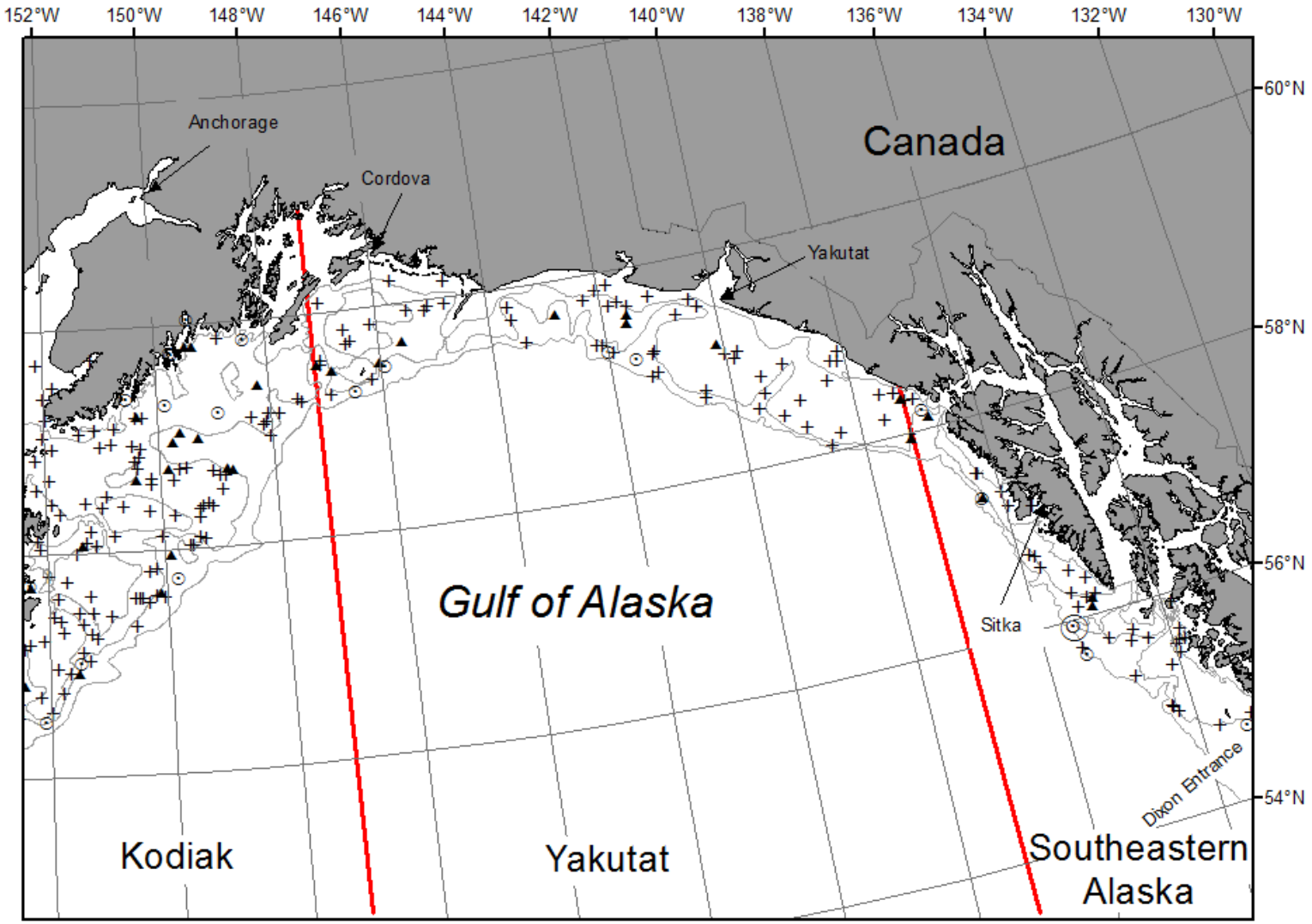

Figure 34. -- Continued (blackspotted rockfish).

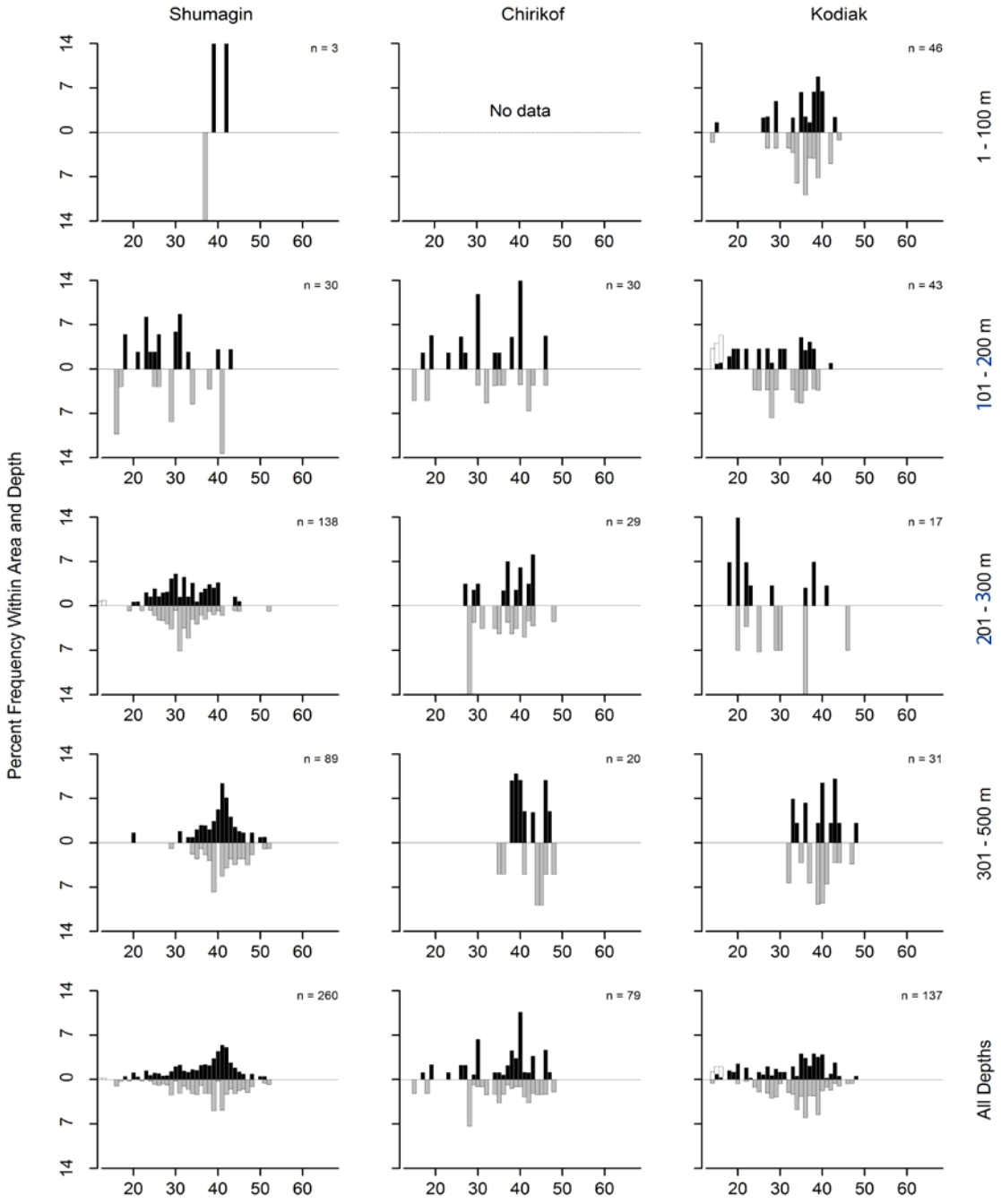

Figure 35. -- Size composition of blackspotted rockfish from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

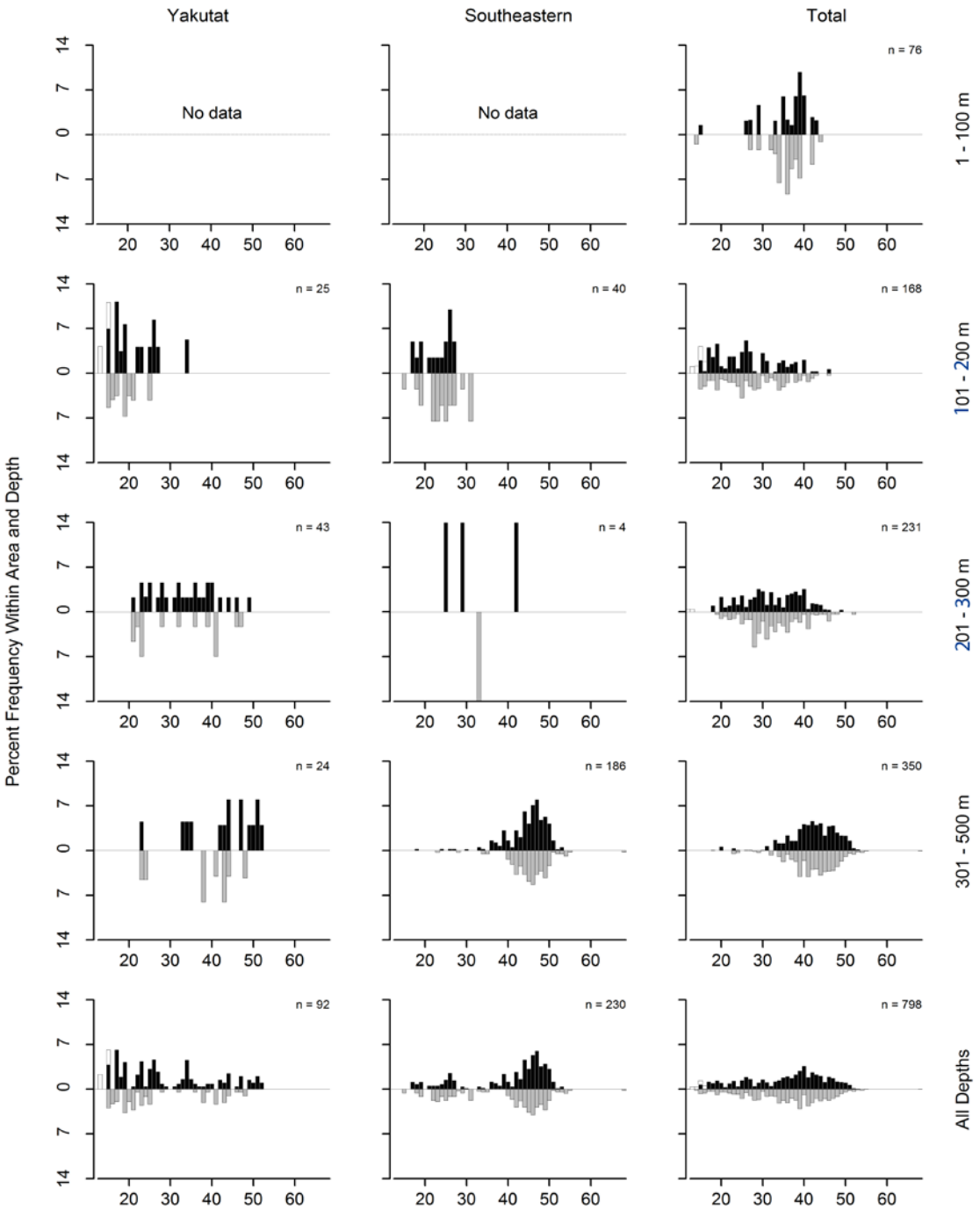

Figure 35. -- Continued (blackspotted rockfish).

Table 44. -- Catch per unit of effort by stratum for blackspotted rockfish sorted by descending CPUE for the 2017 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	5	5	41.36	3,196	0	11,576
Shumagin	301 - 500	Shumagin Slope	4	4	9.78	2,475	0	5,394
Yakutat	301 - 500	Yakutat Slope	3	2	3.16	481	0	2,058
Kodiak	301 - 500	Kodiak Slope	5	3	2.42	704	0	2,169
Shumagin	201 - 300	Shumagin Slope	13	11	2.39	665	114	1,216
Chirikof	301 - 500	Chirikof Slope	4	4	1.97	317	0	773
Chirikof	201 - 300	Chirikof Slope	7	6	1.54	236	56	417
Kodiak	1 - 100	Kenai Peninsula	7	4	1.44	758	59	1,458
Yakutat	201 - 300	Yakutat Slope	10	2	1.20	255	0	827
Southeastern	301 - 500	Southeastern Deep Gullies	3	2	0.94	221	0	1,048
Yakutat	301 - 500	Yakutat Gullies	2	2	0.79	88	0	333
Southeastern	501 - 700	Southeastern Slope	2	1	0.52	54	0	737
Kodiak	101 - 200	Kenai Flats	11	7	0.42	506	96	917
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	1	0.37	157	0	518
Kodiak	1 - 100	Albatross Shallows	13	3	0.31	178	0	511
Chirikof	101 - 200	Shelikof Edge	23	5	0.28	213	0	478
Southeastern	201 - 300	Baranof-Chichagof Slope	4	2	0.21	24	0	83
Kodiak	201 - 300	Kenai Gullies	11	7	0.20	132	17	247
Shumagin	101 - 200	Shumagin Outer Shelf	25	4	0.20	160	0	356
Kodiak	201 - 300	Kodiak Slope	6	2	0.15	25	0	71
Kodiak	101 - 200	Albatross Gullies	22	5	0.15	115	0	279
Yakutat	101 - 200	Middleton Shelf	7	3	0.13	97	0	247
Shumagin	101 - 200	Sanak Gully	4	1	0.13	55	0	230
Chirikof	101 - 200	East Shumagin Gully	15	3	0.10	114	0	311
Kodiak	1 - 100	Northern Kodiak Shallows	6	1	0.09	19	0	68
Shumagin	1 - 100	Fox Islands	9	1	0.06	46	0	152
Yakutat	101 - 200	Yakataga Shelf	6	2	0.05	29	0	89
Yakutat	101 - 200	Yakutat Flats	7	1	0.04	37	0	126
Chirikof	101 - 200	Chirikof Outer Shelf	16	1	0.04	18	0	55
Shumagin	1 - 100	Shumagin Bank	25	2	0.03	38	0	92
Chirikof	201 - 300	Lower Shelikof Gully	9	1	0.03	28	0	94
Kodiak	101 - 200	Portlock Flats	25	2	0.02	17	0	50
Yakutat	101 - 200	Fairweather Shelf	9	1	0.01	4	0	12

Dusky rockfish (*Sebastes variabilis*)

Dusky rockfish was the seventeenth most abundant species in the 2017 survey, and was the twelfth most abundant species in the Chirikof region (Table 2). Dusky rockfish were caught throughout the survey area and at all depths less than 500 m (Table 45). The highest densities occurred in the 101-200 m depth interval in four of the five INPFC areas, with particularly high concentrations in the Shumagin and Chirikof Outer Shelf and the Shelikof Edge strata (Fig. 36 and Table 46). Size did not exhibit a clear trend with depth or longitude (Fig. 37). The estimated biomass of dusky rockfish was 51,270 t, and the highest regional biomass was in the Chirikof region. More than 91% of the biomass was concentrated in the 101-200 m depth interval (Table 45).

Table 45. -- Number of survey hauls, number of hauls with dusky rockfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	6	0.09	391	0	837	0.756
	101 - 200	32	6	9.56	14,032	0	32,127	1.279
	201 - 300	13	1	0.05	14	0	44	1.655
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	13	2.28	14,437	0	32,537	1.256
Chirikof	1 - 100	41	4	0.38	982	0	2,527	1.030
	101 - 200	54	16	7.61	18,151	721	35,582	1.259
	201 - 300	16	3	0.38	434	0	1,134	1.782
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	23	3.01	19,566	2,058	37,075	1.253
Kodiak	1 - 100	61	4	0.46	1,787	0	5,738	1.578
	101 - 200	90	38	3.09	13,389	5,638	21,140	1.660
	201 - 300	20	3	0.10	117	0	290	1.695
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	45	1.56	15,293	6,837	23,749	1.650
Yakutat	1 - 100	17	1	0.03	52	0	176	1.576
	101 - 200	29	6	0.27	805	110	1,499	1.482
	201 - 300	17	2	0.13	65	0	172	1.429
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	9	0.17	922	223	1,622	1.483
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	5	0.46	512	0	1,067	1.042
	201 - 300	10	5	0.92	465	0	1,020	1.199
	301 - 500	8	1	0.24	75	0	313	1.960
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	11	0.39	1,052	319	1,784	1.147
All areas	1 - 100	200	15	0.25	3,212	0	7,231	1.219
	101 - 200	223	71	3.83	46,889	21,207	72,570	1.360
	201 - 300	76	14	0.30	1,094	234	1,955	1.452
	301 - 500	26	1	0.06	75	0	313	1.960
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	101	1.66	51,270	25,313	77,227	1.352

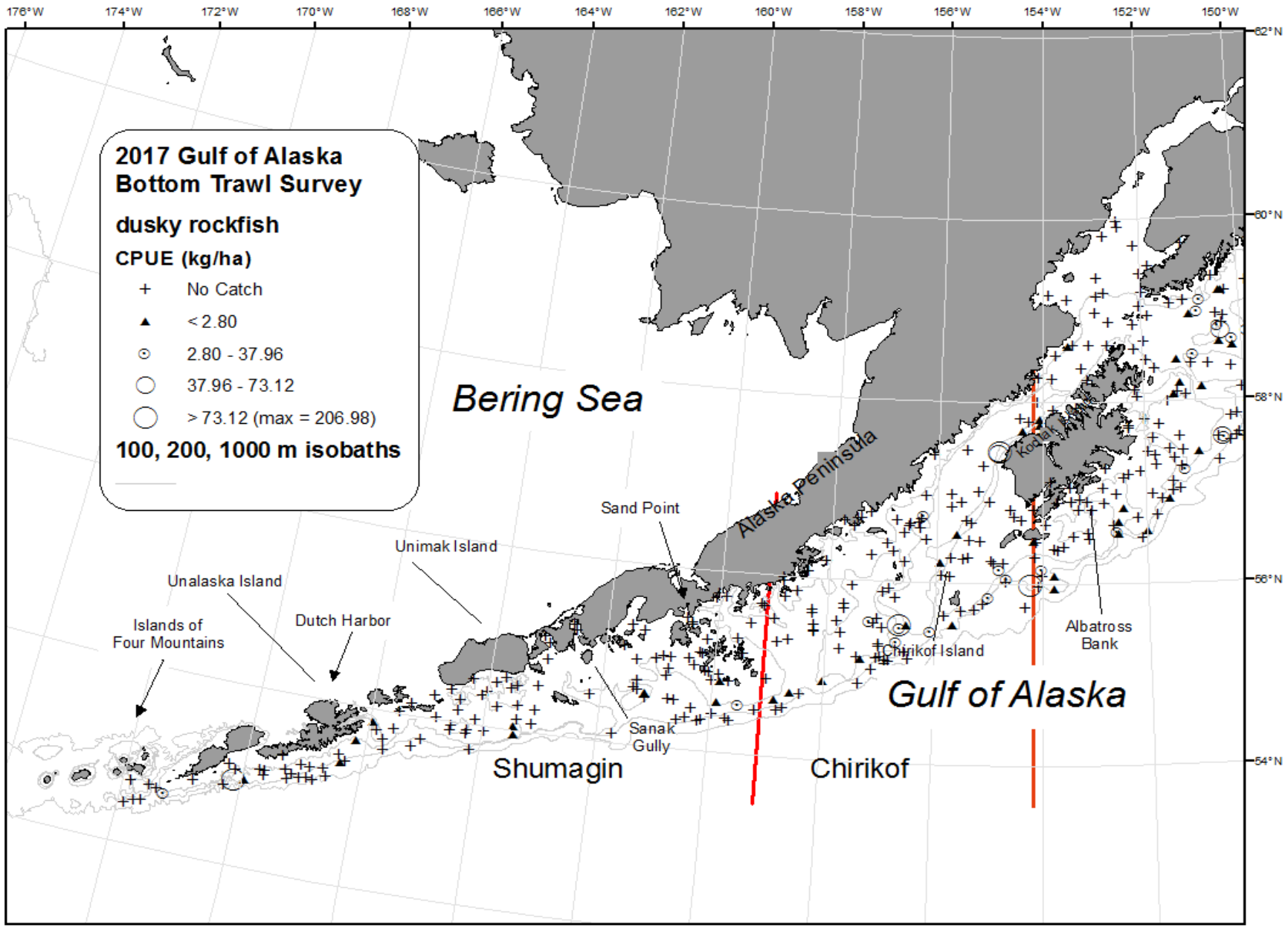

Figure 36. -- Distribution and relative abundance of dusky rockfish from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

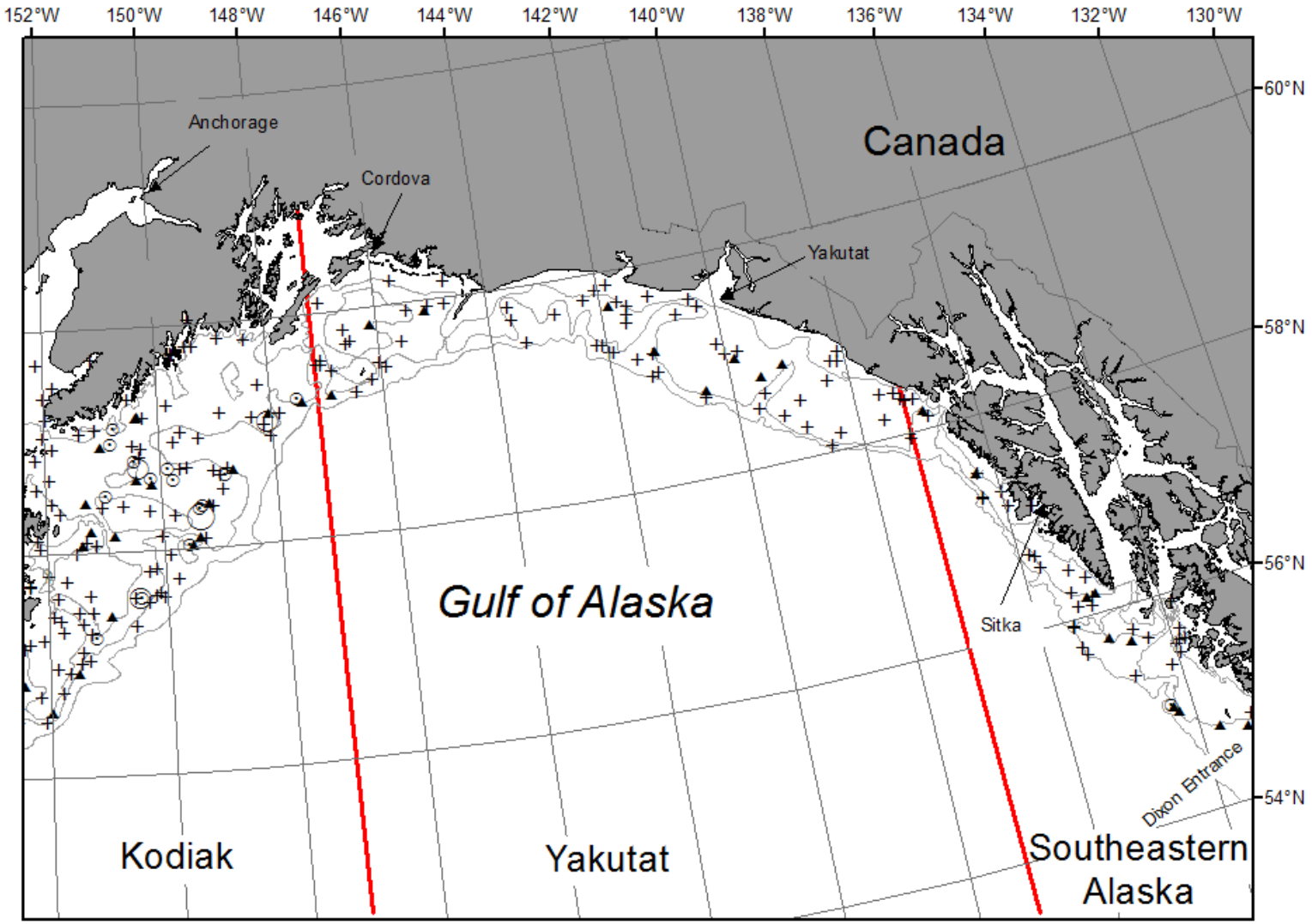

Figure 36. -- Continued (dusky rockfish).

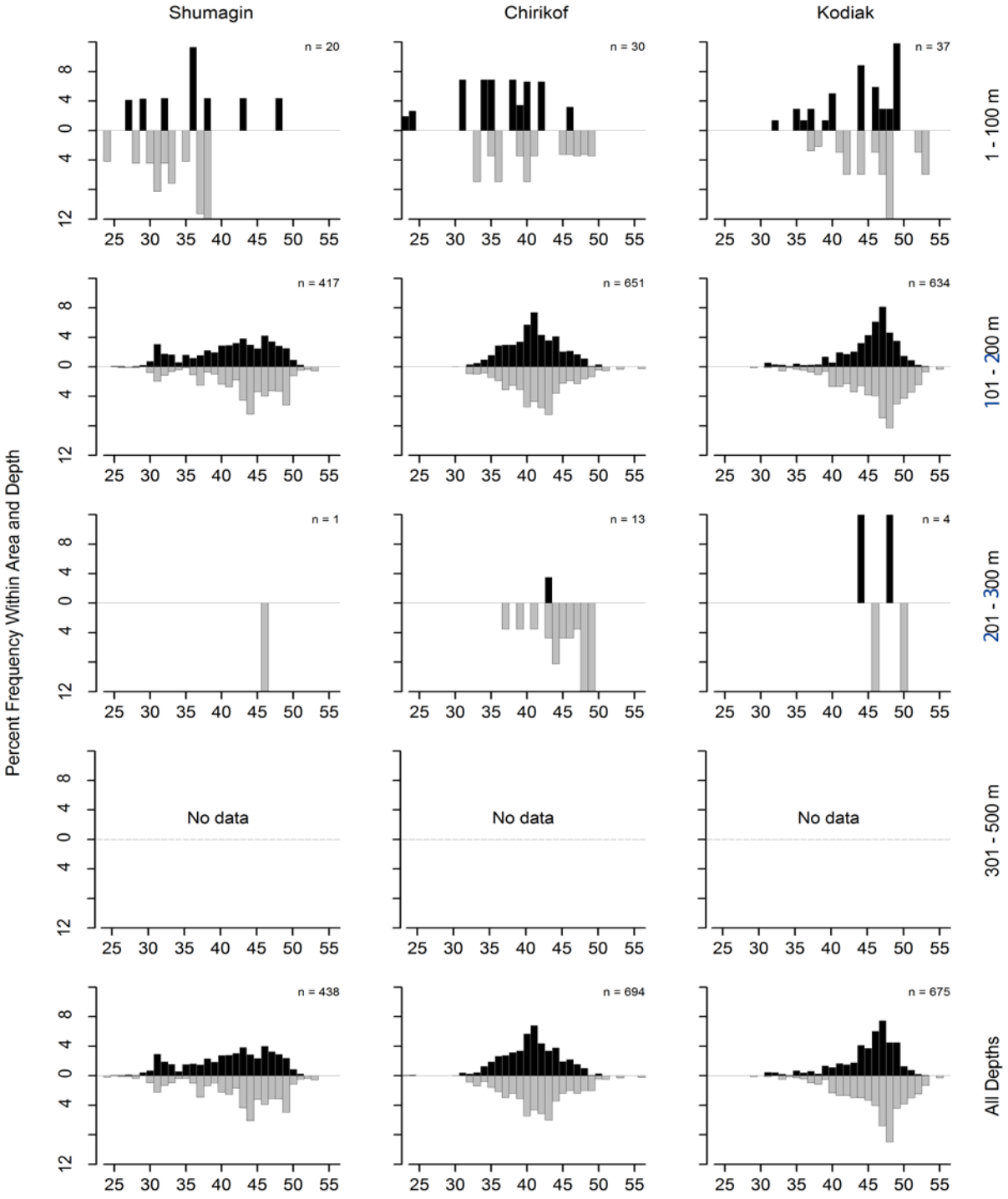

Figure 37. -- Size composition of dusky rockfish from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

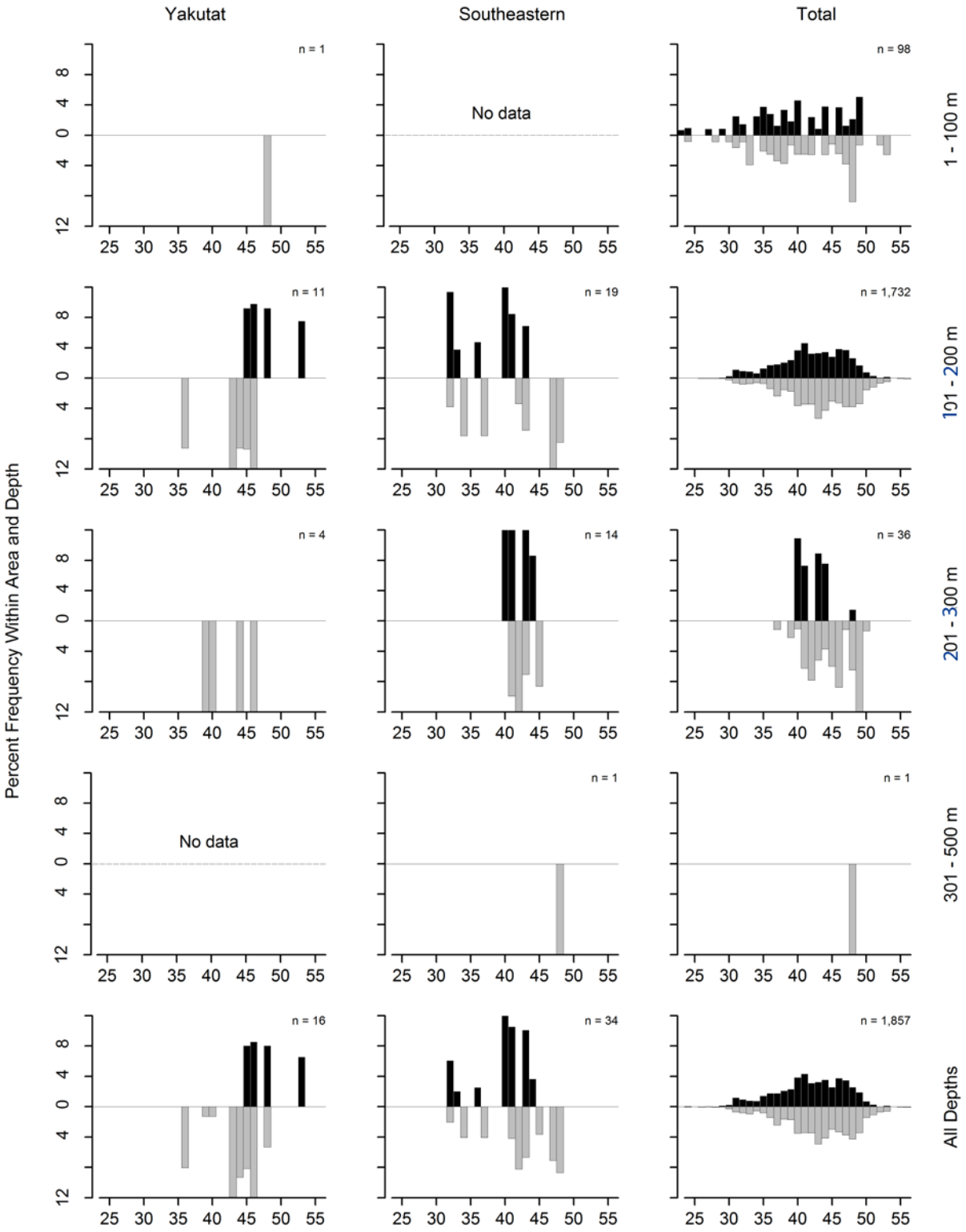

Figure 37. -- Continued (dusky rockfish).

Table 46. -- Catch per unit of effort by stratum for dusky rockfish sorted by descending CPUE for the 2017 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	25	6	17.21	14,032	0	32,162
Chirikof	101 - 200	Shelikof Edge	23	8	16.16	12,501	0	26,733
Chirikof	101 - 200	Chirikof Outer Shelf	16	8	11.28	5,650	0	16,469
Kodiak	101 - 200	Kodiak Outer Shelf	17	13	9.31	4,678	460	8,896
Kodiak	101 - 200	Portlock Flats	25	15	9.25	6,783	566	12,999
Kodiak	1 - 100	Kenai Peninsula	7	1	3.17	1,669	0	5,753
Kodiak	101 - 200	Albatross Gullies	22	6	1.83	1,444	0	4,084
Southeastern	201 - 300	Prince of Wales Slope/Gullie	6	4	1.16	454	0	1,037
Chirikof	201 - 300	Chirikof Slope	7	2	0.90	137	0	354
Yakutat	101 - 200	Yakutat Flats	7	4	0.72	652	0	1,335
Chirikof	1 - 100	Chirikof Bank	19	2	0.65	699	0	2,161
Southeastern	101 - 200	Prince of Wales Shelf	9	2	0.51	348	0	881
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	3	0.39	164	0	381
Chirikof	1 - 100	Semidi Bank	10	1	0.38	277	0	904
Southeastern	301 - 500	Southeastern Deep Gullies	3	1	0.32	75	0	397
Kodiak	1 - 100	Northern Kodiak Shallows	6	2	0.31	68	0	207
Chirikof	201 - 300	Lower Shelikof Gully	9	1	0.30	297	0	981
Kodiak	201 - 300	Kodiak Slope	6	2	0.26	43	0	112
Kodiak	101 - 200	Barren Islands	15	2	0.23	255	0	641
Kodiak	101 - 200	Kenai Flats	11	2	0.19	229	0	651
Shumagin	1 - 100	Fox Islands	9	1	0.18	154	0	508
Yakutat	101 - 200	Middleton Shelf	7	1	0.14	100	0	344
Yakutat	201 - 300	Yakutat Gullies	7	1	0.13	40	0	137
Yakutat	201 - 300	Yakutat Slope	10	1	0.12	26	0	84
Shumagin	1 - 100	Davidson Bank	26	2	0.11	153	0	452
Kodiak	201 - 300	Kenai Gullies	11	1	0.11	74	0	239
Yakutat	101 - 200	Yakataga Shelf	6	1	0.10	53	0	189
Southeastern	201 - 300	Baranof-Chichagof Slope	4	1	0.10	11	0	45
Yakutat	1 - 100	Middleton Shallows	7	1	0.08	52	0	180
Shumagin	1 - 100	Shumagin Bank	25	3	0.07	84	0	191
Shumagin	201 - 300	Shumagin Slope	13	1	0.05	14	0	44
Kodiak	1 - 100	Albatross Banks	25	1	0.03	50	0	154
Chirikof	1 - 100	Upper Alaska Peninsula	12	1	0.01	5	0	16

Dark rockfish (*Sebastes ciliatus*)

Dark rockfish was relatively rare and was not among the 20 most abundant species in any the INPFC areas in the 2017 survey (Table 2). Dark rockfish were caught in only 5 tows, 3 of which were at depths less than 200 m in the Shumagin INPFC area (Tables 47 and 48, Fig. 38). The total estimated biomass of dark rockfish was 361 t (Table 47).

Table 47. -- Number of survey hauls, number of hauls with dark rockfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	1	0.03	118	0	361	1.383
	101 - 200	32	2	0.04	61	0	149	1.228
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	3	0.03	179	0	437	1.326
Chirikof	1 - 100	41	1	0.01	26	0	85	0.855
	101 - 200	54	0	---	---	---	---	---
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	1	<0.01	26	0	85	0.855
Kodiak	1 - 100	61	0	---	---	---	---	---
	101 - 200	90	0	---	---	---	---	---
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	0	---	---	---	---	---
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	0	---	---	---	---	---
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	1	0.14	155	0	506	1.874
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	1	0.06	155	0	506	1.874
All areas	1 - 100	200	2	0.01	144	0	392	1.244
	101 - 200	223	3	0.02	216	0	570	1.631
	201 - 300	76	0	---	---	---	---	---
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	5	0.01	361	0	772	1.450

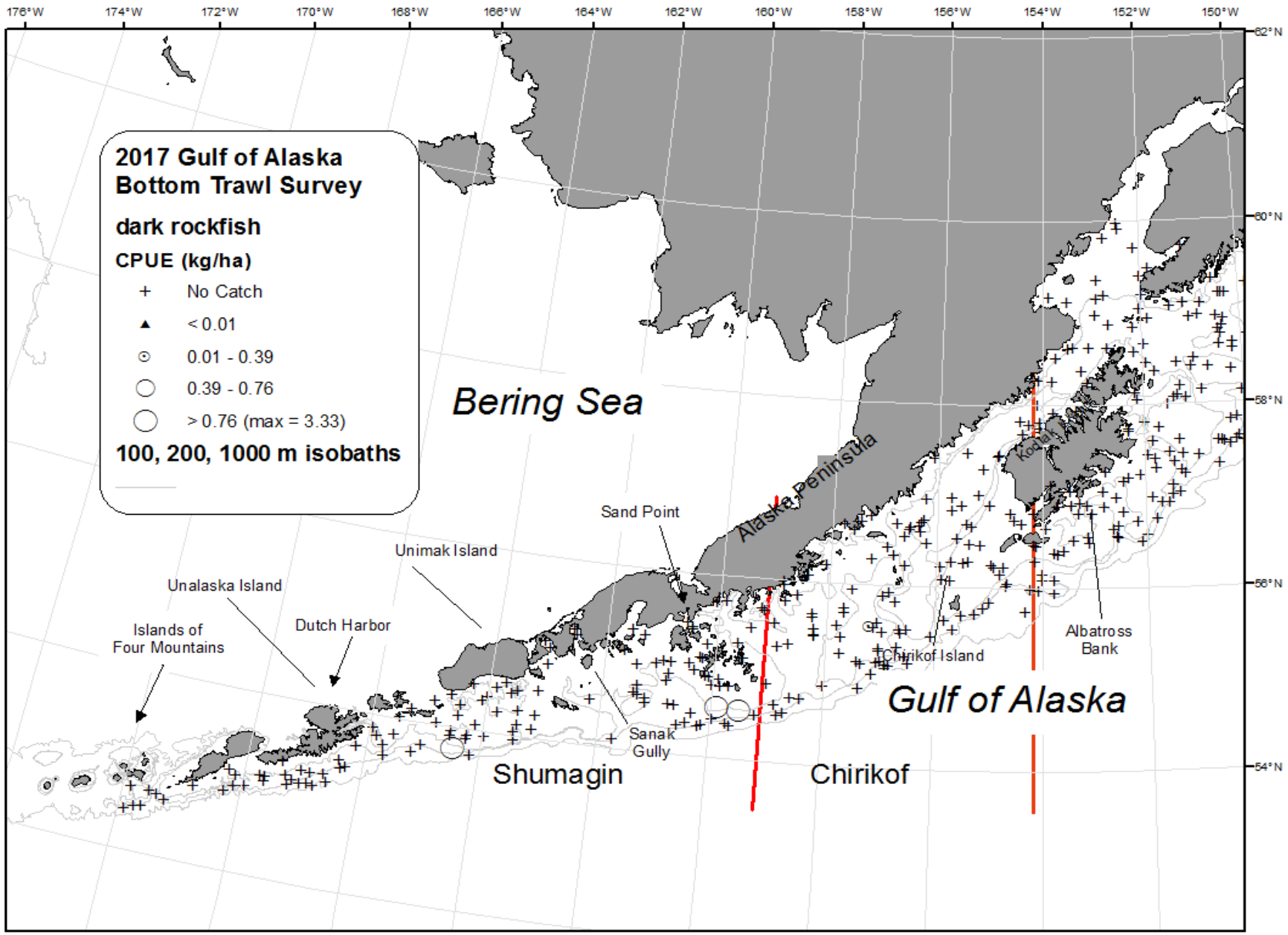

Figure 38. -- Distribution and relative abundance of dark rockfish from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

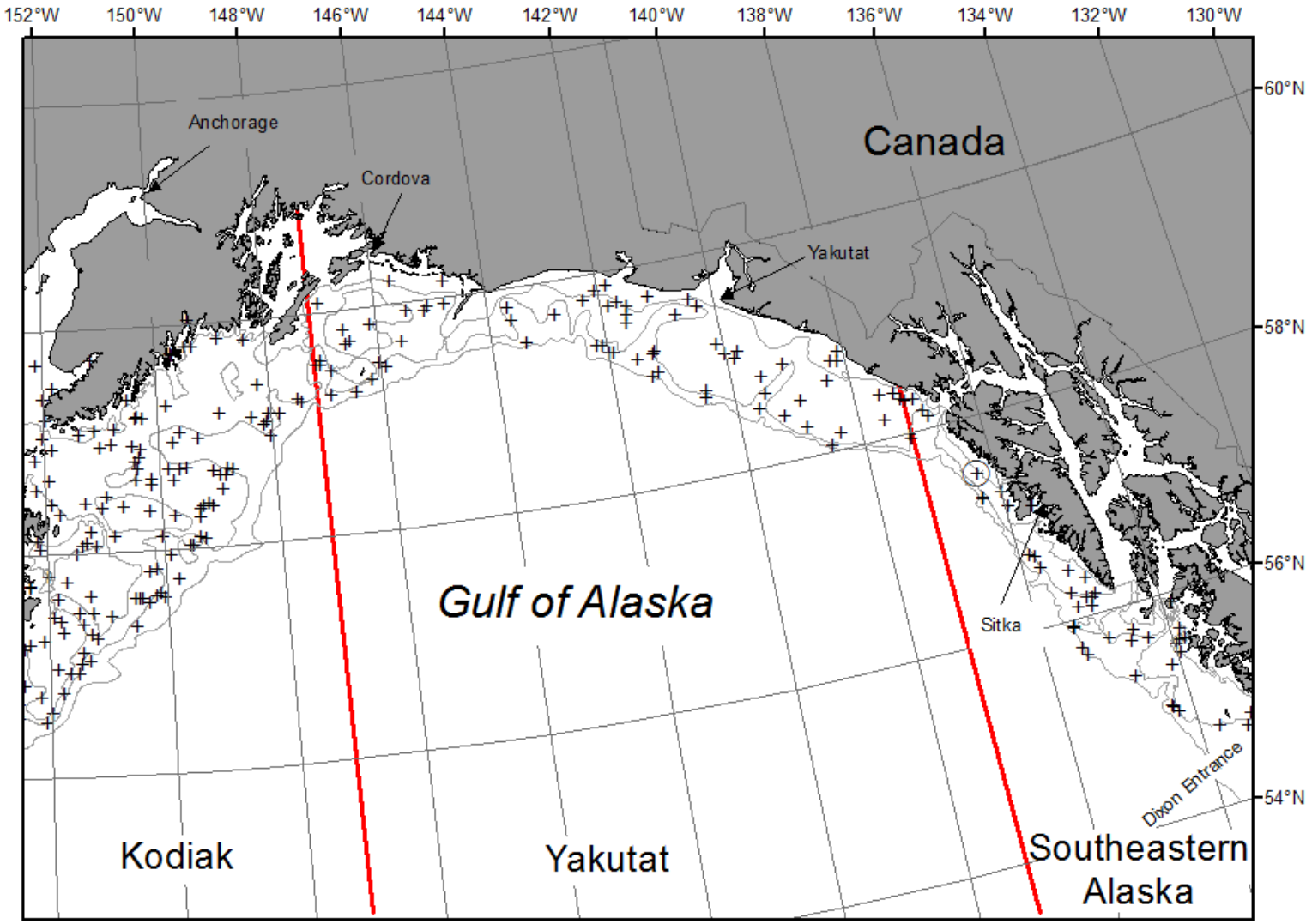

Figure 38. -- Continued (dark rockfish).

Table 48. -- Catch per unit of effort by stratum for dark rockfish sorted by descending CPUE for the 2017 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	9	1	0.37	155	0	513
Shumagin	1 - 100	Shumagin Bank	25	1	0.10	118	0	362
Shumagin	101 - 200	Shumagin Outer Shelf	25	2	0.08	61	0	149
Chirikof	1 - 100	Semidi Bank	10	1	0.04	26	0	86

Sharpchin rockfish (*Sebastes zacentrus*)

Sharpchin rockfish was not among the 20 most abundant species caught in the 2017 survey, but was the thirteenth most abundant species in the Southeastern INPFC area (Table 2). Although sharpchin rockfish were caught in all regions, almost 91% of the estimated biomass was concentrated in the Southeastern region, and 100% at depths less than 300 m (Table 49). The highest densities by far occurred at depths between 201 and 300 m in five strata, with particularly high concentrations in the Prince of Wales Slope/Gullies stratum (Fig. 39 and Table 50). Although females were generally larger than males, size for both sexes was variable with no distinct depth or longitudinal trends (Fig. 40). The estimated biomass of sharpchin rockfish was 11,622 t, and the highest regional biomass by far was in the Southeastern region (Table 49).

Table 49. -- Number of survey hauls, number of hauls with sharpchin rockfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	0	---	---	---	---	---
	101 - 200	32	0	---	---	---	---	---
	201 - 300	13	2	0.16	44	0	125	0.356
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	2	0.01	44	0	125	0.356
Chirikof	1 - 100	41	0	---	---	---	---	---
	101 - 200	54	1	<0.01	6	0	18	0.387
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	1	<0.01	6	0	18	0.387
Kodiak	1 - 100	61	0	---	---	---	---	---
	101 - 200	90	7	0.08	332	0	691	0.252
	201 - 300	20	1	<0.01	5	0	19	0.517
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	8	0.03	338	0	696	0.254
Yakutat	1 - 100	17	1	<0.01	4	0	12	0.103
	101 - 200	29	1	<0.01	11	0	36	0.163
	201 - 300	17	6	1.32	681	0	1,442	0.350
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	8	0.13	696	0	1,457	0.339
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	7	0.86	954	0	2,022	0.148
	201 - 300	10	3	18.97	9,584	0	24,147	0.362
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	10	3.93	10,538	0	25,150	0.320
All areas	1 - 100	200	1	<0.01	4	0	12	0.103
	101 - 200	223	16	0.11	1,304	191	2,417	0.166
	201 - 300	76	12	2.86	10,314	0	24,902	0.361
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	29	0.38	11,622	0	26,264	0.319

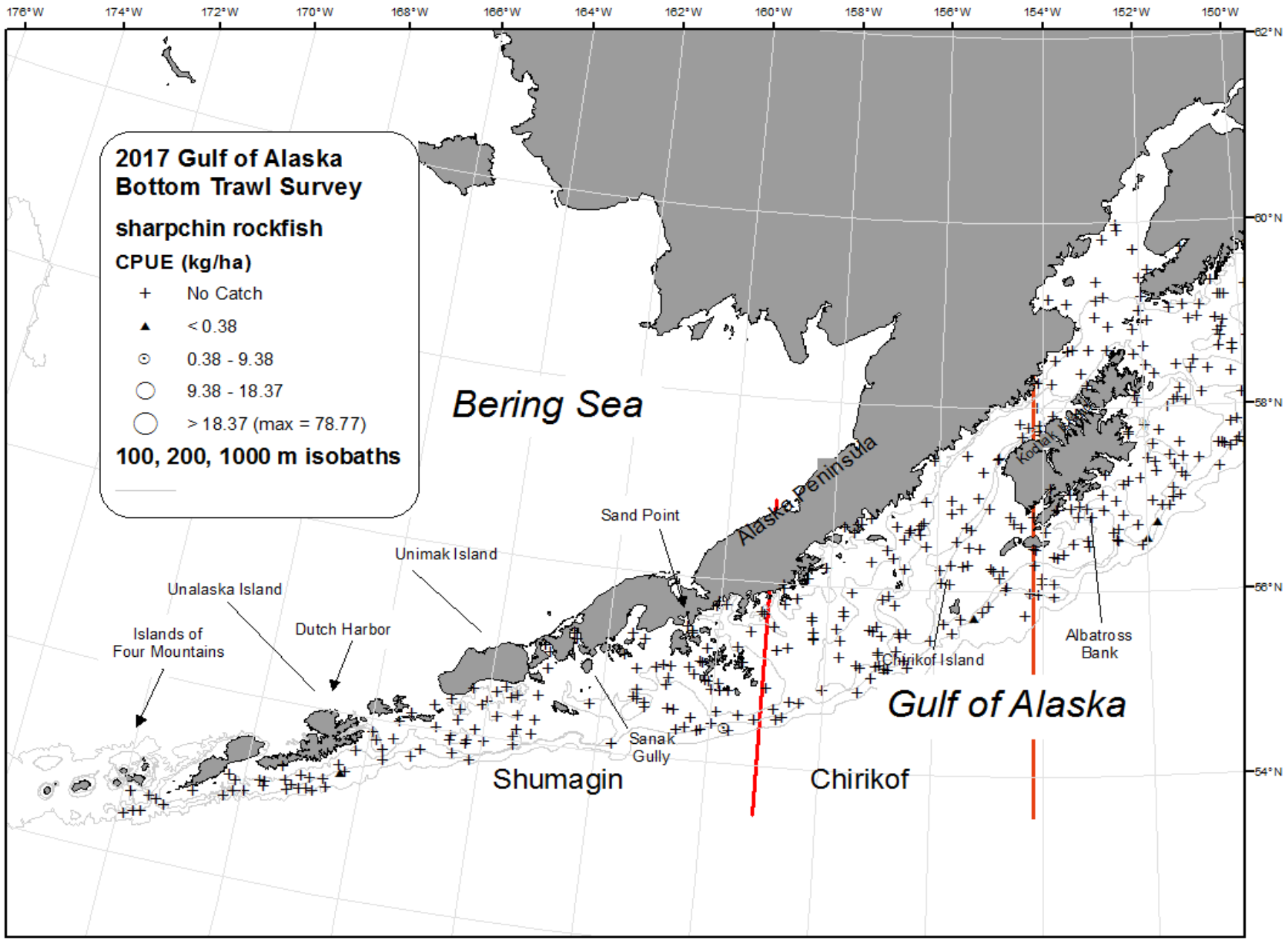

Figure 39. -- Distribution and relative abundance of sharpchin rockfish from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

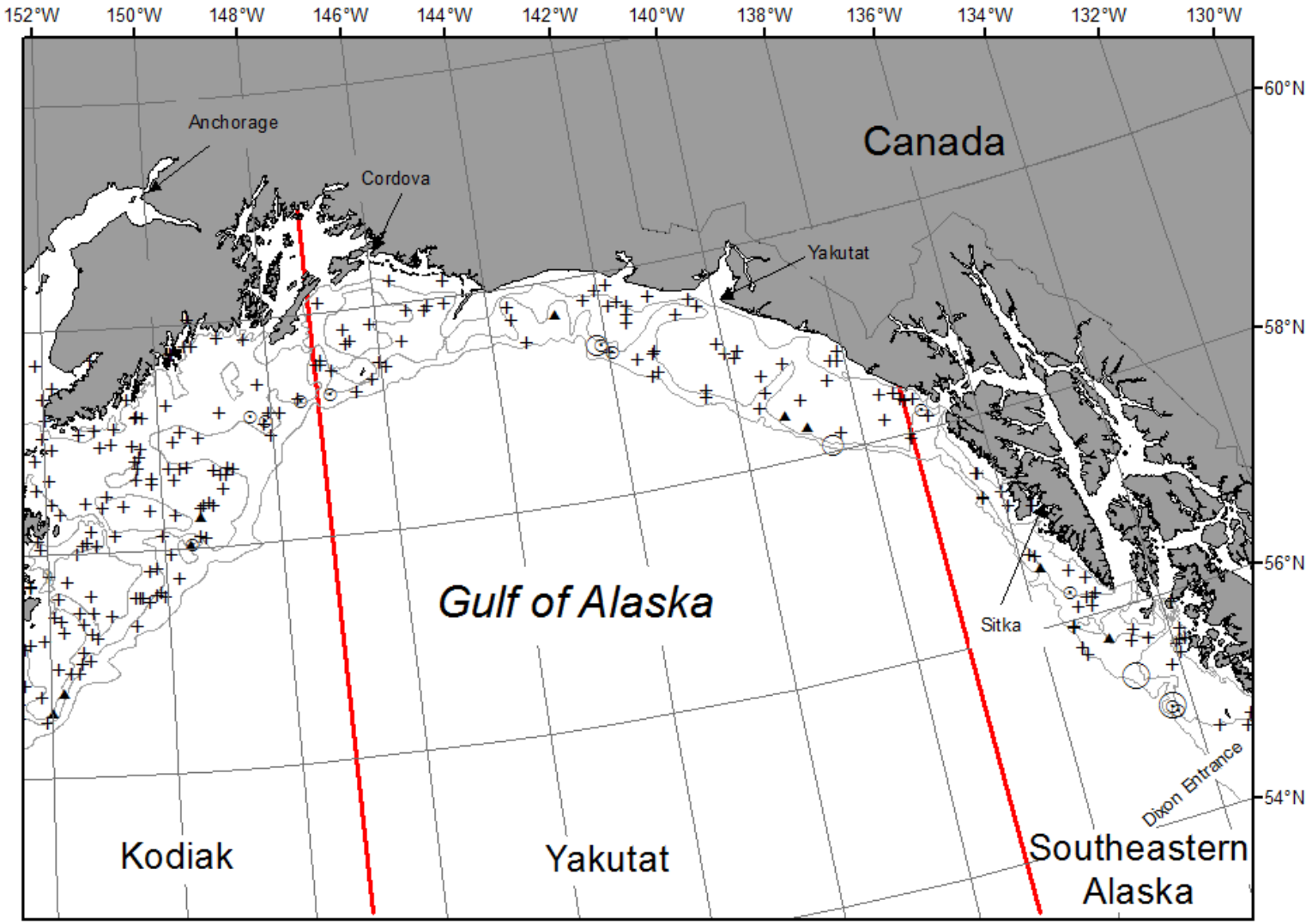

Figure 39. -- Continued (sharpchin rockfish).

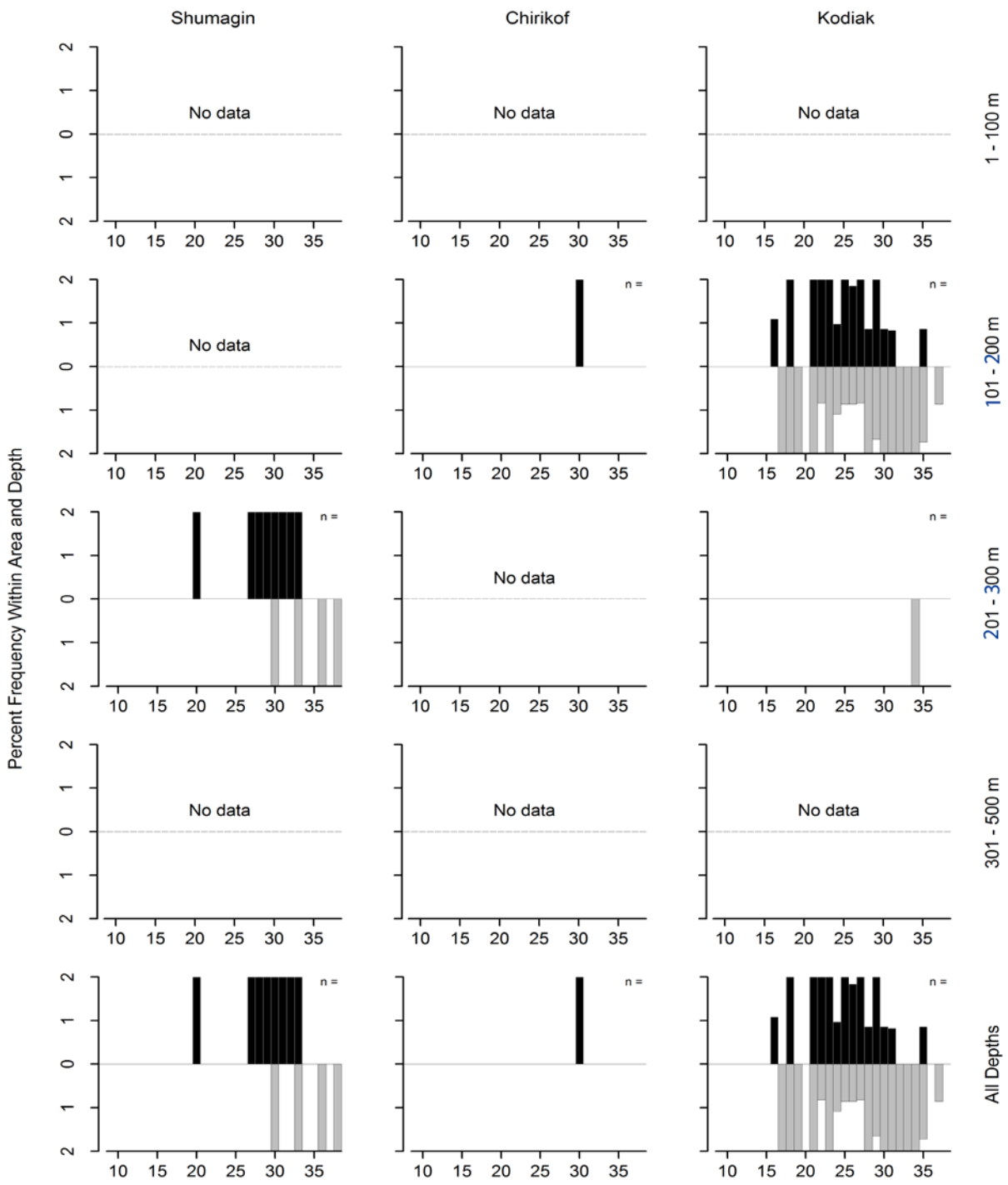

Figure 40. -- Size composition of sharpchin rockfish from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

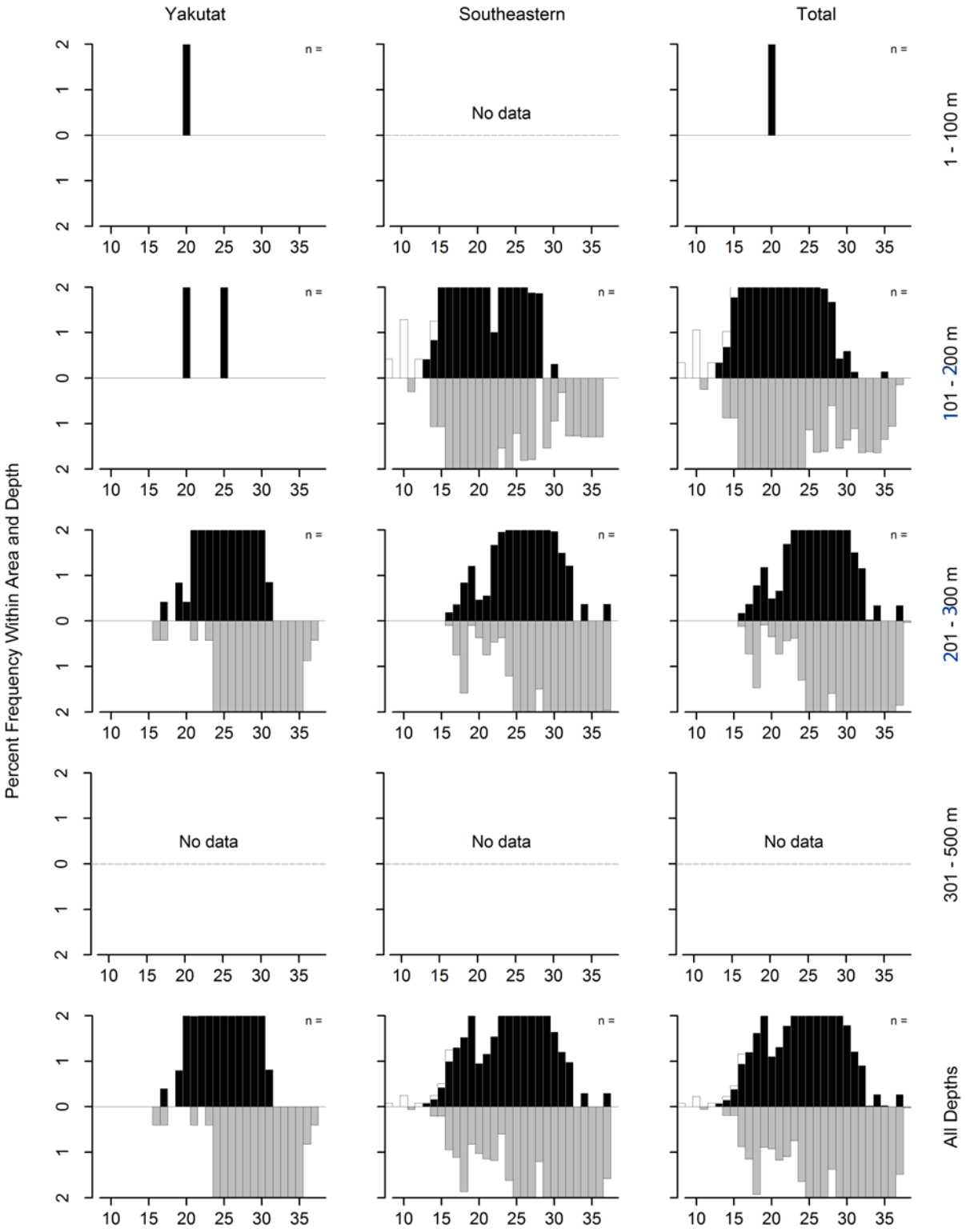

Figure 40. -- Continued (sharpchin rockfish).

Table 50. -- Catch per unit of effort by stratum for sharpchin rockfish sorted by descending CPUE for the 2017 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/Gullie	6	3	24.41	9,584	0	24,885
Yakutat	201 - 300	Yakutat Slope	10	6	3.20	681	0	1,453
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	3	0.90	378	0	936
Southeastern	101 - 200	Prince of Wales Shelf	9	4	0.84	576	0	1,545
Kodiak	101 - 200	Kodiak Outer Shelf	17	5	0.53	265	0	606
Shumagin	201 - 300	Shumagin Slope	13	2	0.16	44	0	126
Kodiak	101 - 200	Kenai Flats	11	1	0.05	65	0	210
Kodiak	201 - 300	Kodiak Slope	6	1	0.03	5	0	19
Yakutat	101 - 200	Fairweather Shelf	9	1	0.01	11	0	37
Chirikof	101 - 200	Chirikof Outer Shelf	16	1	0.01	6	0	19
Kodiak	101 - 200	Portlock Flats	25	1	0.00	3	0	9
Yakutat	1 - 100	Yakutat Shallows	10	1	0.00	4	0	12

Shortraker rockfish (*Sebastes borealis*)

Shortraker rockfish was not among the 20 most abundant species caught in the 2017 survey but was the ninth most abundant species in the Yakutat INPFC area (Table 2). Although caught throughout the survey area at depths between 101 and 700 m, shortraker rockfish were relatively rare in the Shumagin, Chirikof, and Southeastern regions and at depths outside the 101-500 m range (Table 51). The highest densities by far occurred in the Yakutat Slope stratum, where 24% of the estimated biomass was concentrated (Fig. 41 and Table 52). Size decreased slightly with depth, and increased going from west to east (Table 51, Fig. 42). The estimated biomass of shortraker rockfish was 31,534 t, and the highest regional biomass was in the Yakutat region. Almost 96% of the estimated biomass was concentrated at depths between 101 and 500 m (Table 51).

Table 51. -- Number of survey hauls, number of hauls with shortraker rockfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	0	---	---	---	---	---
	101 - 200	32	0	---	---	---	---	---
	201 - 300	13	1	6.40	1,784	0	5,638	8.587
	301 - 500	4	4	2.99	757	0	1,532	2.112
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	5	0.40	2,542	0	6,390	4.487
Chirikof	1 - 100	41	0	---	---	---	---	---
	101 - 200	54	1	0.01	31	0	98	2.303
	201 - 300	16	2	0.15	169	0	441	2.931
	301 - 500	4	4	7.73	1,240	528	1,953	2.193
	501 - 700	3	1	0.79	154	0	644	2.453
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	8	0.25	1,595	866	2,324	2.280
Kodiak	1 - 100	61	1	0.01	53	0	183	3.723
	101 - 200	90	1	1.44	6,232	0	19,380	9.392
	201 - 300	20	4	1.47	1,691	0	3,493	5.850
	301 - 500	5	4	13.37	3,892	0	9,331	3.814
	501 - 700	2	2	1.89	330	87	573	3.640
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	12	1.24	12,197	0	26,011	5.871
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	0	---	---	---	---	---
	201 - 300	17	7	8.85	4,574	0	9,438	5.292
	301 - 500	5	4	29.72	7,810	0	22,679	4.266
	501 - 700	2	1	5.74	843	0	4,471	4.396
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	12	2.39	13,228	0	26,717	4.582
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	0	---	---	---	---	---
	201 - 300	10	1	0.11	53	0	201	4.014
	301 - 500	8	7	6.16	1,920	0	4,420	5.774
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	8	0.74	1,973	0	4,479	5.707
All areas	1 - 100	200	1	<0.01	53	0	183	3.723
	101 - 200	223	2	0.51	6,263	0	19,412	9.250
	201 - 300	76	15	2.29	8,272	2,175	14,368	5.776
	301 - 500	26	23	12.21	15,619	2,887	28,351	3.803
	501 - 700	11	4	1.62	1,327	0	5,023	3.844
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	45	1.02	31,534	13,684	49,383	4.795

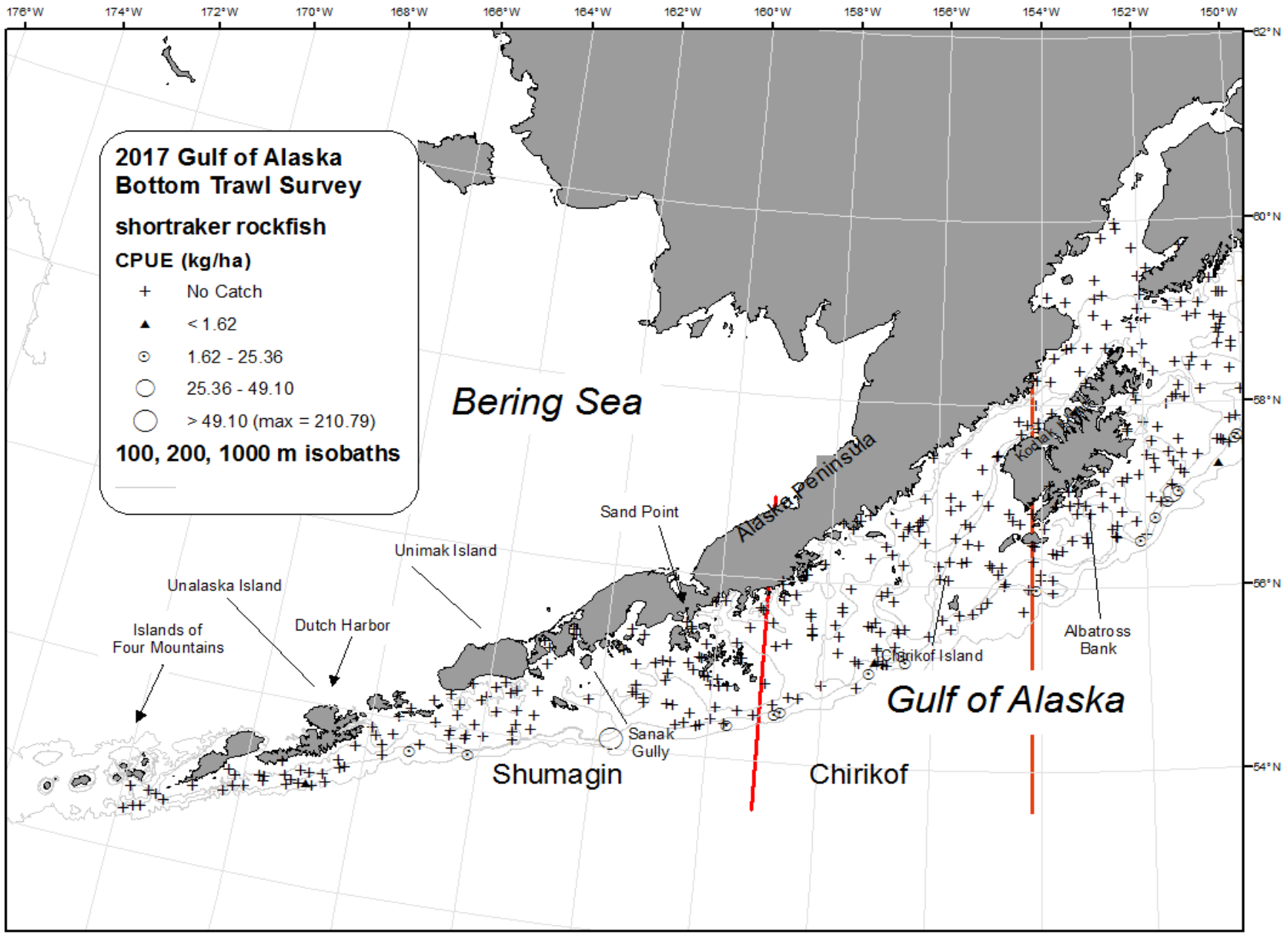

Figure 41. -- Distribution and relative abundance of shortraker rockfish from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

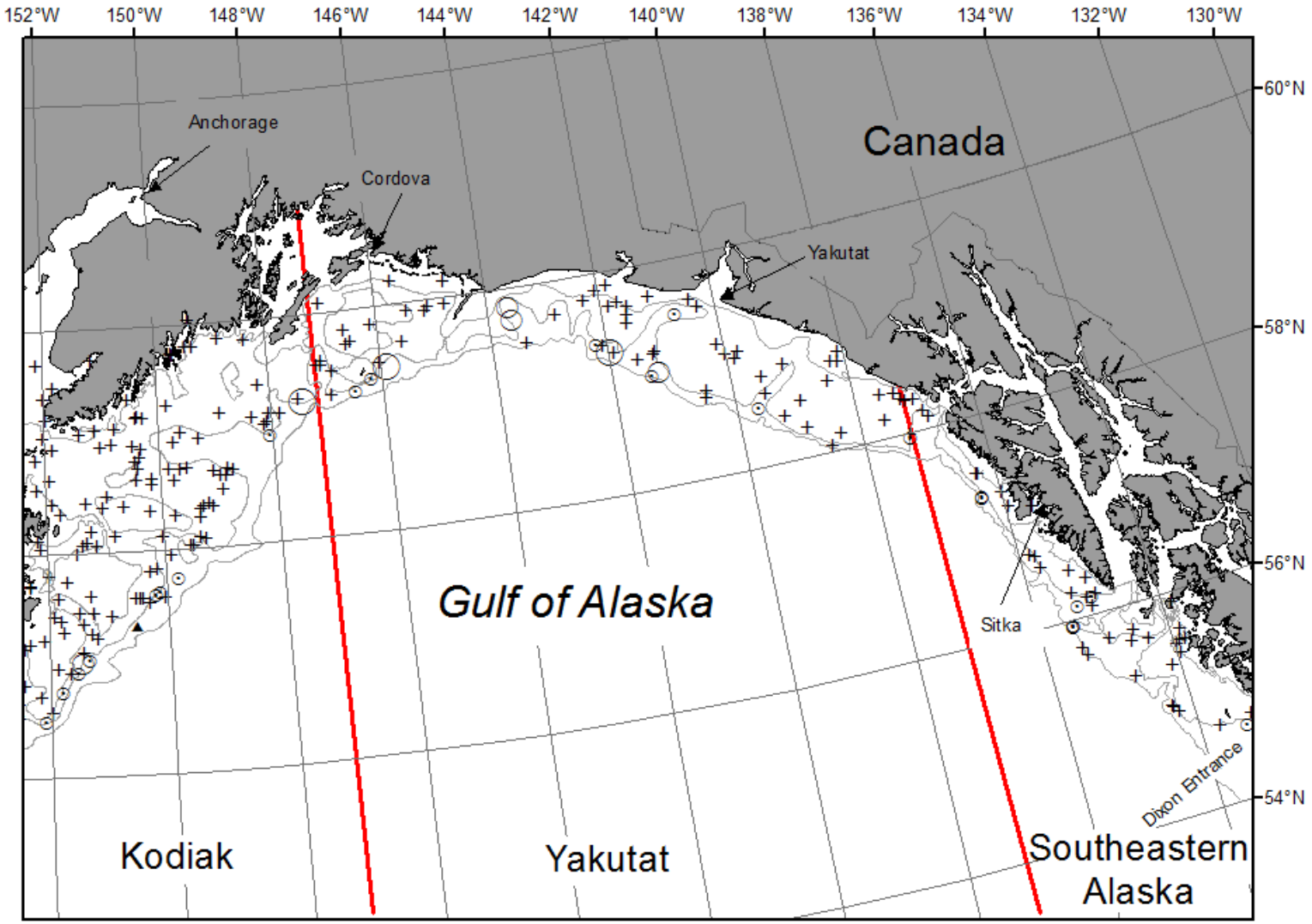

Figure 41. -- Continued (shortraker rockfish).

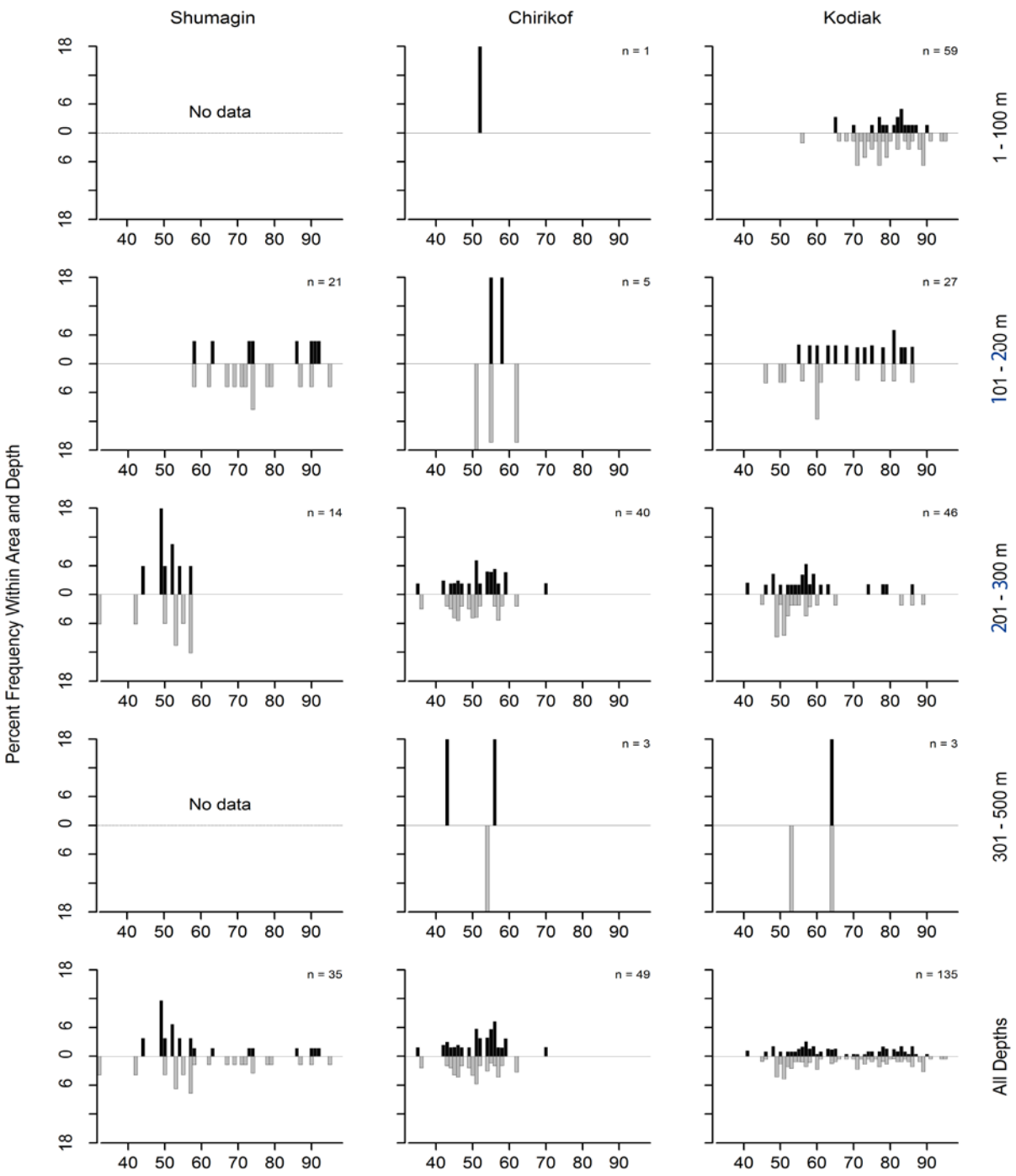

Figure 42. -- Size composition of shortraker rockfish from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

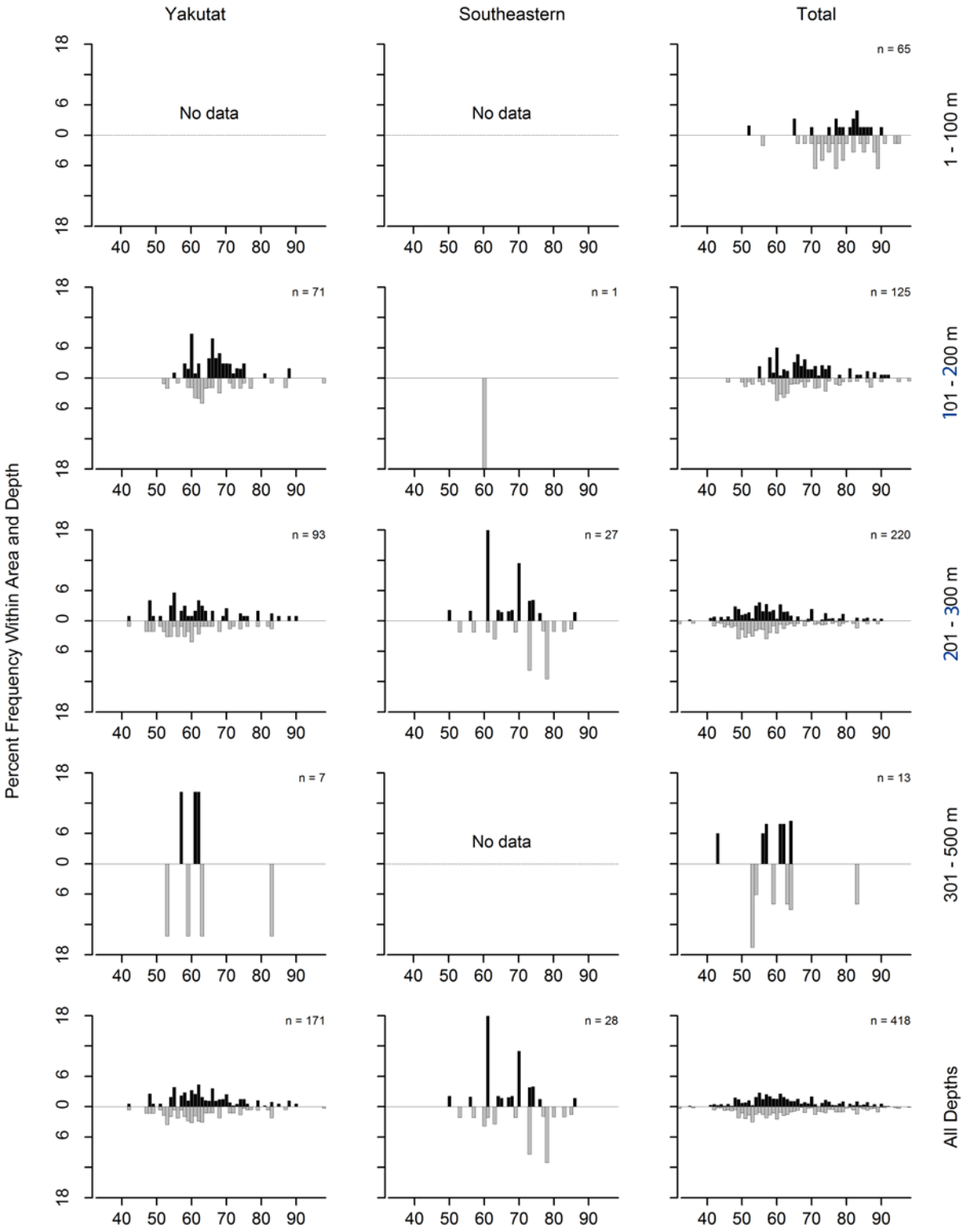

Figure 42. -- Continued (shortraker rockfish).

Table 52. -- Catch per unit of effort by stratum for shortraker rockfish sorted by descending CPUE for the 2017 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Yakutat	301 - 500	Yakutat Slope	3	3	49.79	7,572	0	27,653
Kodiak	301 - 500	Kodiak Slope	5	4	13.37	3,892	0	9,765
Kodiak	101 - 200	Kodiak Outer Shelf	17	1	12.40	6,232	0	19,443
Southeastern	301 - 500	Southeastern Slope	5	5	10.81	835	390	1,280
Kodiak	201 - 300	Kodiak Slope	6	4	10.42	1,691	0	3,584
Yakutat	201 - 300	Yakutat Gullies	7	3	8.89	2,704	0	6,359
Yakutat	201 - 300	Yakutat Slope	10	4	8.79	1,870	0	5,622
Chirikof	301 - 500	Chirikof Slope	4	4	7.73	1,240	424	2,057
Shumagin	201 - 300	Shumagin Slope	13	1	6.40	1,784	0	5,672
Yakutat	501 - 700	Yakutat Slope	2	1	5.74	843	0	11,557
Southeastern	301 - 500	Southeastern Deep Gullies	3	2	4.63	1,085	0	4,395
Shumagin	301 - 500	Shumagin Slope	4	4	2.99	757	0	1,645
Yakutat	301 - 500	Yakutat Gullies	2	1	2.16	239	0	3,273
Kodiak	501 - 700	Kodiak Slope	2	2	1.89	330	0	1,047
Chirikof	201 - 300	Chirikof Slope	7	2	1.11	169	0	451
Chirikof	501 - 700	Chirikof Slope	3	1	0.79	154	0	817
Southeastern	201 - 300	Baranof-Chichagof Slope	4	1	0.47	53	0	222
Kodiak	1 - 100	Northern Kodiak Shallows	6	1	0.24	53	0	190
Chirikof	101 - 200	Chirikof Outer Shelf	16	1	0.06	31	0	98

Shortspine thornyhead (*Sebastolobus alascanus*)

Shortspine thornyhead was the twelfth most abundant species caught in the 2017 survey, with an approximately uniform relative abundance in all INPFC areas (Table 2). Shortspine thornyhead were caught throughout the survey area and at all depths deeper than 100 m (Table 53). The highest densities occurred at depths between 301 and 500 m in three of the five regions, with particularly high concentrations in the Southeastern slope strata (Fig. 43 and Table 54). Size was relatively constant with both depth and longitude (Fig. 44). The estimated biomass of shortspine thornyhead was 80,492 t, and the highest regional biomass was in the Kodiak region. Approximately 73% of the biomass was concentrated at depths between 201 and 500 m (Table 53).

Table 53. -- Number of survey hauls, number of hauls with shortspine thornyhead, mean CPUE, biomass, and mean weight, based on the 2017 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	74	1	<0.01	17	0	55	0.458
	101 - 200	32	3	0.18	269	0	785	0.313
	201 - 300	13	10	20.37	5,680	1,020	10,340	0.240
	301 - 500	4	4	24.61	6,230	3,074	9,385	0.262
	501 - 700	2	2	13.66	2,740	0	7,302	0.283
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	20	2.36	14,936	9,206	20,665	0.257
Chirikof	1 - 100	41	0	---	---	---	---	---
	101 - 200	54	6	0.08	199	0	409	0.537
	201 - 300	16	11	5.03	5,810	2,093	9,527	0.354
	301 - 500	4	4	27.09	4,346	795	7,896	0.309
	501 - 700	3	3	14.52	2,836	433	5,239	0.329
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	24	2.03	13,190	8,318	18,062	0.334
Kodiak	1 - 100	61	3	0.02	86	0	220	0.403
	101 - 200	90	20	0.74	3,185	45	6,326	0.379
	201 - 300	20	18	8.45	9,714	6,035	13,394	0.299
	301 - 500	5	5	18.04	5,252	3,512	6,991	0.221
	501 - 700	2	2	11.51	2,009	495	3,522	0.142
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	48	2.07	20,246	15,362	25,129	0.256
Yakutat	1 - 100	17	2	0.03	51	0	129	0.525
	101 - 200	29	17	1.32	3,891	586	7,197	0.309
	201 - 300	17	15	7.83	4,050	2,258	5,842	0.247
	301 - 500	5	5	18.36	4,825	3,705	5,944	0.245
	501 - 700	2	2	23.33	3,428	653	6,203	0.284
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	41	2.94	16,245	12,189	20,300	0.267
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	6	2.18	2,420	0	7,596	0.231
	201 - 300	10	9	4.36	2,205	189	4,221	0.239
	301 - 500	8	8	33.30	10,378	3,728	17,029	0.302
	501 - 700	2	2	8.45	873	643	1,104	0.522
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	25	5.92	15,876	8,778	22,974	0.285
All areas	1 - 100	200	6	0.01	153	9	297	0.443
	101 - 200	223	52	0.81	9,965	3,625	16,305	0.305
	201 - 300	76	63	7.62	27,459	20,427	34,492	0.279
	301 - 500	26	26	24.26	31,030	24,133	37,926	0.268
	501 - 700	11	11	14.48	11,885	7,733	16,036	0.257
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	158	2.61	80,492	69,254	91,730	0.274

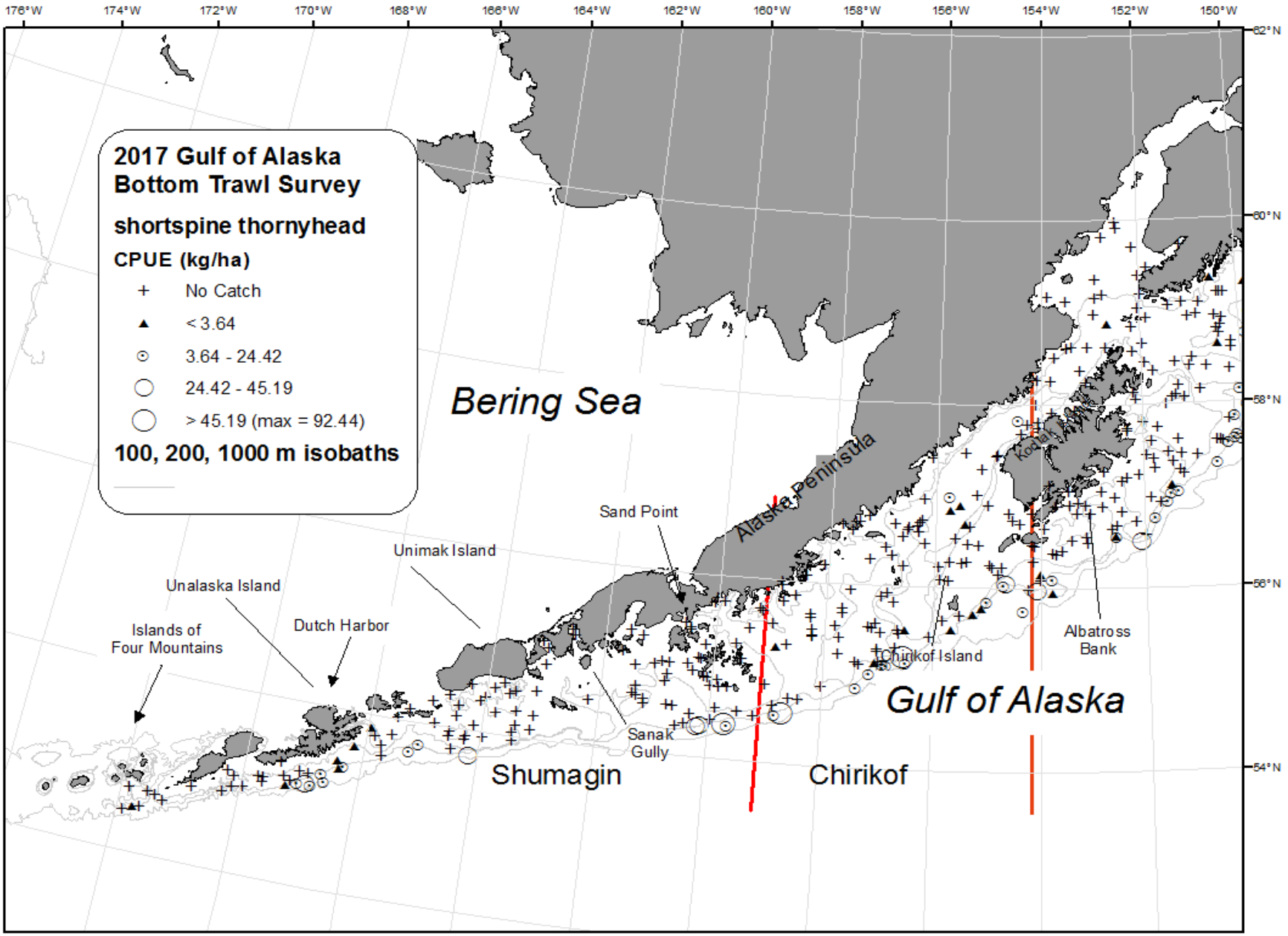

Figure 43. -- Distribution and relative abundance of shortspine thornyhead from the 2017 Gulf of Alaska bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than the mean CPUE, between the mean CPUE and two standard deviations above mean, between two and four standard deviations above the mean, and greater than four standard deviations above the mean.

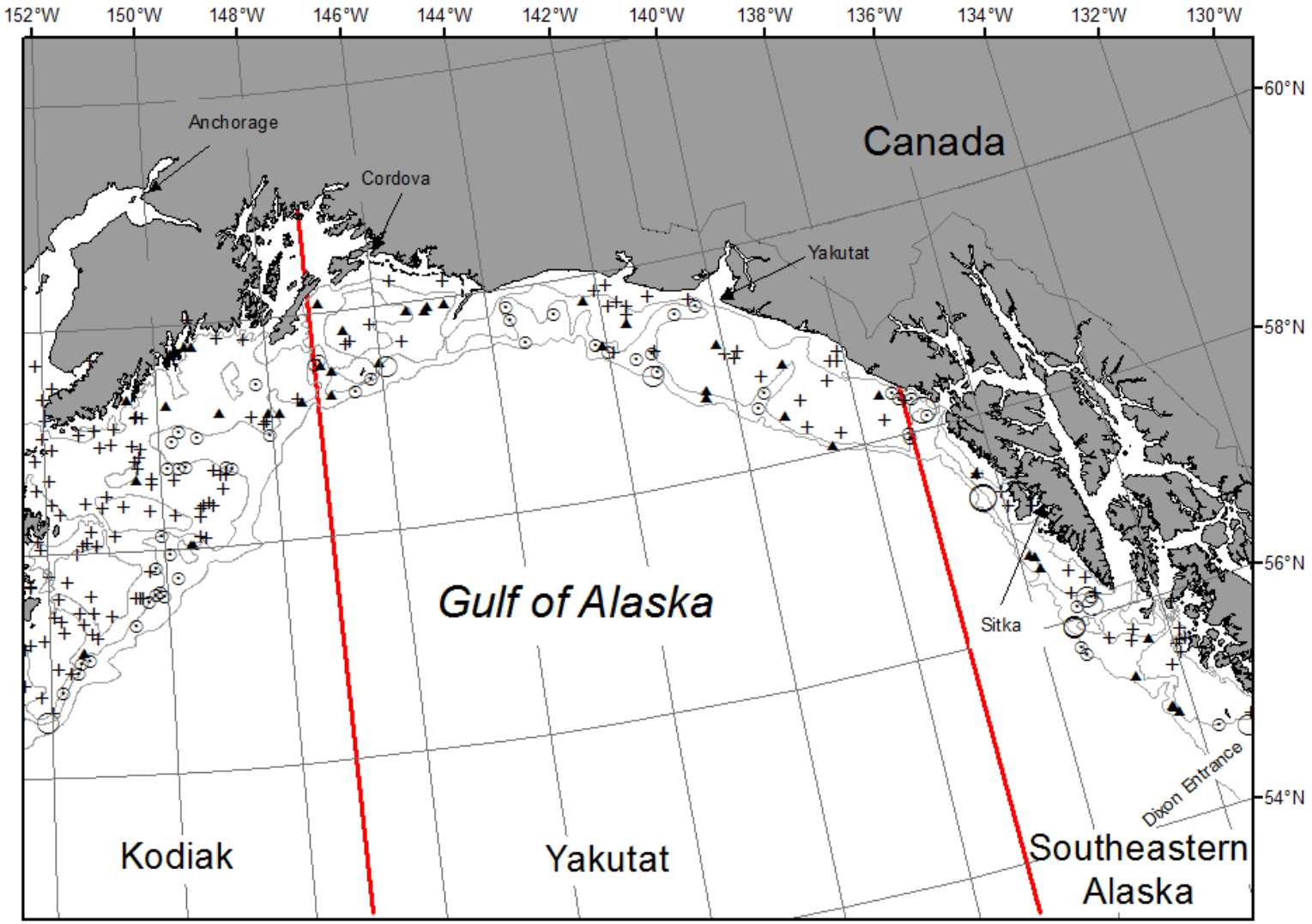

Figure 43. -- Continued (shortspine thornyhead).

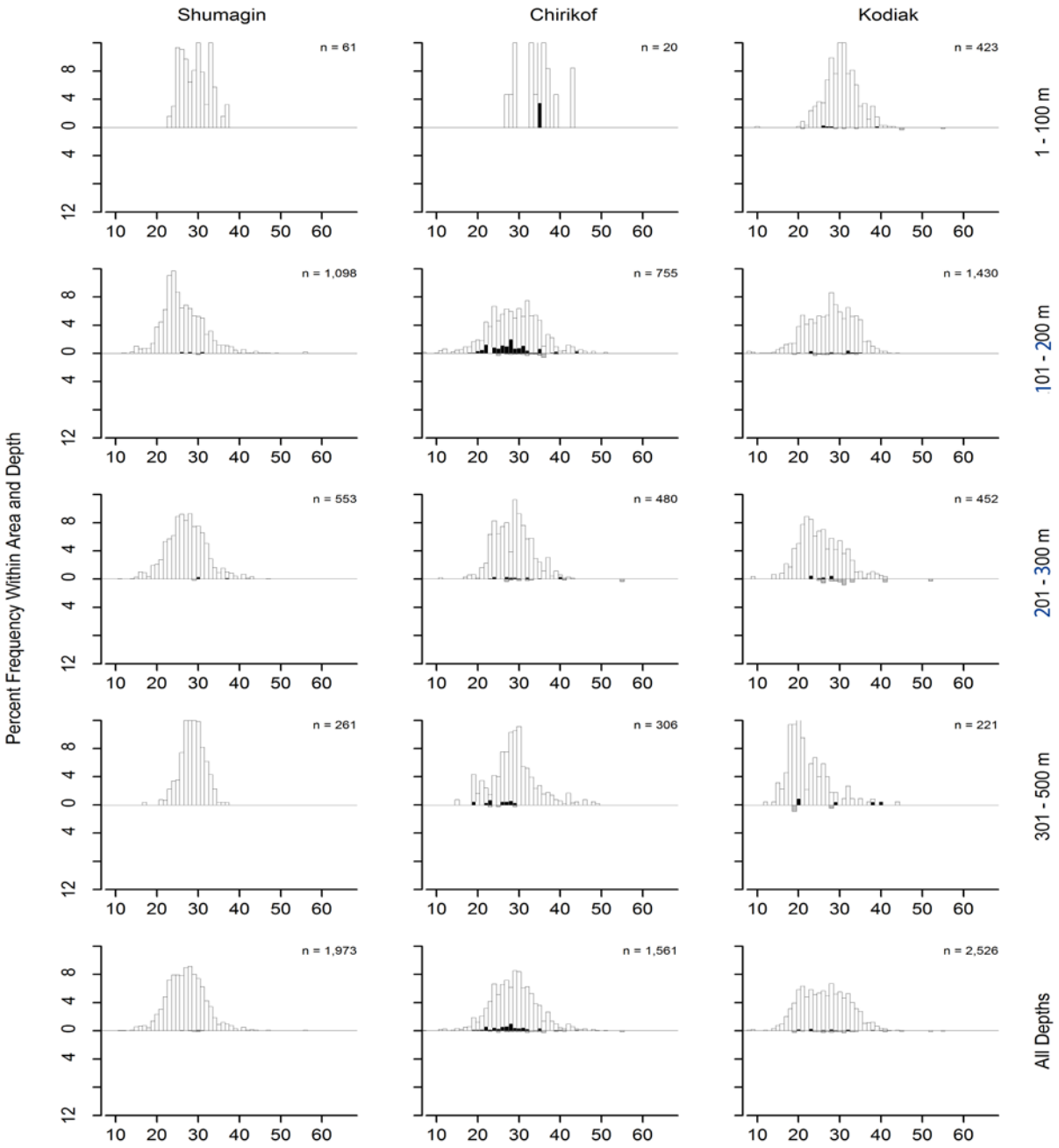

Figure 44. -- Size composition of shortspine thornyhead from the 2017 Gulf of Alaska bottom trawl survey by International North Pacific Fisheries Commission statistical areas and depth intervals. Males are shown in black, females in gray and unsexed fish in white.

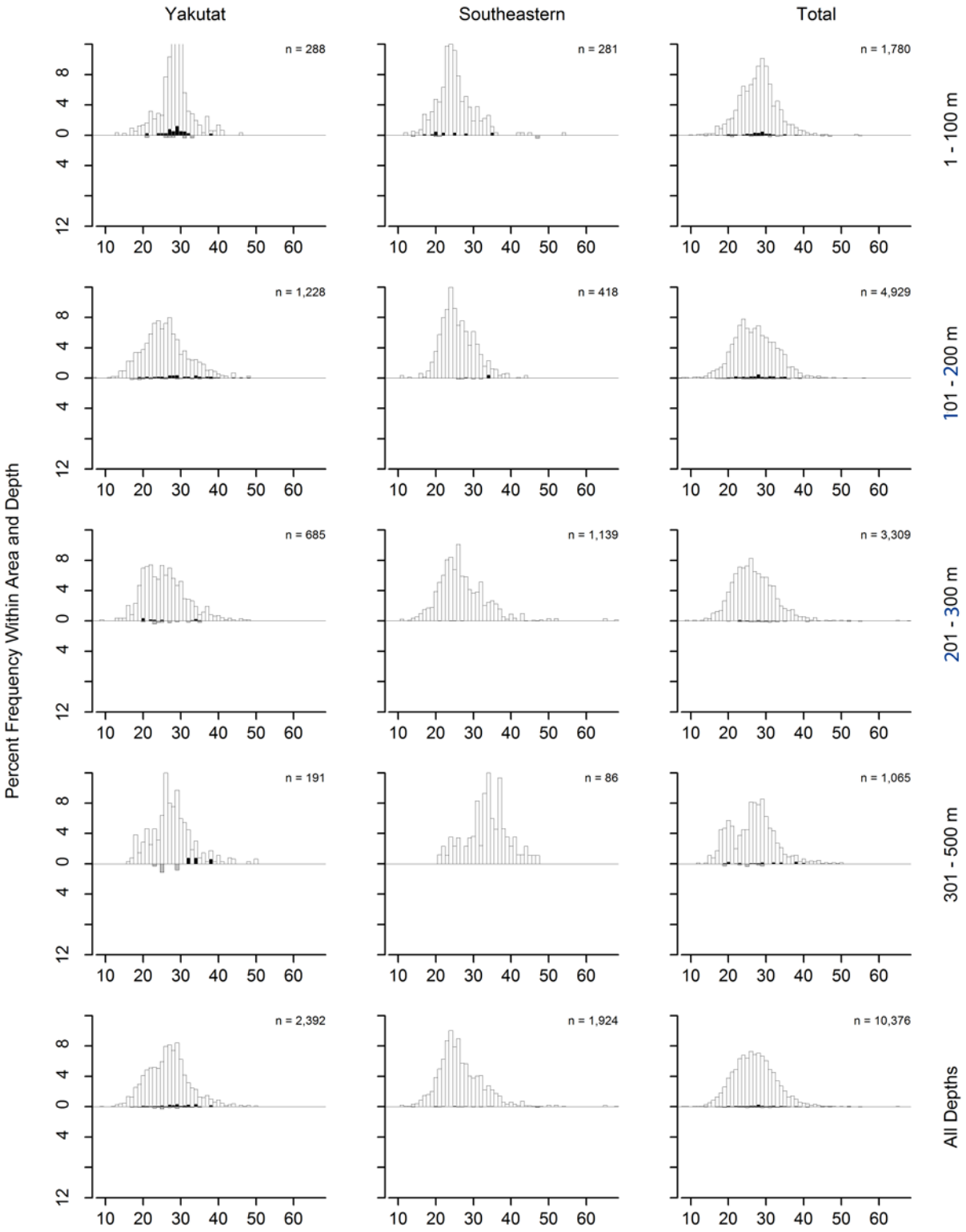

Figure 44. -- Continued (shortspine thornyhead).

Table 54. -- Catch per unit of effort by stratum for shortspine thornyhead sorted by descending CPUE for the 2017 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	5	5	53.98	4,171	2,004	6,337
Chirikof	201 - 300	Chirikof Slope	7	7	29.80	4,554	1,591	7,517
Chirikof	301 - 500	Chirikof Slope	4	4	27.09	4,346	276	8,415
Southeastern	301 - 500	Southeastern Deep Gullies	3	3	26.48	6,208	0	14,551
Shumagin	301 - 500	Shumagin Slope	4	4	24.61	6,230	2,612	9,847
Yakutat	501 - 700	Yakutat Slope	2	2	23.33	3,428	0	11,622
Yakutat	301 - 500	Yakutat Slope	3	3	21.34	3,245	1,829	4,661
Shumagin	201 - 300	Shumagin Slope	13	10	20.37	5,680	979	10,381
Kodiak	301 - 500	Kodiak Slope	5	5	18.04	5,252	3,374	7,130
Chirikof	501 - 700	Chirikof Slope	3	3	14.52	2,836	0	6,085
Yakutat	301 - 500	Yakutat Gullies	2	2	14.27	1,580	0	5,205
Southeastern	201 - 300	Baranof-Chichagof Slope	4	4	14.07	1,583	0	4,260
Shumagin	501 - 700	Shumagin Slope	2	2	13.66	2,740	0	16,210
Kodiak	201 - 300	Kodiak Slope	6	6	13.25	2,150	1,554	2,747
Kodiak	501 - 700	Kodiak Slope	2	2	11.51	2,009	0	6,477
Kodiak	201 - 300	Kenai Gullies	11	11	9.72	6,473	3,649	9,297
Southeastern	501 - 700	Southeastern Slope	2	2	8.45	873	192	1,554
Yakutat	201 - 300	Yakutat Slope	10	9	8.22	1,749	458	3,040
Yakutat	201 - 300	Yakutat Gullies	7	6	7.56	2,301	880	3,722
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	4	5.56	2,333	0	7,606
Kodiak	201 - 300	Upper Shelikof Gully	3	1	3.40	1,091	0	5,788
Yakutat	101 - 200	Fairweather Shelf	9	5	3.19	2,462	0	5,756
Southeastern	201 - 300	Prince of Wales Slope/Gullie	6	5	1.58	622	0	1,378
Kodiak	101 - 200	Kenai Flats	11	5	1.39	1,682	0	4,653
Chirikof	201 - 300	Lower Shelikof Gully	9	4	1.25	1,256	0	3,903
Yakutat	101 - 200	Middleton Shelf	7	6	1.23	900	150	1,650
Kodiak	101 - 200	Portlock Flats	25	4	1.14	836	0	1,783
Yakutat	101 - 200	Yakataga Shelf	6	3	0.84	445	0	1,323
Kodiak	101 - 200	Kodiak Outer Shelf	17	8	0.78	393	0	841
Shumagin	101 - 200	Shumagin Outer Shelf	25	3	0.33	269	0	786
Kodiak	101 - 200	Albatross Gullies	22	2	0.30	234	0	665
Chirikof	101 - 200	Chirikof Outer Shelf	16	4	0.26	129	0	302
Kodiak	1 - 100	Kenai Peninsula	7	3	0.16	86	0	225
Southeastern	101 - 200	Prince of Wales Shelf	9	2	0.13	88	0	271
Yakutat	101 - 200	Yakutat Flats	7	3	0.09	84	0	264
Yakutat	1 - 100	Middleton Shallows	7	2	0.08	51	0	132
Chirikof	101 - 200	East Shumagin Gully	15	1	0.06	62	0	196
Kodiak	101 - 200	Barren Islands	15	1	0.04	40	0	125
Shumagin	1 - 100	Fox Islands	9	1	0.02	17	0	56
Chirikof	101 - 200	Shelikof Edge	23	1	0.01	7	0	23

Other Rockfishes

Redstripe rockfish (*Sebastes proriger*)

Redstripe rockfish was the sixteenth most abundant species in the Kodiak INPFC area, but was extremely rare outside the Southeastern and Kodiak INPFC areas, where 99% of the estimated biomass was concentrated (Table 2). Only a single haul contained redstripe rockfish in the Shumagin region (Table 55). Ten tows in the Prince of Wales Slope/Gullies and Kodiak Outer Shelf strata accounted for 94% of the 30,161 t estimated biomass (Table 56).

Silvergray rockfish (*Sebastes brevispinis*)

Silvergray rockfish was the fourth most abundant species in the Southeastern INPFC area, but were rarely caught outside the Southeastern and Yakutat INPFC areas (Table 2). No silvergray rockfish were caught in the Shumagin region (Table 57). The highest densities by far occurred in the Prince of Wales Slope/Gullies and and Prince of Wales Shelf strata, which combined accounted for 83% of the biomass estimate (Table 58). Approximately 96% of the 36,206 t estimated biomass was concentrated in the 101 to 300 m depth range, with no silvergray rockfish caught at depths deeper than 500 m.

Harlequin rockfish (*Sebastes variegatus*)

Harlequin rockfish was the sixteenth most abundant species in the Shumagin INPFC area, but apart from the three tows, which accounted for almost the entire biomass there, harlequin rockfish were caught infrequently and in modest numbers throughout the survey (Table 2). Harlequin rockfish were concentrated almost exclusively at depths between 101 and 200 m

(Table 59). The highest densities by far occurred in the Shumagin Outer Shelf strata, which accounted for 92% of the 12,920 t estimated biomass (Table 60).

Redbanded rockfish (*Sebastes babcocki*)

Redbanded rockfish was the twentieth most abundant species in the Southeastern INPFC area, but was othewise caught infrequently and in relatively modest numbers in the rest of the survey area (Tables 2 and 61). The bulk of the estimated biomass (95%) was concentrated in the Kodiak, Yakutat and Southeastern INPFC areas, and the highest densities occurred in the 201 to 500 m depth range, with no redbanded rockfish caught at depths deeper than 500 m. The highest concentrations occured in the Prince of Wales Slope/Gullies, Southeastern Deep Gullies and Southeastern Slope strata, which accounted for 37% of the 5,788 t estimated biomass (Table 62).

Yelloweye rockfish (*Sebastes ruberrimus*)

Yelloweye rockfish were caught infrequently and in very modest numbers throughout the survey area (Table 63). No yelloweye rockfish were caught at depths deeper than 200 m. The highest densities occurred in the 101 to 200 m depth range, which accounted for almost 94% of the 1,626 t estimated biomass (Table 64).

Rosethorn rockfish (*Sebastes helvomaculatus*)

Rosethorn rockfish were only caught in the Yakutat and Southeastern INPFC areas and in very modest numbers (Table 65). The highest densities occurred in the Prince of Wales Slope/Gullies, Yakutat Slope, and Prince of Wales shelf strata, which accounted for 88% of the

estimated biomass (Table 66). Rosethorn rockfish were caught almost exclusively in the 101 to 300 m depth range, which accounted for more than 98% of the 2,168 t estimated biomass.

Table 55. -- Number of survey hauls, number of hauls with redstripe rockfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	0	---	---	---	---	---
	101 - 200	32	1	0.05	73	0	223	0.388
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	1	0.01	73	0	223	0.388
Chirikof	1 - 100	41	0	---	---	---	---	---
	101 - 200	54	2	0.03	60	0	186	0.610
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	2	0.01	60	0	186	0.610
Kodiak	1 - 100	61	1	0.01	53	0	177	1.573
	101 - 200	90	7	3.60	15,597	0	46,390	0.697
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	8	1.60	15,650	0	46,443	0.698
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	0	---	---	---	---	---
	201 - 300	17	7	0.16	84	0	171	0.672
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	7	0.02	84	0	171	0.672
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	5	1.33	1,476	0	4,335	0.486
	201 - 300	10	7	25.36	12,813	0	30,285	0.532
	301 - 500	8	1	0.02	6	0	21	1.120
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	13	5.33	14,294	0	31,444	0.527
All areas	1 - 100	200	1	<0.01	53	0	177	1.573
	101 - 200	223	15	1.41	17,206	0	47,983	0.669
	201 - 300	76	14	3.58	12,897	0	30,370	0.532
	301 - 500	26	1	<0.01	6	0	21	1.120
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	31	0.98	30,161	0	63,797	0.604

Table 56. -- Catch per unit of effort by stratum for redstripe rockfish sorted by descending CPUE for the 2017 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/Gullie	6	6	32.59	12,797	0	31,156
Kodiak	101 - 200	Kodiak Outer Shelf	17	4	30.90	15,527	0	46,466
Southeastern	101 - 200	Prince of Wales Shelf	9	2	1.86	1,282	0	4,184
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	3	0.46	194	0	470
Yakutat	201 - 300	Yakutat Slope	10	6	0.34	72	0	160
Southeastern	201 - 300	Baranof-Chichagof Slope	4	1	0.14	15	0	64
Chirikof	101 - 200	Chirikof Outer Shelf	16	2	0.12	60	0	186
Kodiak	1 - 100	Kenai Peninsula	7	1	0.10	53	0	182
Kodiak	101 - 200	Portlock Flats	25	3	0.10	70	0	173
Shumagin	101 - 200	Shumagin Outer Shelf	25	1	0.09	73	0	223
Southeastern	301 - 500	Southeastern Slope	5	1	0.08	6	0	23
Yakutat	201 - 300	Yakutat Gullies	7	1	0.04	12	0	42

Table 57. -- Number of survey hauls, number of hauls with silvergray rockfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	0	---	---	---	---	---
	101 - 200	32	0	---	---	---	---	---
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	0	---	---	---	---	---
Chirikof	1 - 100	41	0	---	---	---	---	---
	101 - 200	54	3	0.03	63	0	142	1.332
	201 - 300	16	2	0.03	30	0	77	1.933
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	5	0.01	94	5	182	1.481
Kodiak	1 - 100	61	1	0.31	1,177	0	3,961	1.065
	101 - 200	90	8	0.52	2,247	0	6,211	1.647
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	9	0.35	3,424	0	8,048	1.386
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	5	0.37	1,081	0	2,940	2.559
	201 - 300	17	5	0.95	490	0	1,093	2.139
	301 - 500	5	1	0.17	44	0	183	1.540
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	11	0.29	1,615	0	3,552	2.375
Southeastern	1 - 100	7	1	0.29	187	0	629	0.703
	101 - 200	18	12	16.16	17,913	0	48,361	1.556
	201 - 300	10	7	25.68	12,974	0	27,083	1.797
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	20	11.58	31,074	0	63,702	1.636
All areas	1 - 100	200	2	0.11	1,364	0	4,182	0.995
	101 - 200	223	28	1.74	21,304	0	52,103	1.596
	201 - 300	76	14	3.74	13,495	0	27,620	1.808
	301 - 500	26	1	0.03	44	0	183	1.540
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	45	1.17	36,206	3,550	68,863	1.630

Table 58. -- Catch per unit of effort by stratum for silvergray rockfish sorted by descending CPUE for the 2017 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/Gullie	6	6	32.96	12,942	0	27,766
Southeastern	101 - 200	Prince of Wales Shelf	9	8	25.04	17,249	0	48,282
Kodiak	101 - 200	Kodiak Outer Shelf	17	3	4.26	2,142	0	6,123
Kodiak	1 - 100	Kenai Peninsula	7	1	2.24	1,177	0	4,057
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	4	1.58	665	20	1,310
Yakutat	201 - 300	Yakutat Slope	10	4	1.49	318	0	818
Yakutat	101 - 200	Fairweather Shelf	9	3	1.24	960	0	2,842
Yakutat	201 - 300	Yakutat Gullies	7	1	0.57	173	0	596
Yakutat	301 - 500	Yakutat Slope	3	1	0.29	44	0	232
Southeastern	1 - 100	Southeastern Shallows	7	1	0.29	187	0	644
Southeastern	201 - 300	Baranof-Chichagof Slope	4	1	0.28	32	0	132
Chirikof	201 - 300	Chirikof Slope	7	2	0.20	30	0	78
Yakutat	101 - 200	Yakutat Flats	7	1	0.10	88	0	304
Chirikof	101 - 200	Chirikof Outer Shelf	16	2	0.10	48	0	123
Kodiak	101 - 200	Portlock Flats	25	4	0.09	63	0	130
Yakutat	101 - 200	Yakataga Shelf	6	1	0.06	33	0	119
Kodiak	101 - 200	Albatross Gullies	22	1	0.05	42	0	129
Chirikof	101 - 200	Shelikof Edge	23	1	0.02	15	0	47

Table 59. -- Number of survey hauls, number of hauls with harlequin rockfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	1	<0.01	2	0	6	0.097
	101 - 200	32	3	8.10	11,893	0	33,851	0.644
	201 - 300	13	1	0.16	44	0	138	0.471
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	5	1.89	11,939	0	33,897	0.642
Chirikof	1 - 100	41	0	---	---	---	---	---
	101 - 200	54	3	0.07	176	0	510	0.409
	201 - 300	16	1	<0.01	4	0	14	0.490
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	4	0.03	180	0	515	0.410
Kodiak	1 - 100	61	0	---	---	---	---	---
	101 - 200	90	7	0.17	744	0	1,750	0.217
	201 - 300	20	1	<0.01	3	0	12	0.278
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	8	0.08	748	0	1,754	0.217
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	1	<0.01	2	0	6	0.055
	201 - 300	17	5	0.04	19	0	44	0.177
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	6	<0.01	21	0	45	0.147
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	1	0.01	12	0	39	0.197
	201 - 300	10	5	0.04	20	2	39	0.249
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	6	0.01	32	2	63	0.227
All areas	1 - 100	200	1	<0.01	2	0	6	0.097
	101 - 200	223	15	1.05	12,827	0	34,810	0.572
	201 - 300	76	13	0.03	91	0	188	0.300
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	29	0.42	12,920	0	34,903	0.568

Table 60. -- Catch per unit of effort by stratum for harlequin rockfish sorted by descending CPUE for the 2017 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	25	3	14.59	11,893	0	33,894
Kodiak	101 - 200	Kodiak Outer Shelf	17	3	1.40	701	0	1,715
Chirikof	101 - 200	Chirikof Outer Shelf	16	3	0.35	176	0	512
Shumagin	201 - 300	Shumagin Slope	13	1	0.16	44	0	139
Yakutat	201 - 300	Yakutat Slope	10	5	0.09	19	0	45
Southeastern	201 - 300	Baranof-Chichagof Slope	4	3	0.09	10	0	21
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	1	0.03	12	0	40
Chirikof	201 - 300	Chirikof Slope	7	1	0.03	4	0	14
Southeastern	201 - 300	Prince of Wales Slope/Gullie	6	2	0.03	11	0	28
Kodiak	101 - 200	Kenai Flats	11	2	0.03	31	0	86
Kodiak	201 - 300	Kodiak Slope	6	1	0.02	3	0	12
Kodiak	101 - 200	Portlock Flats	25	2	0.02	12	0	30
Shumagin	1 - 100	Shumagin Bank	25	1	0.00	2	0	7
Yakutat	101 - 200	Fairweather Shelf	9	1	0.00	2	0	6

Table 61. -- Number of survey hauls, number of hauls with redbanded rockfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	1	<0.01	9	0	27	0.436
	101 - 200	32	0	---	---	---	---	---
	201 - 300	13	4	0.12	35	0	88	0.539
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	5	0.01	43	0	98	0.514
Chirikof	1 - 100	41	0	---	---	---	---	---
	101 - 200	54	3	0.09	214	0	506	1.632
	201 - 300	16	3	0.05	52	0	143	0.676
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	6	0.04	266	0	569	1.276
Kodiak	1 - 100	61	1	<0.01	17	0	56	0.569
	101 - 200	90	11	0.20	852	68	1,635	1.304
	201 - 300	20	7	0.37	423	0	944	1.029
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	19	0.13	1,291	372	2,210	1.181
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	5	0.15	445	0	1,057	1.333
	201 - 300	17	10	0.56	292	16	568	0.523
	301 - 500	5	4	2.97	780	0	3,867	1.322
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	19	0.27	1,518	0	3,242	1.023
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	8	0.42	467	4	930	0.521
	201 - 300	10	8	3.07	1,549	0	3,231	1.240
	301 - 500	8	7	2.10	654	0	2,146	1.081
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	23	0.99	2,670	776	4,564	0.971
All areas	1 - 100	200	2	<0.01	26	0	66	0.514
	101 - 200	223	27	0.16	1,977	875	3,079	0.982
	201 - 300	76	32	0.65	2,351	645	4,057	0.996
	301 - 500	26	11	1.12	1,434	0	3,638	1.200
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	72	0.19	5,788	3,218	8,358	1.030

Table 62. -- Catch per unit of effort by stratum for redbanded rockfish sorted by descending CPUE for the 2017 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/Gullie	6	5	3.75	1,472	0	3,235
Southeastern	301 - 500	Southeastern Deep Gullies	3	3	2.25	528	0	2,539
Southeastern	301 - 500	Southeastern Slope	5	4	1.63	126	18	235
Yakutat	201 - 300	Yakutat Slope	10	8	0.95	203	0	436
Kodiak	101 - 200	Kodiak Outer Shelf	17	6	0.82	412	70	754
Southeastern	201 - 300	Baranof-Chichagof Slope	4	3	0.69	77	0	224
Kodiak	201 - 300	Kodiak Slope	6	3	0.55	90	0	223
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	4	0.55	232	0	637
Kodiak	201 - 300	Kenai Gullies	11	4	0.50	333	0	848
Kodiak	101 - 200	Albatross Gullies	22	3	0.47	374	0	1,089
Yakutat	101 - 200	Yakataga Shelf	6	1	0.36	188	0	671
Chirikof	201 - 300	Chirikof Slope	7	3	0.34	52	0	147
Southeastern	101 - 200	Prince of Wales Shelf	9	4	0.34	235	0	537
Yakutat	101 - 200	Fairweather Shelf	9	4	0.33	258	0	758
Yakutat	201 - 300	Yakutat Gullies	7	2	0.29	89	0	278
Yakutat	301 - 500	Yakutat Slope	3	2	0.26	39	0	133
Chirikof	101 - 200	Shelikof Edge	23	1	0.17	130	0	401
Chirikof	101 - 200	Chirikof Outer Shelf	16	2	0.17	83	0	211
Shumagin	201 - 300	Shumagin Slope	13	4	0.12	35	0	89
Kodiak	101 - 200	Portlock Flats	25	2	0.09	66	0	161
Kodiak	1 - 100	Kenai Peninsula	7	1	0.03	17	0	57
Shumagin	1 - 100	Shumagin Bank	25	1	0.01	9	0	27

Table 63. -- Number of survey hauls, number of hauls with yelloweye rockfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	3	0.01	35	0	97	0.581
	101 - 200	32	4	0.28	407	0	911	3.392
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	7	0.07	442	0	948	2.452
Chirikof	1 - 100	41	0	---	---	---	---	---
	101 - 200	54	2	0.09	215	0	538	2.985
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	2	0.03	215	0	538	2.985
Kodiak	1 - 100	61	1	0.02	67	0	204	2.748
	101 - 200	90	6	0.15	631	0	1,311	2.991
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	7	0.07	698	6	1,389	2.966
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	0	---	---	---	---	---
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	3	0.24	271	0	605	1.496
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	3	0.10	271	0	605	1.496
All areas	1 - 100	200	4	0.01	102	0	251	1.202
	101 - 200	223	15	0.12	1,524	587	2,461	2.610
	201 - 300	76	0	---	---	---	---	---
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	19	0.05	1,626	677	2,574	2.432

Table 64. -- Catch per unit of effort by stratum for yelloweye rockfish sorted by descending CPUE for the 2017 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	17	4	1.00	503	0	1,181
Shumagin	101 - 200	Shumagin Outer Shelf	25	4	0.50	407	0	912
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	2	0.39	164	0	430
Chirikof	101 - 200	Shelikof Edge	23	1	0.18	138	0	424
Southeastern	101 - 200	Prince of Wales Shelf	9	1	0.16	106	0	352
Chirikof	101 - 200	Chirikof Outer Shelf	16	1	0.15	77	0	242
Kodiak	101 - 200	Portlock Flats	25	1	0.08	61	0	188
Kodiak	101 - 200	Kenai Flats	11	1	0.06	66	0	214
Kodiak	1 - 100	Albatross Banks	25	1	0.04	67	0	204
Shumagin	1 - 100	Shumagin Bank	25	1	0.02	30	0	92
Shumagin	1 - 100	Lower Alaska Peninsula	14	2	0.01	5	0	13

Table 65. -- Number of survey hauls, number of hauls with rosethorn rockfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	0	---	---	---	---	---
	101 - 200	32	0	---	---	---	---	---
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	0	---	---	---	---	---
Chirikof	1 - 100	41	0	---	---	---	---	---
	101 - 200	54	0	---	---	---	---	---
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	0	---	---	---	---	---
Kodiak	1 - 100	61	0	---	---	---	---	---
	101 - 200	90	0	---	---	---	---	---
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	0	---	---	---	---	---
Yakutat	1 - 100	17	1	0.01	17	0	55	0.465
	101 - 200	29	1	0.06	187	0	629	0.350
	201 - 300	17	4	0.56	288	0	817	0.297
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	6	0.09	492	0	1,190	0.319
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	3	0.53	592	0	1,873	0.194
	201 - 300	10	4	2.11	1,065	0	2,646	0.204
	301 - 500	8	2	0.06	20	0	57	0.295
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	9	0.62	1,676	0	3,508	0.201
All areas	1 - 100	200	1	<0.01	17	0	55	0.465
	101 - 200	223	4	0.06	778	0	2,067	0.217
	201 - 300	76	8	0.38	1,353	0	3,037	0.218
	301 - 500	26	2	0.02	20	0	57	0.295
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	15	0.07	2,168	260	4,075	0.219

Table 66. -- Catch per unit of effort by stratum for rosethorn rockfish sorted by descending CPUE for the 2017 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/Gullie	6	3	2.71	1,063	0	2,724
Yakutat	201 - 300	Yakutat Slope	10	4	1.35	288	0	825
Southeastern	101 - 200	Prince of Wales Shelf	9	1	0.82	566	0	1,872
Southeastern	301 - 500	Southeastern Slope	5	2	0.25	20	0	61
Yakutat	101 - 200	Yakutat Flats	7	1	0.21	187	0	644
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	2	0.06	25	0	74
Southeastern	201 - 300	Baranof-Chichagof Slope	4	1	0.02	2	0	9
Yakutat	1 - 100	Yakutat Shallows	10	1	0.02	17	0	56

SKATES

Alaska skate (*Bathyraja parmifera*)

Alaska skate were caught infrequently and only in modest numbers in 6 of the strata in the Shumagin, Chirikof, and Kodiak INPFC areas (Tables 67 and 68). No Alaska skate were caught in the Yakutat and Southeastern regions or at depths deeper than 200 m. The highest densities occurred in the Shumagin Bank and Barren Islands strata. The estimated biomass of Alaska skate was 708 t (Table 67).

Aleutian skate (*Bathyraja aleutica*)

Aleutian skate was not among the 20 most abundant species in the 2017 survey, nor was it among the most abundant species in any of INPFC areas (Table 2). Although Aleutian skate were caught throughout the survey area, they were extremely rare in the Yakutat and Southeastern regions (Table 69). Aleutian skate were caught in all depth ranges, but the highest densities occurred at various depth strata less than 300 m (Table 70). The estimated biomass of Aleutian skate was 13,211 t, and 98% of this was concentrated at depths less than 300 m (Table 69).

Bering skate (*Bathyraja interrupta*)

Bering skate was not among the 20 most abundant species in any of the INPFC areas in the 2017 survey (Table 2). Although caught throughout the survey area and at all depths less than 500 m, the bulk of the biomass was concentrated at depths between 101 and 200 m in the Chifikof and Kodiak, and Yakutat INPFC areas (Table 71). The highest densities were recorded

in the 101-200 m depth interval of the Yakataga Shelf, Barren Islands, and Shelikof Edge strata (Table 72). The estimated biomass of Bering skate was 3,743 t, and the highest regional biomass was in the Kodiak region.

Big skate (*Raja binoculata*)

Big skate was not among the 20 most abundant species caught in the 2017 survey but was among the 20 most abundant species in the Shumagin, Chirikof, and Yakutat INPFC areas (Table 2). Big skate were caught throughout the survey area at depths less than 300 m (Table 73). The highest densities occurred at depths less than 100 m in the Upper Alaska Peninsula and Chirikof Bank strata (Table 74). The estimated biomass of big skate was 33,610 t, and the highest regional biomass by far was in the Chirikof region. Approximately 75% of the biomass was concentrated at depths less than 100 m (Table 73).

Longnose skate (*Raja rhina*)

Longnose skate was the eighteenth most abundant species caught in the 2017 survey, and was among the 20 most abundant species in the Chirikof, Kodiak, and Yakutat INPFC areas (Table 2). Longnose skate were caught throughout the survey area at all depths less than 500 m (Table 75). The highest densities occurred at depths less than 100 m in the Kenai Peninsula, Chirikof Bank, and Northern Kodiak Shallows strata (Table 76). The estimated biomass of longnose skate was 49,501 t, and the highest regional biomass was in the Kodiak region, where 43% of the estimated biomass was concentrated (Table 75).

Table 67. -- Number of survey hauls, number of hauls with Alaska skate, mean CPUE, biomass, and mean weight, based on the 2017 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	74	1	0.09	356	0	1,089	5.817
	101 - 200	32	1	0.03	50	0	151	3.992
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	2	0.06	405	0	1,146	5.510
Chirikof	1 - 100	41	1	0.03	70	0	223	2.590
	101 - 200	54	2	0.03	82	0	236	3.317
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	3	0.02	152	0	363	2.935
Kodiak	1 - 100	61	0	---	---	---	---	---
	101 - 200	90	1	0.03	151	0	473	5.200
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	1	0.02	151	0	473	5.200
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	0	---	---	---	---	---
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	0	---	---	---	---	---
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	0	---	---	---	---	---
All areas	1 - 100	200	2	0.03	426	0	1,172	4.825
	101 - 200	223	4	0.02	282	0	652	4.273
	201 - 300	76	0	---	---	---	---	---
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	6	0.02	708	0	1,532	4.589

Table 68. -- Catch per unit of effort by stratum for Alaska skate sorted by descending CPUE for the 2017 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Shumagin	1 - 100	Shumagin Bank	25	1	0.29	356	0	1,090
Kodiak	101 - 200	Barren Islands	15	1	0.14	151	0	476
Chirikof	101 - 200	Shelikof Edge	23	1	0.10	75	0	229
Chirikof	1 - 100	Upper Alaska Peninsula	12	1	0.09	70	0	225
Shumagin	101 - 200	Shumagin Outer Shelf	25	1	0.06	50	0	152
Chirikof	101 - 200	Chirikof Outer Shelf	16	1	0.01	7	0	22

Table 69. -- Number of survey hauls, number of hauls with Aleutian skate, mean CPUE, biomass, and mean weight, based on the 2017 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	74	5	0.42	1,723	0	3,654	7.659
	101 - 200	32	8	1.27	1,862	276	3,448	9.606
	201 - 300	13	1	0.42	116	0	367	13.392
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	14	0.58	3,701	1,283	6,119	8.658
Chirikof	1 - 100	41	4	0.36	935	0	2,011	8.745
	101 - 200	54	10	0.62	1,468	460	2,477	4.935
	201 - 300	16	7	2.90	3,350	599	6,100	5.287
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	1	0.62	121	0	505	6.060
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	22	0.90	5,873	2,819	8,927	5.552
Kodiak	1 - 100	61	5	0.31	1,190	0	2,402	8.086
	101 - 200	90	11	0.45	1,963	394	3,531	5.156
	201 - 300	20	2	0.08	92	0	299	1.049
	301 - 500	5	2	0.23	66	0	169	1.402
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	20	0.34	3,311	1,354	5,268	4.998
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	2	0.03	98	0	273	1.056
	201 - 300	17	3	0.33	173	0	396	2.313
	301 - 500	5	1	0.09	24	0	100	1.267
	501 - 700	2	1	0.11	16	0	85	0.584
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	7	0.06	311	21	600	1.454
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	1	0.05	15	0	54	2.501
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	1	0.01	15	0	54	2.501
All areas	1 - 100	200	14	0.30	3,848	1,459	6,237	8.033
	101 - 200	223	31	0.44	5,391	3,040	7,742	5.588
	201 - 300	76	13	1.03	3,731	954	6,508	4.636
	301 - 500	26	4	0.08	105	0	221	1.459
	501 - 700	11	2	0.17	137	0	524	2.889
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	64	0.43	13,211	9,010	17,412	5.580

Table 70. -- Catch per unit of effort by stratum for Aleutian skate sorted by descending CPUE for the 2017 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	9	6	3.34	3,346	542	6,150
Kodiak	1 - 100	Northern Kodiak Shallows	6	2	1.93	424	0	1,215
Chirikof	101 - 200	Shelikof Edge	23	10	1.90	1,468	458	2,479
Shumagin	101 - 200	Shumagin Outer Shelf	25	6	1.55	1,266	149	2,383
Shumagin	1 - 100	Fox Islands	9	2	1.50	1,249	0	3,159
Chirikof	1 - 100	Semidi Bank	10	3	1.28	934	0	2,027
Shumagin	101 - 200	Sanak Gully	4	1	1.11	470	0	1,966
Kodiak	101 - 200	Barren Islands	15	3	0.82	895	0	2,064
Kodiak	101 - 200	Albatross Gullies	22	2	0.64	504	0	1,471
Chirikof	501 - 700	Chirikof Slope	3	1	0.62	121	0	640
Shumagin	101 - 200	West Shumagin Gully	3	1	0.55	126	0	668
Kodiak	101 - 200	Portlock Flats	25	3	0.45	333	0	760
Shumagin	201 - 300	Shumagin Slope	13	1	0.42	116	0	369
Kodiak	1 - 100	Albatross Shallows	13	1	0.37	213	0	676
Yakutat	201 - 300	Yakutat Slope	10	1	0.37	78	0	256
Yakutat	201 - 300	Yakutat Gullies	7	2	0.31	95	0	260
Kodiak	101 - 200	Kodiak Outer Shelf	17	2	0.31	154	0	436
Kodiak	1 - 100	Albatross Banks	25	1	0.29	448	0	1,374
Kodiak	201 - 300	Upper Shelikof Gully	3	2	0.29	92	0	373
Kodiak	301 - 500	Kodiak Slope	5	2	0.23	66	0	177
Kodiak	1 - 100	Kenai Peninsula	7	1	0.20	105	0	363
Southeastern	301 - 500	Southeastern Slope	5	1	0.20	15	0	57
Shumagin	1 - 100	Shumagin Bank	25	1	0.16	199	0	608
Yakutat	301 - 500	Yakutat Slope	3	1	0.16	24	0	127
Shumagin	1 - 100	Davidson Bank	26	1	0.14	196	0	600
Shumagin	1 - 100	Lower Alaska Peninsula	14	1	0.12	79	0	250
Yakutat	501 - 700	Yakutat Slope	2	1	0.11	16	0	219
Yakutat	101 - 200	Yakutat Flats	7	1	0.08	71	0	245
Kodiak	101 - 200	Kenai Flats	11	1	0.06	78	0	251
Yakutat	101 - 200	Middleton Shelf	7	1	0.04	27	0	92
Chirikof	201 - 300	Chirikof Slope	7	1	0.02	3	0	12
Chirikof	1 - 100	Chirikof Bank	19	1	0.00	1	0	3

Table 71. -- Number of survey hauls, number of hauls with Bering skate, mean CPUE, biomass, and mean weight, based on the 2017 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	74	1	0.04	162	0	494	8.529
	101 - 200	32	2	0.06	87	0	278	1.226
	201 - 300	13	1	0.02	6	0	19	0.842
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	4	0.04	255	0	613	2.625
Chirikof	1 - 100	41	1	0.02	62	0	198	2.449
	101 - 200	54	9	0.21	507	150	864	1.329
	201 - 300	16	1	0.01	16	---	---	0.432
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	11	0.09	586	210	962	1.317
Kodiak	1 - 100	61	2	0.03	129	0	341	2.269
	101 - 200	90	14	0.32	1,406	434	2,378	1.649
	201 - 300	20	4	0.20	231	0	577	1.563
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	20	0.18	1,766	736	2,797	1.670
Yakutat	1 - 100	17	2	0.08	140	0	349	1.712
	101 - 200	29	2	0.28	816	0	2,722	7.826
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	1	0.09	24	0	127	0.598
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	5	0.18	980	0	2,903	4.331
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	1	0.06	63	0	206	1.693
	201 - 300	10	2	0.06	31	0	80	1.319
	301 - 500	8	2	0.20	62	0	234	1.276
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	5	0.06	156	0	345	1.427
All areas	1 - 100	200	6	0.04	493	43	943	2.693
	101 - 200	223	28	0.24	2,879	918	4,840	1.990
	201 - 300	76	8	0.08	284	0	635	1.315
	301 - 500	26	3	0.07	86	0	274	0.970
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	45	0.12	3,743	1,716	5,770	1.934

Table 72. -- Catch per unit of effort by stratum for Bering skate sorted by descending CPUE for the 2017 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	101 - 200	Yakataga Shelf	6	1	1.48	778	0	2,779
Kodiak	101 - 200	Barren Islands	15	5	0.78	856	0	1,774
Chirikof	101 - 200	Shelikof Edge	23	9	0.66	507	150	865
Kodiak	201 - 300	Upper Shelikof Gully	3	1	0.38	121	0	643
Kodiak	101 - 200	Kenai Flats	11	4	0.32	385	5	765
Southeastern	201 - 300	Baranof-Chichagof Slope	4	2	0.27	31	0	88
Southeastern	301 - 500	Southeastern Deep Gullies	3	1	0.23	53	0	281
Yakutat	301 - 500	Yakutat Gullies	2	1	0.22	24	0	329
Kodiak	1 - 100	Northern Kodiak Shallows	6	1	0.17	37	0	133
Kodiak	201 - 300	Kenai Gullies	11	2	0.16	108	0	269
Kodiak	1 - 100	Albatross Shallows	13	1	0.16	92	0	292
Shumagin	101 - 200	Sanak Gully	4	1	0.15	65	0	274
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	1	0.15	63	0	209
Southeastern	301 - 500	Southeastern Slope	5	1	0.12	9	0	36
Shumagin	1 - 100	Davidson Bank	26	1	0.12	162	0	495
Kodiak	101 - 200	Albatross Gullies	22	2	0.12	93	0	229
Yakutat	1 - 100	Middleton Shallows	7	1	0.10	68	0	234
Shumagin	101 - 200	West Shumagin Gully	3	1	0.10	22	0	114
Chirikof	1 - 100	Upper Alaska Peninsula	12	1	0.08	62	0	200
Kodiak	101 - 200	Kodiak Outer Shelf	17	1	0.08	38	0	119
Yakutat	1 - 100	Yakutat Shallows	10	1	0.07	72	0	236
Yakutat	101 - 200	Fairweather Shelf	9	1	0.05	38	0	124
Kodiak	101 - 200	Portlock Flats	25	2	0.05	35	0	85
Shumagin	201 - 300	Shumagin Slope	13	1	0.02	6	0	19
Chirikof	201 - 300	Lower Shelikof Gully	9	1	0.02	16	0	54
Kodiak	201 - 300	Kodiak Slope	6	1	0.01	2	0	8

Table 73. -- Number of survey hauls, number of hauls with big skate, mean CPUE, biomass, and mean weight, based on the 2017 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	74	11	0.79	3,254	956	5,552	11.891
	101 - 200	32	5	1.22	1,794	0	3,928	17.273
	201 - 300	13	1	0.07	20	0	63	2.791
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	17	.80	5,068	2,019	8,118	13.177
Chirikof	1 - 100	41	16	6.38	16,614	7,764	25,464	13.264
	101 - 200	54	3	0.11	258	0	628	5.916
	201 - 300	16	1	1.15	1,333	0	4,350	17.665
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	20	2.80	18,205	9,012	27,397	13.273
Kodiak	1 - 100	61	8	0.97	3,725	71	7,379	6.483
	101 - 200	90	2	0.22	949	0	2,718	15.694
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	10	0.48	4,674	687	8,660	7.359
Yakutat	1 - 100	17	3	0.46	759	0	2,017	6.457
	101 - 200	29	3	1.35	3,965	0	9,969	24.743
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	6	0.85	4,724	0	10,766	17.003
Southeastern	1 - 100	7	2	1.27	828	0	2,476	10.982
	101 - 200	18	1	0.10	111	0	363	5.801
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	3	0.35	940	0	2,608	9.932
All areas	1 - 100	200	40	1.95	25,181	15,332	35,029	10.977
	101 - 200	223	14	0.58	7,076	608	13,544	18.273
	201 - 300	76	2	0.38	1,353	0	4,370	16.387
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	56	1.09	33,610	21,891	45,329	12.161

Table 74. -- Catch per unit of effort by stratum for big skate sorted by descending CPUE for the 2017 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	1 - 100	Upper Alaska Peninsula	12	7	11.95	9,486	1,667	17,305
Chirikof	1 - 100	Chirikof Bank	19	8	6.34	6,842	1,802	11,883
Yakutat	101 - 200	Yakataga Shelf	6	1	2.69	1,419	0	5,069
Yakutat	101 - 200	Yakutat Flats	7	1	2.46	2,219	0	7,650
Shumagin	1 - 100	Lower Alaska Peninsula	14	3	2.00	1,374	0	3,318
Shumagin	101 - 200	Shumagin Outer Shelf	25	4	1.53	1,244	0	3,007
Kodiak	1 - 100	Lower Cook Inlet	10	3	1.34	1,321	0	3,472
Chirikof	201 - 300	Lower Shelikof Gully	9	1	1.33	1,333	0	4,408
Shumagin	101 - 200	Sanak Gully	4	1	1.30	550	0	2,299
Southeastern	1 - 100	Southeastern Shallows	7	2	1.27	828	0	2,533
Kodiak	1 - 100	Albatross Banks	25	2	1.24	1,908	0	4,969
Kodiak	101 - 200	Barren Islands	15	2	0.86	949	0	2,729
Yakutat	1 - 100	Middleton Shallows	7	1	0.78	527	0	1,815
Shumagin	1 - 100	Davidson Bank	26	5	0.77	1,049	18	2,081
Kodiak	1 - 100	Northern Kodiak Shallows	6	1	0.74	163	0	581
Kodiak	1 - 100	Albatross Shallows	13	2	0.58	333	0	918
Shumagin	1 - 100	Shumagin Bank	25	2	0.48	594	0	1,461
Yakutat	101 - 200	Fairweather Shelf	9	1	0.42	326	0	1,078
Chirikof	101 - 200	Chirikof Outer Shelf	16	2	0.42	210	0	572
Chirikof	1 - 100	Semidi Bank	10	1	0.39	285	0	931
Shumagin	1 - 100	Fox Islands	9	1	0.28	237	0	783
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	1	0.27	111	0	368
Yakutat	1 - 100	Yakutat Shallows	10	2	0.23	233	0	638
Shumagin	201 - 300	Shumagin Slope	13	1	0.07	20	0	63
Chirikof	101 - 200	Shelikof Edge	23	1	0.06	48	0	147

Table 75. -- Number of survey hauls, number of hauls with longnose skate, mean CPUE, biomass, and mean weight, based on the 2017 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	74	9	0.46	1,887	517	3,258	7.602
	101 - 200	32	1	0.09	128	0	390	10.978
	201 - 300	13	1	0.42	118	0	373	5.958
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	11	0.34	2,133	720	3,545	7.626
Chirikof	1 - 100	41	6	4.29	11,171	0	25,277	11.417
	101 - 200	54	17	1.59	3,782	1,427	6,137	9.237
	201 - 300	16	6	2.49	2,874	802	4,946	7.144
	301 - 500	4	1	0.30	48	0	182	3.557
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	30	2.75	17,875	3,526	32,224	9.910
Kodiak	1 - 100	61	19	2.63	10,116	3,979	16,252	9.389
	101 - 200	90	26	2.25	9,730	3,994	15,467	8.391
	201 - 300	20	3	1.08	1,241	0	2,935	8.042
	301 - 500	5	3	0.88	257	0	534	3.767
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	51	2.18	21,344	13,292	29,395	8.678
Yakutat	1 - 100	17	2	0.17	284	0	787	2.439
	101 - 200	29	13	1.83	5,382	1,900	8,864	6.443
	201 - 300	17	7	1.30	671	115	1,226	8.939
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	22	1.15	6,337	2,787	9,886	6.172
Southeastern	1 - 100	7	1	0.17	112	0	377	2.949
	101 - 200	18	6	0.77	858	0	1,964	4.792
	201 - 300	10	5	1.29	652	0	1,449	4.920
	301 - 500	8	1	0.61	191	0	800	5.010
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	13	0.68	1,813	434	3,192	4.677
All areas	1 - 100	200	37	1.83	23,570	8,461	38,678	9.588
	101 - 200	223	63	1.63	19,880	12,896	26,864	7.660
	201 - 300	76	22	1.54	5,555	2,972	8,138	7.087
	301 - 500	26	5	0.39	497	0	1,075	4.139
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	127	1.61	49,501	32,979	66,023	8.309

Table 76. -- Catch per unit of effort by stratum for longnose skate sorted by descending CPUE for the 2017 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	Kenai Peninsula	7	4	11.41	5,999	0	12,314
Chirikof	1 - 100	Chirikof Bank	19	3	8.65	9,335	0	23,354
Kodiak	1 - 100	Northern Kodiak Shallows	6	5	6.62	1,456	228	2,683
Southeastern	201 - 300	Baranof-Chichagof Slope	4	2	3.79	426	0	1,297
Kodiak	101 - 200	Kenai Flats	11	5	3.66	4,422	0	9,629
Kodiak	201 - 300	Upper Shelikof Gully	3	2	3.20	1,027	0	3,489
Chirikof	201 - 300	Lower Shelikof Gully	9	6	2.87	2,874	762	4,986
Chirikof	101 - 200	Shelikof Edge	23	11	2.79	2,159	670	3,647
Kodiak	101 - 200	Barren Islands	15	6	2.51	2,757	320	5,194
Yakutat	101 - 200	Fairweather Shelf	9	4	2.43	1,880	0	4,340
Chirikof	1 - 100	Upper Alaska Peninsula	12	3	2.31	1,836	0	4,259
Yakutat	101 - 200	Middleton Shelf	7	4	2.27	1,666	0	3,652
Yakutat	101 - 200	Yakutat Flats	7	3	2.01	1,819	0	4,252
Kodiak	1 - 100	Albatross Shallows	13	5	1.99	1,149	75	2,223
Kodiak	101 - 200	Kodiak Outer Shelf	17	5	1.87	938	48	1,828
Yakutat	201 - 300	Yakutat Slope	10	5	1.82	387	75	698
Shumagin	1 - 100	Fox Islands	9	3	1.31	1,091	0	2,369
Kodiak	101 - 200	Albatross Gullies	22	5	1.21	954	32	1,875
Chirikof	101 - 200	East Shumagin Gully	15	4	1.17	1,302	0	3,137
Southeastern	101 - 200	Prince of Wales Shelf	9	4	1.07	738	0	1,850
Kodiak	1 - 100	Albatross Banks	25	5	0.98	1,512	120	2,904
Yakutat	201 - 300	Yakutat Gullies	7	2	0.93	284	0	781
Kodiak	101 - 200	Portlock Flats	25	5	0.90	660	0	1,376
Kodiak	301 - 500	Kodiak Slope	5	3	0.88	257	0	556
Southeastern	301 - 500	Southeastern Deep Gullies	3	1	0.82	191	0	1,015
Chirikof	101 - 200	Chirikof Outer Shelf	16	2	0.64	321	0	792
Southeastern	201 - 300	Prince of Wales Slope/Gullie	6	3	0.58	226	0	769
Shumagin	201 - 300	Shumagin Slope	13	1	0.42	118	0	375
Kodiak	201 - 300	Kenai Gullies	11	1	0.32	213	0	688
Shumagin	1 - 100	Davidson Bank	26	3	0.31	430	0	947
Yakutat	1 - 100	Middleton Shallows	7	1	0.31	210	0	723
Chirikof	301 - 500	Chirikof Slope	4	1	0.30	48	0	202
Shumagin	1 - 100	Shumagin Bank	25	3	0.30	366	0	797
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	2	0.29	120	0	306
Southeastern	1 - 100	Southeastern Shallows	7	1	0.17	112	0	386
Shumagin	101 - 200	Shumagin Outer Shelf	25	1	0.16	128	0	391
Yakutat	1 - 100	Yakutat Shallows	10	1	0.07	74	0	241
Yakutat	101 - 200	Yakataga Shelf	6	2	0.03	18	0	48

MISCELLANEOUS SPECIES

Capelin (*Mallotus villosus*)

Capelin was relatively rare and was not among the 20 most abundant species in any of the INPFC areas in the 2017 survey (Table 2). Capelin was caught in modest numbers in all regions except for the Southeastern region (Table 77). The highest densities occurred at depths less than 100 m in in various strata in the Chirikof and Kodiak INPFC areas (Table 78). The estimated biomass of capelin was 156 t, and the highest regional biomass was in the Kodiak region, where approximately 60% of the biomass was concentrated (Table 77).

Eulachon (*Thaleichthys pacificus*)

Eulachon was not among the twenty most abundant species caught in the 2017 survey, but was the seventeenth most abundant species in the Yakutat region (Table 2). Although caught throughout the survey area and at all depths less than 500 m, the bulk of the 16,859 t estimated biomass was concentrated in the Chirikof, Kodiak, and Yakuat INPFC areas (Table 79). The highest densities generally occurred at depths between 101 and 300 m, with the highest concentrations in the Upper Shelikof Gully, Shelikof Edge, and Yakutat Gullies strata (Table 80).

Pacific hake (*Merluccius productus*)

Pacific hake was not among the 20 most abundant species caught in the 2017 survey, and was not among the 20 most abundant species in any region (Table 2). Pacific hake were almost exclusively caught in the 301-500 m depth interval of the Southeastern INPFC area, where 99%

of the estimated 490 t biomass occurred (Table 81). The highest concentrations by far were in the Southeastern Deep Gullies and Southeastern Slope strata, which accounted for almost 99% of the survey biomass estimate (Table 82).

Spiny dogfish (*Squalus acanthias*)

Spiny dogfish was the fifteenth most abundant species caught in the 2017 survey and was the fourth most abundant species in the Yakutat region (Table 2). Although caught in all but one of the regions (Shumagin being the exception) and at all depths less than 500 m, the bulk of the 53,979 ton estimated biomass was concentrated at depths less than 200 m in the Kodiak, Yakutat, and Southeastern regions (Table 83). The highest concentrations were in nine strata less than 200 m in the Yakutat and Kodiak regions, which accounted for 89% of the survey biomass estimate (Table 84).

Table 77. -- Number of survey hauls, number of hauls with capelin, mean CPUE, biomass, and mean weight, based on the 2017 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	74	12	<0.01	8	1	16	0.004
	101 - 200	32	2	<0.01	1	---	---	0.005
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	14	<0.01	9	2	16	0.004
Chirikof	1 - 100	41	15	0.02	49	1	98	0.007
	101 - 200	54	0	---	---	---	---	---
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	15	0.01	49	1	98	0.007
Kodiak	1 - 100	61	19	0.02	82	0	171	0.005
	101 - 200	90	6	<0.01	11	---	---	0.009
	201 - 300	20	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	25	0.01	93	3	183	0.006
Yakutat	1 - 100	17	3	<0.01	1	0	2	0.007
	101 - 200	29	6	<0.01	3	---	---	0.01
	201 - 300	17	1	<0.01	<1	0	1	0.012
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	10	<0.01	5	0	10	0.007
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	0	---	---	---	---	---
All areas	1 - 100	200	49	0.01	140	41	240	0.006
	101 - 200	223	14	<0.01	15	---	---	0.008
	201 - 300	76	1	<0.01	<1	0	1	0.012
	301 - 500	26	0	---	---	---	---	---
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	64	0.01	156	55	256	0.006

Table 78. -- Catch per unit of effort by stratum for capelin sorted by descending CPUE for the 2017 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	1 - 100	Upper Alaska Peninsula	12	5	0.05	37	0	84
Kodiak	1 - 100	Lower Cook Inlet	10	5	0.04	43	0	123
Kodiak	1 - 100	Albatross Shallows	13	6	0.03	17	0	50
Kodiak	1 - 100	Kenai Peninsula	7	2	0.02	13	0	44
Chirikof	1 - 100	Chirikof Bank	19	10	0.01	13	0	28
Kodiak	101 - 200	Kenai Flats	11	3	0.01	9	0	26
Shumagin	1 - 100	Lower Alaska Peninsula	14	8	0.01	5	0	10
Kodiak	1 - 100	Albatross Banks	25	5	0.01	9	0	22
Shumagin	1 - 100	Fox Islands	9	2	0.00	3	0	9
Kodiak	101 - 200	Barren Islands	15	2	0.00	2	0	4
Yakutat	101 - 200	Yakutat Flats	7	1	0.00	2	0	8
Yakutat	201 - 300	Yakutat Gullies	7	1	0.00	0	0	1
Yakutat	1 - 100	Yakutat Shallows	10	3	0.00	1	0	2
Shumagin	101 - 200	West Shumagin Gully	3	1	0.00	0	0	1
Shumagin	101 - 200	Sanak Gully	4	1	0.00	0	0	2
Yakutat	101 - 200	Middleton Shelf	7	2	0.00	1	0	2
Yakutat	101 - 200	Yakataga Shelf	6	1	0.00	0	0	1
Shumagin	1 - 100	Shumagin Bank	25	2	0.00	0	0	1
Yakutat	101 - 200	Fairweather Shelf	9	2	0.00	0	0	1
Kodiak	1 - 100	Northern Kodiak Shallows	6	1	0.00	0	0	0
Kodiak	101 - 200	Portlock Flats	25	1	0.00	0	0	0

Table 79. -- Number of survey hauls, number of hauls with eulachon, mean CPUE, biomass, and mean weight, based on the 2017 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	74	3	<0.01	8	0	18	0.023
	101 - 200	32	4	0.02	25	0	77	0.024
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	7	<0.01	32	0	80	0.024
Chirikof	1 - 100	41	8	0.05	136	0	337	0.026
	101 - 200	54	24	1.41	3,359	794	5,925	0.029
	201 - 300	16	10	1.07	1,237	0	2,498	0.025
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	42	0.73	4,733	1,945	7,521	0.028
Kodiak	1 - 100	61	16	0.16	608	0	1,351	0.031
	101 - 200	90	32	1.03	4,451	539	8,362	0.018
	201 - 300	20	15	1.49	1,709	915	2,502	0.029
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	63	0.69	6,768	2,746	10,790	0.021
Yakutat	1 - 100	17	10	0.35	581	0	1,198	0.033
	101 - 200	29	24	1.00	2,941	716	5,166	0.020
	201 - 300	17	10	3.18	1,642	0	4,002	0.026
	301 - 500	5	2	0.25	66	0	209	0.037
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	46	0.95	5,230	2,071	8,389	0.023
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	3	0.04	47	0	148	0.037
	201 - 300	10	4	0.09	46	0	148	0.030
	301 - 500	8	1	0.01	4	0	17	0.027
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	8	0.04	96	0	228	0.033
All areas	1 - 100	200	37	0.10	1,333	391	2,276	0.031
	101 - 200	223	87	0.88	10,822	5,833	15,810	0.021
	201 - 300	76	39	1.29	4,633	2,087	7,179	0.027
	301 - 500	26	3	0.06	70	0	214	0.037
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	166	0.55	16,859	11,281	22,437	0.023

Table 80. -- Catch per unit of effort by stratum for eulachon sorted by descending CPUE for the 2017 Gulf of Alaska bottom trawl survey.

INPFC area	Depth range	Stratum name	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower CI biomass	Upper CI biomass
Kodiak	201 - 300	Upper Shelikof Gully	3	3	4.23	1,357	175	2,539
Chirikof	101 - 200	Shelikof Edge	23	16	3.99	3,087	523	5,650
Yakutat	201 - 300	Yakutat Gullies	7	7	3.93	1,196	0	3,473
Yakutat	201 - 300	Yakutat Slope	10	3	2.09	446	0	1,411
Kodiak	1 - 100	Northern Kodiak Shallows	6	4	2.05	451	0	1,276
Kodiak	101 - 200	Barren Islands	15	10	2.02	2,215	0	5,597
Yakutat	101 - 200	Yakutat Flats	7	6	1.85	1,667	0	3,904
Chirikof	201 - 300	Lower Shelikof Gully	9	9	1.23	1,236	0	2,521
Kodiak	101 - 200	Portlock Flats	25	5	1.23	902	0	2,673
Yakutat	101 - 200	Yakataga Shelf	6	6	0.94	495	239	750
Kodiak	101 - 200	Albatross Gullies	22	5	0.66	524	0	1,372
Kodiak	101 - 200	Kenai Flats	11	8	0.66	791	0	1,647
Yakutat	101 - 200	Fairweather Shelf	9	7	0.63	487	111	864
Yakutat	301 - 500	Yakutat Gullies	2	2	0.60	66	0	488
Yakutat	1 - 100	Yakutat Shallows	10	6	0.55	545	0	1,169
Kodiak	201 - 300	Kenai Gullies	11	10	0.47	311	10	613
Yakutat	101 - 200	Middleton Shelf	7	5	0.40	292	12	571
Kodiak	201 - 300	Kodiak Slope	6	2	0.25	40	0	142
Chirikof	101 - 200	East Shumagin Gully	15	8	0.25	273	0	552
Chirikof	1 - 100	Upper Alaska Peninsula	12	6	0.14	112	0	311
Kodiak	1 - 100	Kenai Peninsula	7	4	0.12	62	0	171
Kodiak	1 - 100	Albatross Shallows	13	4	0.12	68	0	175
Southeastern	201 - 300	Prince of Wales Slope/Gullie	6	3	0.11	44	0	152
Shumagin	101 - 200	West Shumagin Gully	3	3	0.11	25	0	96
Southeastern	101 - 200	Prince of Wales Shelf	9	2	0.07	46	0	150
Yakutat	1 - 100	Middleton Shallows	7	4	0.05	36	0	87
Kodiak	101 - 200	Kodiak Outer Shelf	17	4	0.04	19	0	50
Kodiak	1 - 100	Lower Cook Inlet	10	3	0.03	27	0	72
Chirikof	1 - 100	Chirikof Bank	19	2	0.02	25	0	75
Southeastern	301 - 500	Southeastern Deep Gullies	3	1	0.02	4	0	22
Southeastern	201 - 300	Baranof-Chichagof Slope	4	1	0.02	2	0	7
Shumagin	1 - 100	Lower Alaska Peninsula	14	2	0.01	7	0	18
Chirikof	201 - 300	Chirikof Slope	7	1	0.01	2	0	5
Kodiak	1 - 100	Albatross Banks	25	1	0.00	1	0	3
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	1	0.00	1	0	2
Shumagin	101 - 200	Sanak Gully	4	1	0.00	0	0	1
Shumagin	1 - 100	Shumagin Bank	25	1	0.00	0	0	1

Table 81. -- Number of survey hauls, number of hauls with Pacific hake, mean CPUE, biomass, and mean weight, based on the 2017 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	74	0	---	---	---	---	---
	101 - 200	32	0	---	---	---	---	---
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	0	---	---	---	---	---
Chirikof	1 - 100	41	0	---	---	---	---	---
	101 - 200	54	0	---	---	---	---	---
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	0	---	---	---	---	---
Kodiak	1 - 100	61	0	---	---	---	---	---
	101 - 200	90	0	---	---	---	---	---
	201 - 300	20	1	<0.01	1	---	---	0.066
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	1	<0.01	1	---	---	0.066
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	1	<0.01	4	0	13	0.090
	201 - 300	17	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	1	<0.01	4	0	13	0.090
Southeastern	1 - 100	7	0	---	---	---	---	---
	101 - 200	18	0	---	---	---	---	---
	201 - 300	10	0	---	---	---	---	---
	301 - 500	8	5	1.56	485	0	1,163	1.925
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	5	0.18	485	0	1,163	1.925
All areas	1 - 100	200	0	---	---	---	---	---
	101 - 200	223	1	<0.01	4	0	13	0.090
	201 - 300	76	1	<0.01	1	---	---	0.066
	301 - 500	26	5	0.38	485	0	1,163	1.925
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	7	0.02	490	0	1,168	1.547

Table 82. -- Catch per unit of effort by stratum for Pacific hake sorted by descending CPUE for the 2017 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 Deep Gullies	3	2	1.57	367	0	1,191
Southeastern	301 - 500	Southeastern Slope	5	3	1.52	117	0	378
Yakutat	101 - 200	Middleton Shelf	7	1	0.01	4	0	14
Kodiak	201 - 300	Kenai Gullies	11	1	0.00	1	0	5

Table 83. -- Number of survey hauls, number of hauls with spiny dogfish, mean CPUE, biomass, and mean weight, based on the 2017 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	74	0	---	---	---	---	---
	101 - 200	32	0	---	---	---	---	---
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	125	0	---	---	---	---	---
Chirikof	1 - 100	41	4	42	1,094	0	2,946	2.940
	101 - 200	54	1	1	32	0	100	2.362
	201 - 300	16	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	3	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	118	5	17	1,126	0	2,980	2.920
Kodiak	1 - 100	61	27	553	21,317	7,381	35,253	2.661
	101 - 200	90	29	108	4,683	2,685	6,681	2.710
	201 - 300	20	2	23	259	0	694	2.162
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	178	58	268	26,259	12,177	40,342	2.663
Yakutat	1 - 100	17	11	596	9,937	0	21,886	2.061
	101 - 200	29	20	496	14,564	3,206	25,923	2.512
	201 - 300	17	4	29	149	0	326	1.924
	301 - 500	5	1	13	34	0	180	1.694
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	70	36	446	24,684	9,247	40,120	2.304
Southeastern	1 - 100	7	1	151	987	0	3,320	2.187
	101 - 200	18	7	64	707	0	1,560	1.946
	201 - 300	10	3	26	132	0	304	1.877
	301 - 500	8	2	27	85	0	338	2.198
	501 - 700	2	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	45	13	71	1,910	0	4,311	2.069
All areas	1 - 100	200	43	258	33,334	15,594	51,074	2.441
	101 - 200	223	57	163	19,986	8,392	31,580	2.529
	201 - 300	76	9	15	540	58	1,023	2.018
	301 - 500	26	3	9	119	0	394	2.025
	501 - 700	11	0	---	---	---	---	---
	701 - 1000	0	0	---	---	---	---	---
	All depths	536	112	175	53,979	33,350	74,607	2.467

Table 84. -- Catch per unit of effort by stratum for spiny dogifish sorted by descending CPUE for the 2017 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	Yakutat Shallows	10	7	9.08	9,031	0	21,125
Kodiak	1 - 100	Lower Cook Inlet	10	7	8.31	8,218	0	16,648
Yakutat	101 - 200	Fairweather Shelf	9	7	7.93	6,128	594	11,662
Kodiak	1 - 100	Albatross Banks	25	15	7.03	10,833	0	22,096
Yakutat	101 - 200	Yakutat Flats	7	4	6.37	5,748	0	16,453
Yakutat	101 - 200	Yakataga Shelf	6	6	4.64	2,446	0	5,105
Kodiak	1 - 100	Kenai Peninsula	7	1	3.18	1,674	0	5,772
Kodiak	101 - 200	Albatross Gullies	22	9	2.05	1,618	357	2,880
Kodiak	101 - 200	Barren Islands	15	10	2.02	2,221	693	3,750
Southeastern	1 - 100	Southeastern Shallows	7	1	1.51	987	0	3,401
Yakutat	1 - 100	Middleton Shallows	7	4	1.35	906	0	1,948
Chirikof	1 - 100	Upper Alaska Peninsula	12	1	1.06	843	0	2,699
Kodiak	1 - 100	Albatross Shallows	13	4	1.03	592	0	1,301
Southeastern	101 - 200	Prince of Wales Shelf	9	3	0.92	635	0	1,502
Yakutat	201 - 300	Yakutat Gullies	7	3	0.44	134	0	314
Kodiak	101 - 200	Kenai Flats	11	4	0.41	492	0	986
Kodiak	201 - 300	Kenai Gullies	11	2	0.39	259	0	699
Southeastern	201 - 300	Baranof-Chichagof Slope	4	1	0.39	44	0	182
Southeastern	301 - 500	Southeastern Deep Gullies	3	1	0.34	79	0	421
Kodiak	101 - 200	Portlock Flats	25	3	0.33	243	0	530
Yakutat	101 - 200	Middleton Shelf	7	3	0.33	242	0	619
Yakutat	301 - 500	Yakutat Gullies	2	1	0.31	34	0	465
Chirikof	1 - 100	Chirikof Bank	19	3	0.23	250	0	579
Southeastern	201 - 300	Prince of Wales Slope/Gullie	6	2	0.23	89	0	238
Kodiak	101 - 200	Kodiak Outer Shelf	17	3	0.22	109	0	234
Southeastern	101 - 200	Baranof-Chichagof Shelf	9	4	0.17	72	2	142
Yakutat	201 - 300	Yakutat Slope	10	1	0.07	15	0	48
Southeastern	301 - 500	Southeastern Slope	5	1	0.07	5	0	19
Chirikof	101 - 200	Chirikof Outer Shelf	16	1	0.06	32	0	100

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APPENDIX A

Stratum Specifications and Locations

Appendix Table A-1 presents the survey stratum definitions for the 2017 Gulf of Alaska biennial bottom trawl survey including depth range, stratum name, and stratum area in square nautical miles and square kilometers. Appendix Table A-2 presents the summary stratum 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 2017 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**

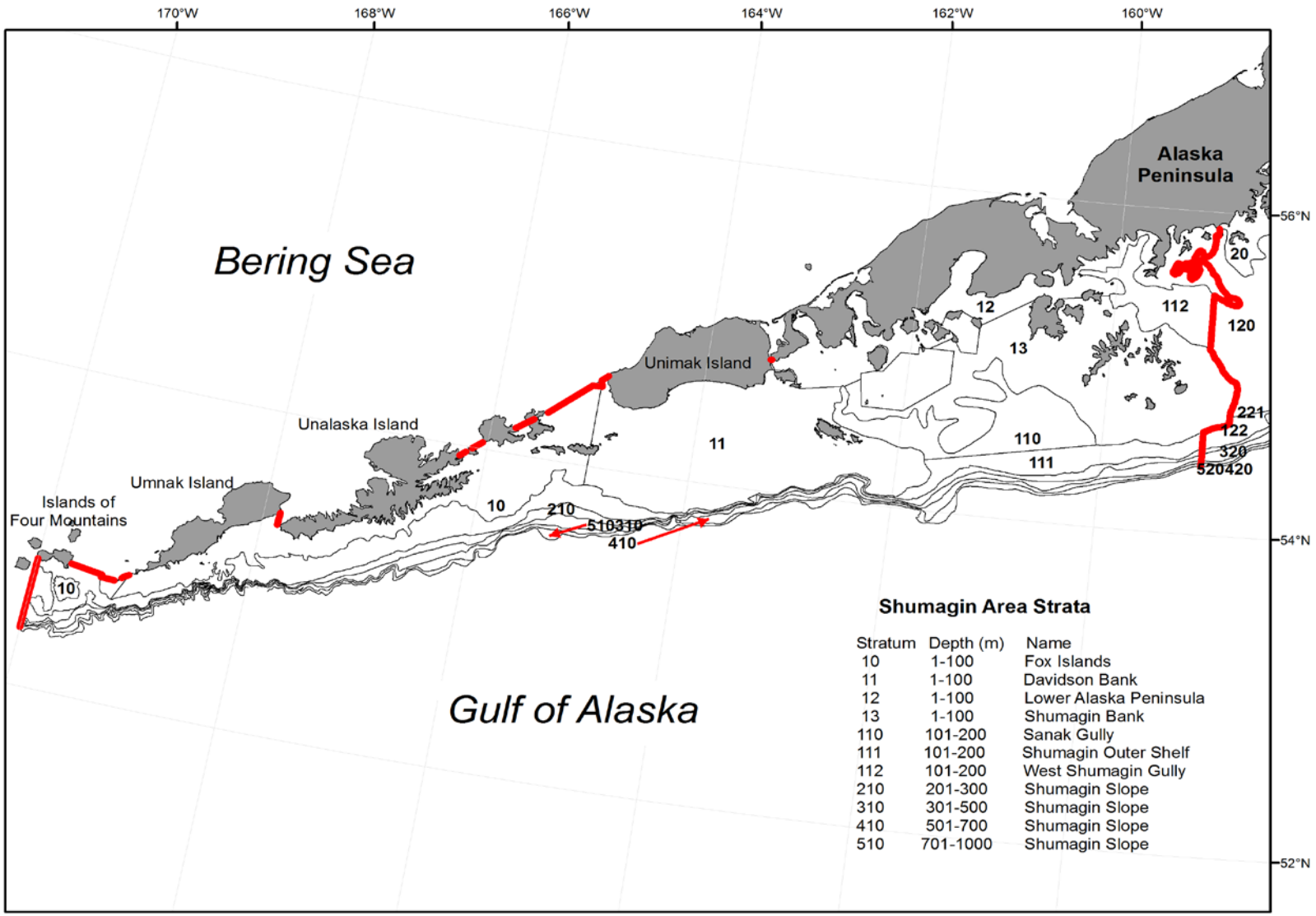
Appendix Table A-1. - Continued.

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**
1 – 700	**999**	**Grand Total**	**89,930**	**308,416**

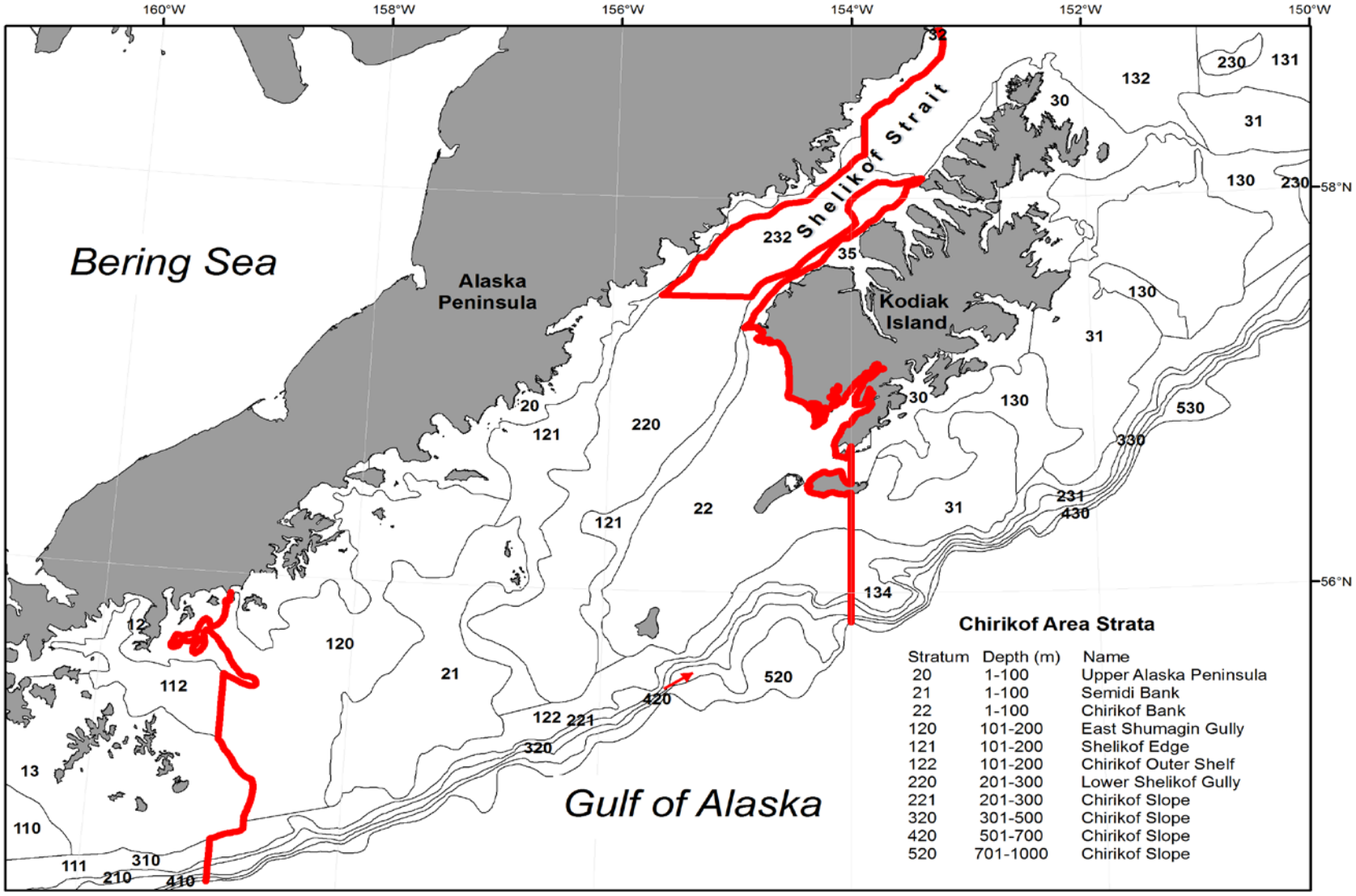
Appendix Table A-2. -- Summary codes used for the 2017 Gulf of Alaska biennial bottom trawl survey including depth range, International North Pacific Fisheries Commission statistical areas, their square areas, and strata included in the summary area.

Summary code number	Depth range (m)	INPFC area	Area (nmi^2)	Area (km^2)	Strata included
911	1 - 100	**Shumagin**	12,039	41,289	10 -13
912	101 - 200		4,280	14,677	110 - 112
913	201 - 300		813	2,788	210
914	301 - 500		738	2,531	310
915	501 - 700		585	2,006	410
919	1 -700		18,455	63,291	
921	1 - 100	**Chirikof**	7,591	26,035	20-22
922	101 - 200		6,954	23,850	120-122
923	201 - 300		3,350	11,490	230, 231
924	301 - 500		468	1,604	320
925	501 - 700		570	1,953	420
929	1 -700		18,933	64,932	
931	1 - 100	**Kodiak**	11,230	38,516	30 - 33, 35
932	101 - 200		12,634	43,332	130 - 134
933	201 - 300		3,350	11,490	230 - 232
934	301 - 500		849	2,912	330
935	501 - 700		509	1,745	430
939	1 -700		28,572	97,995	

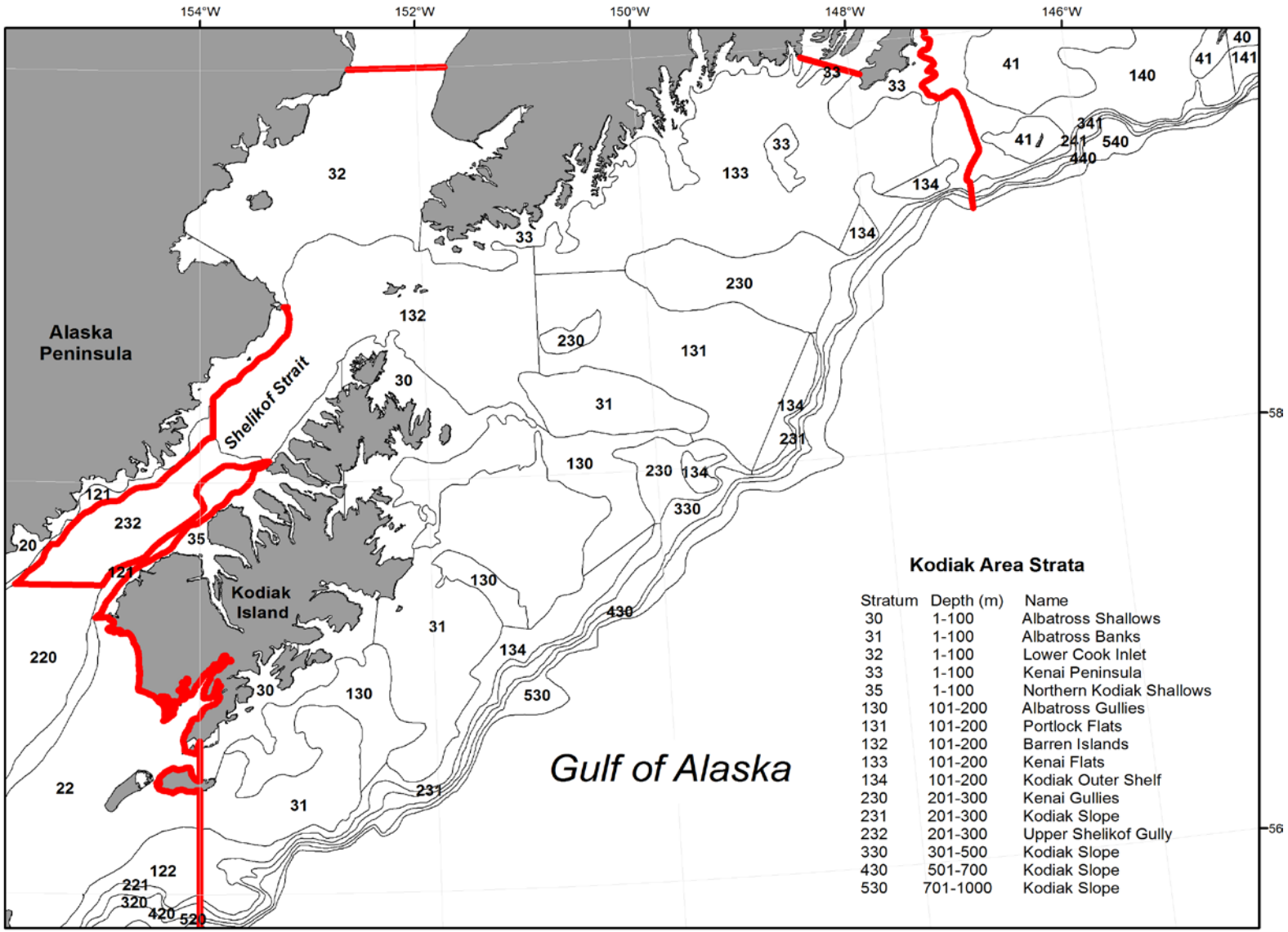
Summary code number	Depth range (m)	INPFC area	Area (nmi^2)	Area (km^2)	Strata included
941	1- 100	**Yakutat**	4,858	16,661	240, 241
942	101 - 200		8,568	29,383	140 – 143
943	201 - 300		1,507	5,170	240, 241
944	301 - 500		766	2,628	340, 341
945	501 - 700		428	1,469	440
949	1 -700		16,127	55,311	
951	1 - 100	**Southeastern**	1,909	6,546	50
952	101 - 200		3,232	11,084	150, 151
953	201 - 300		1,473	5,052	250, 251
954	301 - 500		909	3,117	350, 351
955	501 - 700		301	1,033	450
959	1 - 700		7,824	26,833	
999	1 – 700	**All Areas**	89,930	308,416	



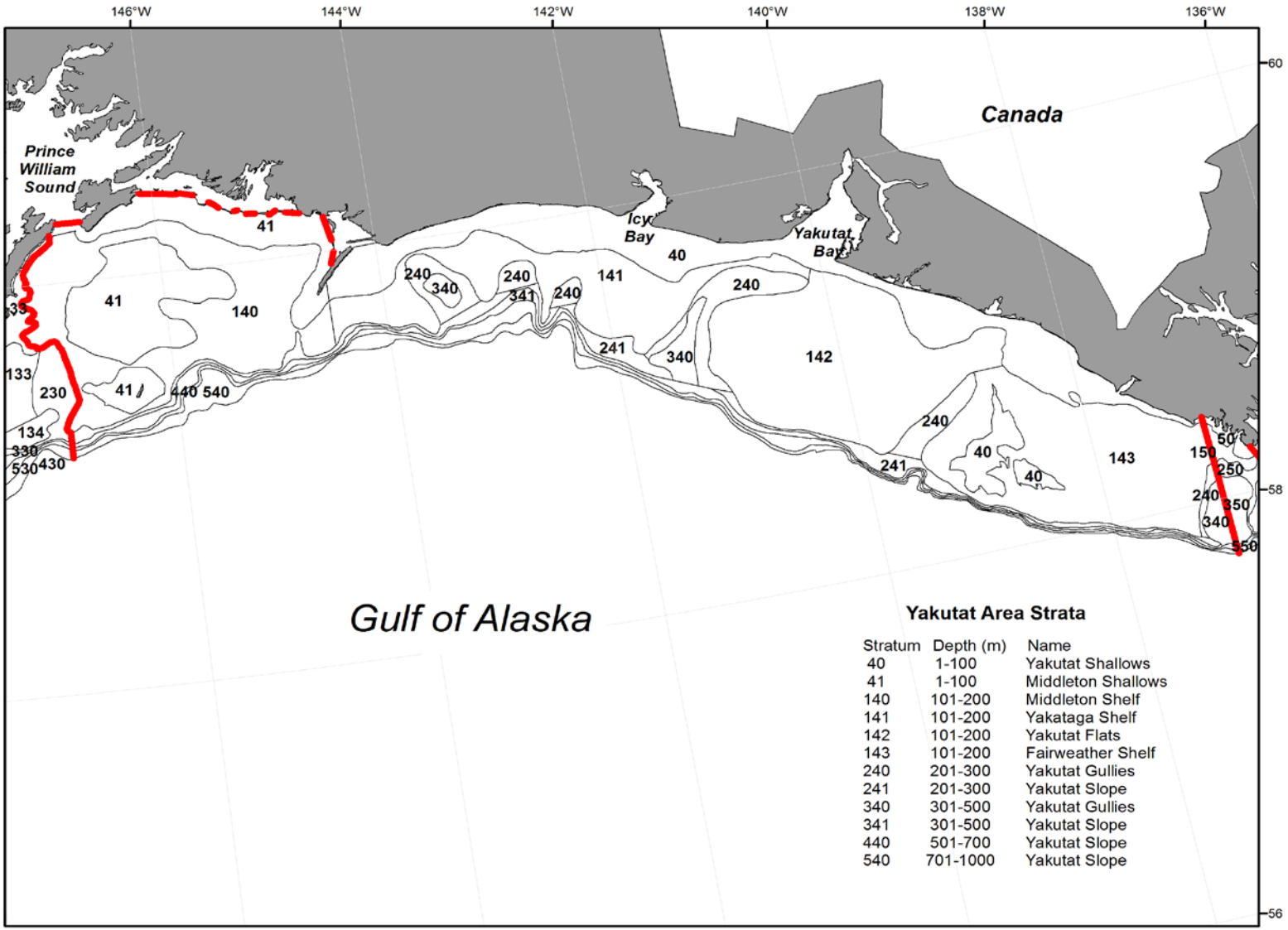
Appendix Figure A-1.--Survey strata in the Shumagin INPFC statistical area used for the 2017 Gulf of Alaska bottom trawl survey.



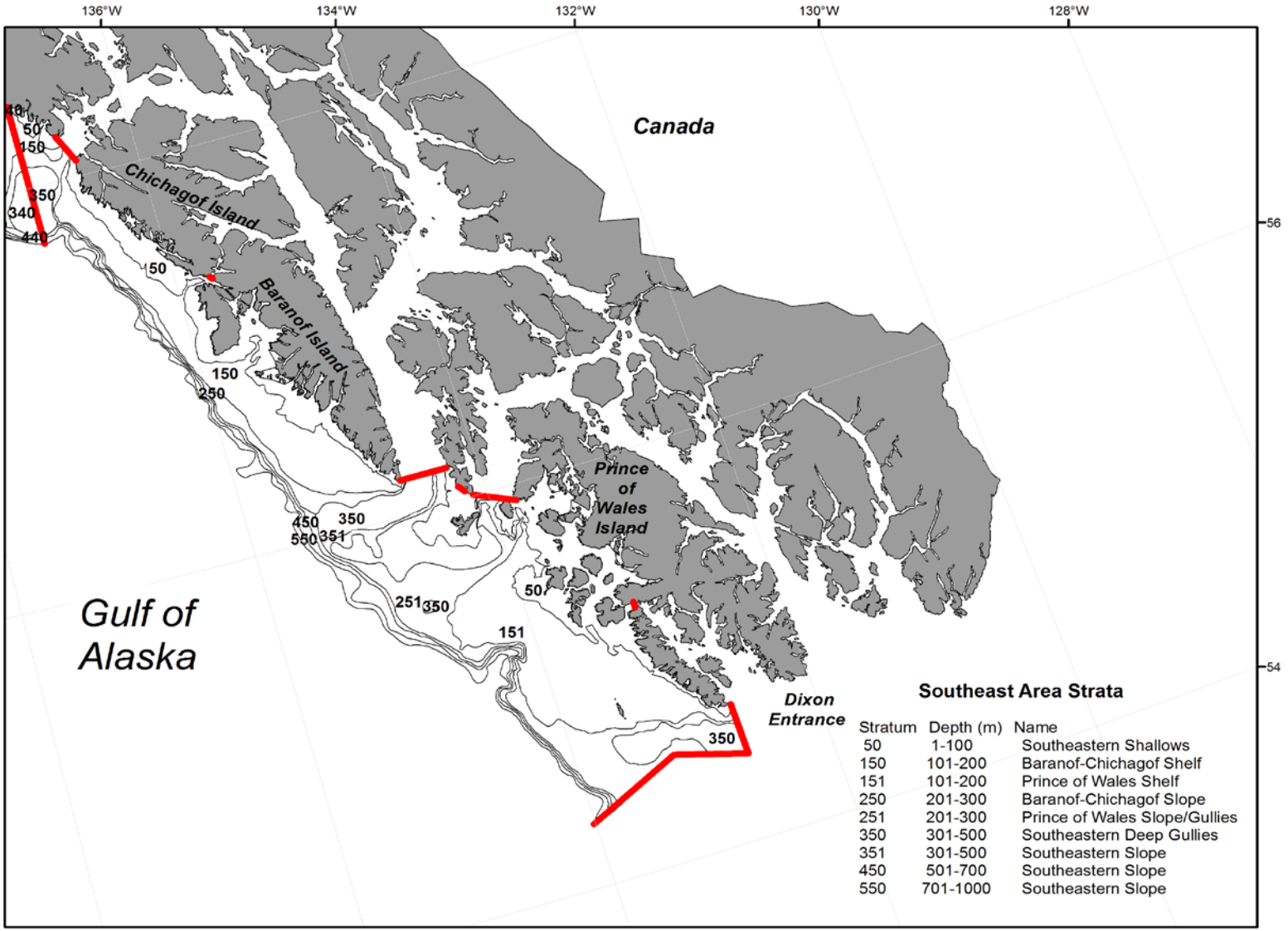
Appendix A Figure A-2.—Survey strata in the Chirikof INPFC statistical area used for the 2017 Gulf of Alaska bottom trawl survey.



Appendix Figure A-3.--Survey strata in the Kodiak INPFC statistical area used for the 2017 Gulf of Alaska bottom trawl survey.



Appendix A Figure A-4.—Survey strata in the Yakutat INPFC statistical area used for the 2017 Gulf of Alaska bottom trawl survey.



Appendix Figure A-5.--Survey strata in the Southeast INPFC statistical area used for the 2017 Gulf of Alaska bottom trawl survey.

APPENDIX B

Fish and Invertebrate Taxa Encountered

Appendix Tables B-1 and B-2 list fish and invertebrate taxa encountered and identified during the 2017 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 2017 Gulf of Alaska bottom trawl survey.

Family	Species Name	Common Name
Petromyzontidae	*Lampetra tridentata*	Pacific lamprey
Chimaeridae	*Hydrolagus colliei*	spotted ratfish
Squalidae	*Squalus suckleyi*	spiny dogfish
	Somniosus pacificus	Pacific sleeper shark
Rajidae	*Beringraja binoculata*	big skate
	Bathyraja interrupta	Bering skate
	Raja rhina	longnose skate
	Bathyraja trachura	roughtail skate
	Bathyraja parmifera	Alaska skate
	Bathyraja aleutica	Aleutian skate
	Bathyraja maculata	whiteblotched skate
Nemichthyidae	Nemichthyidae	snipe eel unid.
Clupeidae	*Clupea pallasii*	Pacific herring
Argentinidae	*Nansenia candida*	bluethroat argentine
Bathylagidae	*Bathylagus pacificus*	Pacific blacksmelt
	Bathylagus milleri	robust blacksmelt
	Leuroglossus schmidti	northern smoothtongue
	Bathylagus ochotensis	popeye blacksmelt
Osmeridae	*Thaleichthys pacificus*	eulachon
	Mallotus villosus	capelin
	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
Paralepidae	*Magnisudis atlantica*	duckbill barracudina
Melanostomiidae	*Tactostoma macropus*	longfin dragonfish
Chauliodontidae	Chauliodontinae	viperfish unid.
	Chauliodus macouni	Pacific viperfish
Malacosteidae	Malacosteinae	loosejaw unid.
Myctophidae	Myctophidae	lanternfish unid.
	Stenobrachius sp.	
	Stenobrachius leucopsarus	northern lampfish
	Diaphus theta	California headlightfish
	Nannobrachium regale	pinpoint lampfish
	Lampanyctus sp.	

	Lampanyctus jordani	brokenline lampfish
Macrouridae	*Coryphaenoides acrolepis*	Pacific grenadier
	Coryphaenoides 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
	Gadus chalcogrammus	walleye pollock
Oneirodidae	*Oneirodes* sp.	
Melamphaeidae	*Poromitra curilensis*	crested bigscale
Scorpaenidae	*Sebastolobus alascanus*	shortspine thornyhead
	Sebastolobus macrochir	broadfin thornyhead
	Sebastolobus altivelis	longspine thornyhead
	Sebastes sp.	rockfish unid.
	Sebastes aleutianus	rougheye rockfish
	Sebastes melanostictus	blackspotted rockfish
	Sebastes alutus	Pacific ocean perch
	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 melanostomus	blackgill rockfish
	Sebastes paucispinis	bocaccio
	Sebastes pinniger	canary rockfish
	Sebastes polyspinis	northern rockfish
	Sebastes proriger	redstripe rockfish
	Sebastes ruberrimus	yelloweye rockfish
	Sebastes babcocki	redbanded rockfish
	Sebastes variegatus	harlequin rockfish
	Sebastes zacentrus	sharpchin rockfish
	Sebastes borealis	shortraker rockfish
	Sebastes reedi	yellowmouth rockfish
	Sebastes	white spotted red rockfish unid.
Anoplopomatidae	*Anoplopoma fimbria*	sablefish

Hexagrammidae	*Ophiodon elongatus*	lingcod
	Pleurogrammus monopterygius	Atka mackerel
	Hexagrammos stelleri	whitespotted greenling
	Hexagrammos lagocephalus	rock greenling
	Hexagrammos decagrammus	kelp greenling
Cottidae	Cottidae	sculpin unid.
	Icelinus filamentosus	threadfin sculpin
	Icelinus borealis	northern sculpin
	Gymnocanthus pistilliger	threaded sculpin
	Gymnocanthus galeatus	armorhead sculpin
	Radulinus asprellus	slim sculpin
	Malacocottus zonurus	darkfin sculpin
	Hemilepidotus zapus	longfin Irish lord
	Hemilepidotus hemilepidotus	red Irish lord
	Hemilepidotus jordani	yellow Irish lord
	Triglops forficata	scissortail sculpin
	Triglops scepticus	spectacled sculpin
	Triglops macellus	roughspine sculpin
	Chitonotus pugetensis	roughback sculpin
	Myoxocephalus polyacanthocephalus	great sculpin
	Myoxocephalus jaok	plain sculpin
	Leptocottus armatus	Pacific staghorn sculpin
	Dasycottus setiger	spinyhead sculpin
	Hemitripterus bolini	bigmouth sculpin
	Icelus spiniger	thorny sculpin
	Icelus uncinalis	uncinate sculpin
Agonidae	*Leptagonus leptorhynchus*	longnose poacher
	Leptagonus frenatus	sawback poacher
	Odontopyxis trispinosa	pygmy poacher
	Bathyagonus alascanus	gray starsnout
	Bathyagonus infraspinatus	spinycheek starsnout
	Bathyagonus pentacanthus	bigeye poacher
	Bathyagonus nigripinnis	blackfin poacher
	Podothecus accipenserinus	sturgeon poacher
	Podothecus veternus	veteran poacher
Cyclopteridae	*Aptocyclus ventricosus*	smooth lumpsucker
	Eumicrotremus orbis	Pacific spiny lumpsucker
	Eumicrotremus gyrinops	Alaskan lumpsucker
	Eumicrotremus phrynoides	toad lumpsucker
	Liparidae	snailfish unid.
	Liparis sp.	
	Liparis pulchellus	showy snailfish
	Careproctus sp.	

	Careproctus melanurus	blacktail snailfish
	Careproctus gilberti	smalldisk snailfish
	Careproctus sp. cf. *gilberti*	dominator snailfish
	Paraliparis dactylosus	red snailfish
	Paraliparis sp.	bluntnose snailfish
	Paraliparis adustus	brown snailfish
Bathymasteridae	*Bathymaster signatus*	searcher
Zoarcidae	*Bothrocara pusillum*	Alaska eelpout
	Bothrocara zestum	western eelpout
	Lycenchelys crotalinus	snakehead eelpout
	Lycodes sp.	
	Lycodes palearis	wattled eelpout
	Lycodes brevipes	shortfin eelpout
	Lycodes beringi	Bering eelpout
	Lycodes pacificus	blackbelly eelpout
	Lycodapus sp.	
Icosteidae	*Icosteus aenigmaticus*	ragfish
Caristiidae	*Caristius macropus*	manefish
Stichaeidae	Stichaeidae	prickleback unid.
	Lumpenus maculatus	daubed shanny
	Lumpenus sagitta	snake prickleback
	Lumpenella longirostris	longsnout prickleback
	Chirolophis sp.	
	Chirolophis decoratus	decorated warbonnet
	Poroclinus rothrocki	whitebarred prickleback
Cryptacanthodidae	*Cryptacanthodes aleutensis*	dwarf wrymouth
	Cryptacanthodes giganteus	giant wrymouth
Anarhichadidae	*Anarrhichthys ocellatus*	wolf-eel
	Anarhichas orientalis	Bering wolffish
Zaproridae	*Zaprora silenus*	prowfish
Trichodontidae	*Trichodon trichodon*	Pacific sandfish
Ammodytidae	*Ammodytes personatus*	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
Platichthys stellatus X *Pleuronectes quadrituberculatus* hybrid	hybrid starry flounder X Alaska plaice
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. – Invertebrates encountered during the 2017 Gulf of Alaska bottom trawl survey.

Phylum	Species Name	Common Name
Porifera	Porifera	sponge unid.
	Demospongiae	
	Suberites sp.	
	Suberites domuncula	hermit sponge
	Aphrocallistes vastus	clay pipe sponge
	Mycale sp.	
	Mycale loveni	tree sponge
	Geodia sp.	
	Geodia mesotriaena	soccer ball sponge
	Acanthascus sp.	
	Halichondria panicea	barrel sponge
	Leucandra heathi	spiny vase sponge
	Rhabdocalyptus sp.	cloud sponge
	Mycale bellabellensis	lampshade sponge
	Stelodoryx oxeata	scapula sponge
	Semisuberites cribrosa	cat-o-nine-tails sponge
	Crella brunnea	soft brown sponge
	Echinoclathria beringensis	hat sponge
	Axinella blanca	firm finger sponge
	Histodermella kagigunensis	spud sponge
	Tedania kagalaskai	club sponge
	Monanchora pulchra	yellow leafy sponge
	Tethya sp.	ball sponge
	Polymastia sp.	
	Polymastia pacifica	orange nipple-ball sponge
	Mycale carlilei	trumpet sponge
	Isodictya rigida	soft finger sponge
	Cladocroce attu	rough hat sponge
	Esperiopsis flagrum	cheesestick sponge
	Mycale tylota	slimy kelp sponge
	Phorbas paucistylifer	
	Acanthascus sp. A	angel-hair vase sponge
	Stelletta sp.	stone sponge
	Polymastia fluegeli	Flugel nippled sponge
	Polymastia sp. A	prolific nipple sponge
	Vulcanella sp. 1	fuzzy cratered sponge
	Tentorium semisuberites	two nipple sponge
	Craniella villosa	tennis ball sponge

	Tedania sp.	
	Latrunculia sp.	
	Latrunculia oparinae	green papillate sponge
	Hymeniacidon assimilis	
	Axinella sp.	firm gray sponge
	Halichondria oblonga	ginseng sponge
	Cornulum clathriata	lattice sponge
	Chondrocladia concrescens	lobed tree sponge
	Halichondria sitiens	
	Hexactinellida	glass sponge unid.
	Geodinella lendenfeldi	calcareous finger sponge
	Aulosaccus schulzei	vase sponge
	Farrea sp.	
	Craniella sp.	puffball sponges
	Craniella sputnika	spiky ball sponge
	Craniella sigmoancoratum	spiny ball sponge
Cnidaria	Hydroidolina	hydroid unid.
	Bonneviella sp. A	champagne flute hydroid
	Bonneviella sp.	
	Aglaophenia sp.	
	Abietinaria sp.	
	Abietinaria greenei	bushy white hydroid
	Scyphozoa	jellyfish unid.
	Periphylla periphylla	helmet jelly
	Chrysaora melanaster	
	Phacellophora camtschatica	egg yolk jelly
	Aequorea sp.	
	Atolla sp.	
	Aurelia labiata	
	Chrysaora fuscescens	sea nettle
	Aurelia limbata	brown rimmed jelly
	Cyanea capillata	lion's mane
	Gersemia sp.	sea raspberry
	Anthomastus sp.	
	Anthomastus sp. A	red anthomastus
	Primnoa sp.	
	Primnoa pacifica	
	Chrysopathes speciosa	
	Paragorgia arborea	Kamchatka coral
	Calcigorgia spiculifera	
	Pennatulacea	sea pen or sea whip unid.
	Virgulariidae	sea whip unid.
	Protoptilum sp.	

	Halipteris sp.	
	Halipteris sp. A	maroon sea whip
	Halipteris willemoesi	
	Ptilosarcus gurneyi	orange sea pen
	Anthoptilum murrayi	Murray sea pen
	Actiniaria	sea anemone unid.
	Actinauge verrilli	reticulate anemone
	Actinostola faeculenta	rough purple sea anemone
	Actinoscyphia sp.	
	Metridium sp.	
	Metridium farcimen	gigantic anemone
	Stomphia sp.	
	Stomphia coccinea	swimming anemone
	Urticina crassicornis	mottled anemone
	Urticina columbiana	crusty red anemone
	Zoanthidae sp. A	hot dog zoanthid
	Cribrinopsis fernaldi	chevron-tentacled anemone
	Liponema brevicorne	tentacle-shedding anemone
	Actinostola sp.	
	Actinostola sp. A	
	Actinostola sp. B	
	Crispatotrochus foxi	cup coral
	Stylaster sp.	
	Crypthelia sp.	
	Cyclohelia lamellata	
	Plumarella sp.	
	Plumarella superba	bushy coral
	Isididae	bamboo coral unid.
	Keratoisis sp.	nodal bamboo coral unid.
	Fanellia compressa	
	Fanellia fraseri	
	Muriceides nigra	
	Plumarella sp. A	pale Plumarella
	Primnoa wingi	
	Arthrogorgia otsukai	
Ctenophora	Ctenophora	comb jelly unid.
Annelida	Polychaeta	polychaete worm unid.
	Eunice valens	iridescent tubeworm
	Aphroditidae	sea mouse unid.
	Aphrodita negligens	
	Cheilonereis cyclurus	red and white banded sea nymph
	Polynoidae	scale worm unid.
	Eunoe sp.	

	Serpula columbiana	red trumpet calcareous tubeworm
	Hirudinea	leech unid.
Annelida	*Notostomum cyclostomum*	striped sea leech
Arthropoda	Isopoda	isopod unid.
	Rocinela angustata	sea cockroach
	Thoracica	barnacle unid.
	Balanus sp.	
	Chirona evermanni	giant barnacle
	Balanus nubilus	
	Pandalus sp.	
	Pandalus danae	dock shrimp
	Pandalus jordani	ocean shrimp
	Pandalus eous	Alaskan pink shrimp
	Pandalus tridens	yellowleg pandalid
	Pandalus platyceros	spot shrimp
	Pandalus hypsinotus	coonstripe shrimp
	Pandalopsis longirostris	northern longbeak
	Pandalopsis dispar	sidestripe shrimp
	Hippolytidae	hippolytid shrimp unid.
	Eualus barbatus	barbed eualid
	Eualus biunguis	deepsea eualid
	Eualus suckleyi	shortscale eualid
	Lebbeus groenlandicus	spiny lebbeid
	Crangon sp.	
	Crangon abyssorum	abyssal Crangon
	Crangon alaskensis	shell shrimp
	Crangon communis	twospine Crangon
	Crangon dalli	ridged Crangon
	Argis sp.	
	Argis dentata	Arctic argid
	Argis lar	kuro argid
	Argis levior	Nelson argid
	Argis ovifer	split-eye argid
	Pasiphaea pacifica	Pacific glass shrimp
	Pasiphaea tarda	crimson pasiphaeid
	Cancer sp.	cancer crab unid.
	Cancer magister	Dungeness crab
	Cancer oregonensis	Oregon rock crab
	Oregonia sp.	
	Oregonia bifurca	split-nose decorator crab
	Oregonia gracilis	graceful decorator crab
	Chorilia longipes	longhorned decorator crab
	Chionoecetes tanneri	grooved Tanner crab

	Chionoecetes bairdi	Tanner crab
	Hyas coarctatus	circumboreal toad crab
	Hyas lyratus	Pacific lyre crab
	Chionoecetes opilio	snow crab
	Paguridae	hermit crab unid.
	Pagurus sp.	
	Pagurus armatus	blackeyed hermit
	Pagurus brandti	sponge hermit
	Pagurus townsendi	Townsend hermit crab
	Pagurus aleuticus	Aleutian hermit
	Labidochirus splendescens	splendid hermit
	Pagurus confragosus	knobbyhand hermit
	Pagurus caurinus	greenmark hermit
	Pagurus cornutus	hornyhand hermit
	Pagurus dalli	whiteknee hermit
	Pagurus kennerlyi	bluespine hermit
	Pagurus trigonocheirus	fuzzy hermit crab
	Pagurus ochotensis	Alaskan hermit
	Pagurus rathbuni	longfinger hermit
	Pagurus setosus	setose hermit
	Pagurus tanneri	longhand hermit
	Elassochirus tenuimanus	widehand hermit crab
	Pagurus capillatus	hairy hermit crab
	Elassochirus cavimanus	purple hermit
	Elassochirus gilli	Pacific red hermit
	Lithodidae	stone crab unid.
	Lopholithodes foraminatus	brown box crab
	Lopholithodes mandtii	red box crab
	Acantholithodes hispidus	fuzzy crab
	Lithodes couesi	scarlet king crab
	Lithodes aequispinus	golden king crab
	Rhinolithodes wosnessenskii	rhinoceros crab
	Phyllolithodes papillosus	flatspine triangle crab
	Paralithodes camtschaticus	red king crab
	Paralomis sp. A	spiny spider crab
	Placetron wosnessenskii	scaled crab
	Munida quadrispina	pinchbug
	Pycnogonida	sea spider unid.
Nemertea	*Emplectonema* sp.	black specked ribbon worm
Sipuncula	Sipuncula	peanut worm unid.
	Phascolosomatidae	
Mollusca	*Neomenia* sp.	
	Polyplacophora	chiton unid.

Placiphorella pacifica	
Leptochiton sp.	
Nudibranchia	nudibranch unid.
Tochuina tetraquetra	giant orange tochui
Tritonia sp.	
Tritonia festiva	festive Tritonia
Tritonia diomedea	rosy Tritonia
Armina californica	California Armina
Chlamylla sp.	
Anisodoris lentiginosa	mottled pale sea-lemon
Dorididae	dorid nudibranch unid.
Archidoris odhneri	white night doris
Cranopsis major	great puncturella
Gastropoda	snail unid.
Naticidae	moonsnail
Cryptonatica sp.	
Cryptonatica affinis	Arctic moonsnail
Cryptonatica russa	rusty moonsnail
Nucella lamellosa	frilled dogwinkle
Euspira sp.	
Lamellaria sp.	
Onchidiopsis brevipes	
Colus sp.	
Japelion aleutica	
Japelion sp. A	
Pyrulofusus sp.	
Pyrulofusus dexius	
Pyrulofusus harpa	left-hand whelk
Volutopsius sp.	
Volutopsius filosus	threaded whelk
Beringius sp.	
Beringius undatus	
Beringius sp. A	Baxter Beringius
Beringius sp. G	
Beringius rotundus	rotund whelk
Neptunea sp.	
Neptunea amianta	white neptune
Neptunea lyrata	lyre whelk
Plicifusus sp.	
Plicifusus virens	
Boreotrophon sp.	
Boreotrophon pacificus	
Fusitriton oregonensis	Oregon triton

Calliostoma titanium	
Calliotropis carlotta	
Cidarina cidaris	
Buccinum sp.	
Buccinum oedematum	swollen whelk
Buccinum viridum	turban whelk
Buccinum plectrum	sinuous whelk
Buccinum aleuticum	Aleut whelk
Arctomelon sp.	
Arctomelon stearnsii	Alaska volute
Bivalvia	bivalve unid.
Modiolus modiolus	northern horsemussel
Chlamys sp.	
Chlamys albida	white scallop
Patinopecten caurinus	weathervane scallop
Yoldia sp.	
Yoldia seminuda	crisscrossed Yoldia
Yoldia hyperborea	northern Yoldia
Limopsis akutanica	Akutan limops
Empleconia vaginata	vaginated limops
Astarte elliptica	elliptical Astarte
Astarte montagui	
Clinocardium sp.	
Clinocardium nuttallii	Nuttall cockle
Clinocardium ciliatum	hairy cockle
Saxidomus gigantea	butter clam
Macoma sp.	
Serripes groenlandicus	Greenland cockle
Serripes notabilis	oblique smoothcockle
Halicardia perplicata	
Pododesmus macrochisma	Alaska falsejingle
Hinnites sp.	rock scallops unid.
Anomiidae	falsejingle unid.
Cephalopoda	cephalopod unid.
Octopodidae	octopus unid.
Benthoctopus leioderma	smoothskin octopus
Octopus sp.	
Opisthoteuthis californiana	flapjack devilfish
Enteroctopus dofleini	giant octopus
Benthoctopus sp.	
Benthoctopus oregonensis	
Decapodiformes	squid unid.
Rossia pacifica	eastern Pacific bobtail

	Doryteuthis opalescens	California market squid
	Gonatidae	
	Gonatus sp.	
	Gonatus onyx	clawed armhook squid
	Gonatus berryi	Berry armhook squid
	Gonatus pyros	fiery armhook squid
	Berryteuthis magister	magistrate armhook squid
	Moroteuthis robusta	robust clubhook squid
	Galiteuthis phyllura	
	Chiroteuthis calyx	
	Octopoteuthis deletron	
	Stigmatoteuthis dofleini	
Bryozoa	Bryozoa	bryozoan unid.
	Myriapora orientalis	
	Flustrellidra corniculata	
	Alcyonidium sp. A	medusa bryozoan
	Alcyonidium pedunculatum	
	Microporina articulata	
	Dendrobeania sp.	
Brachiopoda	*Terebratalia transversa*	common brachiopod
	Terebratulina unguicula	snakeshead brachiopod
	Laqueus californianus	California lamp shell
Echinodermata	Asteroidea	sea star unid.
	Evasterias troschelii	mottled sea star
	Evasterias echinosoma	giant sea star
	Orthasterias koehleri	redbanded sea star
	Leptasterias hylodes	Aleutian sea star
	Leptasterias truculenta	giant Aleutian six-rayed star
	Pycnopodia helianthoides	sunflower sea star
	Stylasterias sp.	
	Stylasterias forreri	long-rayed star
	Ampheraster marianus	
	Lethasterias sp.	
	Lethasterias nanimensis	blackspined sea star
	Poraniopsis inflata	thorny sea star
	Henricia sp.	
	Henricia aspera	ridged blood star
	Henricia leviuscula	blood sea star
	Henricia multispina	spiny Henricia
	Odontohenricia sp.	
	Odontohenricia fisheri	
	Odontohenricia sp. B	
	Leptasterias sp.	

Leptasterias katharinae	
Leptasterias arctica	
Henricia dyscrita	short-spined Henricia
Gephyreaster swifti	Swift sea star
Pseudarchaster sp.	
Pseudarchaster alascensis	
Hippasteria sp.	
Hippasteria kurilensis	
Hippasteria aleutica	Aleutian spiny star
Hippasteria sp. E	Alaskan spiny star
Hippasteria californica	
Hippasteria heathi	
Hippasteria phrygiana	spiny red sea star
Pseudarchaster parelii	scarlet sea star
Mediaster sp.	
Mediaster tenellus	
Mediaster aequalis	vermilion sea star
Ceramaster sp.	
Ceramaster japonicus	red bat star
Ceramaster patagonicus	orange bat sea star
Ceramaster stellatus	
Luidia foliolata	sand sea star
Solaster sp.	
Solaster dawsoni	morning sun sea star
Solaster stimpsoni	striped sun sea star
Solaster sp. A	
Solaster sp. E	Kessler sun star
Solaster sp. F	Fisher sun star
Solaster sp. G	ocher sun star
Crossaster sp.	
Crossaster borealis	grooved sea star
Crossaster sp. B	pink rose star
Crossaster papposus	rose sea star
Heterozonias alternatus	cannonball sun star
Lophaster sp.	
Lophaster sp. B	
Lophaster vexator	crested star
Pteraster sp.	
Pteraster sp. A	
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 arcticus	North Pacific sea star
Dipsacaster sp.	
Dipsacaster borealis	northern sea star
Dipsacaster eximus	
Cheiraster sp.	
Cheiraster dawsoni	fragile sea star
Nearchaster variabilis	
Nearchaster aciculosus	
Nearchaster pedicellaris	
Brisingidae	brisingid sea star
Echinacea	sea urchin unid.
Strongylocentrotus sp.	
Strongylocentrotus droebachiensis	green sea urchin
Strongylocentrotus polyacanthus	
Strongylocentrotus purpuratus	purple sea urchin
Strongylocentrotus pallidus	white sea urchin
Allocentrotus fragilis	orange-pink sea urchin
Brisaster latifrons	heart urchin
Brisaster owstoni	
Echinarachnius parma	parma sand dollar
Florometra sp.	
Florometra acririma	
Florometra serratissima	featherstar crinoid
Florometra asperrima	common northern feather star
Ophiuroidea	brittlestar unid.
Gorgonocephalus eucnemis	basketstar
Asteronyx loveni	serpent sea star
Ophiura sp.	
Ophiura sarsii	notched brittlestar
Stegophiura nodosa	
Stegophiura ponderosa	
Ophiophthalmus cataleimmoidus	
Ophiopholis sp.	
Ophiopholis longispina	
Ophiopholis japonica	
Ophiopholis aculeata	ubiquitous brittle star
Holothuroidea	sea cucumber unid.
Parastichopus californicus	California sea cucumber
Pseudostichopus mollis	sandy sea cucumber

	Molpadia sp.	
	Molpadia intermedia	sweet sea potato
	Pentamera lissoplaca	crescent sea cucumber
	Bathyplotes sp.	
	Cucumaria fallax	sea football
	Cucumaria frondosa	
	Psolus sp.	
	Thyonidium sp.	
	Pannychia moseleyi	deep sea papillate cucumber
	Synallactes sp.	
	Synallactes sp. A	
	Synallactes challengeri	
Chordata	Ascidiacea	tunicate unid.
	Ascidian n. sp. A	cow-eye tunicate
	Pyrosoma sp.	green colonial tunicate
	Thaliacea	salp unid.
	Pyrosoma atlanticum	
	Styela rustica	sea potato
	Halocynthia igaboja	bristly tunicate
	Halocynthia aurantium	sea peach
	Pyura haustor	wrinkled tunicate
	Distaplia sp.	
	Distaplia occidentalis	globular ascidian
	Distaplia smithi	paddle ascidian
	Aplidium californicum	california sea pork
	Amaroucium sp.	
	Amaroucium soldatovi	sand-grain imbedded ascidian
	Ascidia paratropa	glassy tunicate
	Molgula griffithsii	sea grape

APPENDIX C

Appendix Table C-1. -- Length-weight parameters (a and b) for species where individual length and weight data were collected during the 2017 survey. The number of individuals measured and weighed (n) is also provided.

Species	Sex	a	b	n
Arrowtooth flounder	Male	4.850E-06	3.081	285
	Female	2.636E-06	3.192	612
	Both	2.714E-06	3.185	897
Atka mackerel	Male	2.004E-06	3.324	54
	Female	2.571E-05	2.889	89
	Both	1.205E-05	3.019	143
Blackspotted rockfish	Male	7.351E-06	3.121	279
	Female	7.221E-06	3.126	224
	Both	7.221E-06	3.125	503
Pacific cod	Male	3.346E-06	3.184	155
	Female	2.196E-06	3.254	185
	Both	2.576E-06	3.227	340
Dover sole	Male	8.660E-07	3.397	182
	Female	1.132E-06	3.325	155
	Both	1.169E-06	3.345	337
Dusky rockfish	Male	1.307E-05	3.040	251
	Female	1.187E-05	3.056	316
	Both	1.232E-05	3.050	567
Flathead sole	Male	1.517E-06	3.301	314
	Female	1.127E-06	3.354	332
	Both	1.303E-06	3.328	647
Northern rockfish	Male	3.854E-05	2.831	286
	Female	3.517E-05	2.848	345
	Both	3.590E-05	2.844	631
Northern rock sole	Male	4.707E-06	3.152	232
	Female	2.873E-06	3.246	360
	Both	3.156E-06	3.227	592
Walleye pollock	Male	5.014E-06	3.061	408
	Female	4.777E-06	3.070	482
	Both	4.843E-06	3.067	900
Pacific ocean perch	Male	1.212E-05	3.016	524
	Female	1.583E-05	2.968	532
	Both	1.431E-05	2.986	1056
Rex sole	Male	5.300E-07	3.423	248
	Female	5.060E-07	3.433	310
	Both	5.515E-07	3.429	562
Rougheye rockfish	Male	9.617E-06	3.082	334
	Female	7.765E-06	3.119	382
	Both	8.665E-06	3.100	716
Sablefish	Male	2.661E-06	3.199	553
	Female	2.754E-06	3.191	528
	Both	2.676E-06	3.197	1081
Shortraker rockfish	Male	6.230E-06	3.151	171
	Female	4.035E-06	3.226	166
	Both	5.095E-06	3.186	337
Southern rock sole	Male	7.319E-06	3.076	296
	Female	4.720E-06	3.158	428
	Both	5.136E-06	3.142	724
Shortspine thornyhead	Male	3.110E-06	3.229	214
	Female	2.807E-06	3.249	197
	Both	2.947E-06	3.240	411

APPENDIX D

Surface and Bottom Temperatures of the Gulf of Alaska Bottom Trawl Survey

Appendix Figure D-1 presents the bottom temperatures survey for the 2017 Gulf of Alaska biennial bottom trawl survey. Appendix Figure D-2 presents the surface temperatures for the 2017 Gulf of Alaska biennial bottom trawl survey.

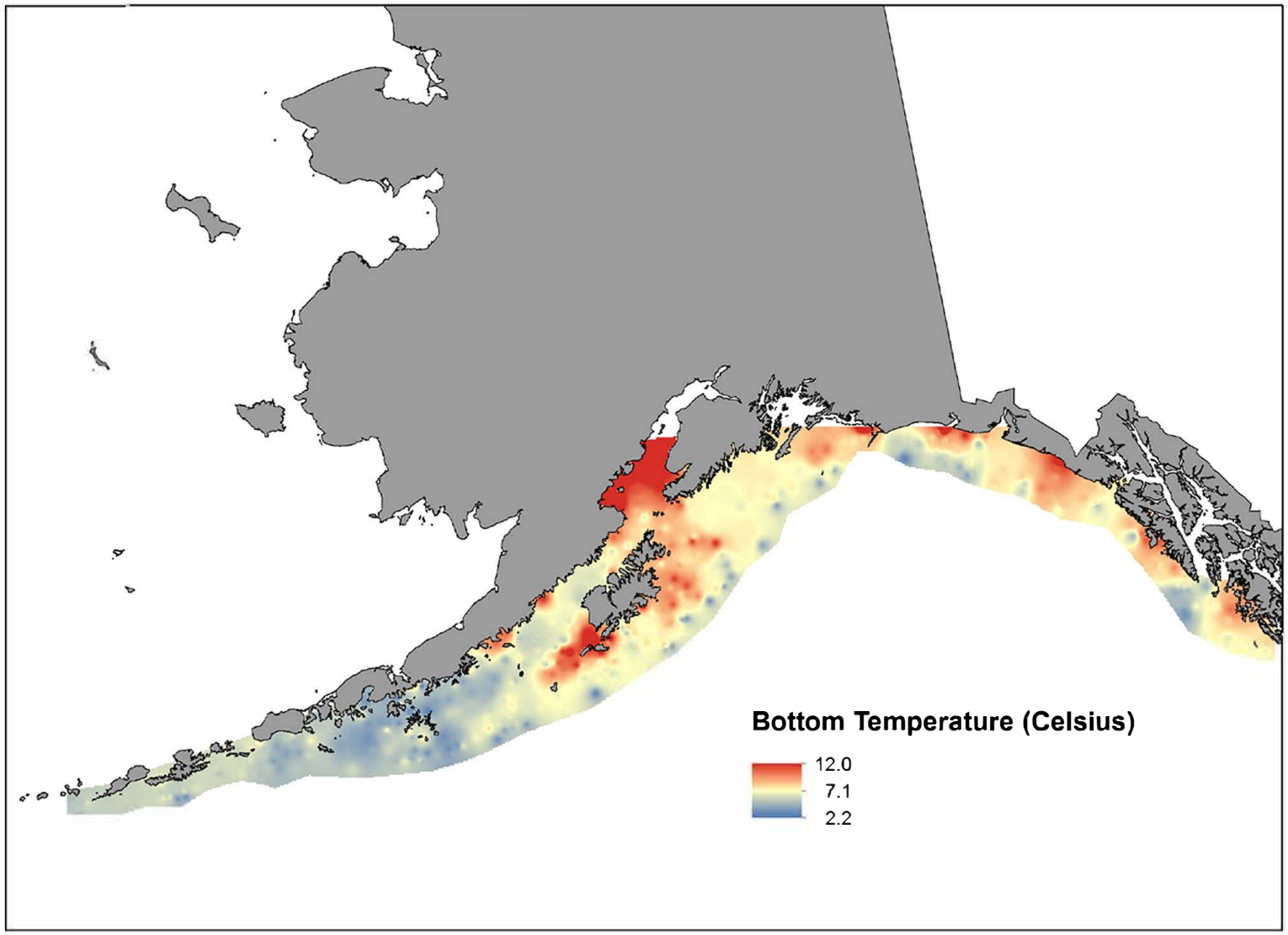


Figure D-1. -- Bottom temperatures GOA 2017 bottom trawl survey

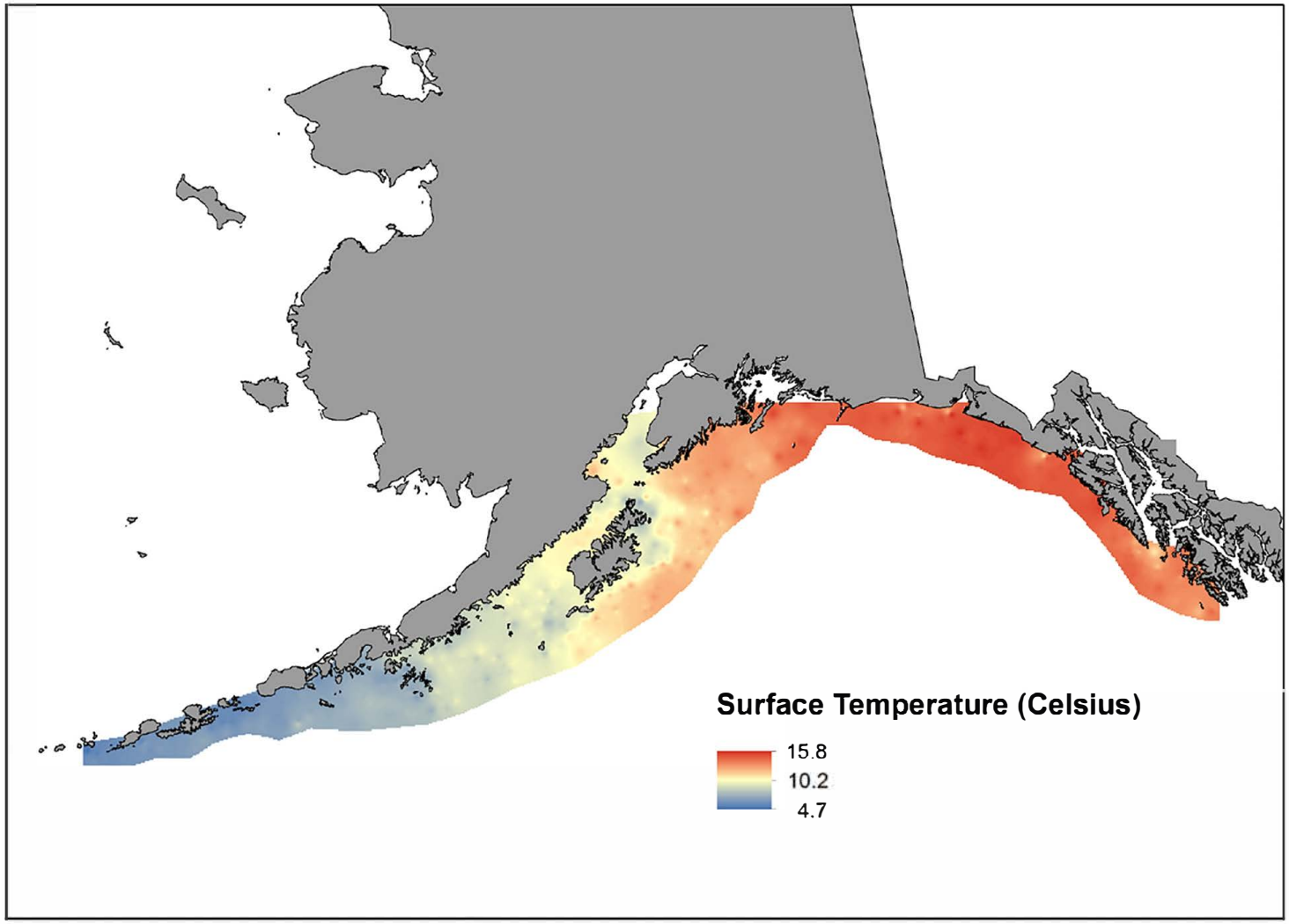


Figure D-2. -- Surface temperatures GOA 2017 bottom trawl survey

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