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Data Report: 2023 Gulf of Alaska Bottom Trawl Survey

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Data Report: 2023 Gulf of Alaska Bottom Trawl Survey

M. C. Siple, P. G. von Szalay, N. W. Raring,
A. N. Dowlin, and B. C. Riggle

Resource Assessment and Conservation Engineering Division
Groundfish Assessment Program
Alaska Fisheries Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
7600 Sand Point Way NE
Seattle WA 98115

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Preface

This report presents data from the 2023 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

The biennial groundfish assessment survey of the Gulf of Alaska (GOA) region was conducted during the summer of 2023 by the Alaska Fisheries Science Center (AFSC) Resource Assessment and Conservation Engineering Division's Groundfish Assessment Program (RACE-GAP). This effort constitutes the 18th standardized Gulf of Alaska survey in a series that began in 1990. The surveyed area comprises the continental shelf and upper continental slope to a depth of 700 m in the Gulf of Alaska, from Islands of Four Mountains (170° W longitude) approximately 2,800 km across the Gulf of Alaska to Dixon Entrance (133°25'W longitude). The survey was conducted aboard two chartered trawlers, the FV *Ocean Explorer* and the FV *Alaska Provider*. Samples were collected successfully at 526 survey stations using standard RACE Division Poly Nor'Eastern high-opening bottom trawl nets with rubber bobbin roller gear.

The two primary objectives of the survey were to 1) describe the distribution and estimate the relative abundance of ecologically and economically important groundfish and invertebrate species in the Gulf of Alaska and 2) collect data to estimate biological parameters used by fisheries researchers and managers such as growth rates, length-weight relationships, feeding habits, and length, sex, and age compositions. In this report, we present data from the 20 species with the highest catch per unit effort (CPUE) across the survey area. Pacific ocean perch (*Sebastes alutus*) had the highest estimated biomass of 1,595,547 metric tons (t), followed by arrowtooth flounder (*Atheresthes stomias*; 1,192,608 mt), walleye pollock (*Gadus chalcogrammus*; 921,866 mt), and Pacific halibut (*Hippoglossus stenolepis*; 462,813 mt). Arrowtooth flounder and Pacific halibut also had the highest estimated biomass of the flatfish. The three elasmobranchs with the highest biomass estimated from the survey were, in order, spiny dogfish (*Squalus suckleyi*), big skate (*Beringraja binoculata*), and longnose skate (*Raja rhina*). The region with the highest species richness of fishes and invertebrates was Kodiak (92 fish species and 164 invertebrate species).

Introduction

The 2023 biennial bottom trawl survey of the Gulf of Alaska (GOA) region was conducted from the 18th of May through the 6th of August, 2023 by the National Marine Fisheries Service (NMFS) Alaska Fisheries Science Center (AFSC) Resource Assessment and Conservation Engineering Division's Groundfish Assessment Program (RACE-GAP). This survey marked the 18th standardized RACE-GAP bottom trawl survey of this area since 1990. The surveys conducted prior to 1987 were cooperative efforts involving U.S. and Japanese scientists and vessels. From 1990 to 1999, the surveys were planned and conducted every three years with RACE-GAP deploying chartered U.S. fishing vessels; the surveys have been biennial since 1999. The primary focus of RACE-GAP bottom trawl surveys is to extend the time series of standardized data collections used to assess, describe, and monitor the distribution, abundance, and biological condition of Gulf of Alaska groundfish and invertebrate stocks ([Stauffer 2004](#)). This report presents the 2023 survey results for the principal groundfish and invertebrate species from six National Marine Fisheries Service (NMFS) statistical areas. Most time series of principal groundfish and invertebrate species preceding this 2023 report are available through the [North Pacific Groundfish Stock Assessments and Fishery Evaluation Reports](#). 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.

The objectives of the RACE-GAP summer bottom trawl surveys of the GOA are to 1) describe the distribution and relative abundance of groundfish and invertebrate species that inhabit the Gulf of Alaska region; 2) collect biological parameters from these populations like age, length-weight relationships; 3) study the feeding habits of select groundfish species; 4) collect acoustic net mensuration data to estimate the area swept as a measure of fishing effort of our standardized research trawls; and 5) to carry out special collections in partnership with collaborators, researchers, and other research institutions.

Special collection requests are solicited annually with a request for proposals and typically cover a wide range of studies. Specimen requests in 2023 included collections of tissues for flatfish genomics; genetics of Pacific cod, northern rockfish, dusky rockfish, sharks, and larval sand lance; genetics and morphometrics of Pacific ocean perch; sponge identification and genetics; and ecology of Arctic and Pacific lampreys. Our survey also provided a platform for Pacific halibut tagging and data collection by the International Pacific Halibut Commission (IPHC); collected data on harmful algal blooms and light intensity; conducted camera drop collections paired with eDNA collections; sampled walleye pollock for stable isotope analysis; tagged Pacific cod; collected voucher specimens for NOAA's Northwest Fisheries Science Center, the University of Washington, and the California Academy of Sciences; collected maturity information about flatfishes and rockfishes; and collected specimens of corals, mollusks, juvenile prawnfish, and market squid for various collaborative projects.

Methods

Survey Area

The Gulf of Alaska forms the northeastern border of the Pacific Ocean and consists of complex bathymetric features ranging from jagged, mountainous pinnacles to flat, muddy areas. These features provide a variety

of habitats resulting in a complex ecosystem. Prevailing rough bottom conditions in many areas require the standard use of rubber bobbin roller gear for our survey bottom trawling operations. The 2023 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 (Fig. 1). The total 2023 survey area was 308,415 km², or 4% smaller (11,590 km²) than the historic standard survey area, which included depth strata between 700 and 1,000 m depths. The deepest strata were eliminated from the 2023 survey because reduced funding has precluded GAP from chartering a third vessel to sample the additional survey area. Continental shelf waters shallower than 200 m made up 82% of the survey area. The shelf width 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 originally stratified by statistical areas erected by the former INPFC. While this commission was 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 roughly 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. The portion of the survey area contained within the Chirikof and Shumagin INPFC areas 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

The two U.S. commercial fishing vessels chartered for the 2023 GOA bottom trawl survey were the *Ocean Explorer* and the *Alaska Provider*.

- The *Alaska Provider* is 53.6 m in overall length (LOA) and is powered by two main engines with 2,200 continuous horsepower (HP). It is equipped with two forward and one stern net reel, but only the aft reel was used during the 2023 bottom trawl survey.
- The *Ocean Explorer* is 47.2 m LOA with a 1,500 HP main engine. It is equipped with two forward net reels, both of which were used during the 2023 bottom trawl survey.

Both vessels are house-forward stern trawlers with hydraulic net reels and paired constant tension (autotrawl) hydraulic trawl winches carrying 2.54 cm diameter steel core cable. Both vessels have articulating hydraulic cranes for handling catches and gear and 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. The survey was divided into four legs of approximately equal length with a port call between each to accommodate crew changes and to resupply. Captain Dan Carney operated the *Ocean Explorer* and Captain Loren Reynolds operated the *Alaska Provider* for all four legs of the survey.

Fishing Gear

The fishing gear and protocols for deployment are described in detail in Stauffer (2004), as are the dimensions and construction of the RACE-GAP Poly Nor'Eastern, four-seam, hard bottom, high-rise bottom trawl used by both vessels. The headrope is approximately 27 m long, and the footrope is about 36 m long (see schematic diagram in Stauffer (2004)). The footrope includes roller gear in a main body consisting of 36 cm rubber bobbins separated by 10 cm rubber disks and wing extensions of 10 and 20 cm rubber disks extending from each side of the main body to the forward thimble. Under normal fishing conditions, the average net width is 16.1 m and the average net height is 6.7 m based on acoustic net mensuration sensors mounted on the wing-tips and headrope of the trawl. Each trawl was certified as conforming to measurement and dimension standards prior to its use on the survey.

Survey Design

The 2023 biennial GOA trawl survey uses a stratified random survey design of areas shallower than 700 m (Munro and Hoff 1995, Raring et al. 2016). The survey area was divided into 59 strata defined by water depth, bottom terrain (e.g., shelf, gully, and slope), and INPFC statistical area (Appendix A). In the GOA bottom trawl survey, stations are randomly selected from the full set of trawlable stations and those of unknown status.

Consistent with recent RACE-GAP assessment surveys (e.g., (Szalay et al. 2008, 2010, Szalay and Raring 2017), sampling effort within each subdistrict was determined using a modified Neyman optimal allocation sampling strategy (Cochran 1977), which balances the variance of stratum catch per unit effort (CPUE; where effort is the product of the estimated distance towed (km) and the estimated mean net spread (m) for each haul), ex-vessel price for the stock (expanded by previous biomass estimates so it is total measure of fishery value; Table 1), and stratum area. Ex-vessel prices for 14 taxa are included in the calculations for allocation, as we are conducting a multispecies survey (see Table 1 for the full list of species). A total of 520 stations were selected for sampling in the 2023 survey. This station allocation total is a 5% reduction from the historical expectation based on stations completed during the standard two-vessel, 75-day, GOA bottom trawl survey charters in recent years (550). Assigned sample densities were highest in the 101 - 200 and 1 - 100 depth intervals at 1.87 and 1.67 stations per 1,000 km² in each interval (Table 2). At a sample size of 520 stations, the survey-wide sampling density was ca. 0.0017 tows per 1,000 km².

The station allocation software¹ draws stations at random without replacement from the pool of previously successfully sampled stations and stations of unknown status within each stratum and allocates these to the two survey vessels. The allocation routine requires that a minimum of two stations are allocated to each stratum to prevent issues with variance calculation. In the event of fishing gear conflicts or untrawlable bottom at a preselected station, an alternate station in the same subdistrict and depth stratum was identified as a substitute for the originally allocated station. Alternate trawl stations could either be previously trawled locations not assigned to either vessel in that survey year, or new trawl sites located by systematically searching for patches of trawlable bottom sufficiently large to accommodate a 15-minute tow within the proper stratum. Operations in Steller sea lion no-transit zones and areas with verified, active crab pot storage were avoided. Search time to find an alternate station within a particular grid cell was limited to 2 hours of searching a 5 × 5 km grid cell; maximum search time was proportionally reduced when stations represented less than 25 km² of the total grid cell. In 2023, in conjunction with a GAP-wide effort to reduce

¹ <https://github.com/afsc-gap-products/StationAllocationAIGOA>

science crew fatigue and related ergonomic injuries, the station allocation strategy was altered to reduce the total number of stations targeted for completion by each vessel (i.e., the 5% reduction previously mentioned relative to historic allocation). Bonus stations were allocated across strata using the same methodology as the primary allocation: 1) In the GOA 2023 survey, the target total number of stations was 520, selected randomly across each stratum. 2) The allocation protocol was run again, this time with the target total number of stations plus the intended number of bonus stations. Bonus stations were sampled at the discretion of the FPC and vessel captain as time allowed.

Trawl Performance Data Collection

Standard towing procedures were followed as closely as possible (Stauffer 2004). The operational goal of each haul was for the net to reach the bottom as quickly as possible and to ensure the proper towing configuration (a net height of 6-10 m and net width of 14-18 m) at the standard towing speed of 3 knots. The trawl should then maintain towing speed and proper net configuration with the footrope in contact with the bottom for 15 minutes, after which the net should be lifted off the bottom as quickly as possible. Standardized scope tables of trawl warp relative to bottom depth were used to determine the amount of wire set out. Tow duration was sometimes abbreviated to avoid potential gear damage or when changing net dimensions indicated that a large catch was affecting the standard fishing configuration. Date, time, and geographical coordinates were recorded every few seconds during each tow. Depth, water temperature, and time were recorded every 1 to 3 seconds using a factory-calibrated Seabird® Model SBE-39 data logger that was attached near the middle of the trawl headrope. The vertical and horizontal trawl openings were monitored with Marport® acoustic net mensuration equipment during each haul. An accelerometer recording date, time, and acceleration in three dimensions to measure the degree of bottom contact was attached to the midpoint of the footrope. An effort was made to lift the trawl off the bottom as quickly as possible at the end of each haul by maintaining or increasing vessel speed while engaging the trawl winches.

Bottom temperature (recorded as gear temperature) was calculated as the average temperature between when the gear was determined to be on-bottom and when the gear was lifted off-bottom. Surface temperature is the temperature at 1 m depth during the upcast. Surface temperatures in previous years were measured and calculated in different ways; refer to Table 1 in Rohan et al. (2022) for equipment and calculation methods historically used for water temperature data, and to the methods section of page 5 of Rohan et al. (2022) for a description of the algorithm used to determine the surface temperature.

All hauls were performed during daylight hours between one-half hour after sunrise and one-half hour before sunset. Trawl performance was assessed after each haul by carefully analyzing data plots from the net mensuration system and other sensors deployed during the haul. A haul was considered successful if the following conditions were met:

- The horizontal and vertical net openings remained within a range of 6-10 m (height) and ~14-18 m (spread)
- The bottom contact sensor indicated consistent contact with the bottom.
- The net suffered little or no damage during the tow.
- There were no significant encounters with large objects (e.g., boulders) or other fishing gear (e.g., crab pots, longline gear).

The minimum acceptable duration for a satisfactory haul was 10 minutes, except when a large catch altered the trawl fishing configuration precipitating the need to haul back early. General guidance for short-

duration, large-catch hauls has been to assign them a positive performance code when catch rates meet or exceed 1,000 kg/min. and all other standards apply (e.g., good bottom contact, no damage to the trawl web, etc.).

Catch Processing and Data Collection

Trawl catches were brought on board and sorted. Catches weighing up to approximately 1 metric ton (mt; 1,000 kg) were deposited directly onto a sorting table where taxa were identified to the lowest possible taxonomic level (e.g., species-level identification). All species nomenclature in our databases and in this report generally follow the Integrated Taxonomic Information System (ITIS). Taxon groups estimated at more than a few kilos were then weighed to the nearest 10 g using a motion compensated Marel® electronic digital platform scale; non-colonial taxa were enumerated. Taxon groups weighing around 2 kg or less were weighed to the nearest 2 g on a smaller capacity, electronic Marel® model M60 digital scale. Catches larger than ~1 mt were often serially processed by depositing aliquots of the total catch onto the sorting table in two or more 1-mt portions. The largest catches (exceeding ca. 8 mt) were sometimes processed volumetrically. For catches where total weight was determined with a load cell, less abundant species were separated from the catch, their weights determined, and then subtracted from the load cell weight. The remainder was then added to the subsample of the abundant species on deck to yield their total weight. For very large catches with more than one abundant species, subsamples of the dominant species were weighed to estimate their relative proportions in the catch, which were then extrapolated to obtain total weights for each species. A similar procedure was used for volumetrically estimated catches, except that the total catch weight was estimated by multiplying the density of a representative sample of the total catch (containing both the abundant and less abundant species) by the total catch volume. An alternative volumetric method was used for dominant species by weighing and averaging a minimum of 30 full sorting baskets and applying the mean weight to the count of unweighed baskets discarded back to the sea ([Rugolo et al. 2020](#)).

Pacific halibut were immediately measured and released when they were not retained for biological samples. In cases when halibut were released, their catch weights were estimated from their measured lengths during data entry using length-weight parameters supplied by the IPHC. When halibut were retained by the onboard IPHC sampler for biological specimen collection, sampling protocol dictated 100% retention. A random subsample of 50-100 (150 for arrowtooth flounder) specimens of each of the other major fish species was collected and measured to generate length frequencies. Target sample size was species-dependent (Table 3). A smaller length frequency sample was collected for some minor catch components such as sculpins. All sharks, skates, and Pacific halibut were measured. Unsexed length frequencies were collected for shortspine thornyhead and yellow Irish lord. Lengths for forage fishes such as Pacific herring, capelin, and eulachon are not required by survey protocols but were opportunistically collected. Length measurements were collected with barcode-reader data loggers and barcoded length boards. Target sample sizes for determining length compositions are listed in Table 3.

When recording fish length, the most common measurement used was fork length (FL). However, sharks, skates, and flatfishes without a fork 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. Fish length was measured to the nearest centimeter and weight was estimated to the nearest 2–10 g (scale accuracy depended on the weight of the specimen, weather conditions, etc.) with the digital scales. In this report, length data are presented as population-level length compositions by year and sex, and as individual lengths by bottom depth. When lengths by bottom depth

are presented, a locally estimated scatterplot smoothing (LOESS) curve is shown with the data, to visualize changes in length by depth. Otoliths were collected from a subset of fish species to determine age composition and parameterize age-length keys. In 2022, in an effort to improve efficiency and ergonomic conditions, GAP scientists and stock assessment authors re-evaluated otolith collection requirements using a simulation approach and settled on new sample sizes; most of these targets were met this year (Table 4). Stomach samples were collected for selected species throughout the survey area by biologists from the AFSC's Resource Ecology and Ecosystem Management Program.

Data Analysis: 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 center of 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 path. The mean net spread was calculated by averaging the smoothed net spread readings from the Marport® sensors 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 generalized additive model (GAM) 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 per area swept by the trawl. 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 errors 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

$$W = aL^b,$$

where W is weight in grams, L is length in mm and a and b are the fitted parameters (Appendix C).

Data Limitations

This survey supports management and conservation of multiple fish and benthic invertebrate species. Indices of abundance derived from survey catch rates and abundance estimates provide relative measures of abundance that are used to fit stock assessment models and monitor population trends and status. We expect that catchability may vary among species and species groups, and this is an important consideration when using the relative indices of abundance produced by the survey. The fact that the bottom trawl survey produces a relative index of abundance is particularly relevant in the Gulf of Alaska and Aleutian Islands, where mean survey CPUE is expanded to extensive untrawlable, unsampled areas.

Table 1. -- Ex-vessel prices used to allocate stations in the GOA 2023 bottom trawl survey. The prices used for station allocation in 2023 are from 2021.

Scientific name	Common name	Ex-vessel price (USD per lb)	Source
<i>Atheresthes stomias</i>	arrowtooth flounder	0.09	REFM
<i>Hippoglossoides elassodon</i>	flathead sole	0.12	REFM
<i>Glyptocephalus zachirus</i>	rex sole	0.36	REFM
<i>Lepidopsetta</i> sp.	rock sole	0.13	REFM
<i>Lepidopsetta polyxystra</i>	northern rock sole	0.15	REFM
<i>Gadus macrocephalus</i>	Pacific cod	0.41	REFM
<i>Gadus chalcogrammus</i>	walleye pollock	0.15	REFM
<i>Pleurogrammus monopterygius</i>	Atka mackerel	0.08	REFM
<i>Sebastes aleutianus</i>	rougheye rockfish	0.33	REFM
<i>Sebastes alutus</i>	Pacific ocean perch	0.17	REFM
<i>Sebastes ciliatus</i>	dark rockfish	0.41	REFM
<i>Sebastes variabilis</i>	dusky rockfish	0.18	REFM
<i>Sebastes polyspinis</i>	northern rockfish	0.15	REFM
<i>Sebastes borealis</i>	shortraker rockfish	0.33	REFM

Table 2. -- Stations allocated and sampled during the 2023 GOA bottom trawl survey.

Survey district	Depth range (m)	Stations allocated	Stations attempted	Stations completed	Total area (km ²)	Stations per 1,000 km ²
Shumagin	1 - 100	73	80	77	41,289	1.86
	101 - 200	26	29	26	14,677	1.77
	201 - 300	10	11	11	2,788	3.95
	301 - 500	2	2	2	2,531	0.79
	501 - 700	2	2	2	2,006	1.00
	All depths	113	124	118	63,290	1.86
Chirikof	1 - 100	46	48	48	26,035	1.84
	101 - 200	55	60	58	23,849	2.43
	201 - 300	12	13	12	11,546	1.04
	301 - 500	2	2	2	1,604	1.25
	501 - 700	2	2	2	1,953	1.02
	All depths	117	125	122	64,988	1.88
Kodiak	1 - 100	69	69	69	38,516	1.79
	101 - 200	92	97	94	43,332	2.17
	201 - 300	13	13	13	11,490	1.13
	301 - 500	4	6	4	2,912	1.37
	501 - 700	2	2	2	1,745	1.15
	All depths	180	187	182	97,994	1.86
Yakutat	1 - 100	16	18	17	16,661	1.02
	101 - 200	29	30	29	29,382	0.99
	201 - 300	11	11	11	5,170	2.13
	301 - 500	5	5	5	2,628	1.90
	501 - 700	2	2	2	1,469	1.36
	All depths	63	66	64	55,310	1.16
Southeastern	1 - 100	7	5	4	6,546	0.61
	101 - 200	25	23	22	11,084	1.98
	201 - 300	9	8	8	5,052	1.58
	301 - 500	4	4	4	3,117	1.28
	501 - 700	2	2	2	1,034	1.94
	All depths	47	42	40	26,833	1.49
All areas	1 - 100	211	220	215	129,047	1.67
	101 - 200	227	239	229	122,324	1.87
	201 - 300	55	56	55	36,047	1.53
	301 - 500	17	19	17	12,792	1.33
	501 - 700	10	10	10	8,206	1.22
	All depths	520	544	526	308,416	0.00

Table 3. -- Target numbers of sexed length samples for each managed species.

Species or species group	Target sample size
walleye pollock (<i>Gadus chalcogrammus</i>)	100
Pacific cod (<i>Gadus macrocephalus</i>)	100
arrowtooth flounder (ATF) (<i>Atheresthes stomias</i>)	150
All rockfish species (<i>Sebastes</i> spp.)	100
sablefish (<i>Anoplopoma fimbria</i>)	100
Atka mackerel (<i>Pleurogrammus monopterygius</i>)	100
All species of flatfish (except ATF) (Order Pleuronectiformes)	100
prowfish (<i>Zaprora silenus</i>)	100
lingcod (<i>Ophiodon elongatus</i>)	100
salmon (Family Salmonidae)	100
yellow Irish lord (<i>Hemilepidotus jordani</i>)	100
bigmouth sculpin (<i>Hemilepidotus bolini</i>)	100
great sculpin (<i>Myoxocephalus polyacanthocephalus</i>)	100
plain sculpin (<i>Myoxocephalus jaok</i>)	100
warty sculpin (<i>Myoxocephalus verrucosus</i>)	100
forage fish (herring, eulachon, capelin, sand lance) (Several families)	100
commander squid (<i>Berryteuthis magister</i>)	100
skates and sharks (total length) (Subclass Elasmobranchii)	50
grenadiers (tip of snout to insertion of first anal ray) (Family Macrouridae)	50

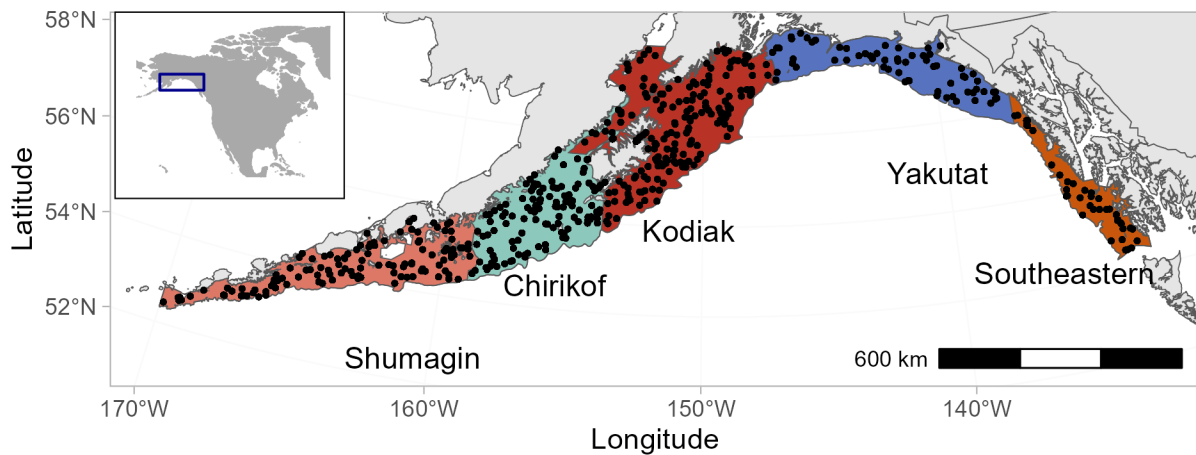


Figure 1. -- Map of the GOA 2023 bottom trawl survey area indicating INPFC areas. Black points indicate stations sampled in this survey.

Results

We successfully sampled 526 stations from a total allocation of 520 (Table 2). There were 550 attempted tows in total across the 544 stations visited. All successful tows were included in the biomass, length, and age composition analyses. Net mensuration data collections were attempted at all haul stations. Net spread was successfully measured using Marport acoustic net mensuration sensors at 525 of the successfully sampled stations.

For hauls where there were no net height data available, we estimated net spread from the following GAM:

$$\text{net.spread} \sim \text{factor}(\text{vessel}) + \text{factor}(\text{net.number}) + s(\text{bottom.depth}) + s(\text{speed}) + s(\text{scope.ratio}) + s(\text{total.catch})$$

For hauls where there were height data available, we estimated net spread from the following GAM:

$$\text{net.spread} \sim \text{factor}(\text{vessel}) + s(\text{net.height}) + \text{factor}(\text{net.number}) + s(\text{bottom.depth}) + s(\text{speed}) + s(\text{scope.ratio}) + s(\text{total.catch})$$

In total, there were 24 unsuccessful tows during the 2023 survey. Temperatures at depth were recorded for all but 2 of the hauls and surface temperature data were recorded for all but 2 hauls. Bottom temperatures ranged from 3.8 to 8.1 °C (Fig. 2). Surface temperatures ranged from 4.6 to 15.5 °C (Fig. 3).

We measured 151,154 lengths (150,388 fishes and 766 armhook squid) and collected 9,231 pairs of otoliths. A summary of the total otoliths sampled by management area and depth can be found in Table 4.

Table 4. --Otolith samples collected compared to otolith targets. A negative percent difference indicates an otolith sample shortfall; positive percent difference indicates that the target was exceeded.

Species	N collected	Target N	Percent difference between target and collection
arrowtooth flounder	925	600	54
Atka mackerel	205	100	105
blackspotted rockfish	225	250	-10
Dover sole	304	500	-39
dusky rockfish	327	500	-35
flathead sole	455	500	-9
harlequin rockfish	127	200	-36
northern rock sole	433	500	-13
northern rockfish	274	500	-45
Pacific cod	1,137	1,000	14
Pacific ocean perch	960	1,000	-4
rex sole	667	700	-5
roughey rockfish	307	300	2
sablefish	225	350	-36
shortraker rockfish	240	400	-40
silvergray rockfish	289	200	44
southern rock sole	498	500	0
walleye pollock	1,633	1,500	9

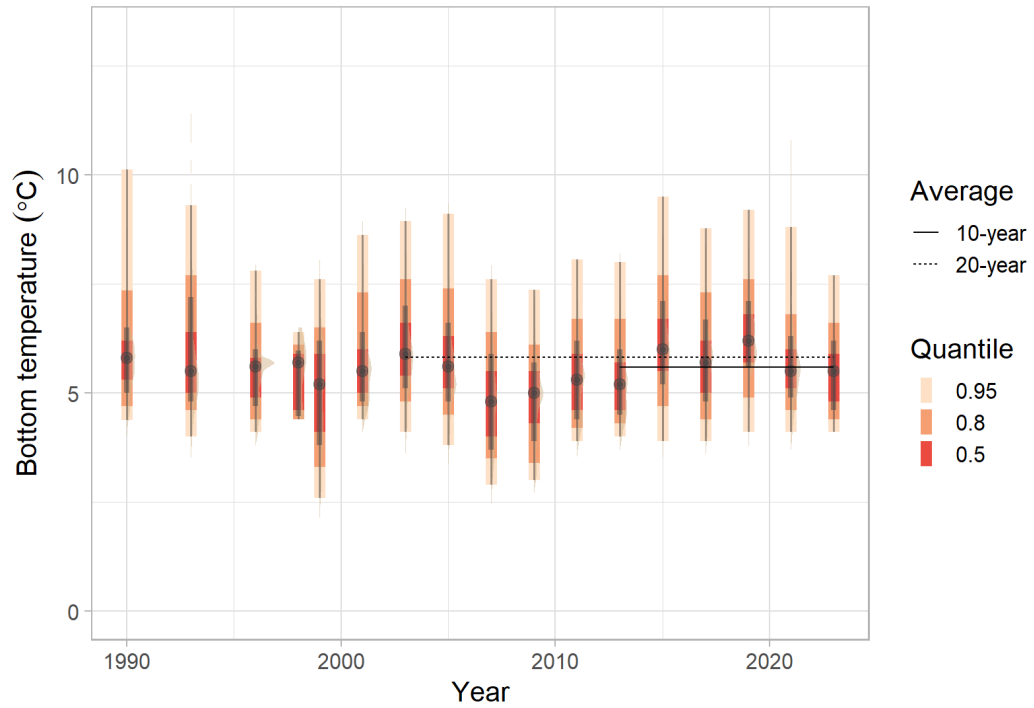


Figure 2. -- Bottom temperatures as measured at the trawl. Brown points represent the median.

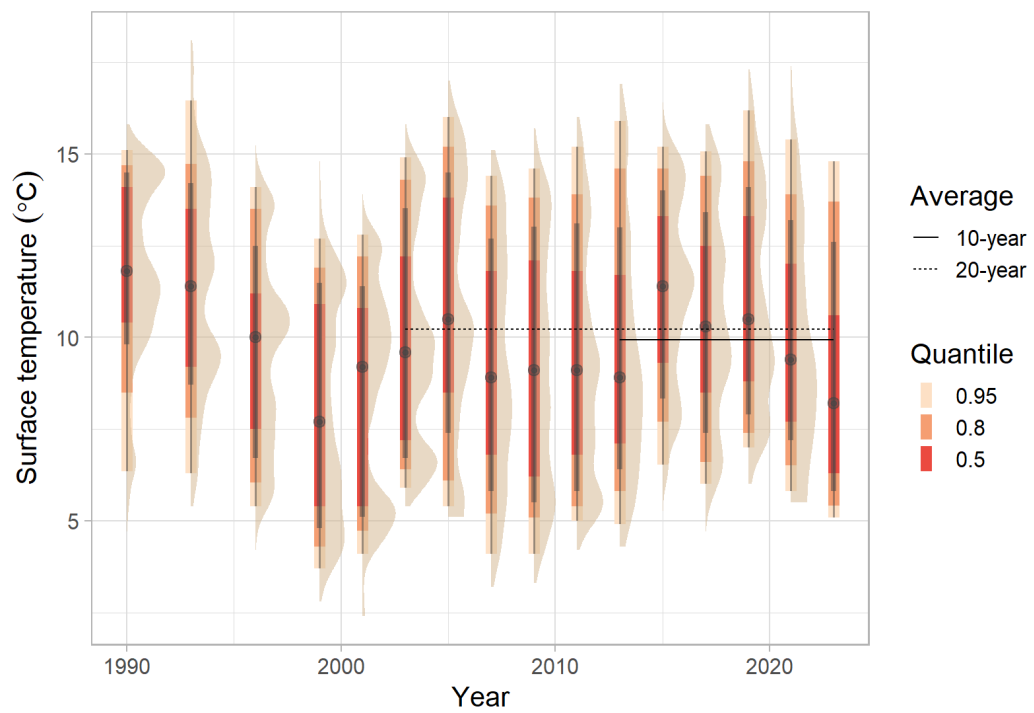


Figure 3. -- Surface temperatures as measured at the trawl. Brown points represent the median.

Results by Area

Total catches across the survey area included 140 fish species from 39 families, and 259 invertebrate species or taxa from 10 phyla. [Appendix B](#) lists all fish and invertebrate taxa encountered during the survey ([Appendix Table B1](#)). Taxa reported here were selected based on 1) their inclusion in a fishery management plan (FMP), including species complexes like deep-water flatfishes and rougheye-blackspotted rockfish, and 2) their presumed importance in the ecosystem. Since groundfish populations are the primary focus of this bottom trawl survey and data report, we present relative abundance estimates for the 20 most abundant groundfish species in each of the survey districts surveyed in 2023, for combined Gulf of Alaska areas, and for the entire survey region (Table 5). Pacific ocean perch was the most abundant species over the entire survey area, followed by arrowtooth flounder, walleye pollock, and Pacific halibut. The elasmobranch with the highest estimated biomass was spiny dogfish and the most abundant flatfish by weight was arrowtooth flounder.

Results by Species

Detailed, species-specific accounts of survey results are organized into four major groups: flatfishes, roundfishes, rockfishes, elasmobranchs, and octopus.

The following information is presented for each species:

- 1) A brief summary of the data and data analyses.
- 2) A table with the number of hauls attempted, number of hauls that caught the species, mean CPUE, estimated biomass with confidence intervals, and mean weight by survey district and depth interval.
- 3) A table with mean CPUE and estimated biomass with confidence intervals by subdistrict and depth range.
- 4) A figure showing the spatial distribution of CPUE across the survey area.
- 5) A figure showing the length distribution of the population.
- 6) A figure showing population-level length data by depth.

Table 5. -- Mean CPUE [kg/ha] for the 20 most abundant groundfish species in each survey district during the 2023 GOA bottom trawl survey.

Species	CPUE (kg/ha)	Species	CPUE (kg/ha)	Species	CPUE (kg/ha)
Shumagin		Kodiak		Southeastern	
walleye pollock	75.9	Pacific ocean perch	64.8	Pacific ocean perch	256.3
arrowtooth flounder	18.9	arrowtooth flounder	46.0	Pacific halibut	94.0
Atka mackerel	12.2	walleye pollock	23.0	arrowtooth flounder	39.9
Pacific cod	9.8	Pacific cod	8.1	silvergray rockfish	9.6
southern rock sole	8.8	sablefish	6.9	sablefish	7.1
Pacific halibut	7.5	Pacific halibut	6.3	canary rockfish	5.4
Pacific ocean perch	7.1	flathead sole	5.8	spotted ratfish	4.3
flathead sole	6.1	spiny dogfish	5.1	shortraker rockfish	4.2
sablefish	5.8	dusky rockfish	5.0	shortspine thornyhead	3.8
yellowfin sole	5.2	giant grenadier	4.9	Dover sole	3.7
northern rock sole	3.0	southern rock sole	3.5	rougheye rockfish	3.5
giant grenadier	2.8	rex sole	3.0	rex sole	3.0
starry flounder	2.8	eulachon	1.9	lingcod	3.0
rex sole	2.1	longnose skate	1.8	walleye pollock	2.8
big skate	1.7	shortspine thornyhead	1.6	redstripe rockfish	2.3
yellow Irish lord	1.6	chum salmon	1.4	sharpchin rockfish	1.9
English sole	1.1	Dover sole	1.3	petrale sole	1.6
shortspine thornyhead	1.0	Pacific herring	1.3	yellowmouth rockfish	1.4
northern rockfish	0.9	big skate	1.1	Pacific cod	1.4
butter sole	0.6	lingcod	0.9	blackspotted rockfish	1.2
Chirikof		Yakutat		All areas	
arrowtooth flounder	51.4	arrowtooth flounder	32.7	Pacific ocean perch	51.7
walleye pollock	24.6	Pacific ocean perch	19.8	arrowtooth flounder	38.7
Pacific ocean perch	18.2	Pacific halibut	9.1	flounder	
Pacific cod	10.2	walleye pollock	8.8	walleye pollock	29.9
Pacific halibut	7.8	sablefish	5.7	Pacific halibut	15.0
sablefish	6.3	lingcod	4.0	Pacific cod	7.5
rex sole	5.0	flathead sole	4.0	sablefish	6.3
giant grenadier	4.2	Dover sole	3.7	flathead sole	4.6
northern rockfish	3.6	Pacific herring	3.6	southern rock sole	3.8
flathead sole	3.5	Pacific cod	3.6	giant grenadier	3.3
southern rock sole	3.2	silvergray rockfish	2.8	rex sole	3.0
dusky rockfish	2.7	spiny dogfish	2.7	Atka mackerel	2.5
Pacific herring	1.8	shortspine thornyhead	2.6	dusky rockfish	2.4
big skate	1.8	starry flounder	2.2	spiny dogfish	2.1
shortspine thornyhead	1.7	English sole	2.1	shortspine thornyhead	1.9
eulachon	1.3	eulachon	2.0	Dover sole	1.6
longnose skate	1.1	shortraker rockfish	1.9	Pacific herring	1.5
Dover sole	0.8	rex sole	1.8	silvergray rockfish	1.4
starry flounder	0.6	giant grenadier	1.3	starry flounder	1.3
northern rock sole	0.5	longnose skate	1.3	lingcod	1.3
				eulachon	1.3

Arrowtooth flounder (*Atheresthes stomias*)

- Arrowtooth flounder was the 2nd most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of arrowtooth flounder in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 1,192,608 mt (Table 6), which is a 5.3% increase from 2021.
- The largest estimated biomass for arrowtooth flounder was in the Kodiak region, and the depth range with the largest estimated biomass was 101 - 200 m.
- The highest CPUEs were recorded in the Chirikof and Kodiak regions (Table 6 and Fig. 4).
- Length distributions by year are provided in Figure 5 (total survey sample size N = 31,878; Fig. 6). On average, the longest individuals were found in the Yakutat region and in a depth range of 301 – 500 m.
- There was a sex difference in length within this species; females (mean FL 42.93 cm) are generally longer than males (mean FL 37.24 cm).

Table 6. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing arrowtooth flounder, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	77	22.25	91,857	55,521	128,193	0.521
	101 - 200	26	26	17.45	25,610	15,675	35,544	0.529
	201 - 300	11	11	3.99	1,112	438	1,787	0.667
	301 - 500	2	2	3.69	933	314	1,553	0.992
	501 - 700	2	1	0.19	39	0	205	0.49
	All depths	118	117	18.89	119,551	82,188	156,914	0.526
Chirikof	1 - 100	48	34	49.6	129,126	40,981	217,270	0.809
	101 - 200	58	57	79.71	190,103	92,088	288,118	0.626
	201 - 300	12	12	12.32	14,221	2,309	26,132	0.905
	301 - 500	2	2	2.74	440	0	1,011	0.856
	501 - 700	2	1	2.19	427	0	2,267	0.636
	All depths	122	106	51.44	334,316	205,159	463,473	0.696
Kodiak	1 - 100	69	59	44.44	171,152	13,055	329,250	0.893
	101 - 200	94	93	60.85	263,659	171,700	355,618	0.776
	201 - 300	13	13	13.58	15,603	1,755	29,450	0.865
	301 - 500	4	3	0.74	216	0	452	0.873
	501 - 700	2	1	0.07	13	0	67	0.508
	All depths	182	169	45.99	450,643	277,199	624,087	0.82
Yakutat	1 - 100	17	16	16.2	26,991	8,936	45,047	0.767
	101 - 200	29	29	50.49	148,347	52,006	244,688	0.902
	201 - 300	11	11	7.15	3,697	1,441	5,953	1.266
	301 - 500	5	4	7.25	1,906	0	5,436	0.885
	501 - 700	2	0	---	---	---	---	---
	All depths	64	60	32.71	180,942	83,427	278,457	0.884
Southeastern	1 - 100	4	2	0.54	356	0	1,270	0.702
	101 - 200	22	21	93.02	103,109	11,921	194,297	0.749
	201 - 300	8	8	6.04	3,050	965	5,136	0.495
	301 - 500	4	3	2.03	632	0	1,978	1.154
	501 - 700	2	1	0.09	9	0	49	0.527
	All depths	40	35	39.93	107,156	15,942	198,371	0.74
All areas	1 - 100	215	188	32.51	419,483	243,747	595,218	0.745
	101 - 200	229	226	59.75	730,828	551,008	910,647	0.735
	201 - 300	55	55	10.45	37,683	22,345	53,020	0.847
	301 - 500	17	14	3.23	4,127	1,175	7,078	0.938
	501 - 700	10	4	0.59	488	0	2,336	0.615
	All depths	526	487	38.67	1,192,608	943,306	1,441,909	0.742

Table 7. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing arrowtooth flounder, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Shumagin Bank	23	23	37.2	46,178	12,377	79,980
Shumagin	1-100	Lower Alaska Peninsula	16	16	21.7	14,921	3,214	26,628
Shumagin	1-100	Davidson Bank	28	28	16.4	22,416	14,921	29,912
Shumagin	1-100	Fox Islands	10	10	10.0	8,342	2,964	13,719
Shumagin	101-200	West Shumagin Gully	3	3	38.4	8,754	0	20,356
Shumagin	101-200	Sanak Gully	5	5	23.0	9,761	741	18,780
Shumagin	101-200	Shumagin Outer Shelf	18	18	8.7	7,095	4,069	10,121
Shumagin	201-300	Shumagin Slope	11	11	4.0	1,112	430	1,795
Shumagin	301-500	Shumagin Slope	2	2	3.7	933	0	2,763
Shumagin	501-700	Shumagin Slope	2	1	0.2	39	0	529
Chirikof	1-100	Upper Alaska Peninsula	13	10	69.8	55,447	3,320	107,574
Chirikof	1-100	Chirikof Bank	24	15	66.8	72,070	0	146,400
Chirikof	1-100	Semidi Bank	11	9	2.2	1,609	270	2,947
Chirikof	101-200	Shelikof Edge	21	21	109.2	84,484	11,797	157,172
Chirikof	101-200	East Shumagin Gully	15	15	79.7	88,460	19,718	157,202
Chirikof	101-200	Chirikof Outer Shelf	22	21	34.2	17,158	3,953	30,364
Chirikof	201-300	Lower Shelikof Gully	7	7	13.1	13,122	808	25,436
Chirikof	201-300	Chirikof Slope	5	5	7.2	1,098	513	1,684
Chirikof	301-500	Chirikof Slope	2	2	2.7	440	0	2,126
Chirikof	501-700	Chirikof Slope	2	1	2.2	427	0	5,858
Kodiak	1-100	Albatross Shallows	10	10	186.4	107,465	0	267,249
Kodiak	1-100	Northern Kodiak Shallows	7	7	50.8	11,168	0	26,595
Kodiak	1-100	Albatross Banks	32	30	26.7	41,142	19,408	62,877
Kodiak	1-100	Kenai Peninsula	11	10	21.4	11,273	2,168	20,378
Kodiak	1-100	Lower Cook Inlet	9	2	0.1	103	0	269
Kodiak	101-200	Barren Islands	16	16	100.8	110,655	25,979	195,330
Kodiak	101-200	Albatross Gullies	22	22	71.1	56,259	33,423	79,095
Kodiak	101-200	Kenai Flats	17	17	55.9	67,465	34,760	100,170
Kodiak	101-200	Portlock Flats	23	22	29.8	21,832	12,137	31,527
Kodiak	101-200	Kodiak Outer Shelf	16	16	14.8	7,448	1,944	12,953
Kodiak	201-300	Upper Shelikof Gully	3	3	35.6	11,416	0	29,748
Kodiak	201-300	Kenai Gullies	7	7	5.3	3,508	1,397	5,619
Kodiak	201-300	Kodiak Slope	3	3	4.2	678	0	1,598
Kodiak	301-500	Kodiak Slope	4	3	0.7	216	0	486
Kodiak	501-700	Kodiak Slope	2	1	0.1	13	0	173
Yakutat	1-100	Yakutat Shallows	10	9	17.8	17,670	27	35,313
Yakutat	1-100	Middleton Shallows	7	7	13.9	9,322	2,476	16,167
Yakutat	101-200	Middleton Shelf	6	6	78.9	57,934	0	137,606
Yakutat	101-200	Fairweather Shelf	11	11	74.8	57,790	0	128,458
Yakutat	101-200	Yakutat Flats	7	7	27.4	24,746	1,017	48,476
Yakutat	101-200	Yakataga Shelf	5	5	14.9	7,877	1,814	13,940
Yakutat	201-300	Yakutat Gullies	5	5	7.6	2,302	0	4,666
Yakutat	201-300	Yakutat Slope	6	6	6.6	1,395	488	2,302
Yakutat	301-500	Yakutat Slope	3	2	11.5	1,754	0	6,513
Yakutat	301-500	Yakutat Gullies	2	2	1.4	152	0	1,226
Southeastern	1-100	Southeastern Shallows	4	2	0.5	356	0	1,403
Southeastern	101-200	Baranof-Chichagof Shelf	7	6	136.7	57,378	0	149,166
Southeastern	101-200	Prince of Wales Shelf	15	15	66.4	45,731	5,932	85,529
Southeastern	201-300	Baranof-Chichagof Slope	2	2	9.1	1,019	0	2,264
Southeastern	201-300	Prince of Wales Slope/Gullies	6	6	5.2	2,032	0	4,208
Southeastern	301-500	Southeastern Deep Gullies	3	3	2.7	632	0	2,452
Southeastern	501-700	Southeastern Slope	2	1	0.1	9	0	127

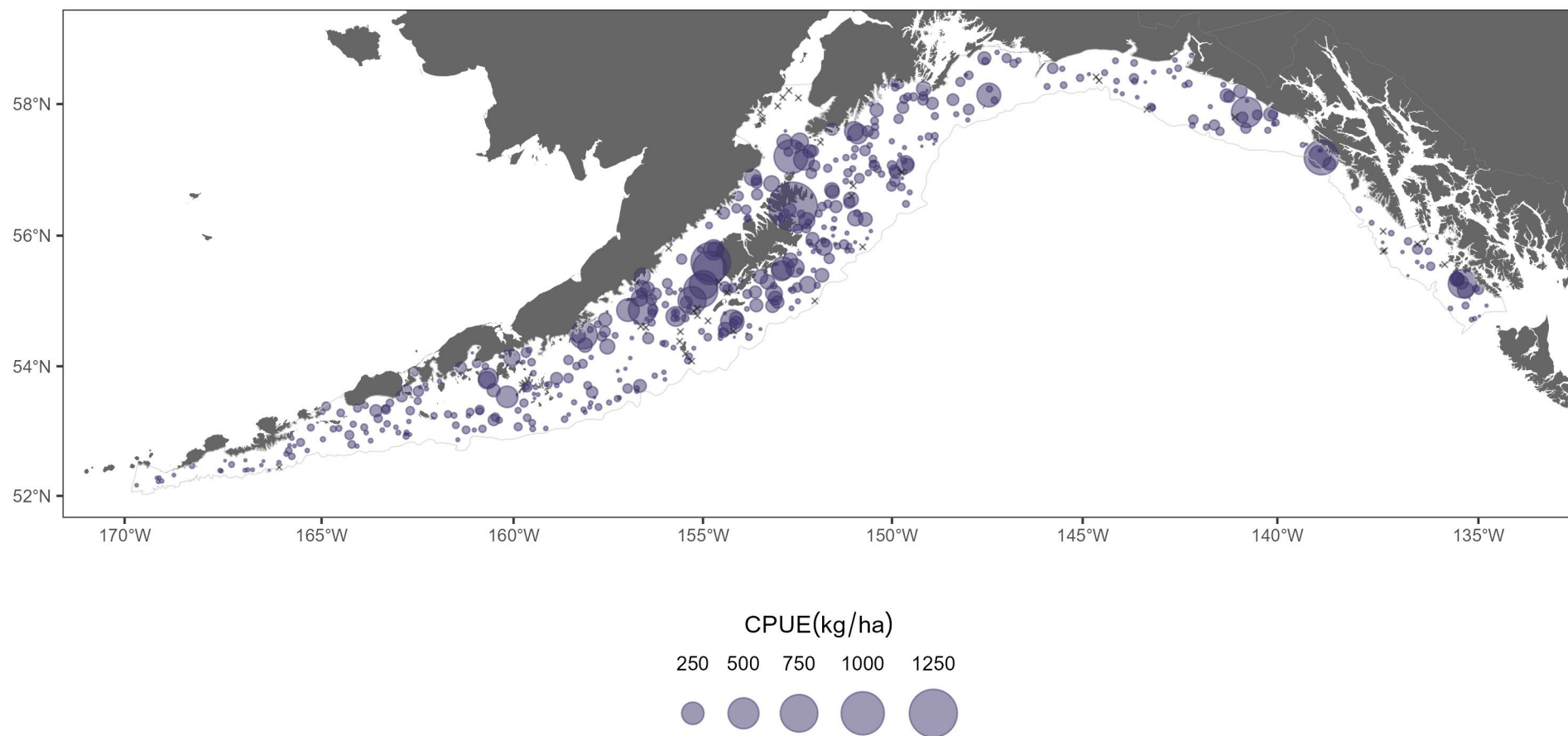


Figure 4. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of arrowtooth flounder in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

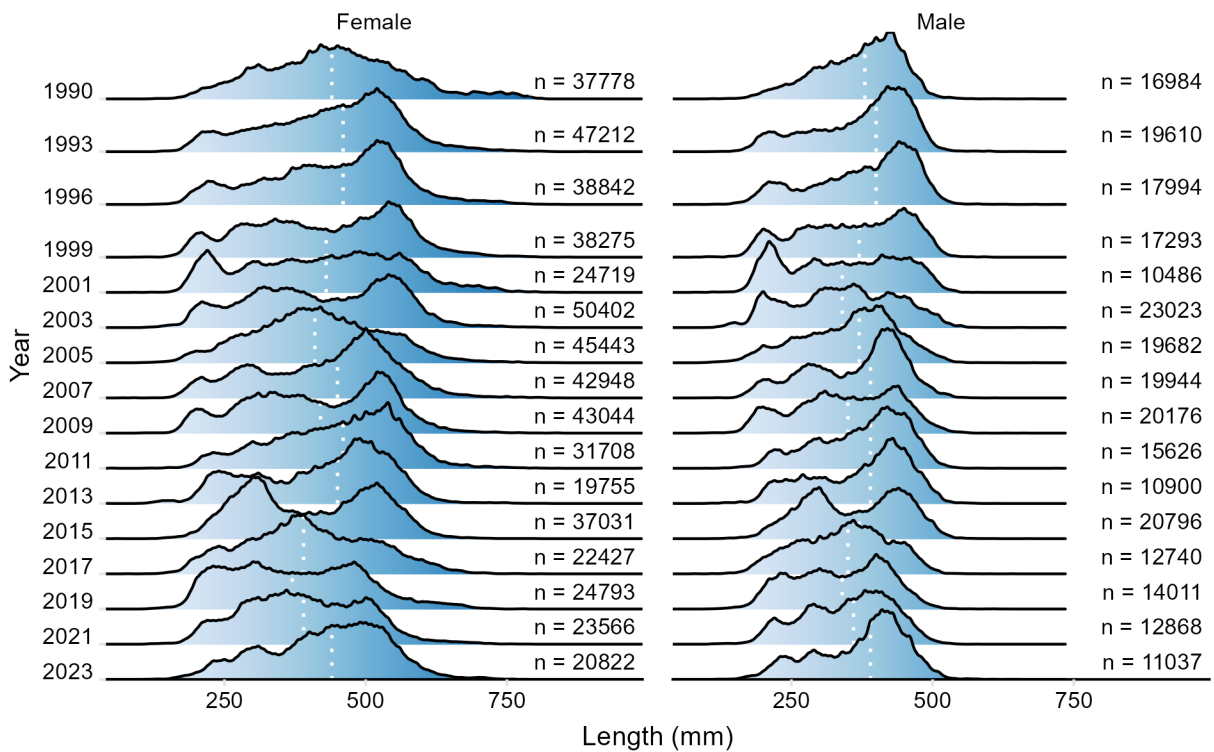


Figure 5. -- Population length composition of arrowtooth flounder in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

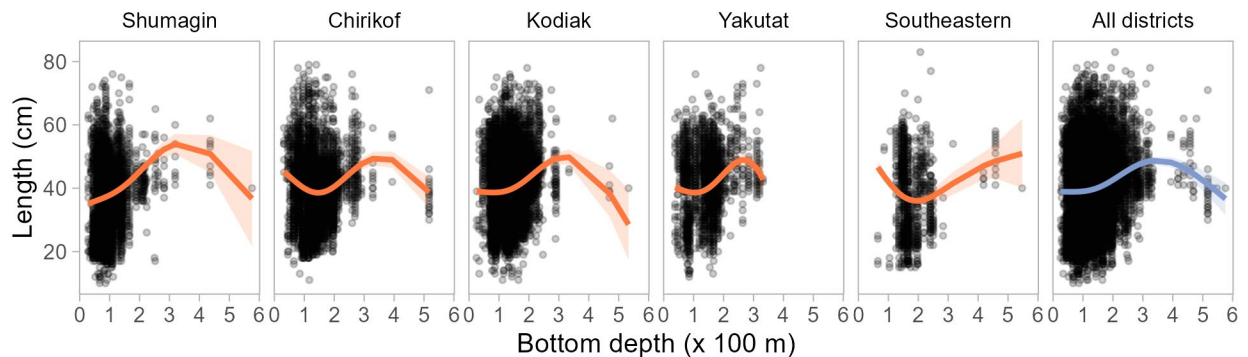


Figure 6. -- Length versus depth for arrowtooth flounder by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Northern rock sole (*Lepidopsetta polyxystra*)

- Northern rock sole was the 27th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of Northern rock sole in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 27,312 mt (Table 8), which is a 47% decrease from 2021.
- The largest estimated biomass for Northern rock sole was in the Shumagin region, and the depth range with the largest estimated biomass was 1 – 100 m.
- The highest CPUEs were recorded in the Shumagin and Chirikof regions (Table 8 and Fig. 7).
- Length distributions by year are provided in Figure 8 (total survey sample size N = 2,957; Fig. 9). On average, the longest individuals were found in the Kodiak region and in a depth range of 101 – 200 m.

Table 8. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing Northern rock sole, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	68	4.55	18,794	13,637	23,950	0.351
	101 - 200	26	8	0.21	301	17	585	0.469
	201 - 300	11	0	---	---	---	---	---
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	118	76	3.02	19,095	13,931	24,258	0.352
Chirikof	1 - 100	48	25	1.34	3,482	883	6,081	0.471
	101 - 200	58	1	0.01	30	0	94	1.039
	201 - 300	12	0	---	---	---	---	---
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	122	26	0.54	3,512	912	6,112	0.474
Kodiak	1 - 100	69	37	1.21	4,641	1,298	7,984	0.528
	101 - 200	94	3	0.01	65	0	146	1.062
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	182	40	0.48	4,706	1,362	8,050	0.532
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	0	---	---	---	---	---
	201 - 300	11	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	64	0	---	---	---	---	---
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	0	---	---	---	---	---
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	40	0	---	---	---	---	---
All areas	1 - 100	215	130	2.09	26,916	20,396	33,436	0.386
	101 - 200	229	12	0.03	396	99	692	0.54
	201 - 300	55	0	---	---	---	---	---
	301 - 500	17	0	---	---	---	---	---
	501 - 700	10	0	---	---	---	---	---
	All depths	526	142	0.89	27,312	20,785	33,838	0.388

Table 9. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing Northern rock sole, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Lower Alaska Peninsula	16	15	8.8	6,072	3,120	9,024
Shumagin	1-100	Davidson Bank	28	26	5.9	8,064	4,548	11,581
Shumagin	1-100	Shumagin Bank	23	17	2.7	3,341	866	5,817
Shumagin	1-100	Fox Islands	10	10	1.6	1,316	0	2,685
Shumagin	101-200	West Shumagin Gully	3	1	0.3	70	0	373
Shumagin	101-200	Shumagin Outer Shelf	18	7	0.3	231	0	477
Chirikof	1-100	Upper Alaska Peninsula	13	8	2.6	2,039	0	4,513
Chirikof	1-100	Chirikof Bank	24	12	1.1	1,162	293	2,030
Chirikof	1-100	Semidi Bank	11	5	0.4	281	0	791
Chirikof	101-200	East Shumagin Gully	15	1	0.0	30	0	95
Kodiak	1-100	Albatross Banks	32	23	2.2	3,385	240	6,530
Kodiak	1-100	Northern Kodiak Shallows	7	6	1.2	254	0	511
Kodiak	1-100	Albatross Shallows	10	2	0.9	537	0	1,430
Kodiak	1-100	Lower Cook Inlet	9	5	0.5	464	0	1,330
Kodiak	1-100	Kenai Peninsula	11	1	0.0	1	0	4
Kodiak	101-200	Kodiak Outer Shelf	16	1	0.0	22	0	68
Kodiak	101-200	Barren Islands	16	1	0.0	30	0	94
Kodiak	101-200	Albatross Gullies	22	1	0.0	13	0	40

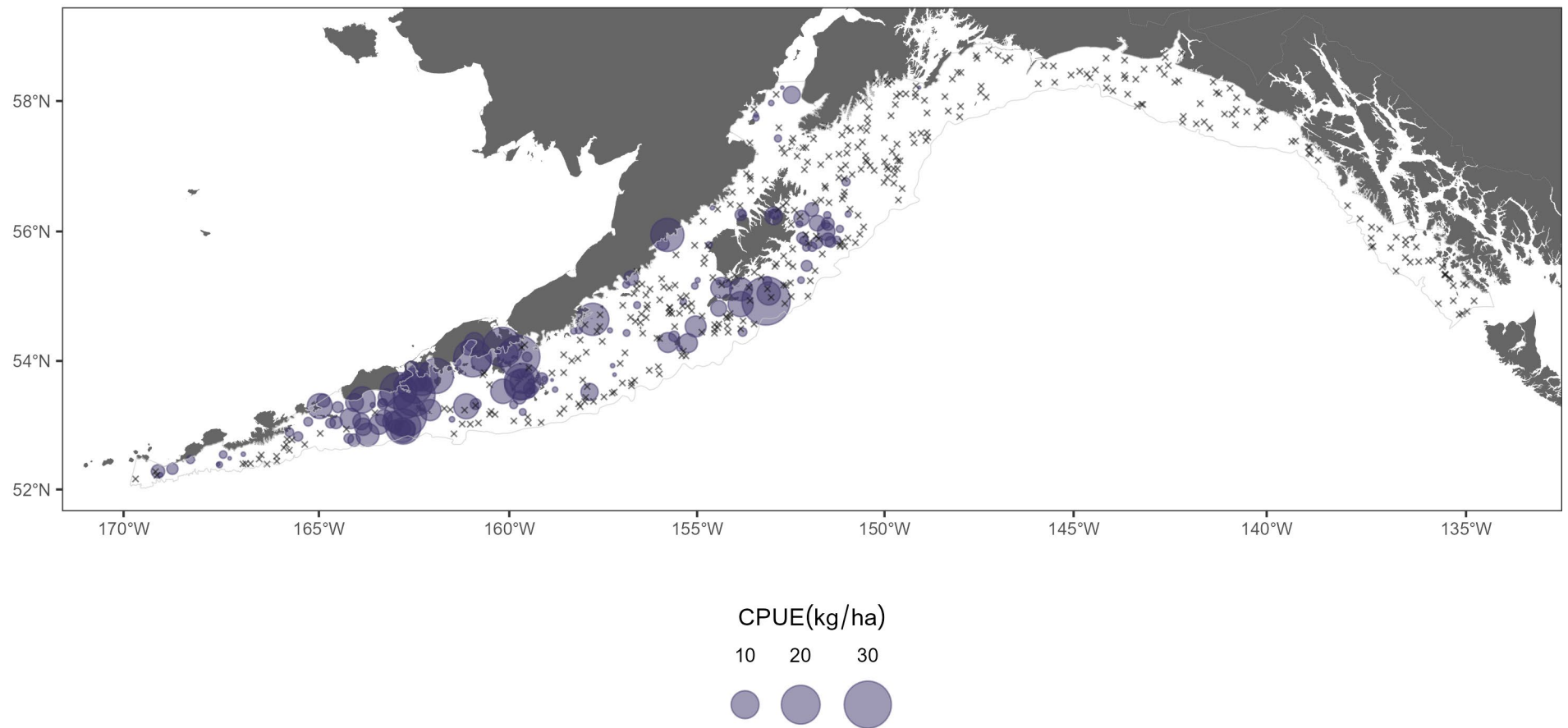


Figure 7. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of Northern rock sole in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

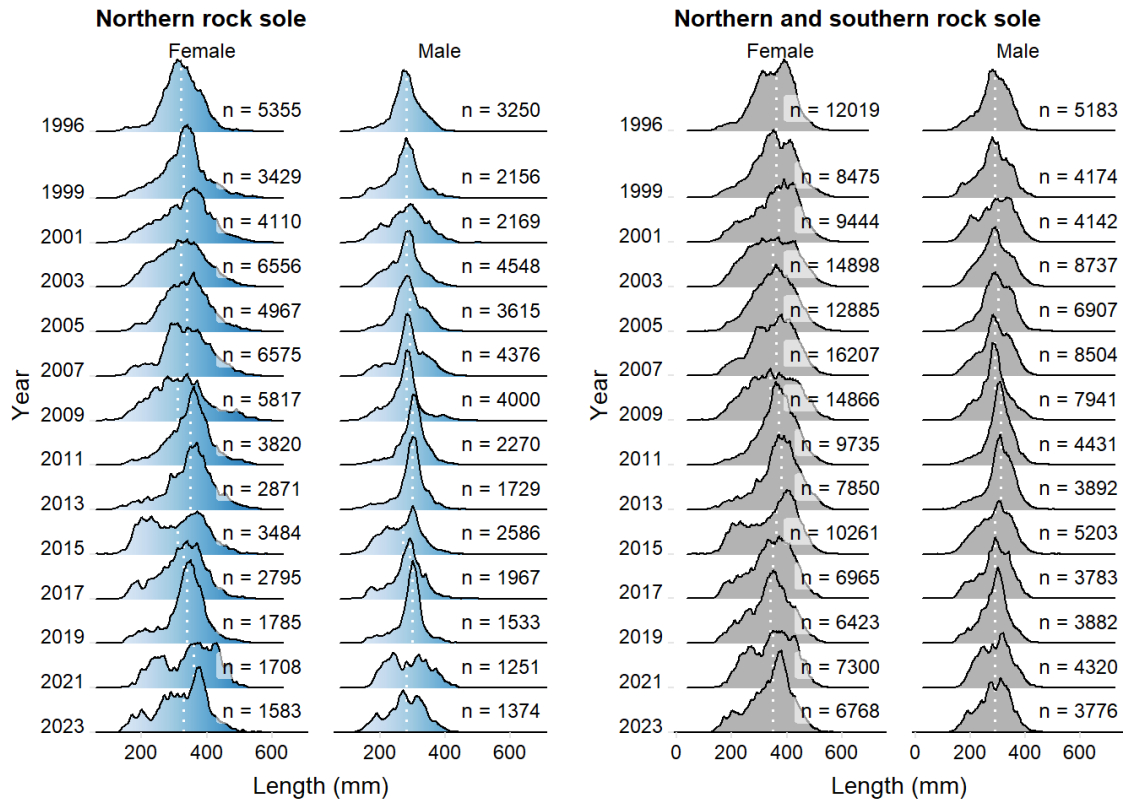


Figure 8. -- Population length composition of Northern rock sole in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length. Since this species was not identified as distinct from its close congener for the entirety of the survey time period, combined lengths are presented in grey.

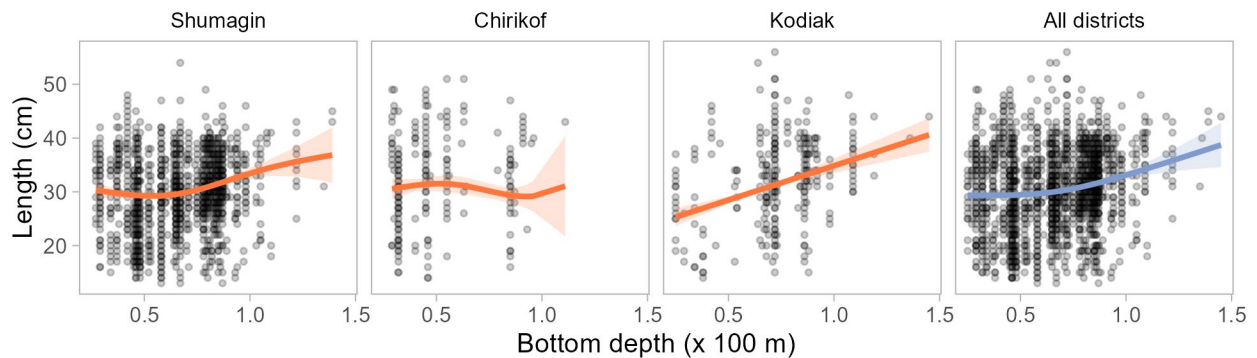


Figure 9. -- Length versus depth for Northern rock sole by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Southern rock sole (*Lepidopsetta bilineata*)

- Southern rock sole was the 8th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of Southern rock sole in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 116,083 mt (Table **10**), which is a 10.4% decrease from 2021.
- The largest estimated biomass for Southern rock sole was in the Shumagin region, and the depth range with the largest estimated biomass was 1 - 100 m.
- The highest CPUEs were recorded in the Shumagin and Kodiak regions (Table **10** and Fig. **10**).
- Length distributions by year are provided in Figure **11** (total survey sample size N = 7,588; Fig. **12**). On average, the longest individuals were found in the Yakutat region and in a depth range of 101 – 200 m.

Table 10. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing Southern rock sole, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	74	13.06	53,923	40,878	66,968	0.466
	101 - 200	26	12	1.21	1,770	898	2,642	0.593
	201 - 300	11	1	0.03	9	0	27	0.835
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	118	87	8.8	55,702	42,630	68,773	0.469
Chirikof	1 - 100	48	36	7.96	20,734	11,680	29,788	0.668
	101 - 200	58	13	0.16	381	80	681	0.652
	201 - 300	12	0	---	---	---	---	---
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	122	49	3.25	21,115	12,056	30,173	0.668
Kodiak	1 - 100	69	52	8.51	32,768	24,802	40,733	0.623
	101 - 200	94	19	0.37	1,614	510	2,719	0.839
	201 - 300	13	1	0.01	12	0	52	0.138
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	182	72	3.51	34,394	26,358	42,430	0.63
Yakutat	1 - 100	17	5	1.19	1,977	111	3,842	1.008
	101 - 200	29	1	0.01	17	0	59	0.353
	201 - 300	11	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	64	6	0.36	1,994	128	3,859	0.993
Southeastern	1 - 100	4	4	3.3	2,162	0	4,379	0.498
	101 - 200	22	3	0.65	717	0	1,664	0.402
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	40	7	1.07	2,879	386	5,372	0.47
All areas	1 - 100	215	171	8.65	111,563	94,025	129,101	0.542
	101 - 200	229	48	0.37	4,499	2,885	6,113	0.614
	201 - 300	55	2	0.01	21	0	62	0.209
	301 - 500	17	0	---	---	---	---	---
	501 - 700	10	0	---	---	---	---	---
	All depths	526	221	3.76	116,083	98,474	133,692	0.544

Table 11. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing Southern rock sole, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Lower Alaska Peninsula	16	13	18.4	12,655	2,722	22,587
Shumagin	1-100	Davidson Bank	28	28	16.9	23,063	16,415	29,711
Shumagin	1-100	Shumagin Bank	23	23	9.2	11,432	5,876	16,987
Shumagin	1-100	Fox Islands	10	10	8.1	6,774	2,762	10,785
Shumagin	101-200	Shumagin Outer Shelf	18	12	2.2	1,770	894	2,646
Shumagin	201-300	Shumagin Slope	11	1	0.0	8	0	27
Chirikof	1-100	Upper Alaska Peninsula	13	10	12.1	9,645	1,579	17,710
Chirikof	1-100	Semidi Bank	11	11	8.9	6,467	3,132	9,802
Chirikof	1-100	Chirikof Bank	24	15	4.3	4,622	969	8,275
Chirikof	101-200	East Shumagin Gully	15	4	0.2	200	0	474
Chirikof	101-200	Chirikof Outer Shelf	22	4	0.2	77	0	160
Chirikof	101-200	Shelikof Edge	21	5	0.1	104	2	206
Kodiak	1-100	Northern Kodiak Shallows	7	7	23.4	5,142	1,411	8,872
Kodiak	1-100	Albatross Banks	32	32	14.6	22,523	16,593	28,454
Kodiak	1-100	Albatross Shallows	10	7	6.5	3,765	0	8,219
Kodiak	1-100	Kenai Peninsula	11	4	2.5	1,297	0	3,411
Kodiak	1-100	Lower Cook Inlet	9	2	0.0	40	0	122
Kodiak	101-200	Kodiak Outer Shelf	16	9	2.8	1,388	280	2,496
Kodiak	101-200	Albatross Gullies	22	6	0.2	152	12	291
Kodiak	101-200	Portlock Flats	23	2	0.0	24	0	66
Kodiak	101-200	Barren Islands	16	1	0.0	28	0	89
Kodiak	101-200	Kenai Flats	17	1	0.0	22	0	69
Kodiak	201-300	Upper Shelikof Gully	3	1	0.0	12	0	65
Yakutat	1-100	Middleton Shallows	7	3	2.4	1,621	0	3,534
Yakutat	1-100	Yakutat Shallows	10	2	0.4	356	0	948
Yakutat	101-200	Middleton Shelf	6	1	0.0	17	0	61
Southeastern	1-100	Southeastern Shallows	4	4	3.3	2,162	0	4,703
Southeastern	101-200	Baranof-Chichagof Shelf	7	2	1.5	612	0	1,584
Southeastern	101-200	Prince of Wales Shelf	15	1	0.2	105	0	330

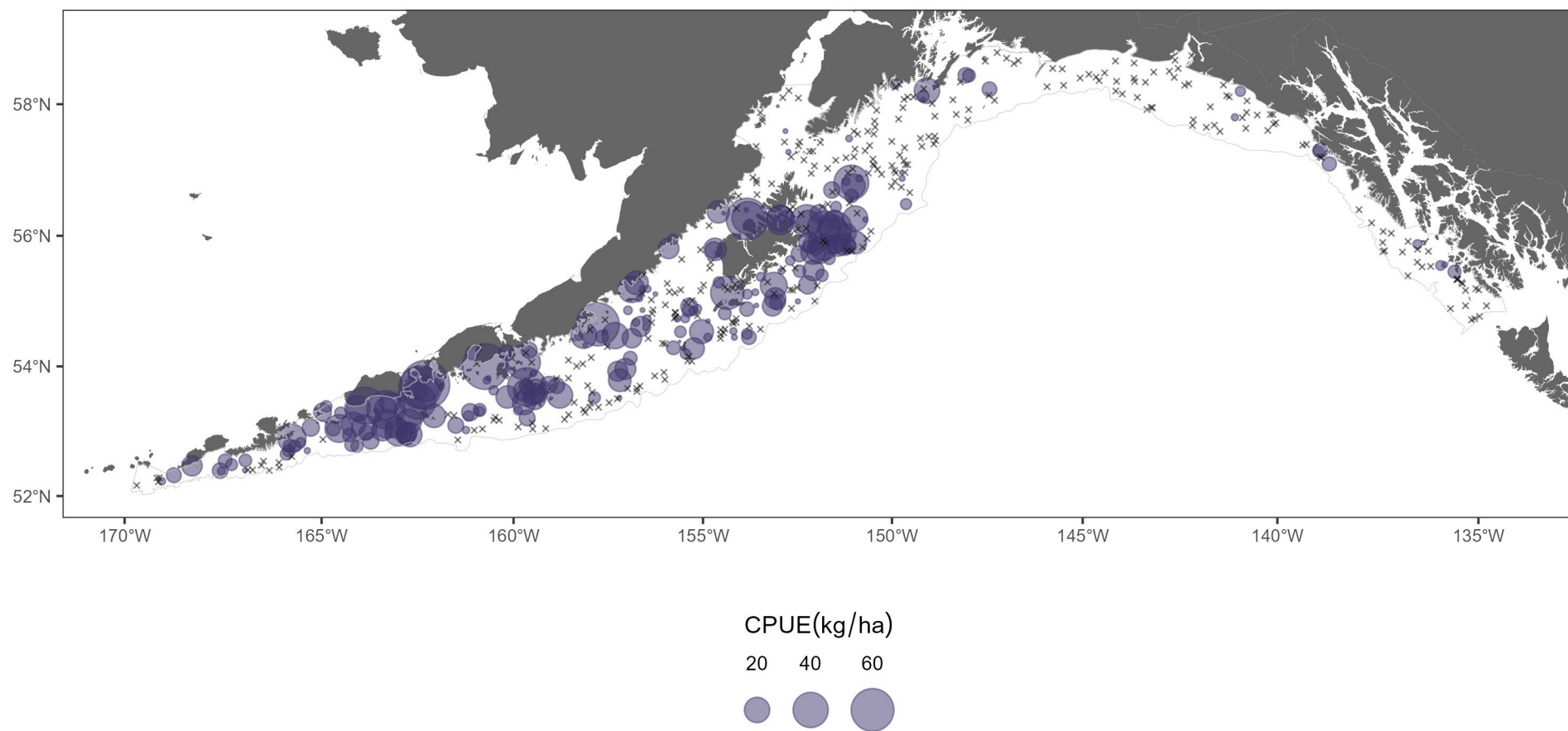


Figure 10. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of Southern rock sole in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

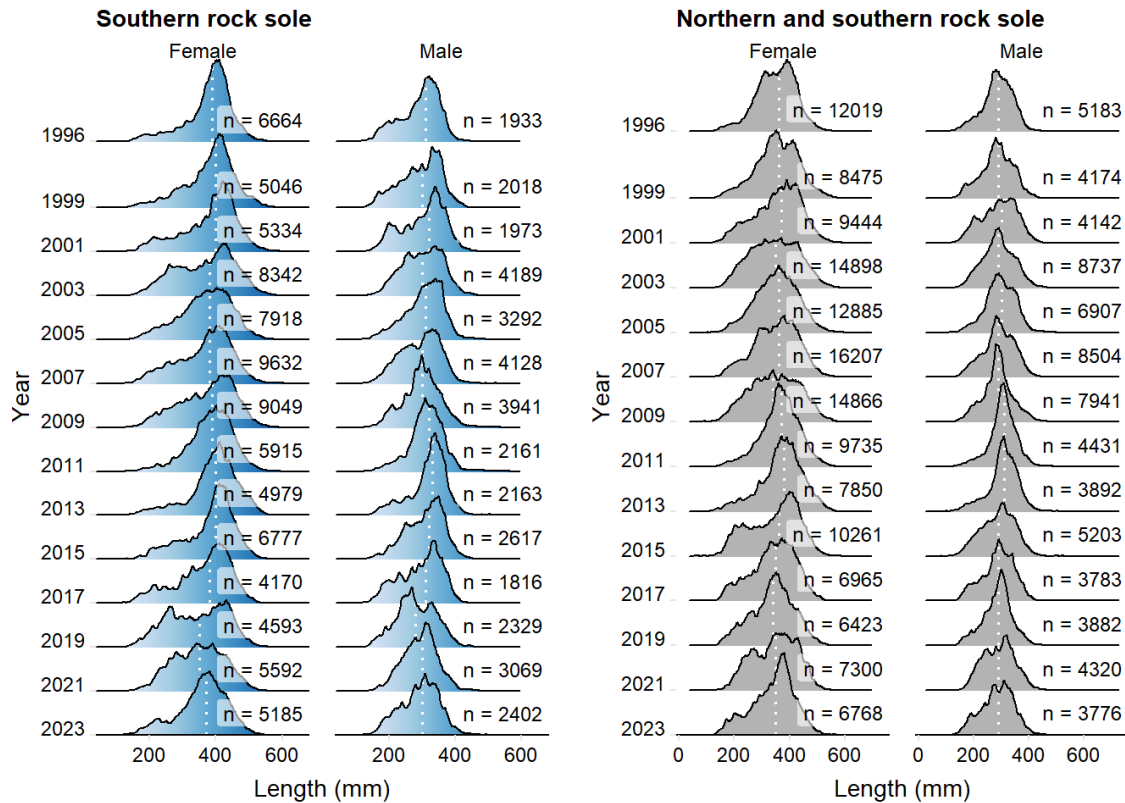


Figure 11. -- Population length composition of Southern rock sole in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length. Since this species was not identified as distinct from its close congener for the entirety of the survey time period, combined lengths are presented in grey.

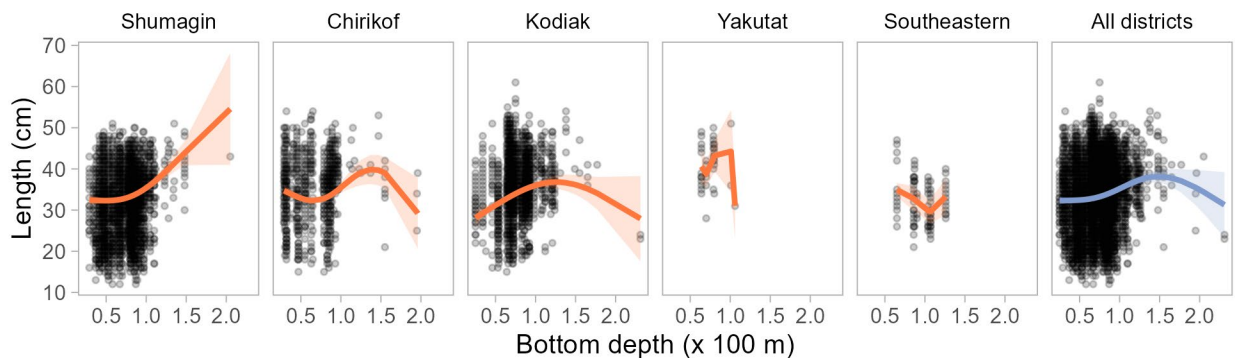


Figure 12. -- Length versus depth for Southern rock sole by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Flathead sole (*Hippoglossoides elassodon*)

- Flathead sole was the 7th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of flathead sole in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 140,862 mt (Table **12**), which is a 21.7% decrease from 2021.
- The largest estimated biomass for flathead sole was in the Kodiak region, and the depth range with the largest estimated biomass was 1 - 100 m.
- The highest CPUEs were recorded in the Shumagin and Kodiak regions (Table **12** and Fig. **13**).
- Length distributions by year are provided in Figure **14** (total survey sample size N = 11,819; Fig. **15**). On average, the longest individuals were found in the Kodiak region and in a depth range of 201 – 300 m.

Table 12. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing flathead sole, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	62	7.88	32,521	8,791	56,252	0.317
	101 - 200	26	17	4.01	5,887	0	14,590	0.199
	201 - 300	11	0	---	---	---	---	---
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	118	79	6.07	38,409	14,066	62,751	0.291
Chirikof	1 - 100	48	33	3.75	9,755	3,886	15,624	0.297
	101 - 200	58	44	4.64	11,055	6,437	15,672	0.229
	201 - 300	12	7	1.71	1,976	0	4,430	0.379
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	122	84	3.51	22,786	15,240	30,333	0.264
Kodiak	1 - 100	69	35	8.08	31,107	15,431	46,783	0.345
	101 - 200	94	69	4.95	21,456	11,695	31,217	0.325
	201 - 300	13	7	4	4,596	0	11,775	0.399
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	182	111	5.83	57,159	38,694	75,624	0.341
Yakutat	1 - 100	17	11	7.11	11,844	0	24,937	0.309
	101 - 200	29	17	3.46	10,177	0	24,246	0.289
	201 - 300	11	7	0.3	157	0	352	0.298
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	64	35	4.01	22,178	4,721	39,635	0.299
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	6	0.3	330	0	711	0.145
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	40	6	0.12	330	0	711	0.145
All areas	1 - 100	215	141	6.6	85,228	54,704	115,751	0.323
	101 - 200	229	153	4	48,905	31,321	66,489	0.27
	201 - 300	55	21	1.87	6,729	301	13,157	0.39
	301 - 500	17	0	---	---	---	---	---
	501 - 700	10	0	---	---	---	---	---
	All depths	526	315	4.57	140,862	105,952	175,771	0.305

Table 13. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing flathead sole, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Lower Alaska Peninsula	16	13	29.6	20,343	0	43,606
Shumagin	1-100	Davidson Bank	28	26	4.8	6,554	1,068	12,040
Shumagin	1-100	Shumagin Bank	23	21	4.5	5,579	340	10,818
Shumagin	1-100	Fox Islands	10	2	0.1	45	0	144
Shumagin	101-200	West Shumagin Gully	3	2	17.0	3,871	0	15,591
Shumagin	101-200	Sanak Gully	5	5	3.8	1,597	1,002	2,191
Shumagin	101-200	Shumagin Outer Shelf	18	10	0.5	420	152	687
Chirikof	1-100	Chirikof Bank	24	14	5.7	6,166	1,432	10,900
Chirikof	1-100	Upper Alaska Peninsula	13	11	4.1	3,255	0	7,039
Chirikof	1-100	Semidi Bank	11	8	0.5	335	110	559
Chirikof	101-200	East Shumagin Gully	15	13	5.4	5,947	2,322	9,572
Chirikof	101-200	Shelikof Edge	21	20	4.1	3,151	1,350	4,953
Chirikof	101-200	Chirikof Outer Shelf	22	11	3.9	1,956	0	4,326
Chirikof	201-300	Lower Shelikof Gully	7	5	2.0	1,962	0	4,501
Chirikof	201-300	Chirikof Slope	5	2	0.1	14	0	42
Kodiak	1-100	Albatross Shallows	10	8	36.2	20,898	5,346	36,449
Kodiak	1-100	Northern Kodiak Shallows	7	7	16.7	3,676	476	6,876
Kodiak	1-100	Kenai Peninsula	11	7	7.3	3,816	1,062	6,570
Kodiak	1-100	Albatross Banks	32	10	1.8	2,700	417	4,984
Kodiak	1-100	Lower Cook Inlet	9	3	0.0	17	0	42
Kodiak	101-200	Albatross Gullies	22	21	10.6	8,357	1,152	15,561
Kodiak	101-200	Kenai Flats	17	14	4.9	5,912	591	11,233
Kodiak	101-200	Portlock Flats	23	18	3.9	2,844	865	4,822
Kodiak	101-200	Barren Islands	16	8	3.7	4,060	0	8,380
Kodiak	101-200	Kodiak Outer Shelf	16	8	0.6	283	65	502
Kodiak	201-300	Upper Shelikof Gully	3	3	11.0	3,518	0	14,306
Kodiak	201-300	Kenai Gullies	7	4	1.6	1,078	0	2,630
Yakutat	1-100	Yakutat Shallows	10	7	8.2	8,123	0	20,868
Yakutat	1-100	Middleton Shallows	7	4	5.5	3,721	0	8,388
Yakutat	101-200	Middleton Shelf	6	3	13.0	9,526	0	24,297
Yakutat	101-200	Yakutat Flats	7	5	0.4	359	0	757
Yakutat	101-200	Fairweather Shelf	11	5	0.3	221	0	548
Yakutat	101-200	Yakataga Shelf	5	4	0.1	70	0	171
Yakutat	201-300	Yakutat Gullies	5	5	0.4	110	0	312
Yakutat	201-300	Yakutat Slope	6	2	0.2	47	0	129
Southeastern	101-200	Prince of Wales Shelf	15	6	0.5	330	0	713

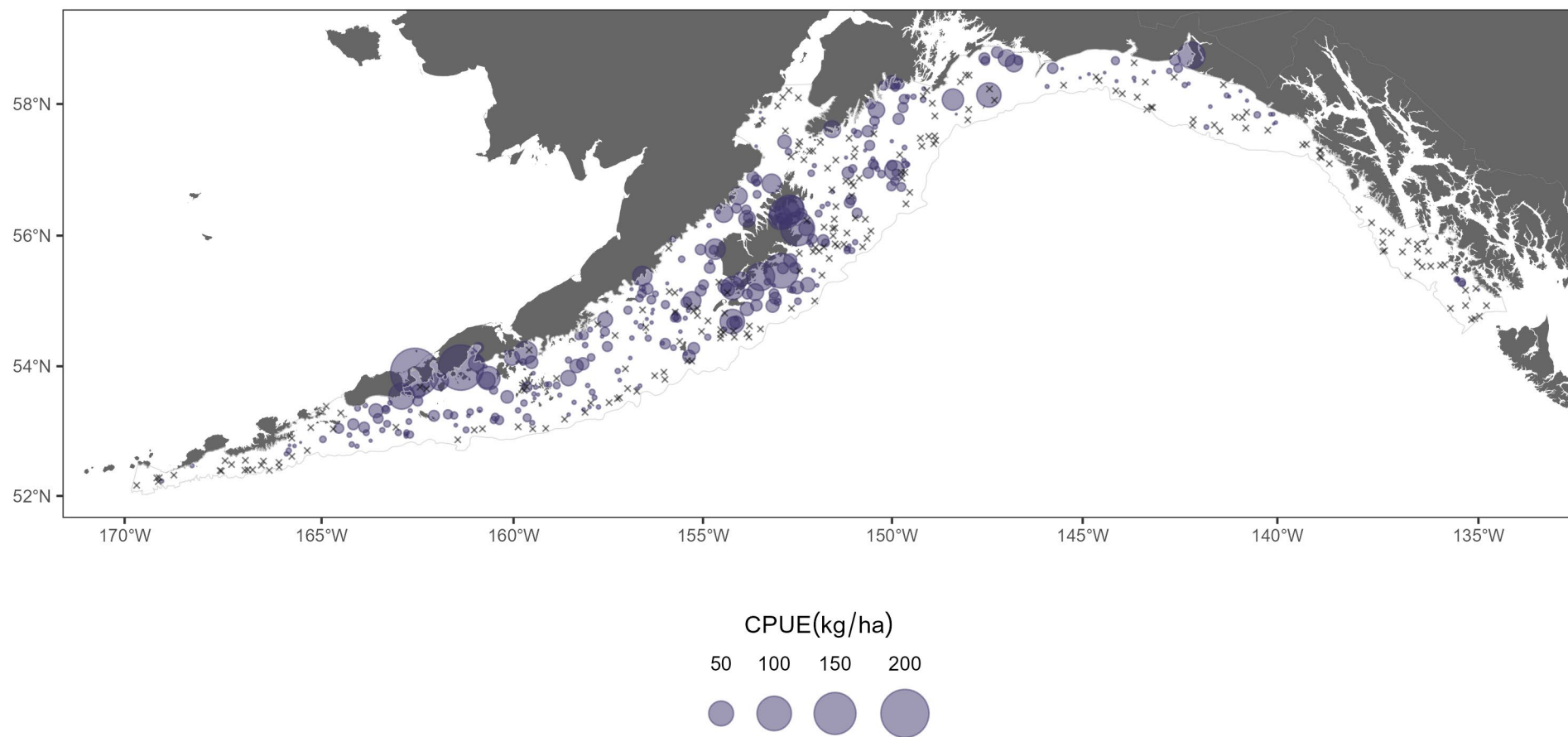


Figure 13. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of flathead sole in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

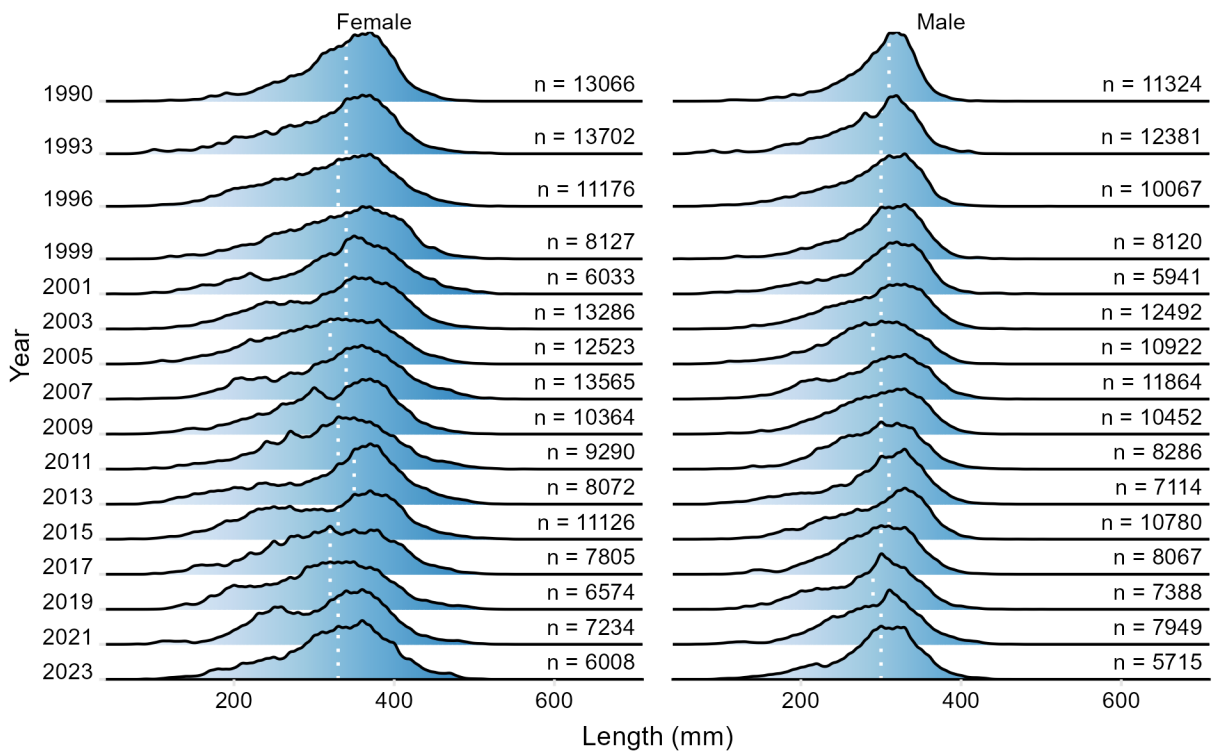


Figure 14. -- Population length composition of flathead sole in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

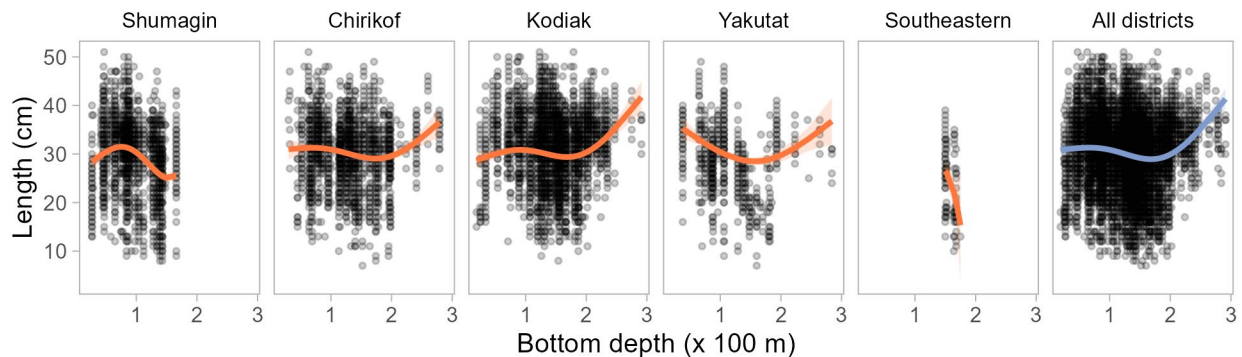


Figure 15. -- Length versus depth for flathead sole by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Rex sole (*Glyptocephalus zachirus*)

- Rex sole was the 10th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of rex sole in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 92,534 mt (Table 14), which is a 17.6% decrease from 2021.
- The largest estimated biomass for rex sole was in the Chirikof region, and the depth range with the largest estimated biomass was 101 - 200 m.
- The highest CPUEs were recorded in the Chirikof and Southeastern regions (Table 14 and Fig. 16).
- Length distributions by year are provided in Figure 17 (total survey sample size N = 10,487; Fig. 18). On average, the longest individuals were found in the Shumagin region and in a depth range of 101 - 200 m.

Table 14. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing rex sole, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	39	0.78	3,225	1,647	4,802	0.444
	101 - 200	26	24	5.69	8,356	3,238	13,473	0.451
	201 - 300	11	8	2.77	773	288	1,258	0.44
	301 - 500	2	1	3.01	761	0	4,037	0.464
	501 - 700	2	2	0.34	67	26	108	0.592
	All depths	118	74	2.08	13,182	7,668	18,695	0.45
Chirikof	1 - 100	48	21	0.99	2,570	851	4,289	0.427
	101 - 200	58	56	10.83	25,822	14,639	37,004	0.368
	201 - 300	12	12	3.14	3,623	1,426	5,820	0.333
	301 - 500	2	1	2.41	386	0	2,046	0.297
	501 - 700	2	1	0.29	57	0	300	0.383
	All depths	122	91	4.99	32,458	20,958	43,957	0.366
Kodiak	1 - 100	69	28	1.25	4,804	1,774	7,834	0.242
	101 - 200	94	80	4.16	18,031	10,967	25,096	0.338
	201 - 300	13	13	4.66	5,352	0	13,215	0.279
	301 - 500	4	3	2.52	733	0	2,015	0.261
	501 - 700	2	2	0.44	77	0	335	0.247
	All depths	182	126	2.96	28,997	18,532	39,462	0.304
Yakutat	1 - 100	17	14	1.57	2,612	1,413	3,812	0.213
	101 - 200	29	25	1.52	4,477	1,171	7,783	0.146
	201 - 300	11	11	3.5	1,808	425	3,191	0.191
	301 - 500	5	5	2.3	604	413	796	0.17
	501 - 700	2	2	2.45	359	323	396	0.189
	All depths	64	57	1.78	9,862	6,233	13,490	0.17
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	20	5.18	5,744	1,880	9,608	0.171
	201 - 300	8	8	3.07	1,552	582	2,521	0.208
	301 - 500	4	3	1.73	541	0	1,666	0.277
	501 - 700	2	2	1.93	200	4	395	0.266
	All depths	40	33	2.99	8,036	4,048	12,024	0.183
All areas	1 - 100	215	102	1.02	13,211	9,415	17,007	0.291
	101 - 200	229	205	5.1	62,430	47,747	77,112	0.302
	201 - 300	55	52	3.64	13,108	5,129	21,087	0.269
	301 - 500	17	13	2.37	3,026	154	5,898	0.269
	501 - 700	10	9	0.93	759	515	1,003	0.235
	All depths	526	381	3	92,534	75,679	109,388	0.294

Table 15. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing rex sole, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Shumagin Bank	23	16	1.3	1,650	474	2,827
Shumagin	1-100	Davidson Bank	28	16	1.1	1,469	372	2,565
Shumagin	1-100	Fox Islands	10	3	0.1	66	0	144
Shumagin	1-100	Lower Alaska Peninsula	16	4	0.1	39	0	97
Shumagin	101-200	Sanak Gully	5	5	6.8	2,885	0	6,847
Shumagin	101-200	Shumagin Outer Shelf	18	16	6.3	5,130	908	9,351
Shumagin	101-200	West Shumagin Gully	3	3	1.5	341	0	834
Shumagin	201-300	Shumagin Slope	11	8	2.8	773	282	1,264
Shumagin	301-500	Shumagin Slope	2	1	3.0	761	0	10,434
Shumagin	501-700	Shumagin Slope	2	2	0.3	67	0	187
Chirikof	1-100	Upper Alaska Peninsula	13	7	1.3	998	29	1,968
Chirikof	1-100	Chirikof Bank	24	10	1.2	1,317	0	2,760
Chirikof	1-100	Semidi Bank	11	4	0.3	255	0	603
Chirikof	101-200	Shelikof Edge	21	21	14.1	10,910	2,623	19,198
Chirikof	101-200	Chirikof Outer Shelf	22	21	13.7	6,859	3,066	10,651
Chirikof	101-200	East Shumagin Gully	15	14	7.3	8,053	977	15,129
Chirikof	201-300	Chirikof Slope	5	5	5.3	804	0	1,911
Chirikof	201-300	Lower Shelikof Gully	7	7	2.8	2,819	766	4,872
Chirikof	301-500	Chirikof Slope	2	1	2.4	386	0	5,288
Chirikof	501-700	Chirikof Slope	2	1	0.3	56	0	774
Kodiak	1-100	Albatross Shallows	10	8	4.6	2,628	0	5,569
Kodiak	1-100	Kenai Peninsula	11	8	3.2	1,674	577	2,771
Kodiak	1-100	Northern Kodiak Shallows	7	1	0.4	92	0	317
Kodiak	1-100	Albatross Banks	32	11	0.3	410	80	739
Kodiak	101-200	Albatross Gullies	22	21	12.2	9,666	3,303	16,029
Kodiak	101-200	Portlock Flats	23	19	3.6	2,617	1,370	3,863
Kodiak	101-200	Kenai Flats	17	17	3.0	3,672	709	6,635
Kodiak	101-200	Kodiak Outer Shelf	16	14	2.0	1,020	378	1,662
Kodiak	101-200	Barren Islands	16	9	1.0	1,057	0	2,495
Kodiak	201-300	Kenai Gullies	7	7	7.6	5,085	0	13,220
Kodiak	201-300	Kodiak Slope	3	3	0.8	129	40	218
Kodiak	201-300	Upper Shelikof Gully	3	3	0.4	138	19	256
Kodiak	301-500	Kodiak Slope	4	3	2.5	733	0	2,202
Kodiak	501-700	Kodiak Slope	2	2	0.4	77	0	839
Yakutat	1-100	Yakutat Shallows	10	9	2.1	2,043	994	3,092
Yakutat	1-100	Middleton Shallows	7	5	0.8	569	0	1,349
Yakutat	101-200	Middleton Shelf	6	5	2.3	1,697	0	4,672
Yakutat	101-200	Yakutat Flats	7	7	2.2	2,013	0	4,358
Yakutat	101-200	Yakataga Shelf	5	5	0.8	433	0	1,183
Yakutat	101-200	Fairweather Shelf	11	8	0.4	334	91	577
Yakutat	201-300	Yakutat Gullies	5	5	4.2	1,266	0	2,722
Yakutat	201-300	Yakutat Slope	6	6	2.5	542	1	1,083
Yakutat	301-500	Yakutat Gullies	2	2	3.5	384	178	591
Yakutat	301-500	Yakutat Slope	3	3	1.4	220	0	470
Yakutat	501-700	Yakutat Slope	2	2	2.4	359	250	468
Southeastern	101-200	Prince of Wales Shelf	15	14	7.7	5,313	1,437	9,188
Southeastern	101-200	Baranof-Chichagof Shelf	7	6	1.0	431	58	804
Southeastern	201-300	Prince of Wales Slope/Gullies	6	6	3.7	1,460	443	2,476
Southeastern	201-300	Baranof-Chichagof Slope	2	2	0.8	92	0	417
Southeastern	301-500	Southeastern Deep Gullies	3	2	2.2	526	0	2,048
Southeastern	301-500	Southeastern Slope	1	1	0.2	15		
Southeastern	501-700	Southeastern Slope	2	2	1.9	200	0	776

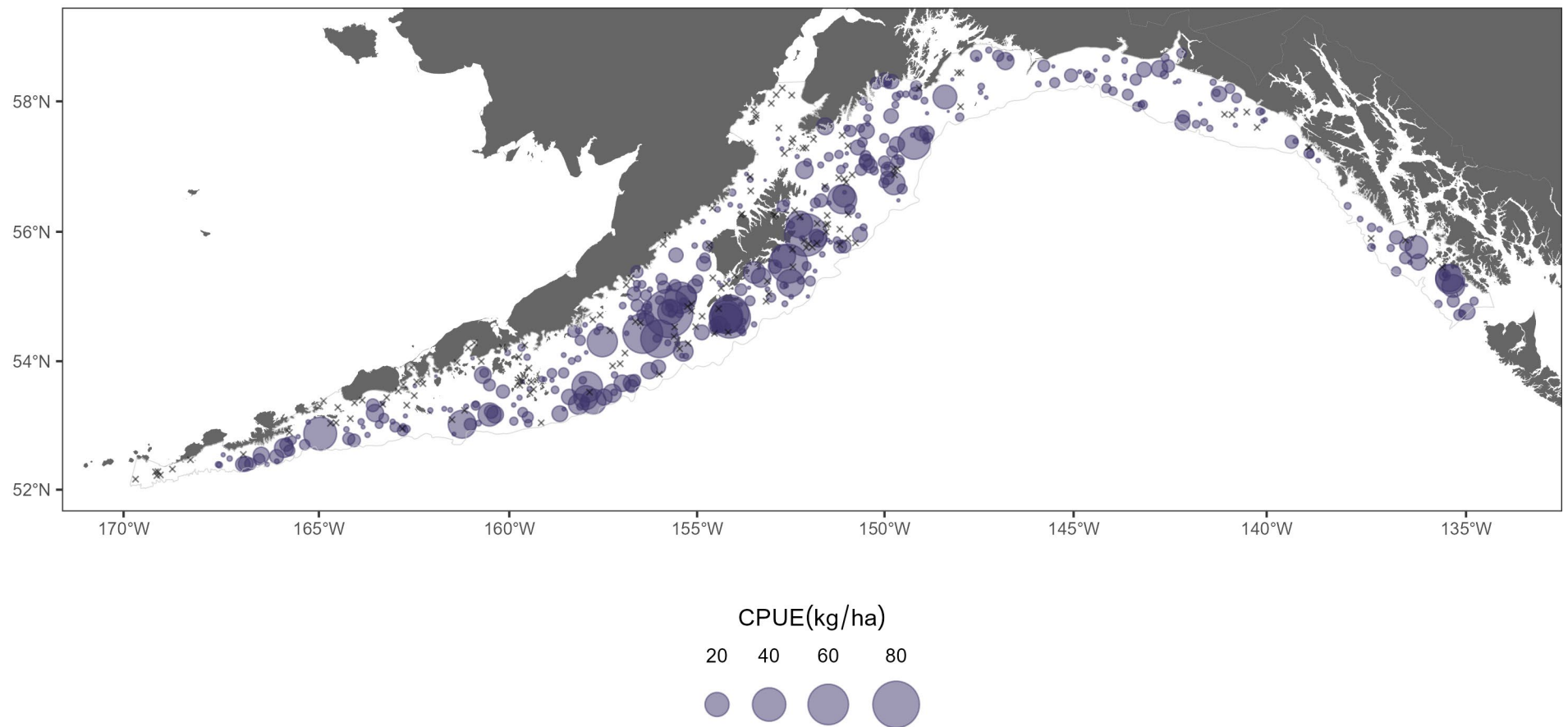


Figure 16. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of rex sole in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

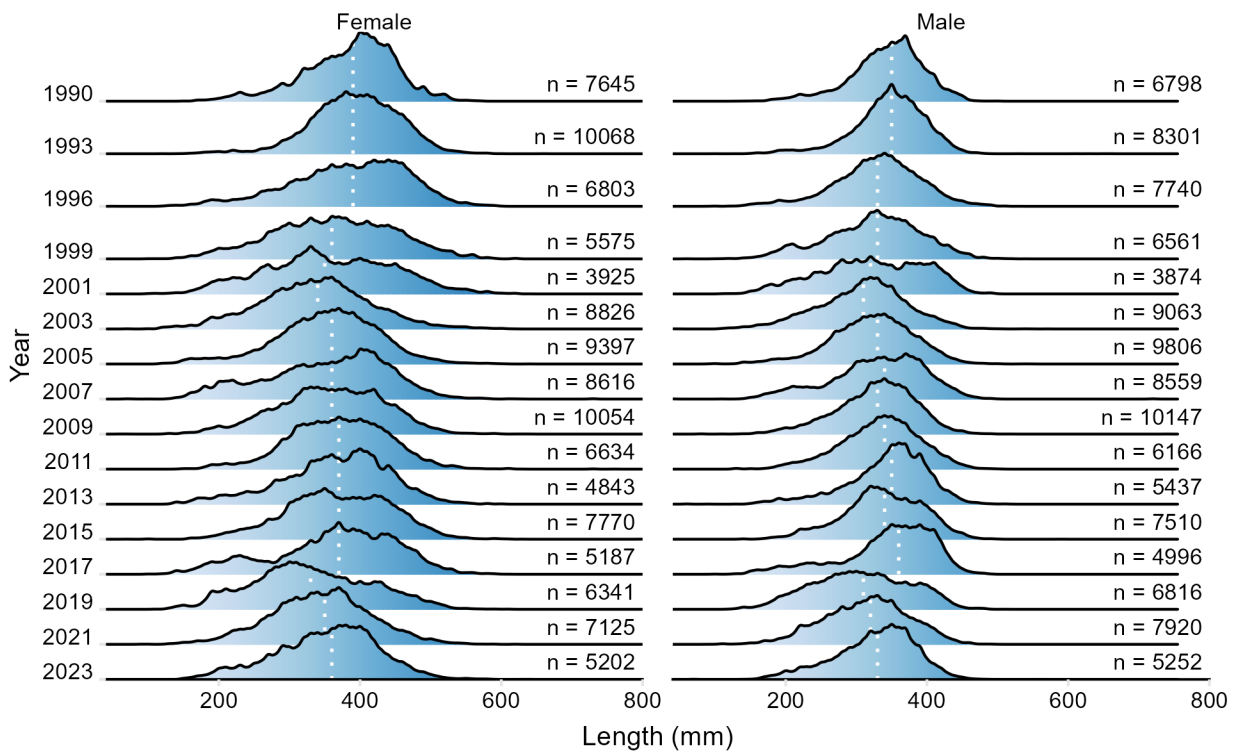


Figure 17. -- Population length composition of rex sole in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

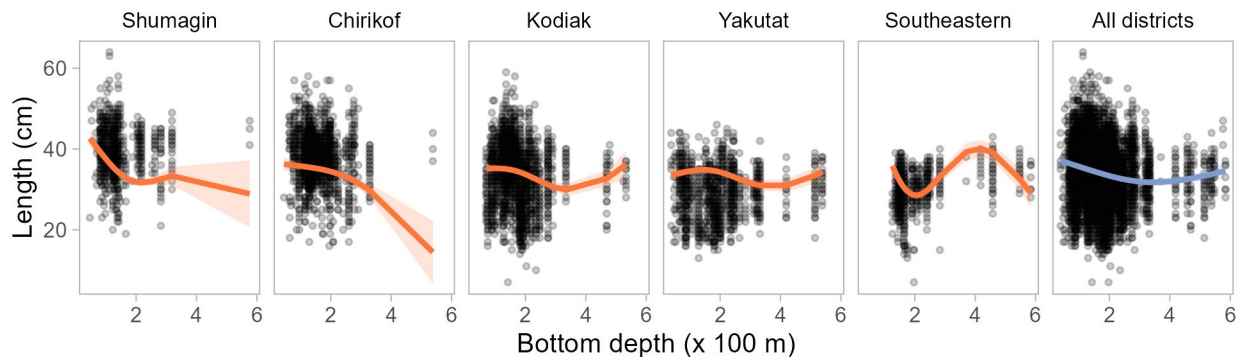


Figure 18. -- Length versus depth for rex sole by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Dover sole (*Microstomus pacificus*)

- Dover sole was the 15th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of Dover sole in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 48,934 mt (Table **16**), which is a 6.2% increase from 2021.
- The largest estimated biomass for Dover sole was in the Yakutat region, and the depth range with the largest estimated biomass was 101 - 200 m.
- The highest CPUEs were recorded in the Yakutat and Southeastern regions (Table **16** and Fig. **19**).
- Length distributions by year are provided in Figure **20** (total survey sample size N = 2,752; Fig. **21**). On average, the longest individuals were found in the Yakutat region and in a depth range of 501 – 700 m.

Table 16. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing Dover sole, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	4	0.01	46	0	98	0.45
	101 - 200	26	6	0.07	107	0	244	0.484
	201 - 300	11	4	0.06	16	1	31	0.4
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	118	14	0.03	169	31	308	0.465
Chirikof	1 - 100	48	8	0.22	565	0	1,369	0.671
	101 - 200	58	37	1.31	3,135	928	5,342	0.587
	201 - 300	12	9	0.79	918	159	1,676	0.486
	301 - 500	2	2	3.83	615	143	1,086	0.713
	501 - 700	2	2	0.84	163	0	640	0.798
	All depths	122	58	0.83	5,395	2,964	7,826	0.59
Kodiak	1 - 100	69	21	0.38	1,459	175	2,742	0.374
	101 - 200	94	58	1.27	5,481	2,069	8,893	0.705
	201 - 300	13	11	3.11	3,576	594	6,558	0.758
	301 - 500	4	3	3.45	1,004	0	2,901	0.685
	501 - 700	2	2	8.69	1,517	0	4,419	0.922
	All depths	182	95	1.33	13,036	8,238	17,835	0.668
Yakutat	1 - 100	17	9	1.34	2,225	0	4,965	0.447
	101 - 200	29	22	4.44	13,053	4,536	21,570	0.751
	201 - 300	11	9	6.72	3,477	0	7,094	0.779
	301 - 500	5	5	5.33	1,400	0	3,960	0.683
	501 - 700	2	2	2.12	311	0	1,058	0.656
	All depths	64	47	3.7	20,465	11,145	29,786	0.698
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	16	3.4	3,766	973	6,560	0.448
	201 - 300	8	7	2.14	1,080	529	1,631	0.415
	301 - 500	4	4	13	4,111	0	10,320	0.739
	501 - 700	2	2	8.82	911	0	2,160	0.922
	All depths	40	29	3.68	9,868	4,486	15,250	0.562
All areas	1 - 100	215	42	0.33	4,295	1,198	7,391	0.437
	101 - 200	229	139	2.09	25,542	15,939	35,145	0.653
	201 - 300	55	40	2.52	9,067	4,928	13,205	0.661
	301 - 500	17	14	5.57	7,129	1,149	13,109	0.717
	501 - 700	10	8	3.54	2,902	475	5,329	0.877
	All depths	526	243	1.59	48,934	37,326	60,542	0.645

Table 17. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing Dover sole, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Lower Alaska Peninsula	16	1	0.0	11	0	34
Shumagin	1-100	Davidson Bank	28	1	0.0	19	0	57
Shumagin	1-100	Shumagin Bank	23	2	0.0	16	0	45
Shumagin	101-200	Sanak Gully	5	1	0.1	53	0	200
Shumagin	101-200	Shumagin Outer Shelf	18	5	0.1	54	5	104
Shumagin	201-300	Shumagin Slope	11	4	0.1	16	1	31
Chirikof	1-100	Chirikof Bank	24	5	0.5	521	0	1,324
Chirikof	1-100	Upper Alaska Peninsula	13	3	0.1	44	0	111
Chirikof	101-200	Shelikof Edge	21	16	3.0	2,314	221	4,406
Chirikof	101-200	East Shumagin Gully	15	7	0.6	713	0	1,572
Chirikof	101-200	Chirikof Outer Shelf	22	14	0.2	108	31	185
Chirikof	201-300	Chirikof Slope	5	5	1.4	218	126	310
Chirikof	201-300	Lower Shelikof Gully	7	4	0.7	699	0	1,480
Chirikof	301-500	Chirikof Slope	2	2	3.8	615	0	2,007
Chirikof	501-700	Chirikof Slope	2	2	0.8	163	0	1,570
Kodiak	1-100	Northern Kodiak Shallows	7	3	2.0	438	0	1,330
Kodiak	1-100	Albatross Shallows	10	7	1.5	872	0	1,929
Kodiak	1-100	Kenai Peninsula	11	7	0.2	98	15	181
Kodiak	1-100	Albatross Banks	32	3	0.0	48	0	110
Kodiak	1-100	Lower Cook Inlet	9	1	0.0	3	0	9
Kodiak	101-200	Kenai Flats	17	14	2.7	3,258	36	6,480
Kodiak	101-200	Albatross Gullies	22	14	1.6	1,268	202	2,334
Kodiak	101-200	Kodiak Outer Shelf	16	6	0.6	321	0	884
Kodiak	101-200	Portlock Flats	23	13	0.4	272	126	419
Kodiak	101-200	Barren Islands	16	11	0.3	362	147	577
Kodiak	201-300	Kenai Gullies	7	7	5.0	3,301	228	6,374
Kodiak	201-300	Upper Shelikof Gully	3	2	0.6	193	0	640
Kodiak	201-300	Kodiak Slope	3	2	0.5	82	0	265
Kodiak	301-500	Kodiak Slope	4	3	3.4	1,004	0	3,178
Kodiak	501-700	Kodiak Slope	2	2	8.7	1,517	0	10,088
Yakutat	1-100	Yakutat Shallows	10	5	1.9	1,918	0	4,666
Yakutat	1-100	Middleton Shallows	7	4	0.5	308	0	971
Yakutat	101-200	Yakutat Flats	7	7	5.9	5,305	0	12,275
Yakutat	101-200	Middleton Shelf	6	4	4.2	3,066	0	8,108
Yakutat	101-200	Fairweather Shelf	11	7	3.8	2,965	0	6,539
Yakutat	101-200	Yakataga Shelf	5	4	3.3	1,717	0	4,800
Yakutat	201-300	Yakutat Gullies	5	4	9.6	2,911	0	6,793
Yakutat	201-300	Yakutat Slope	6	5	2.7	566	165	967
Yakutat	301-500	Yakutat Gullies	2	2	10.6	1,172	0	8,709
Yakutat	301-500	Yakutat Slope	3	3	1.5	228	29	427
Yakutat	501-700	Yakutat Slope	2	2	2.1	311	0	2,516
Southeastern	101-200	Prince of Wales Shelf	15	12	5.2	3,570	773	6,367
Southeastern	101-200	Baranof-Chichagof Shelf	7	4	0.5	196	0	528
Southeastern	201-300	Prince of Wales Slope/Gullies	6	5	2.2	860	295	1,425
Southeastern	201-300	Baranof-Chichagof Slope	2	2	2.0	220	0	840
Southeastern	301-500	Southeastern Deep Gullies	3	3	17.0	3,996	0	12,392
Southeastern	301-500	Southeastern Slope	1	1	1.5	115		
Southeastern	501-700	Southeastern Slope	2	2	8.8	911	0	4,599

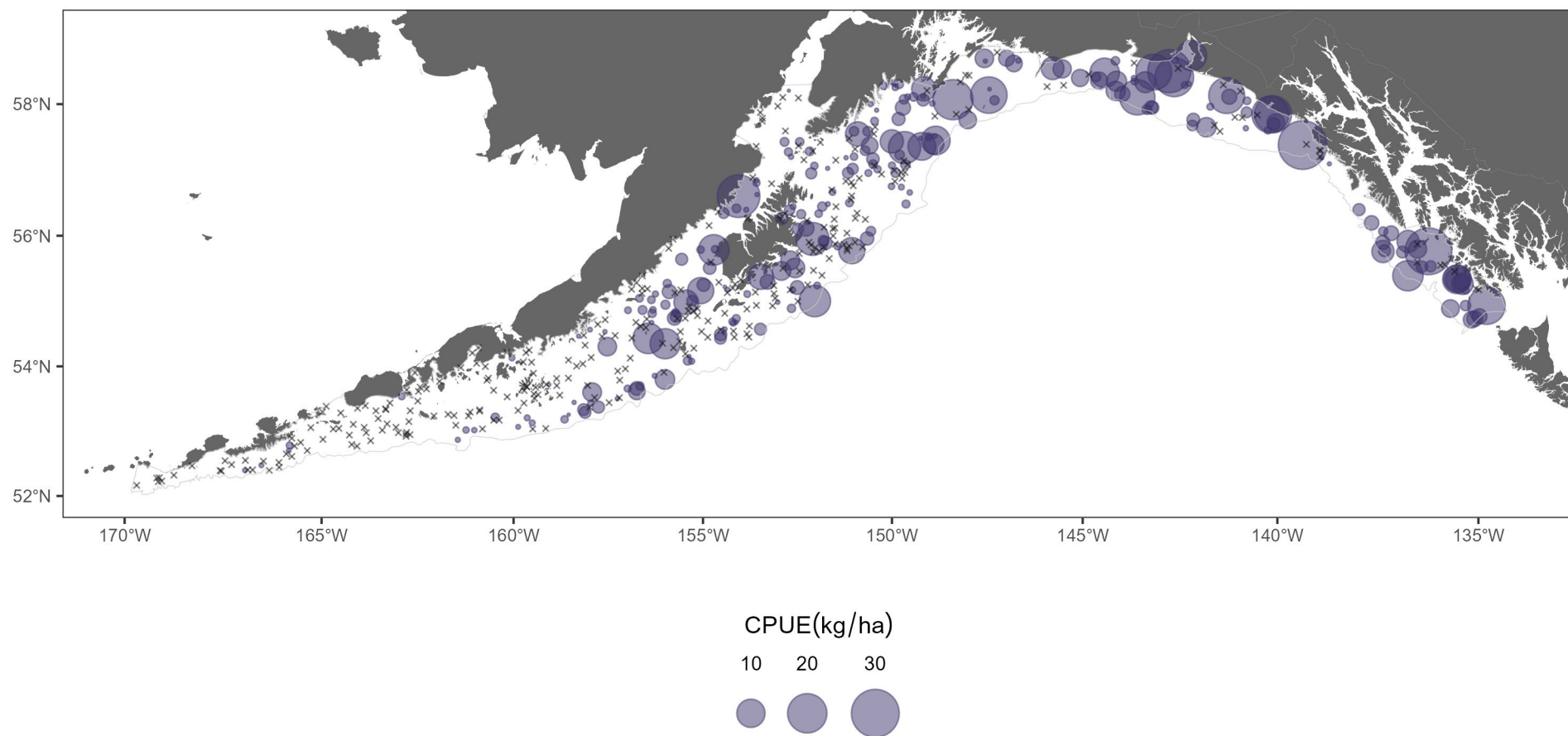


Figure 19. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of Dover sole in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

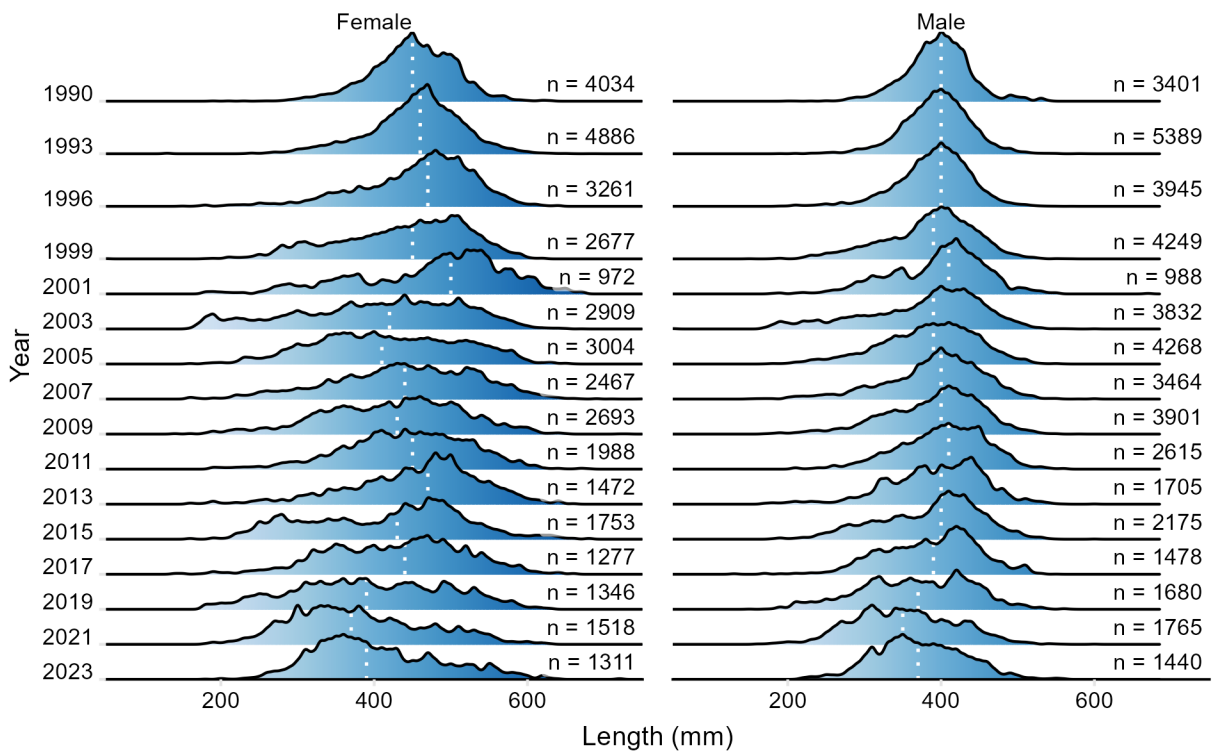


Figure 20. -- Population length composition of Dover sole in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

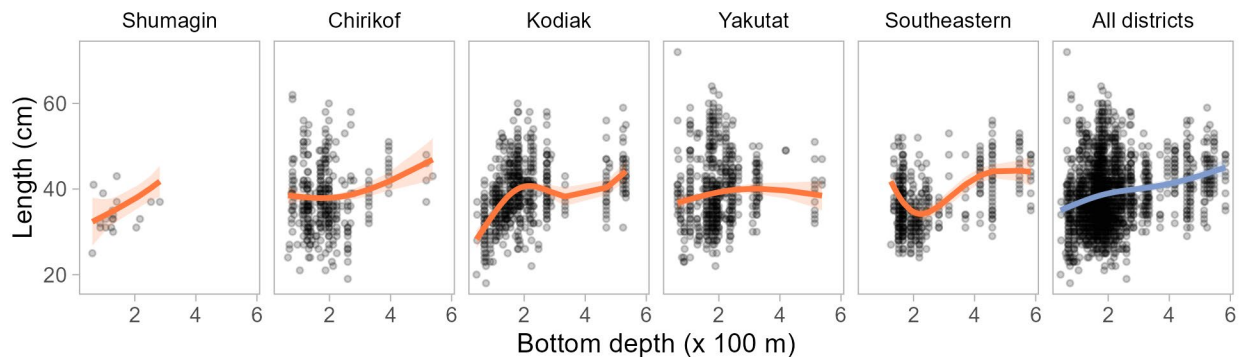


Figure 21. -- Length versus depth for Dover sole by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Starry flounder (*Platichthys stellatus*)

- Starry flounder was the 18th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of starry flounder in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 41,628 mt (Table **18**), which is an 80.2% increase from 2021.
- The largest estimated biomass for starry flounder was in the Shumagin region, and the depth range with the largest estimated biomass was 1 - 100 m.
- The highest CPUEs were recorded in the Shumagin and Yakutat regions (Table **18** and Fig. **22**).
- Length distributions by year are provided in Figure **23** (total survey sample size N = 554; Fig. **24**). On average, the longest individuals were found in the Chirikof region and in a depth range of 1 – 100 m.

Table 18. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing starry flounder, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	14	4.23	17,465	0	44,779	1.774
	101 - 200	26	0	---	---	---	---	---
	201 - 300	11	0	---	---	---	---	---
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	118	14	2.76	17,465	0	44,779	1.774
Chirikof	1 - 100	48	8	1.41	3,668	0	7,382	2.066
	101 - 200	58	0	---	---	---	---	---
	201 - 300	12	0	---	---	---	---	---
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	122	8	0.56	3,668	0	7,382	2.066
Kodiak	1 - 100	69	11	2.16	8,333	0	17,953	1.174
	101 - 200	94	0	---	---	---	---	---
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	182	11	0.85	8,333	0	17,953	1.174
Yakutat	1 - 100	17	5	7.3	12,162	0	29,894	1.996
	101 - 200	29	0	---	---	---	---	---
	201 - 300	11	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	64	5	2.2	12,162	0	29,894	1.996
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	0	---	---	---	---	---
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	40	0	---	---	---	---	---
All areas	1 - 100	215	38	3.23	41,628	8,792	74,464	1.678
	101 - 200	229	0	---	---	---	---	---
	201 - 300	55	0	---	---	---	---	---
	301 - 500	17	0	---	---	---	---	---
	501 - 700	10	0	---	---	---	---	---
	All depths	526	38	1.35	41,628	8,792	74,464	1.678

Table 19. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing starry flounder, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Davidson Bank	28	1	9.7	13,260	0	40,468
Shumagin	1-100	Lower Alaska Peninsula	16	10	3.8	2,636	243	5,028
Shumagin	1-100	Shumagin Bank	23	3	1.3	1,570	0	3,408
Chirikof	1-100	Upper Alaska Peninsula	13	4	3.2	2,563	0	6,063
Chirikof	1-100	Chirikof Bank	24	4	1.0	1,105	0	2,632
Kodiak	1-100	Lower Cook Inlet	9	5	7.9	7,807	0	17,590
Kodiak	1-100	Northern Kodiak Shallows	7	5	2.1	451	0	1,146
Kodiak	1-100	Kenai Peninsula	11	1	0.1	75	0	242
Yakutat	1-100	Yakutat Shallows	10	3	10.2	10,139	0	27,835
Yakutat	1-100	Middleton Shallows	7	2	3.0	2,023	0	6,735

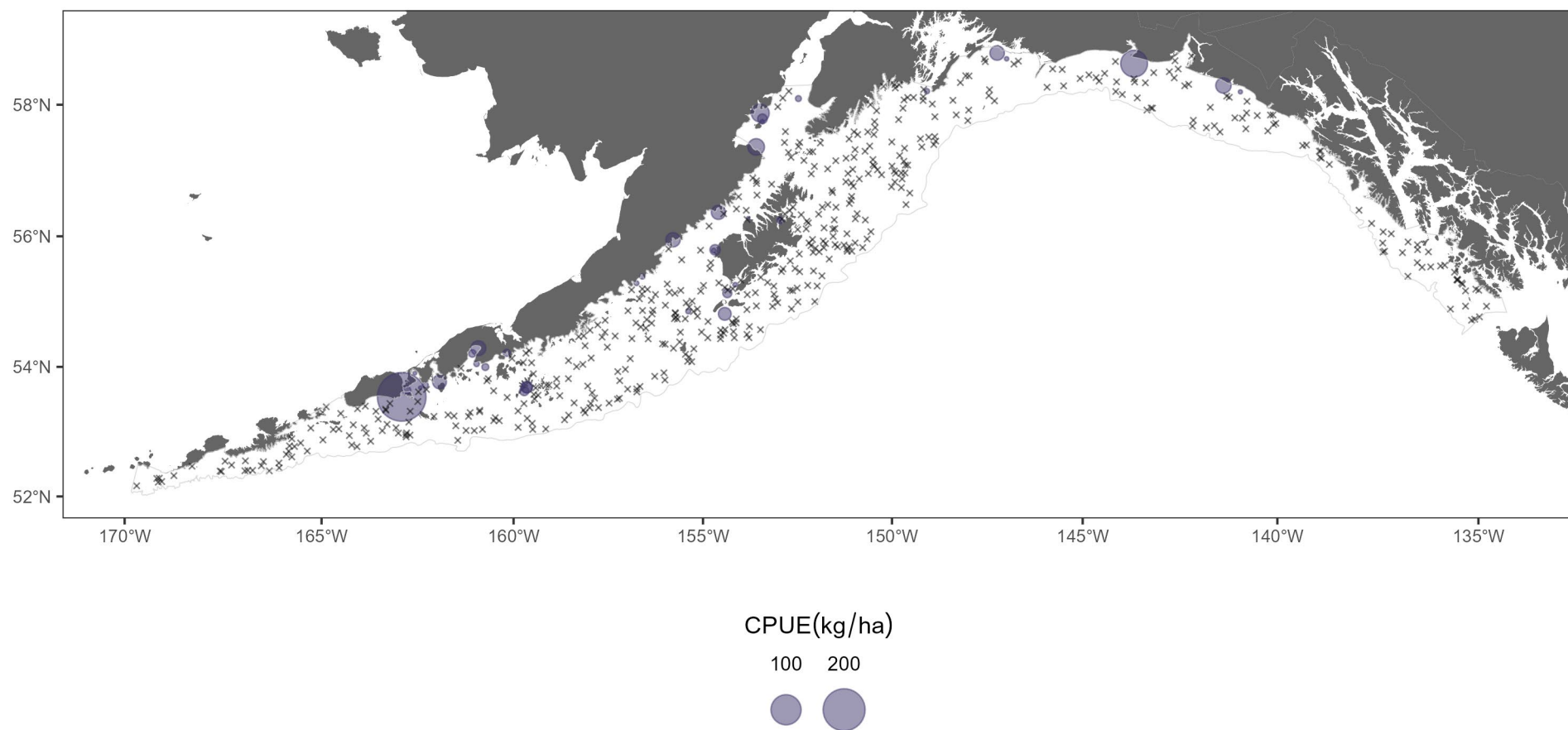


Figure 22. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of starry flounder in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

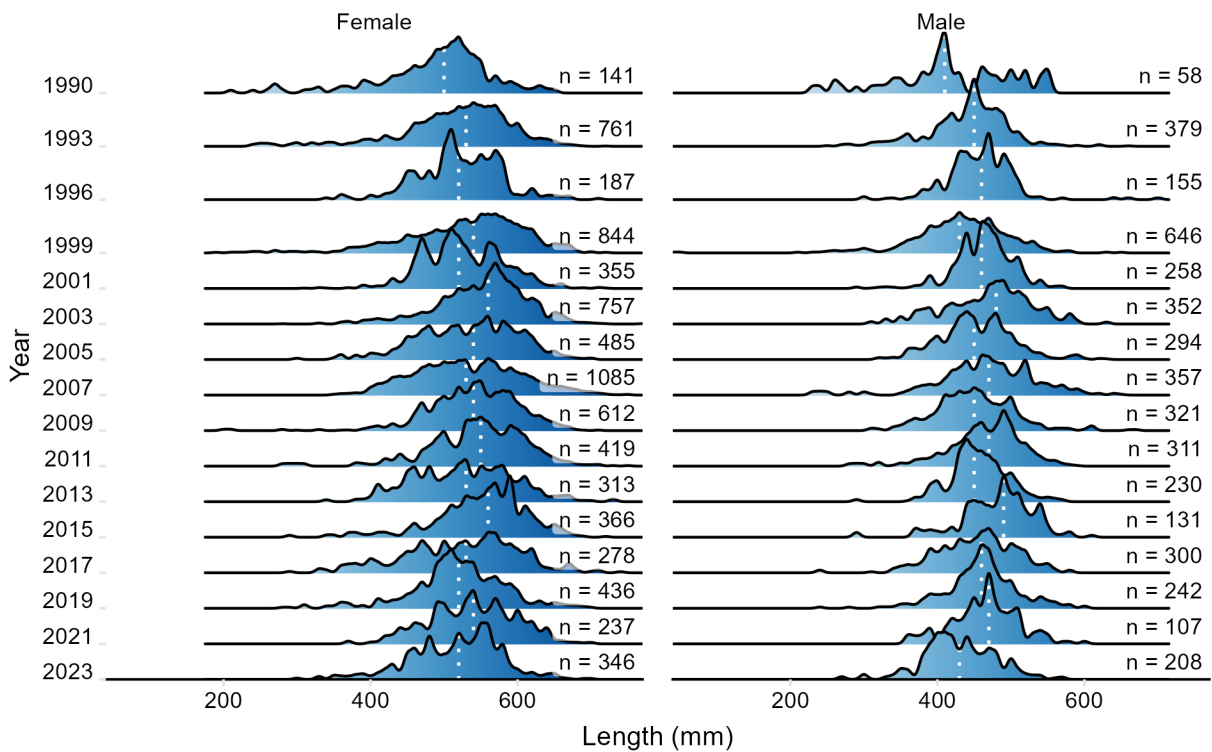


Figure 23. -- Population length composition of starry flounder in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

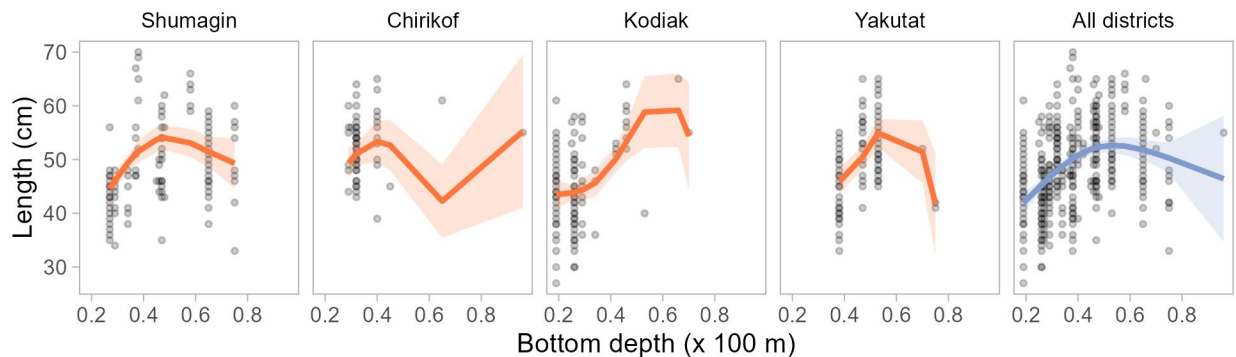


Figure 24. -- Length versus depth for starry flounder by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Pacific cod (*Gadus macrocephalus*)

- Pacific cod was the 5th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of Pacific cod in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 231,184 mt (Table **20**), which is a 32.5% increase from 2021.
- The largest estimated biomass for Pacific cod was in the Kodiak region, and the depth range with the largest estimated biomass was 1 - 100 m.
- The highest CPUEs were recorded in the Chirikof and Shumagin regions (Table **20** and Fig. **25**).
- Length distributions by year are provided in Figure **26** (total survey sample size N = 5,491; Fig. **27**). On average, the longest individuals were found in the Yakutat region and in a depth range of 201 – 300 m.

Table 20. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing Pacific cod, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	76	12.25	50,585	30,113	71,057	1.255
	101 - 200	26	21	7.45	10,935	5,386	16,484	2.863
	201 - 300	11	3	0.74	207	0	479	4.23
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	118	100	9.75	61,726	40,609	82,843	1.398
Chirikof	1 - 100	48	42	18.98	49,415	0	99,236	1.902
	101 - 200	58	32	6.54	15,594	0	34,414	1.991
	201 - 300	12	3	1.14	1,315	0	4,279	2.924
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	122	77	10.21	66,324	14,366	118,282	1.935
Kodiak	1 - 100	69	56	11.6	44,674	28,859	60,488	1.328
	101 - 200	94	73	7.68	33,298	22,822	43,774	2.127
	201 - 300	13	3	1.42	1,635	0	5,052	2.973
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	182	132	8.12	79,606	60,806	98,407	1.597
Yakutat	1 - 100	17	10	4.81	8,022	1,303	14,740	1.878
	101 - 200	29	8	3.94	11,576	0	23,720	3.222
	201 - 300	11	2	0.35	181	0	505	2.593
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	64	20	3.58	19,779	6,417	33,141	2.493
Southeastern	1 - 100	4	1	0.16	108	0	406	0.154
	101 - 200	22	15	1.85	2,053	547	3,559	2.009
	201 - 300	8	6	3.15	1,589	714	2,464	2.146
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	40	22	1.4	3,750	2,090	5,409	1.524
All areas	1 - 100	215	185	11.84	152,803	98,015	207,591	1.457
	101 - 200	229	149	6	73,455	48,817	98,093	2.301
	201 - 300	55	17	1.37	4,927	912	8,942	2.651
	301 - 500	17	0	---	---	---	---	---
	501 - 700	10	0	---	---	---	---	---
	All depths	526	351	7.5	231,184	171,649	290,720	1.667

Table 21. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing Pacific cod, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Lower Alaska Peninsula	16	16	22.8	15,656	7,497	23,815
Shumagin	1-100	Fox Islands	10	10	15.5	12,898	0	29,464
Shumagin	1-100	Davidson Bank	28	28	9.2	12,532	5,988	19,076
Shumagin	1-100	Shumagin Bank	23	22	7.7	9,499	0	19,020
Shumagin	101-200	Shumagin Outer Shelf	18	16	11.7	9,522	4,268	14,777
Shumagin	101-200	West Shumagin Gully	3	2	4.6	1,047	0	5,003
Shumagin	101-200	Sanak Gully	5	3	0.9	366	0	842
Shumagin	201-300	Shumagin Slope	11	3	0.7	207	0	483
Chirikof	1-100	Upper Alaska Peninsula	13	13	46.8	37,133	0	87,022
Chirikof	1-100	Semidi Bank	11	9	7.1	5,195	1,573	8,818
Chirikof	1-100	Chirikof Bank	24	20	6.6	7,087	2,386	11,788
Chirikof	101-200	East Shumagin Gully	15	7	10.0	11,133	0	29,928
Chirikof	101-200	Chirikof Outer Shelf	22	14	3.6	1,814	365	3,263
Chirikof	101-200	Shelikof Edge	21	11	3.4	2,647	856	4,438
Chirikof	201-300	Lower Shelikof Gully	7	1	1.2	1,253	0	4,318
Chirikof	201-300	Chirikof Slope	5	2	0.4	62	0	180
Kodiak	1-100	Northern Kodiak Shallows	7	6	20.8	4,584	0	9,181
Kodiak	1-100	Albatross Banks	32	31	19.1	29,395	15,449	43,341
Kodiak	1-100	Albatross Shallows	10	10	11.1	6,382	4,279	8,486
Kodiak	1-100	Kenai Peninsula	11	5	7.7	4,043	0	10,690
Kodiak	1-100	Lower Cook Inlet	9	4	0.3	268	0	744
Kodiak	101-200	Portlock Flats	23	18	14.7	10,816	4,058	17,574
Kodiak	101-200	Albatross Gullies	22	19	9.4	7,416	3,422	11,411
Kodiak	101-200	Kenai Flats	17	11	5.8	6,947	160	13,734
Kodiak	101-200	Barren Islands	16	14	5.4	5,946	2,870	9,021
Kodiak	101-200	Kodiak Outer Shelf	16	11	4.3	2,173	1,143	3,203
Kodiak	201-300	Upper Shelikof Gully	3	1	3.7	1,186	0	6,287
Kodiak	201-300	Kenai Gullies	7	2	0.7	449	0	1,260
Yakutat	1-100	Yakutat Shallows	10	7	6.0	6,012	0	12,290
Yakutat	1-100	Middleton Shallows	7	3	3.0	2,010	0	5,447
Yakutat	101-200	Fairweather Shelf	11	4	9.1	7,015	0	17,186
Yakutat	101-200	Yakataga Shelf	5	1	6.4	3,360	0	12,686
Yakutat	101-200	Middleton Shelf	6	2	1.5	1,107	0	3,667
Yakutat	101-200	Yakutat Flats	7	1	0.1	94	0	325
Yakutat	201-300	Yakutat Slope	6	2	0.9	181	0	522
Southeastern	1-100	Southeastern Shallows	4	1	0.2	108	0	450
Southeastern	101-200	Prince of Wales Shelf	15	10	2.2	1,512	52	2,973
Southeastern	101-200	Baranof-Chichagof Shelf	7	5	1.3	540	16	1,064
Southeastern	201-300	Baranof-Chichagof Slope	2	2	6.4	717	207	1,227
Southeastern	201-300	Prince of Wales Slope/Gullies	6	4	2.2	872	0	1,786

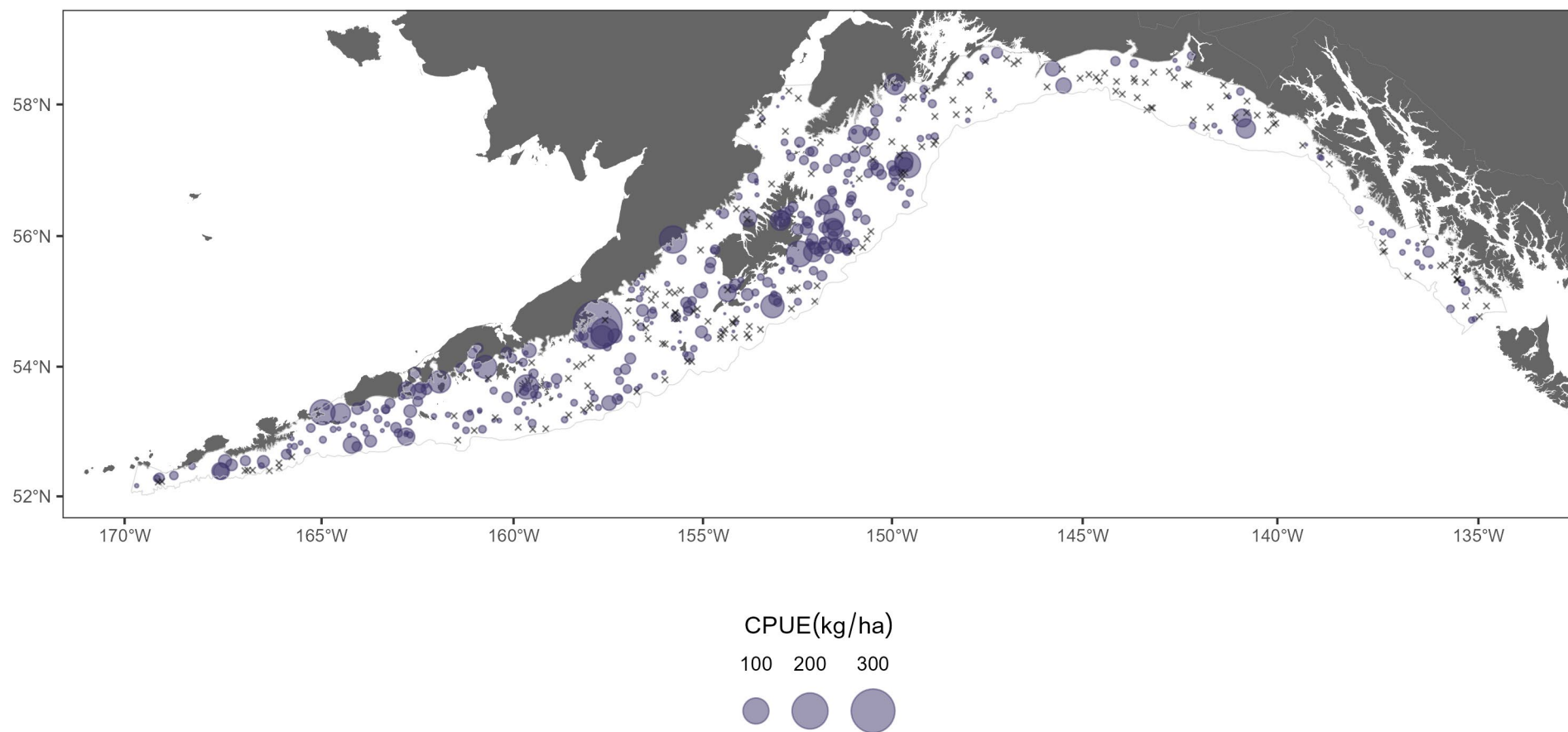


Figure 25. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of Pacific cod in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

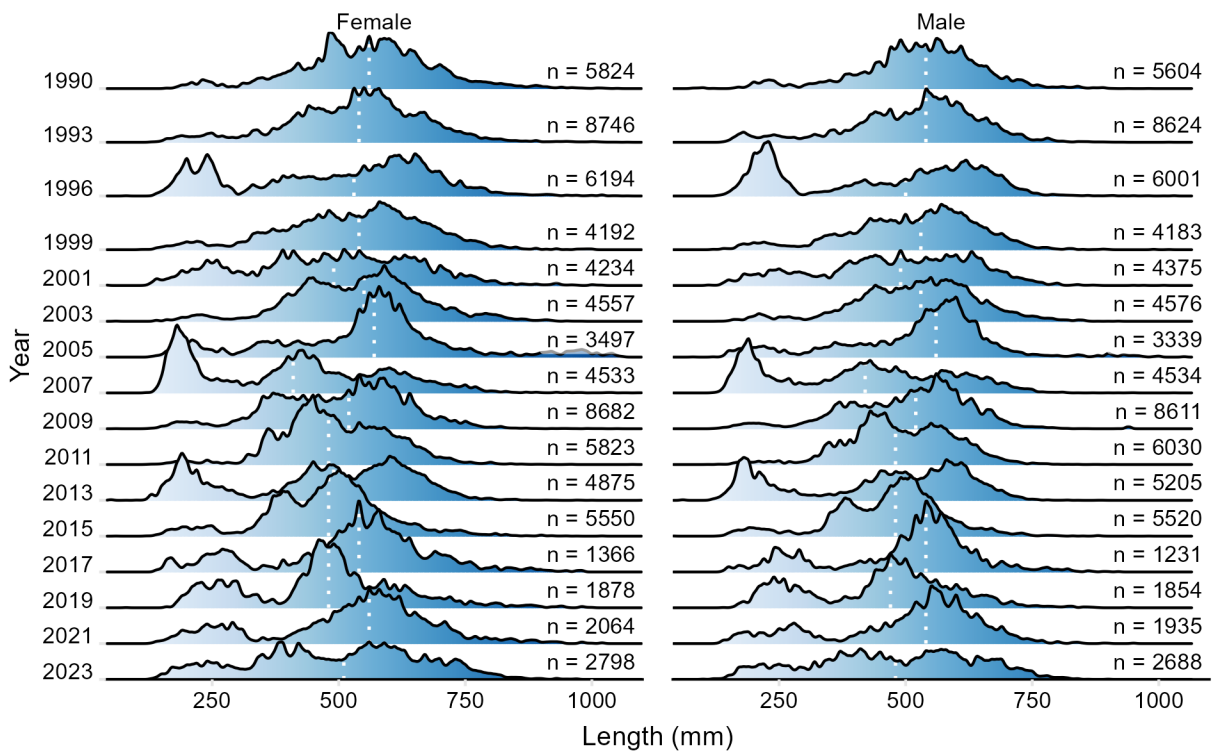


Figure 26. -- Population length composition of Pacific cod in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

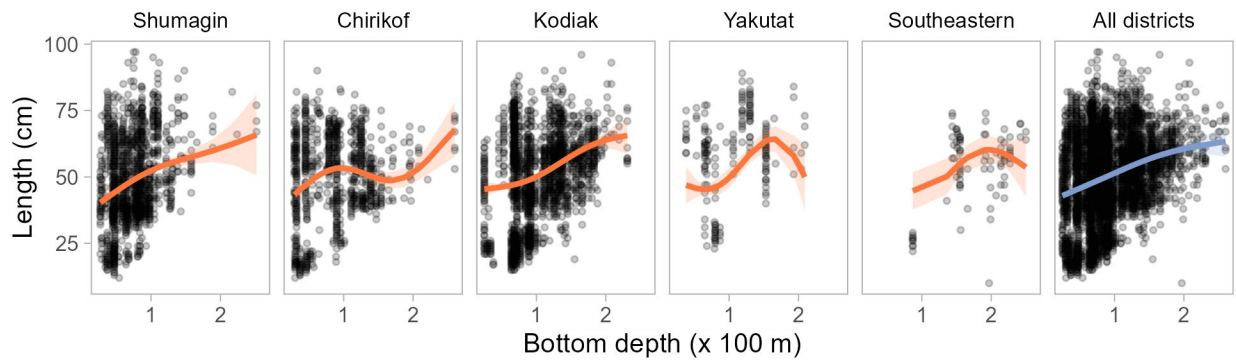


Figure 27. -- Length versus depth for Pacific cod by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Walleye pollock (*Gadus chalcogrammus*)

- Walleye pollock was the 3rd most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of walleye pollock in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 921,866 mt (Table **22**), which is a 74.3% increase from 2021.
- The largest estimated biomass for walleye pollock was in the Shumagin region, and the depth range with the largest estimated biomass was 1 - 100 m.
- The highest CPUEs were recorded in the Shumagin and Chirikof regions (Table **22** and Fig. **28**).
- Length distributions by year are provided in Figure **29** (total survey sample size N = 26,389; Fig. **30**). On average, the longest individuals were found in the Kodiak region and in a depth range of 301 - 500 m.

Table 22. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing walleye pollock, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	75	79.97	330,173	168,086	492,260	0.5
	101 - 200	26	26	99.02	145,336	77,633	213,039	0.552
	201 - 300	11	8	16.81	4,686	436	8,936	0.711
	301 - 500	2	1	0.18	46	0	246	0.875
	501 - 700	2	0	---	---	---	---	---
	All depths	118	110	75.88	480,242	305,342	655,141	0.516
Chirikof	1 - 100	48	33	40.2	104,657	909	208,405	0.612
	101 - 200	58	45	21.09	50,303	8,948	91,659	0.711
	201 - 300	12	10	4	4,618	214	9,023	0.754
	301 - 500	2	1	0.32	51	0	271	0.59
	501 - 700	2	1	1.33	259	0	1,373	0.482
	All depths	122	90	24.6	159,889	50,655	269,122	0.643
Kodiak	1 - 100	69	52	13.09	50,420	9,317	91,523	0.327
	101 - 200	94	84	39.33	170,428	71,431	269,425	0.732
	201 - 300	13	11	3.96	4,552	1,581	7,523	0.767
	301 - 500	4	3	0.62	182	0	424	0.791
	501 - 700	2	0	---	---	---	---	---
	All depths	182	150	23.02	225,582	119,736	331,428	0.574
Yakutat	1 - 100	17	15	8.05	13,412	3,027	23,797	0.14
	101 - 200	29	29	10.6	31,156	1,413	60,899	0.214
	201 - 300	11	11	7.13	3,689	268	7,110	0.255
	301 - 500	5	4	1.12	294	0	738	0.717
	501 - 700	2	0	---	---	---	---	---
	All depths	64	59	8.78	48,551	17,772	79,329	0.189
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	17	4.61	5,109	1,440	8,777	0.285
	201 - 300	8	7	4.83	2,439	0	5,462	0.408
	301 - 500	4	1	0.18	55	0	232	1.76
	501 - 700	2	0	---	---	---	---	---
	All depths	40	25	2.83	7,603	3,194	12,012	0.318
All areas	1 - 100	215	175	38.64	498,662	306,895	690,428	0.461
	101 - 200	229	201	32.89	402,332	275,799	528,866	0.551
	201 - 300	55	47	5.54	19,984	12,630	27,339	0.511
	301 - 500	17	10	0.49	629	225	1,032	0.775
	501 - 700	10	1	0.32	259	0	1,373	0.482
	All depths	526	434	29.89	921,866	692,002	1,151,730	0.498

Table 23. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing walleye pollock, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Davidson Bank	28	27	110.3	150,933	16,188	285,678
Shumagin	1-100	Shumagin Bank	23	23	92.0	114,112	26,723	201,501
Shumagin	1-100	Lower Alaska Peninsula	16	15	59.9	41,162	2,618	79,706
Shumagin	1-100	Fox Islands	10	10	28.8	23,966	14,427	33,504
Shumagin	101-200	Shumagin Outer Shelf	18	18	151.1	123,166	56,402	189,931
Shumagin	101-200	Sanak Gully	5	5	45.8	19,438	0	39,436
Shumagin	101-200	West Shumagin Gully	3	3	12.0	2,732	504	4,959
Shumagin	201-300	Shumagin Slope	11	8	16.8	4,686	384	8,988
Shumagin	301-500	Shumagin Slope	2	1	0.2	46	0	635
Chirikof	1-100	Upper Alaska Peninsula	13	10	99.4	78,968	0	181,518
Chirikof	1-100	Chirikof Bank	24	14	23.4	25,297	2,217	48,377
Chirikof	1-100	Semidi Bank	11	9	0.5	391	0	1,029
Chirikof	101-200	Chirikof Outer Shelf	22	17	33.7	16,877	0	35,838
Chirikof	101-200	East Shumagin Gully	15	11	28.1	31,166	0	68,109
Chirikof	101-200	Shelikof Edge	21	17	2.9	2,261	380	4,142
Chirikof	201-300	Chirikof Slope	5	5	18.6	2,847	0	7,774
Chirikof	201-300	Lower Shelikof Gully	7	5	1.8	1,772	0	3,730
Chirikof	301-500	Chirikof Slope	2	1	0.3	51	0	700
Chirikof	501-700	Chirikof Slope	2	1	1.3	259	0	3,550
Kodiak	1-100	Albatross Shallows	10	9	41.0	23,641	0	57,323
Kodiak	1-100	Kenai Peninsula	11	11	29.7	15,610	0	42,463
Kodiak	1-100	Northern Kodiak Shallows	7	3	12.2	2,690	0	7,014
Kodiak	1-100	Albatross Banks	32	22	5.1	7,880	0	18,968
Kodiak	1-100	Lower Cook Inlet	9	7	0.6	599	0	1,268
Kodiak	101-200	Albatross Gullies	22	20	98.8	78,203	515	155,891
Kodiak	101-200	Kodiak Outer Shelf	16	13	79.9	40,167	0	101,964
Kodiak	101-200	Barren Islands	16	16	24.4	26,739	5,194	48,285
Kodiak	101-200	Portlock Flats	23	18	14.9	10,937	0	23,989
Kodiak	101-200	Kenai Flats	17	17	11.9	14,381	4,515	24,247
Kodiak	201-300	Upper Shelikof Gully	3	3	8.1	2,608	0	7,022
Kodiak	201-300	Kenai Gullies	7	6	2.8	1,893	0	3,898
Kodiak	201-300	Kodiak Slope	3	2	0.3	51	0	206
Kodiak	301-500	Kodiak Slope	4	3	0.6	182	0	460
Yakutat	1-100	Yakutat Shallows	10	9	10.6	10,561	329	20,792
Yakutat	1-100	Middleton Shallows	7	6	4.2	2,851	0	6,136
Yakutat	101-200	Yakutat Flats	7	7	17.4	15,747	0	46,004
Yakutat	101-200	Fairweather Shelf	11	11	11.0	8,469	4,900	12,038
Yakutat	101-200	Middleton Shelf	6	6	8.9	6,507	0	14,989
Yakutat	101-200	Yakataga Shelf	5	5	0.8	432	28	836
Yakutat	201-300	Yakutat Slope	6	6	12.5	2,664	0	6,366
Yakutat	201-300	Yakutat Gullies	5	5	3.4	1,025	31	2,018
Yakutat	301-500	Yakutat Slope	3	2	1.4	211	0	808
Yakutat	301-500	Yakutat Gullies	2	2	0.7	83	0	284
Southeastern	101-200	Prince of Wales Shelf	15	14	7.3	5,038	1,347	8,730
Southeastern	101-200	Baranof-Chichagof Shelf	7	3	0.2	70	0	181
Southeastern	201-300	Prince of Wales Slope/Gullies	6	5	5.6	2,185	0	5,341
Southeastern	201-300	Baranof-Chichagof Slope	2	2	2.3	254	0	2,047
Southeastern	301-500	Southeastern Deep Gullies	3	1	0.2	55	0	294

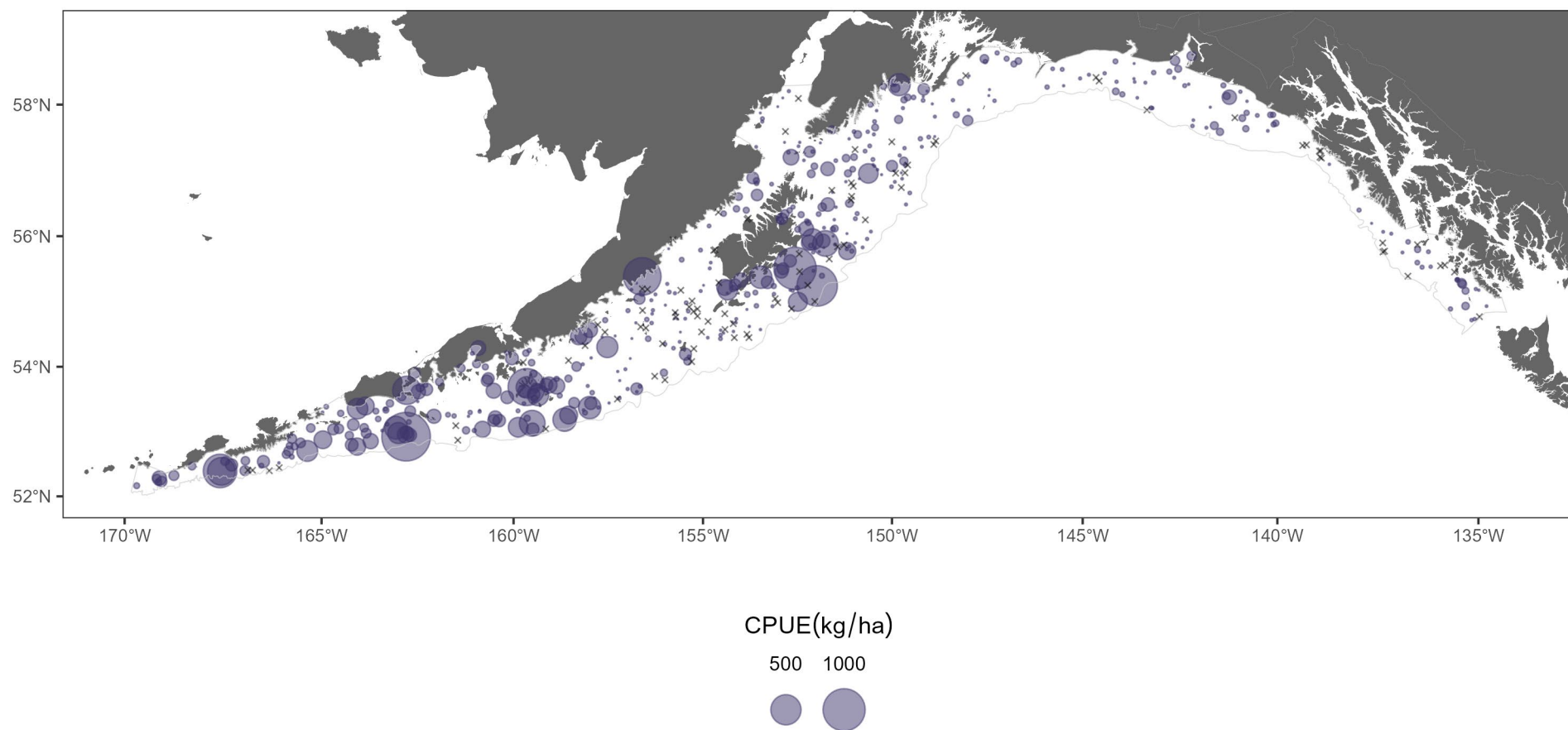


Figure 28. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of walleye pollock in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

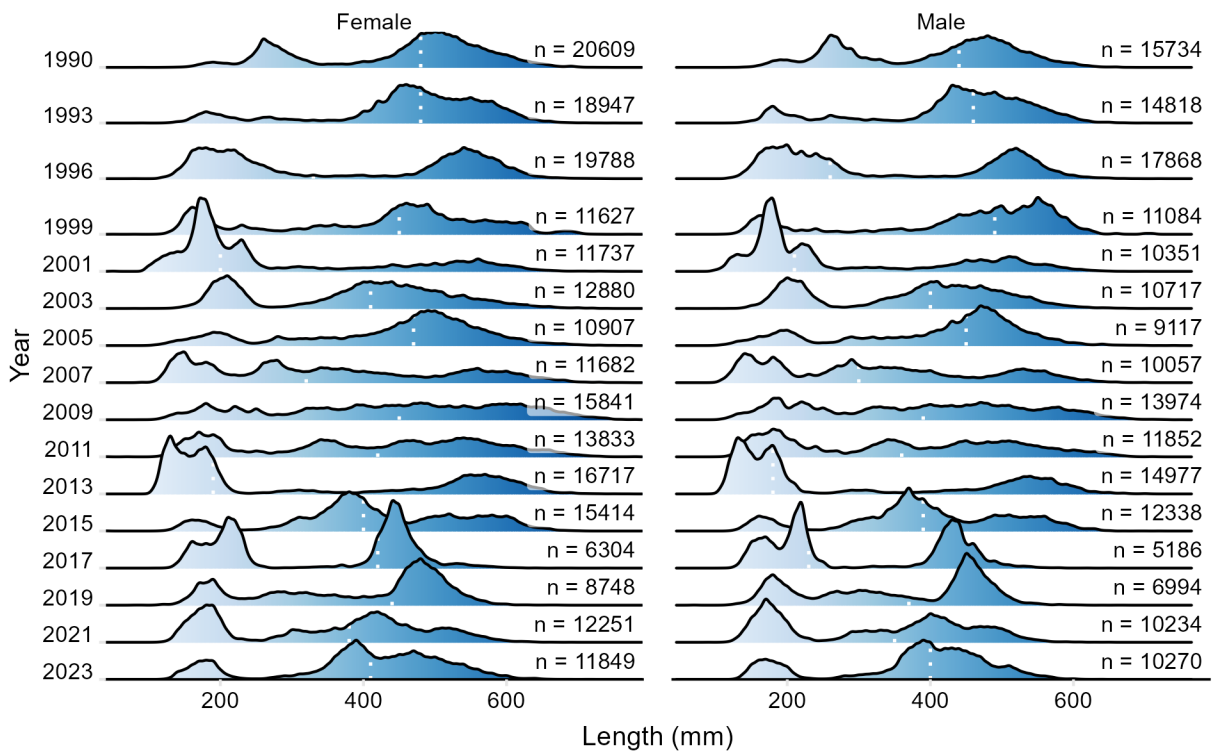


Figure 29. -- Population length composition of walleye pollock in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

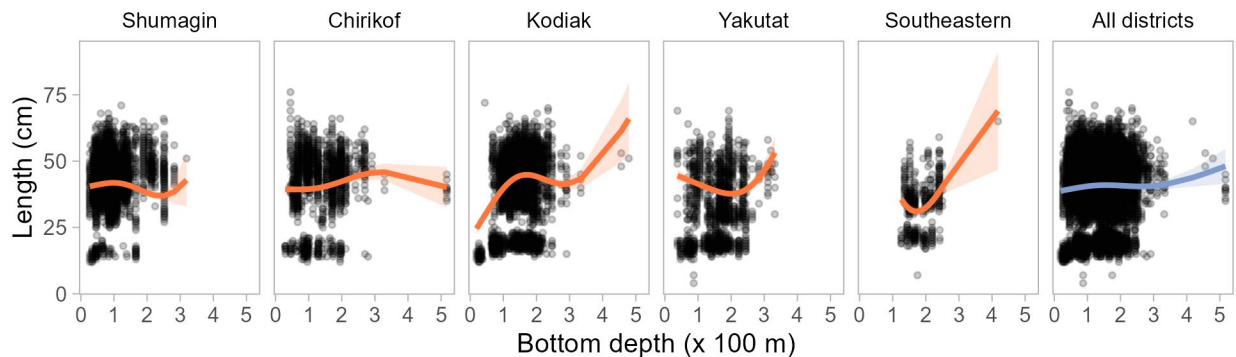


Figure 30. -- Length versus depth for walleye pollock by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Atka mackerel (*Pleurogrammus monopterygius*)

- Atka mackerel was the 11th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of Atka mackerel in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 77,874 mt (Table **24**), which is a 219% increase from 2021.
- The largest estimated biomass for Atka mackerel was in the Shumagin region, and the depth range with the largest estimated biomass was 1 - 100 m.
- The highest CPUEs were recorded in the Shumagin and Chirikof regions (Table **24** and Fig. **31**).
- Length distributions by year are provided in Figure **32** (total survey sample size N = 776; Fig. **33**). On average, the longest individuals were found in the Kodiak region and in a depth range of 101 – 200 m.

Table 24. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing Atka mackerel, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	29	17.64	72,824	0	155,850	0.813
	101 - 200	26	13	2.86	4,195	0	11,082	0.922
	201 - 300	11	3	0.7	196	0	606	0.743
	301 - 500	2	1	0.17	44	0	232	0.941
	501 - 700	2	0	---	---	---	---	---
	All depths	118	46	12.21	77,259	0	160,556	0.818
Chirikof	1 - 100	48	4	0.19	504	0	1,467	1.005
	101 - 200	58	3	0.01	33	0	73	0.534
	201 - 300	12	1	0.04	51	0	172	0.906
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	122	8	0.09	588	0	1,549	0.949
Kodiak	1 - 100	69	1	---	14	0	43	0.708
	101 - 200	94	1	---	13	0	39	0.931
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	182	2	---	27	0	65	0.799
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	0	---	---	---	---	---
	201 - 300	11	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	64	0	---	---	---	---	---
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	0	---	---	---	---	---
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	40	0	---	---	---	---	---
All areas	1 - 100	215	34	5.68	73,342	0	156,373	0.814
	101 - 200	229	17	0.35	4,241	0	11,128	0.917
	201 - 300	55	4	0.07	248	0	656	0.772
	301 - 500	17	1	0.03	44	0	232	0.941
	501 - 700	10	0	---	---	---	---	---
	All depths	526	56	2.52	77,874	0	161,176	0.819

Table 25. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing Atka mackerel, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Shumagin Bank	23	7	27.7	34,336	0	105,317
Shumagin	1-100	Davidson Bank	28	16	27.5	37,594	0	82,633
Shumagin	1-100	Fox Islands	10	6	1.1	894	32	1,756
Shumagin	101-200	Shumagin Outer Shelf	18	11	5.1	4,145	0	11,061
Shumagin	101-200	Sanak Gully	5	2	0.1	50	0	163
Shumagin	201-300	Shumagin Slope	11	3	0.7	196	0	611
Shumagin	301-500	Shumagin Slope	2	1	0.2	44	0	600
Chirikof	1-100	Semidi Bank	11	2	0.6	469	0	1,442
Chirikof	1-100	Upper Alaska Peninsula	13	2	0.0	35	0	94
Chirikof	101-200	Chirikof Outer Shelf	22	1	0.0	10	0	31
Chirikof	101-200	Shelikof Edge	21	1	0.0	13	0	39
Chirikof	101-200	East Shumagin Gully	15	1	0.0	10	0	33
Chirikof	201-300	Lower Shelikof Gully	7	1	0.1	51	0	176
Kodiak	1-100	Albatross Banks	32	1	0.0	14	0	43
Kodiak	101-200	Kodiak Outer Shelf	16	1	0.0	12	0	39

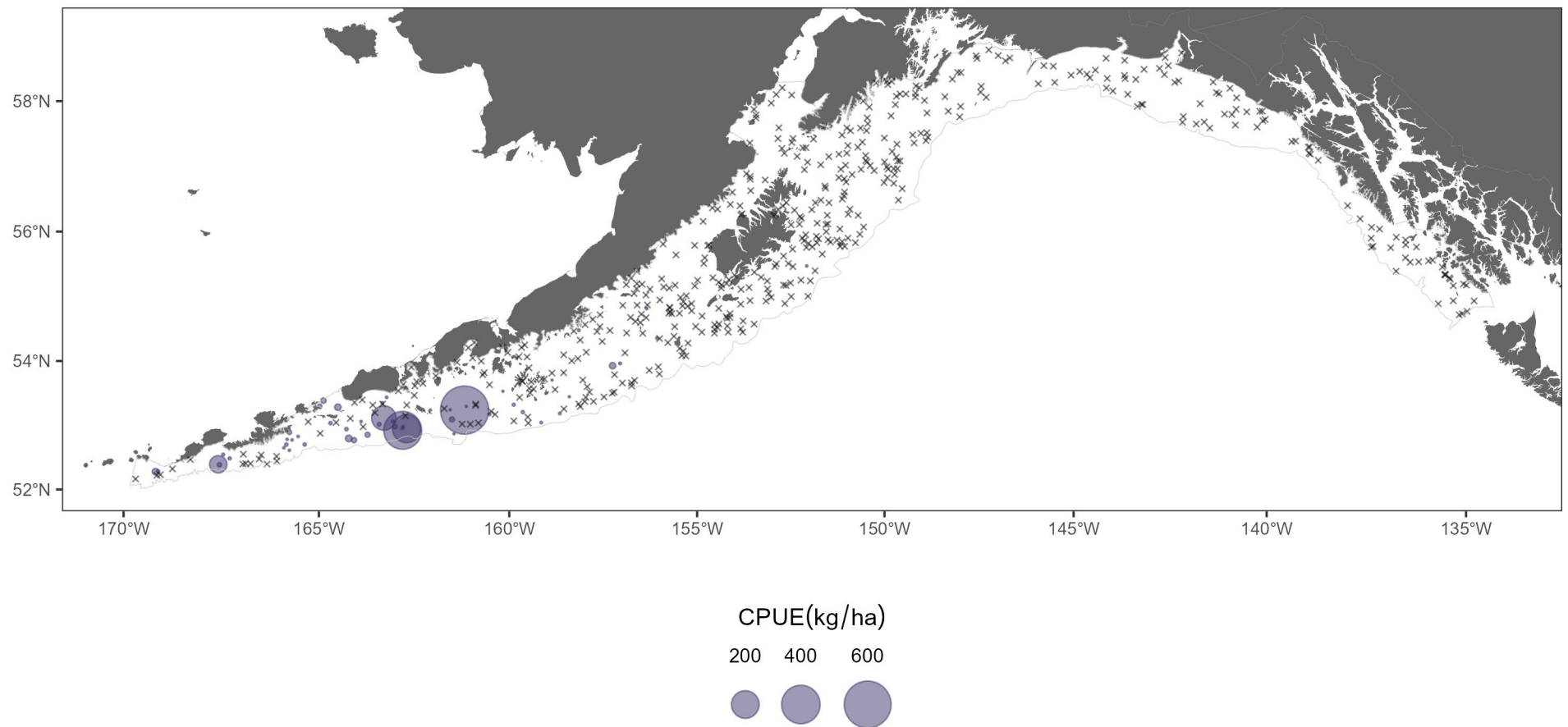


Figure 31. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of Atka mackerel in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

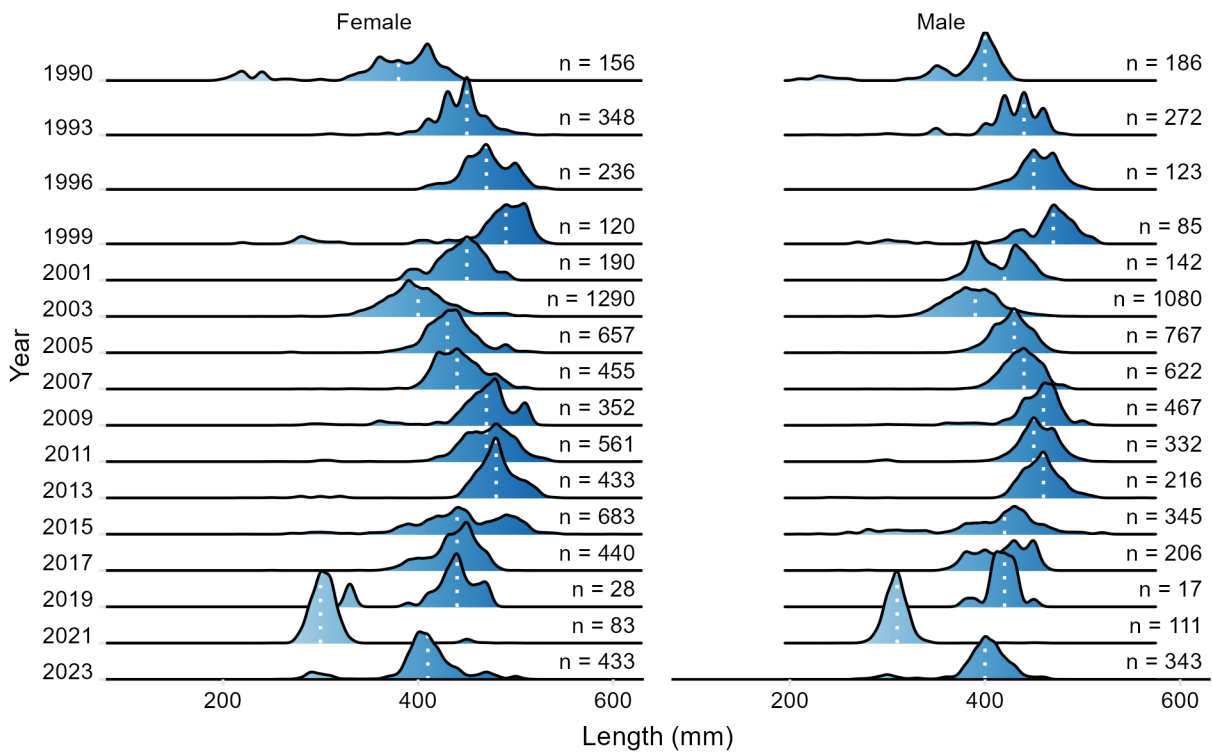


Figure 32. -- Population length composition of Atka mackerel in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

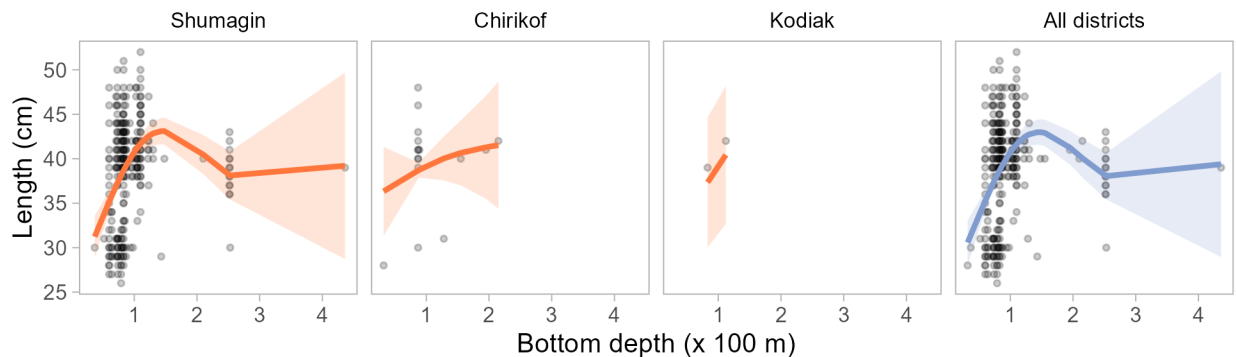


Figure 33. -- Length versus depth for Atka mackerel by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Sablefish (*Anoplopoma fimbria*)

- Sablefish was the 6th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of sablefish in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 195,545 mt (Table **26**), which is a 39.8% decrease from 2021.
- The largest estimated biomass for sablefish was in the Kodiak region, and the depth range with the largest estimated biomass was 301 - 500 m.
- The highest CPUEs were recorded in the Southeastern and Kodiak regions (Table **26** and Fig. **34**).
- Length distributions by year are provided in Figure **35** (total survey sample size N = 3,696; Fig. **36**). On average, the longest individuals were found in the Southeastern region and in a depth range of 301 - 500 m.
- There was a sex difference in length within this species; females (mean FL 52.79 cm) are generally longer than males (mean FL 52.48 cm).

Table 26. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing sablefish, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	13	0.29	1,215	12	2,418	0.18
	101 - 200	26	5	0.61	893	0	2,034	1.146
	201 - 300	11	11	7.65	2,132	712	3,551	1.386
	301 - 500	2	2	62	15,636	0	43,673	1.312
	501 - 700	2	2	84	16,845	13,549	20,141	1.188
	All depths	118	33	5.8	36,721	8,152	65,289	1.045
Chirikof	1 - 100	48	1	0.01	34	0	104	0.831
	101 - 200	58	20	1.27	3,025	477	5,573	1.239
	201 - 300	12	12	16	18,470	0	37,246	1.84
	301 - 500	2	2	35	5,542	0	14,422	1.846
	501 - 700	2	2	70	13,585	0	32,395	1.753
	All depths	122	37	6.26	40,656	19,031	62,282	1.747
Kodiak	1 - 100	69	13	0.26	987	238	1,735	0.672
	101 - 200	94	61	4.4	19,057	11,733	26,380	1.512
	201 - 300	13	13	18	20,752	10,934	30,571	1.78
	301 - 500	4	4	69	20,105	0	47,928	1.934
	501 - 700	2	2	38	6,656	3,646	9,666	2.077
	All depths	182	93	6.89	67,557	42,490	92,624	1.718
Yakutat	1 - 100	17	5	0.45	749	0	1,810	1.136
	101 - 200	29	19	2.08	6,109	1,991	10,227	1.118
	201 - 300	11	10	5.84	3,020	582	5,458	1.417
	301 - 500	5	5	30	7,931	0	24,404	2.168
	501 - 700	2	2	93	13,713	0	38,884	2.385
	All depths	64	41	5.7	31,523	13,825	49,221	1.785
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	16	1.9	2,104	607	3,601	1.122
	201 - 300	8	8	3.81	1,926	475	3,376	1.605
	301 - 500	4	4	39	12,078	4,864	19,292	2.463
	501 - 700	2	2	29	2,981	0	6,051	2.116
	All depths	40	30	7.11	19,088	12,537	25,640	2.034
All areas	1 - 100	215	32	0.23	2,985	1,299	4,671	0.335
	101 - 200	229	121	2.55	31,188	22,423	39,953	1.347
	201 - 300	55	54	13	46,300	25,703	66,898	1.743
	301 - 500	17	17	48	61,292	29,640	92,943	1.809
	501 - 700	10	10	66	53,780	33,209	74,351	1.666
	All depths	526	234	6.34	195,545	157,132	233,958	1.567

Table 27. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing sablefish, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Lower Alaska Peninsula	16	10	1.7	1,152	0	2,358
Shumagin	1-100	Davidson Bank	28	2	0.0	53	0	128
Shumagin	1-100	Shumagin Bank	23	1	0.0	11	0	33
Shumagin	101-200	Shumagin Outer Shelf	18	3	0.9	742	0	1,858
Shumagin	101-200	Sanak Gully	5	2	0.4	152	0	536
Shumagin	201-300	Shumagin Slope	11	11	7.6	2,132	695	3,569
Shumagin	301-500	Shumagin Slope	2	2	61.8	15,636	0	98,426
Shumagin	501-700	Shumagin Slope	2	2	84.0	16,845	7,112	26,577
Chirikof	1-100	Chirikof Bank	24	1	0.0	34	0	104
Chirikof	101-200	Shelikof Edge	21	10	3.1	2,371	0	4,877
Chirikof	101-200	Chirikof Outer Shelf	22	8	0.6	319	62	576
Chirikof	101-200	East Shumagin Gully	15	2	0.3	335	0	979
Chirikof	201-300	Chirikof Slope	5	5	31.9	4,881	279	9,482
Chirikof	201-300	Lower Shelikof Gully	7	7	13.6	13,590	0	32,588
Chirikof	301-500	Chirikof Slope	2	2	34.6	5,542	0	31,762
Chirikof	501-700	Chirikof Slope	2	2	69.6	13,585	0	69,129
Kodiak	1-100	Northern Kodiak Shallows	7	2	1.0	217	0	721
Kodiak	1-100	Kenai Peninsula	11	4	0.9	449	0	1,059
Kodiak	1-100	Albatross Shallows	10	3	0.2	118	0	258
Kodiak	1-100	Albatross Banks	32	3	0.1	184	0	415
Kodiak	1-100	Lower Cook Inlet	9	1	0.0	19	0	63
Kodiak	101-200	Albatross Gullies	22	14	8.5	6,693	1,964	11,422
Kodiak	101-200	Barren Islands	16	11	5.5	5,998	1,015	10,980
Kodiak	101-200	Portlock Flats	23	14	3.1	2,292	612	3,972
Kodiak	101-200	Kenai Flats	17	14	2.8	3,396	582	6,211
Kodiak	101-200	Kodiak Outer Shelf	16	8	1.3	678	86	1,268
Kodiak	201-300	Kodiak Slope	3	3	34.5	5,592	0	12,309
Kodiak	201-300	Kenai Gullies	7	7	17.4	11,598	2,101	21,095
Kodiak	201-300	Upper Shelikof Gully	3	3	11.1	3,563	146	6,981
Kodiak	301-500	Kodiak Slope	4	4	69.0	20,105	0	51,998
Kodiak	501-700	Kodiak Slope	2	2	38.1	6,656	0	15,544
Yakutat	1-100	Middleton Shallows	7	2	0.7	493	0	1,586
Yakutat	1-100	Yakutat Shallows	10	3	0.3	256	0	581
Yakutat	101-200	Fairweather Shelf	11	8	3.6	2,800	0	5,701
Yakutat	101-200	Yakutat Flats	7	5	2.7	2,429	0	5,619
Yakutat	101-200	Middleton Shelf	6	3	1.0	715	0	2,200
Yakutat	101-200	Yakataga Shelf	5	3	0.3	166	0	369
Yakutat	201-300	Yakutat Gullies	5	4	5.9	1,795	0	4,326
Yakutat	201-300	Yakutat Slope	6	6	5.8	1,225	192	2,258
Yakutat	301-500	Yakutat Slope	3	3	37.6	5,714	0	27,836
Yakutat	301-500	Yakutat Gullies	2	2	20.0	2,217	0	9,947
Yakutat	501-700	Yakutat Slope	2	2	93.3	13,713	0	88,039
Southeastern	101-200	Prince of Wales Shelf	15	14	2.9	1,964	473	3,455
Southeastern	101-200	Baranof-Chichagof Shelf	7	2	0.3	140	0	389
Southeastern	201-300	Baranof-Chichagof Slope	2	2	5.3	598	0	2,990
Southeastern	201-300	Prince of Wales Slope/Gullies	6	6	3.4	1,328	0	2,773
Southeastern	301-500	Southeastern Deep Gullies	3	3	50.0	11,730	1,974	21,485
Southeastern	301-500	Southeastern Slope	1	1	4.5	348		
Southeastern	501-700	Southeastern Slope	2	2	28.8	2,981	0	12,047

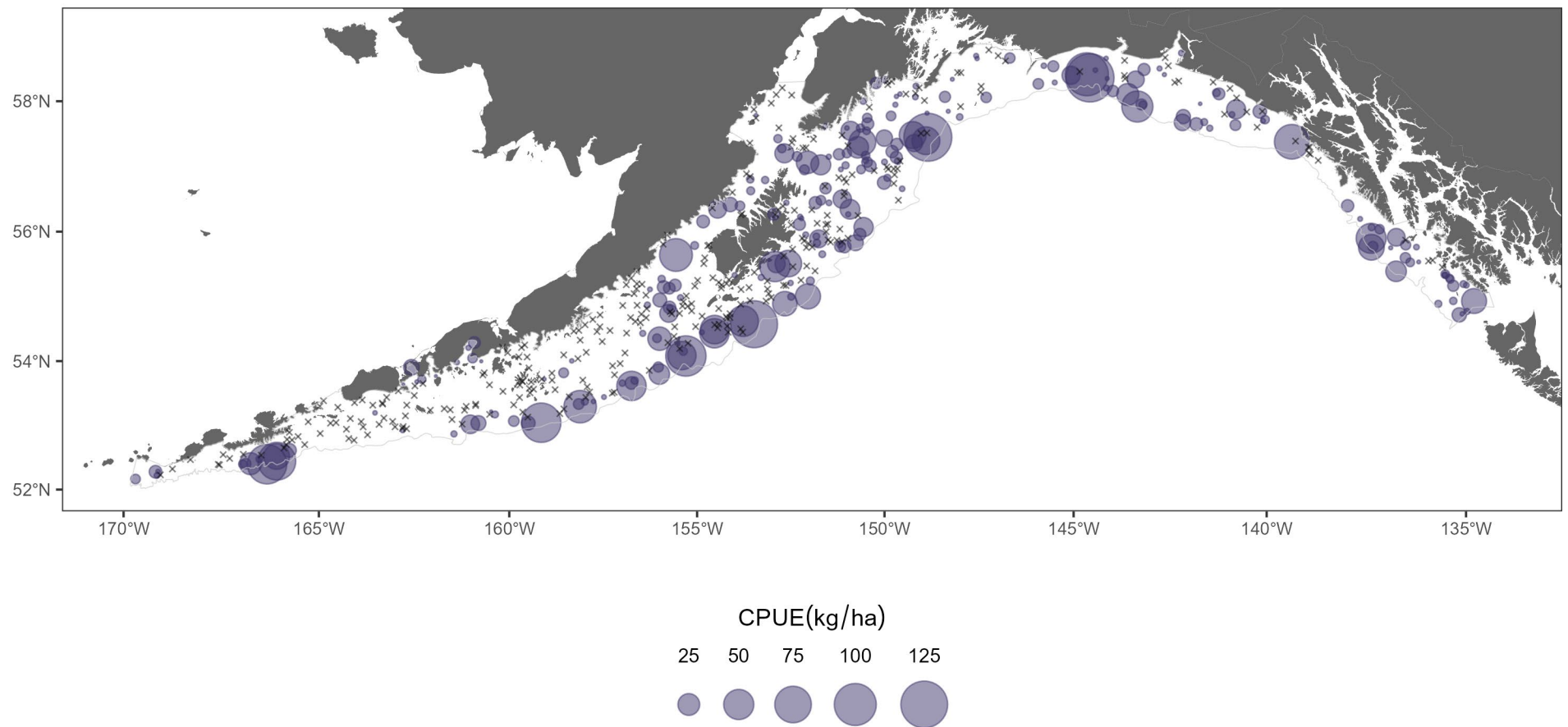


Figure 34. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of sablefish in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

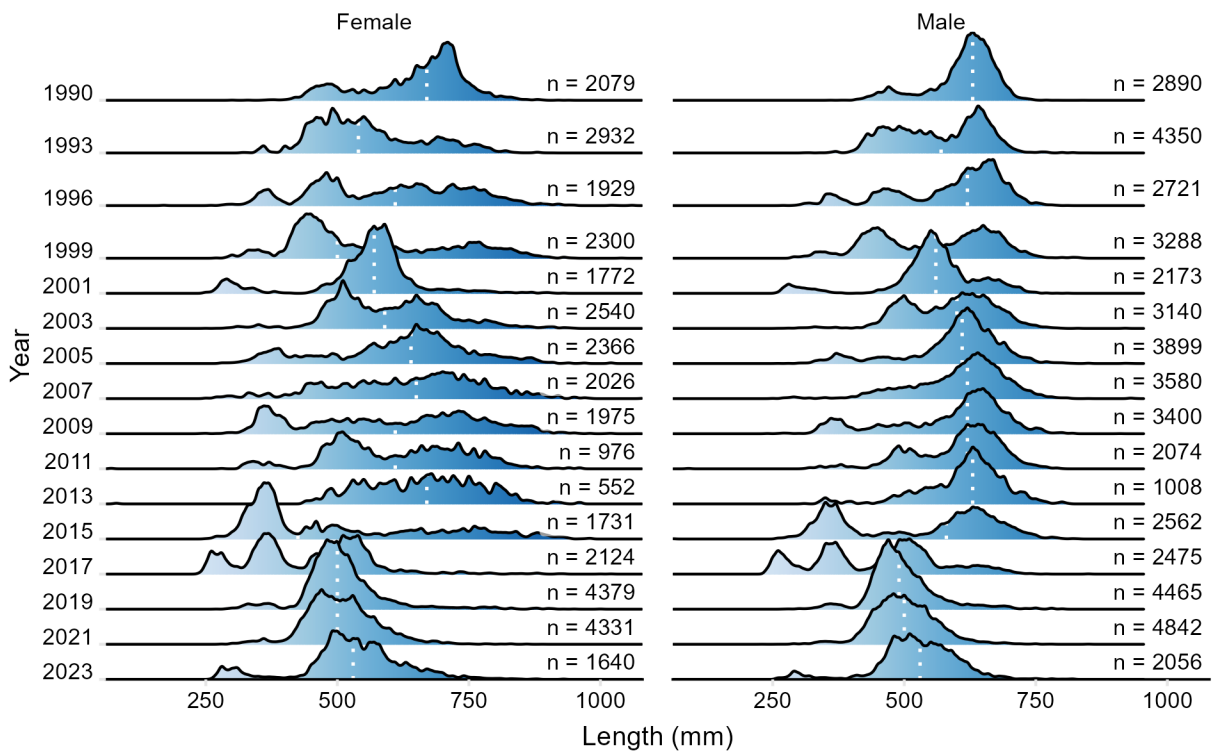


Figure 35. -- Population length composition of sablefish in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

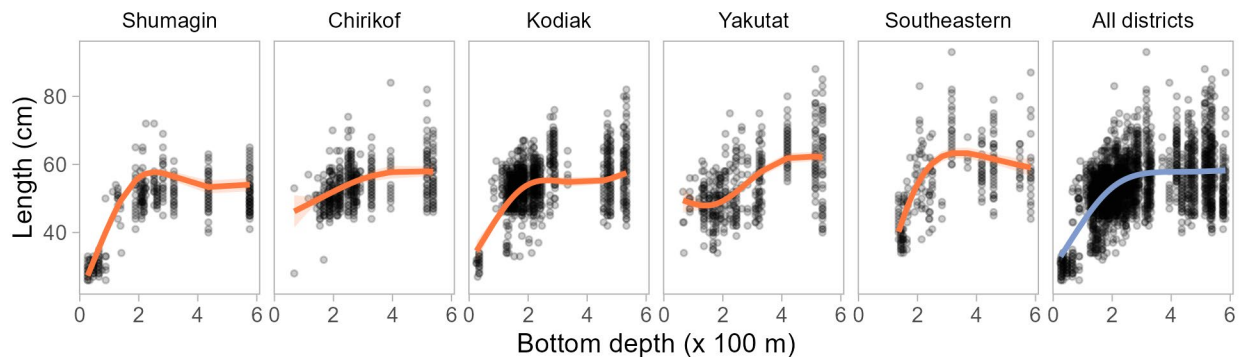


Figure 36. -- Length versus depth for sablefish by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Pacific ocean perch (*Sebastes alutus*)

- Pacific ocean perch was the most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of Pacific ocean perch in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 1,595,547 mt (Table **28**), which is a 7.9% increase from 2021.
- The largest estimated biomass for Pacific ocean perch was in the Southeastern region, and the depth range with the largest estimated biomass was 101 - 200 m.
- The highest CPUEs were recorded in the Southeastern and Kodiak regions (Table **28** and Fig. **37**).
- Length distributions by year are provided in Figure **38** (total survey sample size N = 14,476; Fig. **39**). On average, the longest individuals were found in the Chirikof region and in a depth range of 501 - 700 m.

Table 28. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing Pacific ocean perch, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	3	0.03	109	0	258	0.34
	101 - 200	26	18	14.34	21,041	0	45,008	0.706
	201 - 300	11	11	84.13	23,454	2,300	44,609	0.644
	301 - 500	2	1	1.83	463	0	2,455	0.625
	501 - 700	2	1	0.16	32	0	171	0.41
	All depths	118	34	7.13	45,100	14,292	75,907	0.67
Chirikof	1 - 100	48	5	0.09	229	0	496	0.588
	101 - 200	58	40	44.41	105,909	42,272	169,545	0.753
	201 - 300	12	7	10.16	11,732	5,116	18,347	0.718
	301 - 500	2	2	1.42	229	60	397	0.701
	501 - 700	2	2	0.97	189	0	805	0.867
	All depths	122	56	18.2	118,287	54,367	182,207	0.749
Kodiak	1 - 100	69	10	33.17	127,743	0	398,665	0.892
	101 - 200	94	74	108.88	471,792	185,236	758,347	0.817
	201 - 300	13	10	30.17	34,667	13,020	56,314	0.81
	301 - 500	4	4	0.88	255	0	592	0.69
	501 - 700	2	2	2.2	383	0	961	0.777
	All depths	182	100	64.78	634,840	255,800	1,013,880	0.83
Yakutat	1 - 100	17	3	0.06	95	0	245	0.295
	101 - 200	29	26	24.89	73,131	0	158,368	0.251
	201 - 300	11	11	54.5	28,177	12,349	44,006	0.488
	301 - 500	5	4	30.7	8,068	0	20,718	0.67
	501 - 700	2	1	0.13	18	0	97	0.802
	All depths	64	45	19.8	109,490	22,381	196,599	0.303
Southeastern	1 - 100	4	1	0.51	333	0	1,259	0.681
	101 - 200	22	16	44.66	49,500	0	101,859	0.505
	201 - 300	8	8	432.62	218,574	0	456,937	0.774
	301 - 500	4	2	1345.46	419,378	0	1,730,622	1.016
	501 - 700	2	1	0.44	46	0	242	0.864
	All depths	40	28	256.33	687,831	0	1,865,346	0.866
All areas	1 - 100	215	22	9.96	128,509	0	399,433	0.888
	101 - 200	229	174	58.97	721,372	414,308	1,028,436	0.634
	201 - 300	55	47	87.83	316,605	75,313	557,897	0.727
	301 - 500	17	13	334.9	428,392	0	1,739,699	1.005
	501 - 700	10	7	0.81	669	100	1,238	0.772
	All depths	526	263	51.73	1,595,547	521,462	2,669,633	0.744

Table 29. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing Pacific ocean perch, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Fox Islands	10	2	0.1	71	0	206
Shumagin	1-100	Davidson Bank	28	1	0.0	38	0	116
Shumagin	101-200	West Shumagin Gully	3	1	38.0	8,666	0	45,957
Shumagin	101-200	Shumagin Outer Shelf	18	14	14.5	11,846	0	25,745
Shumagin	101-200	Sanak Gully	5	3	1.2	529	0	1,311
Shumagin	201-300	Shumagin Slope	11	11	84.1	23,454	2,040	44,869
Shumagin	301-500	Shumagin Slope	2	1	1.8	463	0	6,344
Shumagin	501-700	Shumagin Slope	2	1	0.2	32	0	442
Chirikof	1-100	Chirikof Bank	24	2	0.2	168	0	426
Chirikof	1-100	Semidi Bank	11	2	0.1	59	0	148
Chirikof	1-100	Upper Alaska Peninsula	13	1	0.0	1	0	4
Chirikof	101-200	Chirikof Outer Shelf	22	16	136.0	68,145	15,210	121,080
Chirikof	101-200	Shelikof Edge	21	16	39.8	30,812	0	68,587
Chirikof	101-200	East Shumagin Gully	15	8	6.3	6,952	0	15,495
Chirikof	201-300	Chirikof Slope	5	5	73.8	11,278	3,109	19,446
Chirikof	201-300	Lower Shelikof Gully	7	2	0.5	454	0	1,427
Chirikof	301-500	Chirikof Slope	2	2	1.4	228	0	725
Chirikof	501-700	Chirikof Slope	2	2	1.0	189	0	2,007
Kodiak	1-100	Albatross Shallows	10	2	210.8	121,534	0	396,380
Kodiak	1-100	Albatross Banks	32	7	4.0	6,208	0	15,931
Kodiak	1-100	Kenai Peninsula	11	1	0.0	0	0	1
Kodiak	101-200	Kodiak Outer Shelf	16	12	253.5	127,386	0	316,474
Kodiak	101-200	Barren Islands	16	9	156.4	171,714	0	380,135
Kodiak	101-200	Portlock Flats	23	18	78.8	57,812	20,490	95,134
Kodiak	101-200	Albatross Gullies	22	18	64.7	51,221	13,397	89,045
Kodiak	101-200	Kenai Flats	17	17	52.7	63,658	0	145,326
Kodiak	201-300	Kodiak Slope	3	3	97.2	15,775	0	46,737
Kodiak	201-300	Kenai Gullies	7	7	28.4	18,892	3,453	34,331
Kodiak	301-500	Kodiak Slope	4	4	0.9	255	0	641
Kodiak	501-700	Kodiak Slope	2	2	2.2	383	0	2,090
Yakutat	1-100	Yakutat Shallows	10	1	0.1	64	0	210
Yakutat	1-100	Middleton Shallows	7	2	0.0	31	0	85
Yakutat	101-200	Yakutat Flats	7	7	55.3	49,971	0	136,955
Yakutat	101-200	Fairweather Shelf	11	9	21.9	16,955	4,264	29,646
Yakutat	101-200	Yakataga Shelf	5	5	6.9	3,664	0	7,467
Yakutat	101-200	Middleton Shelf	6	5	3.5	2,540	0	5,194
Yakutat	201-300	Yakutat Slope	6	6	124.7	26,523	10,008	43,038
Yakutat	201-300	Yakutat Gullies	5	5	5.4	1,654	0	3,768
Yakutat	301-500	Yakutat Slope	3	3	52.2	7,941	0	25,039
Yakutat	301-500	Yakutat Gullies	2	1	1.2	128	0	1,748
Yakutat	501-700	Yakutat Slope	2	1	0.1	18	0	252
Southeastern	1-100	Southeastern Shallows	4	1	0.5	333	0	1,394
Southeastern	101-200	Prince of Wales Shelf	15	13	51.3	35,301	0	84,211
Southeastern	101-200	Baranof-Chichagof Shelf	7	3	33.8	14,199	0	39,379
Southeastern	201-300	Prince of Wales Slope/Gullies	6	6	516.6	202,872	0	453,175
Southeastern	201-300	Baranof-Chichagof Slope	2	2	139.5	15,702	0	57,013
Southeastern	301-500	Southeastern Deep Gullies	3	1	1,757.8	412,082	0	2,185,270
Southeastern	301-500	Southeastern Slope	1	1	94.4	7,296		
Southeastern	501-700	Southeastern Slope	2	1	0.4	46	0	626

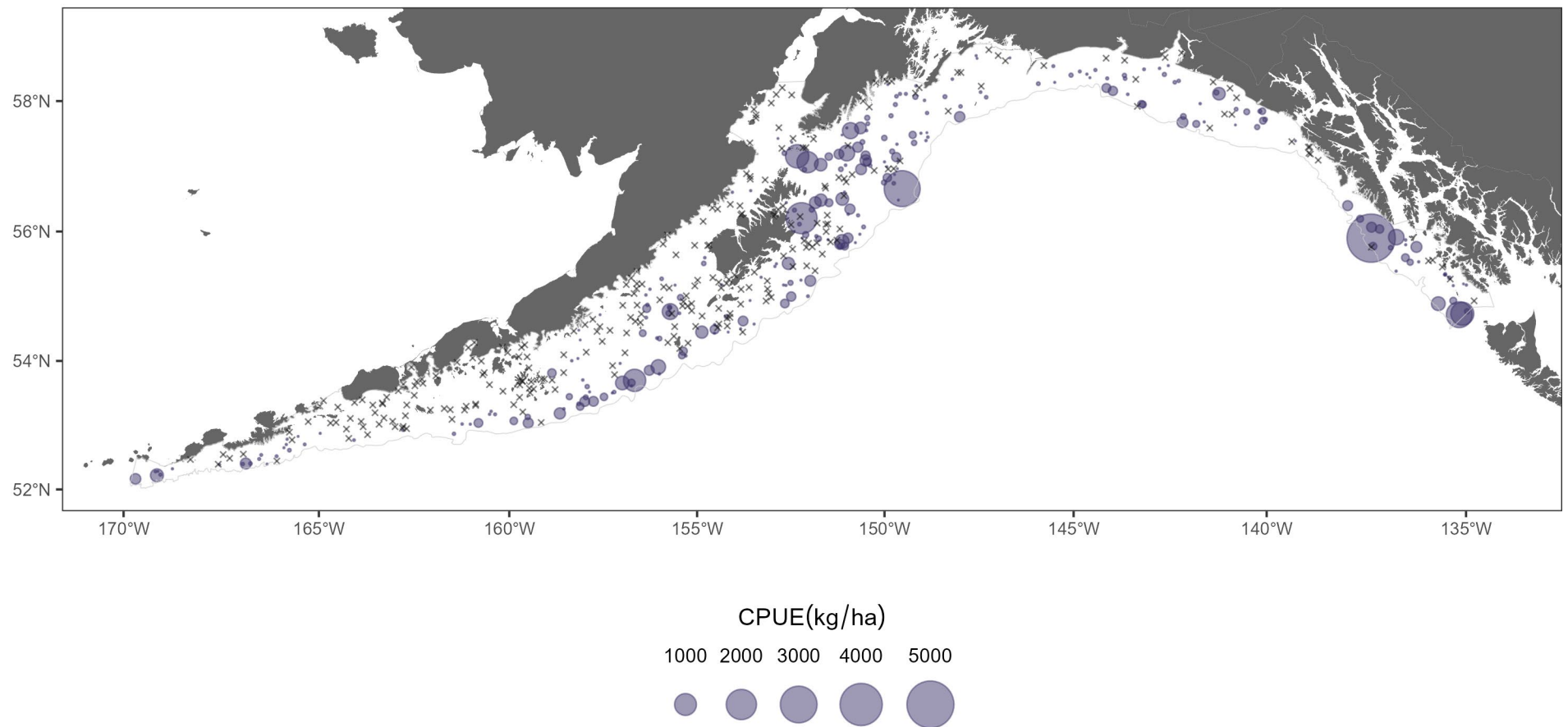


Figure 37. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of Pacific ocean perch in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

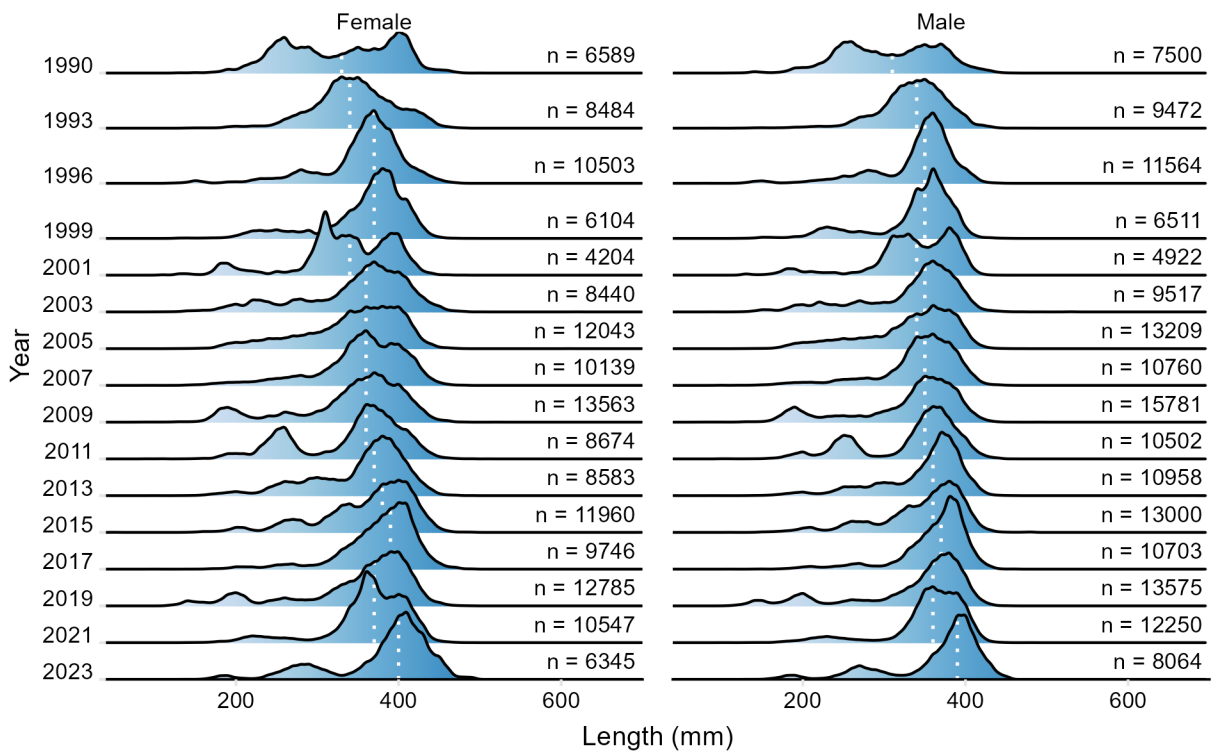


Figure 38. -- Population length composition of Pacific ocean perch in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

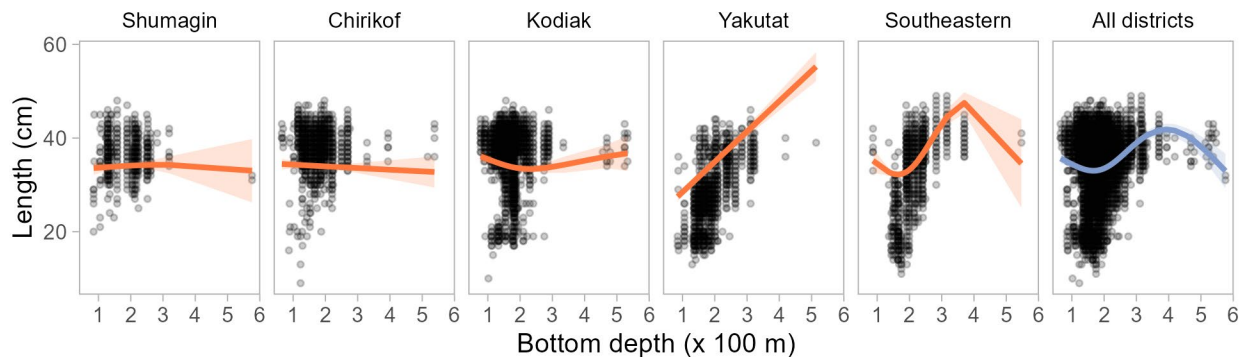


Figure 39. -- Length versus depth for Pacific ocean perch by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Northern rockfish (*Sebastes polyspinis*)

- Northern rockfish was the 24th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of northern rockfish in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 31,758 mt (Table **30**), which is a 65% decrease from 2021.
- The largest estimated biomass for northern rockfish was in the Chirikof region, and the depth range with the largest estimated biomass was 1 - 100 m.
- The highest CPUEs were recorded in the Chirikof and Shumagin regions (Table **30** and Fig. **40**).
- Length distributions by year are provided in Figure **41** (total survey sample size N = 806; Fig. **42**). On average, the longest individuals were found in the Kodiak region and in a depth range of 101 - 200 m.

Table 30. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing northern rockfish, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	8	0.52	2,133	0	4,498	0.935
	101 - 200	26	9	2.53	3,709	0	10,883	1.148
	201 - 300	11	3	0.54	149	0	436	0.859
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	118	20	0.95	5,992	0	13,403	1.054
Chirikof	1 - 100	48	2	7.76	20,207	0	56,561	0.946
	101 - 200	58	13	1.29	3,071	0	6,784	1.022
	201 - 300	12	1	0.01	9	0	32	0.581
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	122	16	3.58	23,287	0	59,857	0.955
Kodiak	1 - 100	69	2	0.13	495	0	1,212	1.229
	101 - 200	94	13	0.45	1,957	0	4,478	1.106
	201 - 300	13	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	182	15	0.25	2,452	0	5,014	1.129
Yakutat	1 - 100	17	0	---	---	---	---	---
	101 - 200	29	1	0.01	28	0	98	0.667
	201 - 300	11	0	---	---	---	---	---
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	64	1	---	28	0	98	0.667
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	0	---	---	---	---	---
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	40	0	---	---	---	---	---
All areas	1 - 100	215	12	1.77	22,835	0	59,288	0.95
	101 - 200	229	36	0.72	8,765	417	17,113	1.089
	201 - 300	55	4	0.04	158	0	446	0.837
	301 - 500	17	0	---	---	---	---	---
	501 - 700	10	0	---	---	---	---	---
	All depths	526	52	1.03	31,758	0	68,909	0.984

Table 31. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing northern rockfish, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Shumagin Bank	23	3	0.7	899	0	2,487
Shumagin	1-100	Davidson Bank	28	3	0.7	937	0	2,649
Shumagin	1-100	Fox Islands	10	2	0.4	297	0	964
Shumagin	101-200	Shumagin Outer Shelf	18	8	4.5	3,666	0	10,870
Shumagin	101-200	Sanak Gully	5	1	0.1	43	0	162
Shumagin	201-300	Shumagin Slope	11	3	0.5	149	0	439
Chirikof	1-100	Semidi Bank	11	2	27.7	20,207	0	57,007
Chirikof	101-200	Chirikof Outer Shelf	22	8	5.3	2,671	0	6,376
Chirikof	101-200	Shelikof Edge	21	3	0.5	349	0	927
Chirikof	101-200	East Shumagin Gully	15	2	0.0	50	0	129
Chirikof	201-300	Chirikof Slope	5	1	0.1	9	0	34
Kodiak	1-100	Albatross Banks	32	2	0.3	494	0	1,212
Kodiak	101-200	Kodiak Outer Shelf	16	7	2.8	1,395	0	3,867
Kodiak	101-200	Portlock Flats	23	5	0.7	526	0	1,193
Kodiak	101-200	Barren Islands	16	1	0.0	36	0	114
Yakutat	101-200	Yakataga Shelf	5	1	0.1	28	0	104

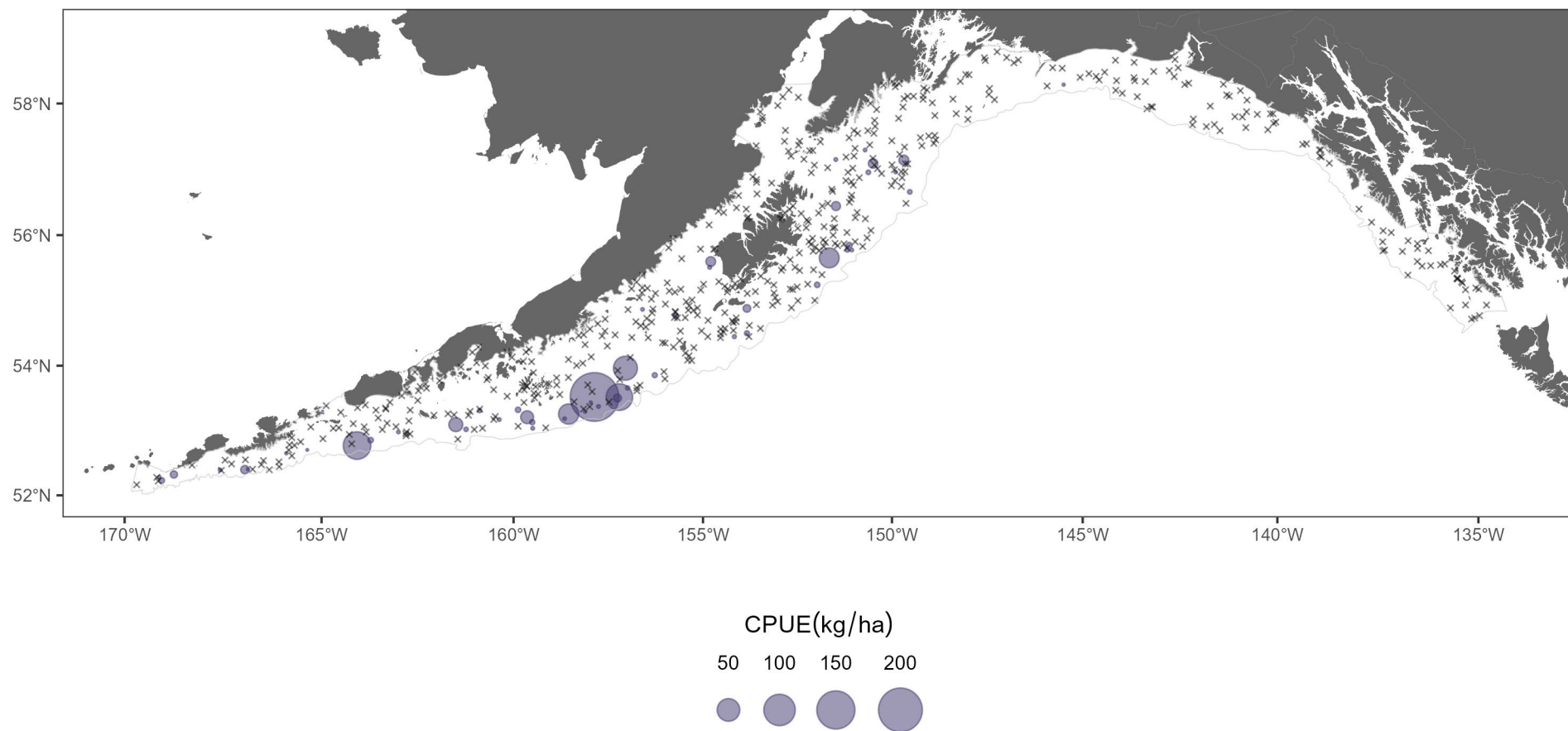


Figure 40. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of northern rockfish in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

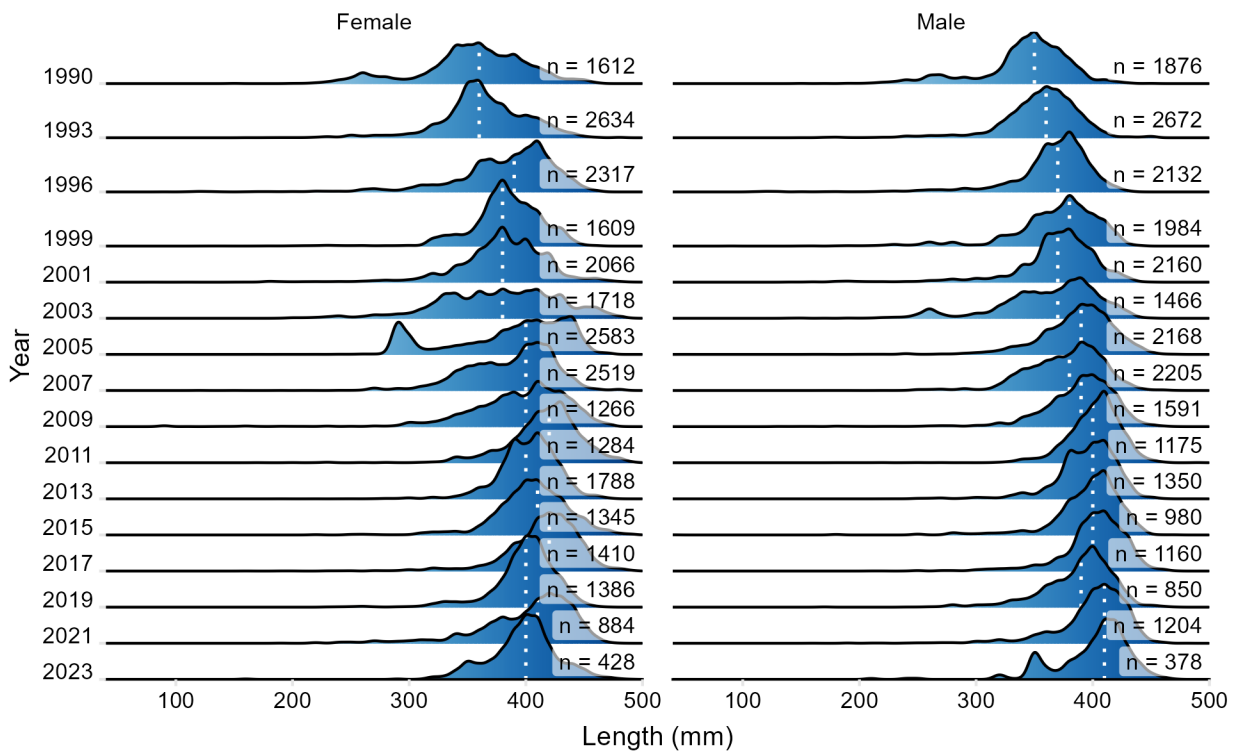


Figure 41. -- Population length composition of northern rockfish in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

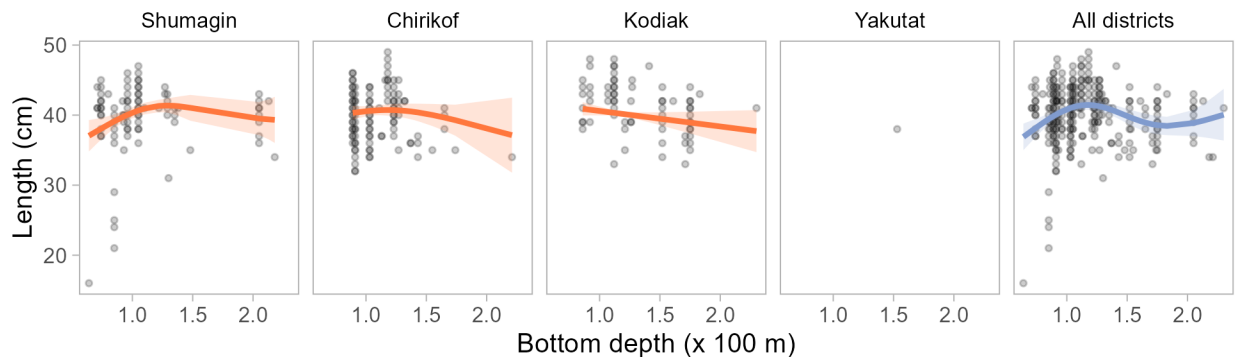


Figure 42. -- Length versus depth for northern rockfish by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Rougheye rockfish (*Sebastes aleutianus*)

- Rougheye rockfish was the 28th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of rougheye rockfish in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 23,540 mt (Table **32**), which is a 39.7% increase from 2021.
- The largest estimated biomass for rougheye rockfish was in the Southeastern region, and the depth range with the largest estimated biomass was 301 - 500 m.
- The highest CPUEs were recorded in the Southeastern and Yakutat regions (Table **32** and Fig. **43**).
- Length distributions by year are provided in Figure **44** (total survey sample size N = 1,143; Fig. **45**). On average, the longest individuals were found in the Southeastern region and in a depth range of 301 - 500 m.

Table 32. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing roughey rockfish, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	0	---	---	---	---	---
	101 - 200	26	1	0.01	18	0	66	0.518
	201 - 300	11	3	0.41	114	0	313	1.946
	301 - 500	2	1	0.28	72	0	381	1.359
	501 - 700	2	0	---	---	---	---	---
	All depths	118	5	0.03	204	0	529	1.39
Chirikof	1 - 100	48	1	---	3	0	8	0.066
	101 - 200	58	11	0.1	245	56	434	0.459
	201 - 300	12	3	0.12	135	0	387	0.549
	301 - 500	2	2	3.59	576	0	2,071	1.627
	501 - 700	2	0	---	---	---	---	---
	All depths	122	17	0.15	959	112	1,805	0.818
Kodiak	1 - 100	69	8	0.68	2,626	663	4,588	0.64
	101 - 200	94	28	0.8	3,450	1,197	5,702	0.577
	201 - 300	13	10	1.53	1,756	0	3,526	0.717
	301 - 500	4	2	0.54	156	0	416	0.977
	501 - 700	2	0	---	---	---	---	---
	All depths	182	48	0.82	7,988	4,713	11,262	0.63
Yakutat	1 - 100	17	1	0.01	18	0	58	0.463
	101 - 200	29	17	1.12	3,289	662	5,915	0.302
	201 - 300	11	8	2	1,036	51	2,021	0.456
	301 - 500	5	5	2.21	582	0	1,268	1.2
	501 - 700	2	2	1.02	151	0	585	1.41
	All depths	64	33	0.92	5,075	2,239	7,911	0.368
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	3	0.03	30	0	68	0.258
	201 - 300	8	1	0.04	18	0	63	0.618
	301 - 500	4	3	29.27	9,124	6,942	11,306	1.649
	501 - 700	2	1	1.38	143	0	756	1.616
	All depths	40	8	3.47	9,315	7,085	11,545	1.615
All areas	1 - 100	215	10	0.21	2,646	683	4,608	0.633
	101 - 200	229	60	0.57	7,031	3,744	10,319	0.401
	201 - 300	55	25	0.85	3,060	1,025	5,094	0.605
	301 - 500	17	13	8.22	10,510	8,244	12,776	1.596
	501 - 700	10	3	0.36	293	0	778	1.503
	All depths	526	111	0.76	23,540	19,071	28,009	0.701

Table 33. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing rougheye rockfish, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	101-200	Sanak Gully	5	1	0.0	18	0	69
Shumagin	201-300	Shumagin Slope	11	3	0.4	114	0	316
Shumagin	301-500	Shumagin Slope	2	1	0.3	72	0	986
Chirikof	1-100	Upper Alaska Peninsula	13	1	0.0	2	0	8
Chirikof	101-200	East Shumagin Gully	15	6	0.2	211	24	398
Chirikof	101-200	Shelikof Edge	21	5	0.0	34	4	64
Chirikof	201-300	Chirikof Slope	5	1	0.1	18	0	69
Chirikof	201-300	Lower Shelikof Gully	7	2	0.1	117	0	374
Chirikof	301-500	Chirikof Slope	2	2	3.6	576	0	4,991
Kodiak	1-100	Albatross Shallows	10	3	2.5	1,457	0	3,224
Kodiak	1-100	Kenai Peninsula	11	4	2.1	1,110	32	2,188
Kodiak	1-100	Northern Kodiak Shallows	7	1	0.3	58	0	201
Kodiak	101-200	Kenai Flats	17	12	1.9	2,254	318	4,191
Kodiak	101-200	Albatross Gullies	22	8	1.4	1,073	0	2,292
Kodiak	101-200	Portlock Flats	23	5	0.1	59	0	120
Kodiak	101-200	Barren Islands	16	2	0.0	43	0	106
Kodiak	101-200	Kodiak Outer Shelf	16	1	0.0	19	0	60
Kodiak	201-300	Kodiak Slope	3	3	2.8	456	0	1,654
Kodiak	201-300	Kenai Gullies	7	6	1.8	1,172	0	2,894
Kodiak	201-300	Upper Shelikof Gully	3	1	0.4	129	0	682
Kodiak	301-500	Kodiak Slope	4	2	0.5	156	0	454
Yakutat	1-100	Yakutat Shallows	10	1	0.0	18	0	58
Yakutat	101-200	Middleton Shelf	6	5	2.4	1,796	0	4,341
Yakutat	101-200	Fairweather Shelf	11	5	1.3	1,010	0	2,204
Yakutat	101-200	Yakataga Shelf	5	4	0.6	296	0	1,002
Yakutat	101-200	Yakutat Flats	7	3	0.2	186	0	501
Yakutat	201-300	Yakutat Slope	6	4	2.2	462	0	1,454
Yakutat	201-300	Yakutat Gullies	5	4	1.9	574	0	1,204
Yakutat	301-500	Yakutat Slope	3	3	2.8	432	0	1,398
Yakutat	301-500	Yakutat Gullies	2	2	1.3	149	0	1,472
Yakutat	501-700	Yakutat Slope	2	2	1.0	150	0	1,433
Southeastern	101-200	Prince of Wales Shelf	15	3	0.0	30	0	68
Southeastern	201-300	Prince of Wales Slope/Gullies	6	1	0.0	18	0	65
Southeastern	301-500	Southeastern Slope	1	1	101.7	7,855		
Southeastern	301-500	Southeastern Deep Gullies	3	2	5.4	1,269	0	4,220
Southeastern	501-700	Southeastern Slope	2	1	1.4	142	0	1,954

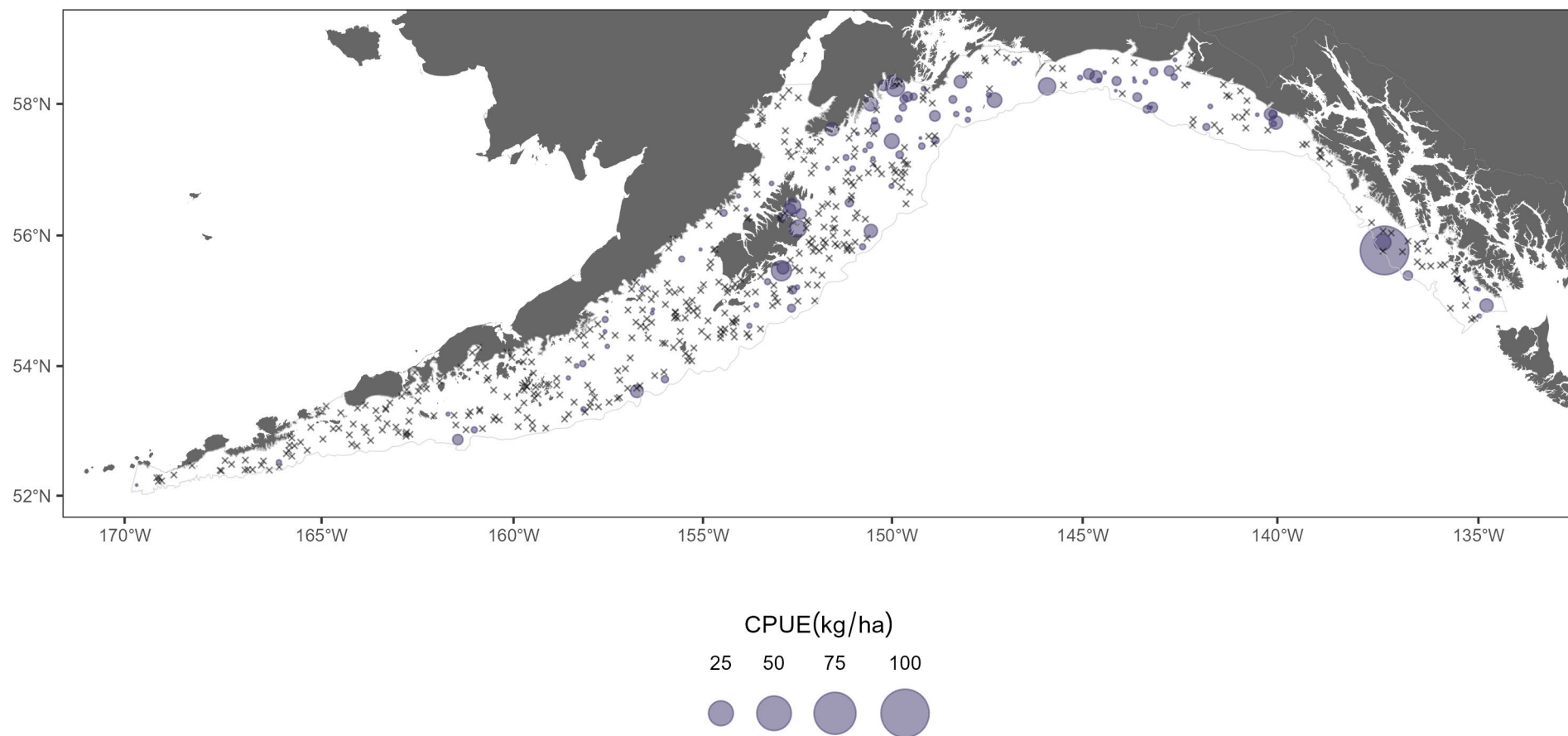


Figure 43. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of rougheye rockfish in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

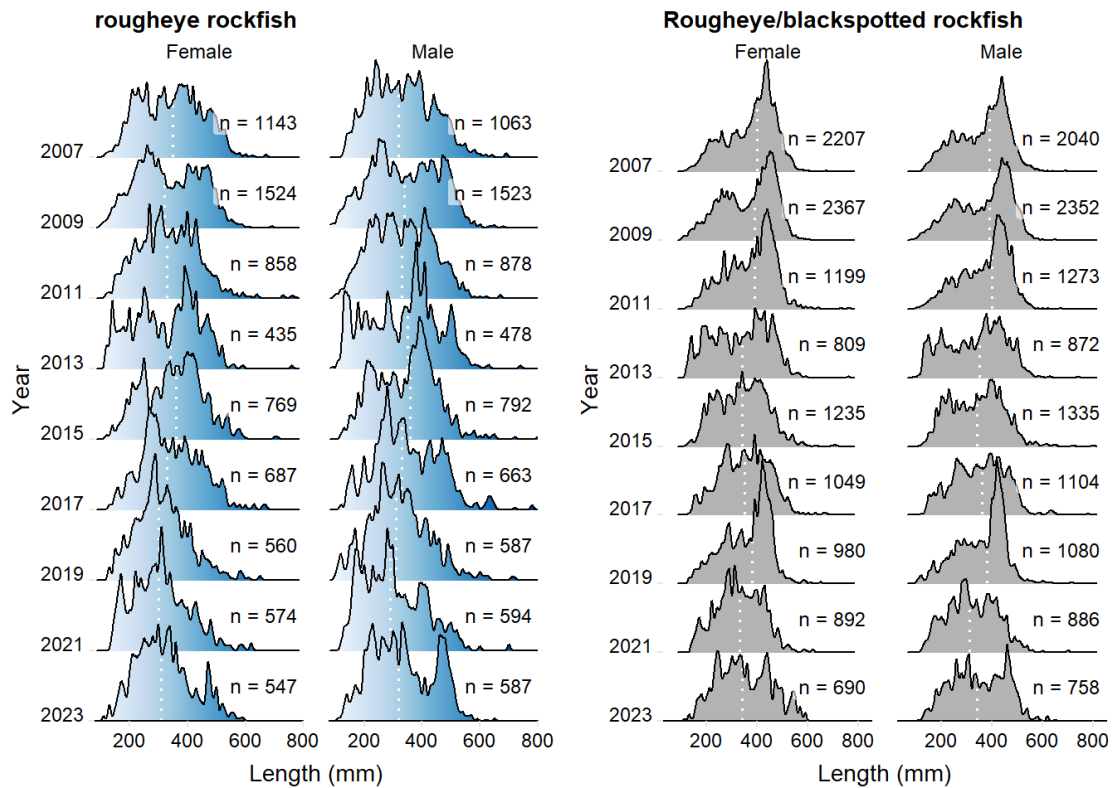


Figure 44. -- Population length composition of rougheye rockfish in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length. Since this species was not identified as distinct from its close congener for the entirety of the survey time period, combined lengths are presented in grey.

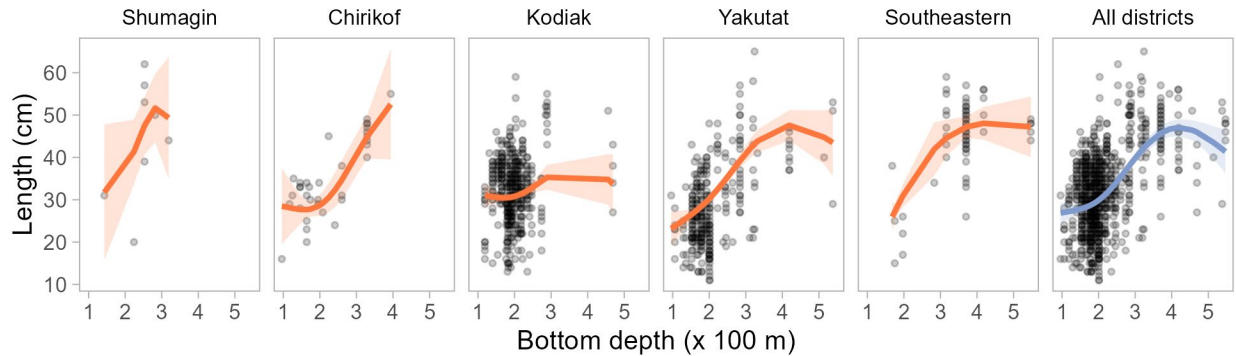


Figure 45. -- Length versus depth for rougheye rockfish by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Blackspotted rockfish (*Sebastes melanostictus*)

- Blackspotted rockfish was the 36th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of blackspotted rockfish in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 7,816 mt (Table **34**), which is a 0.6% increase from 2021.
- The largest estimated biomass for blackspotted rockfish was in the Southeastern region, and the depth range with the largest estimated biomass was 301 - 500 m.
- The highest CPUEs were recorded in the Southeastern and Chirikof regions (Table **34** and Fig. **46**).
- Length distributions by year are provided in Figure **47** (total survey sample size N = 314; Fig. **48**). On average, the longest individuals were found in the Southeastern region and in a depth range of 301 - 500 m.

Table 34. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing blackspotted rockfish, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	1	<0.01	13	0	40	0.57
	101 - 200	26	4	0.08	112	0	255	0.405
	201 - 300	11	8	1.7	475	0	1,005	0.561
	301 - 500	2	1	3.75	949	0	5,033	1.993
	501 - 700	2	0	---	---	---	---	---
	All depths	118	14	0.24	1,549	0	5,773	0.955
Chirikof	1 - 100	48	2	0.01	31	0	78	0.424
	101 - 200	58	5	0.06	134	0	301	0.51
	201 - 300	12	7	0.63	726	50	1,402	1.161
	301 - 500	2	2	5.33	855	0	3,927	1.3
	501 - 700	2	1	0.35	68	0	358	1.005
	All depths	122	17	0.28	1,814	0	3,650	1.075
Kodiak	1 - 100	69	1	0.02	67	0	214	0.56
	101 - 200	94	7	0.03	120	16	223	0.841
	201 - 300	13	7	0.4	462	71	854	0.413
	301 - 500	4	2	0.22	64	0	196	0.782
	501 - 700	2	0	---	---	---	---	---
	All depths	182	17	0.07	713	283	1,142	0.488
Yakutat	1 - 100	17	1	0.01	12	0	39	0.152
	101 - 200	29	5	0.05	150	0	322	0.315
	201 - 300	11	3	0.4	209	0	622	1.206
	301 - 500	5	3	0.38	100	0	235	0.999
	501 - 700	2	0	---	---	---	---	---
	All depths	64	12	0.08	470	46	894	0.57
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	1	<0.01	1	0	4	0.056
	201 - 300	8	1	0.02	13	0	43	0.213
	301 - 500	4	3	10.45	3,257	0	8,178	1.649
	501 - 700	2	0	---	---	---	---	---
	All depths	40	5	1.22	3,271	0	8,192	1.591
All areas	1 - 100	215	5	0.01	122	0	273	0.42
	101 - 200	229	22	0.04	517	235	798	0.438
	201 - 300	55	26	0.52	1,885	902	2,867	0.668
	301 - 500	17	11	4.08	5,225	451	9,999	1.588
	501 - 700	10	1	0.08	68	0	358	1.005
	All depths	526	65	0.25	7,816	3,066	12,567	1.022

Table 35. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing blackspotted rockfish, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Shumagin Bank	23	1	0.0	13	0	40
Shumagin	101-200	Shumagin Outer Shelf	18	4	0.1	112	0	256
Shumagin	201-300	Shumagin Slope	11	8	1.7	475	0	1,011
Shumagin	301-500	Shumagin Slope	2	1	3.8	949	0	13,008
Chirikof	1-100	Chirikof Bank	24	2	0.0	31	0	78
Chirikof	101-200	East Shumagin Gully	15	3	0.1	118	0	283
Chirikof	101-200	Shelikof Edge	21	2	0.0	16	0	40
Chirikof	201-300	Chirikof Slope	5	4	1.8	277	0	707
Chirikof	201-300	Lower Shelikof Gully	7	3	0.4	449	0	1,037
Chirikof	301-500	Chirikof Slope	2	2	5.3	855	0	9,926
Chirikof	501-700	Chirikof Slope	2	1	0.3	68	0	926
Kodiak	1-100	Kenai Peninsula	11	1	0.1	67	0	216
Kodiak	101-200	Kodiak Outer Shelf	16	2	0.1	54	0	136
Kodiak	101-200	Kenai Flats	17	2	0.0	34	0	90
Kodiak	101-200	Portlock Flats	23	1	0.0	17	0	53
Kodiak	101-200	Albatross Gullies	22	1	0.0	8	0	24
Kodiak	101-200	Barren Islands	16	1	0.0	7	0	21
Kodiak	201-300	Kodiak Slope	3	3	1.1	175	0	539
Kodiak	201-300	Kenai Gullies	7	4	0.4	288	0	648
Kodiak	301-500	Kodiak Slope	4	2	0.2	64	0	215
Yakutat	1-100	Middleton Shallows	7	1	0.0	12	0	40
Yakutat	101-200	Yakutat Flats	7	2	0.1	113	0	291
Yakutat	101-200	Middleton Shelf	6	3	0.0	37	0	80
Yakutat	201-300	Yakutat Slope	6	2	0.9	183	0	626
Yakutat	201-300	Yakutat Gullies	5	1	0.1	27	0	101
Yakutat	301-500	Yakutat Slope	3	2	0.5	74	0	254
Yakutat	301-500	Yakutat Gullies	2	1	0.2	25	0	344
Southeastern	101-200	Baranof-Chichagof Shelf	7	1	0.0	1	0	4
Southeastern	201-300	Prince of Wales Slope/Gullies	6	1	0.0	13	0	45
Southeastern	301-500	Southeastern Slope	1	1	21.5	1,659		
Southeastern	301-500	Southeastern Deep Gullies	3	2	6.8	1,598	0	8,253

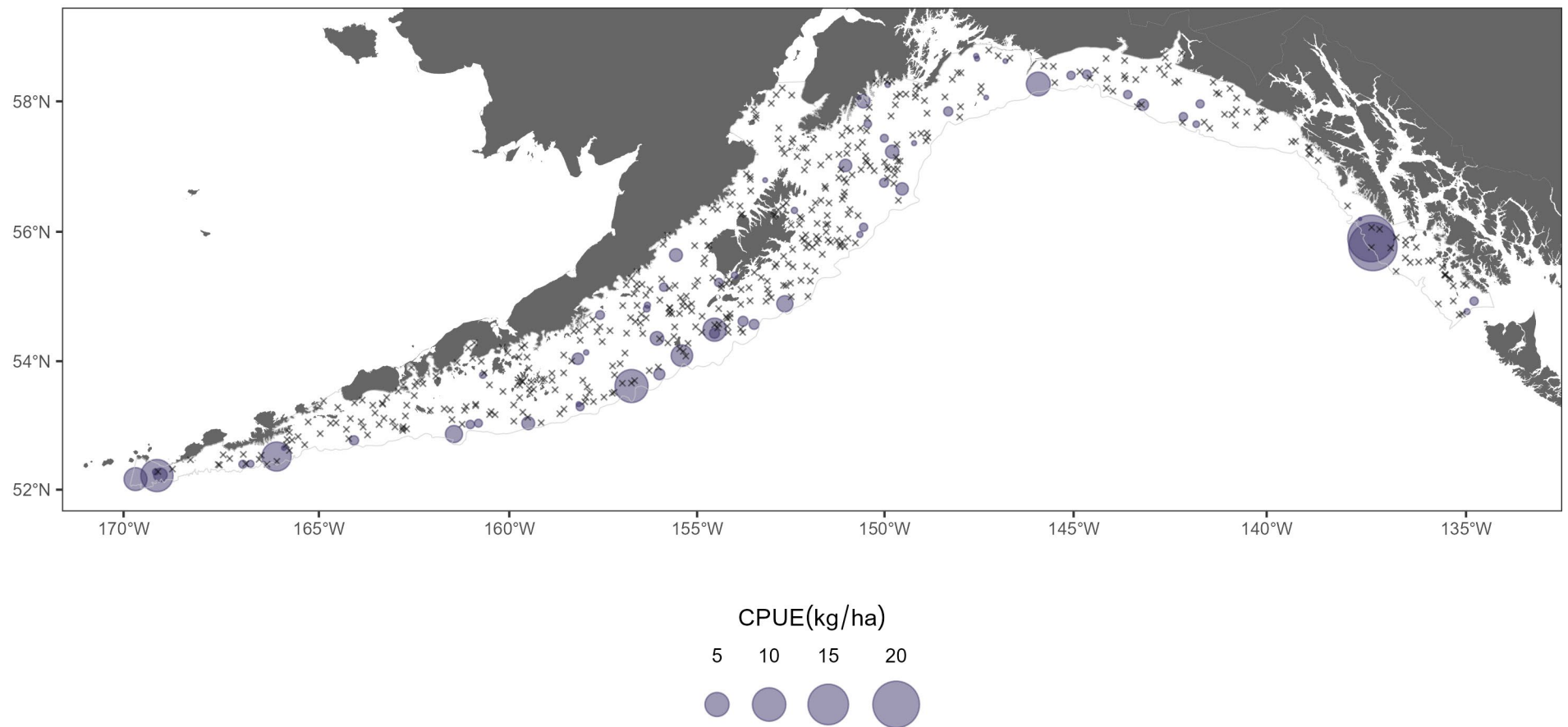


Figure 46. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of blackspotted rockfish in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

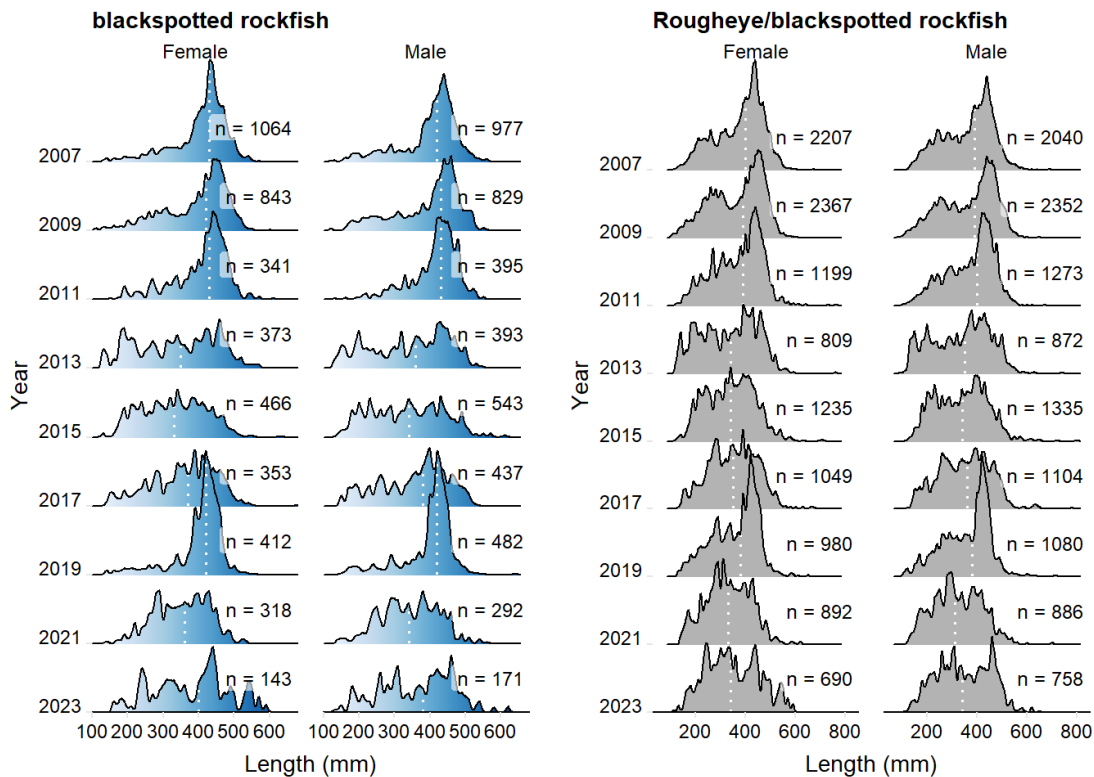


Figure 47. -- Population length composition of blackspotted rockfish in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length. Since this species was not identified as distinct from its close congener for the entirety of the survey time period, combined lengths are presented in grey.

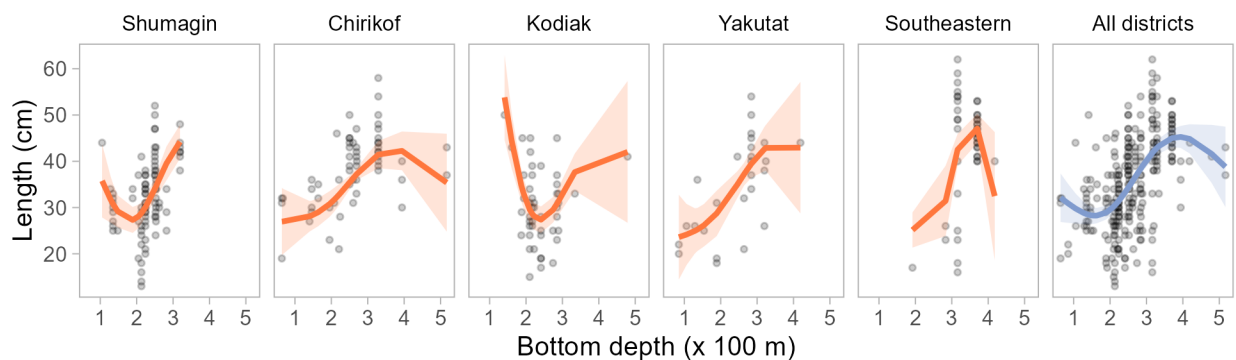


Figure 48. -- Length versus depth for blackspotted rockfish by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Dusky rockfish (*Sebastes variabilis*)

- Dusky rockfish was the 12th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of dusky rockfish in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 73,605 mt (Table **36**), which is a 31.3% decrease from 2021.
- The largest estimated biomass for dusky rockfish was in the Kodiak region, and the depth range with the largest estimated biomass was 101 - 200 m.
- The highest CPUEs were recorded in the Kodiak and Chirikof regions (Table **36** and Fig. **49**).
- Length distributions by year are provided in Figure **50** (total survey sample size N = 1,199; Fig. **51**). On average, the longest individuals were found in the Kodiak region and in a depth range of 301 - 500 m.

Table 36. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing dusky rockfish, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	5	0.03	134	0	271	1.119
	101 - 200	26	6	1.58	2,320	0	6,648	1.443
	201 - 300	11	2	0.29	80	0	218	1.217
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	1	0.22	44	0	234	1.12
	All depths	118	14	0.41	2,578	0	6,912	1.407
Chirikof	1 - 100	48	3	0.39	1,023	0	2,757	0.919
	101 - 200	58	16	6.79	16,203	0	35,185	1.442
	201 - 300	12	2	0.05	60	0	166	1.192
	301 - 500	2	1	0.88	141	0	748	1.941
	501 - 700	2	0	---	---	---	---	---
	All depths	122	22	2.68	17,427	0	36,435	1.397
Kodiak	1 - 100	69	6	0.06	223	33	412	0.99
	101 - 200	94	28	11.22	48,612	0	111,912	1.735
	201 - 300	13	2	0.35	399	0	1,278	1.436
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	1	0.76	133	0	706	1.74
	All depths	182	37	5.04	49,367	0	112,672	1.727
Yakutat	1 - 100	17	1	0.03	45	0	145	1.048
	101 - 200	29	7	1.17	3,428	0	8,855	1.451
	201 - 300	11	4	0.26	135	0	289	1.627
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	64	12	0.65	3,607	0	9,038	1.45
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	4	0.51	560	0	1,544	1.137
	201 - 300	8	2	0.13	66	0	173	1.344
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	40	6	0.23	626	0	1,616	1.156
All areas	1 - 100	215	15	0.11	1,424	0	3,162	0.949
	101 - 200	229	61	5.81	71,123	5,428	136,817	1.627
	201 - 300	55	12	0.21	740	0	1,658	1.407
	301 - 500	17	1	0.11	141	0	748	1.941
	501 - 700	10	2	0.22	177	0	624	1.529
	All depths	526	91	2.39	73,605	7,884	139,326	1.603

Table 37. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing dusky rockfish, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Davidson Bank	28	3	0.1	107	0	239
Shumagin	1-100	Shumagin Bank	23	2	0.0	27	0	68
Shumagin	101-200	Shumagin Outer Shelf	18	6	2.8	2,320	0	6,667
Shumagin	201-300	Shumagin Slope	11	2	0.3	80	0	220
Shumagin	501-700	Shumagin Slope	2	1	0.2	44	0	604
Chirikof	1-100	Semidi Bank	11	2	1.4	990	0	2,744
Chirikof	1-100	Chirikof Bank	24	1	0.0	33	0	100
Chirikof	101-200	Chirikof Outer Shelf	22	8	31.9	15,968	0	35,004
Chirikof	101-200	Shelikof Edge	21	6	0.2	172	24	321
Chirikof	101-200	East Shumagin Gully	15	2	0.1	63	0	157
Chirikof	201-300	Chirikof Slope	5	2	0.4	60	0	175
Chirikof	301-500	Chirikof Slope	2	1	0.9	141	0	1,933
Kodiak	1-100	Northern Kodiak Shallows	7	1	0.3	62	0	214
Kodiak	1-100	Kenai Peninsula	11	2	0.1	69	0	174
Kodiak	1-100	Albatross Shallows	10	2	0.1	69	0	174
Kodiak	1-100	Albatross Banks	32	1	0.0	23	0	69
Kodiak	101-200	Kodiak Outer Shelf	16	7	60.9	30,615	0	92,603
Kodiak	101-200	Portlock Flats	23	13	17.3	12,718	0	30,185
Kodiak	101-200	Kenai Flats	17	6	4.2	5,095	0	13,141
Kodiak	101-200	Barren Islands	16	2	0.2	184	0	481
Kodiak	201-300	Kenai Gullies	7	1	0.6	371	0	1,277
Kodiak	201-300	Kodiak Slope	3	1	0.2	28	0	149
Kodiak	501-700	Kodiak Slope	2	1	0.8	133	0	1,826
Yakutat	1-100	Yakutat Shallows	10	1	0.0	45	0	146
Yakutat	101-200	Yakutat Flats	7	3	3.3	2,976	0	8,558
Yakutat	101-200	Yakataga Shelf	5	2	0.7	385	0	1,067
Yakutat	101-200	Fairweather Shelf	11	2	0.1	67	0	166
Yakutat	201-300	Yakutat Slope	6	3	0.4	94	0	238
Yakutat	201-300	Yakutat Gullies	5	1	0.1	40	0	153
Southeastern	101-200	Baranof-Chichagof Shelf	7	1	1.0	420	0	1,447
Southeastern	101-200	Prince of Wales Shelf	15	3	0.2	140	0	306
Southeastern	201-300	Baranof-Chichagof Slope	2	1	0.3	31	0	420
Southeastern	201-300	Prince of Wales Slope/Gullies	6	1	0.1	35	0	126

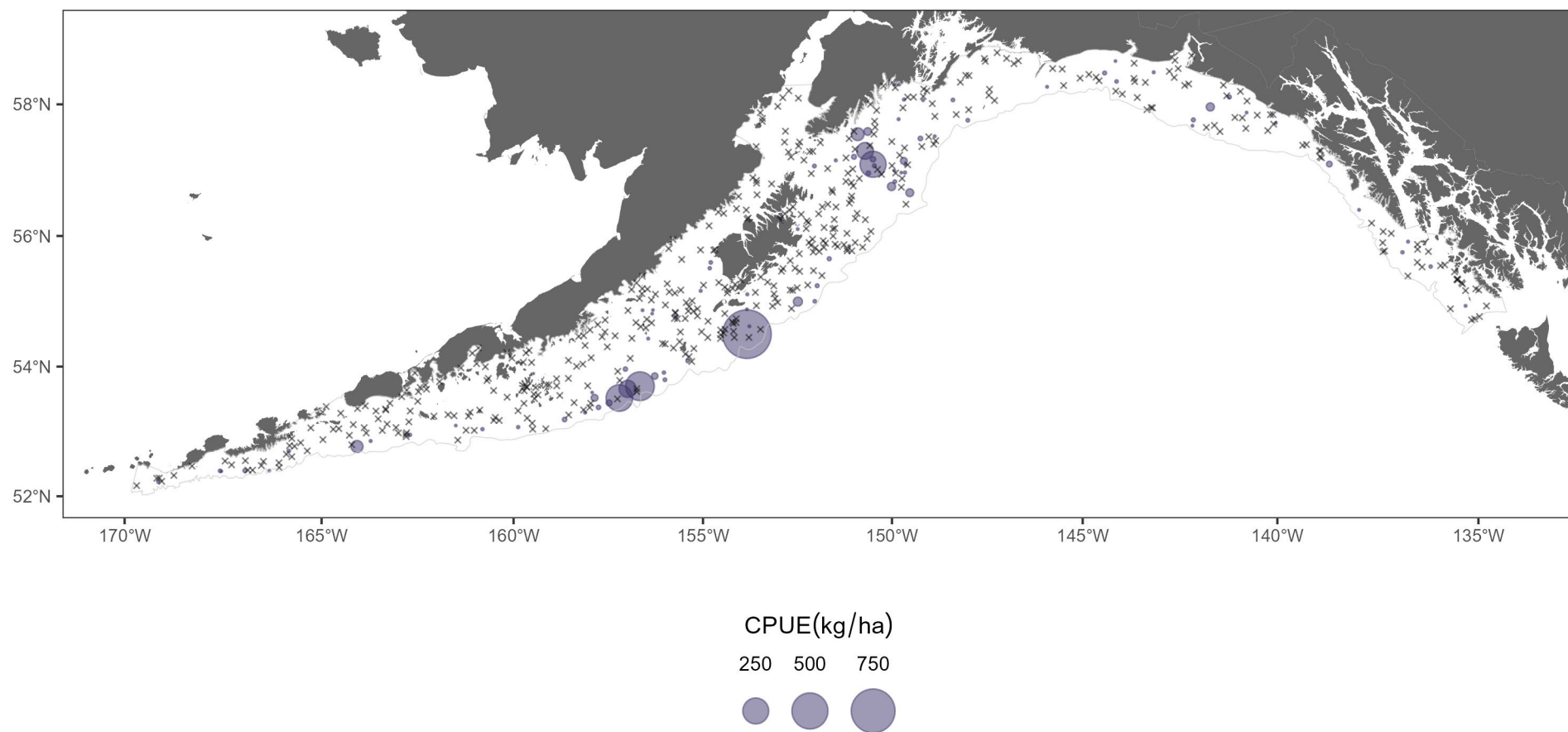


Figure 49. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of dusky rockfish in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

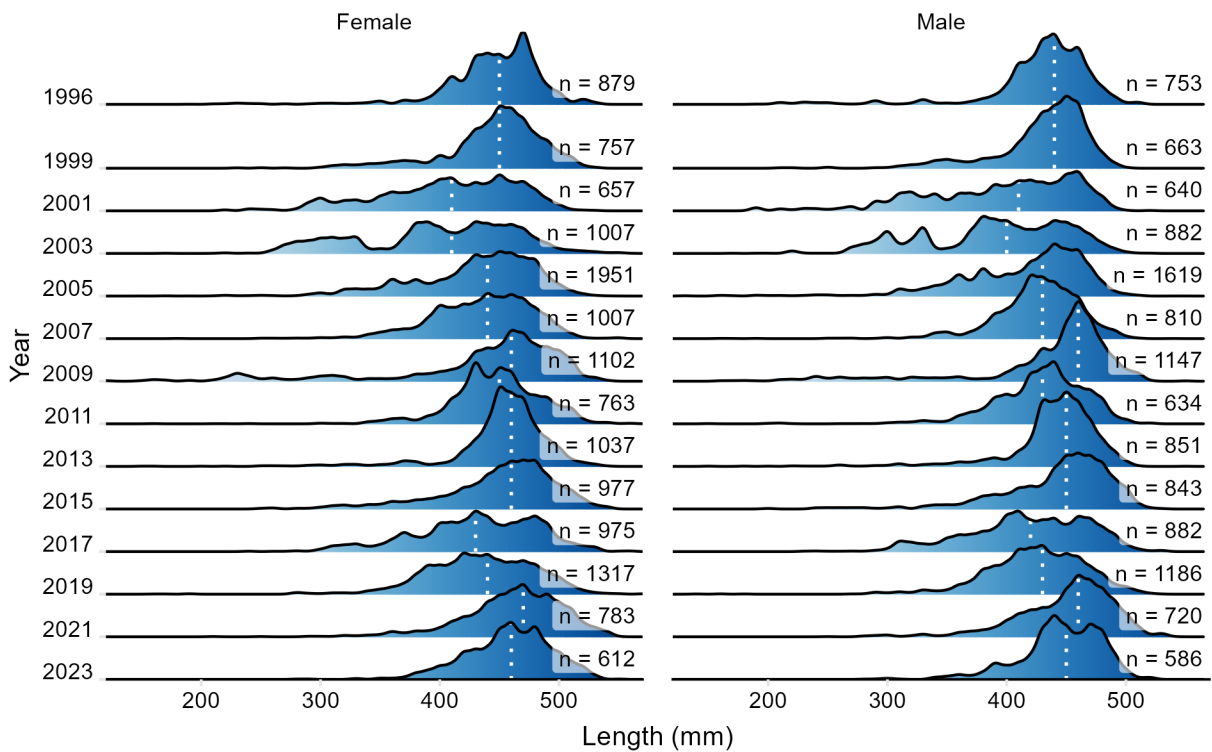


Figure 50. -- Population length composition of dusky rockfish in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

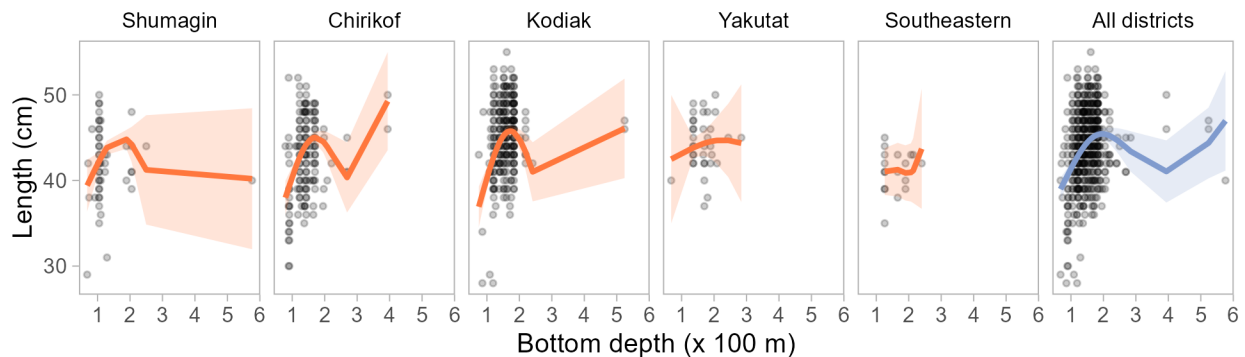


Figure 51. -- Length versus depth for dusky rockfish by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Shortspine thornyhead (*Sebastolobus alascanus*)

- Shortspine thornyhead was the 14th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of shortspine thornyhead in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 57,285 mt (Table **38**), which is a 16% decrease from 2021.
- The largest estimated biomass for shortspine thornyhead was in the Kodiak region, and the depth range with the largest estimated biomass was 301 - 500 m.
- The highest CPUEs were recorded in the Southeastern and Yakutat regions (Table **38** and Fig. **52**).
- Length distributions by year are provided in Figure **53** (total survey sample size N = 5,670; Fig. **54**). On average, the longest individuals were found in the Chirikof region and in a depth range of 501 - 700 m.

Table 38. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing shortspine thornyhead, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	1	0.01	25	0	82	0.254
	101 - 200	26	7	0.37	543	90	996	0.261
	201 - 300	11	11	8.26	2,303	532	4,074	0.259
	301 - 500	2	2	8.73	2,209	0	4,701	0.242
	501 - 700	2	2	4.84	971	840	1,102	0.285
	All depths	118	23	0.96	6,052	3,441	8,662	0.256
Chirikof	1 - 100	48	0	---	---	---	---	---
	101 - 200	58	5	0.1	241	0	595	0.567
	201 - 300	12	10	1.35	1,560	861	2,258	0.306
	301 - 500	2	2	40.47	6,492	0	28,678	0.442
	501 - 700	2	2	14.62	2,855	0	11,814	0.285
	All depths	122	19	1.72	11,147	0	28,875	0.369
Kodiak	1 - 100	69	0	---	---	---	---	---
	101 - 200	94	19	0.72	3,127	0	7,315	0.321
	201 - 300	13	9	5.05	5,798	3,200	8,395	0.273
	301 - 500	4	4	8.43	2,455	481	4,429	0.219
	501 - 700	2	2	24.88	4,341	0	14,403	0.246
	All depths	182	34	1.6	15,721	8,833	22,609	0.263
Yakutat	1 - 100	17	2	0.02	30	0	81	0.105
	101 - 200	29	16	1.49	4,372	131	8,613	0.22
	201 - 300	11	10	6.54	3,379	1,533	5,225	0.224
	301 - 500	5	5	16.56	4,351	655	8,047	0.187
	501 - 700	2	2	14.47	2,126	1,027	3,225	0.247
	All depths	64	35	2.58	14,258	9,013	19,502	0.212
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	4	0.59	658	0	1,419	0.247
	201 - 300	8	8	4.31	2,177	1,332	3,022	0.211
	301 - 500	4	4	12.17	3,794	558	7,030	0.279
	501 - 700	2	2	33.67	3,479	1,827	5,131	0.363
	All depths	40	18	3.77	10,108	7,176	13,040	0.279
All areas	1 - 100	215	3	---	56	0	127	0.143
	101 - 200	229	51	0.73	8,941	3,188	14,694	0.257
	201 - 300	55	48	4.22	15,216	11,607	18,826	0.251
	301 - 500	17	17	15.09	19,301	1,927	36,674	0.268
	501 - 700	10	10	16.78	13,772	4,986	22,558	0.28
	All depths	526	129	1.86	57,285	42,464	72,106	0.264

Table 39. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing shortspine thornyhead, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Fox Islands	10	1	0.0	25	0	83
Shumagin	101-200	Shumagin Outer Shelf	18	7	0.7	543	88	998
Shumagin	201-300	Shumagin Slope	11	11	8.3	2,303	510	4,096
Shumagin	301-500	Shumagin Slope	2	2	8.7	2,209	0	9,567
Shumagin	501-700	Shumagin Slope	2	2	4.8	971	585	1,358
Chirikof	101-200	Chirikof Outer Shelf	22	4	0.2	82	0	193
Chirikof	101-200	East Shumagin Gully	15	1	0.1	158	0	498
Chirikof	201-300	Chirikof Slope	5	5	7.9	1,206	502	1,910
Chirikof	201-300	Lower Shelikof Gully	7	5	0.4	354	0	759
Chirikof	301-500	Chirikof Slope	2	2	40.5	6,492	0	72,005
Chirikof	501-700	Chirikof Slope	2	2	14.6	2,855	0	29,310
Kodiak	101-200	Kenai Flats	17	9	2.3	2,824	0	7,023
Kodiak	101-200	Kodiak Outer Shelf	16	5	0.4	179	0	399
Kodiak	101-200	Portlock Flats	23	3	0.2	112	0	255
Kodiak	101-200	Albatross Gullies	22	2	0.0	12	0	31
Kodiak	201-300	Kodiak Slope	3	3	8.3	1,355	0	3,628
Kodiak	201-300	Kenai Gullies	7	6	6.7	4,443	2,009	6,877
Kodiak	301-500	Kodiak Slope	4	4	8.4	2,455	192	4,717
Kodiak	501-700	Kodiak Slope	2	2	24.9	4,341	0	34,053
Yakutat	1-100	Yakutat Shallows	10	1	0.0	21	0	69
Yakutat	1-100	Middleton Shallows	7	1	0.0	9	0	31
Yakutat	101-200	Middleton Shelf	6	3	3.4	2,476	0	6,765
Yakutat	101-200	Yakutat Flats	7	5	1.7	1,496	0	3,828
Yakutat	101-200	Yakataga Shelf	5	4	0.4	212	0	540
Yakutat	101-200	Fairweather Shelf	11	4	0.2	187	0	392
Yakutat	201-300	Yakutat Slope	6	5	7.0	1,480	0	2,992
Yakutat	201-300	Yakutat Gullies	5	5	6.2	1,898	328	3,469
Yakutat	301-500	Yakutat Slope	3	3	21.9	3,324	0	8,173
Yakutat	301-500	Yakutat Gullies	2	2	9.3	1,027	0	4,612
Yakutat	501-700	Yakutat Slope	2	2	14.5	2,126	0	5,372
Southeastern	101-200	Baranof-Chichagof Shelf	7	2	0.8	332	0	877
Southeastern	101-200	Prince of Wales Shelf	15	2	0.5	326	0	951
Southeastern	201-300	Baranof-Chichagof Slope	2	2	7.9	887	1	1,773
Southeastern	201-300	Prince of Wales Slope/Gullies	6	6	3.3	1,290	420	2,159
Southeastern	301-500	Southeastern Slope	1	1	17.9	1,385		
Southeastern	301-500	Southeastern Deep Gullies	3	3	10.3	2,409	0	6,785
Southeastern	501-700	Southeastern Slope	2	2	33.7	3,479	0	8,357

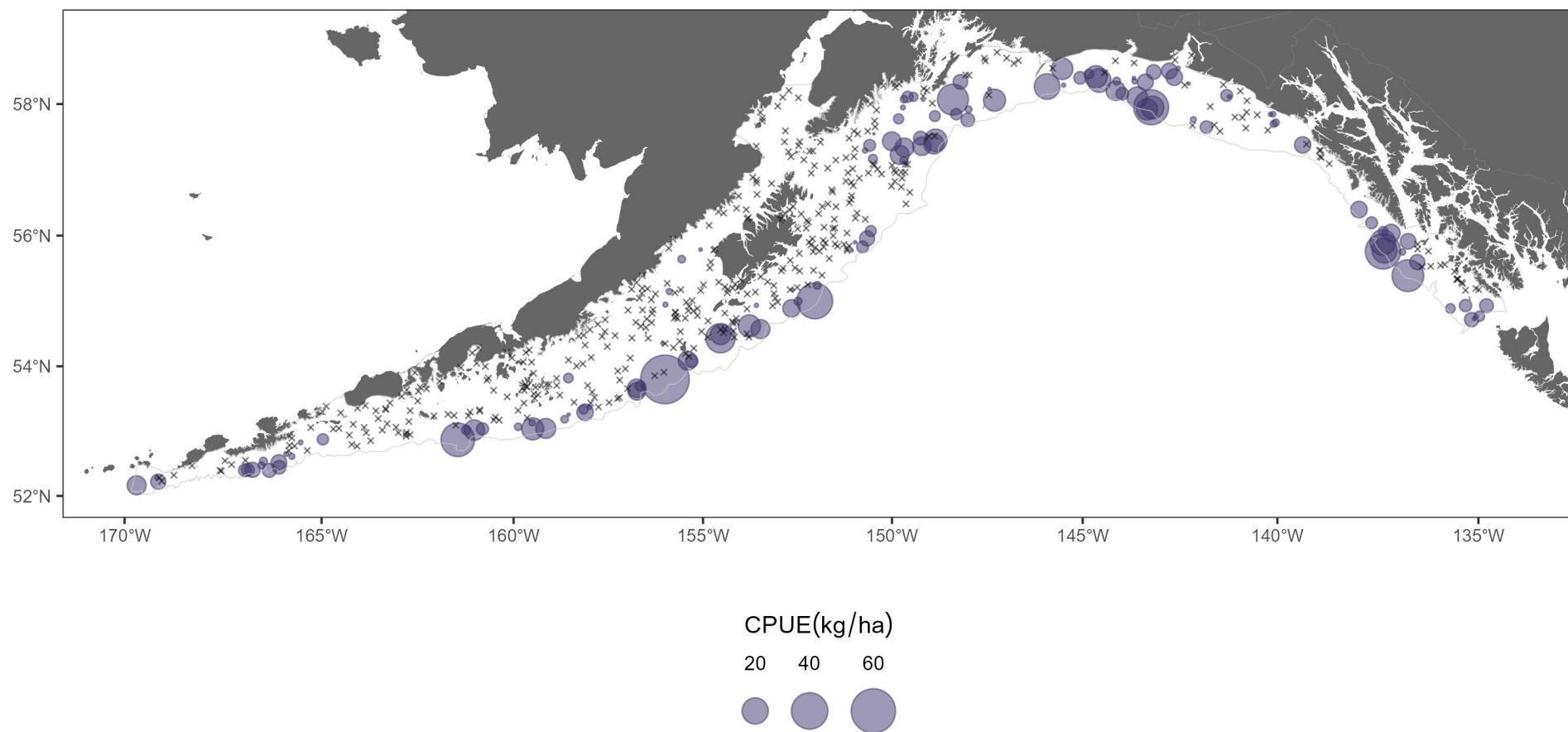


Figure 52. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of shortspine thornyhead in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

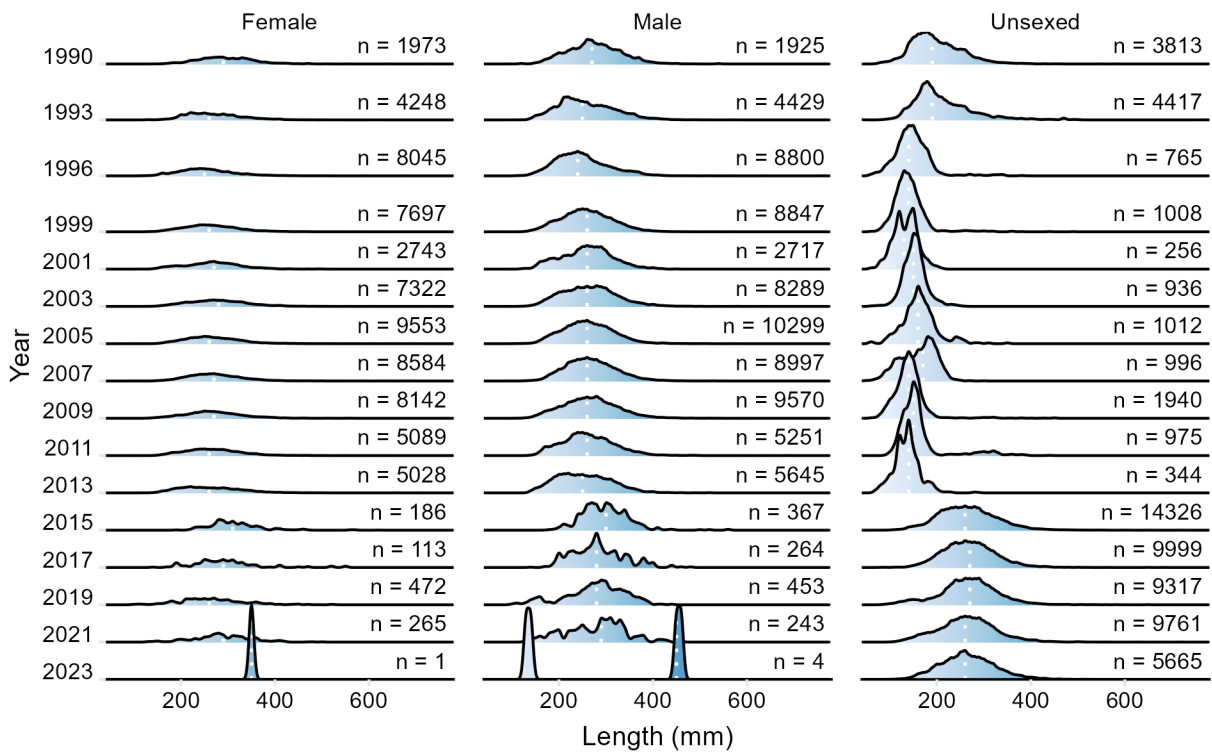


Figure 53. -- Population length composition of shortspine thornyhead in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The “Unsexed” column contains all fish that were not sexed (i.e., it is separate from the “Female” and “Male” columns). The dotted vertical line indicates median length.

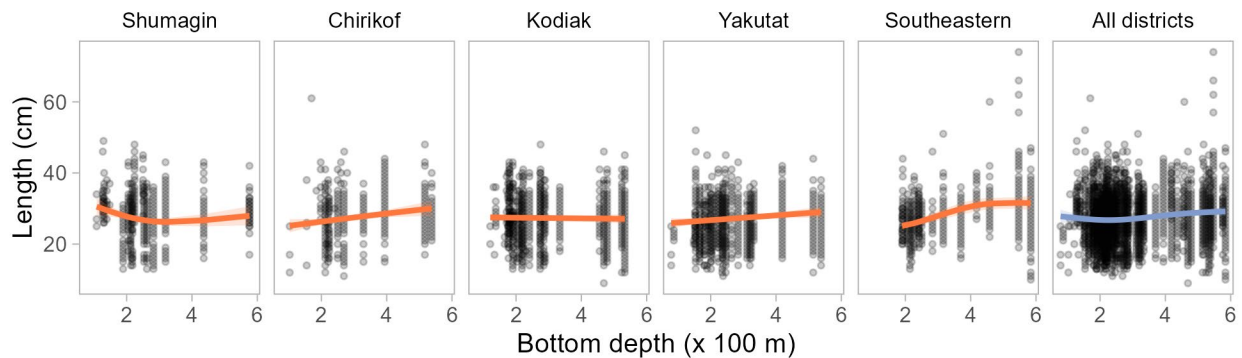


Figure 54. -- Length versus depth for shortspine thornyhead by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Spiny dogfish (*Squalus suckleyi*)

- Spiny dogfish was the 13th most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of spiny dogfish in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 65,568 mt (Table **40**), which is a 102.9% increase from 2021.
- The largest estimated biomass for spiny dogfish was in the Kodiak region, and the depth range with the largest estimated biomass was 1 - 100 m.
- The highest CPUEs were recorded in the Kodiak and Yakutat regions (Table **40** and Fig. **55**).
- Length distributions by year are provided in Figure **56** (total survey sample size N = 846; Fig. **57**). On average, the longest individuals were found in the Kodiak region and in a depth range of 1 - 100 m.

Table 40. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing spiny dogfish, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	2	0.02	89	0	214	2.19
	101 - 200	26	0	---	---	---	---	---
	201 - 300	11	1	0.06	16	0	52	1.601
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	118	3	0.02	105	0	235	2.071
Chirikof	1 - 100	48	0	---	---	---	---	---
	101 - 200	58	0	---	---	---	---	---
	201 - 300	12	0	---	---	---	---	---
	301 - 500	2	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	122	0	---	---	---	---	---
Kodiak	1 - 100	69	19	11.89	45,803	10,066	81,540	2.921
	101 - 200	94	27	0.93	4,029	1,074	6,983	2.784
	201 - 300	13	2	0.35	403	0	1,042	2.154
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	182	48	5.13	50,235	14,361	86,108	2.901
Yakutat	1 - 100	17	6	0.74	1,229	98	2,359	2.488
	101 - 200	29	19	4.46	13,114	4,373	21,855	1.929
	201 - 300	11	2	1.17	606	0	1,592	2.539
	301 - 500	5	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	64	27	2.7	14,948	6,148	23,749	1.985
Southeastern	1 - 100	4	0	---	---	---	---	---
	101 - 200	22	2	0.17	185	0	479	1.105
	201 - 300	8	2	0.19	96	0	305	1.931
	301 - 500	4	0	---	---	---	---	---
	501 - 700	2	0	---	---	---	---	---
	All depths	40	4	0.1	281	0	612	1.294
All areas	1 - 100	215	27	3.65	47,120	11,366	82,874	2.906
	101 - 200	229	48	1.42	17,328	8,145	26,510	2.059
	201 - 300	55	7	0.31	1,121	84	2,157	2.309
	301 - 500	17	0	---	---	---	---	---
	501 - 700	10	0	---	---	---	---	---
	All depths	526	82	2.13	65,568	28,961	102,176	2.611

Table 41. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing spiny dogfish, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Davidson Bank	28	2	0.1	88	0	214
Shumagin	201-300	Shumagin Slope	11	1	0.1	16	0	53
Kodiak	1-100	Lower Cook Inlet	9	7	29.4	29,095	0	60,598
Kodiak	1-100	Albatross Banks	32	9	10.6	16,284	0	36,444
Kodiak	1-100	Kenai Peninsula	11	3	0.8	424	0	991
Kodiak	101-200	Albatross Gullies	22	6	2.3	1,828	0	4,664
Kodiak	101-200	Barren Islands	16	7	1.0	1,074	268	1,880
Kodiak	101-200	Portlock Flats	23	8	0.7	524	138	910
Kodiak	101-200	Kenai Flats	17	6	0.5	603	94	1,112
Kodiak	201-300	Kenai Gullies	7	2	0.6	403	0	1,065
Yakutat	1-100	Yakutat Shallows	10	5	1.2	1,178	36	2,320
Yakutat	1-100	Middleton Shallows	7	1	0.1	51	0	174
Yakutat	101-200	Fairweather Shelf	11	10	10.9	8,430	1,412	15,448
Yakutat	101-200	Yakutat Flats	7	5	4.4	4,016	0	10,407
Yakutat	101-200	Middleton Shelf	6	3	0.8	551	0	1,232
Yakutat	101-200	Yakataga Shelf	5	1	0.2	116	0	440
Yakutat	201-300	Yakutat Gullies	5	2	2.0	606	0	1,671
Southeastern	101-200	Baranof-Chichagof Shelf	7	1	0.3	119	0	410
Southeastern	101-200	Prince of Wales Shelf	15	1	0.1	66	0	207
Southeastern	201-300	Baranof-Chichagof Slope	2	1	0.6	72	0	980
Southeastern	201-300	Prince of Wales Slope/Gullies	6	1	0.1	24	0	87

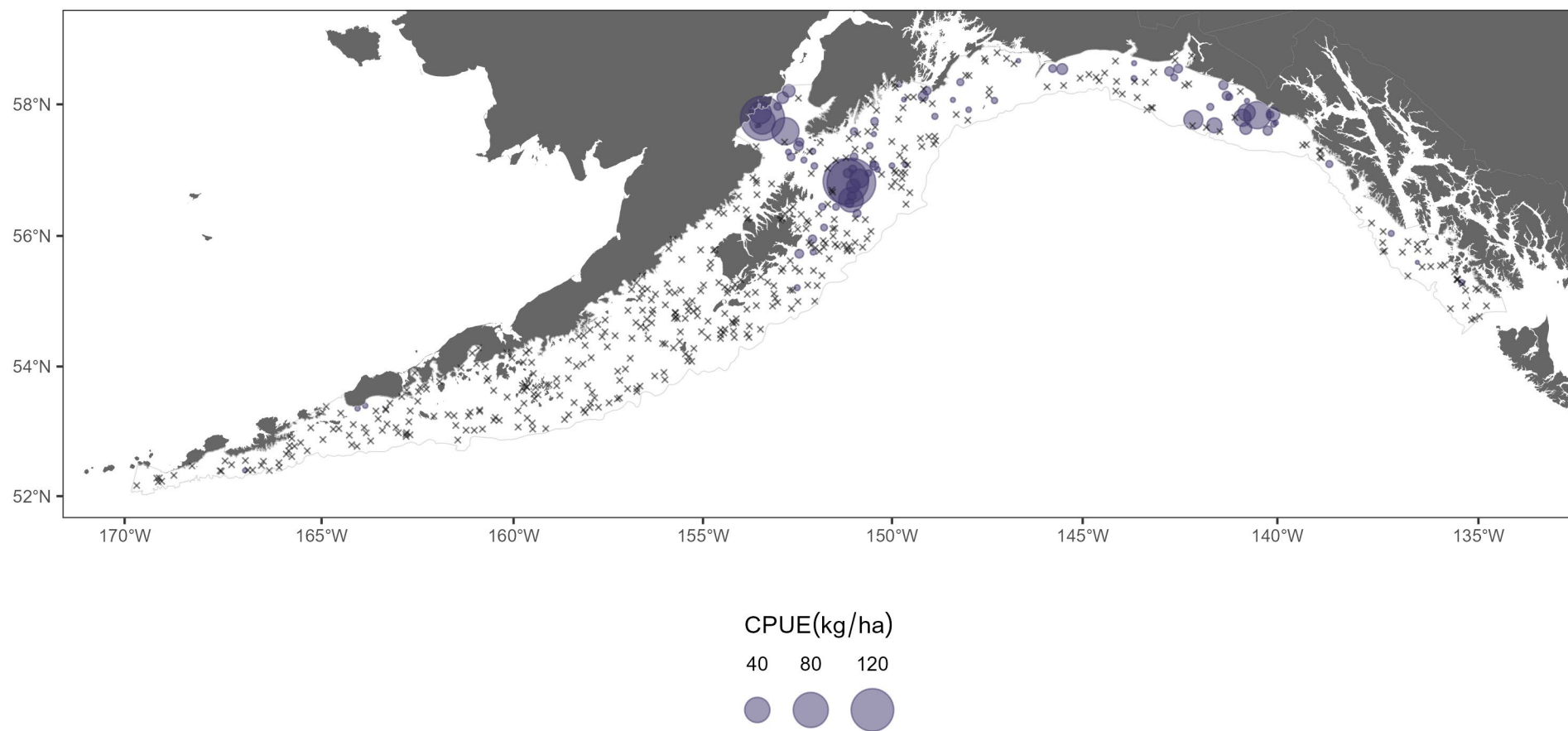


Figure 55. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of spiny dogfish in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

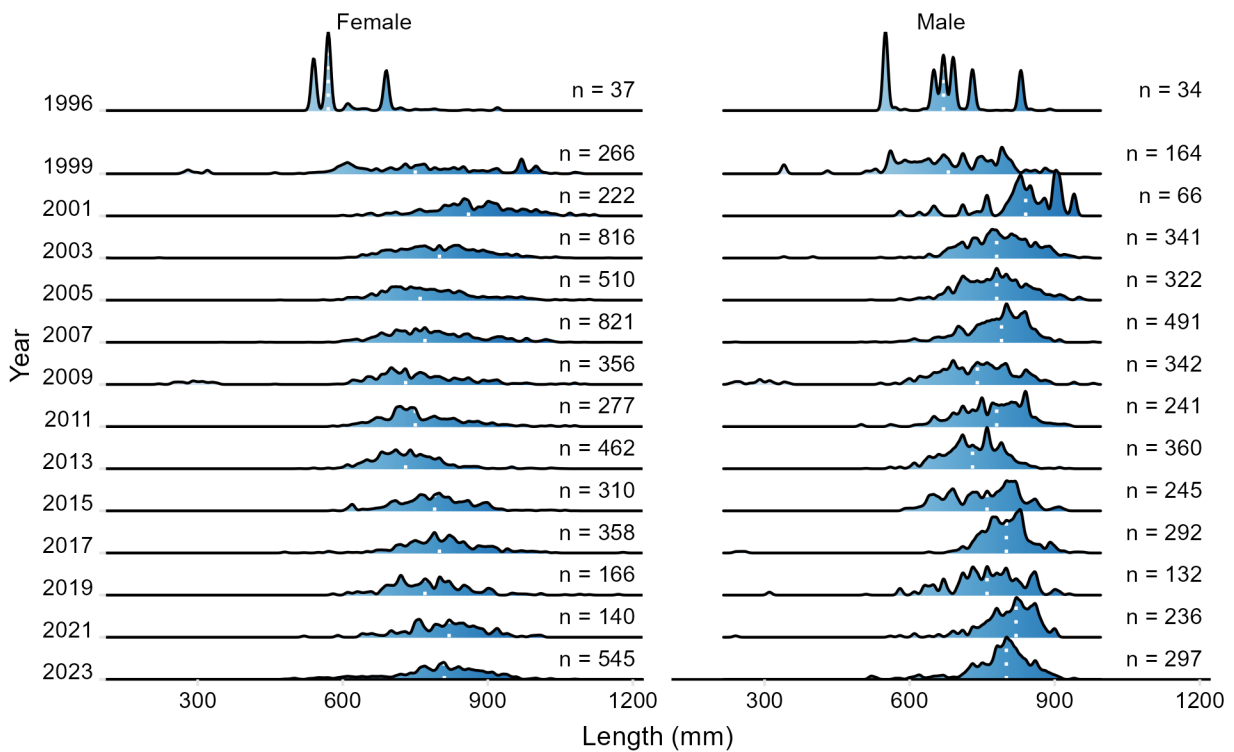


Figure 56. -- Population length composition of spiny dogfish in the Gulf of Alaska bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

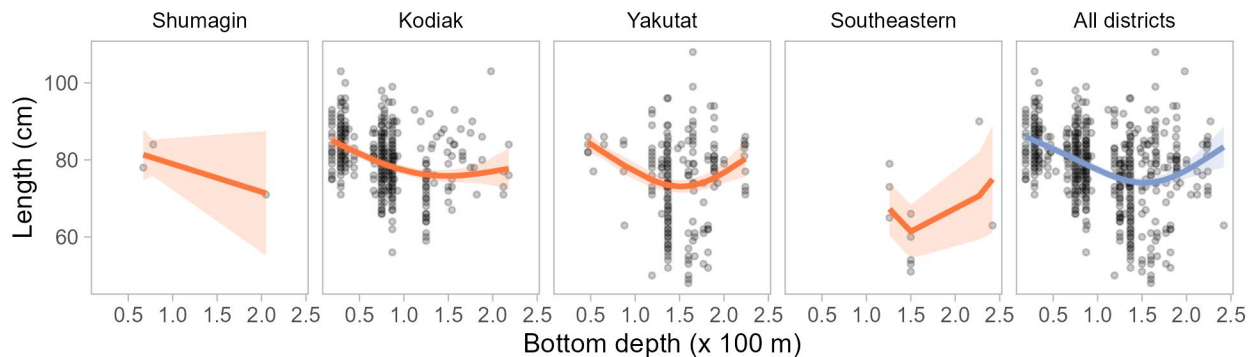


Figure 57. -- Length versus depth for spiny dogfish by survey district in the 2023 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth with a random haul effect, added to show trends in length. Shaded bands indicate 95% confidence intervals. Semi-transparent black points indicate raw (measured) lengths, not expanded to the full population.

Giant octopus (*Enteroctopus dofleini*)

- Giant octopus was the 42nd most abundant species caught in the 2023 Gulf of Alaska survey. The total biomass of giant octopus in the 2023 Gulf of Alaska bottom trawl survey was estimated to be 4,980 mt (Table **42**), which is a 372.8% increase from 2021.
- The largest estimated biomass for giant octopus was in the Kodiak region, and the depth range with the largest estimated biomass was 1 - 100 m.
- The highest CPUEs were recorded in the Kodiak and Shumagin regions (Table **42** and Fig. **58**).

Table 42. -- Summary by survey districts and depth intervals of 2023 Gulf of Alaska trawl effort (number of hauls), number of hauls containing giant octopus, their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL), and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL	Mean weight (kg)
Shumagin	1 - 100	77	7	26.38	1,089	485	2,447	5.23
	101 - 200	26	2	2.7	40	10	155	1.16
	201 - 300	11	1	0.55	2	0	8	0.16
	301 - 500	2	0	0	0	---	---	---
	501 - 700	2	0	0	0	---	---	---
	All depths	118	10	17.86	1,130	516	2,475	3.91
Chirikof	1 - 100	48	0	0	0	---	---	---
	101 - 200	58	5	18.18	434	142	1,320	4.76
	201 - 300	12	0	0	0	---	---	---
	301 - 500	2	1	10.15	16	3	83	0.28
	501 - 700	2	0	0	0	---	---	---
	All depths	122	6	6.92	450	153	1,325	4.01
Kodiak	1 - 100	69	14	54.05	2,082	1,192	3,634	6.48
	101 - 200	94	7	24.84	1,077	454	2,552	7.5
	201 - 300	13	1	0.65	7	1	38	0.2
	301 - 500	4	2	20.03	58	18	186	0.69
	501 - 700	2	1	75.8	132	26	676	3.46
	All depths	182	25	34.25	3,356	2,123	5,305	5.93
Yakutat	1 - 100	17	1	2.59	43	8	220	1.01
	101 - 200	29	0	0	0	---	---	---
	201 - 300	11	1	0.17	1	0	4	0.06
	301 - 500	5	0	0	0	---	---	---
	501 - 700	2	0	0	0	---	---	---
	All depths	64	2	0.8	44	9	220	0.54
Southeastern	1 - 100	4	0	0	0	---	---	---
	101 - 200	22	0	0	0	---	---	---
	201 - 300	8	0	0	0	---	---	---
	301 - 500	4	0	0	0	---	---	---
	501 - 700	2	0	0	0	---	---	---
	All depths	40	0	0	0	---	---	---
All areas	1 - 100	215	22	24.91	3,214	2,027	5,096	5.83
	101 - 200	229	14	12.67	1,550	774	3,101	5.61
	201 - 300	55	3	0.27	10	3	38	0.14
	301 - 500	17	3	5.83	75	27	205	0.55
	501 - 700	---	---	---	---	---	---	---
	All depths	526	43	16.15	4,980	3,421	7,250	4.94

Table 43. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2023 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing giant octopus, and their mean CPUE and biomass estimates with lower and upper 95% confidence limits (CL).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CL	Upper 95% CL
Shumagin	1-100	Shumagin Bank	23	4	0.7	810	0	1,701
Shumagin	1-100	Davidson Bank	28	1	0.1	176	0	537
Shumagin	1-100	Fox Islands	10	2	0.1	103	0	261
Shumagin	101-200	Shumagin Outer Shelf	18	2	0.0	40	0	106
Shumagin	201-300	Shumagin Slope	11	1	0.0	2	0	5
Chirikof	101-200	Shelikof Edge	21	1	0.2	167	0	514
Chirikof	101-200	East Shumagin Gully	15	3	0.2	210	0	643
Chirikof	101-200	Chirikof Outer Shelf	22	1	0.1	56	0	174
Chirikof	301-500	Chirikof Slope	2	1	0.1	16	0	223
Kodiak	1-100	Northern Kodiak Shallows	7	1	1.6	347	0	1,197
Kodiak	1-100	Albatross Banks	32	10	1.0	1,532	564	2,501
Kodiak	1-100	Albatross Shallows	10	2	0.3	201	0	514
Kodiak	1-100	Kenai Peninsula	11	1	0.0	1	0	4
Kodiak	101-200	Albatross Gullies	22	2	0.6	442	0	1,126
Kodiak	101-200	Kenai Flats	17	3	0.3	364	0	957
Kodiak	101-200	Barren Islands	16	2	0.2	270	0	799
Kodiak	201-300	Kenai Gullies	7	1	0.0	7	0	26
Kodiak	301-500	Kodiak Slope	4	2	0.2	58	0	178
Kodiak	501-700	Kodiak Slope	2	1	0.8	132	0	1,813
Yakutat	1-100	Yakutat Shallows	10	1	0.0	43	0	141
Yakutat	201-300	Yakutat Slope	6	1	0.0	1	0	3

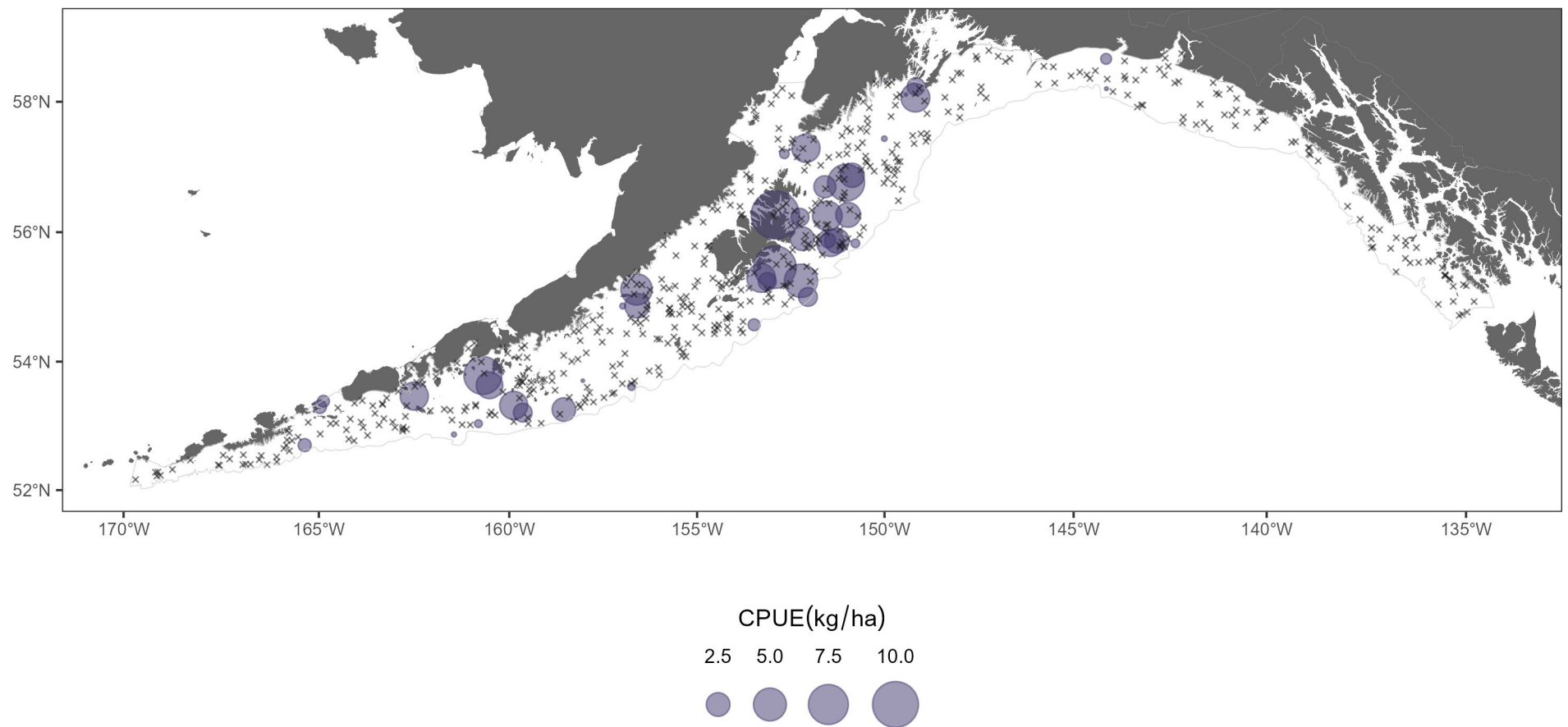


Figure 58. -- Catch-per-unit effort (CPUE, kg/ha; X = no catch) of giant octopus in the 2023 Gulf of Alaska RACE GAP summer bottom trawl survey catches.

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Appendices

Appendix A

Stratum Specifications and Locations

Appendix Table A-1 presents the survey stratum definitions for the 2023 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 survey strata.

Appendix Table A-1. -- Survey strata used for the 2023 Gulf of Alaska biennial survey including depth, stratum code, name and area in square nautical miles (nmi²) and square kilometers (km²).

Depth range (m)	Stratum code	Stratum name	Area (nmi ²)	Area (km ²)
1 - 100	10	Fox Islands	2,430	8,333
	11	Davidson Bank	3,989	13,681
	12	Lower Alaska Peninsula	2,005	6,876
	13	Shumagin Bank	3,615	12,399
	20	Upper Alaska Peninsula	2,315	7,941
	21	Semidi Bank	2,129	7,302
	22	Chirikof Bank	3,147	10,792
	30	Albatross Shallows	1,681	5,766
	31	Albatross Banks	4,491	15,403
	32	Lower Cook Inlet	2,883	9,887
	33	Kenai Peninsula	1,534	5,260
	35	Northern Kodiak Shallows	641	2,200
	40	Yakutat Shallows	2,900	9,947
	41	Middleton Shallows	1,958	6,714
	50	Southeastern Shallows	1,909	6,546
	991	Subtotal	37,628	129,047
101 - 200	110	Sanak Gully	1,238	4,245
	111	Shumagin Outer Shelf	2,377	8,154
	112	West Shumagin Gully	664	2,278

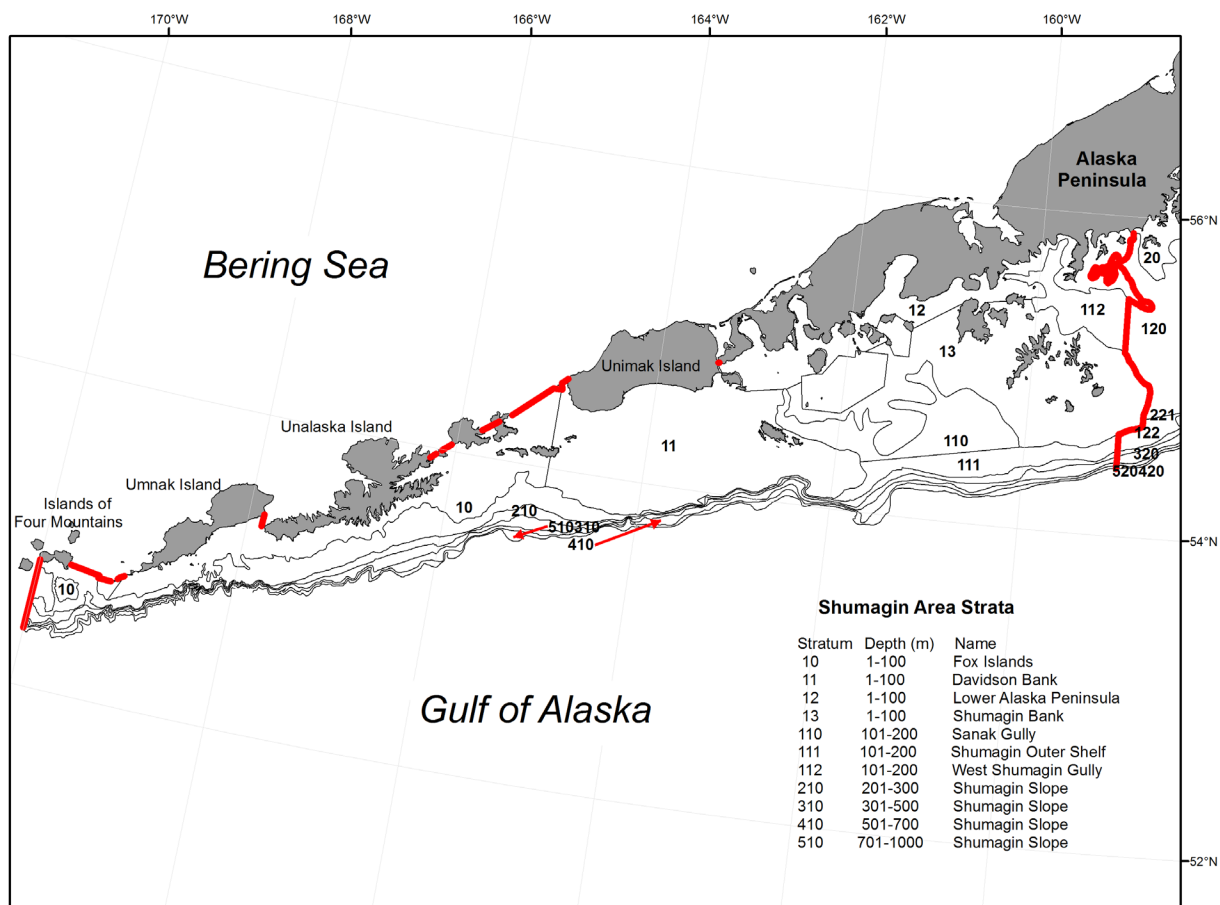
	120	East Shumagin Gully	3,238	11,104
	121	Shelikof Edge	2,255	7,735
	122	Chirikof Outer Shelf	1,461	5,011
	130	Albatross Gullies	2,307	7,912
	131	Portlock Flats	2,139	7,336
	132	Barren Islands	3,202	10,981
	133	Kenai Flats	3,521	12,077
	134	Kodiak Outer Shelf	1,465	5,026
	140	Middleton Shelf	2,142	7,346
	141	Yakataga Shelf	1,539	5,277
	142	Yakutat Flats	2,634	9,032
	143	Fairweather Shelf	2,253	7,728
	150	Baranof-Chichagof Shelf	1,224	4,196
	151	Prince of Wales Shelf	2,008	6,888
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

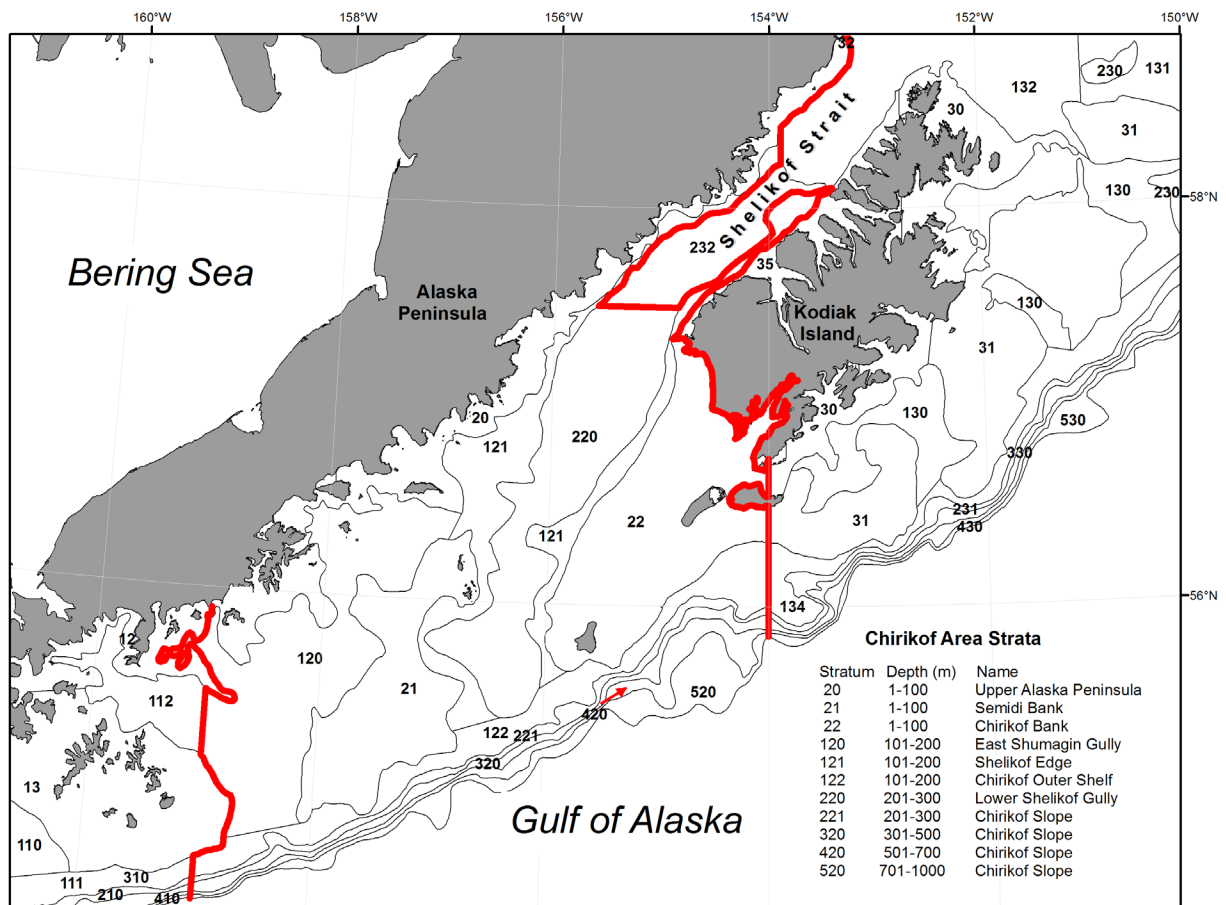
Appendix Table A-2. -- Summary codes used for the 2023 Gulf of Alaska biennial bottom trawl survey including depth range, International North Pacific Fisheries Commission statistical areas, their square areas, and strata included in the summary area.

Summary code	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	
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

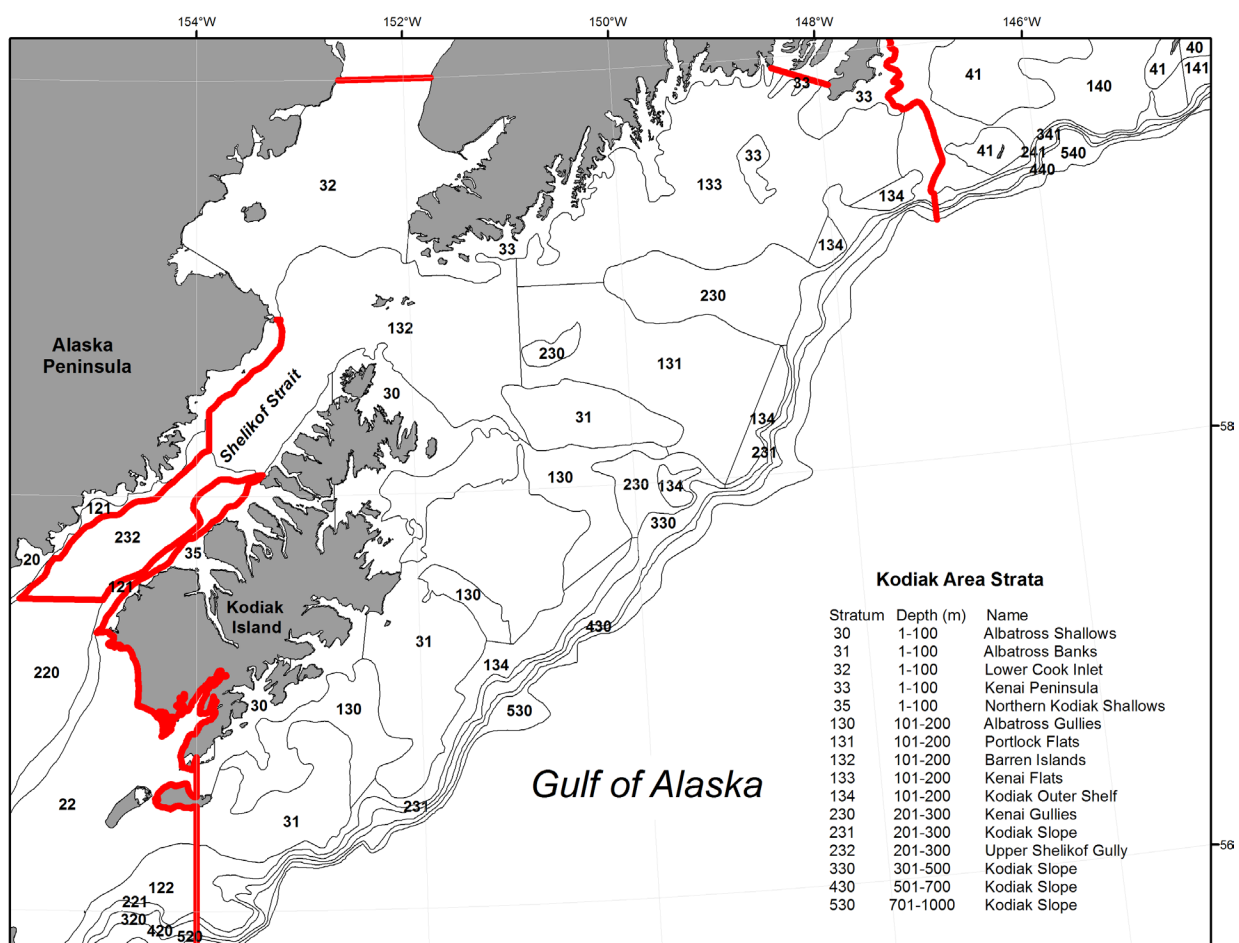
953	201 - 300		1,473	5,052	250, 251
954	301 - 500		909	3,117	350, 351
955	501 - 700		301	1,033	450
959	1 - 700		7,824	26,833	
999	1 – 700	All Areas	89,930	308,416	All



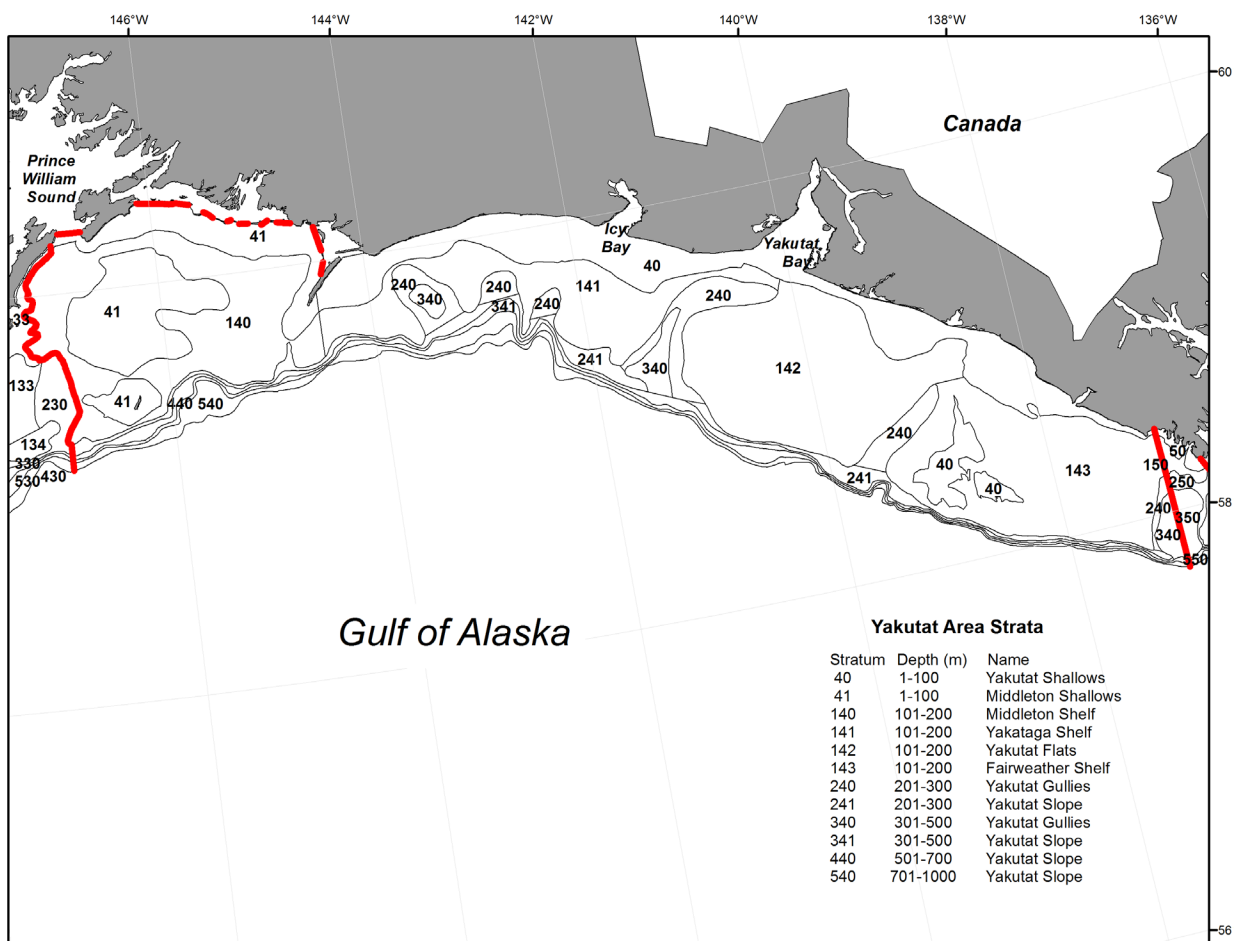
Appendix Figure A-1. -- Gulf of Alaska survey strata in the Shumagin area.



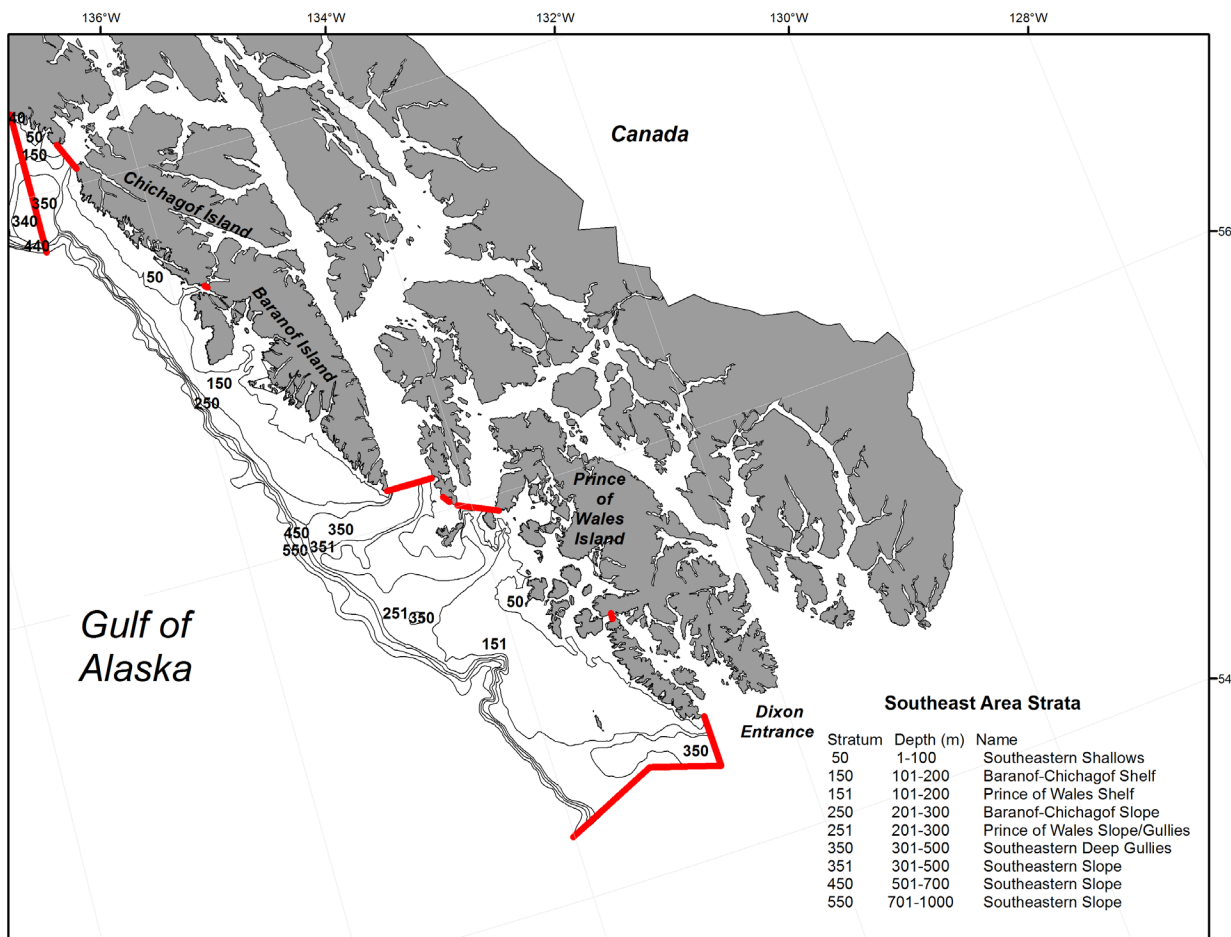
Appendix Figure A-2. – Gulf of Alaska survey strata in the Chirikof area.



Appendix Figure A-3. – Gulf of Alaska survey strata in the Kodiak area.



Appendix Figure A-4. – Gulf of Alaska survey strata in the Yakutat area.



Appendix Figure A-5. -- Gulf of Alaska survey strata in the Southeast region.

Appendix B

Appendix Table B1. -- Fish and invertebrate species encountered and identified during the 2023 Gulf of Alaska bottom trawl survey.

INPFC area	Family	Common name	Species name
Chirikof	Rajidae	Aleutian skate	<i>Bathyraja aleutica</i>
Chirikof	Rajidae	Bering skate	<i>Bathyraja interrupta</i>
Chirikof	Rajidae	Alaska skate	<i>Bathyraja parmifera</i>
Chirikof	Rajidae	mud skate	<i>Bathyraja taranetzi</i>
Chirikof	Rajidae	big skate	<i>Beringrja binoculata</i>
Chirikof	Rajidae	longnose skate	<i>Raja rhina</i>
Chirikof	Pleuronectidae	arrowtooth flounder	<i>Atheresthes stomias</i>
Chirikof	Pleuronectidae	rex sole	<i>Glyptocephalus zachirus</i>
Chirikof	Pleuronectidae	flathead sole	<i>Hippoglossoides elassodon</i>
Chirikof	Pleuronectidae	Pacific halibut	<i>Hippoglossus stenolepis</i>
Chirikof	Pleuronectidae	butter sole	<i>Isopsetta isolepis</i>
Chirikof	Pleuronectidae	southern rock sole	<i>Lepidopsetta bilineata</i>
Chirikof	Pleuronectidae	northern rock sole	<i>Lepidopsetta polyxystra</i>
Chirikof	Pleuronectidae	yellowfin sole	<i>Limanda aspera</i>
Chirikof	Pleuronectidae	slender sole	<i>Lyopsetta exilis</i>
Chirikof	Pleuronectidae	Dover sole	<i>Microstomus pacificus</i>
Chirikof	Pleuronectidae	English sole	<i>Parophrys vetulus</i>
Chirikof	Pleuronectidae	starry flounder	<i>Platichthys stellatus</i>
Chirikof	Pleuronectidae	Alaska plaice	<i>Pleuronectes quadrituberculatus</i>
Chirikof	Pleuronectidae	sand sole	<i>Psettichthys melanostictus</i>
Chirikof	Macrouridae	giant grenadier	<i>Albatrossia pectoralis</i>
Chirikof	Ammodytidae	Arctic sand lance	<i>Ammodytes hexapterus</i>
Chirikof	Ammodytidae	Pacific sand lance	<i>Ammodytes personatus</i>
Chirikof	Anoplopomatidae	sablefish	<i>Anoplopoma fimbria</i>
Chirikof	Moridae	Pacific flatnose	<i>Antimora microlepis</i>
Chirikof	Cyclopteridae	smooth lumpsucker	<i>Aptocyclus ventricosus</i>
Chirikof	Bathylagidae	robust blacksmelt	<i>Bathylagus milleri</i>
Chirikof	Bathymasteridae	searcher	<i>Bathymaster signatus</i>
Chirikof	Liparidae	blackfin snailfish	<i>Careproctus cypselurus</i>
Chirikof	Liparidae	smalldisk snailfish	<i>Careproctus gilberti</i>
Chirikof	Stomiidae	Pacific viperfish	<i>Chauliodus macouni</i>
Chirikof	Clupeidae	Pacific herring	<i>Clupea pallasii</i>
Chirikof	Macrouridae	popeye grenadier	<i>Coryphaenoides cinereus</i>
Chirikof	Cryptacanthodidae	giant wrymouth	<i>Cryptacanthodes giganteus</i>
Chirikof	Liparidae	blotched snailfish	<i>Crystallichthys cyclospilus</i>
Chirikof	Psychrolutidae	spinyhead sculpin	<i>Dasycottus setiger</i>
Chirikof	Gadidae	saffron cod	<i>Eleginus gracilis</i>
Chirikof	Cyclopteridae	Alaskan lumpsucker	<i>Eumicrotremus gyrynops</i>
Chirikof	Gadidae	walleye pollock	<i>Gadus chalcogrammus</i>
Chirikof	Gadidae	Pacific cod	<i>Gadus macrocephalus</i>
Chirikof	Cottidae	armorhead sculpin	<i>Gymnocanthus galeatus</i>
Chirikof	Cottidae	yellow Irish lord	<i>Hemilepidotus jordani</i>
Chirikof	Hemitripterae	bigmouth sculpin	<i>Hemitripterus bolini</i>
Chirikof	Hexagrammidae	kelp greenling	<i>Hexagrammos decagrammus</i>
Chirikof	Hexagrammidae	whitespotted greenling	<i>Hexagrammos stelleri</i>
Chirikof	Bathylagidae	northern smoothtongue	<i>Leuroglossus schmidtii</i>
Chirikof	Stichaeidae	longsnout prickleback	<i>Lumpenella longirostris</i>
Chirikof	Stichaeidae	snake prickleback	<i>Lumpenus sagitta</i>
Chirikof	Zoarcidae	Bering eelpout	<i>Lycodes beringi</i>
Chirikof	Zoarcidae	shortfin eelpout	<i>Lycodes brevipes</i>
Chirikof	Zoarcidae	wattled eelpout	<i>Lycodes palearis</i>

INPFC area	Family	Common name	Species name
Chirikof	Psychrolutidae	darkfin sculpin	<i>Malacocottus zonurus</i>
Chirikof	Osmeridae	Pacific capelin	<i>Mallotus catervarius</i> (=villosus)
Chirikof	Gadidae	Pacific tomcod	<i>Microgadus proximus</i>
Chirikof	Cottidae	plain sculpin	<i>Myoxocephalus jaok</i>
Chirikof	Cottidae	great sculpin	<i>Myoxocephalus polyacanthocephalus</i>
Chirikof	Myctophidae	pinpoint lampfish	<i>Nannobranchium regale</i>
Chirikof	Salmonidae	pink salmon	<i>Oncorhynchus gorbuscha</i>
Chirikof	Salmonidae	chum salmon	<i>Oncorhynchus keta</i>
Chirikof	Salmonidae	coho salmon	<i>Oncorhynchus kisutch</i>
Chirikof	Salmonidae	Chinook salmon	<i>Oncorhynchus tshawytscha</i>
Chirikof	Hexagrammidae	lingcod	<i>Ophiodon elongatus</i>
Chirikof	Hexagrammidae	Atka mackerel	<i>Pleurogrammus monopterygius</i>
Chirikof	Agonidae	sturgeon poacher	<i>Podothecus accipenserinus</i>
Chirikof	Stichaeidae	whitebarred prickleback	<i>Poroclinus rothrocki</i>
Chirikof	Melamphaidae	crested bigscale	<i>Poromitra curilensis</i> (=crassiceps)
Chirikof	Scorpaenidae	rougeye rockfish	<i>Sebastes aleutianus</i>
Chirikof	Scorpaenidae	Pacific ocean perch	<i>Sebastes alutus</i>
Chirikof	Scorpaenidae	redbanded rockfish	<i>Sebastes babcocki</i>
Chirikof	Scorpaenidae	shortraker rockfish	<i>Sebastes borealis</i>
Chirikof	Scorpaenidae	silvergray rockfish	<i>Sebastes brevispinis</i>
Chirikof	Scorpaenidae	dark rockfish	<i>Sebastes ciliatus</i>
Chirikof	Scorpaenidae	quillback rockfish	<i>Sebastes maliger</i>
Chirikof	Scorpaenidae	black rockfish	<i>Sebastes melanops</i>
Chirikof	Scorpaenidae	blackspotted rockfish	<i>Sebastes melanostictus</i>
Chirikof	Scorpaenidae	northern rockfish	<i>Sebastes polyspinis</i>
Chirikof	Scorpaenidae	yelloweye rockfish	<i>Sebastes ruberrimus</i>
Chirikof	Scorpaenidae	dusky rockfish	<i>Sebastes variabilis</i>
Chirikof	Scorpaenidae	harlequin rockfish	<i>Sebastes variegatus</i>
Chirikof	Scorpaenidae	shortspine thornyhead	<i>Sebastolobus alascanus</i>
Chirikof	Myctophidae	northern lampfish	<i>Stenobranchius leucopsarus</i>
Chirikof	Osmeridae	eulachon	<i>Thaleichthys pacificus</i>
Chirikof	Trichodontidae	Pacific sandfish	<i>Trichodon trichodon</i>
Chirikof	Cottidae	roughspine sculpin	<i>Triglops macellus</i>
Chirikof	Cottidae	spectacled sculpin	<i>Triglops scepcticus</i>
Chirikof	Zaproridae	prowfish	<i>Zaprora silenus</i>
Chirikof	Hormathiidae	reticulate anemone	<i>Actinauge verrilli</i>
Chirikof	Actinostolidae	rough purple sea anemone	<i>Actinostola faeculenta</i>
Chirikof	Alcyonidiidae	fruit leather bryozoan	<i>Alcyonidium pedunculatum</i>
Chirikof	Strongylocentrotidae	orange-pink sea urchin	<i>Allocentrotus fragilis</i>
Chirikof	Polyclinidae	sand-grain imbedded ascidian	<i>Amaroucium soldatovi</i>
Chirikof	Aphrocallistidae	clay pipe sponge	<i>Aphrocallistes vastus</i>
Chirikof	Aphroditidae		<i>Aphrodita negligens</i>
Chirikof	Stichopodidae	California sea cucumber	<i>Apostichopus californicus</i>
Chirikof	Crangonidae	kuro argid	<i>Argis lar</i>
Chirikof	Crangonidae	Nelson argid	<i>Argis levior</i>
Chirikof	Asteriidae	purple-orange sea star	<i>Asterias amurensis</i>
Chirikof	Ulmaridae		<i>Aurelia labiata</i>
Chirikof	Balanidae		<i>Balanus nubilus</i>
Chirikof	Buccinidae		<i>Beringius kennicottii</i>
Chirikof	Gonatidae	magistrate armhook squid	<i>Berryteuthis magister</i>
Chirikof	Schizasteridae	heart urchin	<i>Brisaster latifrons</i>
Chirikof	Schizasteridae		<i>Brisaster townsendi</i>
Chirikof	Goniasteridae	red bat star	<i>Ceramaster japonicus</i>
Chirikof	Lineidae	light-edged ribbon worm	<i>Cerebratulus californienesis</i>

INPFC area	Family	Common name	Species name
Chirikof	Benthopectinidae	fragile sea star	<i>Cheiraster dawsoni</i>
Chirikof	Oregoniidae	Tanner crab	<i>Chionoecetes bairdi</i>
Chirikof	Balanidae	giant barnacle	<i>Chirona evermanni</i>
Chirikof	Pisidae	longhorned decorator crab	<i>Chorilia longipes</i>
Chirikof	Pelagiidae	sea nettle	<i>Chrysaora fuscescens</i>
Chirikof	Pelagiidae		<i>Chrysaora melanaster</i>
Chirikof	Trochidae		<i>Cidarina cidaris</i>
Chirikof	Chalinidae	rough hat sponge	<i>Cladocroce attu</i>
Chirikof	Crangonidae	ridged Crangon	<i>Crangon dalli</i>
Chirikof	Actiniidae	chevron-tentacled anemone	<i>Cribrinopsis fernaldi</i>
Chirikof	Solasteridae	grooved sea star	<i>Crossaster borealis</i>
Chirikof	Solasteridae	rose sea star	<i>Crossaster papposus</i>
Chirikof	Naticidae	Aleutian moonshell	<i>Cryptonatica aleutica</i>
Chirikof	Ctenodiscidae	common mud star	<i>Ctenodiscus crispatus</i>
Chirikof	Cucumariidae		<i>Cucumaria frondosa</i>
Chirikof	Cyaneidae	lion's mane jelly	<i>Cyanea capillata</i>
Chirikof	Discodorididae		<i>Diaulula</i> sp. A (Clark 2006)
Chirikof	Pterasteridae	pincushion sea star	<i>Diplopteraster multipes</i>
Chirikof	Astropectinidae	northern sea star	<i>Dipsacaster borealis</i>
Chirikof	Clavelinidae	globular ascidian	<i>Distaplia occidentalis</i>
Chirikof	Clavelinidae	paddle ascidian	<i>Distaplia smithi</i>
Chirikof	Archidorididae	white night doris	<i>Doris odhneri</i>
Chirikof	Echinarachniidae	parma sand dollar	<i>Echinarachnius parma</i>
Chirikof	Microcionidae	hat sponge	<i>Echinoclathria beringensis</i>
Chirikof	Paguridae	purple hermit	<i>Elassochirus cavimanus</i>
Chirikof	Paguridae	Pacific red hermit	<i>Elassochirus gilli</i>
Chirikof	Paguridae	widehand hermit crab	<i>Elassochirus tenuimanus</i>
Chirikof	Octopodidae	giant octopus	<i>Enteroctopus dofeini</i>
Chirikof	Polynoidae	thorny scaleworm	<i>Eunoe senta</i>
Chirikof	Asteriidae	giant sea star	<i>Evasterias echinosoma</i>
Chirikof	Primnoidae		<i>Fanellia fraseri</i>
Chirikof	Antedonidae	featherstar crinoid	<i>Florometra serratissima</i>
Chirikof	Ranellidae	Oregon triton	<i>Fusitriton oregonensis</i>
Chirikof	Goniasteridae	Swift sea star	<i>Gephyreaster swifti</i>
Chirikof	Cancridae	Oregon rock crab	<i>Glebocarcinus oregonensis</i>
Chirikof	Gonatidae	clawed armhook squid	<i>Gonatus onyx</i>
Chirikof	Gorgonocephalidae	basketstar	<i>Gorgonocephalus eucnemis</i>
Chirikof	Halichondriidae	ginseng sponge	<i>Halichondria oblonga</i>
Chirikof	Halipteridae		<i>Halipterus willemoesi</i>
Chirikof	Pyuridae	sea peach	<i>Halocynthia aurantium</i>
Chirikof	Pyuridae	bristly tunicate	<i>Halocynthia igaboja</i>
Chirikof	Echinasteridae	ridged blood star	<i>Henricia aspera</i>
Chirikof	Echinasteridae	blood sea star	<i>Henricia leviuscula</i>
Chirikof	Echinasteridae	spiny Henricia	<i>Henricia multispina</i>
Chirikof	Goniasteridae		<i>Hippasteria californica</i>
Chirikof	Goniasteridae	spiny red sea star	<i>Hippasteria phrygiana (=spinosa)</i>
Chirikof	Coelosphaeridae	spud sponge	<i>Histodermella kagigunensis</i>
Chirikof	Veneridae	Kennerleys venus	<i>Humilaria kennerleyi</i>
Chirikof	Oregoniidae	Pacific lyre crab	<i>Hyas lyratus</i>
Chirikof	Paguridae	splendid hermit	<i>Labidochirus splendescens</i>
Chirikof	Laqueidae	California lamp shell	<i>Laqueus californianus</i>
Chirikof	Latrunculiidae	green papillate sponge	<i>Latrunculia oparinae</i>
Chirikof	Asteriidae	blackspined sea star	<i>Lethasterias nanimensis</i>
Chirikof	Lithodidae	golden king crab	<i>Lithodes aequispinus</i>
Chirikof		crested sea star	<i>Lophaster furcilliger</i>

INPFC area	Family	Common name	Species name
Chirikof	Lithodidae	brown box crab	<i>Lopholithodes foraminatus</i>
Chirikof	Luidiidae	sand sea star	<i>Luidia foliolata</i>
Chirikof	Naticidae	pale moonshell	<i>Lunatia pallida</i>
Chirikof	Metridiidae	gigantic anemone	<i>Metridium farcimen</i>
Chirikof	Calpensiidae		<i>Microporina articulata</i>
Chirikof	Mytilidae	northern horsemussel	<i>Modiolus modiolus</i>
Chirikof	Molpadiidae	sweet sea potato	<i>Molpadia intermedia</i>
Chirikof	Mycalidae	lampshade sponge	<i>Mycale bellabellensis</i>
Chirikof	Mycalidae	tree sponge	<i>Mycale loveni</i>
Chirikof	Myriaporidae		<i>Myriapora orientalis</i>
Chirikof	Buccinidae	white neptune	<i>Neptunea amianta</i>
Chirikof	Buccinidae	Pribilof whelk	<i>Neptunea pribiloffensis</i>
Chirikof	Ophiactidae	ubiquitous brittle star	<i>Ophiopholis aculeata</i>
Chirikof	Ophiuridae	notched brittlestar	<i>Ophiura sarsii</i>
Chirikof	Oregoniidae	split-nose decorator crab	<i>Oregonia bifurca</i>
Chirikof	Oregoniidae	graceful decorator crab	<i>Oregonia gracilis</i>
Chirikof	Asteriidae	redbanded sea star	<i>Orthasterias koehleri</i>
Chirikof	Paguridae	Aleutian hermit	<i>Pagurus aleuticus</i>
Chirikof	Paguridae	Bering hermit	<i>Pagurus beringanus</i>
Chirikof	Paguridae	sponge hermit	<i>Pagurus brandti</i>
Chirikof	Paguridae	hairy hermit crab	<i>Pagurus capillatus</i>
Chirikof	Paguridae	knobbyhand hermit	<i>Pagurus confragosus</i>
Chirikof	Paguridae	hornyhand hermit	<i>Pagurus cornutus</i>
Chirikof	Paguridae	bluespine hermit	<i>Pagurus kennerlyi</i>
Chirikof	Paguridae	Alaskan hermit	<i>Pagurus ochotensis</i>
Chirikof	Paguridae	longhand hermit	<i>Pagurus tanneri</i>
Chirikof	Paguridae	Townsend hermit crab	<i>Pagurus townsendi</i>
Chirikof	Paguridae	fuzzy hermit crab	<i>Pagurus trigonocheirus</i>
Chirikof	Pandalidae	sidestripe shrimp	<i>Pandalopsis dispar</i>
Chirikof	Pandalidae	Alaskan pink shrimp	<i>Pandalus eous</i>
Chirikof	Pandalidae	ocean shrimp	<i>Pandalus jordani</i>
Chirikof	Pandalidae	roughpatch shrimp	<i>Pandalus stenolepis</i>
Chirikof	Lithodidae	red king crab	<i>Paralithodes camtschaticus</i>
Chirikof	Pasiphaeidae	Pacific glass shrimp	<i>Pasiphaea pacifica</i>
Chirikof	Pectinidae	weathervane scallop	<i>Patinopecten caurinus</i>
Chirikof	Discodorididae	Pacific sea lemon	<i>Peltodoris nobilis</i>
Chirikof	Ulmaridae	egg yolk jelly	<i>Phacellophora camtschatica</i>
Chirikof	Lithodidae	flatspine triangle crab	<i>Phyllolithodes papillosus</i>
Chirikof	Echinasteridae	thorny sea star	<i>Poraniopsis inflata</i>
Chirikof	Primnoidae		<i>Primnoa pacifica</i>
Chirikof	Goniasteridae		<i>Pseudarchaster alascensis</i>
Chirikof	Goniasteridae	scarlet sea star	<i>Pseudarchaster parelii</i>
Chirikof	Synallactidae	sandy sea cucumber	<i>Pseudostichopus mollis</i>
Chirikof	Pterasteridae		<i>Pteraster marssipus</i>
Chirikof	Pterasteridae	wrinkled star	<i>Pteraster militaris</i>
Chirikof	Pterasteridae		<i>Pteraster tessellatus</i>
Chirikof	Asteriidae	sunflower sea star	<i>Pycnopodia helianthoides</i>
Chirikof	Buccinidae	left-hand whelk	<i>Pyrulofusus harpa</i>
Chirikof	Mucronellidae	ribbed bryozoan	<i>Rhamphostomella costata</i>
Chirikof	Lithodidae	rhinoceros crab	<i>Rhinolithodes wosnessenskii</i>
Chirikof	Sepiolidae	eastern Pacific bobtail	<i>Rossia pacifica</i>
Chirikof	Cardiidae	oblique smoothcockle	<i>Serripes notabilis</i>
Chirikof	Solasteridae	morning sun sea star	<i>Solaster dawsoni</i>
Chirikof	Solasteridae	northern sun sea star	<i>Solaster endeca</i>
Chirikof	Solasteridae		<i>Solaster</i> sp. A (Clark 1997)

INPFC area	Family	Common name	Species name
Chirikof	Solasteridae	beautiful sun star	<i>Solaster spectabilis</i>
Chirikof	Ophiuridae		<i>Stegophiura ponderosa</i>
Chirikof	Actinostolidae	swimming anemone	<i>Stomphia coccinea</i>
Chirikof	Strongylocentrotidae	white sea urchin	<i>Strongylocentrotus pallidus</i>
Chirikof	Strongylocentrotidae		<i>Strongylocentrotus polyacanthus</i>
Chirikof	Styelidae	sea potato	<i>Styela rustica</i>
Chirikof	Asteriidae	long-rayed star	<i>Stylasterias forreri</i>
Chirikof	Synallactidae		<i>Synallactes challengerii</i>
Chirikof	Laqueidae	common brachiopod	<i>Terebratalia transversa</i>
Chirikof	Salpidae	common salp	<i>Thetys vagina</i>
Chirikof	Opheliidae	pupa utility worm	<i>Travisia pupa</i>
Chirikof	Zoanthidae	hot dog zoanthid	<i>Zoanthidae</i> sp. A
Kodiak	Rajidae	Aleutian skate	<i>Bathyrāja aleutica</i>
Kodiak	Rajidae	Bering skate	<i>Bathyrāja interrupta</i>
Kodiak	Rajidae	Alaska skate	<i>Bathyrāja parmifera</i>
Kodiak	Rajidae	big skate	<i>Beringrāja binoculata</i>
Kodiak	Rajidae	longnose skate	<i>Raja rhina</i>
Kodiak	Squalidae	spiny dogfish	<i>Squalus suckleyi</i>
Kodiak	Pleuronectidae	arrowtooth flounder	<i>Atheresthes stomias</i>
Kodiak	Pleuronectidae	deepsea sole	<i>Embassichthys bathybius</i>
Kodiak	Pleuronectidae	petrale sole	<i>Eopsetta jordani</i>
Kodiak	Pleuronectidae	rex sole	<i>Glyptocephalus zachirus</i>
Kodiak	Pleuronectidae	flathead sole	<i>Hippoglossoides elassodon</i>
Kodiak	Pleuronectidae	Pacific halibut	<i>Hippoglossus stenolepis</i>
Kodiak	Pleuronectidae	butter sole	<i>Isopsetta isolepis</i>
Kodiak	Pleuronectidae	southern rock sole	<i>Lepidopsetta bilineata</i>
Kodiak	Pleuronectidae	northern rock sole	<i>Lepidopsetta polyxystra</i>
Kodiak	Pleuronectidae	yellowfin sole	<i>Limanda aspera</i>
Kodiak	Pleuronectidae	slender sole	<i>Lyopsetta exilis</i>
Kodiak	Pleuronectidae	Dover sole	<i>Microstomus pacificus</i>
Kodiak	Pleuronectidae	English sole	<i>Parophrys vetulus</i>
Kodiak	Pleuronectidae	starry flounder	<i>Platichthys stellatus</i>
Kodiak	Pleuronectidae	Alaska plaice	<i>Pleuronectes quadrituberculatus</i>
Kodiak	Pleuronectidae	sand sole	<i>Psettichthys melanostictus</i>
Kodiak	Macrouridae	giant grenadier	<i>Albatrossia pectoralis</i>
Kodiak	Ammodytidae	Arctic sand lance	<i>Ammodytes hexapterus</i>
Kodiak	Ammodytidae	Pacific sand lance	<i>Ammodytes personatus</i>
Kodiak	Anoplopomatidae	sablefish	<i>Anoplopoma fimbria</i>
Kodiak	Cyclopteridae	smooth lumpsucker	<i>Aptocyclus ventricosus</i>
Kodiak	Agonidae	blackfin poacher	<i>Bathylagonus nigripinnis</i>
Kodiak	Bathymasteridae	searcher	<i>Bathymaster signatus</i>
Kodiak	Stomiidae	Pacific viperfish	<i>Chauliodus macouni</i>
Kodiak	Clupeidae	Pacific herring	<i>Clupea pallasii</i>
Kodiak	Macrouridae	popeye grenadier	<i>Coryphaenoides cinereus</i>
Kodiak	Cryptacanthodidae	giant wrymouth	<i>Cryptacanthodes giganteus</i>
Kodiak	Psychrolutidae	spinyhead sculpin	<i>Dasycottus setiger</i>
Kodiak	Gadidae	saffron cod	<i>Eleginus gracilis</i>
Kodiak	Cyclopteridae	Alaskan lumpsucker	<i>Eumicrotremus gyrops</i>
Kodiak	Cyclopteridae	Pacific spiny lumpsucker	<i>Eumicrotremus orbis</i>
Kodiak	Gadidae	walleye pollock	<i>Gadus chalcogrammus</i>
Kodiak	Gadidae	Pacific cod	<i>Gadus macrocephalus</i>
Kodiak	Cottidae	armorhead sculpin	<i>Gymnocanthus galeatus</i>
Kodiak	Cottidae	threaded sculpin	<i>Gymnocanthus pistilliger</i>
Kodiak	Cottidae	red Irish lord	<i>Hemilepidotus hemilepidotus</i>
Kodiak	Cottidae	yellow Irish lord	<i>Hemilepidotus jordani</i>
Kodiak	Hemitriptidae	bigmouth sculpin	<i>Hemitripterus bolini</i>

INPFC area	Family	Common name	Species name
Kodiak	Hexagrammidae	kelp greenling	<i>Hexagrammos decagrammus</i>
Kodiak	Hexagrammidae	whitespotted greenling	<i>Hexagrammos stelleri</i>
Kodiak	Cottidae	spatulate sculpin	<i>Icelus spatula</i>
Kodiak	Cottidae	thorny sculpin	<i>Icelus spiniger</i>
Kodiak	Agonidae	sawback poacher	<i>Leptagonus frenatus</i>
Kodiak	Bathylagidae	northern smoohtongue	<i>Leuroglossus schmidtii</i>
Kodiak	Liparidae	variegated snailfish	<i>Liparis gibbus</i>
Kodiak	Stichaeidae	longsnout prickleback	<i>Lumpenella longirostris</i>
Kodiak	Zoarcidae	Bering eelpout	<i>Lycodes beringi</i>
Kodiak	Zoarcidae	shortfin eelpout	<i>Lycodes brevipes</i>
Kodiak	Zoarcidae	bigfin eelpout	<i>Lycodes cortezianus</i>
Kodiak	Zoarcidae	blackbelly eelpout	<i>Lycodes pacificus</i>
Kodiak	Zoarcidae	wattled eelpout	<i>Lycodes palearis</i>
Kodiak	Psychrolutidae	darkfin sculpin	<i>Malacocottus zonurus</i>
Kodiak	Osmeridae	Pacific capelin	<i>Mallotus catervarius (=villosus)</i>
Kodiak	Gadidae	Pacific tomcod	<i>Microgadus proximus</i>
Kodiak	Cottidae	plain sculpin	<i>Myoxocephalus jaok</i>
Kodiak	Cottidae	great sculpin	<i>Myoxocephalus polyacanthocephalus</i>
Kodiak	Hemitripterae	sailfin sculpin	<i>Nautichthys oculofasciatus</i>
Kodiak	Salmonidae	chum salmon	<i>Oncorhynchus keta</i>
Kodiak	Salmonidae	Chinook salmon	<i>Oncorhynchus tshawytscha</i>
Kodiak	Hexagrammidae	lingcod	<i>Ophiodon elongatus</i>
Kodiak	Osmeridae	rainbow smelt	<i>Osmerus mordax</i>
Kodiak	Hexagrammidae	Atka mackerel	<i>Pleurogrammus monopterygius</i>
Kodiak	Agonidae	sturgeon poacher	<i>Podothecus accipenserinus</i>
Kodiak	Stichaeidae	whitebarred prickleback	<i>Poroclinus rothrocki</i>
Kodiak	Rhamphocottidae	grunt sculpin	<i>Rhamphocottus richardsoni</i>
Kodiak	Scorpaenidae	rougeye rockfish	<i>Sebastes aleutianus</i>
Kodiak	Scorpaenidae	Pacific ocean perch	<i>Sebastes alutus</i>
Kodiak	Scorpaenidae	redbanded rockfish	<i>Sebastes babcocki</i>
Kodiak	Scorpaenidae	shortraker rockfish	<i>Sebastes borealis</i>
Kodiak	Scorpaenidae	silvergray rockfish	<i>Sebastes brevispinis</i>
Kodiak	Scorpaenidae	widow rockfish	<i>Sebastes entomelas</i>
Kodiak	Scorpaenidae	quillback rockfish	<i>Sebastes maliger</i>
Kodiak	Scorpaenidae	black rockfish	<i>Sebastes melanops</i>
Kodiak	Scorpaenidae	blackspotted rockfish	<i>Sebastes melanostictus</i>
Kodiak	Scorpaenidae	northern rockfish	<i>Sebastes polyspinis</i>
Kodiak	Scorpaenidae	redstripe rockfish	<i>Sebastes proriger</i>
Kodiak	Scorpaenidae	yelloweye rockfish	<i>Sebastes ruberrimus</i>
Kodiak	Scorpaenidae	dusky rockfish	<i>Sebastes variabilis</i>
Kodiak	Scorpaenidae	harlequin rockfish	<i>Sebastes variegatus</i>
Kodiak	Scorpaenidae	sharpchin rockfish	<i>Sebastes zacentrus</i>
Kodiak	Scorpaenidae	shortspine thornyhead	<i>Sebastolobus alascanus</i>
Kodiak	Osmeridae	eulachon	<i>Thaleichthys pacificus</i>
Kodiak	Trichodontidae	Pacific sandfish	<i>Trichodon trichodon</i>
Kodiak	Cottidae	scissortail sculpin	<i>Triglops forficata</i>
Kodiak	Cottidae	roughspine sculpin	<i>Triglops macellus</i>
Kodiak	Zaproridae	prowfish	<i>Zaprora silenus</i>
Kodiak	Hormathiidae	reticulate anemone	<i>Actinauge verrilli</i>
Kodiak	Actinostolidae	rough purple sea anemone	<i>Actinostola faeculenta</i>
Kodiak	Alcyonidiidae	fruit leather bryozoan	<i>Alcyonidium pedunculatum</i>
Kodiak	Strongylocentrotidae	orange-pink sea urchin	<i>Allocentrotus fragilis</i>
Kodiak	Polyclinidae	sand-grain imbedded ascidian	<i>Amaroucium soldatovi</i>
Kodiak	Aphrocallistidae	clay pipe sponge	<i>Aphrocallistes vastus</i>
Kodiak	Aphroditidae		<i>Aphrodita negligens</i>

INPFC area	Family	Common name	Species name
Kodiak	Stichopodidae	California sea cucumber	<i>Apostichopus californicus</i>
Kodiak	Crangonidae	Nelson argid	<i>Argis levior</i>
Kodiak	Astartidae	elliptical Astarte	<i>Astarte elliptica</i>
Kodiak	Asteriidae	purple-orange sea star	<i>Asterias amurensis</i>
Kodiak	Rossellidae	vase sponge	<i>Aulosaccus schulzei</i>
Kodiak	Ulmaridae		<i>Aurelia labiata</i>
Kodiak	Ulmaridae	brown rimmed jelly	<i>Aurelia limbata</i>
Kodiak	Octopodidae	smoothskin octopus	<i>Benthoctopus leioderma</i>
Kodiak	Buccinidae		<i>Beringius undatus</i>
Kodiak	Gonatidae	magistrate armhook squid	<i>Berryteuthis magister</i>
Kodiak	Muricidae		<i>Boreotrophon pacificus</i>
Kodiak	Schizasteridae	heart urchin	<i>Brisaster latifrons</i>
Kodiak	Buccinidae	swollen whelk	<i>Buccinum oedematum</i>
Kodiak	Chromodorididae		<i>Cadlina modesta</i>
Kodiak	Goniasteridae	red bat star	<i>Ceramaster japonicus</i>
Kodiak	Goniasteridae	orange bat sea star	<i>Ceramaster patagonicus</i>
Kodiak	Goniasteridae		<i>Ceramaster stellatus</i>
Kodiak	Lineidae	light-edged ribbon worm	<i>Cerebratulus californienesis</i>
Kodiak	Benthopectinidae	fragile sea star	<i>Cheiraster dawsoni</i>
Kodiak	Oregoniidae	Tanner crab	<i>Chionoecetes bairdi</i>
Kodiak	Balanidae	giant barnacle	<i>Chirona evermanni</i>
Kodiak	Chiroteuthidae		<i>Chiroteuthis calyx</i>
Kodiak	Pisidae	longhorned decorator crab	<i>Chorilia longipes</i>
Kodiak	Pelagiidae	sea nettle	<i>Chrysaora fuscescens</i>
Kodiak	Pelagiidae		<i>Chrysaora melanaster</i>
Kodiak	Trochidae		<i>Cidarina cidaris</i>
Kodiak	Chalinidae	rough hat sponge	<i>Cladocroce attu</i>
Kodiak	Crangonidae	ridged Crangon	<i>Crangon dalli</i>
Kodiak	Actiniidae	chevron-tentacled anemone	<i>Cribrinopsis fernaldi</i>
Kodiak	Solasteridae	grooved sea star	<i>Crossaster borealis</i>
Kodiak	Solasteridae	rose sea star	<i>Crossaster papposus</i>
Kodiak	Solasteridae	pink rose star	<i>Crossaster</i> sp. B (Clark)
Kodiak	Acanthochitonidae	giant Pacific chiton	<i>Cryptochiton stelleri</i>
Kodiak	Ctenodiscidae	common mud star	<i>Ctenodiscus crispatus</i>
Kodiak	Cucumariidae		<i>Cucumaria frondosa</i>
Kodiak	Cyaneidae	lion's mane jelly	<i>Cyanea capillata</i>
Kodiak	Poraniidae	leather sea star	<i>Dermasterias imbricata</i>
Kodiak	Pterasteridae	pincushion sea star	<i>Diplopteraster multipes</i>
Kodiak	Astropectinidae	northern sea star	<i>Dipsacaster borealis</i>
Kodiak	Astropectinidae		<i>Dipsacaster eximus</i>
Kodiak	Clavelinidae	globular ascidian	<i>Distaplia occidentalis</i>
Kodiak	Clavelinidae	paddle ascidian	<i>Distaplia smithi</i>
Kodiak	Echinarachniidae	parma sand dollar	<i>Echinarachnius parma</i>
Kodiak	Microcionidae	hat sponge	<i>Echinoclathria beringensis</i>
Kodiak	Paguridae	purple hermit	<i>Elassochirus cavimanus</i>
Kodiak	Paguridae	Pacific red hermit	<i>Elassochirus gilli</i>
Kodiak	Paguridae	widehand hermit crab	<i>Elassochirus tenuimanus</i>
Kodiak	Octopodidae	giant octopus	<i>Enteroctopus dofleini</i>
Kodiak	Hippolytidae	shortscale eualid	<i>Eualus suckleyi</i>
Kodiak	Polynoidae	giant scale worm	<i>Eunoe nodosa</i>
Kodiak	Asteriidae	giant sea star	<i>Evasterias echinosoma</i>
Kodiak	Asteriidae	mottled sea star	<i>Evasterias troschelii</i>
Kodiak	Antedonidae	featherstar crinoid	<i>Florometra serratissima</i>
Kodiak	Ranellidae	Oregon triton	<i>Fusitriton oregonensis</i>
Kodiak	Goniasteridae	Swift sea star	<i>Gephyreaster swifti</i>

INPFC area	Family	Common name	Species name
Kodiak	Cancridae	Oregon rock crab	<i>Glebocarcinus oregonensis</i>
Kodiak	Glycymerididae		<i>Glycymeris septentrionalis</i>
Kodiak	Gorgonocephalidae	basketstar	<i>Gorgonocephalus eucnemis</i>
Kodiak	Halipteridae		<i>Halipteris willemoesi</i>
Kodiak	Pyuridae	sea peach	<i>Halocynthia aurantium</i>
Kodiak	Pyuridae	bristly tunicate	<i>Halocynthia igaboja</i>
Kodiak	Echinasteridae	ridged blood star	<i>Henricia aspera</i>
Kodiak	Solasteridae	cannonball sun star	<i>Heterozonias alternatus</i>
Kodiak	Goniasteridae		<i>Hippasteria californica</i>
Kodiak	Goniasteridae	spiny red sea star	<i>Hippasteria phrygiana (=spinosa)</i>
Kodiak	Coelosphaeridae	spud sponge	<i>Histodermella kagigunensis</i>
Kodiak	Oregoniidae	Pacific lyre crab	<i>Hyas lyratus</i>
Kodiak	Paguridae	splendid hermit	<i>Labidochirus splendescens</i>
Kodiak	Laqueidae	California lamp shell	<i>Laqueus californianus</i>
Kodiak	Hippolytidae	spiny lebbeid	<i>Lebbeus groenlandicus</i>
Kodiak	Astropectinidae	North Pacific sea star	<i>Leptychaster arcticus</i>
Kodiak	Asteriidae	blackspined sea star	<i>Lethasterias nanimensis</i>
Kodiak	Liponematidae	tentacle-shedding anemone	<i>Liponema brevicorne</i>
Kodiak	Lithodidae	golden king crab	<i>Lithodes aequispinus</i>
Kodiak	Lithodidae	brown box crab	<i>Lopholithodes foraminatus</i>
Kodiak	Lucinidae	ringed lucine	<i>Lucinoma annulatum</i>
Kodiak	Luidiidae	sand sea star	<i>Luidia foliolata</i>
Kodiak	Naticidae	pale moonshell	<i>Lunatia pallida</i>
Kodiak	Goniasteridae	vermillion sea star	<i>Mediaster aequalis</i>
Kodiak	Yoldiidae	broad Yoldia	<i>Megayoldia thraciacaeformis</i>
Kodiak	Metridiidae	gigantic anemone	<i>Metridium farcimen</i>
Kodiak	Metridiidae	clonal plumose anemone	<i>Metridium senile</i>
Kodiak	Calpensiidae		<i>Microporina articulata</i>
Kodiak	Mytilidae	northern horsemussel	<i>Modiolus modiolus</i>
Kodiak	Molpadiidae	sweet sea potato	<i>Molpadia intermedia</i>
Kodiak	Galatheidae	pinchbug	<i>Munida quadrispina</i>
Kodiak	Mycalidae	tree sponge	<i>Mycale loveni</i>
Kodiak	Benthopectinidae		<i>Nearchaster variabilis</i>
Kodiak	Neomeniidae		<i>Neomenia cf. yamamotoi</i> (Clark 2006)
Kodiak	Buccinidae	white neptune	<i>Neptunea amianta</i>
Kodiak	Buccinidae	lyre whelk	<i>Neptunea lyrata</i>
Kodiak	Buccinidae	Pribilof whelk	<i>Neptunea pribiloffensis</i>
Kodiak	Muricidae	winged trophon	<i>Nipponotrophon stuarti</i>
Kodiak	Piscicolidae	striped sea leech	<i>Notostomum cyclostomum</i>
Kodiak	Muricidae	frilled dogwinkle	<i>Nucella lamellosa</i>
Kodiak	Echinasteridae		<i>Odontohenricia fisheri</i>
Kodiak	Ophiactidae	ubiquitous brittle star	<i>Ophiopholis aculeata</i>
Kodiak	Ophiuridae	notched brittlestar	<i>Ophiura sarsii</i>
Kodiak	Oregoniidae	graceful decorator crab	<i>Oregonia gracilis</i>
Kodiak	Asteriidae	redbanded sea star	<i>Orthasterias koehleri</i>
Kodiak	Paguridae	Aleutian hermit	<i>Pagurus aleuticus</i>
Kodiak	Paguridae	sponge hermit	<i>Pagurus brandti</i>
Kodiak	Paguridae	hairy hermit crab	<i>Pagurus capillatus</i>
Kodiak	Paguridae	knobbyhand hermit	<i>Pagurus confragosus</i>
Kodiak	Paguridae	hornyhand hermit	<i>Pagurus cornutus</i>
Kodiak	Paguridae	bluespine hermit	<i>Pagurus kennerlyi</i>
Kodiak	Paguridae	Alaskan hermit	<i>Pagurus ochotensis</i>
Kodiak	Paguridae	longfinger hermit	<i>Pagurus rathbuni</i>
Kodiak	Paguridae	setose hermit	<i>Pagurus setosus</i>

INPFC area	Family	Common name	Species name
Kodiak	Paguridae	Townsend hermit crab	<i>Pagurus townsendi</i>
Kodiak	Paguridae	fuzzy hermit crab	<i>Pagurus trigonocheirus</i>
Kodiak	Pandalidae	sidestripe shrimp	<i>Pandalopsis dispar</i>
Kodiak	Pandalidae	Alaskan pink shrimp	<i>Pandalus eous</i>
Kodiak	Pandalidae	humpy shrimp	<i>Pandalus goniurus</i>
Kodiak	Pandalidae	coonstripe shrimp	<i>Pandalus hypsinotus</i>
Kodiak	Pandalidae	ocean shrimp	<i>Pandalus jordani</i>
Kodiak	Pandalidae	spot shrimp	<i>Pandalus platyceros</i>
Kodiak	Pandalidae	roughpatch shrimp	<i>Pandalus stenolepis</i>
Kodiak	Crangonidae	horned shrimp	<i>Paracrangon echinata</i>
Kodiak	Lithodidae	Hanasaki king crab	<i>Paralithodes brevipes</i>
Kodiak	Pasiphaeidae	Pacific glass shrimp	<i>Pasiphaea pacifica</i>
Kodiak	Pectinidae	weathervane scallop	<i>Patinopecten caurinus</i>
Kodiak	Periphyllidae	helmet jelly	<i>Periphylla periphylla</i>
Kodiak	Ulmaridae	egg yolk jelly	<i>Phacellophora camtschatica</i>
Kodiak	Reteporidae	lattice-work bryozoan	<i>Phidolopora pacifica</i>
Kodiak	Anomiidae	abalone jingle	<i>Pododesmus cepio</i>
Kodiak	Echinasteridae	thorny sea star	<i>Poraniopsis inflata</i>
Kodiak	Primnoidae		<i>Primnoa pacifica</i>
Kodiak	Goniasteridae		<i>Pseudarchaster alascensis</i>
Kodiak	Goniasteridae	scarlet sea star	<i>Pseudarchaster parelii</i>
Kodiak	Synallactidae	sandy sea cucumber	<i>Pseudostichopus mollis</i>
Kodiak	Pterasteridae		<i>Pteraster marssipus</i>
Kodiak	Pterasteridae	wrinkled star	<i>Pteraster militaris</i>
Kodiak	Pterasteridae		<i>Pteraster tessellatus</i>
Kodiak	Pennatulidae	orange sea pen	<i>Ptilosarcus gurneyi</i>
Kodiak	Epialtidae	graceful kelp crab	<i>Pugettia gracilis</i>
Kodiak	Asteriidae	sunflower sea star	<i>Pycnopodia helianthoides</i>
Kodiak	Buccinidae	left-hand whelk	<i>Pyrulofusus harpa</i>
Kodiak	Lithodidae	rhinoceros crab	<i>Rhinolithodes wosnessenskii</i>
Kodiak	Aegidae	sea cockroach	<i>Rocinela angustata</i>
Kodiak	Sepiolidae	eastern Pacific bobtail	<i>Rossia pacifica</i>
Kodiak	Cardiidae	oblique smoothcockle	<i>Serripes notabilis</i>
Kodiak	Solasteridae	northern sun sea star	<i>Solaster endeca</i>
Kodiak	Ophiuridae		<i>Stegophiura ponderosa</i>
Kodiak	Strongylocentrotidae	red sea urchin	<i>Strongylocentrotus franciscanus</i>
Kodiak	Strongylocentrotidae	white sea urchin	<i>Strongylocentrotus pallidus</i>
Kodiak	Styelidae	sea potato	<i>Styela rustica</i>
Kodiak	Asteriidae	long-rayed star	<i>Stylasterias forreri</i>
Kodiak	Suberitidae	hermit sponge	<i>Suberites domuncula</i>
Kodiak	Synallactidae		<i>Synallactes challengerii</i>
Kodiak	Laqueidae	common brachiopod	<i>Terebratalia transversa</i>
Kodiak	Salpidae	common salp	<i>Thetys vagina</i>
Kodiak	Tritoniidae	giant orange tochi	<i>Tochuina gigantea</i>
Kodiak	Opheliidae	pupa utility worm	<i>Travisia pupa</i>
Kodiak	Tritoniidae	rosy Tritonia	<i>Tritonia diomedea</i>
Kodiak	Tritoniidae	festive Tritonia	<i>Tritonia festiva</i>
Kodiak	Zoanthidae	hot dog zoanthid	<i>Zoanthidae</i> sp. A
Shumagin	Rajidae	Aleutian skate	<i>Bathyraja aleutica</i>
Shumagin	Rajidae	whiteblotched skate	<i>Bathyraja maculata</i>
Shumagin	Rajidae	Alaska skate	<i>Bathyraja parmifera</i>
Shumagin	Rajidae	mud skate	<i>Bathyraja taranetzi</i>
Shumagin	Rajidae	big skate	<i>Beringrāja binoculata</i>
Shumagin	Lamnidae	salmon shark	<i>Lamna ditropis</i>
Shumagin	Rajidae	longnose skate	<i>Raja rhina</i>

INPFC area	Family	Common name	Species name
Shumagin	Squalidae	spiny dogfish	<i>Squalus suckleyi</i>
Shumagin	Pleuronectidae	Kamchatka flounder	<i>Atheresthes evermanni</i>
Shumagin	Pleuronectidae	arrowtooth flounder	<i>Atheresthes stomias</i>
Shumagin	Pleuronectidae	rex sole	<i>Glyptocephalus zachirus</i>
Shumagin	Pleuronectidae	flathead sole	<i>Hippoglossoides elassodon</i>
Shumagin	Pleuronectidae	Pacific halibut	<i>Hippoglossus stenolepis</i>
Shumagin	Pleuronectidae	butter sole	<i>Isopsetta isolepis</i>
Shumagin	Pleuronectidae	southern rock sole	<i>Lepidopsetta bilineata</i>
Shumagin	Pleuronectidae	northern rock sole	<i>Lepidopsetta polyxystra</i>
Shumagin	Pleuronectidae	yellowfin sole	<i>Limanda aspera</i>
Shumagin	Pleuronectidae	Dover sole	<i>Microstomus pacificus</i>
Shumagin	Pleuronectidae	English sole	<i>Parophrys vetulus</i>
Shumagin	Pleuronectidae	starry flounder	<i>Platichthys stellatus</i>
Shumagin	Pleuronectidae	Alaska plaice	<i>Pleuronectes quadrituberculatus</i>
Shumagin	Pleuronectidae	sand sole	<i>Psettichthys melanostictus</i>
Shumagin	Macrouridae	giant grenadier	<i>Albatrossia pectoralis</i>
Shumagin	Ammodytidae	Pacific sand lance	<i>Ammodytes personatus</i>
Shumagin	Anarhichadidae	Bering wolffish	<i>Anarhichas orientalis</i>
Shumagin	Anoplopomatidae	sablefish	<i>Anoplopoma fimbria</i>
Shumagin	Agonidae	bigeye poacher	<i>Bathagonus pentacanthus</i>
Shumagin	Bathymasteridae	searcher	<i>Bathymaster signatus</i>
Shumagin	Liparidae	emarginate snailfish	<i>Careproctus furcellus</i>
Shumagin	Stomiidae	Pacific viperfish	<i>Chauliodus macouni</i>
Shumagin	Clupeidae	Pacific herring	<i>Clupea pallasii</i>
Shumagin	Macrouridae	popeye grenadier	<i>Coryphaenoides cinereus</i>
Shumagin	Cryptacanthodidae	giant wrymouth	<i>Cryptacanthodes giganteus</i>
Shumagin	Psychrolutidae	spinyhead sculpin	<i>Dasycottus setiger</i>
Shumagin	Cyclopteridae	Pacific spiny lumpsucker	<i>Eumicrotremus orbis</i>
Shumagin	Gadidae	walleye pollock	<i>Gadus chalcogrammus</i>
Shumagin	Gadidae	Pacific cod	<i>Gadus macrocephalus</i>
Shumagin	Cottidae	armorhead sculpin	<i>Gymnocanthus galeatus</i>
Shumagin	Cottidae	red Irish lord	<i>Hemilepidotus hemilepidotus</i>
Shumagin	Cottidae	yellow Irish lord	<i>Hemilepidotus jordani</i>
Shumagin	Hemitriptidae	bigmouth sculpin	<i>Hemitripterus bolini</i>
Shumagin	Hexagrammidae	kelp greenling	<i>Hexagrammos decagrammus</i>
Shumagin	Hexagrammidae	whitespotted greenling	<i>Hexagrammos stelleri</i>
Shumagin	Agonidae	fourhorn poacher	<i>Hypsagonus quadricornis</i>
Shumagin	Myctophidae	brokenline lampfish	<i>Lampanyctus jordani</i>
Shumagin	Stichaeidae	daubed shanny	<i>Leptoclinus maculatus</i>
Shumagin	Bathylagidae	northern smoohtongue	<i>Leuroglossus schmidtii</i>
Shumagin	Stichaeidae	longsnout prickleback	<i>Lumpenella longirostris</i>
Shumagin	Stichaeidae	slender eelblenny	<i>Lumpenus fabricii</i>
Shumagin	Stichaeidae	snake prickleback	<i>Lumpenus sagitta</i>
Shumagin	Zoarcidae	Bering eelpout	<i>Lycodes beringi</i>
Shumagin	Zoarcidae	shortfin eelpout	<i>Lycodes brevipes</i>
Shumagin	Zoarcidae	wattled eelpout	<i>Lycodes palearis</i>
Shumagin	Psychrolutidae	darkfin sculpin	<i>Malacocottus zonurus</i>
Shumagin	Osmeridae	Pacific capelin	<i>Mallotus catervarius (=villosus)</i>
Shumagin	Gadidae	Pacific tomcod	<i>Microgadus proximus</i>
Shumagin	Cottidae	plain sculpin	<i>Myoxocephalus jaok</i>
Shumagin	Cottidae	great sculpin	<i>Myoxocephalus polyacanthocephalus</i>
Shumagin	Salmonidae	chum salmon	<i>Oncorhynchus keta</i>
Shumagin	Salmonidae	Chinook salmon	<i>Oncorhynchus tshawytscha</i>
Shumagin	Hexagrammidae	Atka mackerel	<i>Pleurogrammus monopterygius</i>
Shumagin	Agonidae	sturgeon poacher	<i>Podothecus accipenserinus</i>

INPFC area	Family	Common name	Species name
Shumagin	Rhamphocottidae	grunt sculpin	<i>Rhamphocottus richardsoni</i>
Shumagin	Scorpaenidae	rougeye rockfish	<i>Sebastes aleutianus</i>
Shumagin	Scorpaenidae	Pacific ocean perch	<i>Sebastes alutus</i>
Shumagin	Scorpaenidae	redbanded rockfish	<i>Sebastes babcocki</i>
Shumagin	Scorpaenidae	shortraker rockfish	<i>Sebastes borealis</i>
Shumagin	Scorpaenidae	silvergray rockfish	<i>Sebastes brevispinis</i>
Shumagin	Scorpaenidae	quillback rockfish	<i>Sebastes maliger</i>
Shumagin	Scorpaenidae	black rockfish	<i>Sebastes melanops</i>
Shumagin	Scorpaenidae	blackspotted rockfish	<i>Sebastes melanostictus</i>
Shumagin	Scorpaenidae	northern rockfish	<i>Sebastes polyspinis</i>
Shumagin	Scorpaenidae	yelloweye rockfish	<i>Sebastes ruberrimus</i>
Shumagin	Scorpaenidae	dusky rockfish	<i>Sebastes variabilis</i>
Shumagin	Scorpaenidae	harlequin rockfish	<i>Sebastes variegatus</i>
Shumagin	Scorpaenidae	sharpchin rockfish	<i>Sebastes zacentrus</i>
Shumagin	Scorpaenidae	shortspine thornyhead	<i>Sebastolobus alascanus</i>
Shumagin	Osmeridae	eulachon	<i>Thaleichthys pacificus</i>
Shumagin	Trichodontidae	Pacific sandfish	<i>Trichodon trichodon</i>
Shumagin	Cottidae	scissortail sculpin	<i>Triglops forficata</i>
Shumagin	Cottidae	spectacled sculpin	<i>Triglops scepcticus</i>
Shumagin	Zaproridae	prowfish	<i>Zaprora silenus</i>
Shumagin	Hormathiidae	reticulate anemone	<i>Actinauge verrilli</i>
Shumagin	Actinostolidae	rough purple sea anemone	<i>Actinostola faeculenta</i>
Shumagin	Alcyonidiidae	fruit leather bryozoan	<i>Alcyonidium pedunculatum</i>
Shumagin	Polyclinidae	sand-grain imbedded ascidian	<i>Amaroucium soldatovi</i>
Shumagin	Aphrocallistidae	clay pipe sponge	<i>Aphrocallistes vastus</i>
Shumagin	Volutidae		<i>Arctomelon borealis</i>
Shumagin	Crangonidae	kuro argid	<i>Argis lar</i>
Shumagin	Asciidiidae	glassy tunicate	<i>Ascidia paratropa</i>
Shumagin	Asciidiidae	cow-eye tunicate	<i>Ascidian n. sp. A</i>
Shumagin	Asteriidae	purple-orange sea star	<i>Asterias amurensis</i>
Shumagin	Axinellidae	firm finger sponge	<i>Axinella blanca</i>
Shumagin	Axinellidae		<i>Axinella rugosa</i>
Shumagin	Balanidae	beaked barnacle	<i>Balanus rostratus</i>
Shumagin	Gonatidae	magistrate armhook squid	<i>Berryteuthis magister</i>
Shumagin	Bonneviellidae	champagne flute hydroid	<i>Bonneviella sp. A (Clark 2006)</i>
Shumagin	Schizasteridae	heart urchin	<i>Brisaster latifrons</i>
Shumagin	Bugulidae		<i>Bugula pacifica</i>
Shumagin	Acanthogorgiidae		<i>Calcigorgia spiculifera</i>
Shumagin	Goniasteridae	red bat star	<i>Ceramaster japonicus</i>
Shumagin	Benthopectinidae	fragile sea star	<i>Cheiraster dawsoni</i>
Shumagin	Corellidae	disc-top tunicate	<i>Chelyosoma productum</i>
Shumagin	Oregoniidae	Tanner crab	<i>Chionoecetes bairdi</i>
Shumagin	Oregoniidae	grooved Tanner crab	<i>Chionoecetes tanneri</i>
Shumagin	Balanidae	giant barnacle	<i>Chirona evermanni</i>
Shumagin	Pectinidae	reddish scallop	<i>Chlamys rubida</i>
Shumagin	Pelagiidae	sea nettle	<i>Chrysaora fuscescens</i>
Shumagin	Pelagiidae		<i>Chrysaora melanaster</i>
Shumagin	Cardiidae	hairy cockle	<i>Ciliatoclinocardium ciliatum</i>
Shumagin	Chalinidae	rough hat sponge	<i>Cladocroce attu</i>
Shumagin	Cardiidae	Nuttall cockle	<i>Clinocardium nuttallii</i>
Shumagin	Crangonidae	ridged Crangon	<i>Crangon dalli</i>
Shumagin	Tetillidae	baseball sponge	<i>Craniella craniana</i>
Shumagin	Tetillidae	spiky ball sponge	<i>Craniella sputnika</i>
Shumagin	Actiniidae	chevron-tentacled anemone	<i>Cribrinopsis fernaldi</i>
Shumagin	Solasteridae	grooved sea star	<i>Crossaster borealis</i>

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Shumagin	Solasteridae	rose sea star	<i>Crossaster papposus</i>
Shumagin	Solasteridae	pink rose star	<i>Crossaster</i> sp. B (Clark)
Shumagin	Naticidae	Aleutian moonsnail	<i>Cryptonatica aleutica</i>
Shumagin	Ctenodiscidae	common mud star	<i>Ctenodiscus crispatus</i>
Shumagin	Pterasteridae	pincushion sea star	<i>Diplopteraster multipes</i>
Shumagin	Clavelinidae	globular ascidian	<i>Distaplia occidentalis</i>
Shumagin	Echinarachniidae	parma sand dollar	<i>Echinarachnius parma</i>
Shumagin	Microcionidae	hat sponge	<i>Echinoclathria beringensis</i>
Shumagin	Paguridae	purple hermit	<i>Elassochirus cavimanus</i>
Shumagin	Paguridae	Pacific red hermit	<i>Elassochirus gilli</i>
Shumagin	Paguridae	widehand hermit crab	<i>Elassochirus tenuimanus</i>
Shumagin	Emplectonematidae	black specked ribbon worm	<i>Emplectonema</i> sp. (Clark 2006)
Shumagin	Octopodidae	giant octopus	<i>Enteroctopus dofleini</i>
Shumagin	Hippolytidae	circumpolar eualid	<i>Eualus gaimardii</i>
Shumagin	Polynoidae	giant scale worm	<i>Eunoe nodosa</i>
Shumagin	Sergestidae	Pacific sergestid	<i>Eusergestes similis</i>
Shumagin	Asteriidae	mottled sea star	<i>Evasterias troschelii</i>
Shumagin	Primnoidae		<i>Fanellia compressa</i>
Shumagin	Ranellidae	Oregon triton	<i>Fusitriton oregonensis</i>
Shumagin	Cancridae	Oregon rock crab	<i>Glebocarcinus oregonensis</i>
Shumagin	Gonatidae	Berry armhook squid	<i>Gonatus berryi</i>
Shumagin	Gonatidae	clawed armhook squid	<i>Gonatus onyx</i>
Shumagin	Gorgonocephalidae	basketstar	<i>Gorgonocephalus eucnemis</i>
Shumagin	Halipteridae		<i>Halipteris willemoesi</i>
Shumagin	Pyuridae	sea peach	<i>Halocynthia aurantium</i>
Shumagin	Pyuridae	bristly tunicate	<i>Halocynthia igaboja</i>
Shumagin	Scalpellidae	Columbian barnacle	<i>Hamatoscalpellum columbianum</i>
Shumagin	Aphrocallistidae	goblet sponge	<i>Heterochone calyx</i>
Shumagin	Goniasteridae	Aleutian spiny star	<i>Hippasteria aleutica</i>
Shumagin	Coelosphaeridae	spud sponge	<i>Histodermella kagigunensis</i>
Shumagin	Oregoniidae	circumboreal toad crab	<i>Hyas coarctatus</i>
Shumagin	Oregoniidae	Pacific lyre crab	<i>Hyas lyratus</i>
Shumagin	Paguridae	splendid hermit	<i>Labidochirus splendescens</i>
Shumagin	Latrunculiidae	green papillate sponge	<i>Latrunculia oparinae</i>
Shumagin	Asteriidae	Aleutian sea star	<i>Leptasterias hylodes</i>
Shumagin	Asteriidae	blackspined sea star	<i>Lethasterias nanimensis</i>
Shumagin	Amphoriscidae		<i>Leucilla nuttingi</i>
Shumagin	Limopsidae	Akutan limops	<i>Limopsis akutanica</i>
Shumagin	Liponematidae	tentacle-shedding anemone	<i>Liponema brevicorne</i>
Shumagin	Lithodidae	golden king crab	<i>Lithodes aequispinus</i>
Shumagin	Lithodidae	brown box crab	<i>Lopholithodes foraminatus</i>
Shumagin	Luidiidae	sand sea star	<i>Luidia foliolata</i>
Shumagin	Goniasteridae	vermilion sea star	<i>Mediaster aequalis</i>
Shumagin	Cancridae	Dungeness crab	<i>Metacarcinus magister</i>
Shumagin	Metridiidae	gigantic anemone	<i>Metridium farcimen</i>
Shumagin	Metridiidae	clonal plumose anemone	<i>Metridium senile</i>
Shumagin	Mytilidae	northern horsemussel	<i>Modiolus modiolus</i>
Shumagin	Molpadiidae	sweet sea potato	<i>Molpadia intermedia</i>
Shumagin	Crambeidae	yellow leafy sponge	<i>Monanchora pulchra</i>
Shumagin	Onychoteuthidae	robust clubhook squid	<i>Moroteuthis robusta</i>
Shumagin	Mycalidae	tree sponge	<i>Mycale loveni</i>
Shumagin	Benthopectinidae		<i>Nearchaster variabilis</i>
Shumagin	Nuculanidae	northern nutclam	<i>Nuculana pernula</i>
Shumagin	Ophiactidae		<i>Ophiopholis japonica</i>
Shumagin	Ophiuridae	notched brittlestar	<i>Ophiura sarsii</i>

INPFC area	Family	Common name	Species name
Shumagin	Oregoniidae	graceful decorator crab	<i>Oregonia gracilis</i>
Shumagin	Asteriidae	redbanded sea star	<i>Orthasterias koehleri</i>
Shumagin	Paguridae	Aleutian hermit	<i>Pagurus aleuticus</i>
Shumagin	Paguridae	sponge hermit	<i>Pagurus brandti</i>
Shumagin	Paguridae	hairy hermit crab	<i>Pagurus capillatus</i>
Shumagin	Paguridae	knobbyhand hermit	<i>Pagurus confragosus</i>
Shumagin	Paguridae	bluespine hermit	<i>Pagurus kennerlyi</i>
Shumagin	Paguridae	Alaskan hermit	<i>Pagurus ochotensis</i>
Shumagin	Paguridae	longfinger hermit	<i>Pagurus rathbuni</i>
Shumagin	Paguridae	longhand hermit	<i>Pagurus tanneri</i>
Shumagin	Paguridae	fuzzy hermit crab	<i>Pagurus trigonocheirus</i>
Shumagin	Pandalidae	Alaskan pink shrimp	<i>Pandalus eous</i>
Shumagin	Pandalidae	ocean shrimp	<i>Pandalus jordani</i>
Shumagin	Pandalidae	roughpatch shrimp	<i>Pandalus stenolepis</i>
Shumagin	Pandalidae	yellowleg pandalid	<i>Pandalus tridens</i>
Shumagin	Lithodidae		<i>Paralomis verrilli</i>
Shumagin	Pasiphaeidae	Pacific glass shrimp	<i>Pasiphaea pacifica</i>
Shumagin	Pectinidae	weathervane scallop	<i>Patinopecten caurinus</i>
Shumagin	Ulmaridae	egg yolk jelly	<i>Phacellophora camtschatica</i>
Shumagin	Lithodidae	scaled crab	<i>Placetrion wosnessenskii</i>
Shumagin	Anomiidae	abalone jingle	<i>Pododesmus cepio</i>
Shumagin	Polymastiidae	prolific nipple sponge	<i>Polymastia</i> sp. A (Clark 2006)
Shumagin	Goniasteridae	scarlet sea star	<i>Pseudarchaster parelii</i>
Shumagin	Synallactidae	sandy sea cucumber	<i>Pseudostichopus mollis</i>
Shumagin	Pterasteridae		<i>Pteraster jordani</i>
Shumagin	Pterasteridae	cushion sea star	<i>Pteraster temnochiton</i>
Shumagin	Pterasteridae		<i>Pteraster tessellatus</i>
Shumagin	Asteriidae	sunflower sea star	<i>Pycnopodia helianthoides</i>
Shumagin	Mucronellidae	ribbed bryozoan	<i>Rhamphostomella costata</i>
Shumagin	Lithodidae	rhinoceros crab	<i>Rhinolithodes wosnessenskii</i>
Shumagin	Esperiopsidae	cat-o-nine-tails sponge	<i>Semisuberites cribrosa</i>
Shumagin	Cardiidae	oblique smoothcockle	<i>Serripes notabilis</i>
Shumagin	Solasteridae	morning sun sea star	<i>Solaster dawsoni</i>
Shumagin	Solasteridae	northern sun sea star	<i>Solaster endeca</i>
Shumagin	Solasteridae		<i>Solaster hypothyrsus</i>
Shumagin	Solasteridae	ocher sun star	<i>Solaster</i> sp. G (Clark)
Shumagin	Ophiuridae		<i>Stegophiura ponderosa</i>
Shumagin	Strongylocentrotidae	white sea urchin	<i>Strongylocentrotus pallidus</i>
Shumagin	Asteriidae	long-rayed star	<i>Stylasterias forreri</i>
Shumagin	Suberitidae	hermit sponge	<i>Suberites domuncula</i>
Shumagin	Synallactidae		<i>Synallactes challengerii</i>
Shumagin	Tedaniidae	club sponge	<i>Tedania kagalaskai</i>
Shumagin	Tellinidae		<i>Tellina bodegensis</i>
Shumagin	Laqueidae	common brachiopod	<i>Terebratalia transversa</i>
Shumagin	Actiniidae	mottled anemone	<i>Urticina crassicornis</i>
Shumagin	Yoldiidae	northern Yoldia	<i>Yoldia hyperborea</i>
Shumagin	Zoanthidae	hot dog zoanthid	<i>Zoanthidae</i> sp. A
Southeastern	Scyliorhinidae	brown cat shark	<i>Apristurus brunneus</i>
Southeastern	Rajidae	Aleutian skate	<i>Bathyraja aleutica</i>
Southeastern	Rajidae	big skate	<i>Beringrja binoculata</i>
Southeastern	Chimaeridae	spotted ratfish	<i>Hydrolagus colliei</i>
Southeastern	Rajidae	longnose skate	<i>Raja rhina</i>
Southeastern	Squalidae	spiny dogfish	<i>Squalus suckleyi</i>
Southeastern	Pleuronectidae	arrowtooth flounder	<i>Atheresthes stomias</i>
Southeastern	Paralichthyidae	Pacific sanddab	<i>Citharichthys sordidus</i>

INPFC area	Family	Common name	Species name
Southeastern	Pleuronectidae	deepsea sole	<i>Embassichthys bathybius</i>
Southeastern	Pleuronectidae	petrale sole	<i>Eopsetta jordani</i>
Southeastern	Pleuronectidae	rex sole	<i>Glyptocephalus zachirus</i>
Southeastern	Pleuronectidae	flathead sole	<i>Hippoglossoides elassodon</i>
Southeastern	Pleuronectidae	Pacific halibut	<i>Hippoglossus stenolepis</i>
Southeastern	Pleuronectidae	southern rock sole	<i>Lepidopsetta bilineata</i>
Southeastern	Pleuronectidae	slender sole	<i>Lyopsetta exilis</i>
Southeastern	Pleuronectidae	Dover sole	<i>Microstomus pacificus</i>
Southeastern	Pleuronectidae	English sole	<i>Parophrys vetulus</i>
Southeastern	Macrouridae	giant grenadier	<i>Albatrossia pectoralis</i>
Southeastern	Anarrhichadidae	wolf-eel	<i>Anarrhichthys ocellatus</i>
Southeastern	Anoplopomatidae	sablefish	<i>Anoplopoma fimbria</i>
Southeastern	Bathylagidae	robust blacksmelt	<i>Bathylagus milleri</i>
Southeastern	Bramidae	Pacific pomfret	<i>Brama japonica</i>
Southeastern	Liparidae	blackfin snailfish	<i>Careproctus cypselurus</i>
Southeastern	Stomiidae	Pacific viperfish	<i>Chauliodus macouni</i>
Southeastern	Clupeidae	Pacific herring	<i>Clupea pallasii</i>
Southeastern	Macrouridae	popeye grenadier	<i>Coryphaenoides cinereus</i>
Southeastern	Gadidae	walleye pollock	<i>Gadus chalcogrammus</i>
Southeastern	Gadidae	Pacific cod	<i>Gadus macrocephalus</i>
Southeastern	Bathylagidae	northern smoothtongue	<i>Leuroglossus schmidtii</i>
Southeastern	Zoarcidae	shortfin eelpout	<i>Lycodes brevipes</i>
Southeastern	Zoarcidae	bigfin eelpout	<i>Lycodes cortezianus</i>
Southeastern	Zoarcidae	blackbelly eelpout	<i>Lycodes pacificus</i>
Southeastern	Psychrolutidae	darkfin sculpin	<i>Malacocottus zonurus</i>
Southeastern	Osmeridae	Pacific capelin	<i>Mallotus catervarius (=villosus)</i>
Southeastern	Merlucciidae	Pacific hake	<i>Merluccius productus</i>
Southeastern	Salmonidae	pink salmon	<i>Oncorhynchus gorbuscha</i>
Southeastern	Salmonidae	chum salmon	<i>Oncorhynchus keta</i>
Southeastern	Salmonidae	coho salmon	<i>Oncorhynchus kisutch</i>
Southeastern	Salmonidae	chinook salmon	<i>Oncorhynchus tshawytscha</i>
Southeastern	Hexagrammidae	lingcod	<i>Ophiodon elongatus</i>
Southeastern	Liparidae	bluntnose snailfish	<i>Paraliparis</i> sp. cf. <i>dactylosus</i> (Orr and Baldwin)
Southeastern	Notosudidae	Adler waryfish	<i>Scopelosaurus adleri</i>
Southeastern	Scorpaenidae	rougeye rockfish	<i>Sebastes aleutianus</i>
Southeastern	Scorpaenidae	Pacific ocean perch	<i>Sebastes alutus</i>
Southeastern	Scorpaenidae	redbanded rockfish	<i>Sebastes babcocki</i>
Southeastern	Scorpaenidae	shortraker rockfish	<i>Sebastes borealis</i>
Southeastern	Scorpaenidae	silvergray rockfish	<i>Sebastes brevispinis</i>
Southeastern	Scorpaenidae	darkblotched rockfish	<i>Sebastes crameri</i>
Southeastern	Scorpaenidae	splitnose rockfish	<i>Sebastes diploproa</i>
Southeastern	Scorpaenidae	greenstriped rockfish	<i>Sebastes elongatus</i>
Southeastern	Scorpaenidae	widow rockfish	<i>Sebastes entomelas</i>
Southeastern	Scorpaenidae	yellowtail rockfish	<i>Sebastes flavidus</i>
Southeastern	Scorpaenidae	rosethorn rockfish	<i>Sebastes helvomaculatus</i>
Southeastern	Scorpaenidae	quillback rockfish	<i>Sebastes maliger</i>
Southeastern	Scorpaenidae	black rockfish	<i>Sebastes melanops</i>
Southeastern	Scorpaenidae	blackspotted rockfish	<i>Sebastes melanostictus</i>
Southeastern	Scorpaenidae	bocaccio	<i>Sebastes paucispinis</i>
Southeastern	Scorpaenidae	canary rockfish	<i>Sebastes pinniger</i>
Southeastern	Scorpaenidae	redstripe rockfish	<i>Sebastes proriger</i>
Southeastern	Scorpaenidae	yellowmouth rockfish	<i>Sebastes reedi</i>
Southeastern	Scorpaenidae	yelloweye rockfish	<i>Sebastes ruberrimus</i>
Southeastern	Scorpaenidae	dusky rockfish	<i>Sebastes variabilis</i>
Southeastern	Scorpaenidae	harlequin rockfish	<i>Sebastes variegatus</i>

INPFC area	Family	Common name	Species name
Southeastern	Scorpaenidae	sharpchin rockfish	<i>Sebastes zacentrus</i>
Southeastern	Scorpaenidae	shortspine thornyhead	<i>Sebastolobus alascanus</i>
Southeastern	Scorpaenidae	longspine thornyhead	<i>Sebastolobus altivelis</i>
Southeastern	Myctophidae	northern lampfish	<i>Stenobrachius leucopsarus</i>
Southeastern	Stomiidae	longfin dragonfish	<i>Tactostoma macropus</i>
Southeastern	Osmeridae	eulachon	<i>Thaleichthys pacificus</i>
Southeastern	Zaproridae	prowfish	<i>Zaprora silenus</i>
Southeastern	Hormathiidae	reticulate anemone	<i>Actinauge verrilli</i>
Southeastern	Strongylocentrotidae	orange-pink sea urchin	<i>Allocentrotus fragilis</i>
Southeastern	Aphrocallistidae	clay pipe sponge	<i>Aphrocallistes vastus</i>
Southeastern	Aphroditidae		<i>Aphrodita negligens</i>
Southeastern	Ulmaridae		<i>Aurelia labiata</i>
Southeastern	Cranchiidae		<i>Belonella borealis</i>
Southeastern	Gonatidae	magistrate armhook squid	<i>Berryteuthis magister</i>
Southeastern	Schizasteridae	heart urchin	<i>Brisaster latifrons</i>
Southeastern	Goniasteridae	red bat star	<i>Ceramaster japonicus</i>
Southeastern	Oregoniidae	Tanner crab	<i>Chionoecetes bairdi</i>
Southeastern	Pelagiidae		<i>Chrysaora melanaster</i>
Southeastern	Trochidae		<i>Cidarina cidaris</i>
Southeastern	Solasteridae	grooved sea star	<i>Crossaster borealis</i>
Southeastern	Solasteridae	rose sea star	<i>Crossaster papposus</i>
Southeastern	Ctenodiscidae	common mud star	<i>Ctenodiscus crispatus</i>
Southeastern	Cyaneidae	lion's mane jelly	<i>Cyanea capillata</i>
Southeastern	Astropectinidae	northern sea star	<i>Dipsacaster borealis</i>
Southeastern	Microcionidae	hat sponge	<i>Echinoclathria beringensis</i>
Southeastern	Ranellidae	Oregon triton	<i>Fusitriton oregonensis</i>
Southeastern	Gonatidae	boreopacific armhook squid	<i>Gonatopsis borealis</i>
Southeastern	Gorgonocephalidae	basketstar	<i>Gorgonocephalus eucnemis</i>
Southeastern	Halipteridae		<i>Halipterus willemoesi</i>
Southeastern	Echinasteridae	blood sea star	<i>Henricia leviuscula</i>
Southeastern	Goniasteridae		<i>Hippasteria heathi</i>
Southeastern	Goniasteridae		<i>Hippasteria lepidonotus</i>
Southeastern			<i>Lophaster</i> sp. A (Clark)
Southeastern	Lithodidae	brown box crab	<i>Lopholithodes foraminatus</i>
Southeastern	Luidiidae	sand sea star	<i>Luidia foliolata</i>
Southeastern	Goniasteridae	vermillion sea star	<i>Mediaster aequalis</i>
Southeastern	Metridiidae	gigantic anemone	<i>Metridium farcimen</i>
Southeastern	Galatheidae	pinchbug	<i>Munida quadrispina</i>
Southeastern	Mycalidae	lampshade sponge	<i>Mycale bellabellensis</i>
Southeastern	Mycalidae	tree sponge	<i>Mycale loveni</i>
Southeastern	Benthopectinidae		<i>Nearchaster variabilis</i>
Southeastern	Octopoteuthidae		<i>Octopoteuthis deletron</i>
Southeastern	Echinasteridae		<i>Odontohenricia fisheri</i>
Southeastern	Paguridae	Aleutian hermit	<i>Pagurus aleuticus</i>
Southeastern	Paguridae	knobbyhand hermit	<i>Pagurus confragosus</i>
Southeastern	Paguridae	hornyhand hermit	<i>Pagurus cornutus</i>
Southeastern	Pandalidae	sidestripe shrimp	<i>Pandalopsis dispar</i>
Southeastern	Pandalidae	ocean shrimp	<i>Pandalus jordani</i>
Southeastern	Pandalidae	spot shrimp	<i>Pandalus platyceros</i>
Southeastern	Pasiphaeidae	Pacific glass shrimp	<i>Pasiphaea pacifica</i>
Southeastern	Periphyllidae	helmet jelly	<i>Periphylla periphylla</i>
Southeastern	Ulmaridae	egg yolk jelly	<i>Phacellophora camtschatica</i>
Southeastern	Primnoidae		<i>Primnoa pacifica</i>
Southeastern	Synallactidae	sandy sea cucumber	<i>Pseudostichopus mollis</i>
Southeastern	Sepiolidae	eastern Pacific bobtail	<i>Rossia pacifica</i>

INPFC area	Family	Common name	Species name
Southeastern	Ophiuridae		<i>Stegophiura ponderosa</i>
Southeastern	Myxillidae	scapula sponge	<i>Stelodoryx oxecta</i>
Southeastern	Histioteuthidae		<i>Stigmatoteuthis dofeini</i>
Southeastern	Actinostolidae	swimming anemone	<i>Stomphia coccinea</i>
Southeastern	Asteriidae	long-rayed star	<i>Stylasterias forreri</i>
Southeastern	Salpidae	common salp	<i>Thetys vagina</i>
Yakutat	Rajidae	Aleutian skate	<i>Bathyrāja aleutica</i>
Yakutat	Rajidae	Bering skate	<i>Bathyrāja interrupta</i>
Yakutat	Rajidae	big skate	<i>Beringrāja binoculata</i>
Yakutat	Chimaeridae	spotted ratfish	<i>Hydrolagus colliei</i>
Yakutat	Rajidae	longnose skate	<i>Raja rhina</i>
Yakutat	Squalidae	spiny dogfish	<i>Squalus suckleyi</i>
Yakutat	Pleuronectidae	arrowtooth flounder	<i>Atheresthes stomias</i>
Yakutat	Paralichthyidae	Pacific sanddab	<i>Citharichthys sordidus</i>
Yakutat	Pleuronectidae	petrale sole	<i>Eopsetta jordani</i>
Yakutat	Pleuronectidae	rex sole	<i>Glyptocephalus zachirus</i>
Yakutat	Pleuronectidae	flathead sole	<i>Hippoglossoides elassodon</i>
Yakutat	Pleuronectidae	Pacific halibut	<i>Hippoglossus stenolepis</i>
Yakutat	Pleuronectidae	butter sole	<i>Isopsetta isolepis</i>
Yakutat	Pleuronectidae	southern rock sole	<i>Lepidopsetta bilineata</i>
Yakutat	Pleuronectidae	slender sole	<i>Lyopsetta exilis</i>
Yakutat	Pleuronectidae	Dover sole	<i>Microstomus pacificus</i>
Yakutat	Pleuronectidae	English sole	<i>Parophrys vetulus</i>
Yakutat	Pleuronectidae	starry flounder	<i>Platichthys stellatus</i>
Yakutat	Macrouridae	giant grenadier	<i>Albatrossia pectoralis</i>
Yakutat	Anarrhichadidae	wolf-eel	<i>Anarrhichthys ocellatus</i>
Yakutat	Anoplopomatidae	sablefish	<i>Anoplopoma fimbria</i>
Yakutat	Agonidae	Aleutian alligatorfish	<i>Aspidophoroides monoptyerygius</i>
Yakutat	Agonidae	gray starsnout	<i>Bathylagonus alascanus</i>
Yakutat	Bathymasteridae	searcher	<i>Bathymaster signatus</i>
Yakutat	Stomiidae	Pacific viperfish	<i>Chauliodus macouni</i>
Yakutat	Clupeidae	Pacific herring	<i>Clupea pallasii</i>
Yakutat	Psychrolutidae	spinyhead sculpin	<i>Dasycottus setiger</i>
Yakutat	Gadidae	walleye pollock	<i>Gadus chalcogrammus</i>
Yakutat	Gadidae	Pacific cod	<i>Gadus macrocephalus</i>
Yakutat	Hemitriptidae	bigmouth sculpin	<i>Hemitripterus bolini</i>
Yakutat	Myctophidae	brokenline lampfish	<i>Lampanyctus jordani</i>
Yakutat	Stichaeidae	daubed shanny	<i>Leptoclinus maculatus</i>
Yakutat	Bathylagidae	northern smoothtongue	<i>Leuroglossus schmidti</i>
Yakutat	Zoarcidae	Bering eelpout	<i>Lycodes beringi</i>
Yakutat	Zoarcidae	shortfin eelpout	<i>Lycodes brevipes</i>
Yakutat	Zoarcidae	bigfin eelpout	<i>Lycodes cortezianus</i>
Yakutat	Zoarcidae	blackbelly eelpout	<i>Lycodes pacificus</i>
Yakutat	Zoarcidae	wattled eelpout	<i>Lycodes palearis</i>
Yakutat	Psychrolutidae	blackfin sculpin	<i>Malacocottus kincaidi</i>
Yakutat	Psychrolutidae	darkfin sculpin	<i>Malacocottus zonurus</i>
Yakutat	Osmeridae	Pacific capelin	<i>Mallotus catervarius (=villosus)</i>
Yakutat	Merlucciidae	Pacific hake	<i>Merluccius productus</i>
Yakutat	Gadidae	Pacific tomcod	<i>Microgadus proximus</i>
Yakutat	Myctophidae	pinpoint lampfish	<i>Nannobranchium regale</i>
Yakutat	Salmonidae	chum salmon	<i>Oncorhynchus keta</i>
Yakutat	Salmonidae	coho salmon	<i>Oncorhynchus kisutch</i>
Yakutat	Salmonidae	chinook salmon	<i>Oncorhynchus tshawytscha</i>
Yakutat	Hexagrammidae	lingcod	<i>Ophiodon elongatus</i>
Yakutat	Stichaeidae	whitebarred prickleback	<i>Poroclinus rothrocki</i>
Yakutat	Scorpaenidae	rougeye rockfish	<i>Sebastes aleutianus</i>

INPFC area	Family	Common name	Species name
Yakutat	Scorpaenidae	Pacific ocean perch	<i>Sebastes alutus</i>
Yakutat	Scorpaenidae	redbanded rockfish	<i>Sebastes babcocki</i>
Yakutat	Scorpaenidae	shortraker rockfish	<i>Sebastes borealis</i>
Yakutat	Scorpaenidae	silvergray rockfish	<i>Sebastes brevispinis</i>
Yakutat	Scorpaenidae	darkblotched rockfish	<i>Sebastes crameri</i>
Yakutat	Scorpaenidae	splitnose rockfish	<i>Sebastes diploproa</i>
Yakutat	Scorpaenidae	greenstriped rockfish	<i>Sebastes elongatus</i>
Yakutat	Scorpaenidae	yellowtail rockfish	<i>Sebastes flavidus</i>
Yakutat	Scorpaenidae	rosethorn rockfish	<i>Sebastes helvomaculatus</i>
Yakutat	Scorpaenidae	quillback rockfish	<i>Sebastes maliger</i>
Yakutat	Scorpaenidae	black rockfish	<i>Sebastes melanops</i>
Yakutat	Scorpaenidae	blackspotted rockfish	<i>Sebastes melanostictus</i>
Yakutat	Scorpaenidae	northern rockfish	<i>Sebastes polyspinis</i>
Yakutat	Scorpaenidae	redstripe rockfish	<i>Sebastes proriger</i>
Yakutat	Scorpaenidae	yelloweye rockfish	<i>Sebastes ruberrimus</i>
Yakutat	Scorpaenidae	dusky rockfish	<i>Sebastes variabilis</i>
Yakutat	Scorpaenidae	sharpchin rockfish	<i>Sebastes zacentrus</i>
Yakutat	Scorpaenidae	shortspine thornyhead	<i>Sebastolobus alascanus</i>
Yakutat	Scorpaenidae	broadfin thornyhead	<i>Sebastolobus macrochir</i>
Yakutat	Osmeridae	longfin smelt	<i>Spirinchus thaleichthys</i>
Yakutat	Myctophidae	northern lampfish	<i>Stenobrachius leucopsarus</i>
Yakutat	Osmeridae	eulachon	<i>Thaleichthys pacificus</i>
Yakutat	Trichodontidae	Pacific sandfish	<i>Trichodon trichodon</i>
Yakutat	Petromyzontidae	Pacific lamprey	<i>Lampetra tridentata</i>
Yakutat	Hormathiidae	reticulate anemone	<i>Actinauge verrilli</i>
Yakutat	Alcyonidiidae	fruit leather bryozoan	<i>Alcyonidium pedunculatum</i>
Yakutat	Strongylocentrotidae	orange-pink sea urchin	<i>Allocentrotus fragilis</i>
Yakutat	Aphrocallistidae	clay pipe sponge	<i>Aphrocallistes vastus</i>
Yakutat	Aphroditidae		<i>Aphrodita negligens</i>
Yakutat	Stichopodidae	California sea cucumber	<i>Apostichopus californicus</i>
Yakutat	Astartidae		<i>Astarte montagui</i>
Yakutat	Ulmaridae		<i>Aurelia labiata</i>
Yakutat	Cranchiidae		<i>Belonella borealis</i>
Yakutat	Octopodidae	smoothskin octopus	<i>Benthoctopus leioderma</i>
Yakutat	Octopodidae		<i>Benthoctopus oregonensis</i>
Yakutat	Gonatidae	magistrate armhook squid	<i>Berryteuthis magister</i>
Yakutat	Schizasteridae	heart urchin	<i>Brisaster latifrons</i>
Yakutat	Goniasteridae	orange bat sea star	<i>Ceramaster patagonicus</i>
Yakutat	Nereididae	red and white banded sea nymph	<i>Cheilonereis cyclurus</i>
Yakutat	Benthopectinidae	fragile sea star	<i>Cheiraster dawsoni</i>
Yakutat	Oregoniidae	Tanner crab	<i>Chionoecetes bairdi</i>
Yakutat	Pisidae	longhorned decorator crab	<i>Chorilia longipes</i>
Yakutat	Pelagiidae		<i>Chrysaora melanaster</i>
Yakutat	Crangonidae	ridged Crangon	<i>Crangon dalli</i>
Yakutat	Solasteridae	grooved sea star	<i>Crossaster borealis</i>
Yakutat	Solasteridae	rose sea star	<i>Crossaster papposus</i>
Yakutat	Naticidae	Aleutian moonshell	<i>Cryptonatica aleutica</i>
Yakutat	Naticidae	rusty moonshell	<i>Cryptonatica russa</i>
Yakutat	Ctenodiscidae	common mud star	<i>Ctenodiscus crispatus</i>
Yakutat	Cyaneidae	lion's mane jelly	<i>Cyanea capillata</i>
Yakutat	Loliginidae	California market squid	<i>Doryteuthis opalescens</i>
Yakutat	Paguridae	widehand hermit crab	<i>Elassochirus tenuimanus</i>
Yakutat	Octopodidae	giant octopus	<i>Enteroctopus dofleini</i>
Yakutat	Ranellidae	Oregon triton	<i>Fusitriton oregonensis</i>
Yakutat	Goniasteridae	Swift sea star	<i>Gephyreaster swifti</i>

INPFC area	Family	Common name	Species name
Yakutat	Gonatidae	boreopacific armhook squid	<i>Gonatopsis borealis</i>
Yakutat	Gorgonocephalidae	basketstar	<i>Gorgonocephalus eucnemis</i>
Yakutat	Halipteridae		<i>Halipterus willemoesi</i>
Yakutat	Echinasteridae	ridged blood star	<i>Henricia aspera</i>
Yakutat	Goniasteridae	spiny red sea star	<i>Hippasteria phrygiana (=spinos)</i>
Yakutat	Goniasteridae	Alaskan spiny star	<i>Hippasteria</i> sp. E (Clark)
Yakutat	Paguridae	splendid hermit	<i>Labidochirus splendescens</i>
Yakutat	Laqueidae	California lamp shell	<i>Laqueus californianus</i>
Yakutat	Asteriidae	blackspined sea star	<i>Lethasterias nanimensis</i>
Yakutat	Schizopathidae		<i>Lillipathes lilliei</i>
Yakutat	Lithodidae	brown box crab	<i>Lopholithodes foraminatus</i>
Yakutat	Luidiidae	sand sea star	<i>Luidia foliolata</i>
Yakutat	Naticidae	pale moonshell	<i>Lunatia pallida</i>
Yakutat	Metridiidae	gigantic anemone	<i>Metridium farcimen</i>
Yakutat	Galatheididae	pinchbug	<i>Munida quadrispina</i>
Yakutat	Mycalidae	tree sponge	<i>Mycale loveni</i>
Yakutat	Ophiuridae	notched brittlestar	<i>Ophiura sarsii</i>
Yakutat	Oregoniidae	graceful decorator crab	<i>Oregonia gracilis</i>
Yakutat	Paguridae	Aleutian hermit	<i>Pagurus aleuticus</i>
Yakutat	Paguridae	sponge hermit	<i>Pagurus brandti</i>
Yakutat	Paguridae	knobbyhand hermit	<i>Pagurus confragosus</i>
Yakutat	Paguridae	Alaskan hermit	<i>Pagurus ochotensis</i>
Yakutat	Paguridae	longhand hermit	<i>Pagurus tanneri</i>
Yakutat	Pandalidae	sidestripe shrimp	<i>Pandalopsis dispar</i>
Yakutat	Pandalidae	dock shrimp	<i>Pandalus danae</i>
Yakutat	Pandalidae	Alaskan pink shrimp	<i>Pandalus eous</i>
Yakutat	Pandalidae	ocean shrimp	<i>Pandalus jordani</i>
Yakutat	Pandalidae	spot shrimp	<i>Pandalus platyceros</i>
Yakutat	Pasiphaeidae	Pacific glass shrimp	<i>Pasiphaea pacifica</i>
Yakutat	Pectinidae	weathervane scallop	<i>Patinopecten caurinus</i>
Yakutat	Periphyllidae	helmet jelly	<i>Periphylla periphylla</i>
Yakutat	Ulmaridae	egg yolk jelly	<i>Phacellophora camtschatica</i>
Yakutat	Pinnotheridae	pea crab	<i>Pinnixa occidentalis</i>
Yakutat	Echinasteridae	thorny sea star	<i>Poraniopsis inflata</i>
Yakutat	Primnoidae		<i>Primnoa pacifica</i>
Yakutat	Synallactidae	sandy sea cucumber	<i>Pseudostichopus mollis</i>
Yakutat	Asteriidae	sunflower sea star	<i>Pycnopodia helianthoides</i>
Yakutat	Aegidae	sea cockroach	<i>Rocinela angustata</i>
Yakutat	Sepiolidae	eastern Pacific bobtail	<i>Rossia pacifica</i>
Yakutat	Ophiuridae		<i>Stegophiura ponderosa</i>
Yakutat	Strongylocentrotidae		<i>Strongylocentrotus polyacanthus</i>
Yakutat	Styelidae	sea potato	<i>Styela rustica</i>
Yakutat	Asteriidae	long-rayed star	<i>Stylasterias forreri</i>
Yakutat	Synallactidae		<i>Synallactes challengerii</i>
Yakutat	Pedicellasteridae		<i>Tarsaster alaskanus</i>
Yakutat	Salpidae	common salp	<i>Thetys vagina</i>
Yakutat	Yoldiidae	crisscrossed Yoldia	<i>Yoldia seminuda</i>

Appendix C

Appendix Table C-1. -- Length-weight parameters (*a* and *b*) for species where individual length and weight data were collected during the 2023 survey. The number of individuals measured and weighed (*n*) is also provided.

Species	Sex	a	b	n
Arrowtooth flounder	Male	4.373E-06	3.106	285
	Female	2.969E-06	3.179	637
	Both	2.843E-06	3.184	925
Atka mackerel	Male	1.801E-06	3.332	96
	Female	1.562E-05	2.949	109
	Both	7.741E-06	3.077	205
Blackspotted rockfish	Male	4.262E-06	3.212	122
	Female	6.087E-06	3.150	103
	Both	5.007E-06	3.184	225
Pacific cod	Male	4.456E-06	3.136	536
	Female	3.548E-06	3.175	601
	Both	3.907E-06	3.158	1137
Dover sole	Male	2.238E-06	3.241	162
	Female	2.561E-06	3.219	142
	Both	2.396E-06	3.230	304
Dusky rockfish	Male	4.043E-06	3.232	163
	Female	1.881E-05	2.979	164
	Both	8.410E-06	3.111	327
Flathead sole	Male	1.171E-06	3.348	194
	Female	6.878E-07	3.438	261
	Both	8.518E-07	3.402	455
Northern rockfish	Male	6.700E-06	3.130	138
	Female	3.046E-05	2.876	136
	Both	1.628E-05	2.981	274
Northern rock sole	Male	5.534E-06	3.122	171
	Female	2.819E-06	3.242	262
	Both	3.544E-06	3.203	433

Species	Sex	a	b	n
Walleye pollock	Male	6.127E-06	3.028	738
	Female	6.462E-06	3.021	895
	Both	6.255E-06	3.025	1633
Pacific ocean perch	Male	1.021E-05	3.046	523
	Female	1.887E-05	2.936	437
	Both	1.364E-05	2.994	960
Rex sole	Male	7.462E-07	3.364	312
	Female	5.913E-07	3.409	355
	Both	5.945E-07	3.406	667
Rougheye rockfish	Male	1.053E-05	3.067	156
	Female	6.656E-06	3.149	151
	Both	8.704E-06	3.101	307
Sablefish	Male	8.691E-07	3.382	113
	Female	1.311E-06	3.313	112
	Both	1.111E-06	3.341	225
Shortraker rockfish	Male	9.834E-06	3.078	132
	Female	8.755E-06	3.100	108
	Both	9.819E-06	3.080	240
Southern rock sole	Male	5.396E-06	3.132	117
	Female	5.330E-06	3.139	381
	Both	4.425E-06	3.170	498
Rougheye-Blcksp complex	Male	7.72E-06	3.116	278
	Female	7.35E-06	3.126	254
	Both	7.56E-06	3.120	532



U.S. Secretary of Commerce
Gina M. Raimondo

Under Secretary of Commerce for
Oceans and Atmosphere
Dr. Richard W. Spinrad

Assistant Administrator,
National Marine Fisheries Service.
Janet Coit

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www.fisheries.noaa.gov

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**National Marine
Fisheries Service**
Alaska Fisheries Science Center
7600 Sand Point Way N.E.
Seattle, WA 98115-6349