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Data Report: 2021 Gulf of Alaska Bottom Trawl Survey

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Data Report: 2021 Gulf of Alaska Bottom Trawl Survey

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Preface

This report presents data from the 2021 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 catch per unit effort and estimated biomass, weight and length measurements, length-weight regression parameters, lists of identified species, survey strata specifications, and trawl descriptions.

Abstract

The biennial groundfish assessment survey of the Gulf of Alaska (GOA) region was conducted during the summer of 2021 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-GAP 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 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 for federally managed species and species complexes. Pacific ocean perch (*Sebastes alutus*) had the highest estimated biomass of 1,478,940 metric tons (t), followed by arrowtooth flounder (*Atheresthes stomias*; 1,132,192 t), walleye pollock (*Gadus chalcogrammus*; 528,841 t), and sablefish (*Anoplopoma fimbria*; 325,075 t). Arrowtooth flounder and Pacific halibut (*Hippoglossus stenolepis*; 300,195 t) were the flatfish species with the highest estimated biomass. The three chondrichthyans with the highest biomass estimated from the survey were, in order of highest to lowest, longnose skate (*Beringraja rhina*), spotted ratfish (*Hydrolagus colliei*), and spiny dogfish (*Squalus suckleyi*). The highest species richness of fishes (108 species) and the highest invertebrate species richness (218 species) were found in the Kodiak region.

Introduction

The 2021 biennial bottom trawl survey of the Gulf of Alaska (GOA) region was conducted from the 18th of May through the 6th of August 2021 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 17th standardized RACE-GAP bottom trawl survey of this area since 1990. 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. Surveys conducted prior to 1990 were cooperative efforts involving U.S. and Japanese scientists and vessels or used other, non-standardized methods.

The primary focus of the RACE-GAP bottom trawl survey is to extend the time series of standardized data collections used to assess, describe, and monitor the distribution, abundance, and biological condition of GOA groundfish and invertebrate stocks (Stauffer 2004). This survey supports annual stock assessments to meet the requirements of Alaska's Fishery Management Plans. This report presents the 2021 survey results for the principal groundfish and invertebrate species from five historical International North Pacific Fisheries Commission (INPFC) reporting regions representing seven National Marine Fisheries Service (NMFS) statistical areas. Most time series of principal groundfish and invertebrate species preceding this report are available through the North Pacific Groundfish Stock Assessments and Fishery Evaluation Reports. The INPFC existed from 1952 to 1993 to facilitate the coordination, cooperation, and exchange of scientific information about 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 GOA bottom trawl surveys and roughly overlapped with the NMFS statistical areas created later and used starting in 2025 to manage GOA stocks.

The objectives of the RACE-GAP summer bottom trawl surveys in the GOA are to 1) describe the distribution and relative abundance of groundfish and invertebrate species that inhabit the GOA region; 2) collect biological measurements from these populations like age, length, and weight; 3) study the feeding habits of select groundfish species; 4) collect net mensuration data to estimate the area swept and calculate catch per unit effort (CPUE); and 5) to carry out scientific projects and collections in partnership with collaborators, researchers, and other research institutions.

Collections for scientific projects are done by request and selected via a proposal evaluation process. Special collection requests in 2021 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; 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; and collected specimens of corals, mollusks, juvenile prowfish, and market squid for various collaborative projects.

Methods

Survey Area

The GOA 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 survey bottom trawling operations. The 2021 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 2021 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 historically sampled in the Gulf (700-1,000 m) have been eliminated due to survey effort reductions beyond GAP's control. 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 the portion of the slope between 200 and 700 m, which represented 18% of the total survey area. The survey was originally stratified using statistical areas established by the 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 2021 GOA bottom trawl survey were the FV *Ocean Explorer* and the FV *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).
- The *Ocean Explorer* is 47.2 m LOA with a 1,500 HP main engine.

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 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 trawl warp measuring systems,

transceivers for detecting the signal from wing tip sensors, a hull-mounted multi-beam transducer for providing depth data and acoustic measurements, and a down sounder and transducer for depth and seafloor monitoring.

Due to continuing concerns with the transmission of COVID 19, the survey was divided into two legs of approximately equal length with a port call between both to accommodate crew changes and to resupply; the survey would typically have been comprised of 4 shorter cruise legs with more opportunity for crew exchange and resupply.

Captain Dan Carney and Jerry Ellifson operated the FV *Ocean Explorer* and Captain Loren Reynolds operated the FV *Alaska Provider* for both 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 upper 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 2021 biennial GOA trawl survey uses a stratified random survey design on areas shallower than 700 m (Munro and Hoff 1995, Raring et al. 2016). The survey area was divided into 54 strata defined by water depth, bottom terrain (e.g., shelf, gully, and slope), and INPFC statistical area (Appendix A). In the GOA bottom trawl survey, stations are randomly selected within a stratum from the full set of stations deemed trawlable or with unknown trawlability status.

Consistent with recent RACE-GAP surveys (e.g., von Szalay et al. 2008, 2010, von Szalay and Raring 2017), sampling effort within each stratum 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 (Table **1**), and stratum area. Ex-vessel prices for 15 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 540 stations were selected for sampling in the 2021 survey. Assigned sample densities were highest in the 301 - 500 m and 201 - 300 m depth intervals at 2.19 and 2.05 stations per 1,000 km^2 in each depth interval (Table **2**). At a sample size of 540 stations, the survey-wide sampling density was ca. 0.002 tows per 1,000 km^2.

This year's station allocation routine[1] draws stations at random, without replacement, from the pool of previously successfully sampled stations and those of unknown status within each stratum, and allocates these to the two survey vessels. This routine requires that a minimum

[1] https://github.com/afsc-gap-products/StationAllocationAIGOA

of two stations are allocated to each stratum so that a sample stratum variance can be calculated. In the event of fishing gear conflicts or untrawlable bottom at a preselected station, an alternate station in the same 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 large enough 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 two hours of searching a 5 × 5 km grid cell; maximum search time was proportionally reduced when stations represented less than 25 km^2 of the total grid cell. If the full search time was expended within a grid cell without identifying a trawlable patch, that grid cell was designated untrawlable for future station allocations.

Trawling Methods and Data Collection

Standard trawl configuration and 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 reduced to avoid potential gear damage or when changing net dimensions indicated that a large catch was affecting the configuration of the net. 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 and surface temperatures were recorded for each haul. Bottom temperatures were calculated as the average temperature between when the gear was determined to be on-bottom and when the gear was lifted off-bottom. Surface temperatures were taken to be either the first measurement at a depth of 1 m or linearly interpolated from measurements on either side of 1 m during the upcast. Surface temperatures in previous years were measured and calculated in different ways; see Table 1 in Rohan et al. (2022) for equipment and calculation methods historically used for water temperature data, and see 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 to be “good performance” 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 to no damage during the tow.
- There were no encounters with large objects (e.g., boulders) or other fishing gear (e.g., crab pots, longline gear) that would alter the performance of the net.

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 satisfactory 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 (t; 1,000 kg) were deposited directly onto a sorting table where taxa were identified to the lowest possible taxonomic level. All species nomenclature in our databases and in this report generally follow the Integrated Taxonomic Information System (ITIS[2]). Taxon groups estimated to weigh more than a few kilos were weighed to the nearest 10 g using a motion compensated Marel® electronic digital platform scale; non-colonial taxa were also 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 t were often serially processed by depositing aliquots of the total catch onto the sorting table in 1-t portions. Very large catches were sampled one of three ways:

1) Very large catches that could be lifted off the deck with the crane (5-8 t) were weighed with a dynamometer (load cell) when the sea state allowed.

2) Some large catches were also split on deck and subsampled using a brailer net.

3) The weights of some of the largest catches (exceeding ca. 8 t) were estimated volumetrically, using the total volume and a subsample volume to obtain catch proportions and total catch weights.

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 major fish species was collected, sexed, and measured to generate length frequencies (Table **3**). All sharks, skates, and Pacific halibut were measured. A smaller length frequency sample was collected for minor catch components such as sculpins. 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 and recorded with barcode-reader data loggers and barcoded length boards.

[2] https://www.itis.gov/

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.

When recording fish length, the most common measurement used was fork length (FL). However, sharks and skates were measured using total length (TL) and giant grenadier were measured from the tip of the snout to the origin of the anal fin. Fish that could not be readily sexed were classified as unsexed. Fish length was measured to the nearest centimeter and individual fish weight was estimated to the nearest 2–10 g 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 (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 taxon, the 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. 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.

Individual length and weight measurements were used to estimate length-weight parameters, which are used to expand biomass from subsample lengths using the length-weight relationship

$$W = aL^b,$$

where W is weight in grams, L is length in mm and a and b are the fitted parameters (Appendix C). In this report, sex-specific differences in weight are provided in the results section for arrowtooth flounder, Pacific halibut, Pacific cod, walleye pollock, sablefish, and Pacific ocean perch. If a Komolgorov-Smirnov test of the male and female length distributions indicates the male and female length distributions differ, a bullet is included in the species results indicating this difference and the mean lengths for each sex.

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 interpreting the relative indices of abundance produced by the survey.

Table 1. -- Ex-vessel prices used to allocate stations in the GOA 2021 bottom trawl survey. *Data source:* Commercial Operator's Annual Reports prices for categories with inshore retained catch at least 30% of the total retained catch. The prices used for station allocation in 2021 are from 2019.

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

Table 2. -- Stations allocated and sampled during the 2021 GOA bottom trawl survey.

Survey district	Depth range (m)	Stations allocated	Stations completed	Total area (km^2)	Stations per 1,000 km^2
Shumagin	1 - 100	72	70	41,289	1.70
	101 - 200	27	27	14,677	1.84
	201 - 300	13	11	2,788	3.95
	301 - 500	4	4	2,531	1.58
	501 - 700	2	2	2,006	1.00
	All depths	118	114	63,290	1.80
Chirikof	1 - 100	42	41	26,035	1.57
	101 - 200	51	51	23,849	2.14
	201 - 300	16	16	11,546	1.39
	301 - 500	4	4	1,604	2.49
	501 - 700	3	3	1,953	1.54
	All depths	116	115	64,988	1.77
Kodiak	1 - 100	63	62	38,516	1.61
	101 - 200	92	89	43,332	2.05
	201 - 300	18	18	11,490	1.57
	301 - 500	6	6	2,912	2.06
	501 - 700	2	2	1,745	1.15
	All depths	181	177	97,994	1.81
Yakutat	1 - 100	16	16	16,661	0.96
	101 - 200	31	31	29,382	1.06
	201 - 300	16	16	5,170	3.09
	301 - 500	7	6	2,628	2.28
	501 - 700	2	1	1,469	0.68
	All depths	72	70	55,310	1.27
Southeastern	1 - 100	7	7	6,546	1.07
	101 - 200	23	23	11,084	2.08
	201 - 300	13	13	5,052	2.57
	301 - 500	8	8	3,117	2.57
	501 - 700	2	2	1,034	1.94
	All depths	53	53	26,833	1.98
All areas	1 - 100	200	196	129,047	1.52
	101 - 200	224	221	122,324	1.81
	201 - 300	76	74	36,047	2.05
	301 - 500	29	28	12,792	2.19
	501 - 700	11	10	8,206	1.22
	All depths	540	529	308,416	0.0017

Table 3. -- Target numbers per haul of length samples for each managed species. Asterisks (*) indicate species that are not sexed; for all other species sexed lengths are collected.

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

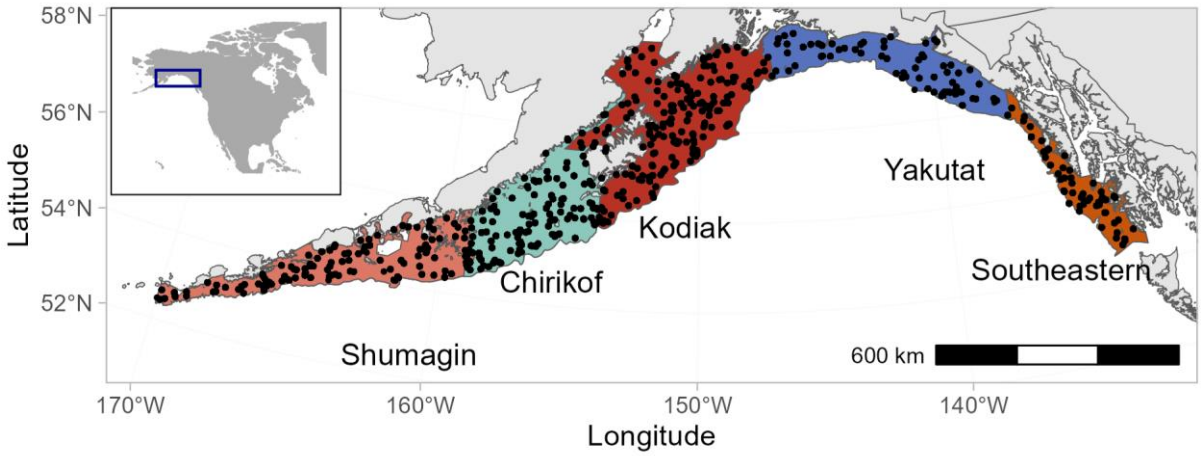

Figure 1. -- Map of the GOA 2021 bottom trawl survey area indicating INPFC areas. Black points indicate stations sampled in this survey.

Results

We successfully sampled 526 stations from a total allocation of 540 (Table **2**). All successful tows were included in the biomass, length, and age composition analyses. Marport acoustic net mensuration sensors were deployed at all stations and net mensuration data were successfully collected at 505 stations. For the 21 stations without sufficient Marport mensuration data, net spread was estimated from a generalized additive model (GAM).

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

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

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

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

In total, there were 31 unsuccessful tows during the 2021 survey. Bottom temperatures were recorded for all but 3 hauls and surface temperature data were recorded for all but 10 hauls. Bottom temperatures ranged from 3.7 to 10.8 °C (Fig. **2**). Surface temperatures ranged from 5.5 to 17.4 °C (Fig. **3**).

We measured 185,962 lengths (185,136 fishes and 826 armhook squid) and collected 11,708 pairs of otoliths. A summary of the total otoliths sampled by species can be found in Table **4**.

Results by Area

Total catches across the survey area included 153 fish species from 37 families, and 333 invertebrate taxa from 11 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 each of the survey districts surveyed in 2021, 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 sablefish. The elasmobranch with the highest estimated biomass was the skate complex and the flatfish with the highest estimated biomass was arrowtooth flounder.

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
Atka mackerel	68	100	-32
walleye pollock	1,352	1,500	-10
Pacific cod	586	1,000	-41
northern rock sole	268	500	-46
southern rock sole	804	500	61
rex sole	759	500	52
Dover sole	774	500	55
flathead sole	712	500	42
arrowtooth flounder	937	900	4
shortspine thornyhead	418	350	19
rougheye rockfish	780	400	95
blackspotted rockfish	401	500	-20
Pacific ocean perch	1,154	1,000	15
northern rockfish	515	700	-26
shortraker rockfish	136	400	-66
dusky rockfish	440	500	-12
sharpchin rockfish	136	200	-32
redstripe rockfish	64	200	-68
sablefish	1,186	600	98

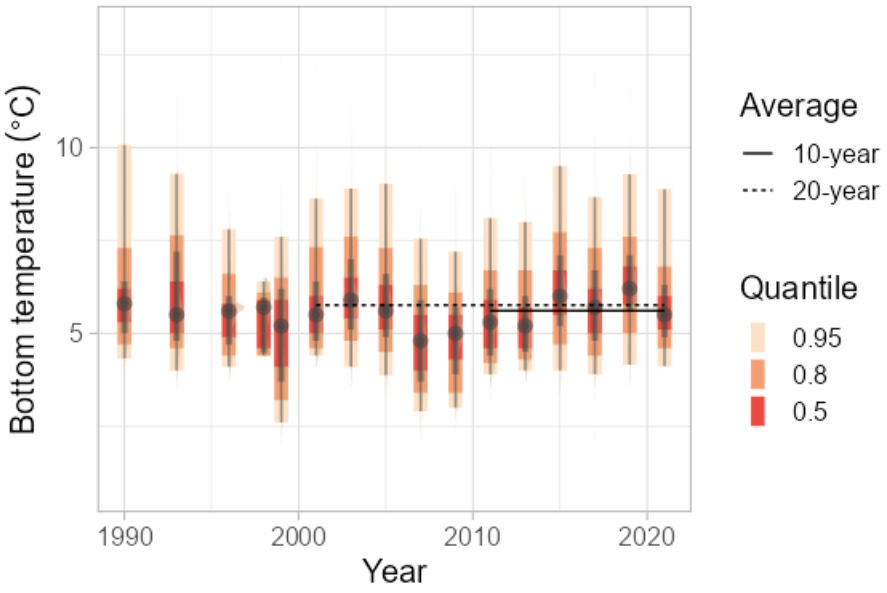

Figure 2. – Bottom temperature measured at the headrope of the trawl. Larger brown points represent the median. Shaded distributions represent the density of measurements. Dotted lines show the mean bottom (gear) temperature over the past 10 and 20 years.

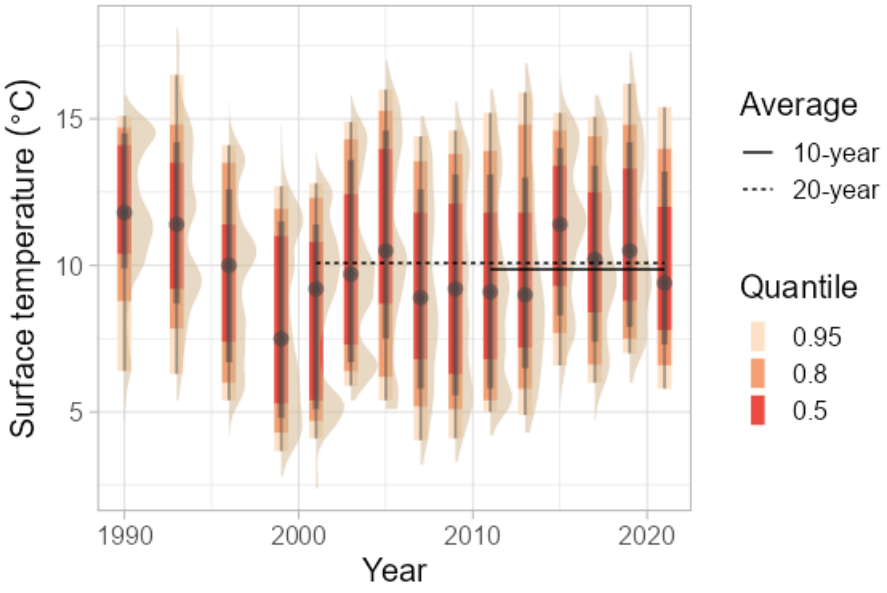

Figure 3. -- Surface temperatures as measured at the trawl. Larger brown points represent the median. Shaded distributions represent the density of measurements. Dotted lines show the mean surface temperature over the past 10 and 20 years.

Results by Species

The following information is presented for each species or complex:

1) A brief summary of the data collected and data analyses
2) A table with the number of hauls attempted, number of hauls where that species was present, mean CPUE, estimated biomass, and mean weight by survey district and depth interval
3) A table with mean CPUE and estimated biomass by subdistrict and depth range
4) A figure showing the spatial distribution of weight 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
7) For arrowtooth flounder, Pacific halibut, Pacific cod, walleye pollock, sablefish, and Pacific ocean perch, information about whether there was a sex-specific difference in length.

Length data (5-6) are not shown for complexes or for invertebrates (e.g., giant Pacific octopus). Length data are presented starting from the year when that species was first positively identified and lengthed in a standardized way. For related species that were not always distinguished from one another, this may be later than the first standardized year of the survey. Specifically, arrowtooth flounder were distinguished from Kamchatka flounder starting in 1992, northern and southern rock sole were distinguished from one another starting in 1996, dusky and dark rockfish were distinguished from one another in 1996, and rougheye/blackspotted rockfish were distinguished from one another starting in 2006.

Table 5. -- Mean CPUE [kg/ha] for the 20 most abundant groundfish species in each survey district during the 2021 GOA bottom trawl survey.

Species	CPUE (kg/ha)
Shumagin	
arrowtooth flounder	57.3
walleye pollock	39.9
Pacific ocean perch	21.5
giant grenadier	11.6
southern rock sole	11.0
Pacific halibut	9.5
northern rockfish	8.4
Pacific cod	8.2
flathead sole	7.3
sablefish	6.2
Atka mackerel	3.8
northern rock sole	3.5
rex sole	2.5
yellowfin sole	2.4
shortspine thornyhead	2.3
black rockfish	1.5
yellow Irish lord	1.0
blackspotted rockfish	0.7
starry flounder	0.4
butter sole	0.4
Chirikof	
Pacific ocean perch	88.0
arrowtooth flounder	41.7
sablefish	20.6
walleye pollock	17.5
Pacific halibut	7.8
flathead sole	7.4
giant grenadier	6.9
dusky rockfish	6.1
Pacific cod	6.0
rex sole	5.0
northern rockfish	4.1
northern rock sole	2.6
southern rock sole	2.1
eulachon	1.9
shortspine thornyhead	1.9
English sole	1.0
Dover sole	0.8
starry flounder	0.7
lingcod	0.6
rougheye rockfish	0.4

Species	CPUE (kg/ha)
Kodiak	
Pacific ocean perch	62.5
arrowtooth flounder	35.7
walleye pollock	11.1
sablefish	10.3
Pacific halibut	8.8
dusky rockfish	6.5
giant grenadier	6.4
Pacific cod	6.0
flathead sole	5.7
southern rock sole	4.2
rex sole	3.9
shortspine thornyhead	1.7
English sole	1.6
northern rock sole	1.3
lingcod	1.3
Dover sole	1.2
spiny dogfish	1.2
northern rockfish	1.1
eulachon	1.1
starry flounder	1.0
Yakutat	
arrowtooth flounder	18.2
Pacific ocean perch	8.3
sablefish	6.3
walleye pollock	6.1
flathead sole	5.0
Pacific halibut	4.9
Dover sole	3.2
Pacific herring	3.1
spiny dogfish	3.1
lingcod	2.9
shortspine thornyhead	2.5
shortraker rockfish	2.4
silvergray rockfish	2.3
Pacific cod	2.3
rex sole	2.1
eulachon	1.7
English sole	1.2
starry flounder	1.1
rougheye rockfish	0.5
redbanded rockfish	0.5

Species	CPUE (kg/ha)
Southeastern	
canary rockfish	57.7
Pacific ocean perch	42.1
Pacific halibut	25.7
arrowtooth flounder	18.0
silvergray rockfish	10.9
walleye pollock	7.3
sablefish	5.9
rex sole	5.3
Pacific cod	4.3
Pacific hake	4.0
Dover sole	3.9
shortspine thornyhead	3.9
sharpchin rockfish	2.1
lingcod	2.1
English sole	1.9
southern rock sole	1.1
spiny dogfish	1.0
rougheye rockfish	1.0
redbanded rockfish	0.9
eulachon	0.9
All areas	
Pacific ocean perch	48.0
arrowtooth flounder	36.7
walleye pollock	17.1
sablefish	10.5
Pacific halibut	9.5
giant grenadier	5.9
flathead sole	5.8
Pacific cod	5.7
canary rockfish	5.0
southern rock sole	4.2
rex sole	3.6
dusky rockfish	3.5
northern rockfish	2.9
shortspine thornyhead	2.2
northern rock sole	1.7
Dover sole	1.5
silvergray rockfish	1.4
lingcod	1.2
English sole	1.2
eulachon	1.1

arrowtooth flounder (*Atheresthes stomias*)

- Arrowtooth flounder was the 2nd most abundant species caught in the 2021 GOA survey. Their total biomass was estimated to be 1,132,192 t (Table **6**), which is a 5.2% increase from 2019.
- The largest estimated biomass for arrowtooth flounder was in the Shumagin region and the depth range with the largest estimated biomass was 101 - 200 m.
- The highest arrowtooth CPUEs were recorded in the Shumagin and Chirikof regions (Table **6** and Fig. **4**).
- On average, the longest arrowtooth were found in the Yakutat region and in a depth range of 301 - 500 m (Fig. **5** and Fig. **6**).
- Males and females of this species differed in average length; females (mean FL 39.13 cm) are generally longer than males (mean FL 34.94 cm).

Table 6. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing arrowtooth flounder, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	67	5,942.3	245,348	0.539
Shumagin	101 - 200	27	27	7,313.8	107,346	0.443
Shumagin	201 - 300	11	11	813.1	2,267	0.617
Shumagin	301 - 500	4	4	2,055.3	5,202	1.125
Shumagin	501 - 700	2	2	1,198.2	2,403	1.147
Shumagin	**All depths**	**114**	**111**	**5,728.6**	**362,567**	**0.512**
Chirikof	1 - 100	41	36	2,234.3	58,171	0.578
Chirikof	101 - 200	51	51	7,358.1	175,487	0.579
Chirikof	201 - 300	16	16	3,174.8	36,656	0.586
Chirikof	301 - 500	4	4	375.5	602	0.87
Chirikof	501 - 700	3	2	67.5	132	1.11
Chirikof	**All depths**	**115**	**109**	**4,170.8**	**271,048**	**0.58**
Kodiak	1 - 100	62	52	1,949.8	75,097	0.623
Kodiak	101 - 200	89	87	5,649.2	244,789	0.615
Kodiak	201 - 300	18	18	2,247.4	25,824	0.629
Kodiak	301 - 500	6	6	1,182.5	3,443	1.074
Kodiak	501 - 700	2	2	168.4	294	0.874
Kodiak	**All depths**	**177**	**165**	**3,566.0**	**349,447**	**0.62**
Yakutat	1 - 100	16	15	1,251.4	20,850	0.713
Yakutat	101 - 200	31	31	2,472.3	72,640	0.688
Yakutat	201 - 300	16	15	1,182.0	6,111	0.944
Yakutat	301 - 500	6	6	417.5	1,097	1.171
Yakutat	501 - 700	1	1	65.6	96	1.02
Yakutat	**All depths**	**70**	**68**	**1,822.3**	**100,794**	**0.708**
Southeastern	1 - 100	7	4	442.4	2,896	0.858
Southeastern	101 - 200	23	22	3,423.5	37,947	0.653
Southeastern	201 - 300	13	13	921.7	4,657	0.698
Southeastern	301 - 500	8	8	909.8	2,836	1.038
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**47**	**1,801.3**	**48,336**	**0.682**
All areas	1 - 100	196	174	3,118.0	402,363	0.567
All areas	101 - 200	221	218	5,217.4	638,209	0.577
All areas	201 - 300	74	73	2,094.9	75,515	0.627
All areas	301 - 500	28	28	1,030.4	13,181	1.081
All areas	501 - 700	10	7	356.4	2,925	1.106
All areas	**All depths**	**529**	**500**	**3,671.0**	**1,132,192**	**0.58**

Table 7. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing arrowtooth flounder, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	8	3,264.4	27,201
Davidson Bank	1 - 100	26	24	2,964.0	40,551
Lower Alaska Peninsula	1 - 100	14	13	3,757.3	25,834
Shumagin Bank	1 - 100	22	22	12,240.1	151,762
Upper Alaska Peninsula	1 - 100	12	12	5,278.8	41,919
Semidi Bank	1 - 100	10	9	407.1	2,973
Chirikof Bank	1 - 100	19	15	1,230.5	13,279
Albatross Shallows	1 - 100	11	10	5,099.6	29,405
Albatross Banks	1 - 100	25	20	1,107.7	17,062
Lower Cook Inlet	1 - 100	9	8	220.8	2,183
Kenai Peninsula	1 - 100	11	9	2,970.4	15,624
Northern Kodiak Shallows	1 - 100	6	5	4,920.6	10,823
Yakutat Shallows	1 - 100	10	9	1,379.5	13,722
Middleton Shallows	1 - 100	6	6	1,061.5	7,128
Southeastern Shallows	1 - 100	7	4	442.4	2,896
Sanak Gully	101 - 200	4	4	15,776.4	66,976
Shumagin Outer Shelf	101 - 200	20	20	3,511.1	28,628
West Shumagin Gully	101 - 200	3	3	5,154.1	11,742
East Shumagin Gully	101 - 200	14	14	8,208.8	91,151
Shelikof Edge	101 - 200	19	19	6,755.4	52,251
Chirikof Outer Shelf	101 - 200	18	18	6,403.2	32,085
Albatross Gullies	101 - 200	19	19	5,892.2	46,618
Portlock Flats	101 - 200	23	23	8,602.2	63,109
Barren Islands	101 - 200	14	14	3,836.0	42,122
Kenai Flats	101 - 200	15	15	6,919.1	83,562
Kodiak Outer Shelf	101 - 200	18	16	1,865.9	9,378
Middleton Shelf	101 - 200	7	7	2,309.1	16,962
Yakataga Shelf	101 - 200	6	6	2,026.1	10,691
Yakutat Flats	101 - 200	8	8	2,156.0	19,472
Fairweather Shelf	101 - 200	10	10	3,301.7	25,514
Baranof-Chichagof Shelf	101 - 200	10	10	4,152.8	17,427
Prince of Wales Shelf	101 - 200	13	12	2,979.2	20,520
Shumagin Slope	201 - 300	11	11	813.1	2,267
Lower Shelikof Gully	201 - 300	9	9	3,521.6	35,279
Chirikof Slope	201 - 300	7	7	901.3	1,377
Kenai Gullies	201 - 300	9	9	936.4	6,236
Kodiak Slope	201 - 300	6	6	691.1	1,121
Upper Shelikof Gully	201 - 300	3	3	5,756.0	18,467
Yakutat Gullies	201 - 300	7	6	1,209.5	3,680
Yakutat Slope	201 - 300	9	9	1,142.7	2,431
Baranof-Chichagof Slope	201 - 300	3	3	752.7	847
Prince of Wales Slope/Gullies	201 - 300	10	10	970.1	3,810
Shumagin Slope	301 - 500	4	4	2,055.3	5,202

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Chirikof Slope	301 - 500	4	4	375.5	602
Kodiak Slope	301 - 500	6	6	1,182.5	3,443
Yakutat Gullies	301 - 500	1	1	170.5	189
Yakutat Slope	301 - 500	5	5	597.3	908
Southeastern Deep Gullies	301 - 500	4	4	383.1	898
Southeastern Slope	301 - 500	4	4	2,508.0	1,938
Shumagin Slope	501 - 700	2	2	1,198.2	2,403
Chirikof Slope	501 - 700	3	2	67.5	132
Kodiak Slope	501 - 700	2	2	168.4	294
Yakutat Slope	501 - 700	1	1	65.6	96

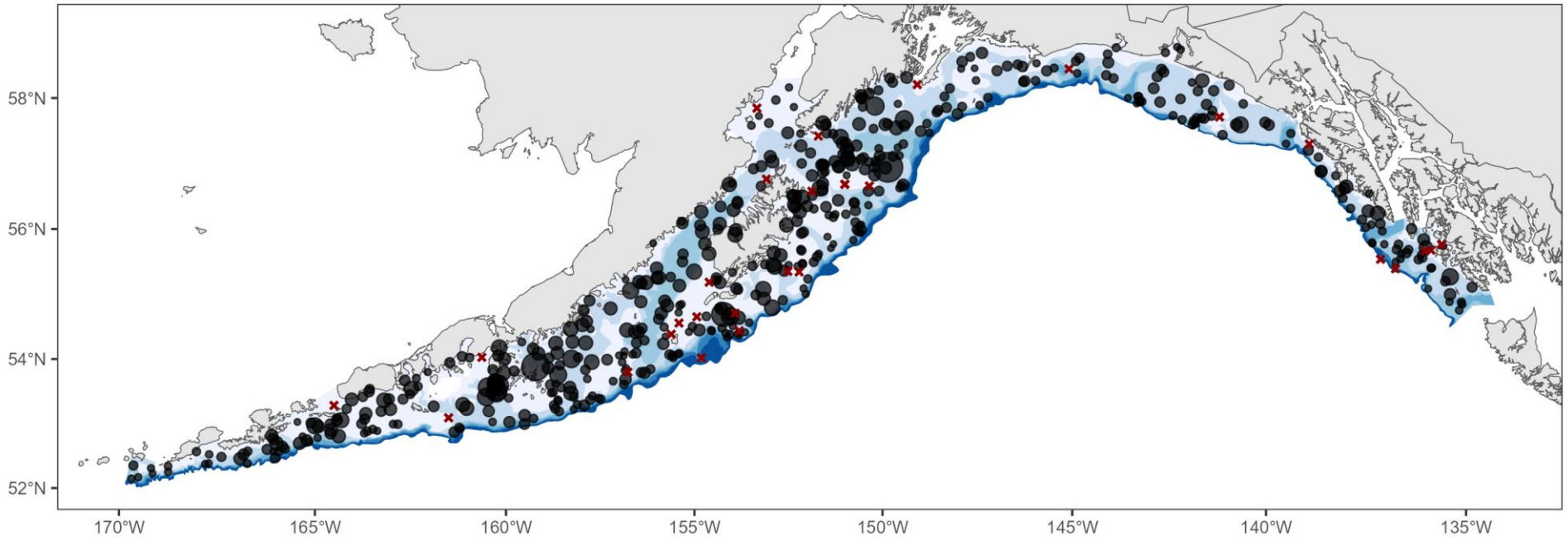

Figure 4. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of arrowtooth flounder in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

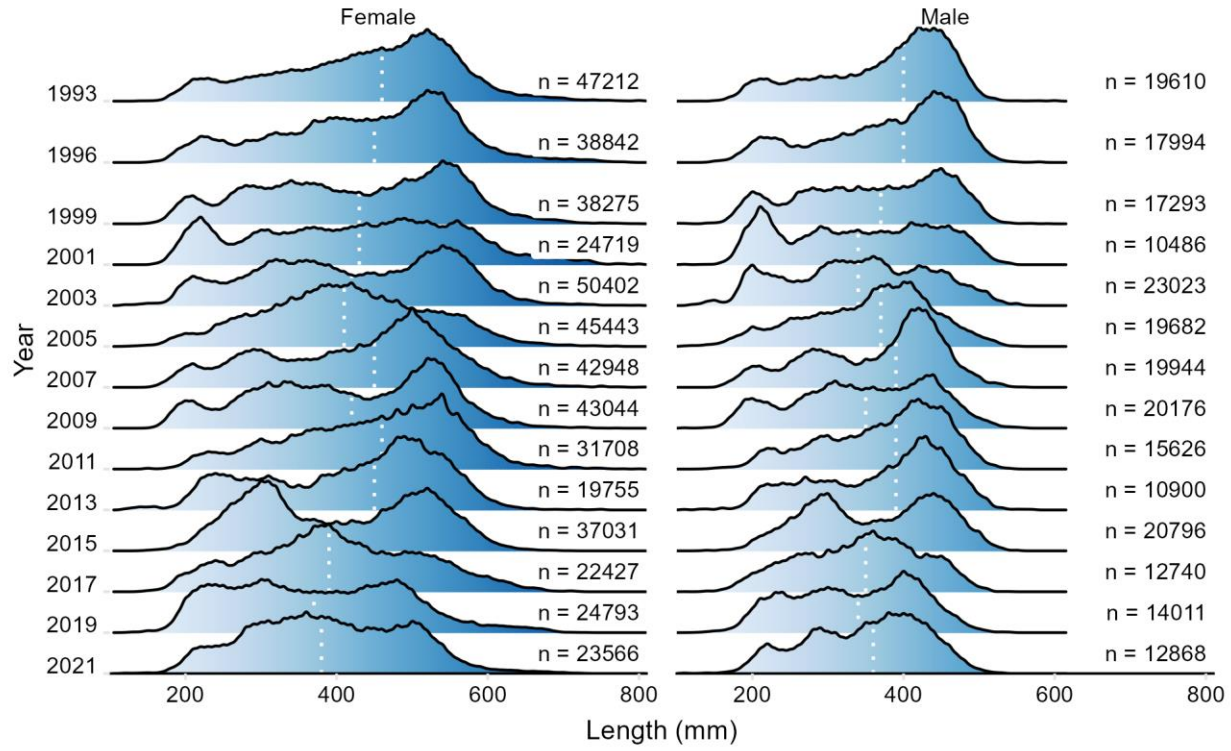

Figure 5. -- Population length composition of arrowtooth flounder in the Gulf of Alaska bottom trawl survey between 1993 and 2021. The dotted vertical line indicates median length.

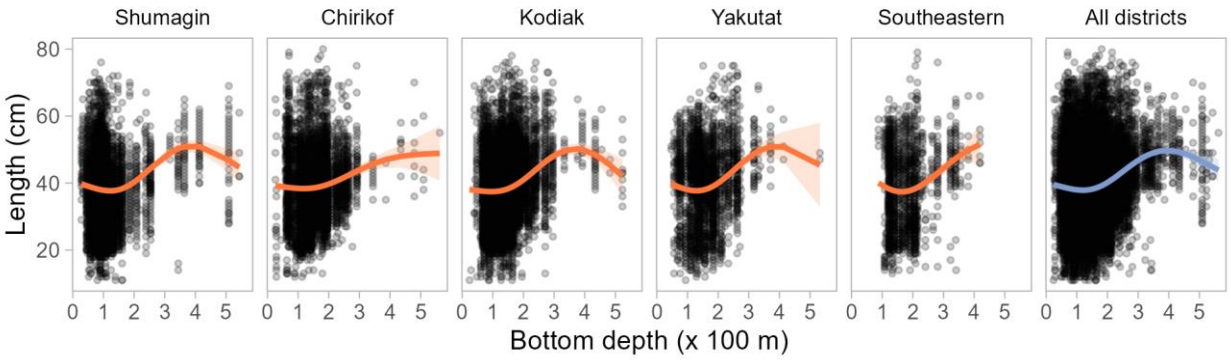

Figure 6. -- Length versus depth for arrowtooth flounder by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where arrowtooth flounder were found.

northern rock sole (*Lepidopsetta polyxystra*)

- The total biomass of northern rock sole was estimated to be 51,498 t in the GOA 2021 survey (Table **8**), which is a 29.2% increase from 2019.
- 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 northern rock sole CPUEs were recorded in the Shumagin and Chirikof regions (Table **8** and Fig. **7**).
- On average, the longest individuals were found in the Kodiak region and in a depth range of 201 - 300 m (Fig. **8** and Fig. **9**).

Table 8. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing northern rock sole, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	65	531.7	21,953	0.392
Shumagin	101 - 200	27	7	18.4	270	0.551
Shumagin	201 - 300	11	1	1.9	5	0.57
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**73**	**351.2**	**22,229**	**0.393**
Chirikof	1 - 100	41	27	636.7	16,577	0.592
Chirikof	101 - 200	51	1	2.5	59	0.624
Chirikof	201 - 300	16	0	0.0	0	--
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**28**	**256.0**	**16,637**	**0.592**
Kodiak	1 - 100	62	35	325.3	12,530	0.513
Kodiak	101 - 200	89	6	2.4	103	0.628
Kodiak	201 - 300	18	0	0.0	0	--
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**41**	**128.9**	**12,633**	**0.513**
Yakutat	1 - 100	16	0	0.0	0	--
Yakutat	101 - 200	31	0	0.0	0	--
Yakutat	201 - 300	16	0	0.0	0	--
Yakutat	301 - 500	6	0	0.0	0	--
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**0**	**0.0**	**0**	**--**
Southeastern	1 - 100	7	0	0.0	0	--
Southeastern	101 - 200	23	0	0.0	0	--
Southeastern	201 - 300	13	0	0.0	0	--
Southeastern	301 - 500	8	0	0.0	0	--
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**0**	**0.0**	**0**	**--**
All areas	1 - 100	196	127	395.7	51,061	0.471
All areas	101 - 200	221	14	3.5	432	0.577
All areas	201 - 300	74	1	0.1	5	0.57
All areas	301 - 500	28	0	0.0	0	--
All areas	501 - 700	10	0	0.0	0	--
All areas	**All depths**	**529**	**142**	**167.0**	**51,498**	**0.471**

Table 9. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing northern rock sole, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	7	1,123.4	9,361
Davidson Bank	1 - 100	26	25	502.8	6,880
Lower Alaska Peninsula	1 - 100	14	13	250.4	1,721
Shumagin Bank	1 - 100	22	20	321.9	3,991
Upper Alaska Peninsula	1 - 100	12	8	257.7	2,046
Semidi Bank	1 - 100	10	9	218.3	1,594
Chirikof Bank	1 - 100	19	10	1,198.7	12,937
Albatross Shallows	1 - 100	11	7	519.0	2,992
Albatross Banks	1 - 100	25	17	368.3	5,672
Lower Cook Inlet	1 - 100	9	6	384.4	3,801
Kenai Peninsula	1 - 100	11	1	2.7	14
Northern Kodiak Shallows	1 - 100	6	4	23.0	51
Shumagin Outer Shelf	101 - 200	20	7	33.2	270
Chirikof Outer Shelf	101 - 200	18	1	11.8	59
Albatross Gullies	101 - 200	19	2	6.2	49
Barren Islands	101 - 200	14	1	0.8	9
Kodiak Outer Shelf	101 - 200	18	3	9.0	45
Shumagin Slope	201 - 300	11	1	1.9	5

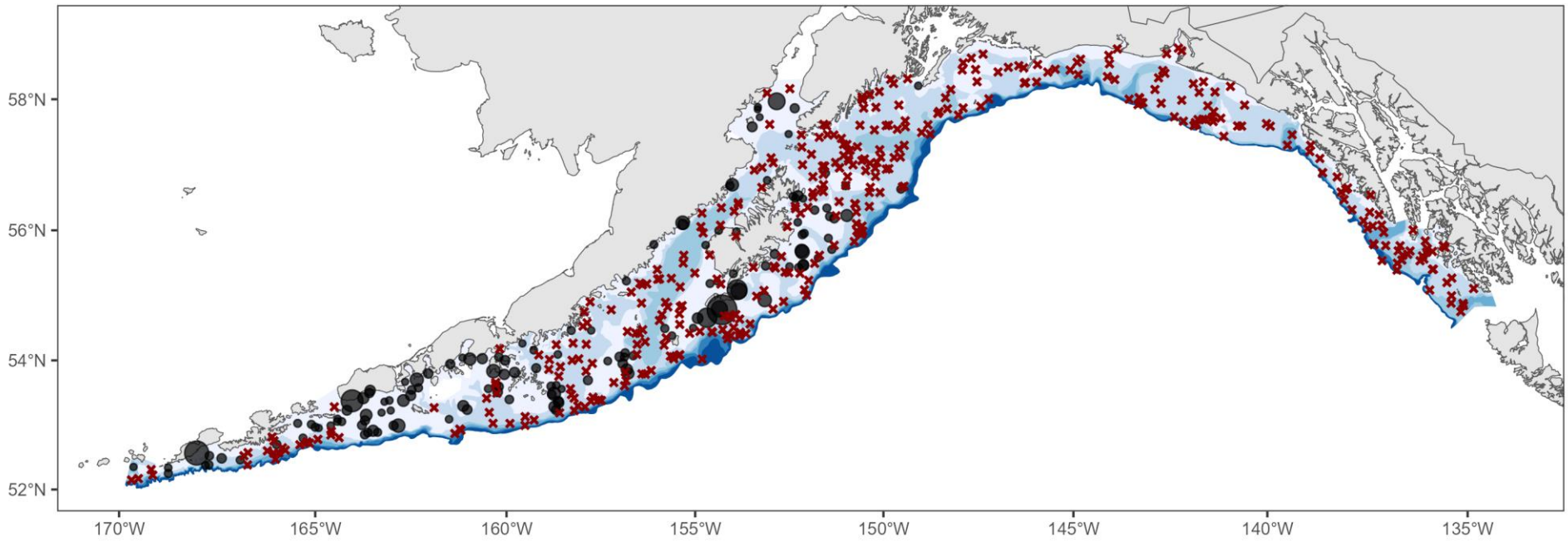

Figure 7. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of northern rock sole in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

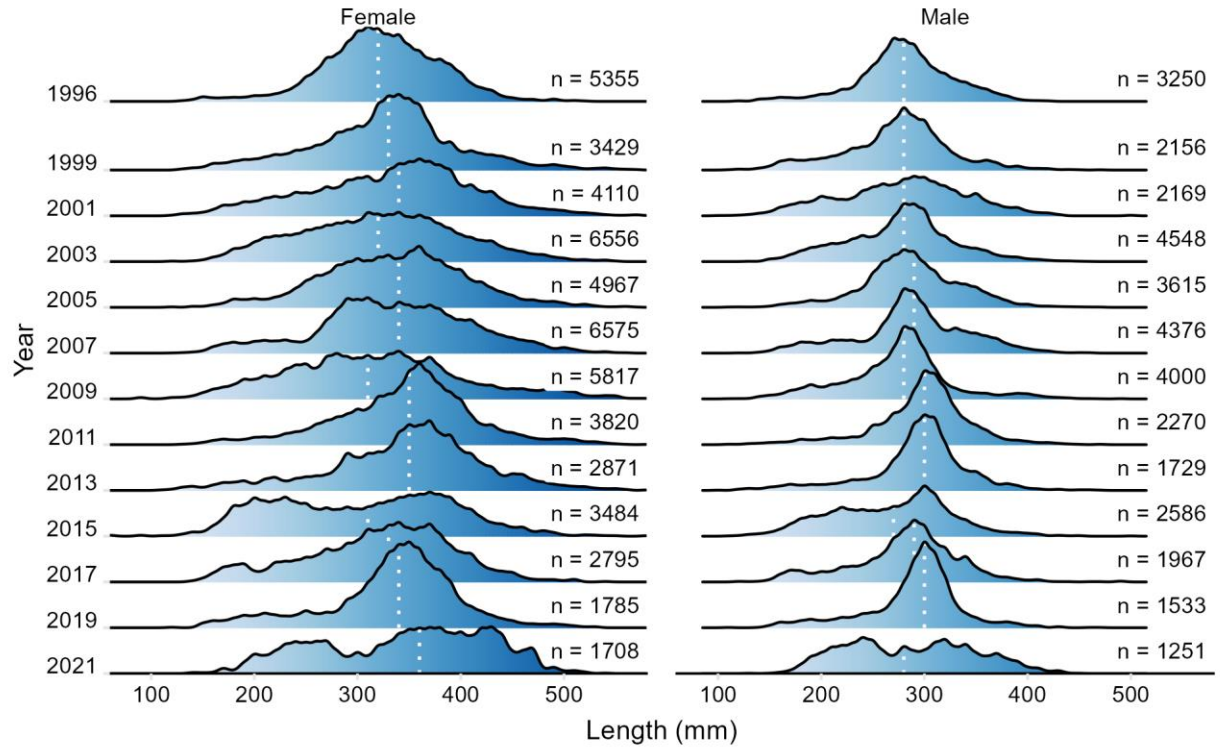

Figure 8. -- Population length composition of northern rock sole in the Gulf of Alaska bottom trawl survey between 1996 and 2021. The dotted vertical line indicates median length.

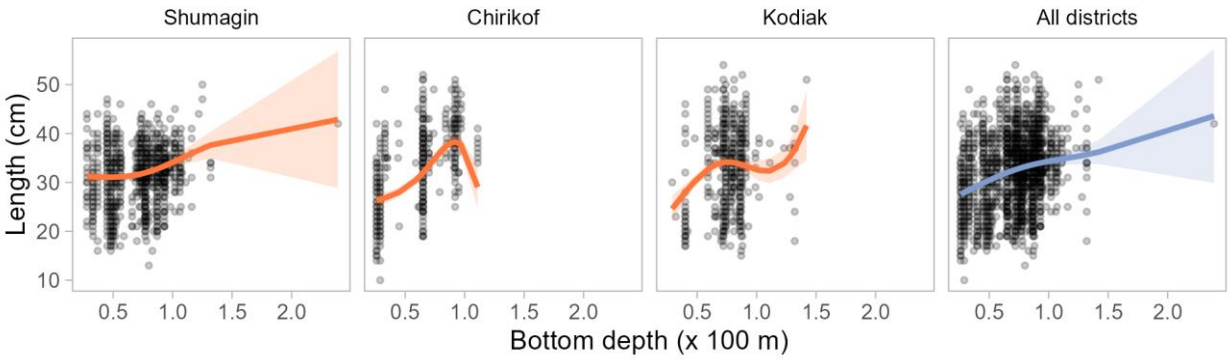

Figure 9. -- Length versus depth for northern rock sole by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where northern rock sole were found.

southern rock sole (*Lepidopsetta bilineata*)

- The total biomass of southern rock sole was estimated to be 129,601 t in the GOA 2021 survey (Table **10**), which is a 28.7% increase from 2019.
- 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**).
- On average, the longest individuals were found in the Yakutat region and in a depth range of 101 - 200 m (Fig. **11** and Fig. **12**).

Table 10. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing southern rock sole, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	67	1,546.8	63,864	0.453
Shumagin	101 - 200	27	21	378.3	5,552	0.638
Shumagin	201 - 300	11	0	0.0	0	--
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**88**	**1,096.8**	**69,416**	**0.464**
Chirikof	1 - 100	41	29	511.3	13,313	0.611
Chirikof	101 - 200	51	8	15.3	364	1.106
Chirikof	201 - 300	16	0	0.0	0	--
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**37**	**210.5**	**13,677**	**0.619**
Kodiak	1 - 100	62	45	985.2	37,944	0.498
Kodiak	101 - 200	89	28	73.7	3,192	0.656
Kodiak	201 - 300	18	0	0.0	0	--
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**73**	**419.8**	**41,136**	**0.507**
Yakutat	1 - 100	16	7	143.3	2,387	0.891
Yakutat	101 - 200	31	2	3.5	102	0.646
Yakutat	201 - 300	16	0	0.0	0	--
Yakutat	301 - 500	6	0	0.0	0	--
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**9**	**45.0**	**2,489**	**0.877**
Southeastern	1 - 100	7	3	306.0	2,003	0.449
Southeastern	101 - 200	23	7	79.4	880	0.479
Southeastern	201 - 300	13	0	0.0	0	--
Southeastern	301 - 500	8	0	0.0	0	--
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**10**	**107.4**	**2,883**	**0.458**
All areas	1 - 100	196	151	926.1	119,511	0.486
All areas	101 - 200	221	66	82.5	10,091	0.635
All areas	201 - 300	74	0	0.0	0	--
All areas	301 - 500	28	0	0.0	0	--
All areas	501 - 700	10	0	0.0	0	--
All areas	**All depths**	**529**	**217**	**420.2**	**129,601**	**0.495**

Table 11. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing southern rock sole, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	8	2,214.8	18,456
Davidson Bank	1 - 100	26	26	1,773.7	24,267
Lower Alaska Peninsula	1 - 100	14	12	946.9	6,511
Shumagin Bank	1 - 100	22	21	1,180.0	14,631
Upper Alaska Peninsula	1 - 100	12	8	504.0	4,002
Semidi Bank	1 - 100	10	10	841.6	6,145
Chirikof Bank	1 - 100	19	11	293.3	3,165
Albatross Shallows	1 - 100	11	11	1,924.0	11,094
Albatross Banks	1 - 100	25	24	1,535.7	23,655
Lower Cook Inlet	1 - 100	9	2	15.4	153
Kenai Peninsula	1 - 100	11	3	170.5	897
Northern Kodiak Shallows	1 - 100	6	5	975.3	2,145
Yakutat Shallows	1 - 100	10	2	19.6	195
Middleton Shallows	1 - 100	6	5	326.5	2,192
Southeastern Shallows	1 - 100	7	3	306.0	2,003
Sanak Gully	101 - 200	4	3	9.0	38
Shumagin Outer Shelf	101 - 200	20	18	676.3	5,514
East Shumagin Gully	101 - 200	14	1	2.6	29
Shelikof Edge	101 - 200	19	1	3.8	29
Chirikof Outer Shelf	101 - 200	18	6	61.0	306
Albatross Gullies	101 - 200	19	6	15.8	125
Portlock Flats	101 - 200	23	4	21.6	158
Barren Islands	101 - 200	14	3	100.1	1,099
Kenai Flats	101 - 200	15	3	5.9	71
Kodiak Outer Shelf	101 - 200	18	12	346.1	1,739
Fairweather Shelf	101 - 200	10	2	13.3	102
Baranof-Chichagof Shelf	101 - 200	10	3	64.1	269
Prince of Wales Shelf	101 - 200	13	4	88.6	610

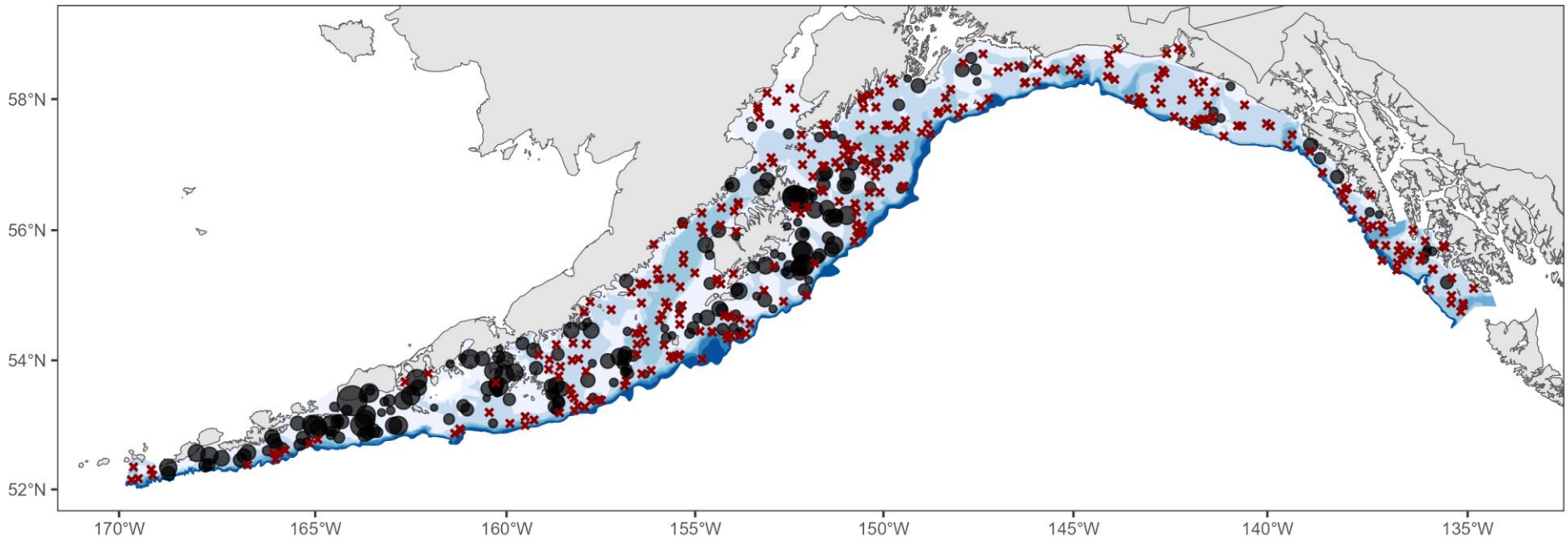

Figure 10. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of southern rock sole in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

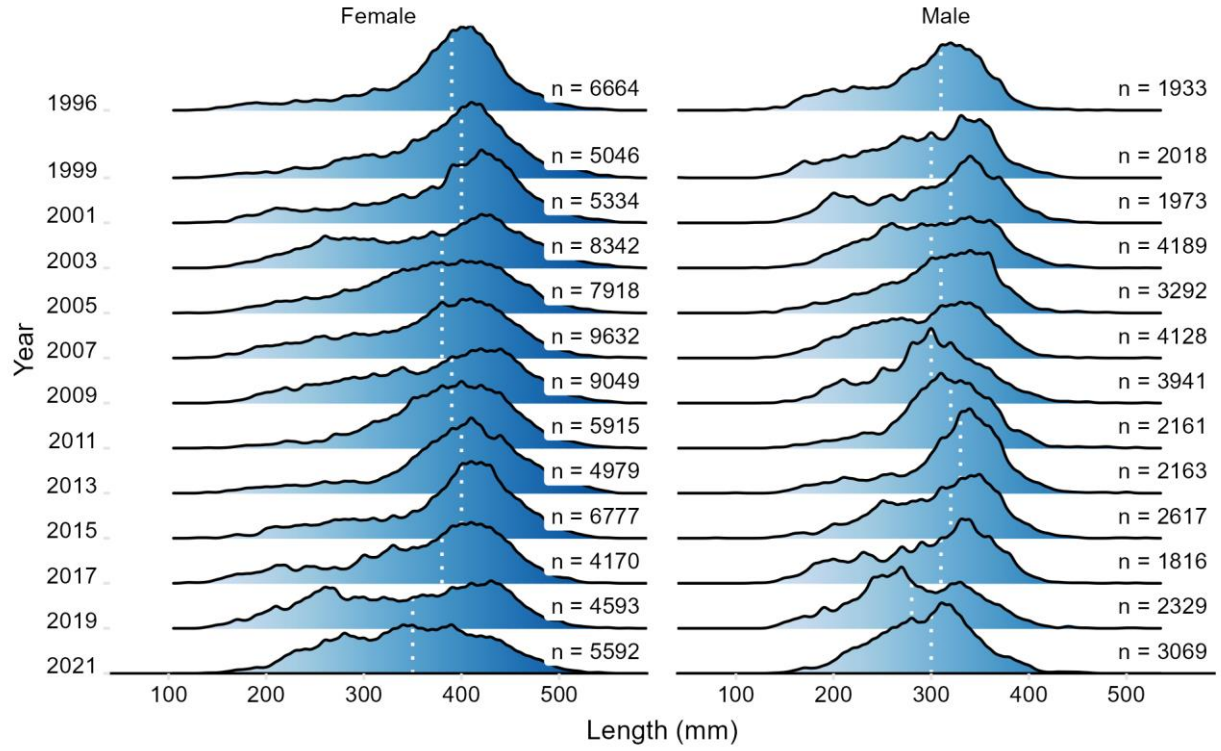

Figure 11. -- Population length composition of southern rock sole in the Gulf of Alaska bottom trawl survey between 1996 and 2021. The dotted vertical line indicates median length.

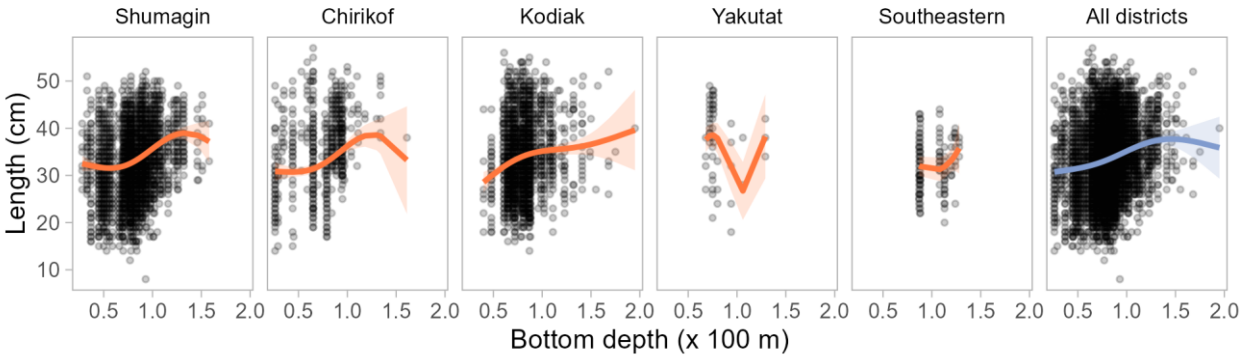

Figure 12. -- Length versus depth for southern rock sole by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where southern rock sole were found.

flathead sole (*Hippoglossoides elassodon*)

- Flathead sole was the 9th most abundant species caught in the 2021 GOA survey. Their total biomass was estimated to be 180,000 t (Table **12**), which is a 3.1% decrease from 2019.
- 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 Chirikof and Shumagin regions (Table **12** and Fig. **13**).
- On average, the longest individuals were found in the Kodiak region and in a depth range of 201 - 300 m (Fig. **14** and Fig. **15**).

Table 12. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing flathead sole, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	53	873.3	36,057	0.254
Shumagin	101 - 200	27	20	686.6	10,078	0.262
Shumagin	201 - 300	11	4	33.1	92	0.27
Shumagin	301 - 500	4	1	2.8	7	0.304
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**78**	**730.5**	**46,234**	**0.256**
Chirikof	1 - 100	41	29	1,053.5	27,427	0.273
Chirikof	101 - 200	51	45	820.8	19,576	0.243
Chirikof	201 - 300	16	9	117.4	1,355	0.385
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**83**	**744.1**	**48,359**	**0.262**
Kodiak	1 - 100	62	34	535.9	20,642	0.332
Kodiak	101 - 200	89	62	759.7	32,919	0.367
Kodiak	201 - 300	18	12	170.5	1,960	0.506
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**108**	**566.6**	**55,521**	**0.357**
Yakutat	1 - 100	16	9	814.8	13,576	0.294
Yakutat	101 - 200	31	20	442.9	13,013	0.265
Yakutat	201 - 300	16	10	223.3	1,155	0.474
Yakutat	301 - 500	6	0	0.0	0	--
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**39**	**501.6**	**27,744**	**0.284**
Southeastern	1 - 100	7	4	302.6	1,981	0.194
Southeastern	101 - 200	23	3	14.2	157	0.169
Southeastern	201 - 300	13	1	0.6	3	0.11
Southeastern	301 - 500	8	0	0.0	0	--
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**8**	**79.8**	**2,142**	**0.191**
All areas	1 - 100	196	129	772.5	99,684	0.276
All areas	101 - 200	221	150	619.2	75,744	0.293
All areas	201 - 300	74	36	126.7	4,565	0.447
All areas	301 - 500	28	1	0.5	7	0.304
All areas	501 - 700	10	0	0.0	0	--
All areas	**All depths**	**529**	**316**	**583.6**	**180,000**	**0.286**

Table 13. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing flathead sole, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	1	4.9	41
Davidson Bank	1 - 100	26	19	665.6	9,106
Lower Alaska Peninsula	1 - 100	14	13	2,991.9	20,572
Shumagin Bank	1 - 100	22	20	511.2	6,338
Upper Alaska Peninsula	1 - 100	12	12	1,879.1	14,921
Semidi Bank	1 - 100	10	7	69.0	504
Chirikof Bank	1 - 100	19	10	1,112.1	12,002
Albatross Shallows	1 - 100	11	8	917.8	5,292
Albatross Banks	1 - 100	25	13	252.6	3,891
Kenai Peninsula	1 - 100	11	7	762.5	4,011
Northern Kodiak Shallows	1 - 100	6	6	3,385.6	7,447
Yakutat Shallows	1 - 100	10	7	1,077.3	10,716
Middleton Shallows	1 - 100	6	2	426.0	2,860
Southeastern Shallows	1 - 100	7	4	302.6	1,981
Sanak Gully	101 - 200	4	4	723.7	3,073
Shumagin Outer Shelf	101 - 200	20	13	380.9	3,105
West Shumagin Gully	101 - 200	3	3	1,711.8	3,900
East Shumagin Gully	101 - 200	14	14	911.5	10,122
Shelikof Edge	101 - 200	19	19	766.0	5,924
Chirikof Outer Shelf	101 - 200	18	12	704.6	3,530
Albatross Gullies	101 - 200	19	18	1,578.1	12,485
Portlock Flats	101 - 200	23	18	950.6	6,974
Barren Islands	101 - 200	14	10	179.9	1,975
Kenai Flats	101 - 200	15	12	941.5	11,370
Kodiak Outer Shelf	101 - 200	18	4	22.8	114
Middleton Shelf	101 - 200	7	4	744.7	5,470
Yakataga Shelf	101 - 200	6	6	131.5	694
Yakutat Flats	101 - 200	8	7	521.7	4,712
Fairweather Shelf	101 - 200	10	3	276.5	2,137
Baranof-Chichagof Shelf	101 - 200	10	1	0.8	3
Prince of Wales Shelf	101 - 200	13	2	22.3	154
Shumagin Slope	201 - 300	11	4	33.1	92
Lower Shelikof Gully	201 - 300	9	8	123.9	1,242
Chirikof Slope	201 - 300	7	1	74.4	114
Kenai Gullies	201 - 300	9	7	222.8	1,484
Kodiak Slope	201 - 300	6	2	2.4	4
Upper Shelikof Gully	201 - 300	3	3	147.1	472
Yakutat Gullies	201 - 300	7	6	355.5	1,082
Yakutat Slope	201 - 300	9	4	34.3	73
Prince of Wales Slope/Gullies	201 - 300	10	1	0.8	3
Shumagin Slope	301 - 500	4	1	2.8	7

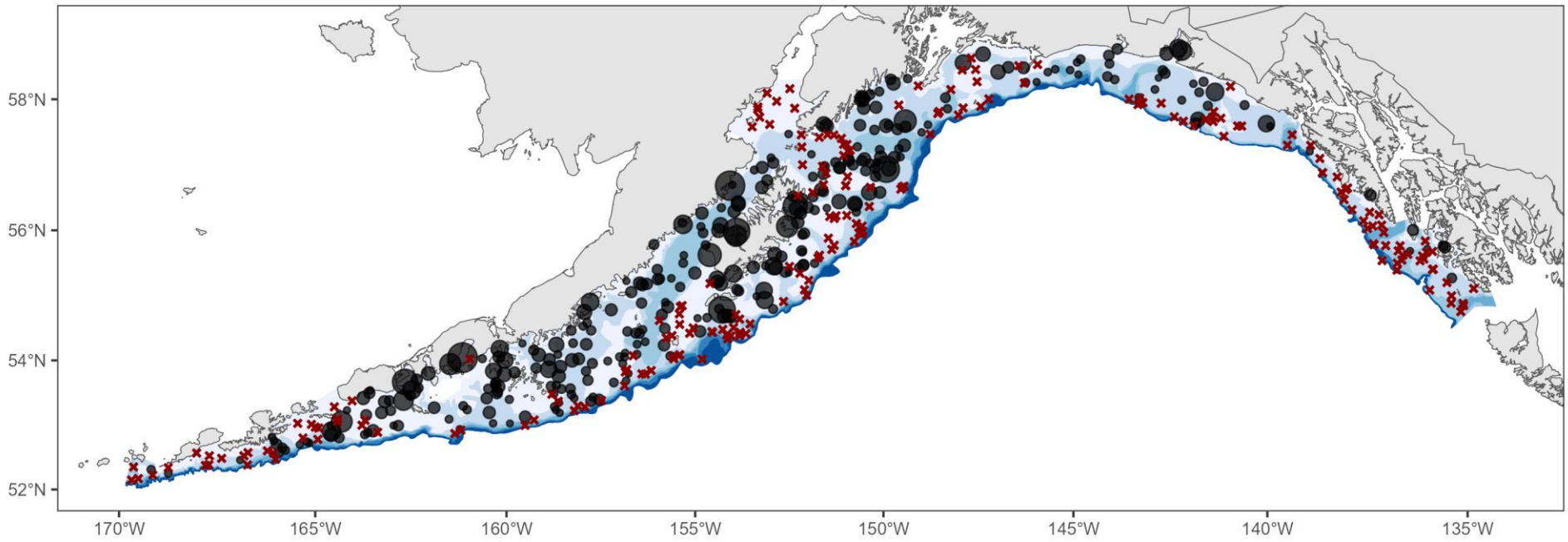

Figure 13. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of flathead sole in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

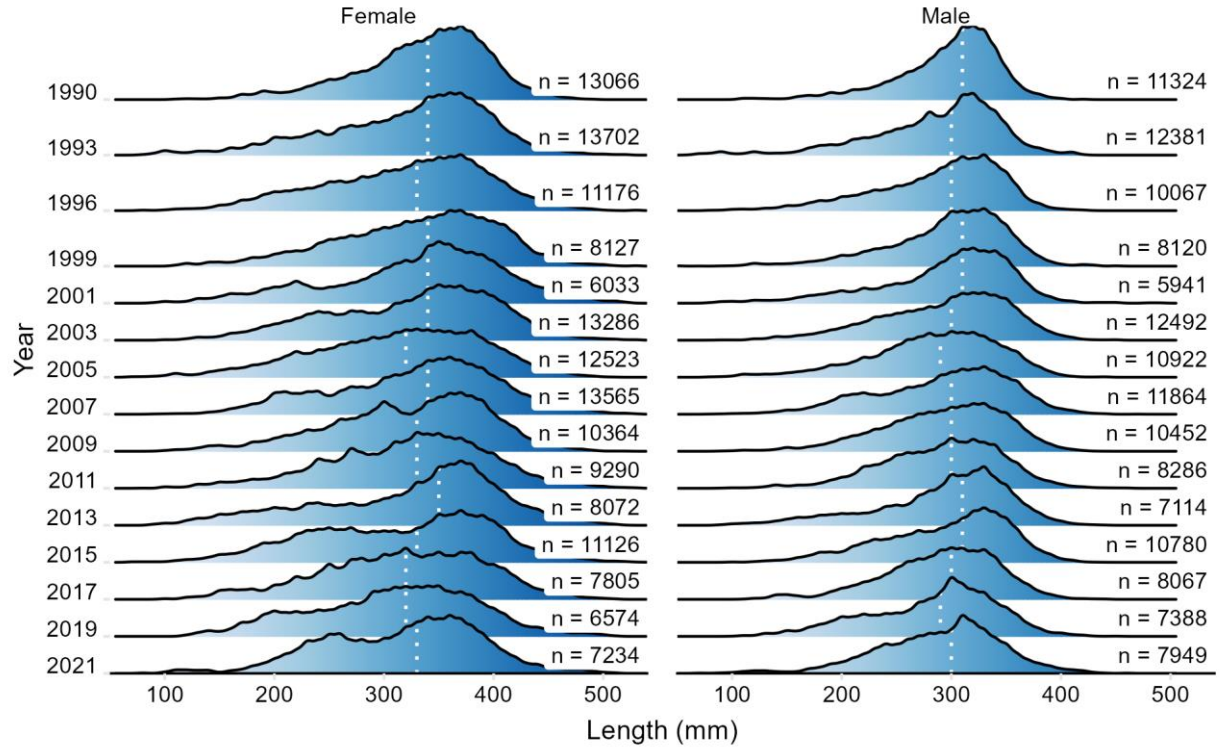

Figure 14. -- Population length composition of flathead sole in the Gulf of Alaska bottom trawl survey between 1990 and 2021. The dotted vertical line indicates median length.

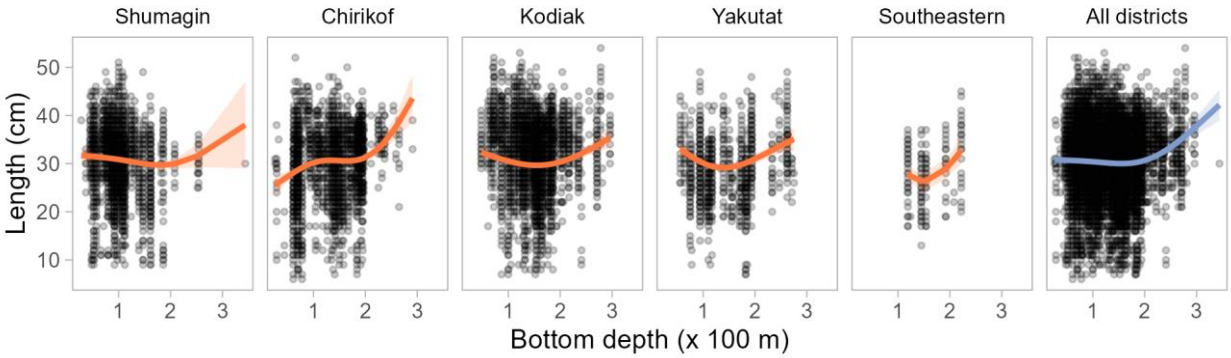

Figure 15. -- Length versus depth for flathead sole by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where flathead sole were found.

rex sole (*Glyptocephalus zachirus*)

- The total biomass of rex sole was estimated to be 112,333 t in the GOA 2021 survey (Table **14**), which is a 24.2% increase from 2019.
- The largest estimated biomass for rex sole was in the Kodiak region and the depth range with the largest estimated biomass was 101 - 200 m.
- The highest rex sole CPUEs were recorded in the Southeastern and Chirikof regions (Table **14** and Fig. **16**).
- On average, the longest individuals were found in the Shumagin region and in a depth range of 101 - 200 m (Fig. **17** and Fig. **18**).

Table 14. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing rex sole, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	33	111.3	4,594	0.395
Shumagin	101 - 200	27	26	583.9	8,570	0.432
Shumagin	201 - 300	11	10	830.9	2,316	0.389
Shumagin	301 - 500	4	3	45.9	116	0.474
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**72**	**246.4**	**15,597**	**0.414**
Chirikof	1 - 100	41	19	246.3	6,413	0.358
Chirikof	101 - 200	51	50	864.6	20,621	0.336
Chirikof	201 - 300	16	16	456.9	5,276	0.382
Chirikof	301 - 500	4	4	75.5	121	0.328
Chirikof	501 - 700	3	2	12.2	24	0.354
Chirikof	**All depths**	**115**	**91**	**499.4**	**32,454**	**0.347**
Kodiak	1 - 100	62	28	131.6	5,071	0.264
Kodiak	101 - 200	89	79	626.6	27,153	0.317
Kodiak	201 - 300	18	18	432.7	4,972	0.256
Kodiak	301 - 500	6	4	248.7	724	0.293
Kodiak	501 - 700	2	2	136.8	239	0.258
Kodiak	**All depths**	**177**	**131**	**389.4**	**38,159**	**0.299**
Yakutat	1 - 100	16	14	232.4	3,871	0.195
Yakutat	101 - 200	31	28	163.0	4,790	0.135
Yakutat	201 - 300	16	16	381.7	1,973	0.181
Yakutat	301 - 500	6	6	174.7	459	0.192
Yakutat	501 - 700	1	1	482.7	709	0.242
Yakutat	**All depths**	**70**	**65**	**213.4**	**11,803**	**0.165**
Southeastern	1 - 100	7	4	359.5	2,354	0.097
Southeastern	101 - 200	23	20	732.2	8,116	0.182
Southeastern	201 - 300	13	13	487.4	2,463	0.202
Southeastern	301 - 500	8	6	372.3	1,160	0.267
Southeastern	501 - 700	2	1	220.5	228	0.273
Southeastern	**All depths**	**53**	**44**	**533.7**	**14,321**	**0.166**
All areas	1 - 100	196	98	172.8	22,302	0.24
All areas	101 - 200	221	203	566.1	69,251	0.28
All areas	201 - 300	74	73	471.6	17,000	0.273
All areas	301 - 500	28	23	201.8	2,581	0.262
All areas	501 - 700	10	6	146.2	1,200	0.252
All areas	**All depths**	**529**	**403**	**364.2**	**112,333**	**0.27**

Table 15. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing rex sole, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	3	13.4	112
Davidson Bank	1 - 100	26	11	217.5	2,975
Lower Alaska Peninsula	1 - 100	14	8	32.7	225
Shumagin Bank	1 - 100	22	11	103.4	1,282
Upper Alaska Peninsula	1 - 100	12	6	203.2	1,614
Semidi Bank	1 - 100	10	6	29.5	215
Chirikof Bank	1 - 100	19	7	424.7	4,584
Albatross Shallows	1 - 100	11	7	485.8	2,801
Albatross Banks	1 - 100	25	10	29.6	456
Kenai Peninsula	1 - 100	11	7	300.1	1,578
Northern Kodiak Shallows	1 - 100	6	4	106.5	234
Yakutat Shallows	1 - 100	10	8	158.0	1,572
Middleton Shallows	1 - 100	6	6	342.5	2,299
Southeastern Shallows	1 - 100	7	4	359.5	2,354
Sanak Gully	101 - 200	4	4	496.1	2,106
Shumagin Outer Shelf	101 - 200	20	19	725.2	5,913
West Shumagin Gully	101 - 200	3	3	241.9	551
East Shumagin Gully	101 - 200	14	13	597.2	6,631
Shelikof Edge	101 - 200	19	19	1,273.4	9,849
Chirikof Outer Shelf	101 - 200	18	18	826.3	4,140
Albatross Gullies	101 - 200	19	19	1,475.2	11,672
Portlock Flats	101 - 200	23	22	746.4	5,476
Barren Islands	101 - 200	14	12	192.5	2,114
Kenai Flats	101 - 200	15	14	377.4	4,558
Kodiak Outer Shelf	101 - 200	18	12	663.2	3,333
Middleton Shelf	101 - 200	7	6	358.2	2,631
Yakataga Shelf	101 - 200	6	6	59.0	311
Yakutat Flats	101 - 200	8	7	136.4	1,232
Fairweather Shelf	101 - 200	10	9	79.6	615
Baranof-Chichagof Shelf	101 - 200	10	10	1,187.8	4,985
Prince of Wales Shelf	101 - 200	13	10	454.6	3,132
Shumagin Slope	201 - 300	11	10	830.9	2,316
Lower Shelikof Gully	201 - 300	9	9	445.4	4,462
Chirikof Slope	201 - 300	7	7	532.2	813
Kenai Gullies	201 - 300	9	9	657.4	4,378
Kodiak Slope	201 - 300	6	6	153.6	249
Upper Shelikof Gully	201 - 300	3	3	107.7	345
Yakutat Gullies	201 - 300	7	7	355.1	1,080
Yakutat Slope	201 - 300	9	9	419.7	893
Baranof-Chichagof Slope	201 - 300	3	3	265.6	299
Prince of Wales Slope/Gullies	201 - 300	10	10	551.0	2,164
Shumagin Slope	301 - 500	4	3	45.9	116
Chirikof Slope	301 - 500	4	4	75.5	121

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Kodiak Slope	301 - 500	6	4	248.7	724
Yakutat Gullies	301 - 500	1	1	210.2	233
Yakutat Slope	301 - 500	5	5	148.8	226
Southeastern Deep Gullies	301 - 500	4	3	471.9	1,106
Southeastern Slope	301 - 500	4	3	70.0	54
Chirikof Slope	501 - 700	3	2	12.2	24
Kodiak Slope	501 - 700	2	2	136.8	239
Yakutat Slope	501 - 700	1	1	482.7	709
Southeastern Slope	501 - 700	2	1	220.5	228

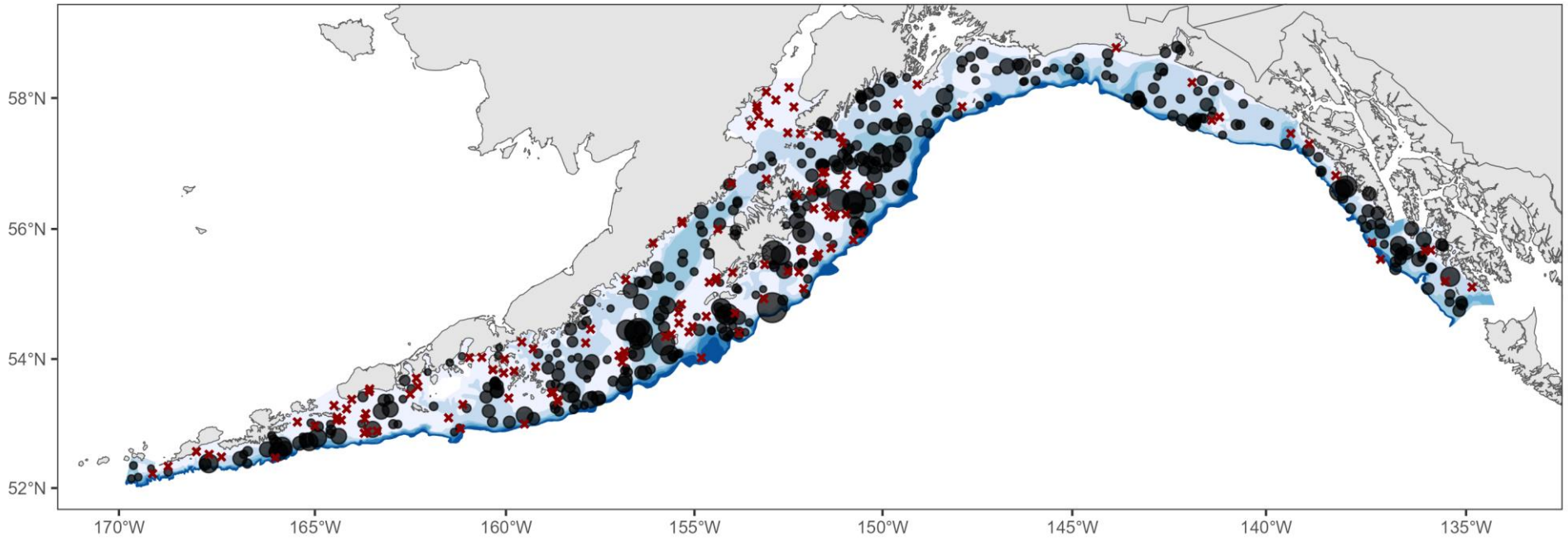

Figure 16. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of rex sole in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

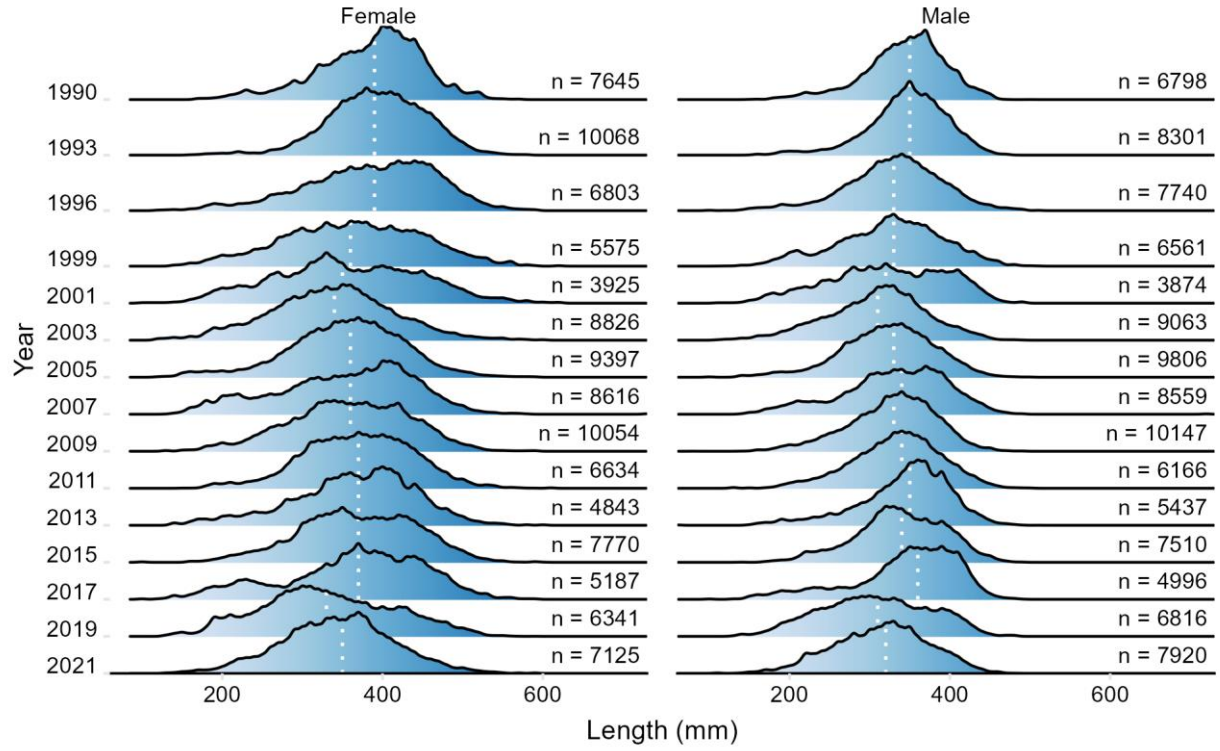

Figure 17. -- Population length composition of rex sole in the Gulf of Alaska bottom trawl survey between 1990 and 2021. The dotted vertical line indicates median length.

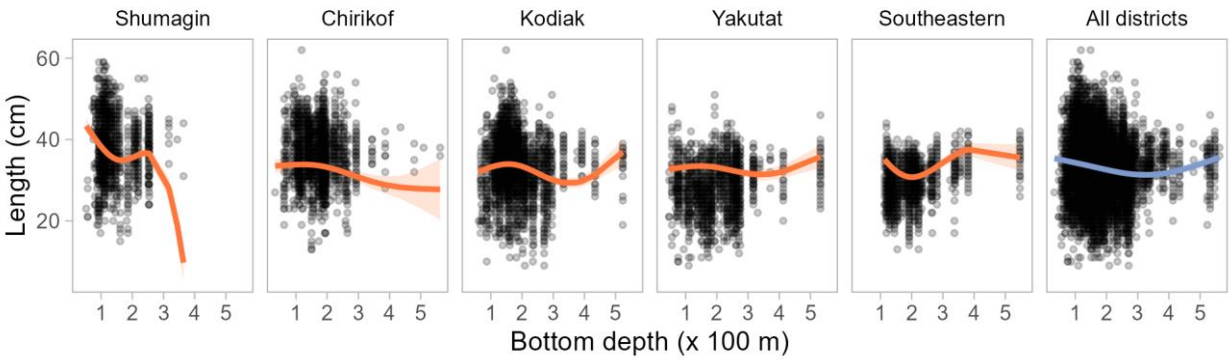

Figure 18. -- Length versus depth for rex sole by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where rex sole were found.

Dover sole (*Microstomus pacificus*)

- The total biomass of Dover sole was estimated to be 46,079 t in the GOA 2021 survey (Table **16**), which is a 4% decrease from 2019.
- 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 Southeastern and Yakutat regions (Table **16** and Fig. **19**).
- On average, the longest individuals were found in the Yakutat region and in a depth range of 501 - 700 m (Fig. **20** and Fig. **21**).

Table 16. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing Dover sole, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	6	1.1	47	0.193
Shumagin	101 - 200	27	3	2.3	34	0.355
Shumagin	201 - 300	11	5	16.0	45	0.401
Shumagin	301 - 500	4	3	50.0	127	1.047
Shumagin	501 - 700	2	1	63.9	128	0.98
Shumagin	**All depths**	**114**	**18**	**6.0**	**380**	**0.543**
Chirikof	1 - 100	41	10	59.8	1,556	0.341
Chirikof	101 - 200	51	32	82.3	1,963	0.49
Chirikof	201 - 300	16	12	108.8	1,256	0.927
Chirikof	301 - 500	4	3	104.5	168	0.758
Chirikof	501 - 700	3	2	147.1	287	0.866
Chirikof	**All depths**	**115**	**59**	**80.5**	**5,230**	**0.499**
Kodiak	1 - 100	62	18	21.2	815	0.368
Kodiak	101 - 200	89	69	136.0	5,891	0.569
Kodiak	201 - 300	18	12	345.7	3,972	0.68
Kodiak	301 - 500	6	5	98.5	287	0.787
Kodiak	501 - 700	2	2	645.6	1,127	0.676
Kodiak	**All depths**	**177**	**106**	**123.4**	**12,092**	**0.591**
Yakutat	1 - 100	16	10	283.4	4,722	0.341
Yakutat	101 - 200	31	22	266.9	7,843	0.689
Yakutat	201 - 300	16	16	743.7	3,845	0.812
Yakutat	301 - 500	6	5	282.2	741	0.754
Yakutat	501 - 700	1	1	426.6	627	0.632
Yakutat	**All depths**	**70**	**54**	**321.4**	**17,778**	**0.557**
Southeastern	1 - 100	7	4	450.2	2,947	0.405
Southeastern	101 - 200	23	14	140.2	1,554	0.475
Southeastern	201 - 300	13	13	543.2	2,744	0.524
Southeastern	301 - 500	8	7	967.3	3,015	0.728
Southeastern	501 - 700	2	1	326.7	338	0.988
Southeastern	**All depths**	**53**	**39**	**395.0**	**10,598**	**0.523**
All areas	1 - 100	196	48	78.2	10,087	0.358
All areas	101 - 200	221	140	141.3	17,285	0.594
All areas	201 - 300	74	58	329.1	11,863	0.687
All areas	301 - 500	28	23	339.1	4,338	0.744
All areas	501 - 700	10	7	305.4	2,506	0.724
All areas	**All depths**	**529**	**276**	**149.4**	**46,079**	**0.55**

Table 17. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing Dover sole, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	1	0.4	3
Lower Alaska Peninsula	1 - 100	14	4	5.4	37
Shumagin Bank	1 - 100	22	1	0.6	7
Upper Alaska Peninsula	1 - 100	12	7	62.0	493
Semidi Bank	1 - 100	10	1	4.4	32
Chirikof Bank	1 - 100	19	2	95.6	1,031
Albatross Shallows	1 - 100	11	6	96.7	558
Albatross Banks	1 - 100	25	4	8.3	128
Lower Cook Inlet	1 - 100	9	1	0.7	7
Kenai Peninsula	1 - 100	11	3	9.5	50
Northern Kodiak Shallows	1 - 100	6	4	33.0	73
Yakutat Shallows	1 - 100	10	7	197.4	1,964
Middleton Shallows	1 - 100	6	3	410.8	2,758
Southeastern Shallows	1 - 100	7	4	450.2	2,947
Shumagin Outer Shelf	101 - 200	20	3	4.2	34
East Shumagin Gully	101 - 200	14	7	17.9	199
Shelikof Edge	101 - 200	19	14	194.2	1,502
Chirikof Outer Shelf	101 - 200	18	11	52.4	262
Albatross Gullies	101 - 200	19	15	229.7	1,818
Portlock Flats	101 - 200	23	20	146.1	1,072
Barren Islands	101 - 200	14	12	70.2	770
Kenai Flats	101 - 200	15	14	163.2	1,971
Kodiak Outer Shelf	101 - 200	18	8	51.8	260
Middleton Shelf	101 - 200	7	4	431.9	3,173
Yakataga Shelf	101 - 200	6	5	208.9	1,102
Yakutat Flats	101 - 200	8	7	266.1	2,403
Fairweather Shelf	101 - 200	10	6	150.8	1,165
Baranof-Chichagof Shelf	101 - 200	10	9	214.5	900
Prince of Wales Shelf	101 - 200	13	5	94.9	654
Shumagin Slope	201 - 300	11	5	16.0	45
Lower Shelikof Gully	201 - 300	9	6	107.7	1,079
Chirikof Slope	201 - 300	7	6	116.1	177
Kenai Gullies	201 - 300	9	8	581.6	3,873
Kodiak Slope	201 - 300	6	4	60.8	99
Yakutat Gullies	201 - 300	7	7	896.9	2,729
Yakutat Slope	201 - 300	9	9	524.6	1,116
Baranof-Chichagof Slope	201 - 300	3	3	196.4	221
Prince of Wales Slope/Gullies	201 - 300	10	10	642.5	2,523
Shumagin Slope	301 - 500	4	3	50.0	127
Chirikof Slope	301 - 500	4	3	104.5	168
Kodiak Slope	301 - 500	6	5	98.5	287
Yakutat Gullies	301 - 500	1	1	399.0	442
Yakutat Slope	301 - 500	5	4	197.1	300
Southeastern Deep Gullies	301 - 500	4	3	1,137.7	2,667
Southeastern Slope	301 - 500	4	4	450.4	348
Shumagin Slope	501 - 700	2	1	63.9	128
Chirikof Slope	501 - 700	3	2	147.1	287

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Kodiak Slope	501 - 700	2	2	645.6	1,127
Yakutat Slope	501 - 700	1	1	426.6	627
Southeastern Slope	501 - 700	2	1	326.7	338

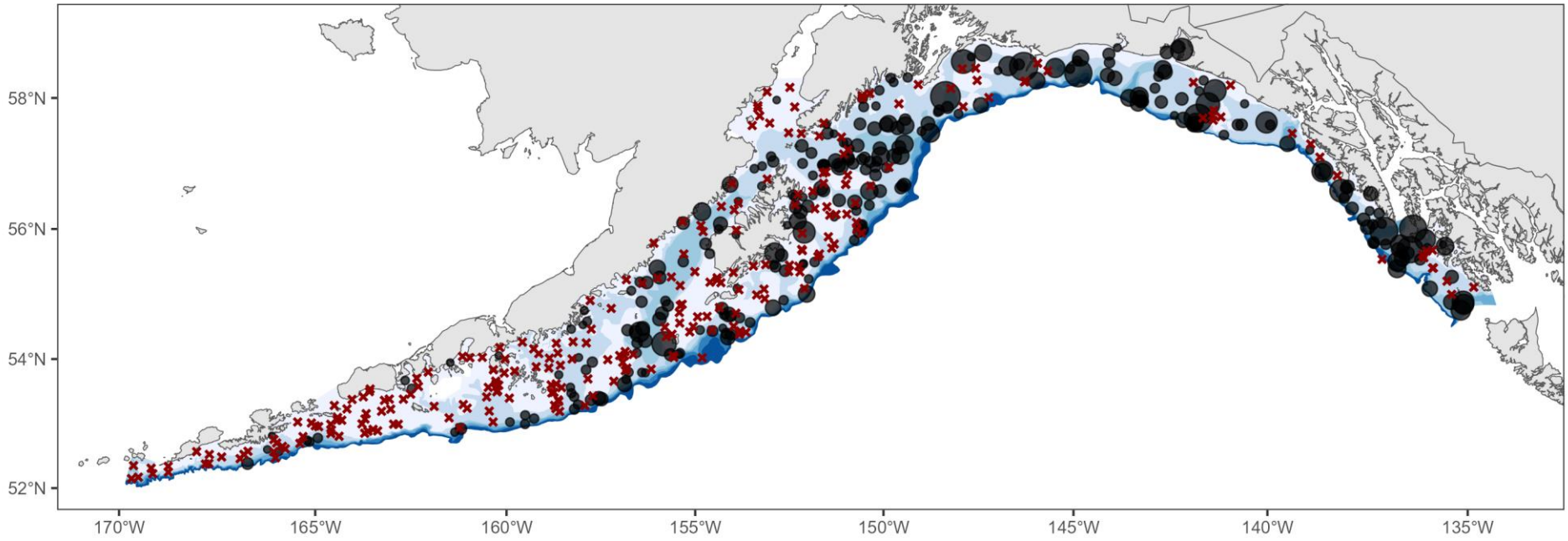

Figure 19. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of Dover sole in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

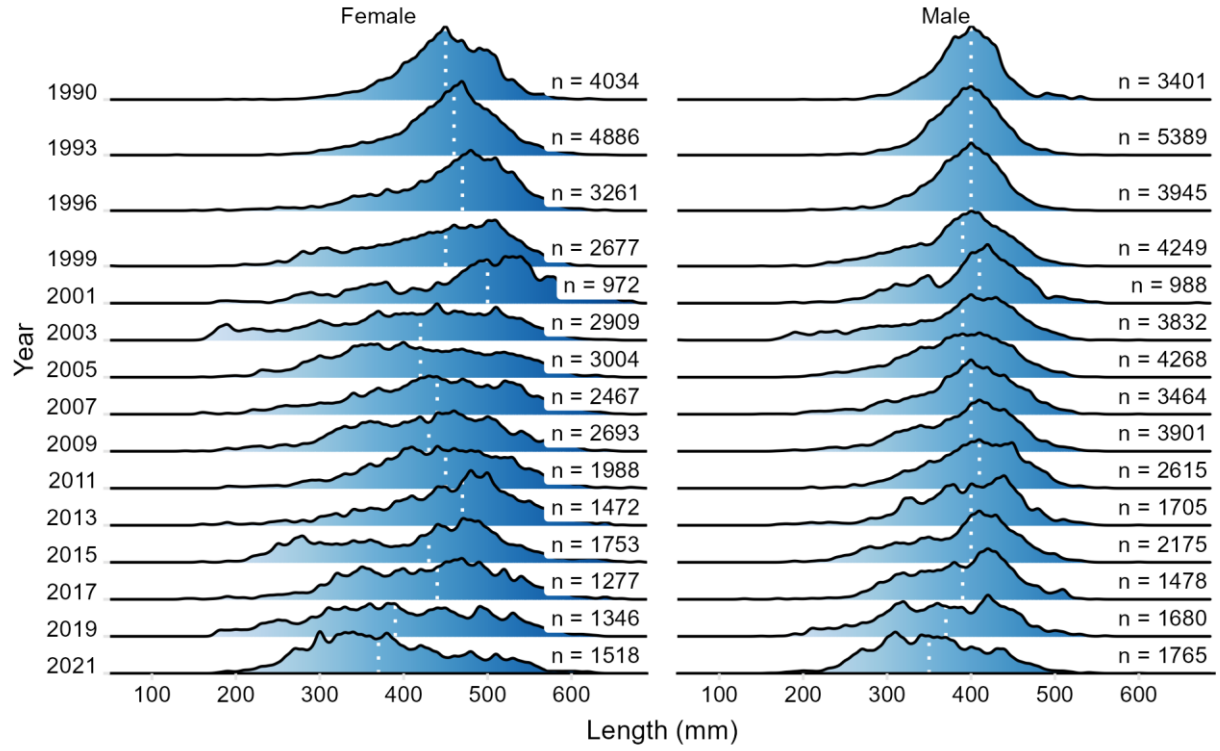

Figure 20. -- Population length composition of Dover sole in the Gulf of Alaska bottom trawl survey between 1990 and 2021. The dotted vertical line indicates median length.

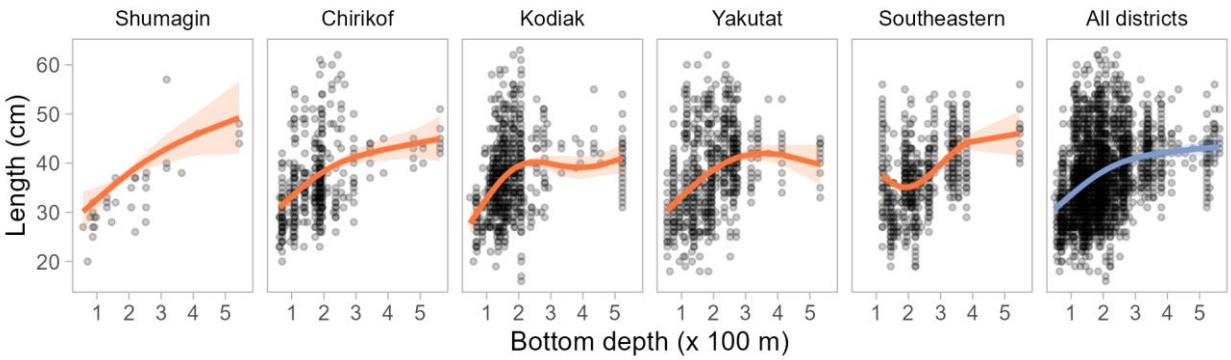

Figure 21. -- Length versus depth for Dover sole by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where Dover sole were found.

starry flounder (*Platichthys stellatus*)

- The total biomass of starry flounder was estimated to be 23,101 t in the GOA 2021 survey (Table **18**), which is a 33.6% decrease from 2019.
- The largest estimated biomass for starry flounder 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 Yakutat and Kodiak regions (Table **18** and Fig. **22**).
- On average, the longest individuals were found in the Chirikof region and in a depth range of 101 - 200 m (Fig. **23** and Fig. **24**).

Table 18. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing starry flounder, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	9	68.9	2,845	2.039
Shumagin	101 - 200	27	0	0.0	0	--
Shumagin	201 - 300	11	0	0.0	0	--
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**9**	**45.0**	**2,845**	**2.039**
Chirikof	1 - 100	41	6	140.8	3,665	2.139
Chirikof	101 - 200	51	1	28.2	673	3.324
Chirikof	201 - 300	16	0	0.0	0	--
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**7**	**66.8**	**4,338**	**2.264**
Kodiak	1 - 100	62	11	252.3	9,717	1.853
Kodiak	101 - 200	89	0	0.0	0	--
Kodiak	201 - 300	18	0	0.0	0	--
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**11**	**99.2**	**9,717**	**1.853**
Yakutat	1 - 100	16	3	372.1	6,200	2.208
Yakutat	101 - 200	31	0	0.0	0	--
Yakutat	201 - 300	16	0	0.0	0	--
Yakutat	301 - 500	6	0	0.0	0	--
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**3**	**112.1**	**6,200**	**2.208**
Southeastern	1 - 100	7	0	0.0	0	--
Southeastern	101 - 200	23	0	0.0	0	--
Southeastern	201 - 300	13	0	0.0	0	--
Southeastern	301 - 500	8	0	0.0	0	--
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**0**	**0.0**	**0**	**--**
All areas	1 - 100	196	29	173.8	22,428	2.01
All areas	101 - 200	221	1	5.5	673	3.324
All areas	201 - 300	74	0	0.0	0	--
All areas	301 - 500	28	0	0.0	0	--
All areas	501 - 700	10	0	0.0	0	--
All areas	**All depths**	**529**	**30**	**74.9**	**23,101**	**2.033**

Table 19. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing starry flounder, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Davidson Bank	1 - 100	26	3	90.5	1,238
Lower Alaska Peninsula	1 - 100	14	5	59.5	409
Shumagin Bank	1 - 100	22	1	96.6	1,198
Upper Alaska Peninsula	1 - 100	12	4	180.6	1,434
Chirikof Bank	1 - 100	19	2	206.8	2,231
Albatross Shallows	1 - 100	11	3	385.9	2,225
Lower Cook Inlet	1 - 100	9	7	754.3	7,458
Northern Kodiak Shallows	1 - 100	6	1	15.6	34
Yakutat Shallows	1 - 100	10	3	623.3	6,200
Chirikof Outer Shelf	101 - 200	18	1	134.3	673

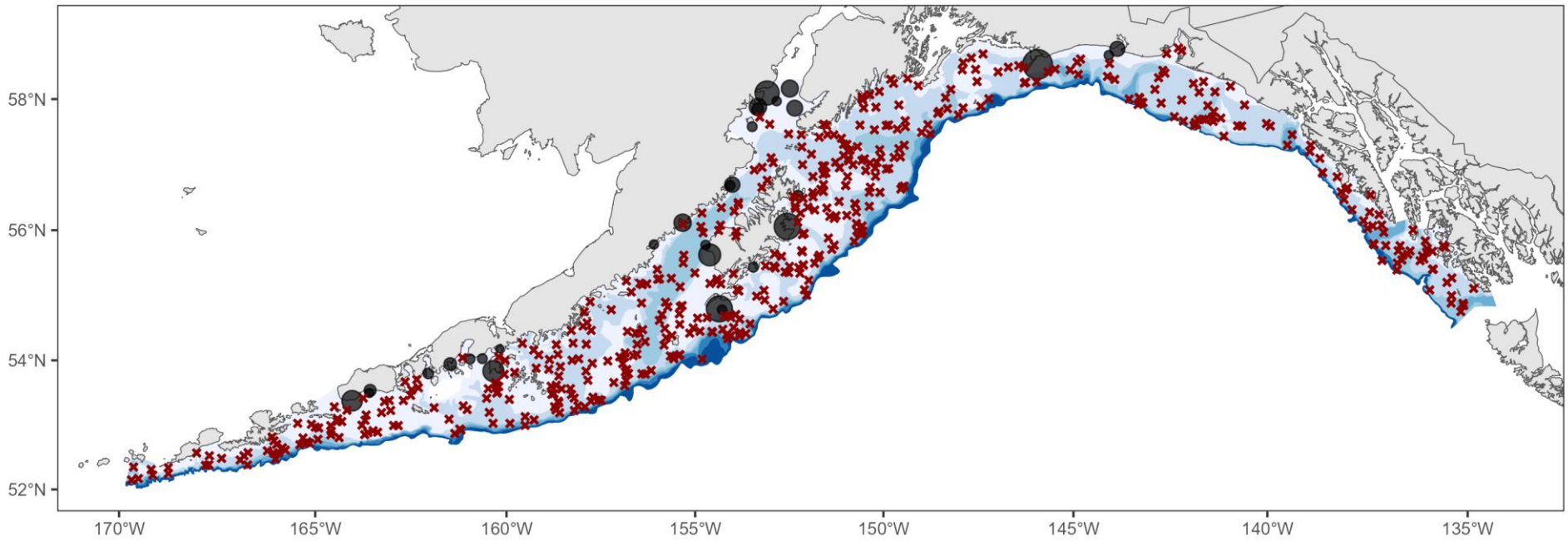

Figure 22. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of starry flounder in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

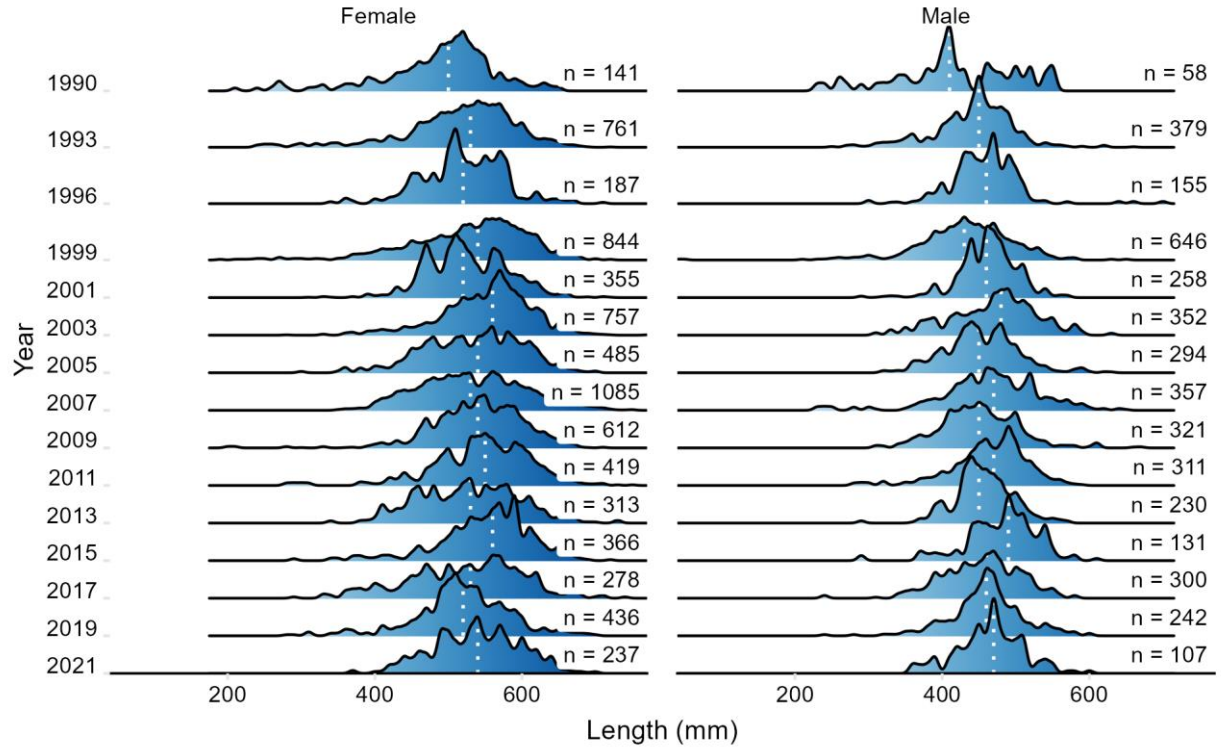

Figure 23. -- Population length composition of starry flounder in the Gulf of Alaska bottom trawl survey between 1990 and 2021. The dotted vertical line indicates median length.

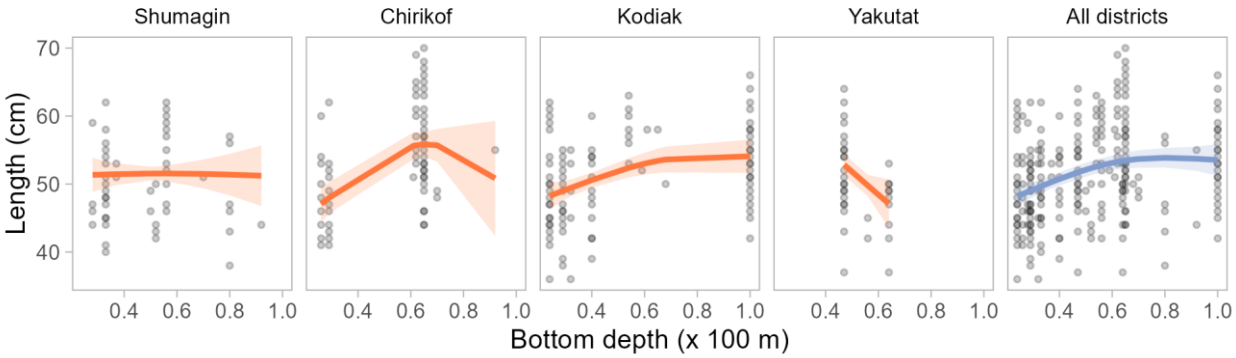

Figure 24. -- Length versus depth for starry flounder by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where starry flounder were found.

Pacific cod (*Gadus macrocephalus*)

- Pacific cod was the 10th most abundant species caught in the 2021 GOA survey. Their total biomass was estimated to be 174,414 t (Table **20**), which is a 3.9% decrease from 2019.
- 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 Shumagin and Chirikof regions (Table **20** and Fig. **25**).
- On average, the longest individuals were found in the Southeastern region and in a depth range of 201 - 300 m (Fig. **26** and Fig. **27**).
- Males and females of this species differed in average length; females (mean FL 52.71 cm) are generally longer than males (mean FL 50.21 cm).

Table 20. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing Pacific cod, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	63	1,022.1	42,200	1.593
Shumagin	101 - 200	27	19	645.2	9,469	3.212
Shumagin	201 - 300	11	1	65.7	183	2.813
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**83**	**819.3**	**51,852**	**1.758**
Chirikof	1 - 100	41	35	1,007.3	26,225	1.985
Chirikof	101 - 200	51	31	541.1	12,906	2.317
Chirikof	201 - 300	16	4	12.7	147	1.993
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**70**	**604.4**	**39,277**	**2.083**
Kodiak	1 - 100	62	44	446.7	17,206	1.396
Kodiak	101 - 200	89	78	955.7	41,414	2.409
Kodiak	201 - 300	18	2	39.7	456	3.021
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**124**	**602.9**	**59,076**	**1.991**
Yakutat	1 - 100	16	12	688.3	11,468	1.704
Yakutat	101 - 200	31	6	31.7	931	3.544
Yakutat	201 - 300	16	1	33.9	175	2.926
Yakutat	301 - 500	6	0	0.0	0	--
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**19**	**227.3**	**12,575**	**1.783**
Southeastern	1 - 100	7	3	63.4	415	2.16
Southeastern	101 - 200	23	18	827.7	9,174	1.954
Southeastern	201 - 300	13	8	404.7	2,044	2.161
Southeastern	301 - 500	8	0	0.0	0	--
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**29**	**433.6**	**11,634**	**1.994**
All areas	1 - 100	196	157	755.6	97,513	1.654
All areas	101 - 200	221	152	604.1	73,895	2.41
All areas	201 - 300	74	16	83.4	3,006	2.32
All areas	301 - 500	28	0	0.0	0	--
All areas	501 - 700	10	0	0.0	0	--
All areas	**All depths**	**529**	**325**	**565.5**	**174,414**	**1.918**

Table 21. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing Pacific cod, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	8	973.3	8,110
Davidson Bank	1 - 100	26	25	1,583.3	21,662
Lower Alaska Peninsula	1 - 100	14	13	855.4	5,881
Shumagin Bank	1 - 100	22	17	528.0	6,546
Upper Alaska Peninsula	1 - 100	12	12	531.4	4,220
Semidi Bank	1 - 100	10	8	1,562.9	11,412
Chirikof Bank	1 - 100	19	15	981.5	10,592
Albatross Shallows	1 - 100	11	9	465.4	2,683
Albatross Banks	1 - 100	25	20	657.6	10,129
Lower Cook Inlet	1 - 100	9	4	79.2	784
Kenai Peninsula	1 - 100	11	7	556.7	2,928
Northern Kodiak Shallows	1 - 100	6	4	309.9	682
Yakutat Shallows	1 - 100	10	8	487.4	4,848
Middleton Shallows	1 - 100	6	4	986.0	6,620
Southeastern Shallows	1 - 100	7	3	63.4	415
Sanak Gully	101 - 200	4	1	295.9	1,256
Shumagin Outer Shelf	101 - 200	20	18	1,007.3	8,213
East Shumagin Gully	101 - 200	14	5	460.7	5,116
Shelikof Edge	101 - 200	19	9	215.5	1,666
Chirikof Outer Shelf	101 - 200	18	17	1,222.1	6,124
Albatross Gullies	101 - 200	19	16	1,188.9	9,407
Portlock Flats	101 - 200	23	23	1,316.5	9,659
Barren Islands	101 - 200	14	13	942.0	10,344
Kenai Flats	101 - 200	15	14	785.6	9,487
Kodiak Outer Shelf	101 - 200	18	12	501.0	2,518
Middleton Shelf	101 - 200	7	1	19.4	142
Fairweather Shelf	101 - 200	10	5	102.1	789
Baranof-Chichagof Shelf	101 - 200	10	9	1,221.3	5,125
Prince of Wales Shelf	101 - 200	13	9	587.9	4,049
Shumagin Slope	201 - 300	11	1	65.7	183
Lower Shelikof Gully	201 - 300	9	1	9.5	95
Chirikof Slope	201 - 300	7	3	33.5	51
Kenai Gullies	201 - 300	9	1	29.7	198
Upper Shelikof Gully	201 - 300	3	1	80.6	259
Yakutat Slope	201 - 300	9	1	82.3	175
Baranof-Chichagof Slope	201 - 300	3	3	954.2	1,074
Prince of Wales Slope/Gullies	201 - 300	10	5	247.2	971

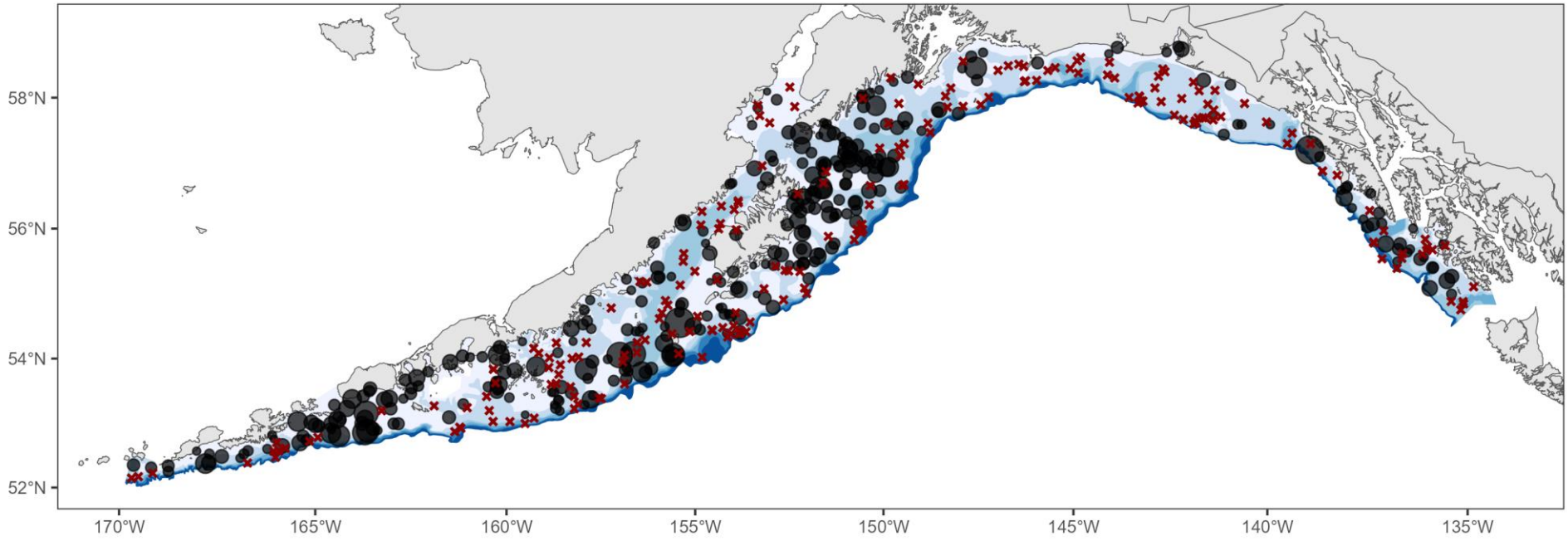

Figure 25. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of Pacific cod in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

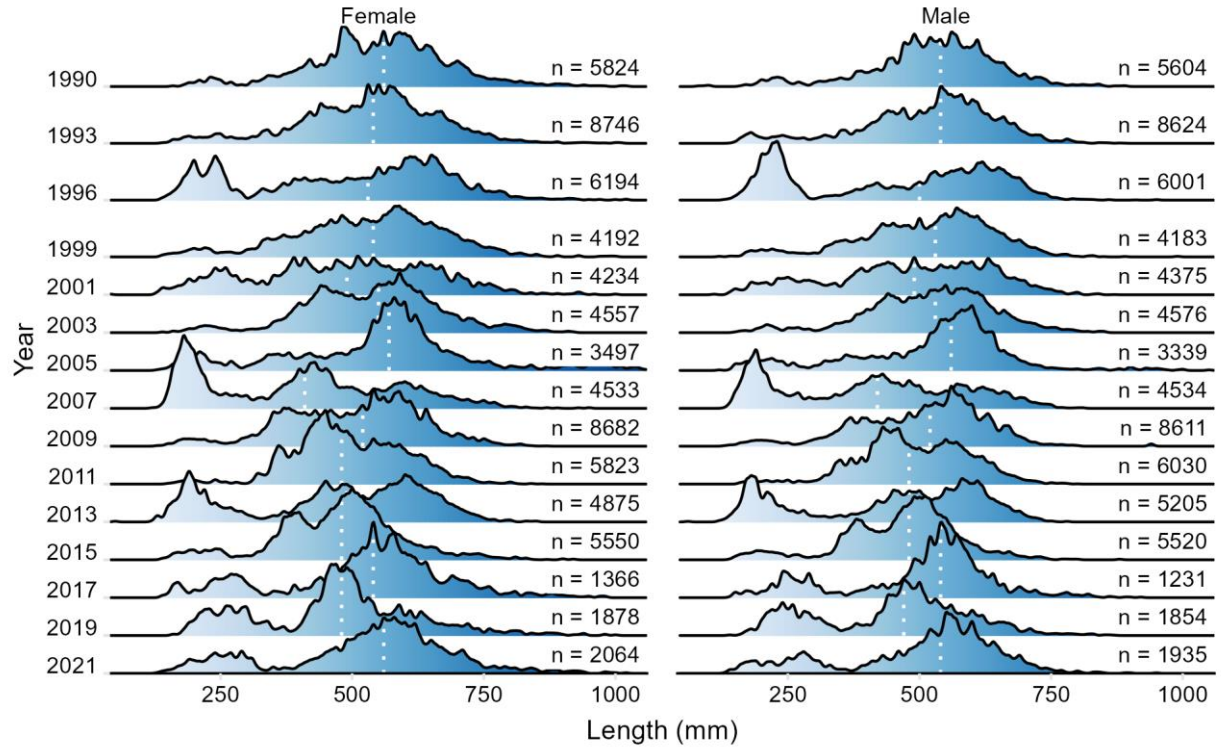

Figure 26. -- Population length composition of Pacific cod in the Gulf of Alaska bottom trawl survey between 1990 and 2021. The dotted vertical line indicates median length.

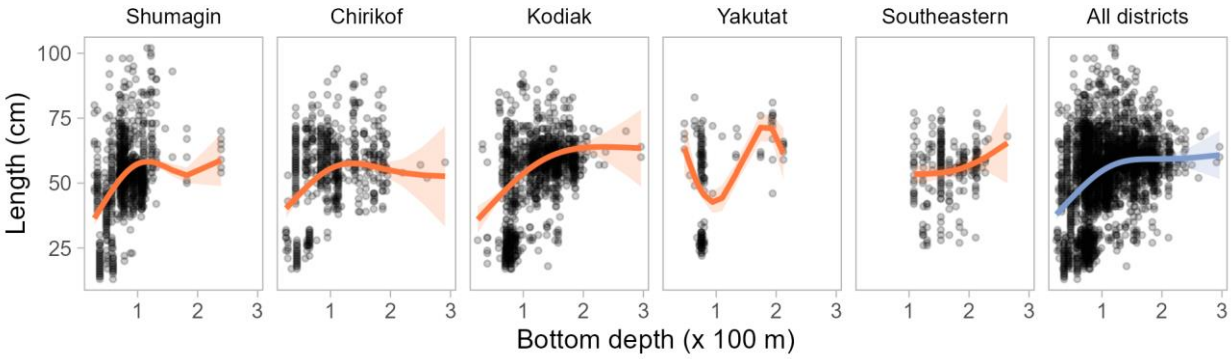

Figure 27. -- Length versus depth for Pacific cod by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where Pacific cod were found.

walleye pollock (*Gadus chalcogrammus*)

- Walleye pollock was the 3rd most abundant species caught in the 2021 GOA survey. Their total biomass was estimated to be 528,841 t (Table **22**), which is a 72.2% increase from 2019.
- The largest estimated biomass for walleye pollock was in the Shumagin region and the depth range with the largest estimated biomass was 101 - 200 m.
- The highest CPUEs were recorded in the Shumagin and Chirikof regions (Table **22** and Fig. **28**).
- On average, the longest individuals were found in the Southeastern region and in a depth range of 301 - 500 m (Fig. **29** and Fig. **30**).
- Males and females of this species differed in average length; females (mean FL 34.59 cm) are generally longer than males (mean FL 32.34 cm).

Table 22. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing walleye pollock, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	45	1,677.4	69,256	0.348
Shumagin	101 - 200	27	18	7,440.9	109,212	0.555
Shumagin	201 - 300	11	11	26,638.5	74,267	0.725
Shumagin	301 - 500	4	1	36.1	91	0.995
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**75**	**3,994.7**	**252,827**	**0.507**
Chirikof	1 - 100	41	35	1,125.4	29,299	0.146
Chirikof	101 - 200	51	47	2,501.0	59,647	0.55
Chirikof	201 - 300	16	16	2,126.4	24,552	0.463
Chirikof	301 - 500	4	4	65.0	104	0.62
Chirikof	501 - 700	3	2	69.3	135	0.619
Chirikof	**All depths**	**115**	**104**	**1,750.1**	**113,737**	**0.314**
Kodiak	1 - 100	62	44	1,130.1	43,528	0.306
Kodiak	101 - 200	89	76	1,253.9	54,333	0.677
Kodiak	201 - 300	18	18	943.5	10,841	0.532
Kodiak	301 - 500	6	3	25.5	74	0.772
Kodiak	501 - 700	2	1	20.4	36	0.566
Kodiak	**All depths**	**177**	**142**	**1,110.4**	**108,813**	**0.448**
Yakutat	1 - 100	16	14	1,020.5	17,003	0.178
Yakutat	101 - 200	31	30	332.1	9,757	0.238
Yakutat	201 - 300	16	16	1,299.4	6,718	0.517
Yakutat	301 - 500	6	5	187.8	493	0.849
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**65**	**614.2**	**33,972**	**0.226**
Southeastern	1 - 100	7	4	412.2	2,698	0.335
Southeastern	101 - 200	23	19	764.5	8,473	0.275
Southeastern	201 - 300	13	13	1,614.7	8,158	0.65
Southeastern	301 - 500	8	3	52.6	164	1.053
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**39**	**726.5**	**19,493**	**0.378**
All areas	1 - 100	196	142	1,253.7	161,785	0.251
All areas	101 - 200	221	190	1,973.6	241,422	0.528
All areas	201 - 300	74	74	3,454.8	124,536	0.619
All areas	301 - 500	28	16	72.5	927	0.849
All areas	501 - 700	10	3	20.8	171	0.607
All areas	**All depths**	**529**	**425**	**1,714.7**	**528,841**	**0.405**

Table 23. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing walleye pollock, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	3	14.5	121
Davidson Bank	1 - 100	26	15	629.5	8,612
Lower Alaska Peninsula	1 - 100	14	13	8,319.5	57,203
Shumagin Bank	1 - 100	22	14	267.8	3,320
Upper Alaska Peninsula	1 - 100	12	12	756.5	6,008
Semidi Bank	1 - 100	10	9	422.1	3,082
Chirikof Bank	1 - 100	19	14	1,872.6	20,209
Albatross Shallows	1 - 100	11	8	5,679.3	32,747
Albatross Banks	1 - 100	25	19	231.8	3,570
Lower Cook Inlet	1 - 100	9	6	60.5	598
Kenai Peninsula	1 - 100	11	8	1,069.4	5,625
Northern Kodiak Shallows	1 - 100	6	3	449.2	988
Yakutat Shallows	1 - 100	10	9	1,543.4	15,353
Middleton Shallows	1 - 100	6	5	245.9	1,651
Southeastern Shallows	1 - 100	7	4	412.2	2,698
Sanak Gully	101 - 200	4	2	148.2	629
Shumagin Outer Shelf	101 - 200	20	13	13,269.5	108,196
West Shumagin Gully	101 - 200	3	3	169.8	387
East Shumagin Gully	101 - 200	14	14	180.4	2,004
Shelikof Edge	101 - 200	19	18	1,289.5	9,974
Chirikof Outer Shelf	101 - 200	18	15	9,513.5	47,669
Albatross Gullies	101 - 200	19	17	3,384.3	26,776
Portlock Flats	101 - 200	23	20	540.5	3,966
Barren Islands	101 - 200	14	14	1,415.9	15,547
Kenai Flats	101 - 200	15	14	641.6	7,748
Kodiak Outer Shelf	101 - 200	18	11	59.0	297
Middleton Shelf	101 - 200	7	7	421.9	3,099
Yakataga Shelf	101 - 200	6	6	185.5	979
Yakutat Flats	101 - 200	8	8	178.9	1,616
Fairweather Shelf	101 - 200	10	9	525.7	4,062
Baranof-Chichagof Shelf	101 - 200	10	10	453.5	1,903
Prince of Wales Shelf	101 - 200	13	9	953.9	6,570
Shumagin Slope	201 - 300	11	11	26,638.5	74,267
Lower Shelikof Gully	201 - 300	9	9	629.5	6,306
Chirikof Slope	201 - 300	7	7	11,938.8	18,246
Kenai Gullies	201 - 300	9	9	437.2	2,911
Kodiak Slope	201 - 300	6	6	1,972.7	3,201
Upper Shelikof Gully	201 - 300	3	3	1,474.1	4,729
Yakutat Gullies	201 - 300	7	7	1,289.9	3,925
Yakutat Slope	201 - 300	9	9	1,313.0	2,793
Baranof-Chichagof Slope	201 - 300	3	3	2,091.4	2,353
Prince of Wales Slope/Gullies	201 - 300	10	10	1,478.0	5,804
Shumagin Slope	301 - 500	4	1	36.1	91

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Chirikof Slope	301 - 500	4	4	65.0	104
Kodiak Slope	301 - 500	6	3	25.5	74
Yakutat Slope	301 - 500	5	5	324.5	493
Southeastern Deep Gullies	301 - 500	4	2	63.2	148
Southeastern Slope	301 - 500	4	1	20.3	16
Chirikof Slope	501 - 700	3	2	69.3	135
Kodiak Slope	501 - 700	2	1	20.4	36

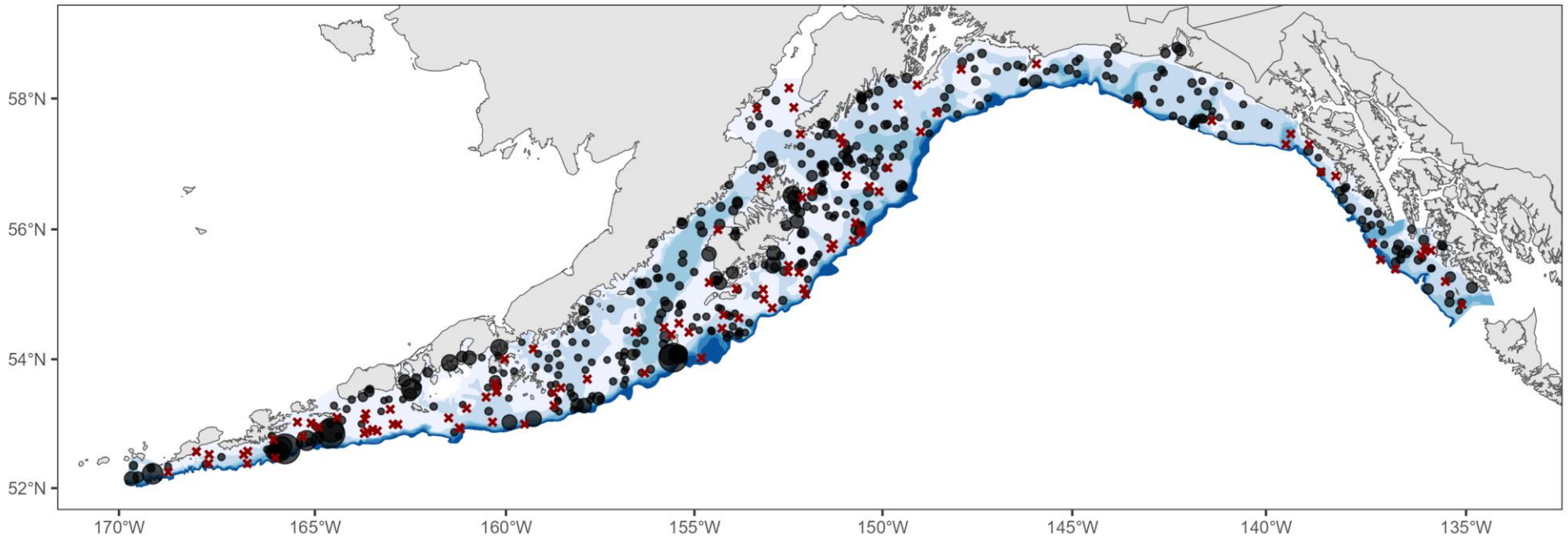

Figure 28. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of walleye pollock in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

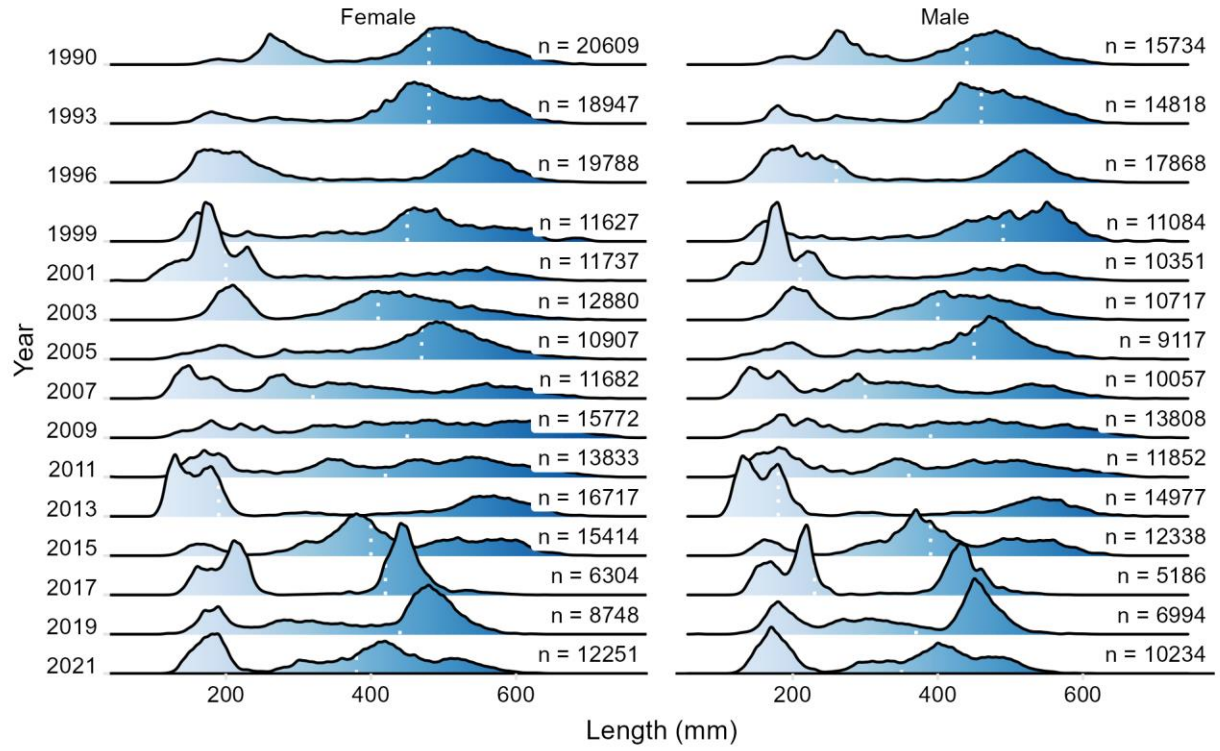

Figure 29. -- Population length composition of walleye pollock in the Gulf of Alaska bottom trawl survey between 1990 and 2021. The dotted vertical line indicates median length.

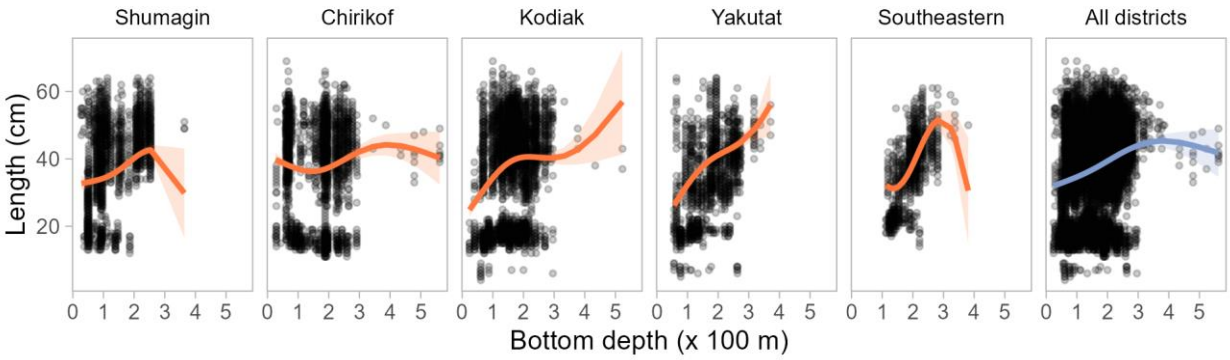

Figure 30. -- Length versus depth for walleye pollock by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where walleye pollock were found.

Atka mackerel (*Pleurogrammus monopterygius*)

- The total biomass of Atka mackerel was estimated to be 24,411 t in the GOA 2021 survey (Table **24**), which is more than a twofold increase from 2019.
- 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**).
- On average, the longest individuals were found in the Kodiak region and in a depth range of 101 - 200 m (Fig. **32** and Fig. **33**). The median length for Atka mackerel was lower in 2025 than in previous years (Fig. **32**).

Table 24. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing Atka mackerel, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	7	575.1	23,746	0.367
Shumagin	101 - 200	27	6	41.4	608	1.202
Shumagin	201 - 300	11	0	0.0	0	--
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**13**	**384.8**	**24,354**	**0.373**
Chirikof	1 - 100	41	1	0.4	10	0.38
Chirikof	101 - 200	51	2	1.0	24	0.963
Chirikof	201 - 300	16	1	0.9	11	0.94
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**4**	**0.7**	**45**	**0.712**
Kodiak	1 - 100	62	0	0.0	0	--
Kodiak	101 - 200	89	1	0.3	12	1.028
Kodiak	201 - 300	18	0	0.0	0	--
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**1**	**0.1**	**12**	**1.028**
Yakutat	1 - 100	16	0	0.0	0	--
Yakutat	101 - 200	31	0	0.0	0	--
Yakutat	201 - 300	16	0	0.0	0	--
Yakutat	301 - 500	6	0	0.0	0	--
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**0**	**0.0**	**0**	**--**
Southeastern	1 - 100	7	0	0.0	0	--
Southeastern	101 - 200	23	0	0.0	0	--
Southeastern	201 - 300	13	0	0.0	0	--
Southeastern	301 - 500	8	0	0.0	0	--
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**0**	**0.0**	**0**	**--**
All areas	1 - 100	196	8	184.1	23,756	0.367
All areas	101 - 200	221	9	5.3	644	1.187
All areas	201 - 300	74	1	0.3	11	0.94
All areas	301 - 500	28	0	0.0	0	--
All areas	501 - 700	10	0	0.0	0	--
All areas	**All depths**	**529**	**18**	**79.1**	**24,411**	**0.374**

Table 25. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing Atka mackerel, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	2	2,829.8	23,580
Davidson Bank	1 - 100	26	4	11.3	154
Lower Alaska Peninsula	1 - 100	14	1	1.7	11
Upper Alaska Peninsula	1 - 100	12	1	1.3	10
Shumagin Outer Shelf	101 - 200	20	6	74.5	608
Shelikof Edge	101 - 200	19	1	1.7	13
Chirikof Outer Shelf	101 - 200	18	1	2.2	11
Kodiak Outer Shelf	101 - 200	18	1	2.4	12
Chirikof Slope	201 - 300	7	1	7.0	11

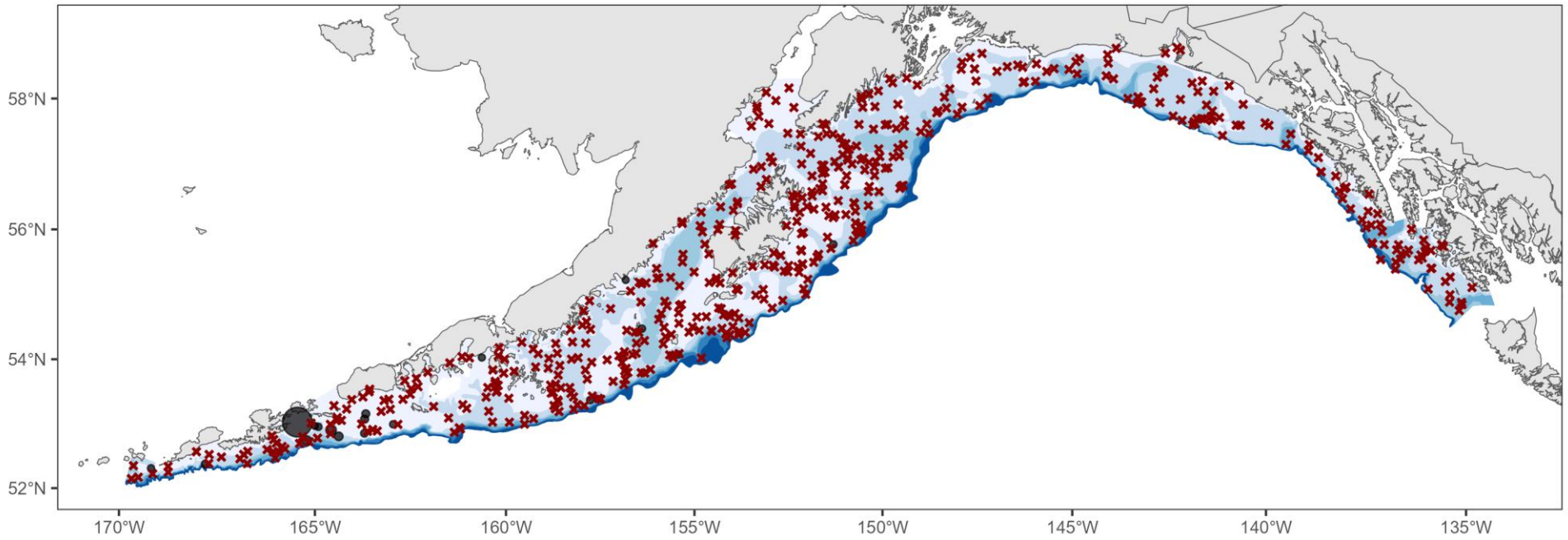

Figure 31. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of Atka mackerel in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

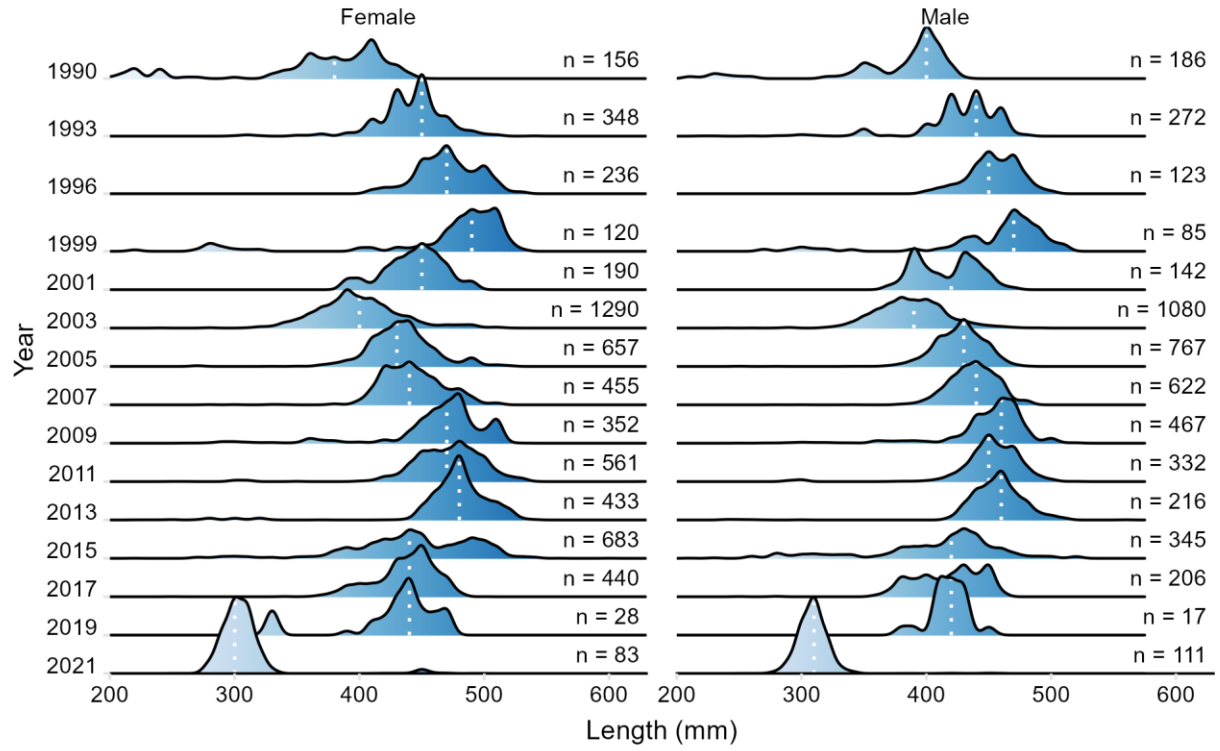

Figure 32. -- Population length composition of Atka mackerel in the Gulf of Alaska bottom trawl survey between 1990 and 2021. The dotted vertical line indicates median length.

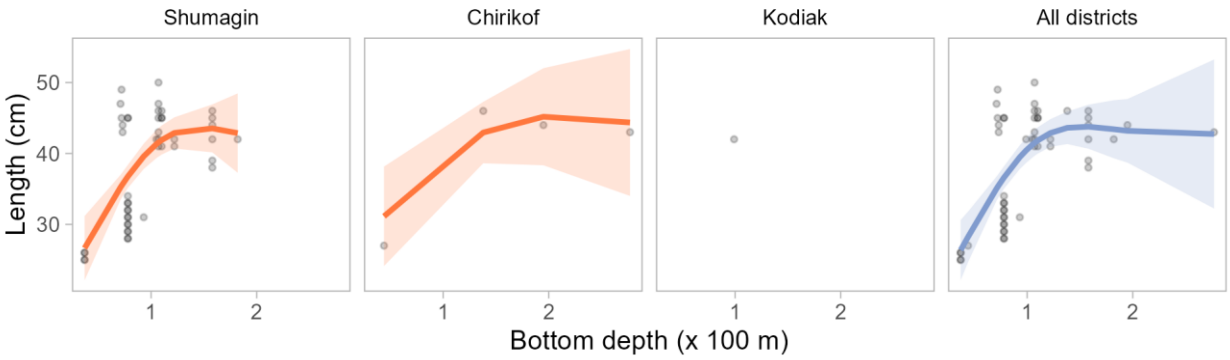

Figure 33. -- Length versus depth for Atka mackerel by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where Atka mackerel were found.

sablefish (*Anoplopoma fimbria*)

- Sablefish was the 4th most abundant species caught in the 2021 GOA survey. Their total biomass was estimated to be 325,075 t (Table **26**), which is a 22.8% increase from 2019.
- The largest estimated biomass for sablefish 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 Kodiak regions (Table **26** and Fig. **34**).
- On average, the longest individuals were found in the Shumagin region and in a depth range of 301 - 500 m (Fig. **35** and Fig. **36**).
- Males and females of this species differed in average length; females (mean FL 50.8 cm) are generally longer than males (mean FL 50.03 cm).

Table 26. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing sablefish, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	10	9.0	373	0.397
Shumagin	101 - 200	27	10	57.1	838	1.231
Shumagin	201 - 300	11	11	5,781.8	16,119	1.38
Shumagin	301 - 500	4	4	4,498.1	11,385	1.68
Shumagin	501 - 700	2	2	5,228.1	10,486	1.554
Shumagin	**All depths**	**114**	**37**	**619.4**	**39,201**	**1.462**
Chirikof	1 - 100	41	3	2.3	59	0.735
Chirikof	101 - 200	51	35	2,308.5	55,057	1.332
Chirikof	201 - 300	16	16	5,856.1	67,615	1.333
Chirikof	301 - 500	4	4	2,699.5	4,330	1.85
Chirikof	501 - 700	3	3	3,393.9	6,629	1.652
Chirikof	**All depths**	**115**	**61**	**2,057.2**	**133,690**	**1.357**
Kodiak	1 - 100	62	12	41.4	1,596	0.799
Kodiak	101 - 200	89	72	1,239.6	53,713	1.238
Kodiak	201 - 300	18	18	2,302.2	26,453	1.294
Kodiak	301 - 500	6	6	3,395.4	9,887	1.804
Kodiak	501 - 700	2	2	5,593.1	9,759	2.141
Kodiak	**All depths**	**177**	**110**	**1,034.8**	**101,407**	**1.336**
Yakutat	1 - 100	16	8	58.5	974	0.718
Yakutat	101 - 200	31	27	608.0	17,865	0.833
Yakutat	201 - 300	16	16	738.8	3,820	1.339
Yakutat	301 - 500	6	5	2,569.1	6,751	2.206
Yakutat	501 - 700	1	1	3,713.7	5,456	2.139
Yakutat	**All depths**	**70**	**57**	**630.4**	**34,866**	**1.115**
Southeastern	1 - 100	7	4	165.4	1,083	0.583
Southeastern	101 - 200	23	14	470.1	5,211	0.829
Southeastern	201 - 300	13	13	394.7	1,994	1.059
Southeastern	301 - 500	8	7	1,932.9	6,025	1.898
Southeastern	501 - 700	2	2	1,546.9	1,599	2.164
Southeastern	**All depths**	**53**	**40**	**593.0**	**15,911**	**1.142**
All areas	1 - 100	196	37	31.6	4,084	0.656
All areas	101 - 200	221	158	1,084.7	132,683	1.173
All areas	201 - 300	74	74	3,218.1	116,002	1.324
All areas	301 - 500	28	26	3,000.2	38,378	1.842
All areas	501 - 700	10	10	4,134.4	33,929	1.823
All areas	**All depths**	**529**	**305**	**1,054.0**	**325,075**	**1.319**

Table 27. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing sablefish, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	1	10.3	86
Davidson Bank	1 - 100	26	4	9.2	126
Lower Alaska Peninsula	1 - 100	14	3	12.4	85
Shumagin Bank	1 - 100	22	2	6.1	76
Upper Alaska Peninsula	1 - 100	12	3	7.4	59
Albatross Shallows	1 - 100	11	2	22.6	130
Albatross Banks	1 - 100	25	3	3.4	53
Lower Cook Inlet	1 - 100	9	1	16.0	158
Kenai Peninsula	1 - 100	11	6	238.5	1,255
Yakutat Shallows	1 - 100	10	6	67.1	668
Middleton Shallows	1 - 100	6	2	45.6	306
Southeastern Shallows	1 - 100	7	4	165.4	1,083
Sanak Gully	101 - 200	4	2	58.6	249
Shumagin Outer Shelf	101 - 200	20	5	13.0	106
West Shumagin Gully	101 - 200	3	3	211.9	483
East Shumagin Gully	101 - 200	14	9	1,459.2	16,203
Shelikof Edge	101 - 200	19	16	2,424.1	18,750
Chirikof Outer Shelf	101 - 200	18	10	4,012.2	20,104
Albatross Gullies	101 - 200	19	18	2,105.5	16,658
Portlock Flats	101 - 200	23	22	1,208.1	8,863
Barren Islands	101 - 200	14	12	1,372.2	15,068
Kenai Flats	101 - 200	15	13	351.3	4,243
Kodiak Outer Shelf	101 - 200	18	7	1,767.0	8,880
Middleton Shelf	101 - 200	7	6	405.6	2,980
Yakataga Shelf	101 - 200	6	6	267.9	1,413
Yakutat Flats	101 - 200	8	7	624.4	5,640
Fairweather Shelf	101 - 200	10	8	1,013.5	7,832
Baranof-Chichagof Shelf	101 - 200	10	8	648.4	2,721
Prince of Wales Shelf	101 - 200	13	6	361.4	2,490
Shumagin Slope	201 - 300	11	11	5,781.8	16,119
Lower Shelikof Gully	201 - 300	9	9	3,414.3	34,204
Chirikof Slope	201 - 300	7	7	21,861.6	33,411
Kenai Gullies	201 - 300	9	9	2,483.7	16,540
Kodiak Slope	201 - 300	6	6	1,488.9	2,416
Upper Shelikof Gully	201 - 300	3	3	2,336.8	7,497
Yakutat Gullies	201 - 300	7	7	643.9	1,959
Yakutat Slope	201 - 300	9	9	874.6	1,861
Baranof-Chichagof Slope	201 - 300	3	3	460.4	518
Prince of Wales Slope/Gullies	201 - 300	10	10	375.9	1,476

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Shumagin Slope	301 - 500	4	4	4,498.1	11,385
Chirikof Slope	301 - 500	4	4	2,699.5	4,330
Kodiak Slope	301 - 500	6	6	3,395.4	9,887
Yakutat Gullies	301 - 500	1	1	5,035.6	5,575
Yakutat Slope	301 - 500	5	4	773.1	1,176
Southeastern Deep Gullies	301 - 500	4	4	2,192.9	5,141
Southeastern Slope	301 - 500	4	3	1,144.1	884
Shumagin Slope	501 - 700	2	2	5,228.1	10,486
Chirikof Slope	501 - 700	3	3	3,393.9	6,629
Kodiak Slope	501 - 700	2	2	5,593.1	9,759
Yakutat Slope	501 - 700	1	1	3,713.7	5,456
Southeastern Slope	501 - 700	2	2	1,546.9	1,599

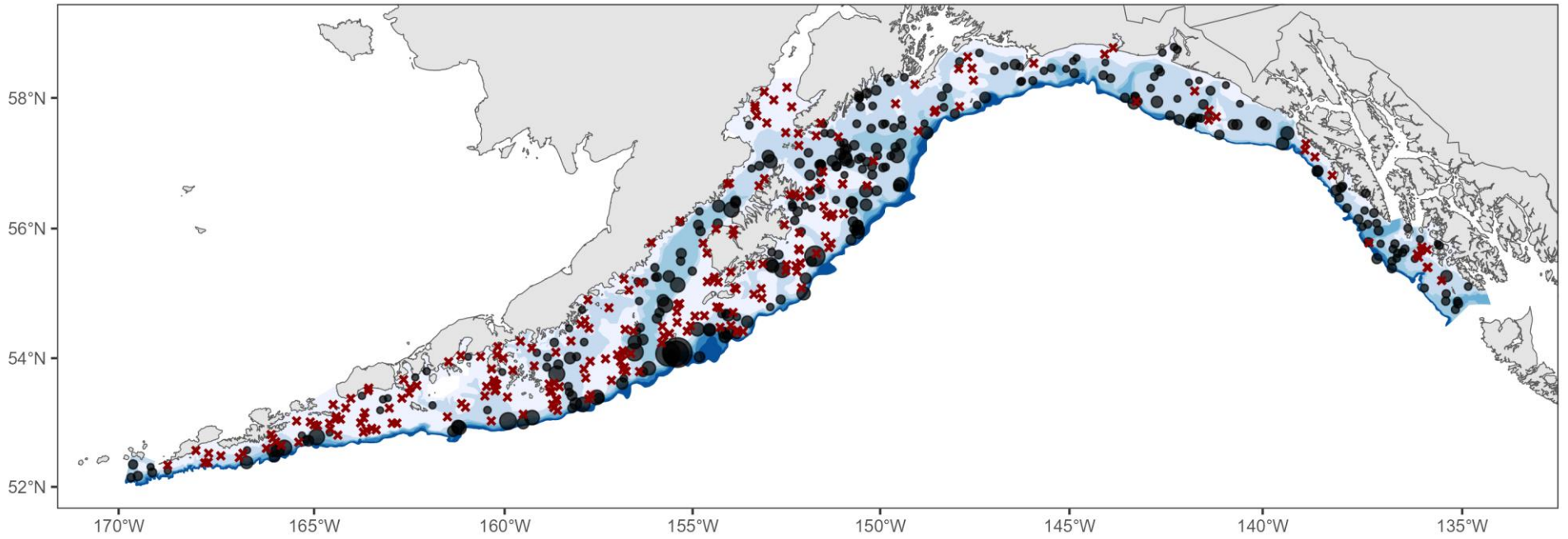

Figure 34. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of sablefish in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

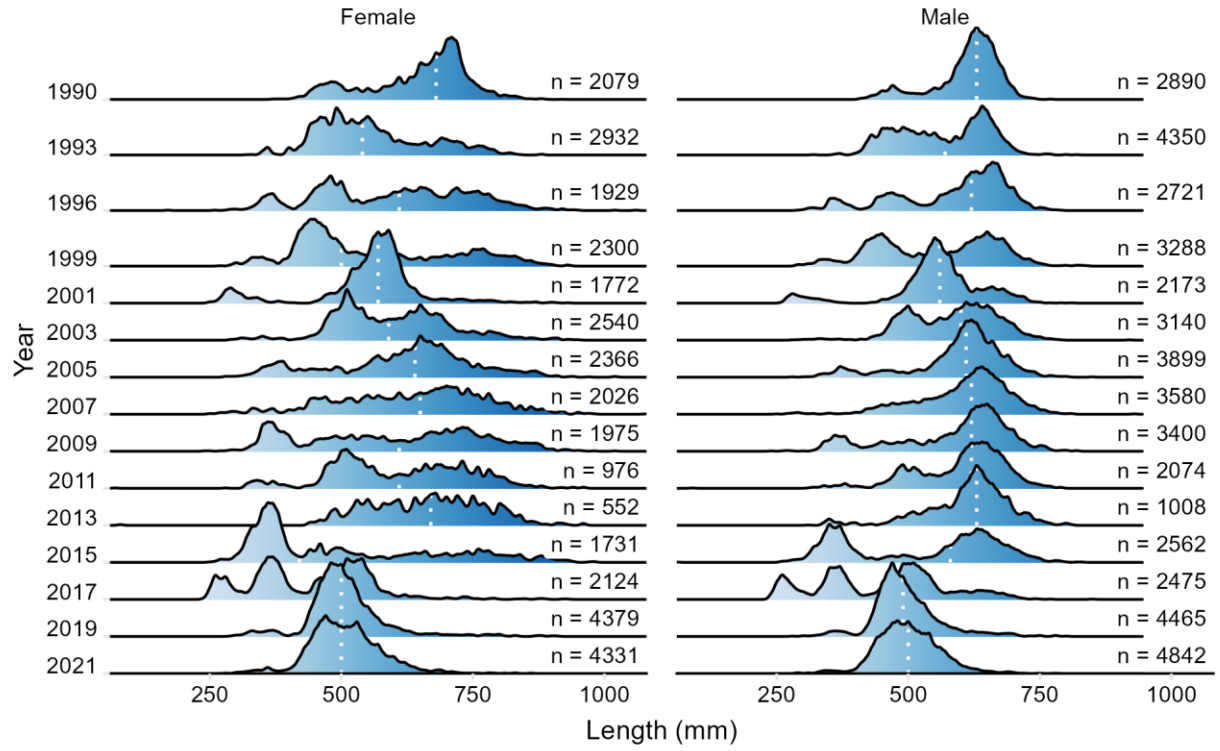

Figure 35. -- Population length composition of sablefish in the Gulf of Alaska bottom trawl survey between 1990 and 2021. The dotted vertical line indicates median length.

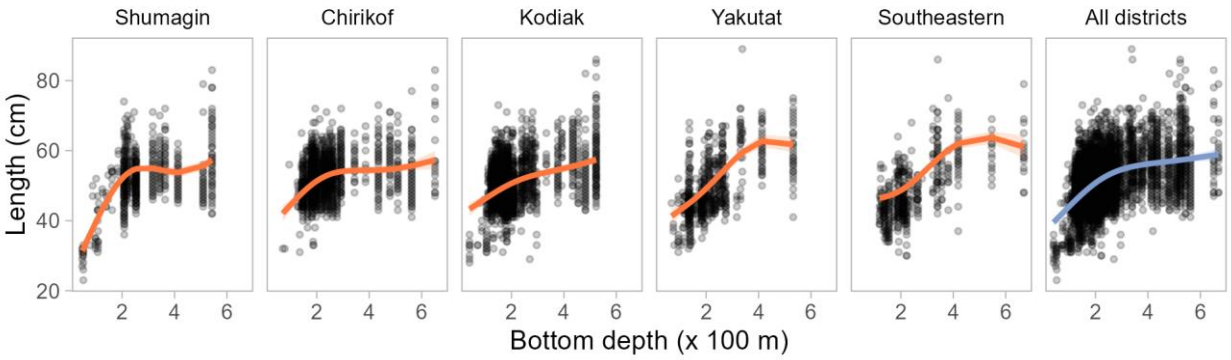

Figure 36. -- Length versus depth for sablefish by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where sablefish were found.

Pacific ocean perch (*Sebastes alutus*)

- Pacific ocean perch was the most abundant species caught in the 2021 GOA survey. Their total biomass was estimated to be 1,478,940 t (Table **28**), which is a 22% increase from 2019.
- The largest estimated biomass for Pacific ocean perch 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 **28** and Fig. **37**).
- On average, the longest individuals were found in the Kodiak region and in a depth range of 301 - 500 m (Fig. **38** and Fig. **39**).
- Males and females of this species differed in average length; females (mean FL 36.36 cm) are generally longer than males (mean FL 35.5 cm).

Table 28. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing Pacific ocean perch, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	11	40.5	1,671	0.446
Shumagin	101 - 200	27	10	670.2	9,837	0.575
Shumagin	201 - 300	11	11	44,490.6	124,037	0.614
Shumagin	301 - 500	4	3	203.1	514	0.668
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**35**	**2,149.8**	**136,060**	**0.609**
Chirikof	1 - 100	41	5	1,764.0	45,926	0.835
Chirikof	101 - 200	51	32	20,423.5	487,089	0.659
Chirikof	201 - 300	16	12	3,354.2	38,727	0.683
Chirikof	301 - 500	4	3	148.4	238	0.718
Chirikof	501 - 700	3	2	68.8	134	0.608
Chirikof	**All depths**	**115**	**54**	**8,803.4**	**572,115**	**0.672**
Kodiak	1 - 100	62	14	78.6	3,026	0.816
Kodiak	101 - 200	89	70	13,333.5	577,762	0.747
Kodiak	201 - 300	18	14	2,666.9	30,643	0.704
Kodiak	301 - 500	6	4	78.4	228	0.772
Kodiak	501 - 700	2	2	188.3	329	0.666
Kodiak	**All depths**	**177**	**104**	**6,245.1**	**611,988**	**0.745**
Yakutat	1 - 100	16	2	0.7	11	0.129
Yakutat	101 - 200	31	25	503.3	14,789	0.187
Yakutat	201 - 300	16	16	4,136.9	21,388	0.459
Yakutat	301 - 500	6	5	3,667.2	9,637	0.735
Yakutat	501 - 700	1	1	29.6	43	0.92
Yakutat	**All depths**	**70**	**49**	**829.3**	**45,869**	**0.33**
Southeastern	1 - 100	7	4	127.2	833	0.171
Southeastern	101 - 200	23	14	3,296.6	36,541	0.372
Southeastern	201 - 300	13	13	13,686.7	69,149	0.639
Southeastern	301 - 500	8	6	2,028.6	6,323	0.742
Southeastern	501 - 700	2	1	59.5	62	0.81
Southeastern	**All depths**	**53**	**38**	**4,207.7**	**112,908**	**0.513**
All areas	1 - 100	196	36	398.8	51,468	0.763
All areas	101 - 200	221	151	9,205.2	1,126,019	0.66
All areas	201 - 300	74	66	7,877.1	283,945	0.621
All areas	301 - 500	28	21	1,324.3	16,940	0.736
All areas	501 - 700	10	6	69.2	568	0.678
All areas	**All depths**	**529**	**280**	**4,795.3**	**1,478,940**	**0.656**

Table 29. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing Pacific ocean perch, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	3	156.2	1,301
Davidson Bank	1 - 100	26	1	7.6	104
Lower Alaska Peninsula	1 - 100	14	1	2.2	15
Shumagin Bank	1 - 100	22	6	20.2	251
Upper Alaska Peninsula	1 - 100	12	1	1.4	11
Semidi Bank	1 - 100	10	2	14.2	104
Chirikof Bank	1 - 100	19	2	4,244.9	45,811
Albatross Shallows	1 - 100	11	5	17.7	102
Albatross Banks	1 - 100	25	6	139.3	2,146
Kenai Peninsula	1 - 100	11	3	147.9	778
Yakutat Shallows	1 - 100	10	1	0.9	9
Middleton Shallows	1 - 100	6	1	0.4	3
Southeastern Shallows	1 - 100	7	4	127.2	833
Shumagin Outer Shelf	101 - 200	20	10	1,206.5	9,837
East Shumagin Gully	101 - 200	14	6	525.7	5,838
Shelikof Edge	101 - 200	19	13	2,208.2	17,080
Chirikof Outer Shelf	101 - 200	18	13	92,635.4	464,172
Albatross Gullies	101 - 200	19	18	26,340.4	208,399
Portlock Flats	101 - 200	23	20	19,046.3	139,732
Barren Islands	101 - 200	14	12	13,553.9	148,833
Kenai Flats	101 - 200	15	10	3,264.1	39,420
Kodiak Outer Shelf	101 - 200	18	10	8,233.3	41,379
Middleton Shelf	101 - 200	7	4	30.9	227
Yakataga Shelf	101 - 200	6	6	535.0	2,823
Yakutat Flats	101 - 200	8	8	571.9	5,165
Fairweather Shelf	101 - 200	10	7	850.7	6,574
Baranof-Chichagof Shelf	101 - 200	10	8	6,571.0	27,574
Prince of Wales Shelf	101 - 200	13	6	1,301.8	8,966
Shumagin Slope	201 - 300	11	11	44,490.6	124,037
Lower Shelikof Gully	201 - 300	9	5	265.4	2,659
Chirikof Slope	201 - 300	7	7	23,600.4	36,069
Kenai Gullies	201 - 300	9	8	2,071.3	13,794
Kodiak Slope	201 - 300	6	6	10,384.0	16,849
Yakutat Gullies	201 - 300	7	7	2,965.4	9,023
Yakutat Slope	201 - 300	9	9	5,812.5	12,365
Baranof-Chichagof Slope	201 - 300	3	3	20,344.0	22,892
Prince of Wales Slope/Gullies	201 - 300	10	10	11,779.1	46,257
Shumagin Slope	301 - 500	4	3	203.1	514
Chirikof Slope	301 - 500	4	3	148.4	238

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Kodiak Slope	301 - 500	6	4	78.4	228
Yakutat Slope	301 - 500	5	5	6,337.5	9,637
Southeastern Deep Gullies	301 - 500	4	2	51.2	120
Southeastern Slope	301 - 500	4	4	8,028.1	6,203
Chirikof Slope	501 - 700	3	2	68.8	134
Kodiak Slope	501 - 700	2	2	188.3	329
Yakutat Slope	501 - 700	1	1	29.6	43
Southeastern Slope	501 - 700	2	1	59.5	62

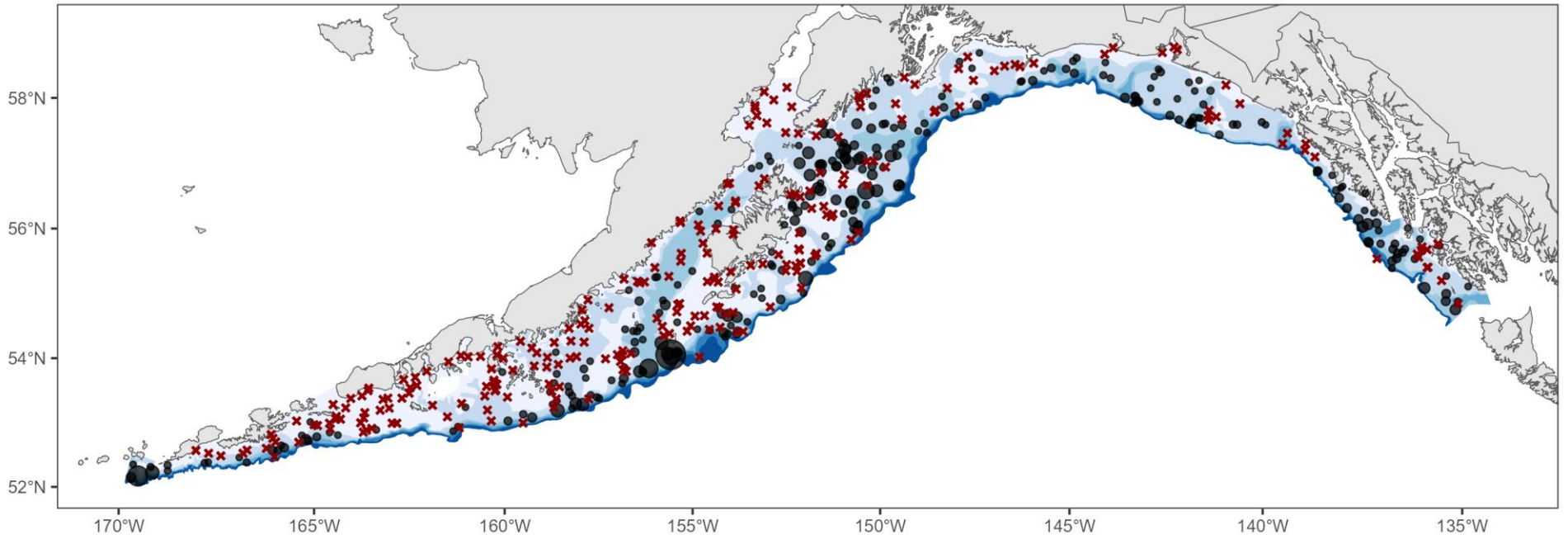

Figure 37. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of Pacific ocean perch in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

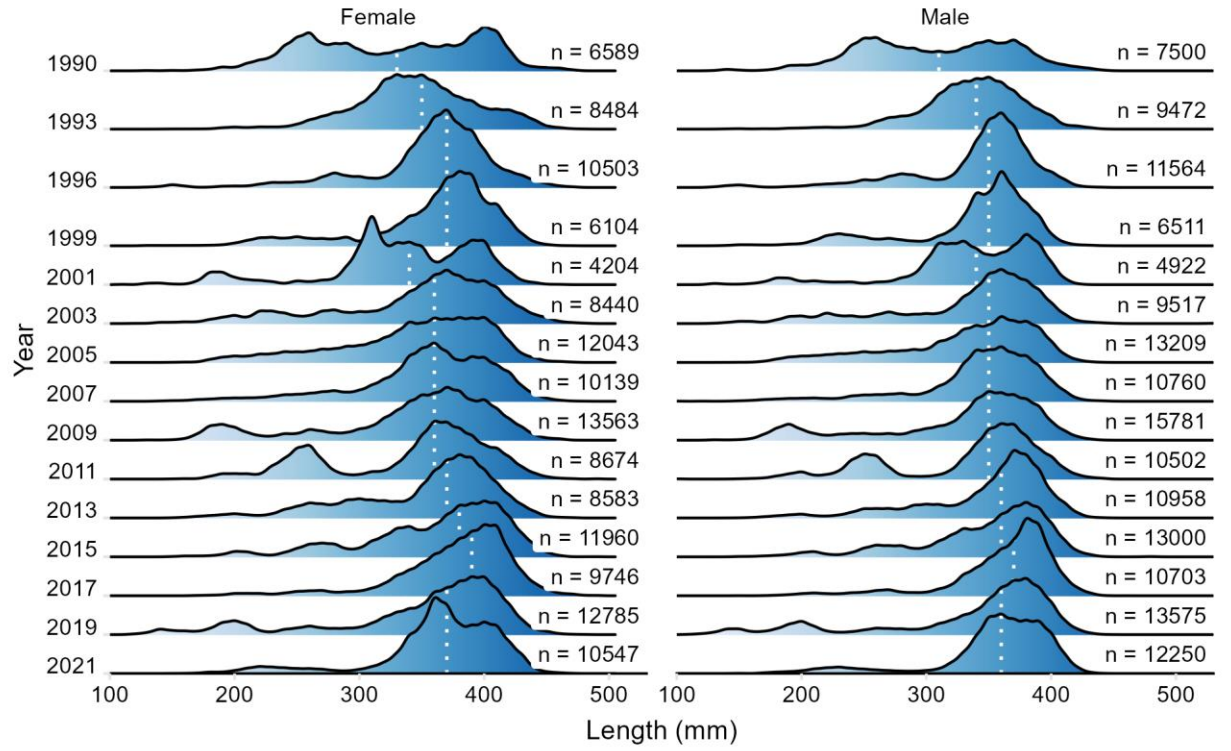

Figure 38. -- Population length composition of Pacific ocean perch in the Gulf of Alaska bottom trawl survey between 1990 and 2021. The dotted vertical line indicates median length.

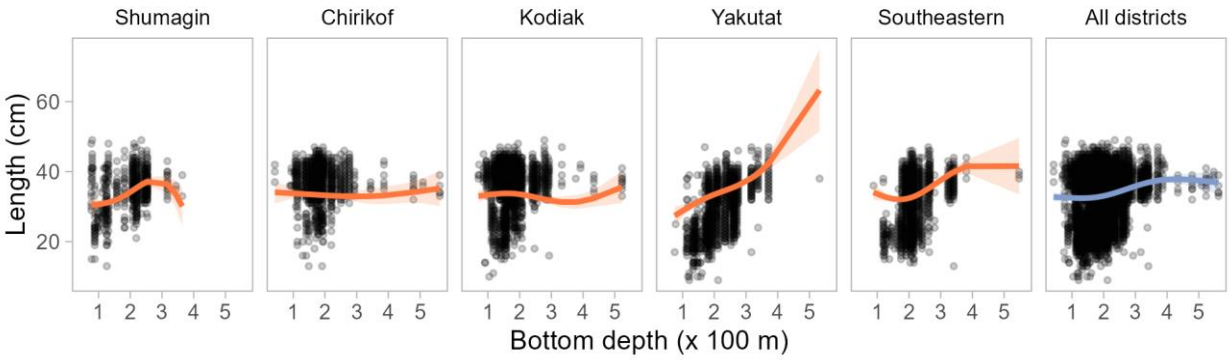

Figure 39. -- Length versus depth for Pacific ocean perch by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where Pacific ocean perch were found.

northern rockfish (*Sebastes polyspinis*)

- The total biomass of northern rockfish was estimated to be 90,670 t in the GOA 2021 survey (Table **30**), which is a 4.5% increase from 2019.
- The largest estimated biomass for northern rockfish was in the Shumagin region and the depth range with the largest estimated biomass was 101 - 200 m.
- The highest CPUEs were recorded in the Shumagin and Chirikof regions (Table **30** and Fig. **40**).
- On average, the longest individuals were found in the Kodiak region and in a depth range of 101 - 200 m (Fig. **41** and Fig. **42**).

Table 30. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing northern rockfish, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	12	805.0	33,239	0.995
Shumagin	101 - 200	27	10	1,370.2	20,111	1.055
Shumagin	201 - 300	11	2	12.0	34	0.872
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**24**	**843.5**	**53,384**	**1.017**
Chirikof	1 - 100	41	7	23.2	605	1.058
Chirikof	101 - 200	51	12	1,096.9	26,160	0.938
Chirikof	201 - 300	16	2	2.9	34	0.69
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**21**	**412.4**	**26,799**	**0.94**
Kodiak	1 - 100	62	4	180.1	6,936	1.089
Kodiak	101 - 200	89	21	82.0	3,552	0.987
Kodiak	201 - 300	18	0	0.0	0	--
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**25**	**107.0**	**10,487**	**1.052**
Yakutat	1 - 100	16	0	0.0	0	--
Yakutat	101 - 200	31	0	0.0	0	--
Yakutat	201 - 300	16	0	0.0	0	--
Yakutat	301 - 500	6	0	0.0	0	--
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**0**	**0.0**	**0**	**--**
Southeastern	1 - 100	7	0	0.0	0	--
Southeastern	101 - 200	23	0	0.0	0	--
Southeastern	201 - 300	13	0	0.0	0	--
Southeastern	301 - 500	8	0	0.0	0	--
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**0**	**0.0**	**0**	**--**
All areas	1 - 100	196	23	316.0	40,780	1.011
All areas	101 - 200	221	43	407.3	49,823	0.986
All areas	201 - 300	74	4	1.9	67	0.77
All areas	301 - 500	28	0	0.0	0	--
All areas	501 - 700	10	0	0.0	0	--
All areas	**All depths**	**529**	**70**	**294.0**	**90,670**	**0.997**

Table 31. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing northern rockfish, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	3	546.4	4,553
Davidson Bank	1 - 100	26	2	641.6	8,778
Lower Alaska Peninsula	1 - 100	14	1	1.2	8
Shumagin Bank	1 - 100	22	6	1,605.0	19,900
Upper Alaska Peninsula	1 - 100	12	2	9.1	72
Semidi Bank	1 - 100	10	3	58.5	427
Chirikof Bank	1 - 100	19	2	9.8	105
Albatross Shallows	1 - 100	11	1	0.8	4
Albatross Banks	1 - 100	25	3	450.0	6,931
Shumagin Outer Shelf	101 - 200	20	10	2,466.5	20,111
East Shumagin Gully	101 - 200	14	3	2,143.1	23,798
Shelikof Edge	101 - 200	19	2	18.3	142
Chirikof Outer Shelf	101 - 200	18	7	443.3	2,221
Albatross Gullies	101 - 200	19	2	5.5	44
Portlock Flats	101 - 200	23	9	56.7	416
Barren Islands	101 - 200	14	3	16.9	186
Kenai Flats	101 - 200	15	1	2.5	31
Kodiak Outer Shelf	101 - 200	18	6	572.1	2,875
Shumagin Slope	201 - 300	11	2	12.0	34
Chirikof Slope	201 - 300	7	2	22.2	34

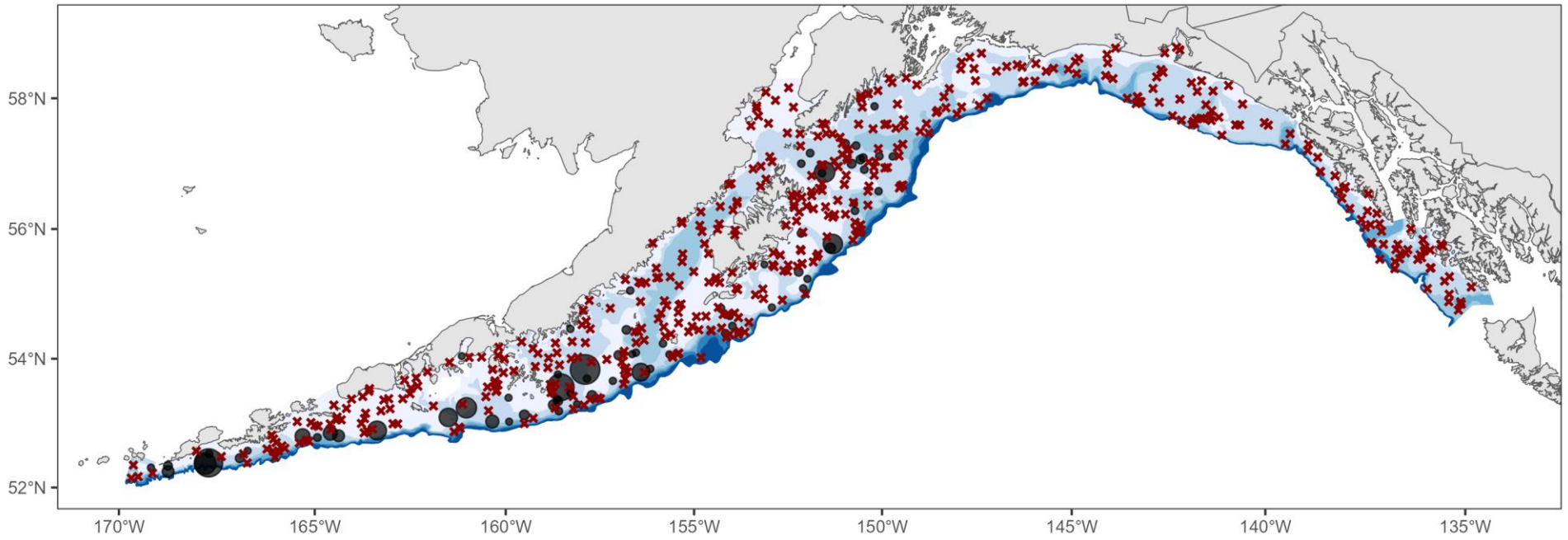

Figure 40. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of northern rockfish in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

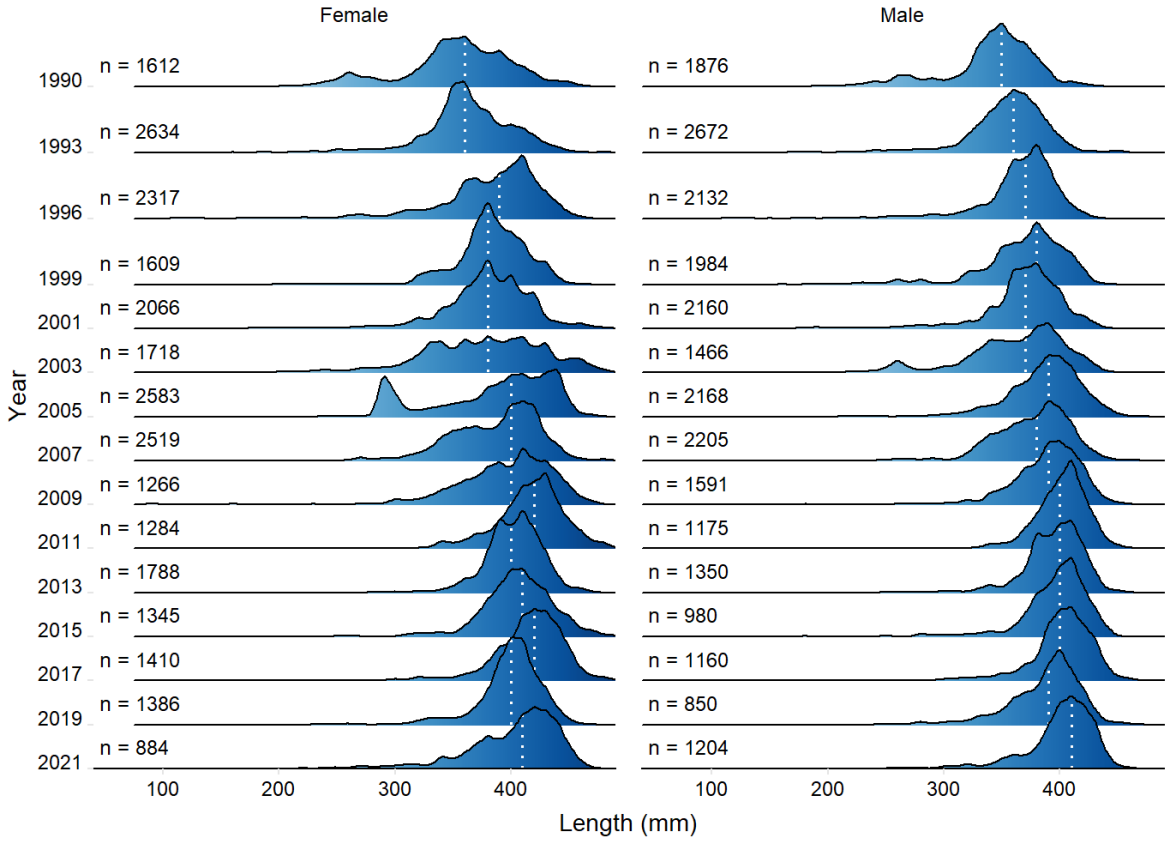

Figure 41. -- Population length composition of northern rockfish in the Gulf of Alaska bottom trawl survey between 1990 and 2021. The dotted vertical line indicates median length.

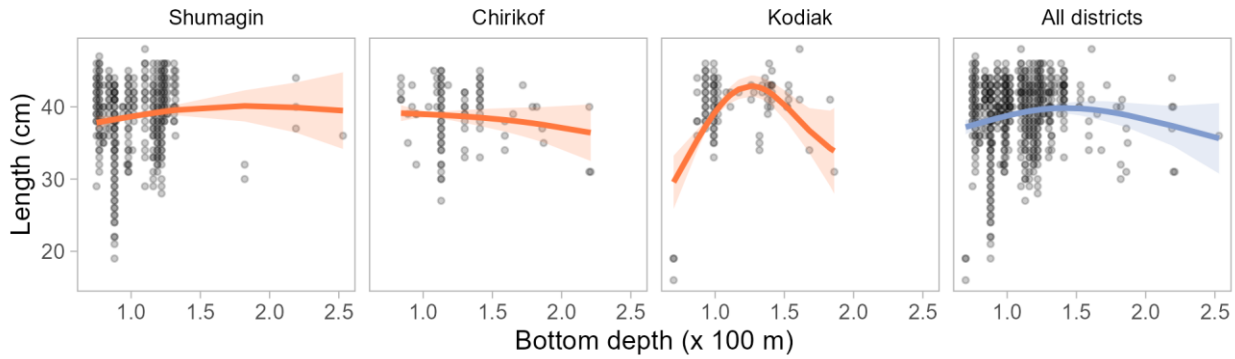

Figure 42. -- Length versus depth for northern rockfish by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where northern rockfish were found.

dusky rockfish (*Sebastes variabilis*)

- The total biomass of dusky rockfish was the estimated to be 107,069 t in the GOA 2021 survey (Table **32**), which is a 21.2% increase from 2019.
- 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 **32** and Fig. **43**).
- On average, the longest individuals were found in the Kodiak region and in a depth range of 201 - 300 m (Fig. **44** and Fig. **45**).

Table 32. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing dusky rockfish, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	8	25.4	1,051	0.859
Shumagin	101 - 200	27	5	62.1	911	1.265
Shumagin	201 - 300	11	3	18.9	53	1.246
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**16**	**31.8**	**2,014**	**1.014**
Chirikof	1 - 100	41	4	3.9	102	0.683
Chirikof	101 - 200	51	16	1,658.2	39,547	1.606
Chirikof	201 - 300	16	4	13.2	153	1.444
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**24**	**612.4**	**39,801**	**1.6**
Kodiak	1 - 100	62	1	0.9	36	1.6
Kodiak	101 - 200	89	34	1,459.5	63,241	1.784
Kodiak	201 - 300	18	3	29.7	341	1.588
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**38**	**649.2**	**63,618**	**1.783**
Yakutat	1 - 100	16	1	2.9	48	1.036
Yakutat	101 - 200	31	3	8.3	244	1.405
Yakutat	201 - 300	16	5	76.3	394	1.625
Yakutat	301 - 500	6	0	0.0	0	--
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**9**	**12.4**	**685**	**1.484**
Southeastern	1 - 100	7	0	0.0	0	--
Southeastern	101 - 200	23	4	72.8	806	1.129
Southeastern	201 - 300	13	4	28.6	145	1.283
Southeastern	301 - 500	8	0	0.0	0	--
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**8**	**35.4**	**951**	**1.15**
All areas	1 - 100	196	14	9.6	1,236	0.858
All areas	101 - 200	221	62	856.3	104,749	1.698
All areas	201 - 300	74	19	30.1	1,085	1.511
All areas	301 - 500	28	0	0.0	0	--
All areas	501 - 700	10	0	0.0	0	--
All areas	**All depths**	**529**	**95**	**347.2**	**107,069**	**1.677**

Table 33. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing dusky rockfish, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	2	31.3	261
Davidson Bank	1 - 100	26	2	44.7	611
Lower Alaska Peninsula	1 - 100	14	1	4.3	29
Shumagin Bank	1 - 100	22	3	12.0	149
Upper Alaska Peninsula	1 - 100	12	2	6.6	53
Chirikof Bank	1 - 100	19	2	4.5	49
Albatross Shallows	1 - 100	11	1	6.2	36
Yakutat Shallows	1 - 100	10	1	4.8	48
Shumagin Outer Shelf	101 - 200	20	5	111.7	911
East Shumagin Gully	101 - 200	14	2	264.0	2,932
Shelikof Edge	101 - 200	19	4	150.8	1,166
Chirikof Outer Shelf	101 - 200	18	10	7,074.5	35,449
Albatross Gullies	101 - 200	19	4	20.8	165
Portlock Flats	101 - 200	23	15	1,378.8	10,116
Barren Islands	101 - 200	14	4	227.5	2,498
Kenai Flats	101 - 200	15	4	388.1	4,687
Kodiak Outer Shelf	101 - 200	18	7	9,108.1	45,775
Yakataga Shelf	101 - 200	6	1	21.6	114
Yakutat Flats	101 - 200	8	2	14.4	130
Baranof-Chichagof Shelf	101 - 200	10	3	180.2	756
Prince of Wales Shelf	101 - 200	13	1	7.3	50
Shumagin Slope	201 - 300	11	3	18.9	53
Lower Shelikof Gully	201 - 300	9	1	6.1	61
Chirikof Slope	201 - 300	7	3	59.9	92
Kenai Gullies	201 - 300	9	2	28.0	186
Kodiak Slope	201 - 300	6	1	95.2	155
Yakutat Gullies	201 - 300	7	2	19.1	58
Yakutat Slope	201 - 300	9	3	158.0	336
Baranof-Chichagof Slope	201 - 300	3	1	18.2	20
Prince of Wales Slope/Gullies	201 - 300	10	3	31.6	124

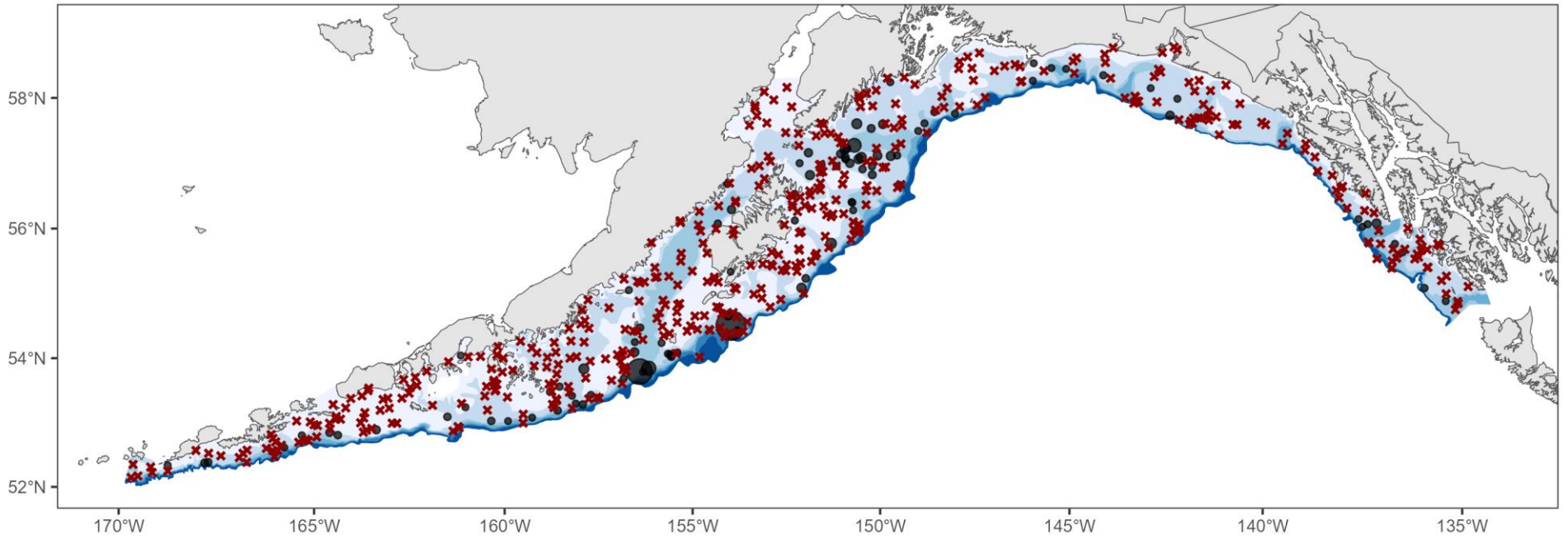

Figure 43. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of dusky rockfish in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

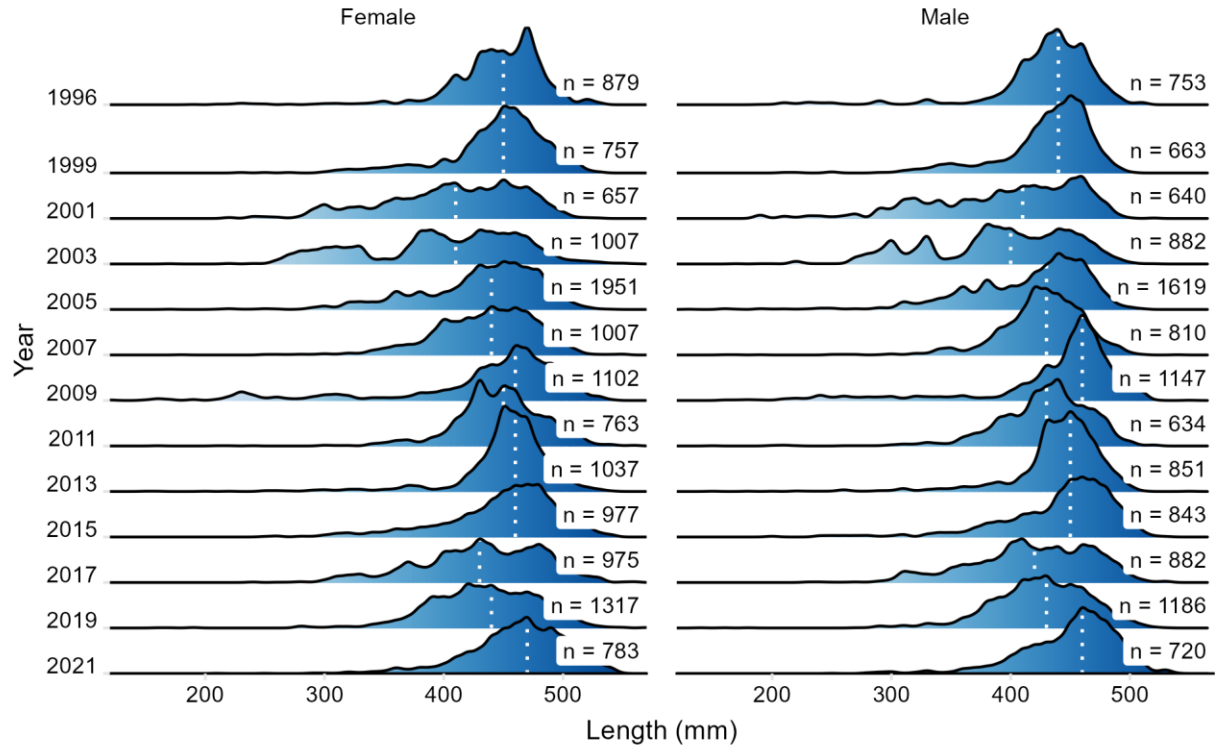

Figure 44. -- Population length composition of dusky rockfish in the Gulf of Alaska bottom trawl survey between 1996 and 2021. The dotted vertical line indicates median length.

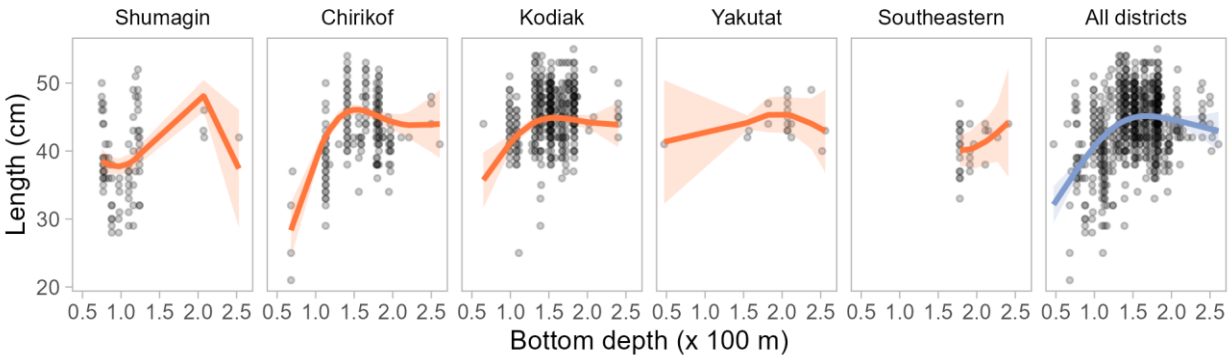

Figure 45. -- Length versus depth for dusky rockfish by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where dusky rockfish were found.

shortspine thornyhead (*Sebastolobus alascanus*)

- The total biomass of shortspine thornyhead was estimated to be 68,224 t in the GOA 2021 survey (Table **34**), which is a 13.1% decrease from 2019.
- 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 **34** and Fig. **46**).
- On average, the longest individuals were found in the Shumagin region and in a depth range of 1 - 100 m (Fig. **47** and Fig. **48**).

Table 34. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing shortspine thornyhead, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	3	1.5	61	0.344
Shumagin	101 - 200	27	4	1.7	25	0.191
Shumagin	201 - 300	11	9	795.5	2,218	0.306
Shumagin	301 - 500	4	4	3,208.1	8,120	0.338
Shumagin	501 - 700	2	2	2,128.4	4,269	0.259
Shumagin	**All depths**	**114**	**22**	**232.1**	**14,693**	**0.306**
Chirikof	1 - 100	41	1	0.6	15	0.3
Chirikof	101 - 200	51	5	42.2	1,007	0.369
Chirikof	201 - 300	16	12	432.1	4,989	0.304
Chirikof	301 - 500	4	4	1,901.6	3,050	0.319
Chirikof	501 - 700	3	3	1,578.2	3,082	0.248
Chirikof	**All depths**	**115**	**25**	**186.9**	**12,143**	**0.295**
Kodiak	1 - 100	62	3	0.4	14	0.236
Kodiak	101 - 200	89	11	26.3	1,141	0.218
Kodiak	201 - 300	18	14	681.3	7,829	0.299
Kodiak	301 - 500	6	6	1,147.2	3,340	0.257
Kodiak	501 - 700	2	2	2,589.4	4,518	0.245
Kodiak	**All depths**	**177**	**36**	**171.9**	**16,842**	**0.268**
Yakutat	1 - 100	16	2	1.1	19	0.226
Yakutat	101 - 200	31	13	91.1	2,677	0.205
Yakutat	201 - 300	16	15	682.6	3,529	0.191
Yakutat	301 - 500	6	6	1,544.4	4,058	0.255
Yakutat	501 - 700	1	1	2,558.1	3,759	0.33
Yakutat	**All depths**	**70**	**37**	**253.9**	**14,042**	**0.238**
Southeastern	1 - 100	7	1	2.3	15	0.2
Southeastern	101 - 200	23	3	18.3	203	0.196
Southeastern	201 - 300	13	10	668.6	3,378	0.163
Southeastern	301 - 500	8	8	1,676.4	5,225	0.231
Southeastern	501 - 700	2	2	1,629.2	1,684	0.454
Southeastern	**All depths**	**53**	**24**	**391.5**	**10,505**	**0.218**
All areas	1 - 100	196	10	1.0	123	0.278
All areas	101 - 200	221	36	41.3	5,053	0.228
All areas	201 - 300	74	60	608.7	21,942	0.246
All areas	301 - 500	28	28	1,860.2	23,794	0.279
All areas	501 - 700	10	10	2,109.5	17,311	0.277
All areas	**All depths**	**529**	**144**	**221.2**	**68,224**	**0.263**

Table 35. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing shortspine thornyhead, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	1	4.4	37
Shumagin Bank	1 - 100	22	2	1.9	24
Chirikof Bank	1 - 100	19	1	1.4	15
Kenai Peninsula	1 - 100	11	3	2.7	14
Yakutat Shallows	1 - 100	10	2	1.9	19
Southeastern Shallows	1 - 100	7	1	2.3	15
Shumagin Outer Shelf	101 - 200	20	4	3.1	25
East Shumagin Gully	101 - 200	14	3	89.0	988
Shelikof Edge	101 - 200	19	1	0.2	2
Chirikof Outer Shelf	101 - 200	18	1	3.5	17
Albatross Gullies	101 - 200	19	1	6.8	54
Portlock Flats	101 - 200	23	4	9.2	67
Kenai Flats	101 - 200	15	4	74.8	903
Kodiak Outer Shelf	101 - 200	18	2	23.1	116
Middleton Shelf	101 - 200	7	4	40.9	300
Yakataga Shelf	101 - 200	6	5	140.5	741
Yakutat Flats	101 - 200	8	3	159.1	1,437
Fairweather Shelf	101 - 200	10	1	25.7	198
Baranof-Chichagof Shelf	101 - 200	10	3	48.3	203
Shumagin Slope	201 - 300	11	9	795.5	2,218
Lower Shelikof Gully	201 - 300	9	5	298.1	2,987
Chirikof Slope	201 - 300	7	7	1,309.8	2,002
Kenai Gullies	201 - 300	9	8	874.3	5,823
Kodiak Slope	201 - 300	6	6	1,236.3	2,006
Yakutat Gullies	201 - 300	7	7	630.4	1,918
Yakutat Slope	201 - 300	9	8	757.2	1,611
Baranof-Chichagof Slope	201 - 300	3	3	1,722.9	1,939
Prince of Wales Slope/Gullies	201 - 300	10	7	366.5	1,439
Shumagin Slope	301 - 500	4	4	3,208.1	8,120
Chirikof Slope	301 - 500	4	4	1,901.6	3,050
Kodiak Slope	301 - 500	6	6	1,147.2	3,340
Yakutat Gullies	301 - 500	1	1	406.0	449
Yakutat Slope	301 - 500	5	5	2,373.4	3,609
Southeastern Deep Gullies	301 - 500	4	4	892.1	2,091
Southeastern Slope	301 - 500	4	4	4,056.3	3,134
Shumagin Slope	501 - 700	2	2	2,128.4	4,269
Chirikof Slope	501 - 700	3	3	1,578.2	3,082
Kodiak Slope	501 - 700	2	2	2,589.4	4,518
Yakutat Slope	501 - 700	1	1	2,558.1	3,759
Southeastern Slope	501 - 700	2	2	1,629.2	1,684

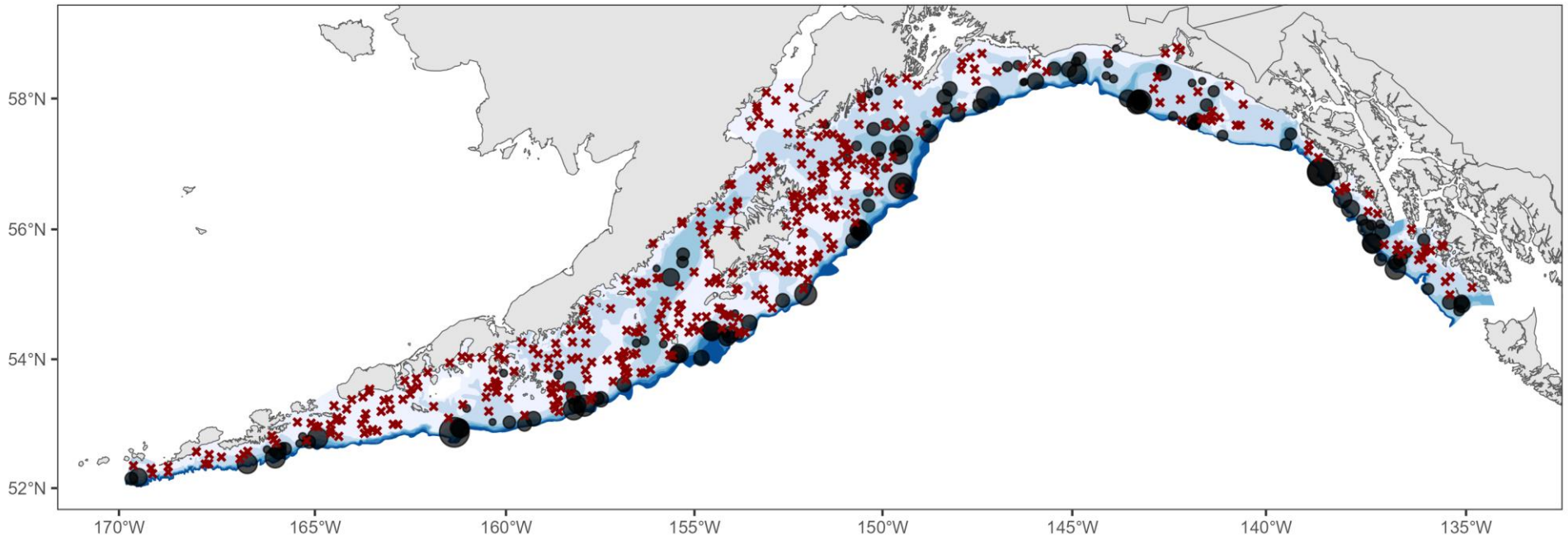

Figure 46. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of shortspine thornyhead in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

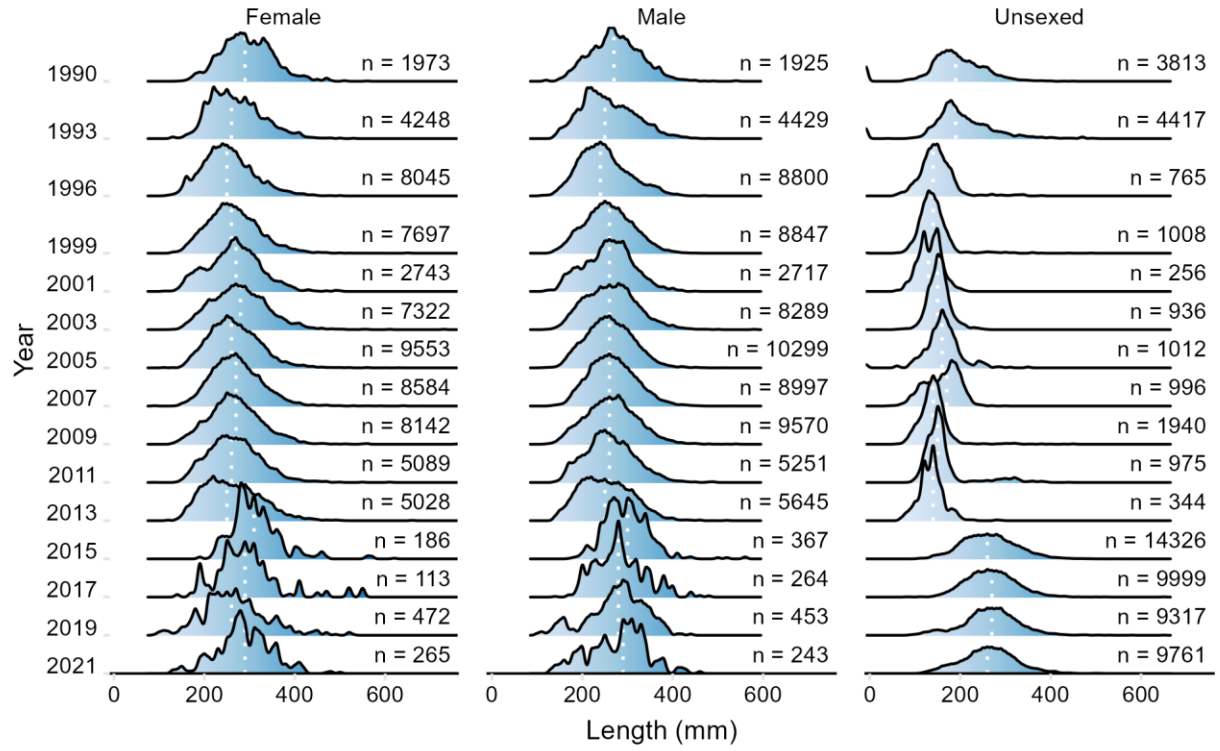

Figure 47. -- Population length composition of shortspine thornyhead in the Gulf of Alaska bottom trawl survey between 1990 and 2021. The dotted vertical line indicates median length.

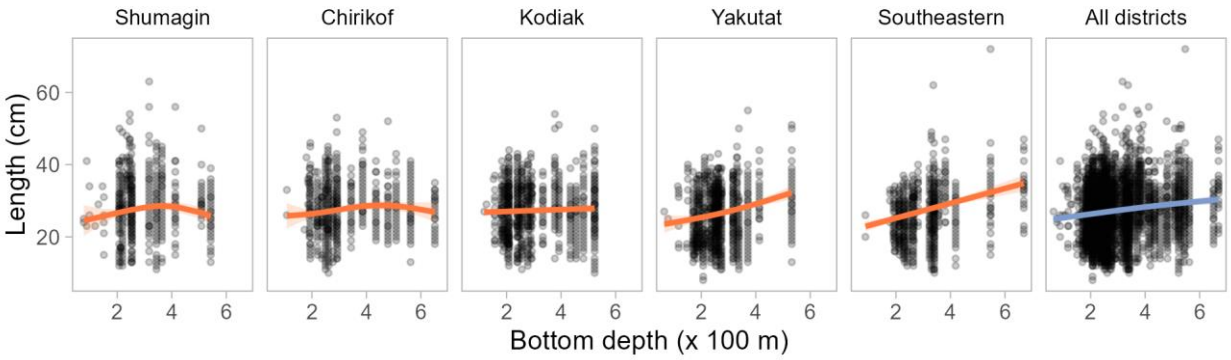

Figure 48. -- Length versus depth for shortspine thornyhead by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where shortspine thornyhead were found.

spiny dogfish (*Squalus suckleyi*)

- The total biomass of spiny dogfish was estimated to be 32,319 t in the GOA 2021 survey (Table **36**), which is a 46.8% increase from 2019.
- The largest estimated biomass for spiny dogfish was in the Yakutat region and the depth range with the largest estimated biomass was 1 - 100 m.
- The highest CPUEs were recorded in the Yakutat and Kodiak regions (Table **36** and Fig. **49**).
- On average, the longest individuals were found in the Shumagin region and in a depth range of 1 - 100 m (Fig. **50** and Fig. **51**).

Table 36. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing spiny dogfish, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	1	3.9	161	6.84
Shumagin	101 - 200	27	0	0.0	0	--
Shumagin	201 - 300	11	0	0.0	0	--
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**1**	**2.5**	**161**	**6.84**
Chirikof	1 - 100	41	4	13.2	343	3.358
Chirikof	101 - 200	51	1	2.0	47	2.92
Chirikof	201 - 300	16	0	0.0	0	--
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**5**	**6.0**	**390**	**3.298**
Kodiak	1 - 100	62	21	268.5	10,341	2.647
Kodiak	101 - 200	89	17	34.9	1,512	2.619
Kodiak	201 - 300	18	3	19.1	219	2.056
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**41**	**123.2**	**12,072**	**2.63**
Yakutat	1 - 100	16	10	559.8	9,327	2.591
Yakutat	101 - 200	31	14	249.3	7,324	2.369
Yakutat	201 - 300	16	3	55.6	287	2.332
Yakutat	301 - 500	6	0	0.0	0	--
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**27**	**306.3**	**16,939**	**2.486**
Southeastern	1 - 100	7	3	395.2	2,587	2.146
Southeastern	101 - 200	23	2	7.0	78	2.249
Southeastern	201 - 300	13	1	18.5	93	3.385
Southeastern	301 - 500	8	0	0.0	0	--
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**6**	**102.8**	**2,758**	**2.176**
All areas	1 - 100	196	39	176.4	22,758	2.576
All areas	101 - 200	221	34	73.3	8,961	2.409
All areas	201 - 300	74	7	16.6	600	2.33
All areas	301 - 500	28	0	0.0	0	--
All areas	501 - 700	10	0	0.0	0	--
All areas	**All depths**	**529**	**80**	**104.8**	**32,319**	**2.522**

Table 37. -- Summary by area and depth interval of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing spiny dogfish, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Davidson Bank	1 - 100	26	1	11.8	161
Upper Alaska Peninsula	1 - 100	12	2	23.3	185
Chirikof Bank	1 - 100	19	2	14.6	158
Albatross Shallows	1 - 100	11	1	8.7	50
Albatross Banks	1 - 100	25	6	224.6	3,460
Lower Cook Inlet	1 - 100	9	7	636.1	6,289
Kenai Peninsula	1 - 100	11	4	60.8	320
Northern Kodiak Shallows	1 - 100	6	3	100.6	221
Yakutat Shallows	1 - 100	10	5	678.4	6,748
Middleton Shallows	1 - 100	6	5	384.1	2,579
Southeastern Shallows	1 - 100	7	3	395.2	2,587
Shelikof Edge	101 - 200	19	1	6.1	47
Portlock Flats	101 - 200	23	6	25.9	190
Barren Islands	101 - 200	14	5	46.9	515
Kenai Flats	101 - 200	15	6	66.8	807
Middleton Shelf	101 - 200	7	3	140.0	1,029
Yakataga Shelf	101 - 200	6	2	179.6	948
Yakutat Flats	101 - 200	8	5	163.3	1,475
Fairweather Shelf	101 - 200	10	4	501.3	3,873
Baranof-Chichagof Shelf	101 - 200	10	2	18.5	78
Kenai Gullies	201 - 300	9	2	21.3	142
Upper Shelikof Gully	201 - 300	3	1	24.1	77
Yakutat Gullies	201 - 300	7	2	88.7	270
Yakutat Slope	201 - 300	9	1	8.2	18
Baranof-Chichagof Slope	201 - 300	3	1	83.1	93

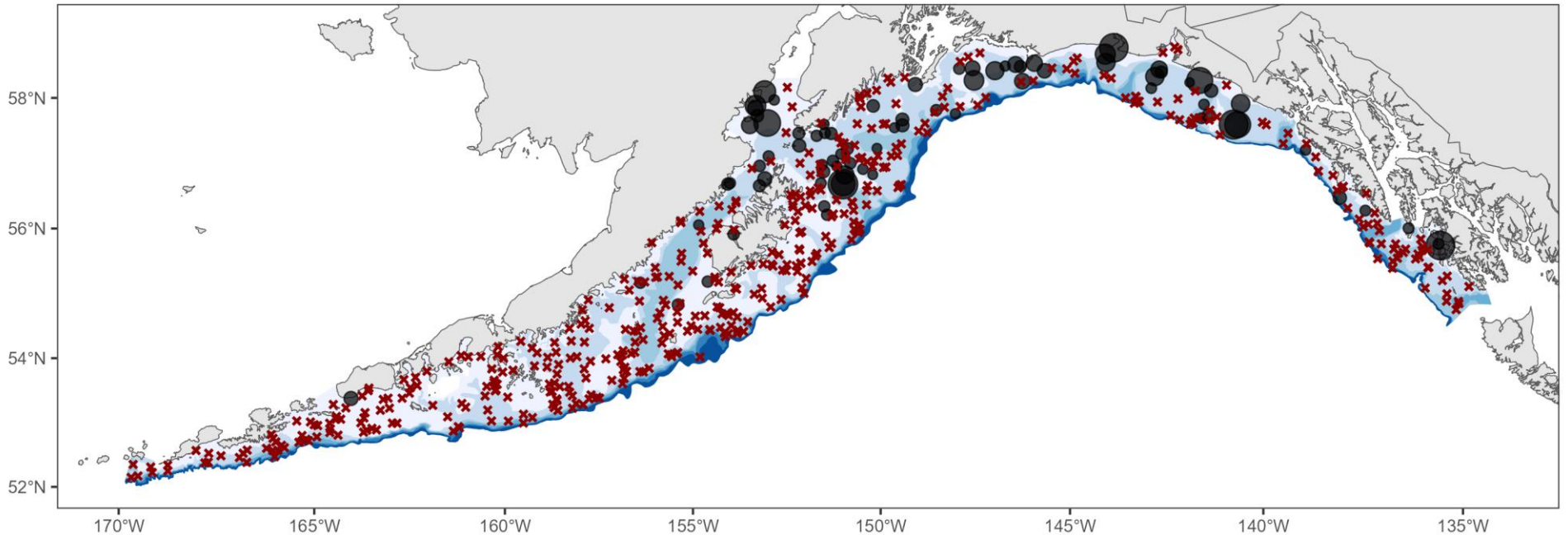

Figure 49. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of spiny dogfish in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

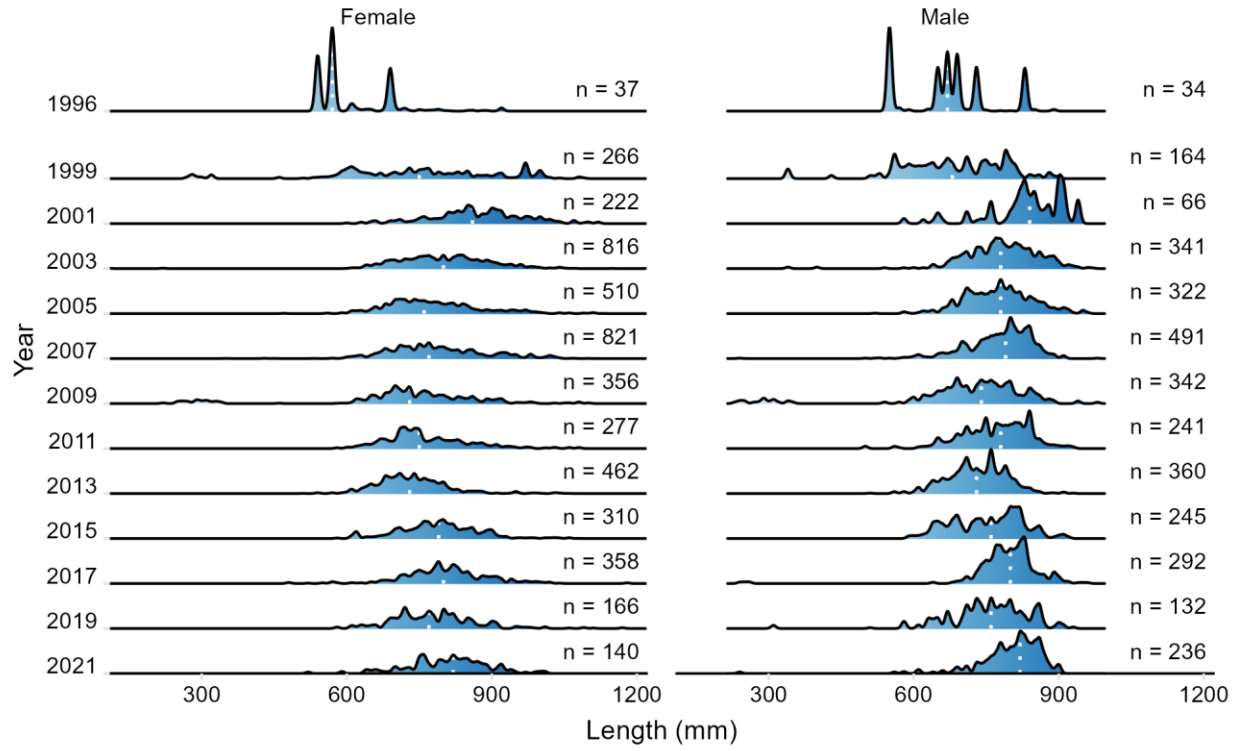

Figure 50. -- Population length composition of spiny dogfish in the Gulf of Alaska bottom trawl survey between 1996 and 2021. The dotted vertical line indicates median length. The start year of 1996 is because this was the first year when total length was used for spiny dogfish.

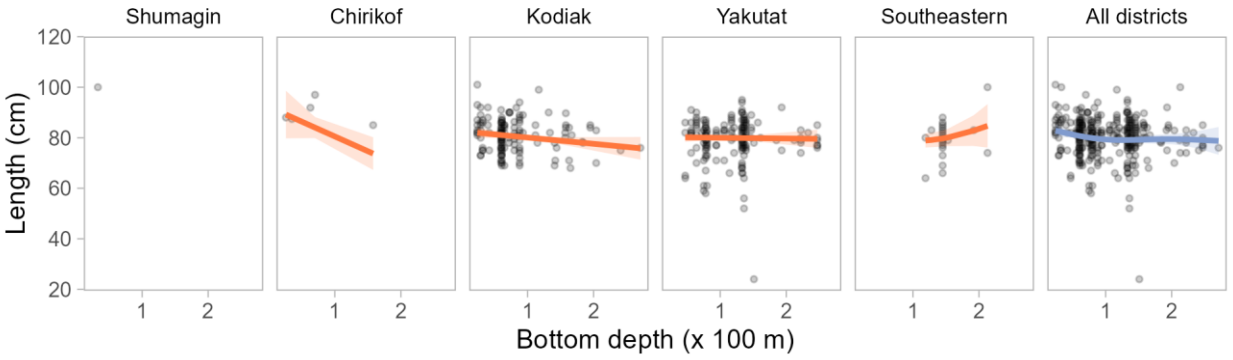

Figure 51. -- Length versus depth for spiny dogfish by survey district in the 2021 Gulf of Alaska bottom trawl survey. Lines represent a GAM of length by depth (with a random haul effect) added to show trends in length. Shaded bands indicate 95% confidence intervals. Semitransparent black points indicate raw (measured) lengths, not expanded to the full population. The x-axis represents the full depth range where spiny dogfish were found.

giant octopus (*Enteroctopus dofleini*)

- The total biomass of giant octopus was estimated to be 1,054 t in the GOA 2021 survey (Table **38**), which is a 91.5% decrease from 2019.
- The largest estimated biomass for giant octopus 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 **38** and Fig. **52**).

Table 38. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of trawl hauls), number of hauls containing giant octopus, their mean CPUE and biomass estimates, and average individual weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	3	3.7	151	3.167
Shumagin	101 - 200	27	1	0.7	10	0.675
Shumagin	201 - 300	11	0	0.0	0	--
Shumagin	301 - 500	4	1	10.1	26	0.372
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**5**	**3.0**	**187**	**1.418**
Chirikof	1 - 100	41	2	14.8	384	17.54
Chirikof	101 - 200	51	3	14.8	353	8.305
Chirikof	201 - 300	16	1	0.2	2	--
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	2	28.0	55	0.811
Chirikof	**All depths**	**115**	**8**	**12.2**	**794**	**6.022**
Kodiak	1 - 100	62	1	1.1	40	1.839
Kodiak	101 - 200	89	2	0.4	18	0.7
Kodiak	201 - 300	18	0	0.0	0	--
Kodiak	301 - 500	6	1	2.1	6	0.363
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**4**	**0.7**	**64**	**1**
Yakutat	1 - 100	16	0	0.0	0	--
Yakutat	101 - 200	31	0	0.0	0	--
Yakutat	201 - 300	16	0	0.0	0	--
Yakutat	301 - 500	6	0	0.0	0	--
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**0**	**0.0**	**0**	**--**
Southeastern	1 - 100	7	0	0.0	0	--
Southeastern	101 - 200	23	0	0.0	0	--
Southeastern	201 - 300	13	2	1.6	8	0.25
Southeastern	301 - 500	8	0	0.0	0	--
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**2**	**0.3**	**8**	**0.25**
All areas	1 - 100	196	6	4.5	576	6.285
All areas	101 - 200	221	6	3.1	381	4.572
All areas	201 - 300	74	3	0.3	10	0.311
All areas	301 - 500	28	2	2.5	32	0.37
All areas	501 - 700	10	2	6.7	55	0.811
All areas	**All depths**	**529**	**19**	**3.4**	**1,054**	**2.925**

Table 39. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2021 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).

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Davidson Bank	1 - 100	26	1	9.9	135
Shumagin Bank	1 - 100	22	2	1.3	16
Semidi Bank	1 - 100	10	1	50.9	372
Chirikof Bank	1 - 100	19	1	1.2	13
Albatross Banks	1 - 100	25	1	2.6	40
Shumagin Outer Shelf	101 - 200	20	1	1.3	10
East Shumagin Gully	101 - 200	14	2	27.8	309
Chirikof Outer Shelf	101 - 200	18	1	8.7	44
Kodiak Outer Shelf	101 - 200	18	2	3.5	18
Chirikof Slope	201 - 300	7	1	1.3	2
Prince of Wales Slope/Gullies	201 - 300	10	2	2.0	8
Shumagin Slope	301 - 500	4	1	10.1	26
Kodiak Slope	301 - 500	6	1	2.1	6
Chirikof Slope	501 - 700	3	2	28.0	55

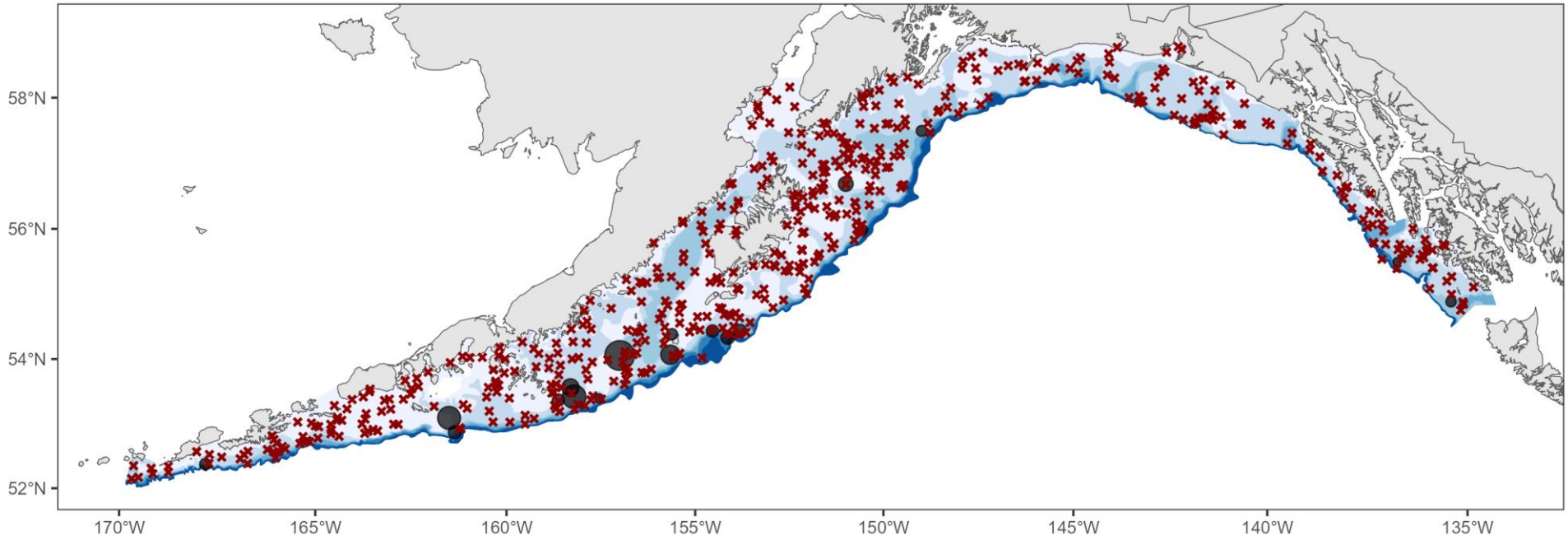

Figure 52. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of giant octopus in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey.

deepwater flatfish complex (*various*)

- The deepwater flatfish complex includes Dover sole (*Microstomus pacificus*), Greenland turbot (*Reinhardtius hippoglossoides*), Kamchatka flounder (*Atheresthes evermanni*), and deepsea sole (*Embassichthys bathybius*).
- The total biomass of the deepwater flatfish complex was estimated to be 46,258 t in the GOA 2021 survey (Table **40**), which is a 3.9% decrease from 2019.
- The largest estimated biomass for the deepwater flatfish complex 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 Southeastern and Yakutat regions (Table **40** and Fig. **53**).
- Length compositions and size by depth are not shown for complexes; these data are available upon request.

Table 40. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing members of the deepwater flatfish complex, and their mean CPUE and biomass estimates.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Shumagin	1 - 100	70	6	1.1	47
Shumagin	101 - 200	27	3	2.3	34
Shumagin	201 - 300	11	6	18.3	51
Shumagin	301 - 500	4	3	50.0	127
Shumagin	501 - 700	2	1	63.9	128
Shumagin	**All depths**	**114**	**19**	**6.1**	**387**
Chirikof	1 - 100	41	10	59.8	1,556
Chirikof	101 - 200	51	32	82.3	1,963
Chirikof	201 - 300	16	12	108.8	1,256
Chirikof	301 - 500	4	3	104.5	168
Chirikof	501 - 700	3	2	147.1	287
Chirikof	**All depths**	**115**	**59**	**80.5**	**5,230**
Kodiak	1 - 100	62	18	21.2	815
Kodiak	101 - 200	89	69	136.0	5,891
Kodiak	201 - 300	18	12	345.7	3,972
Kodiak	301 - 500	6	5	98.5	287
Kodiak	501 - 700	2	2	707.0	1,234
Kodiak	**All depths**	**177**	**106**	**124.5**	**12,199**
Yakutat	1 - 100	16	10	283.4	4,722
Yakutat	101 - 200	31	22	266.9	7,843
Yakutat	201 - 300	16	16	743.7	3,845
Yakutat	301 - 500	6	5	282.2	741
Yakutat	501 - 700	1	1	456.5	671
Yakutat	**All depths**	**70**	**54**	**322.2**	**17,822**
Southeastern	1 - 100	7	4	450.2	2,947
Southeastern	101 - 200	23	14	140.2	1,554
Southeastern	201 - 300	13	13	543.2	2,744
Southeastern	301 - 500	8	7	967.3	3,015
Southeastern	501 - 700	2	2	347.4	359
Southeastern	**All depths**	**53**	**40**	**395.8**	**10,619**
All areas	1 - 100	196	48	78.2	10,087
All areas	101 - 200	221	140	141.3	17,285
All areas	201 - 300	74	59	329.3	11,869
All areas	301 - 500	28	23	339.1	4,338
All areas	501 - 700	10	8	326.4	2,679
All areas	**All depths**	**529**	**278**	**150.0**	**46,258**

Table 41. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing members of the deepwater flatfish complex, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	1	0.4	3
Lower Alaska Peninsula	1 - 100	14	4	5.4	37
Shumagin Bank	1 - 100	22	1	0.6	7
Upper Alaska Peninsula	1 - 100	12	7	62.0	493
Semidi Bank	1 - 100	10	1	4.4	32
Chirikof Bank	1 - 100	19	2	95.6	1,031
Albatross Shallows	1 - 100	11	6	96.7	558
Albatross Banks	1 - 100	25	4	8.3	128
Lower Cook Inlet	1 - 100	9	1	0.7	7
Kenai Peninsula	1 - 100	11	3	9.5	50
Northern Kodiak Shallows	1 - 100	6	4	33.0	73
Yakutat Shallows	1 - 100	10	7	197.4	1,964
Middleton Shallows	1 - 100	6	3	410.8	2,758
Southeastern Shallows	1 - 100	7	4	450.2	2,947
Shumagin Outer Shelf	101 - 200	20	3	4.2	34
East Shumagin Gully	101 - 200	14	7	17.9	199
Shelikof Edge	101 - 200	19	14	194.2	1,502
Chirikof Outer Shelf	101 - 200	18	11	52.4	262
Albatross Gullies	101 - 200	19	15	229.7	1,818
Portlock Flats	101 - 200	23	20	146.1	1,072
Barren Islands	101 - 200	14	12	70.2	770
Kenai Flats	101 - 200	15	14	163.2	1,971
Kodiak Outer Shelf	101 - 200	18	8	51.8	260
Middleton Shelf	101 - 200	7	4	431.9	3,173
Yakataga Shelf	101 - 200	6	5	208.9	1,102
Yakutat Flats	101 - 200	8	7	266.1	2,403
Fairweather Shelf	101 - 200	10	6	150.8	1,165
Baranof-Chichagof Shelf	101 - 200	10	9	214.5	900
Prince of Wales Shelf	101 - 200	13	5	94.9	654
Shumagin Slope	201 - 300	11	6	18.3	51
Lower Shelikof Gully	201 - 300	9	6	107.7	1,079
Chirikof Slope	201 - 300	7	6	116.1	177
Kenai Gullies	201 - 300	9	8	581.6	3,873
Kodiak Slope	201 - 300	6	4	60.8	99
Yakutat Gullies	201 - 300	7	7	896.9	2,729
Yakutat Slope	201 - 300	9	9	524.6	1,116
Baranof-Chichagof Slope	201 - 300	3	3	196.4	221
Prince of Wales Slope/Gullies	201 - 300	10	10	642.5	2,523

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Shumagin Slope	301 - 500	4	3	50.0	127
Chirikof Slope	301 - 500	4	3	104.5	168
Kodiak Slope	301 - 500	6	5	98.5	287
Yakutat Gullies	301 - 500	1	1	399.0	442
Yakutat Slope	301 - 500	5	4	197.1	300
Southeastern Deep Gullies	301 - 500	4	3	1,137.7	2,667
Southeastern Slope	301 - 500	4	4	450.4	348
Shumagin Slope	501 - 700	2	1	63.9	128
Chirikof Slope	501 - 700	3	2	147.1	287
Kodiak Slope	501 - 700	2	2	707.0	1,234
Yakutat Slope	501 - 700	1	1	456.5	671
Southeastern Slope	501 - 700	2	2	347.4	359

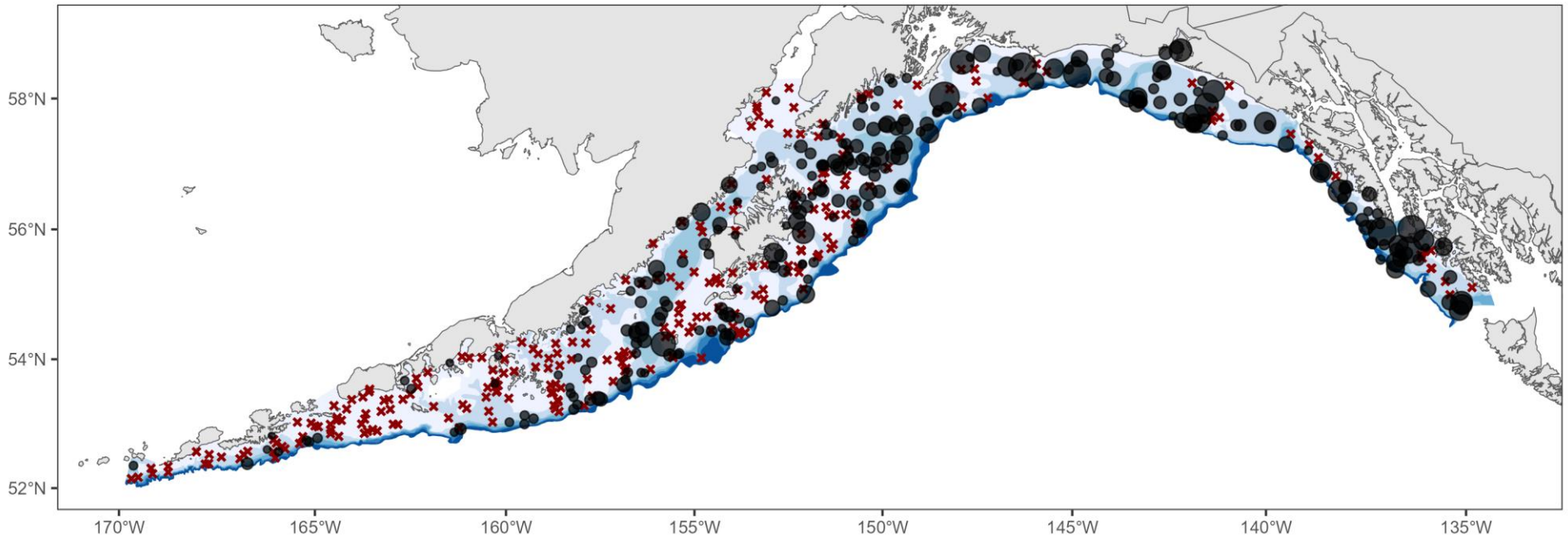

Figure 53. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of the deepwater flatfish complex in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

demersal shelf rockfish (*various*)

- The demersal shelf rockfish includes yelloweye rockfish (*Sebastes ruberrimus*), quillback rockfish (*Sebastes maliger*), copper rockfish (*Sebastes caurinus*), rosethorn rockfish (*Sebastes helvomaculatus*), canary rockfish (*Sebastes pinniger*), tiger rockfish (*Sebastes nigrocinctus*), and China rockfish (*Sebastes nebulosus*).
- The total biomass of the demersal shelf rockfish was estimated to be 160,474 t in the GOA 2021 survey (Table **42**).
- The largest estimated biomass for the demersal shelf rockfish 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 **42** and Fig. **54**).
- Length compositions and size by depth are not shown for complexes; these data are available upon request.

Table 42. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing members of the demersal shelf rockfish, and their mean CPUE and biomass estimates.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	4	3.0	124	0.72
Shumagin	101 - 200	27	1	1.5	22	1.296
Shumagin	201 - 300	11	0	0.0	0	--
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**5**	**2.3**	**147**	**0.773**
Chirikof	1 - 100	41	3	2.9	76	0.297
Chirikof	101 - 200	51	0	0.0	0	--
Chirikof	201 - 300	16	0	0.0	0	--
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**3**	**1.2**	**76**	**0.297**
Kodiak	1 - 100	62	4	1.6	60	0.469
Kodiak	101 - 200	89	9	79.3	3,436	4.77
Kodiak	201 - 300	18	0	0.0	0	--
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**13**	**35.7**	**3,496**	**4.12**
Yakutat	1 - 100	16	1	12.4	207	1.54
Yakutat	101 - 200	31	1	21.2	622	0.765
Yakutat	201 - 300	16	3	48.1	249	0.324
Yakutat	301 - 500	6	1	6.2	16	0.365
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**6**	**19.8**	**1,094**	**0.621**
Southeastern	1 - 100	7	1	42.4	278	1.074
Southeastern	101 - 200	23	9	13,998.5	155,162	1.96
Southeastern	201 - 300	13	5	42.6	215	0.27
Southeastern	301 - 500	8	1	2.1	6	0.273
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**16**	**5,808.8**	**155,870**	**1.938**
All areas	1 - 100	196	13	5.8	745	0.784
All areas	101 - 200	221	20	1,301.8	159,242	1.973
All areas	201 - 300	74	8	12.9	464	0.297
All areas	301 - 500	28	2	1.8	23	0.333
All areas	501 - 700	10	0	0.0	0	--
All areas	**All depths**	**529**	**43**	**520.3**	**160,474**	**1.926**

Table 43. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing members of the demersal shelf rockfish, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	1	0.8	7
Lower Alaska Peninsula	1 - 100	14	1	4.1	28
Shumagin Bank	1 - 100	22	2	7.2	90
Upper Alaska Peninsula	1 - 100	12	3	9.6	76
Albatross Shallows	1 - 100	11	1	3.2	18
Albatross Banks	1 - 100	25	2	2.2	33
Northern Kodiak Shallows	1 - 100	6	1	3.9	8
Middleton Shallows	1 - 100	6	1	30.8	207
Southeastern Shallows	1 - 100	7	1	42.4	278
Shumagin Outer Shelf	101 - 200	20	1	2.8	22
Portlock Flats	101 - 200	23	3	7.1	52
Kenai Flats	101 - 200	15	1	16.5	199
Kodiak Outer Shelf	101 - 200	18	5	633.6	3,184
Fairweather Shelf	101 - 200	10	1	80.4	622
Baranof-Chichagof Shelf	101 - 200	10	2	41.0	172
Prince of Wales Shelf	101 - 200	13	7	22,502.0	154,990
Yakutat Gullies	201 - 300	7	1	2.9	9
Yakutat Slope	201 - 300	9	2	112.8	240
Baranof-Chichagof Slope	201 - 300	3	2	28.7	32
Prince of Wales Slope/Gullies	201 - 300	10	3	46.6	183
Yakutat Slope	301 - 500	5	1	10.7	16
Southeastern Slope	301 - 500	4	1	8.3	6

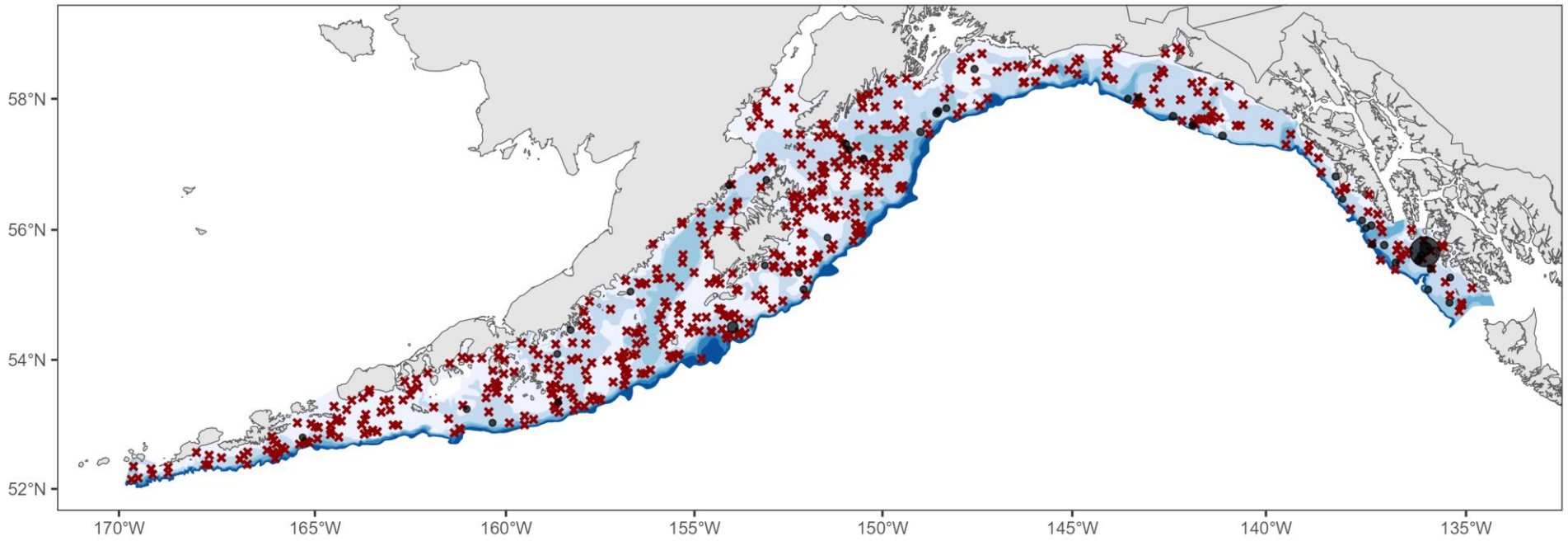

Figure 54. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of the demersal shelf rockfish in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

northern and southern rock sole (*Lepidopsetta polyxystra* and *Lepidopsetta bilineata*)

- The northern and southern rock sole complex includes northern rock sole (*Lepidopsetta polyxystra*) and southern rock sole (*Lepidopsetta bilineata*). It does not include "unidentified rock sole," which are categorized separately in the survey.
- Northern and southern rock sole together were the 8th most abundant stock caught in the 2021 Gulf of Alaska survey. Their total biomass was estimated to be 181,100 t (Table **44**), which is a 28.8% increase from 2019.
- The largest estimated biomass for northern and 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 **44** and Fig. **55**).
- Length compositions and size by depth are not shown for complexes; these data are available upon request.

Table 44. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing northern and southern rock sole, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	69	2,078.5	85,817	0.436
Shumagin	101 - 200	27	21	396.7	5,823	0.633
Shumagin	201 - 300	11	1	1.9	5	0.57
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**91**	**1,448.0**	**91,645**	**0.445**
Chirikof	1 - 100	41	33	1,148.1	29,890	0.6
Chirikof	101 - 200	51	8	17.8	423	0.998
Chirikof	201 - 300	16	0	0.0	0	--
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**41**	**466.5**	**30,314**	**0.604**
Kodiak	1 - 100	62	51	1,310.5	50,474	0.501
Kodiak	101 - 200	89	28	76.0	3,295	0.656
Kodiak	201 - 300	18	0	0.0	0	--
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**79**	**548.7**	**53,769**	**0.509**
Yakutat	1 - 100	16	7	143.3	2,387	0.891
Yakutat	101 - 200	31	2	3.5	102	0.646
Yakutat	201 - 300	16	0	0.0	0	--
Yakutat	301 - 500	6	0	0.0	0	--
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**9**	**45.0**	**2,489**	**0.877**
Southeastern	1 - 100	7	3	306.0	2,003	0.449
Southeastern	101 - 200	23	7	79.4	880	0.479
Southeastern	201 - 300	13	0	0.0	0	--
Southeastern	301 - 500	8	0	0.0	0	--
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**10**	**107.4**	**2,883**	**0.458**
All areas	1 - 100	196	163	1,321.8	170,571	0.481
All areas	101 - 200	221	66	86.0	10,523	0.633
All areas	201 - 300	74	1	0.1	5	0.57
All areas	301 - 500	28	0	0.0	0	--
All areas	501 - 700	10	0	0.0	0	--
All areas	**All depths**	**529**	**230**	**587.2**	**181,100**	**0.488**

Table 45. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing members of the northern - southern rock sole complex, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	8	3,338.3	27,817
Davidson Bank	1 - 100	26	26	2,276.6	31,146
Lower Alaska Peninsula	1 - 100	14	14	1,197.2	8,232
Shumagin Bank	1 - 100	22	21	1,501.9	18,622
Upper Alaska Peninsula	1 - 100	12	10	761.7	6,049
Semidi Bank	1 - 100	10	10	1,059.9	7,740
Chirikof Bank	1 - 100	19	13	1,492.0	16,102
Albatross Shallows	1 - 100	11	11	2,443.0	14,086
Albatross Banks	1 - 100	25	24	1,904.0	29,328
Lower Cook Inlet	1 - 100	9	7	399.9	3,953
Kenai Peninsula	1 - 100	11	3	173.2	911
Northern Kodiak Shallows	1 - 100	6	6	998.4	2,196
Yakutat Shallows	1 - 100	10	2	19.6	195
Middleton Shallows	1 - 100	6	5	326.5	2,192
Southeastern Shallows	1 - 100	7	3	306.0	2,003
Sanak Gully	101 - 200	4	3	9.0	38
Shumagin Outer Shelf	101 - 200	20	18	709.4	5,784
East Shumagin Gully	101 - 200	14	1	2.6	29
Shelikof Edge	101 - 200	19	1	3.8	29
Chirikof Outer Shelf	101 - 200	18	6	72.8	365
Albatross Gullies	101 - 200	19	6	21.9	173
Portlock Flats	101 - 200	23	4	21.6	158
Barren Islands	101 - 200	14	3	100.9	1,108
Kenai Flats	101 - 200	15	3	5.9	71
Kodiak Outer Shelf	101 - 200	18	12	355.1	1,785
Fairweather Shelf	101 - 200	10	2	13.3	102
Baranof-Chichagof Shelf	101 - 200	10	3	64.1	269
Prince of Wales Shelf	101 - 200	13	4	88.6	610
Shumagin Slope	201 - 300	11	1	1.9	5

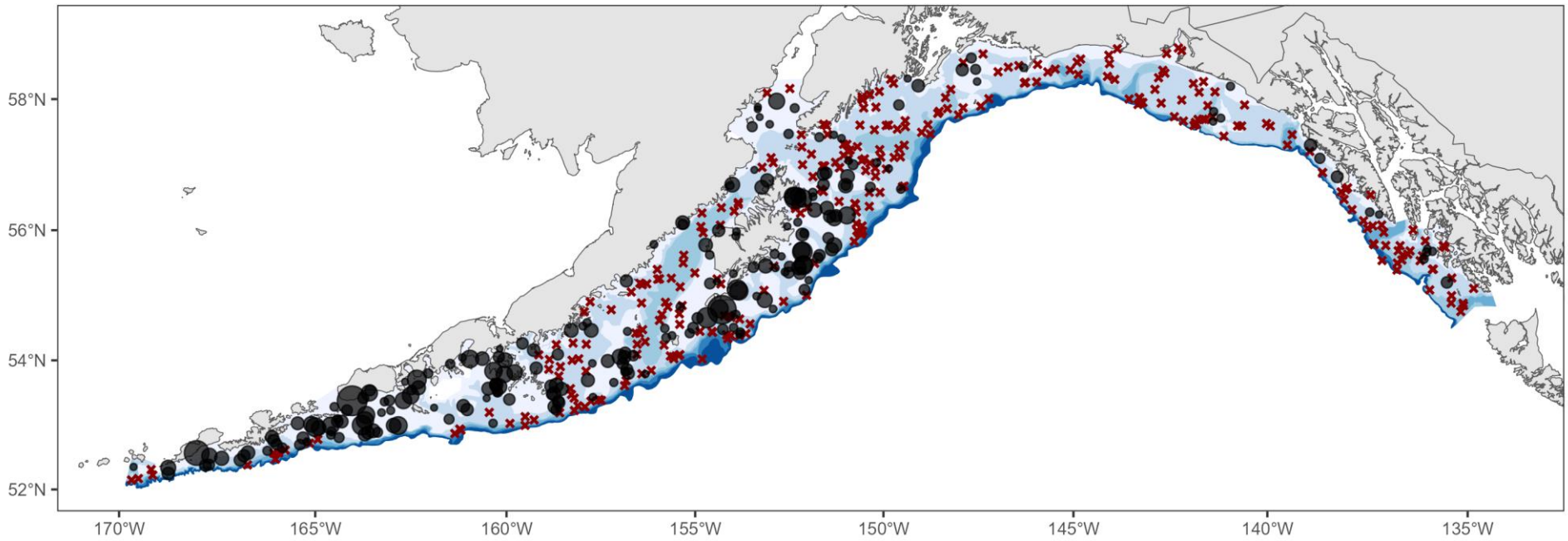

Figure 55. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of the northern - southern rock sole complex in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

other rockfish complex (*various*)

- The other rockfish complex includes aurora rockfish (*Sebastes aurora*), blackgill rockfish (*Sebastes melanostomus*), bocaccio (*Sebastes paucispinus*), chilipepper rockfish (*Sebastes goodei*), darkblotched rockfish (*Sebastes crameri*), greenstriped rockfish (*Sebastes elongatus*), harlequin rockfish (*Sebastes variegatus*), northern rockfish (*Sebastes polyspinis*), pygmy rockfish (*Sebastes wilsoni*), redbanded rockfish (*Sebastes babcocki*), redstripe rockfish (*Sebastes proriger*), sharpchin rockfish (*Sebastes zacentrus*), shortbelly rockfish (*Sebastes jordani*), silvergray rockfish (*Sebastes brevispinis*), splitnose rockfish (*Sebastes diploproa*), stripetail rockfish (*Sebastes saxicola*), vermilion rockfish (*Sebastes miniatus*), widow rockfish (*Sebastes entomelas*), yellowmouth rockfish (*Sebastes reedi*), and yellowtail rockfish (*Sebastes flavidus*).
- The total biomass of the other rockfish complex was estimated to be 157,596 t in the GOA 2021 survey (Table **46**), which is a <1% increase from 2019.
- The largest estimated biomass for the other rockfish complex was in the Shumagin region and the depth range with the largest estimated biomass was 101 - 200 m.
- The highest CPUEs were recorded in the Southeastern and Shumagin regions (Table **46** and Fig. **56**).
- Length compositions and size by depth are not shown for complexes; these data are available upon request.

Table 46. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing members of the other rockfish complex, and their mean CPUE and biomass estimates.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	12	805.0	33,239	0.995
Shumagin	101 - 200	27	10	1,370.2	20,111	1.055
Shumagin	201 - 300	11	5	36.3	101	0.696
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**27**	**844.5**	**53,451**	**1.016**
Chirikof	1 - 100	41	7	23.2	605	1.058
Chirikof	101 - 200	51	16	1,134.1	27,047	0.937
Chirikof	201 - 300	16	4	42.1	486	1.443
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**27**	**433.0**	**28,138**	**0.945**
Kodiak	1 - 100	62	6	191.5	7,377	1.116
Kodiak	101 - 200	89	33	146.9	6,364	1.082
Kodiak	201 - 300	18	6	51.2	588	0.911
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**45**	**146.2**	**14,328**	**1.091**
Yakutat	1 - 100	16	2	13.3	221	1.354
Yakutat	101 - 200	31	13	526.8	15,478	1.423
Yakutat	201 - 300	16	14	636.9	3,293	0.586
Yakutat	301 - 500	6	5	15.7	41	0.618
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**34**	**344.1**	**19,033**	**1.138**
Southeastern	1 - 100	7	4	81.4	533	0.481
Southeastern	101 - 200	23	13	2,657.2	29,453	0.933
Southeastern	201 - 300	13	13	2,288.9	11,564	0.693
Southeastern	301 - 500	8	6	351.1	1,094	1.234
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**36**	**1,589.2**	**42,664**	**0.848**
All areas	1 - 100	196	31	325.3	41,975	1.003
All areas	101 - 200	221	85	804.8	98,452	1.023
All areas	201 - 300	74	42	444.8	16,032	0.684
All areas	301 - 500	28	11	88.8	1,136	1.19
All areas	501 - 700	10	0	0.0	0	--
All areas	**All depths**	**529**	**169**	**511.0**	**157,596**	**0.97**

Table 47. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing members of the other rockfish complex, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	3	546.4	4,553
Davidson Bank	1 - 100	26	2	641.6	8,778
Lower Alaska Peninsula	1 - 100	14	1	1.2	8
Shumagin Bank	1 - 100	22	6	1,605.0	19,900
Upper Alaska Peninsula	1 - 100	12	2	9.1	72
Semidi Bank	1 - 100	10	3	58.5	427
Chirikof Bank	1 - 100	19	2	9.8	105
Albatross Shallows	1 - 100	11	2	71.5	412
Albatross Banks	1 - 100	25	3	450.0	6,931
Kenai Peninsula	1 - 100	11	1	6.4	34
Yakutat Shallows	1 - 100	10	1	12.4	124
Middleton Shallows	1 - 100	6	1	14.6	98
Southeastern Shallows	1 - 100	7	4	81.4	533
Shumagin Outer Shelf	101 - 200	20	10	2,466.5	20,111
East Shumagin Gully	101 - 200	14	4	2,143.5	23,801
Shelikof Edge	101 - 200	19	4	71.1	550
Chirikof Outer Shelf	101 - 200	18	8	538.0	2,696
Albatross Gullies	101 - 200	19	4	274.2	2,169
Portlock Flats	101 - 200	23	12	125.8	923
Barren Islands	101 - 200	14	4	18.5	203
Kenai Flats	101 - 200	15	5	11.4	137
Kodiak Outer Shelf	101 - 200	18	8	583.1	2,931
Middleton Shelf	101 - 200	7	1	6.3	46
Yakataga Shelf	101 - 200	6	3	51.0	269
Yakutat Flats	101 - 200	8	4	82.6	746
Fairweather Shelf	101 - 200	10	5	1,865.6	14,417
Baranof-Chichagof Shelf	101 - 200	10	4	881.3	3,698
Prince of Wales Shelf	101 - 200	13	9	3,739.2	25,755
Shumagin Slope	201 - 300	11	5	36.3	101
Lower Shelikof Gully	201 - 300	9	1	40.2	403
Chirikof Slope	201 - 300	7	3	54.7	84
Kenai Gullies	201 - 300	9	4	21.2	141
Kodiak Slope	201 - 300	6	2	275.2	446
Yakutat Gullies	201 - 300	7	5	104.5	318
Yakutat Slope	201 - 300	9	9	1,398.4	2,975
Baranof-Chichagof Slope	201 - 300	3	3	2,784.1	3,133
Prince of Wales Slope/Gullies	201 - 300	10	10	2,147.0	8,431
Yakutat Slope	301 - 500	5	5	27.1	41
Southeastern Deep Gullies	301 - 500	4	2	398.6	934
Southeastern Slope	301 - 500	4	4	207.1	160

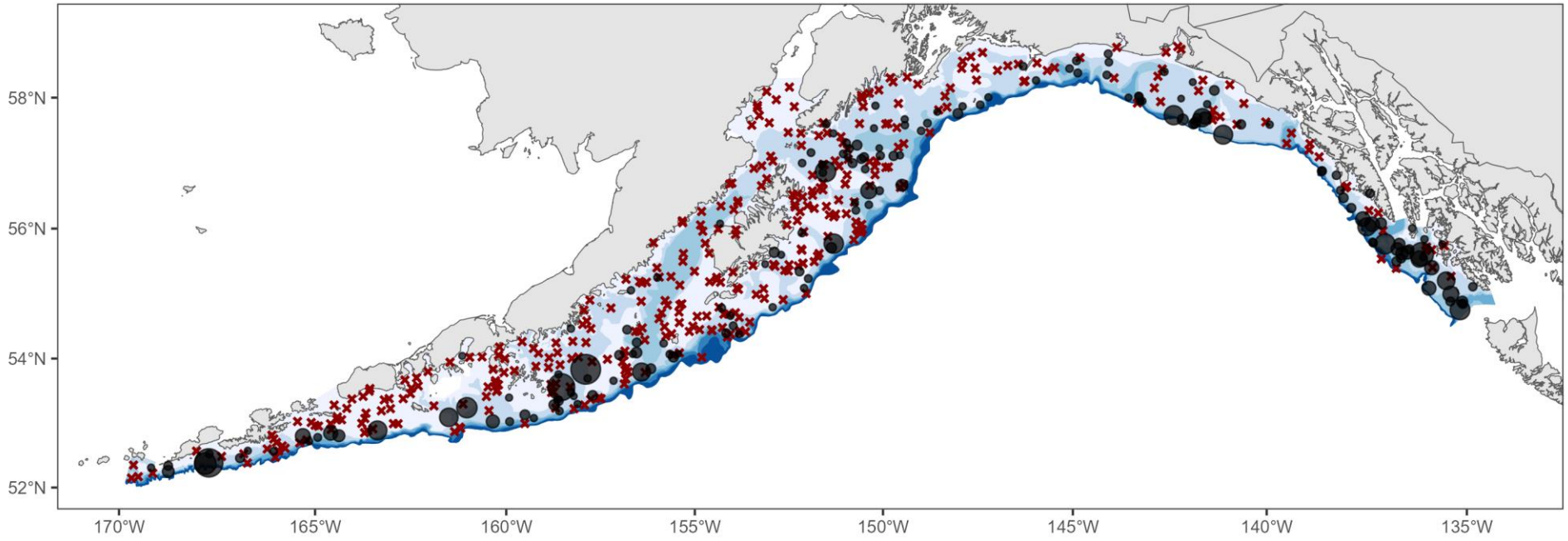

Figure 56. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of the other rockfish complex in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

rougheye-blackspotted rockfish (*various*)

- The rougheye-blackspotted rockfish complex includes rougheye rockfish (*Sebastes aleutianus*), blackspotted rockfish (*Sebastes melanostictus*), and rougheye and blackspotted rockfishes that could not be distinguished from one another.
- The total biomass of rougheye-blackspotted rockfish was estimated to be 24,612 t in the GOA 2021 survey (Table **48**), which is a 55.6% decrease from 2019.
- The largest estimated biomass for rougheye - blackspotted rockfish 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 **48** and Fig. **57**).
- Length compositions and size by depth are not shown for complexes; these data are available upon request.

Table 48. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing members of the rougheye - blackspotted rockfish complex, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	3	1.7	72	0.72
Shumagin	101 - 200	27	5	51.4	754	0.579
Shumagin	201 - 300	11	9	362.0	1,009	0.508
Shumagin	301 - 500	4	3	1,346.1	3,407	1.066
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**20**	**82.8**	**5,242**	**0.797**
Chirikof	1 - 100	41	4	3.3	86	0.282
Chirikof	101 - 200	51	14	33.0	788	0.493
Chirikof	201 - 300	16	10	157.4	1,817	1.056
Chirikof	301 - 500	4	3	353.3	567	1.301
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**31**	**50.1**	**3,258**	**0.803**
Kodiak	1 - 100	62	8	63.5	2,445	0.51
Kodiak	101 - 200	89	24	108.2	4,688	0.557
Kodiak	201 - 300	18	16	133.3	1,531	0.593
Kodiak	301 - 500	6	5	253.8	739	1.333
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**53**	**96.0**	**9,403**	**0.575**
Yakutat	1 - 100	16	4	4.4	73	0.197
Yakutat	101 - 200	31	16	34.8	1,022	0.221
Yakutat	201 - 300	16	11	202.4	1,046	0.545
Yakutat	301 - 500	6	5	484.7	1,274	1.156
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**36**	**61.7**	**3,415**	**0.426**
Southeastern	1 - 100	7	2	133.0	871	0.444
Southeastern	101 - 200	23	0	0.0	0	--
Southeastern	201 - 300	13	1	4.0	20	0.68
Southeastern	301 - 500	8	7	735.6	2,293	1.694
Southeastern	501 - 700	2	1	105.8	109	1.92
Southeastern	**All depths**	**53**	**11**	**122.7**	**3,293**	**0.968**
All areas	1 - 100	196	21	27.5	3,547	0.471
All areas	101 - 200	221	59	59.3	7,252	0.455
All areas	201 - 300	74	47	150.5	5,425	0.658
All areas	301 - 500	28	23	647.2	8,279	1.247
All areas	501 - 700	10	1	13.3	109	1.92
All areas	**All depths**	**529**	**151**	**79.8**	**24,612**	**0.641**

Table 49. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing members of the rougheye - blackspotted rockfish complex, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	1	4.0	33
Lower Alaska Peninsula	1 - 100	14	1	2.1	14
Shumagin Bank	1 - 100	22	1	1.9	24
Upper Alaska Peninsula	1 - 100	12	2	5.5	44
Chirikof Bank	1 - 100	19	2	3.9	42
Albatross Shallows	1 - 100	11	1	8.4	49
Kenai Peninsula	1 - 100	11	6	453.8	2,387
Northern Kodiak Shallows	1 - 100	6	1	4.5	10
Yakutat Shallows	1 - 100	10	2	6.2	62
Middleton Shallows	1 - 100	6	2	1.8	12
Southeastern Shallows	1 - 100	7	2	133.0	871
Shumagin Outer Shelf	101 - 200	20	2	67.5	550
West Shumagin Gully	101 - 200	3	3	89.6	204
East Shumagin Gully	101 - 200	14	7	43.5	483
Shelikof Edge	101 - 200	19	7	39.5	306
Albatross Gullies	101 - 200	19	5	101.2	801
Portlock Flats	101 - 200	23	6	24.1	177
Barren Islands	101 - 200	14	4	39.1	429
Kenai Flats	101 - 200	15	8	269.7	3,257
Kodiak Outer Shelf	101 - 200	18	1	4.8	24
Middleton Shelf	101 - 200	7	5	53.2	391
Yakataga Shelf	101 - 200	6	5	48.3	255
Yakutat Flats	101 - 200	8	6	41.7	376
Shumagin Slope	201 - 300	11	9	362.0	1,009
Lower Shelikof Gully	201 - 300	9	5	111.5	1,117
Chirikof Slope	201 - 300	7	5	458.1	700
Kenai Gullies	201 - 300	9	9	130.8	871
Kodiak Slope	201 - 300	6	4	132.4	215
Upper Shelikof Gully	201 - 300	3	3	138.8	445
Yakutat Gullies	201 - 300	7	4	206.9	630
Yakutat Slope	201 - 300	9	7	196.0	417
Prince of Wales Slope/Gullies	201 - 300	10	1	5.2	20
Shumagin Slope	301 - 500	4	3	1,346.1	3,407
Chirikof Slope	301 - 500	4	3	353.3	567
Kodiak Slope	301 - 500	6	5	253.8	739
Yakutat Gullies	301 - 500	1	1	435.2	482
Yakutat Slope	301 - 500	5	4	520.7	792
Southeastern Deep Gullies	301 - 500	4	3	566.8	1,329
Southeastern Slope	301 - 500	4	4	1,247.6	964
Southeastern Slope	501 - 700	2	1	105.8	109

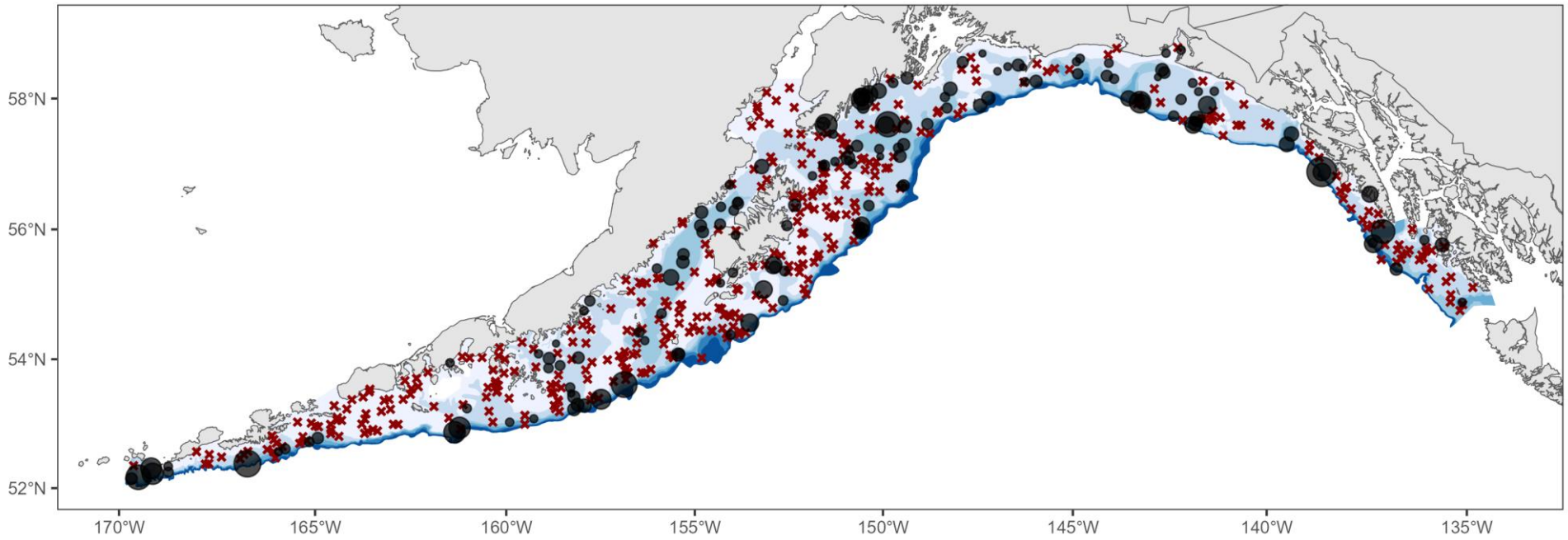

Figure 57. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of the rougheye - blackspotted rockfish complex in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

shallow-water flatfish complex (*various*)

- The shallow-water flatfish complex includes northern rock sole (*Lepidopsetta polyxystra*), southern rock sole (*Lepidopsetta bilineata*), yellowfin sole (*Limanda aspera*), butter sole (*Isopsetta isolepis*), starry flounder (*Platichthys stellatus*), English sole (*Parophrys vetulus*), sand sole (*Psettichthys melanostictus*), and Alaska plaice (*Pleuronectes quadrituberculatus*).
- The shallow-water flatfish complex was the 6th most abundant group caught in the 2021 Gulf of Alaska survey. Their total biomass was estimated to be 275,277 t in 2021 (Table **50**), which is a 17.8% increase from 2019.
- The largest estimated biomass for the shallow-water flatfish complex 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 **50** and Fig. **58**).
- Length compositions and size by depth are not shown for complexes; these data are available upon request.

Table 50. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing members of the shallow-water flatfish complex, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	69	2,660.0	109,828	0.448
Shumagin	101 - 200	27	21	414.3	6,081	0.629
Shumagin	201 - 300	11	1	1.9	5	0.57
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**91**	**1,831.5**	**115,914**	**0.455**
Chirikof	1 - 100	41	40	1,655.4	43,097	0.596
Chirikof	101 - 200	51	14	80.7	1,924	1.524
Chirikof	201 - 300	16	0	0.0	0	--
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	1	4.6	9	0.42
Chirikof	**All depths**	**115**	**55**	**692.9**	**45,030**	**0.612**
Kodiak	1 - 100	62	55	2,203.4	84,867	0.518
Kodiak	101 - 200	89	40	128.3	5,557	0.613
Kodiak	201 - 300	18	1	1.3	15	1.2
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**96**	**922.9**	**90,440**	**0.523**
Yakutat	1 - 100	16	14	939.4	15,651	0.742
Yakutat	101 - 200	31	8	10.4	306	0.552
Yakutat	201 - 300	16	0	0.0	0	--
Yakutat	301 - 500	6	0	0.0	0	--
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**22**	**288.5**	**15,957**	**0.737**
Southeastern	1 - 100	7	6	522.6	3,421	0.478
Southeastern	101 - 200	23	11	407.4	4,515	0.528
Southeastern	201 - 300	13	0	0.0	0	--
Southeastern	301 - 500	8	0	0.0	0	--
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**17**	**295.8**	**7,937**	**0.505**
All areas	1 - 100	193	182	1,993.7	257,284	0.504
All areas	101 - 200	221	94	150.3	18,383	0.632
All areas	201 - 300	74	2	0.6	20	0.928
All areas	301 - 500	28	0	0.0	0	--
All areas	501 - 700	10	1	1.1	9	0.42
All areas	**All depths**	**529**	**281**	**892.6**	**275,277**	**0.511**

Table 51. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing members of the shallow-water flatfish complex, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	8	3,435.9	28,630
Davidson Bank	1 - 100	26	26	2,485.4	34,004
Lower Alaska Peninsula	1 - 100	14	14	3,463.1	23,811
Shumagin Bank	1 - 100	22	21	1,885.8	23,382
Upper Alaska Peninsula	1 - 100	12	12	1,597.5	12,686
Semidi Bank	1 - 100	10	10	1,059.9	7,740
Chirikof Bank	1 - 100	19	18	2,100.8	22,672
Albatross Shallows	1 - 100	11	11	5,033.1	29,021
Albatross Banks	1 - 100	25	25	2,193.8	33,792
Lower Cook Inlet	1 - 100	9	9	1,590.1	15,721
Kenai Peninsula	1 - 100	11	4	195.5	1,029
Northern Kodiak Shallows	1 - 100	6	6	2,411.9	5,305
Yakutat Shallows	1 - 100	10	9	1,324.9	13,179
Middleton Shallows	1 - 100	6	5	368.2	2,472
Southeastern Shallows	1 - 100	7	6	522.6	3,421
Sanak Gully	101 - 200	4	3	19.8	84
Shumagin Outer Shelf	101 - 200	20	18	735.4	5,997
East Shumagin Gully	101 - 200	14	2	6.8	76
Shelikof Edge	101 - 200	19	3	6.5	51
Chirikof Outer Shelf	101 - 200	18	9	358.7	1,797
Albatross Gullies	101 - 200	19	11	287.4	2,274
Portlock Flats	101 - 200	23	9	31.1	228
Barren Islands	101 - 200	14	5	106.6	1,170
Kenai Flats	101 - 200	15	3	8.3	100
Kodiak Outer Shelf	101 - 200	18	12	355.1	1,785
Middleton Shelf	101 - 200	7	4	11.5	84
Yakataga Shelf	101 - 200	6	1	12.5	66
Fairweather Shelf	101 - 200	10	3	20.1	156
Baranof-Chichagof Shelf	101 - 200	10	6	258.7	1,085
Prince of Wales Shelf	101 - 200	13	5	497.9	3,430
Shumagin Slope	201 - 300	11	1	1.9	5
Kodiak Slope	201 - 300	6	1	9.1	15
Chirikof Slope	501 - 700	3	1	4.6	9

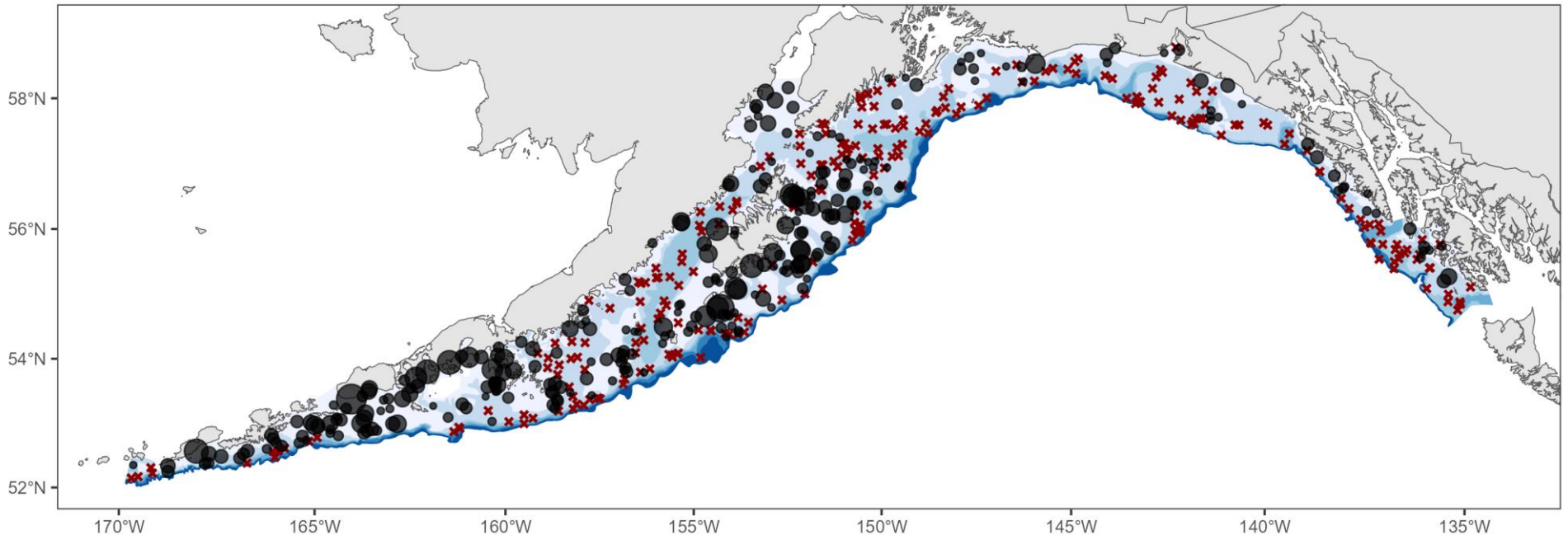

Figure 58. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of the shallow-water flatfish complex in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

sharks (*various*)

- The sharks complex includes spiny dogfish (*Squalus suckleyi*), Pacific sleeper shark (*Somniosus pacificus*), and salmon shark (*Lamna ditropis*). This group is dominated by spiny dogfish.
- The total biomass of sharks was estimated to be 33,555 t in the GOA 2021 survey (Table **52**), which is a 24.8% increase from 2019.
- The largest estimated biomass for sharks was in the Yakutat region and the depth range with the largest estimated biomass was 1 - 100 m.
- The highest CPUEs were recorded in the Yakutat and Kodiak regions (Table **52** and Fig. **59**).
- Length compositions and size by depth are not shown for complexes; these data are available upon request.

Table 52. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing sharks, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	1	3.9	161	6.84
Shumagin	101 - 200	27	1	84.2	1,235	--
Shumagin	201 - 300	11	0	0.0	0	--
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	0	0.0	0	--
Shumagin	**All depths**	**114**	**2**	**22.1**	**1,396**	**59.366**
Chirikof	1 - 100	41	4	13.2	343	3.358
Chirikof	101 - 200	51	1	2.0	47	2.92
Chirikof	201 - 300	16	0	0.0	0	--
Chirikof	301 - 500	4	0	0.0	0	--
Chirikof	501 - 700	3	0	0.0	0	--
Chirikof	**All depths**	**115**	**5**	**6.0**	**390**	**3.298**
Kodiak	1 - 100	62	21	268.5	10,341	2.647
Kodiak	101 - 200	89	17	34.9	1,512	2.619
Kodiak	201 - 300	18	3	19.1	219	2.056
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**41**	**123.2**	**12,072**	**2.63**
Yakutat	1 - 100	16	10	559.8	9,327	2.591
Yakutat	101 - 200	31	14	249.3	7,324	2.369
Yakutat	201 - 300	16	3	55.6	287	2.332
Yakutat	301 - 500	6	0	0.0	0	--
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**27**	**306.3**	**16,939**	**2.486**
Southeastern	1 - 100	7	3	395.2	2,587	2.417
Southeastern	101 - 200	23	2	7.0	78	2.249
Southeastern	201 - 300	13	1	18.5	93	3.385
Southeastern	301 - 500	8	0	0.0	0	--
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**53**	**6**	**102.8**	**2,758**	**2.176**
All areas	1 - 100	196	39	176.4	22,758	2.576
All areas	101 - 200	221	35	83.4	10,197	2.741
All areas	201 - 300	74	7	16.6	600	2.33
All areas	301 - 500	28	0	0.0	0	--
All areas	501 - 700	10	0	0.0	0	--
All areas	**All depths**	**529**	**81**	**108.8**	**33,555**	**2.619**

Table 53. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing sharks, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Davidson Bank	1 - 100	26	1	11.8	161
Upper Alaska Peninsula	1 - 100	12	2	23.3	185
Chirikof Bank	1 - 100	19	2	14.6	158
Albatross Shallows	1 - 100	11	1	8.7	50
Albatross Banks	1 - 100	25	6	224.6	3,460
Lower Cook Inlet	1 - 100	9	7	636.1	6,289
Kenai Peninsula	1 - 100	11	4	60.8	320
Northern Kodiak Shallows	1 - 100	6	3	100.6	221
Yakutat Shallows	1 - 100	10	5	678.4	6,748
Middleton Shallows	1 - 100	6	5	384.1	2,579
Southeastern Shallows	1 - 100	7	3	395.2	2,587
Shumagin Outer Shelf	101 - 200	20	1	151.5	1,235
Shelikof Edge	101 - 200	19	1	6.1	47
Portlock Flats	101 - 200	23	6	25.9	190
Barren Islands	101 - 200	14	5	46.9	515
Kenai Flats	101 - 200	15	6	66.8	807
Middleton Shelf	101 - 200	7	3	140.0	1,029
Yakataga Shelf	101 - 200	6	2	179.6	948
Yakutat Flats	101 - 200	8	5	163.3	1,475
Fairweather Shelf	101 - 200	10	4	501.3	3,873
Baranof-Chichagof Shelf	101 - 200	10	2	18.5	78
Kenai Gullies	201 - 300	9	2	21.3	142
Upper Shelikof Gully	201 - 300	3	1	24.1	77
Yakutat Gullies	201 - 300	7	2	88.7	270
Yakutat Slope	201 - 300	9	1	8.2	18
Baranof-Chichagof Slope	201 - 300	3	1	83.1	93

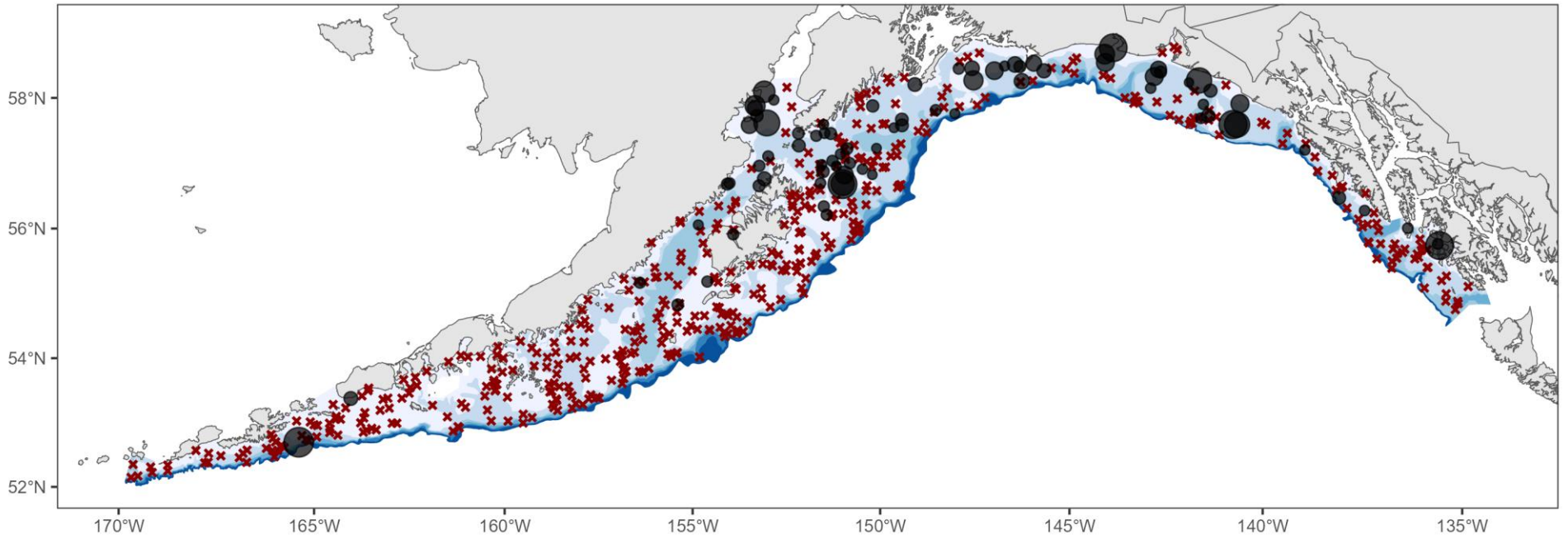

Figure 59. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of sharks in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

skates (*various*)

- The skates complex includes unidentified skates (*Rajidae*), white skate (*Bathyraja spinosissima*), deepsea skate (*Bathyraja abyssicola*), big skate (*Beringraja binoculata*), California skate (*Raja inornata*), Bering skate (*Bathyraja interrupta*), longnose skate (*Beringraja rhina*), roughshoulder skate (*Amblyraja hyperborea*), starry skate (*Raja stellulata*), mud skate (*Bathyraja taranetzi*), roughtail skate (*Bathyraja trachura*), Alaska skate (*Arctoraja parmifera*), Aleutian skate (*Bathyraja aleutica*), commander skate (*Bathyraja lindbergi*), leopard skate (*Bathyraja panthera*), whiteblotched skate (*Bathyraja maculata*), butterfly skate (*Bathyraja mariposa*), whitebrow skate (*Bathyraja minispinosa*), golden skate (*Bathyraja smirnovi*), and Okhotsk skate (*Bathyraja violacea*).
- The total biomass of skates was estimated to be 81,778 t in the GOA 2021 survey (Table **54**), which is a 5.5% decrease from 2019.
- The largest estimated biomass for skates was in the Kodiak region and the depth range with the largest estimated skate biomass was 1 - 100 m.
- The highest CPUEs were recorded in the Chirikof and Kodiak regions (Table **54** and Fig. **60**).
- Length compositions and size by depth are not shown for complexes; these data are available upon request.

Table 54. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing skates, their mean CPUE and biomass estimates, and average fish weight.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)	Average weight (kg)
Shumagin	1 - 100	70	18	175.7	7,255	12.695
Shumagin	101 - 200	27	10	166.7	2,447	8.542
Shumagin	201 - 300	11	3	172.6	481	5.942
Shumagin	301 - 500	4	0	0.0	0	--
Shumagin	501 - 700	2	1	1.7	3	0.077
Shumagin	**All depths**	**114**	**32**	**160.9**	**10,186**	**10.368**
Chirikof	1 - 100	41	16	519.0	13,512	11.842
Chirikof	101 - 200	51	24	323.3	7,710	7.148
Chirikof	201 - 300	16	10	391.6	4,521	6.549
Chirikof	301 - 500	4	1	122.8	197	6.51
Chirikof	501 - 700	3	2	95.9	187	1.882
Chirikof	**All depths**	**115**	**53**	**402.0**	**26,127**	**8.595**
Kodiak	1 - 100	62	33	315.0	12,133	6.861
Kodiak	101 - 200	89	42	301.2	13,052	6.193
Kodiak	201 - 300	18	9	412.3	4,738	5.12
Kodiak	301 - 500	6	0	0.0	0	--
Kodiak	501 - 700	2	0	0.0	0	--
Kodiak	**All depths**	**177**	**84**	**305.4**	**29,923**	**6.232**
Yakutat	1 - 100	16	8	498.3	8,302	5.493
Yakutat	101 - 200	31	11	171.2	5,029	7.07
Yakutat	201 - 300	16	7	144.8	749	5.124
Yakutat	301 - 500	6	1	171.5	451	3.366
Yakutat	501 - 700	1	0	0.0	0	--
Yakutat	**All depths**	**70**	**27**	**262.7**	**14,530**	**5.806**
Southeastern	1 - 100	7	2	22.8	149	0.948
Southeastern	101 - 200	23	3	26.2	291	5.443
Southeastern	201 - 300	13	4	67.8	342	3.689
Southeastern	301 - 500	8	5	73.8	230	2.275
Southeastern	501 - 700	2	0	0.0	0	--
Southeastern	**All depths**	**50**	**13**	**33.1**	**888**	**2.315**
All areas	1 - 100	196	77	320.4	41,350	8.03
All areas	101 - 200	221	90	233.2	28,528	6.733
All areas	201 - 300	74	33	300.5	10,831	5.595
All areas	301 - 500	28	7	68.6	878	3.308
All areas	501 - 700	10	3	23.2	191	1.332
All areas	**All depths**	**529**	**210**	**265.2**	**81,778**	**6.971**

Table 55. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing skates, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	4	349.2	2,910
Davidson Bank	1 - 100	26	6	142.1	1,944
Lower Alaska Peninsula	1 - 100	14	4	207.8	1,429
Shumagin Bank	1 - 100	22	4	78.4	972
Upper Alaska Peninsula	1 - 100	12	5	786.6	6,247
Semidi Bank	1 - 100	10	4	369.2	2,696
Chirikof Bank	1 - 100	19	7	423.4	4,569
Albatross Shallows	1 - 100	11	7	591.5	3,411
Albatross Banks	1 - 100	25	9	177.0	2,726
Lower Cook Inlet	1 - 100	9	5	256.5	2,536
Kenai Peninsula	1 - 100	11	7	444.2	2,337
Northern Kodiak Shallows	1 - 100	6	5	510.9	1,124
Yakutat Shallows	1 - 100	10	5	403.7	4,016
Middleton Shallows	1 - 100	6	3	638.3	4,286
Southeastern Shallows	1 - 100	7	2	22.8	149
Sanak Gully	101 - 200	4	1	161.0	684
Shumagin Outer Shelf	101 - 200	20	6	113.8	928
West Shumagin Gully	101 - 200	3	3	366.8	836
East Shumagin Gully	101 - 200	14	7	311.9	3,463
Shelikof Edge	101 - 200	19	11	453.5	3,507
Chirikof Outer Shelf	101 - 200	18	6	147.5	739
Albatross Gullies	101 - 200	19	7	190.1	1,504
Portlock Flats	101 - 200	23	14	377.8	2,772
Barren Islands	101 - 200	14	8	167.9	1,844
Kenai Flats	101 - 200	15	6	432.3	5,221
Kodiak Outer Shelf	101 - 200	18	7	340.6	1,712
Middleton Shelf	101 - 200	7	5	349.3	2,566
Yakataga Shelf	101 - 200	6	3	184.5	974
Yakutat Flats	101 - 200	8	1	123.0	1,111
Fairweather Shelf	101 - 200	10	2	49.0	379
Baranof-Chichagof Shelf	101 - 200	10	2	46.4	195
Prince of Wales Shelf	101 - 200	13	1	13.9	96
Shumagin Slope	201 - 300	11	3	172.6	481
Lower Shelikof Gully	201 - 300	9	8	444.1	4,449
Chirikof Slope	201 - 300	7	2	47.3	72
Kenai Gullies	201 - 300	9	6	376.0	2,504
Upper Shelikof Gully	201 - 300	3	3	696.3	2,234
Yakutat Gullies	201 - 300	7	2	74.4	226
Yakutat Slope	201 - 300	9	5	245.5	522

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Baranof-Chichagof Slope	201 - 300	3	1	15.3	17
Prince of Wales Slope/Gullies	201 - 300	10	3	82.8	325
Chirikof Slope	301 - 500	4	1	122.8	197
Yakutat Slope	301 - 500	5	1	296.4	451
Southeastern Deep Gullies	301 - 500	4	2	51.7	121
Southeastern Slope	301 - 500	4	3	141.0	109
Shumagin Slope	501 - 700	2	1	1.7	3
Chirikof Slope	501 - 700	3	2	95.9	187

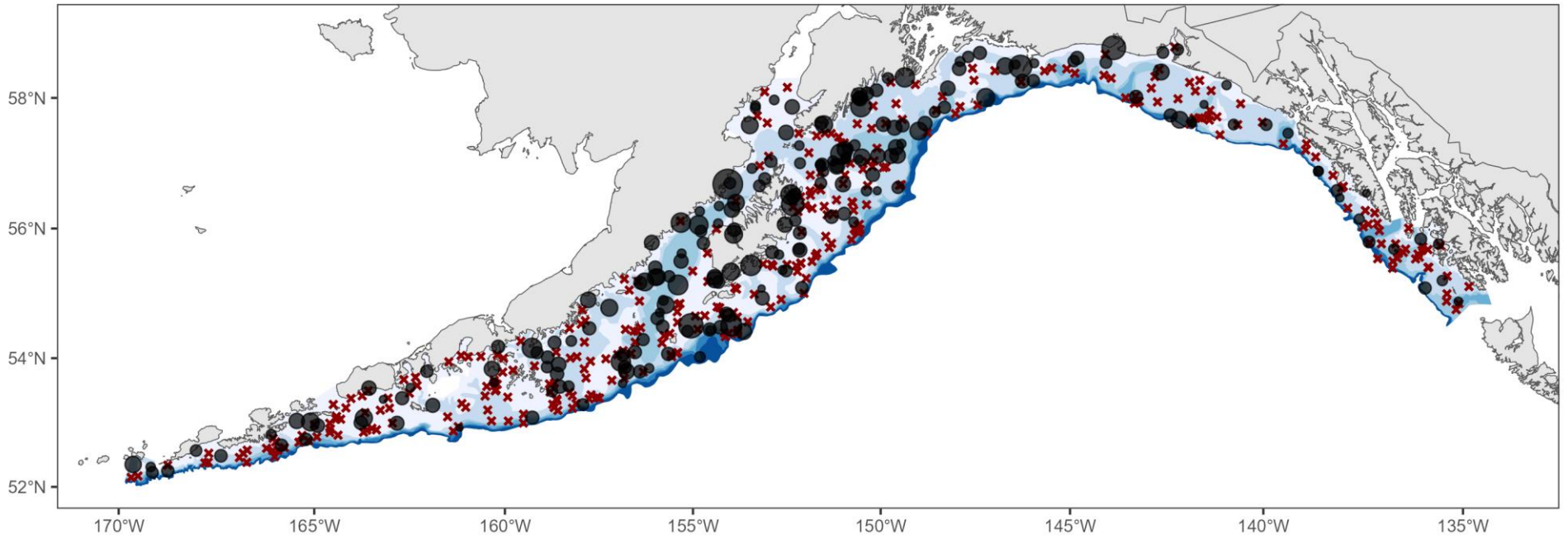

Figure 60. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of skates in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

thornyheads (*various*)

- The thornyheads category includes shortspine thornyhead (*Sebastolobus alascanus*), longspine thornyhead (*Sebastolobus altivelis*), and broadfin thornyhead (*Sebastolobus macrochir*), although longspine and broadfin thornyheads are rare in GOA catches.
- The total biomass of thornyheads was estimated to be 68,853 t in the GOA 2021 survey (Table **56**), which is a 13.1% decrease from 2019.
- The largest estimated biomass for thornyheads 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 **56** and Fig. **61**).
- Length compositions and size by depth are not shown for complexes; these data are available upon request.

Table 56. -- Summary by survey districts and depth intervals of 2021 Gulf of Alaska trawl effort (number of hauls), number of hauls containing thornyheads, their mean CPUE and biomass estimates.

Survey district	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Shumagin	1 - 100	70	3	1.5	61
Shumagin	101 - 200	27	4	1.7	25
Shumagin	201 - 300	11	9	795.5	2,218
Shumagin	301 - 500	4	4	3,208.1	8,120
Shumagin	501 - 700	2	2	2,128.4	4,269
Shumagin	**All depths**	**114**	**22**	**232.1**	**14,693**
Chirikof	1 - 100	41	1	0.6	15
Chirikof	101 - 200	51	5	42.2	1,007
Chirikof	201 - 300	16	12	432.1	4,989
Chirikof	301 - 500	4	4	1,901.6	3,050
Chirikof	501 - 700	3	3	1,578.2	3,082
Chirikof	**All depths**	**115**	**25**	**186.9**	**12,143**
Kodiak	1 - 100	62	3	0.4	14
Kodiak	101 - 200	89	11	26.3	1,141
Kodiak	201 - 300	18	14	681.3	7,829
Kodiak	301 - 500	6	6	1,147.2	3,340
Kodiak	501 - 700	2	2	2,589.4	4,518
Kodiak	**All depths**	**177**	**36**	**171.9**	**16,842**
Yakutat	1 - 100	16	2	1.1	19
Yakutat	101 - 200	31	13	91.1	2,677
Yakutat	201 - 300	16	15	682.6	3,529
Yakutat	301 - 500	6	6	1,544.4	4,058
Yakutat	501 - 700	1	1	2,558.1	3,759
Yakutat	**All depths**	**70**	**37**	**253.9**	**14,042**
Southeastern	1 - 100	7	1	2.3	15
Southeastern	101 - 200	23	3	18.3	203
Southeastern	201 - 300	13	10	668.6	3,378
Southeastern	301 - 500	8	8	1,676.4	5,225
Southeastern	501 - 700	2	2	2,237.7	2,313
Southeastern	**All depths**	**53**	**24**	**414.9**	**11,134**
All areas	1 - 100	196	10	1.0	123
All areas	101 - 200	221	36	41.3	5,053
All areas	201 - 300	74	60	608.7	21,942
All areas	301 - 500	28	28	1,860.2	23,794
All areas	501 - 700	10	10	2,186.2	17,940
All areas	**All depths**	**529**	**144**	**223.2**	**68,853**

Table 57. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2021 Gulf of Alaska survey trawl effort (number of hauls), number of hauls containing thornyheads, and their mean CPUE and biomass estimates.

Stratum name	Depth (m)	Total haul count	Hauls w/ positive catch	CPUE (kg/km^2)	Biomass (t)
Fox Islands	1 - 100	8	1	4.4	37
Shumagin Bank	1 - 100	22	2	1.9	24
Chirikof Bank	1 - 100	19	1	1.4	15
Kenai Peninsula	1 - 100	11	3	2.7	14
Yakutat Shallows	1 - 100	10	2	1.9	19
Southeastern Shallows	1 - 100	7	1	2.3	15
Shumagin Outer Shelf	101 - 200	20	4	3.1	25
East Shumagin Gully	101 - 200	14	3	89.0	988
Shelikof Edge	101 - 200	19	1	0.2	2
Chirikof Outer Shelf	101 - 200	18	1	3.5	17
Albatross Gullies	101 - 200	19	1	6.8	54
Portlock Flats	101 - 200	23	4	9.2	67
Kenai Flats	101 - 200	15	4	74.8	903
Kodiak Outer Shelf	101 - 200	18	2	23.1	116
Middleton Shelf	101 - 200	7	4	40.9	300
Yakataga Shelf	101 - 200	6	5	140.5	741
Yakutat Flats	101 - 200	8	3	159.1	1,437
Fairweather Shelf	101 - 200	10	1	25.7	198
Baranof-Chichagof Shelf	101 - 200	10	3	48.3	203
Shumagin Slope	201 - 300	11	9	795.5	2,218
Lower Shelikof Gully	201 - 300	9	5	298.1	2,987
Chirikof Slope	201 - 300	7	7	1,309.8	2,002
Kenai Gullies	201 - 300	9	8	874.3	5,823
Kodiak Slope	201 - 300	6	6	1,236.3	2,006
Yakutat Gullies	201 - 300	7	7	630.4	1,918
Yakutat Slope	201 - 300	9	8	757.2	1,611
Baranof-Chichagof Slope	201 - 300	3	3	1,722.9	1,939
Prince of Wales Slope/Gullies	201 - 300	10	7	366.5	1,439
Shumagin Slope	301 - 500	4	4	3,208.1	8,120
Chirikof Slope	301 - 500	4	4	1,901.6	3,050
Kodiak Slope	301 - 500	6	6	1,147.2	3,340
Yakutat Gullies	301 - 500	1	1	406.0	449
Yakutat Slope	301 - 500	5	5	2,373.4	3,609
Southeastern Deep Gullies	301 - 500	4	4	892.1	2,091
Southeastern Slope	301 - 500	4	4	4,056.3	3,134
Shumagin Slope	501 - 700	2	2	2,128.4	4,269
Chirikof Slope	501 - 700	3	3	1,578.2	3,082
Kodiak Slope	501 - 700	2	2	2,589.4	4,518
Yakutat Slope	501 - 700	1	1	2,558.1	3,759
Southeastern Slope	501 - 700	2	2	2,237.7	2,313

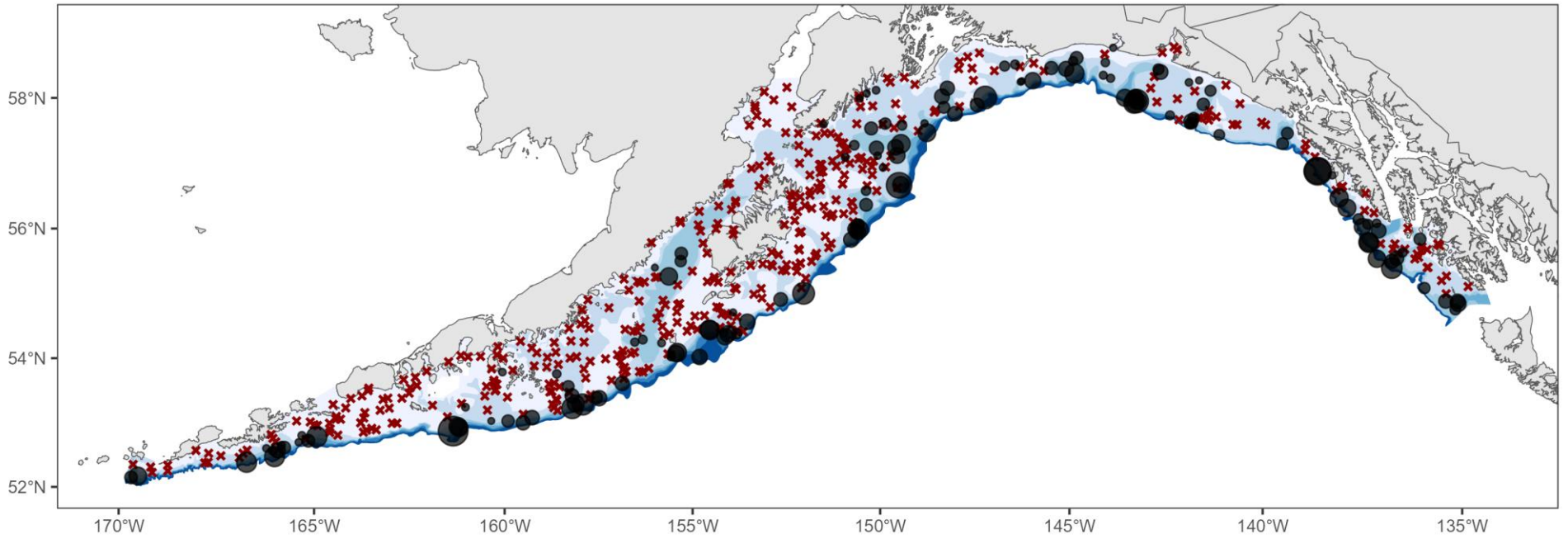

Figure 61. -- Catch per unit effort (CPUE, kg/ha; X = no catch) of thornyheads in the 2021 Gulf of Alaska RACE GAP summer bottom trawl survey. Strata are shaded by their maximum depth (darker colors = deeper).

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Appendices

Appendix A

Appendix Table A1. -- Survey strata used for the 2021 Gulf of Alaska bottom trawl survey including depth, stratum number, name and area.

Depth range (m)	Stratum number	Stratum name	Area (km^2)
1 - 100	10	Fox Islands	8,333
1 - 100	11	Davidson Bank	13,681
1 - 100	12	Lower Alaska Peninsula	6,876
1 - 100	13	Shumagin Bank	12,399
1 - 100	20	Upper Alaska Peninsula	7,941
1 - 100	21	Semidi Bank	7,302
1 - 100	22	Chirikof Bank	10,792
1 - 100	30	Albatross Shallows	5,766
1 - 100	31	Albatross Banks	15,403
1 - 100	32	Lower Cook Inlet	9,887
1 - 100	33	Kenai Peninsula	5,260
1 - 100	35	Northern Kodiak Shallows	2,200
1 - 100	40	Yakutat Shallows	9,947
1 - 100	41	Middleton Shallows	6,714
1 - 100	50	Southeastern Shallows	6,546
101 - 200	110	Sanak Gully	4,245
101 - 200	111	Shumagin Outer Shelf	8,154
101 - 200	112	West Shumagin Gully	2,278
101 - 200	120	East Shumagin Gully	11,104
101 - 200	121	Shelikof Edge	7,735
101 - 200	122	Chirikof Outer Shelf	5,011
101 - 200	130	Albatross Gullies	7,912
101 - 200	131	Portlock Flats	7,336
101 - 200	132	Barren Islands	10,981
101 - 200	133	Kenai Flats	12,077
101 - 200	134	Kodiak Outer Shelf	5,026
101 - 200	140	Middleton Shelf	7,346
101 - 200	141	Yakataga Shelf	5,277
101 - 200	142	Yakutat Flats	9,032
101 - 200	143	Fairweather Shelf	7,728
101 - 200	150	Baranof-Chichagof Shelf	4,196
101 - 200	151	Prince of Wales Shelf	6,888

Depth range (m)	Stratum number	Stratum name	Area (km^2)
201 - 300	210	Shumagin Slope	2,788
201 - 300	220	Lower Shelikof Gully	10,018
201 - 300	221	Chirikof Slope	1,528
201 - 300	230	Kenai Gullies	6,659
201 - 300	231	Kodiak Slope	1,623
201 - 300	232	Upper Shelikof Gully	3,208
201 - 300	240	Yakutat Gullies	3,043
201 - 300	241	Yakutat Slope	2,127
201 - 300	250	Baranof-Chichagof Slope	1,125
201 - 300	251	Prince of Wales Slope/Gullies	3,927
301 - 500	310	Shumagin Slope	2,531
301 - 500	320	Chirikof Slope	1,604
301 - 500	330	Kodiak Slope	2,912
301 - 500	340	Yakutat Gullies	1,107
301 - 500	341	Yakutat Slope	1,521
301 - 500	350	Southeastern Deep Gullies	2,344
301 - 500	351	Southeastern Slope	773
501 - 700	410	Shumagin Slope	2,006
501 - 700	420	Chirikof Slope	1,953
501 - 700	430	Kodiak Slope	1,745
501 - 700	440	Yakutat Slope	1,469
501 - 700	450	Southeastern Slope	1,033
1 - 700		**Grand total**	**320,006**

Appendix B

Appendix Table B1. -- Fish and invertebrate species encountered and identified during the 2021 Gulf of Alaska bottom trawl survey.

INPFC area	Family	Common name	Species name
Chirikof	Rajidae	Aleutian skate	*Bathyraja aleutica*
Chirikof	Rajidae	Bering skate	*Bathyraja interrupta*
Chirikof	Rajidae	big skate	*Beringraja binoculata*
Chirikof	Rajidae	longnose skate	*Beringraja rhina*
Chirikof	Squalidae	spiny dogfish	*Squalus suckleyi*
Chirikof	Pleuronectidae	arrowtooth flounder	*Atheresthes stomias*
Chirikof	Pleuronectidae	rex sole	*Glyptocephalus zachirus*
Chirikof	Pleuronectidae	flathead sole	*Hippoglossoides elassodon*
Chirikof	Pleuronectidae	Pacific halibut	*Hippoglossus stenolepis*
Chirikof	Pleuronectidae	butter sole	*Isopsetta isolepis*
Chirikof	Pleuronectidae	southern rock sole	*Lepidopsetta bilineata*
Chirikof	Pleuronectidae	northern rock sole	*Lepidopsetta polyxystra*
Chirikof	Pleuronectidae	yellowfin sole	*Limanda aspera*
Chirikof	Pleuronectidae	slender sole	*Lyopsetta exilis*
Chirikof	Pleuronectidae	Dover sole	*Microstomus pacificus*
Chirikof	Pleuronectidae	English sole	*Parophrys vetulus*
Chirikof	Pleuronectidae	starry flounder	*Platichthys stellatus*
Chirikof	Pleuronectidae	Alaska plaice	*Pleuronectes quadrituberculatus*
Chirikof	Pleuronectidae	sand sole	*Psettichthys melanostictus*
Chirikof	Macrouridae	giant grenadier	*Albatrossia pectoralis*
Chirikof	Ammodytidae	Pacific sand lance	*Ammodytes personatus*
Chirikof	Anoplopomatidae	sablefish	*Anoplopoma fimbria*
Chirikof	Agonidae	spinycheek starsnout	*Bathyagonus infraspinatus*
Chirikof	Agonidae	blackfin poacher	*Bathyagonus nigripinnis*
Chirikof	Agonidae	bigeye poacher	*Bathyagonus pentacanthus*
Chirikof	Bathymasteridae	searcher	*Bathymaster signatus*
Chirikof	Liparidae	Alaska snailfish	*Careproctus colletti*
Chirikof	Liparidae	smalldisk snailfish	*Careproctus gilberti*
Chirikof	Liparidae	blacktail snailfish	*Careproctus melanurus*
Chirikof	Stomiidae	Pacific viperfish	*Chauliodus macouni*
Chirikof	Stichaeidae	bearded warbonnet	*Chirolophis snyderi*
Chirikof	Clupeidae	Pacific herring	*Clupea pallasii*
Chirikof	Macrouridae	popeye grenadier	*Coryphaenoides cinereus*
Chirikof	Cryptacanthodidae	giant wrymouth	*Cryptacanthodes giganteus*
Chirikof	Psychrolutidae	spinyhead sculpin	*Dasycottus setiger*
Chirikof	Gadidae	walleye pollock	*Gadus chalcogrammus*
Chirikof	Gadidae	Pacific cod	*Gadus macrocephalus*
Chirikof	Cottidae	armorhead sculpin	*Gymnocanthus galeatus*
Chirikof	Cottidae	yellow Irish lord	*Hemilepidotus jordani*
Chirikof	Hemitripteridae	bigmouth sculpin	*Hemitripterus bolini*
Chirikof	Hexagrammidae	kelp greenling	*Hexagrammos decagrammus*
Chirikof	Hexagrammidae	whitespotted greenling	*Hexagrammos stelleri*
Chirikof	Cottidae	thorny sculpin	*Icelus spiniger*
Chirikof	Stichaeidae	daubed shanny	*Leptoclinus maculatus*
Chirikof	Bathylagidae	northern smoothtongue	*Leuroglossus schmidti*
Chirikof	Liparidae	variegated snailfish	*Liparis gibbus*
Chirikof	Stichaeidae	longsnout prickleback	*Lumpenella longirostris*
Chirikof	Zoarcidae	Bering eelpout	*Lycodes beringi*
Chirikof	Zoarcidae	shortfin eelpout	*Lycodes brevipes*
Chirikof	Zoarcidae	wattled eelpout	*Lycodes palearis*
Chirikof	Psychrolutidae	darkfin sculpin	*Malacocottus zonurus*

INPFC area	Family	Common name	Species name
Chirikof	Osmeridae	Pacific capelin	*Mallotus catervarius (=villosus)*
Chirikof	Gadidae	Pacific tomcod	*Microgadus proximus*
Chirikof	Cottidae	plain sculpin	*Myoxocephalus jaok*
Chirikof	Cottidae	great sculpin	*Myoxocephalus polyacanthocephalus*
Chirikof	Salmonidae	pink salmon	*Oncorhynchus gorbuscha*
Chirikof	Salmonidae	chum salmon	*Oncorhynchus keta*
Chirikof	Salmonidae	chinook salmon	*Oncorhynchus tshawytscha*
Chirikof	Hexagrammidae	lingcod	*Ophiodon elongatus*
Chirikof	Liparidae	red snailfish	*Paraliparis dactylosus*
Chirikof	Hexagrammidae	Atka mackerel	*Pleurogrammus monopterygius*
Chirikof	Agonidae	sturgeon poacher	*Podothecus accipenserinus*
Chirikof	Stichaeidae	whitebarred prickleback	*Poroclinus rothrocki*
Chirikof	Melamphaidae	crested bigscale	*Poromitra curilensis (=crassiceps)*
Chirikof	Bathylagidae	robust blacksmelt	*Pseudobathylagus milleri*
Chirikof	Agonidae	sawback poacher	*Sarritor frenatus*
Chirikof	Scorpaenidae	rougheye rockfish	*Sebastes aleutianus*
Chirikof	Scorpaenidae	Pacific ocean perch	*Sebastes alutus*
Chirikof	Scorpaenidae	redbanded rockfish	*Sebastes babcocki*
Chirikof	Scorpaenidae	shortraker rockfish	*Sebastes borealis*
Chirikof	Scorpaenidae	silvergray rockfish	*Sebastes brevispinis*
Chirikof	Scorpaenidae	splitnose rockfish	*Sebastes diploproa*
Chirikof	Scorpaenidae	quillback rockfish	*Sebastes maliger*
Chirikof	Scorpaenidae	black rockfish	*Sebastes melanops*
Chirikof	Scorpaenidae	blackspotted rockfish	*Sebastes melanostictus*
Chirikof	Scorpaenidae	northern rockfish	*Sebastes polyspinis*
Chirikof	Scorpaenidae	redstripe rockfish	*Sebastes proriger*
Chirikof	Scorpaenidae	yelloweye rockfish	*Sebastes ruberrimus*
Chirikof	Scorpaenidae	dusky rockfish	*Sebastes variabilis*
Chirikof	Scorpaenidae	harlequin rockfish	*Sebastes variegatus*
Chirikof	Scorpaenidae	sharpchin rockfish	*Sebastes zacentrus*
Chirikof	Scorpaenidae	shortspine thornyhead	*Sebastolobus alascanus*
Chirikof	Myctophidae	northern lampfish	*Stenobrachius leucopsarus*
Chirikof	Osmeridae	eulachon	*Thaleichthys pacificus*
Chirikof	Trichodontidae	Pacific sandfish	*Trichodon trichodon*
Chirikof	Cottidae	roughspine sculpin	*Triglops macellus*
Chirikof	Zaproridae	prowfish	*Zaprora silenus*
Chirikof	Sertulariidae	bushy white hydroid	*Abietinaria greenei*
Chirikof	Rossellidae	angel-hair vase sponge	*Acanthascus* sp. A
Chirikof	Hormathiidae	reticulate anemone	*Actinauge verrilli*
Chirikof	Actinostolidae	rough purple sea anemone	*Actinostola faeculenta*
Chirikof	Strongylocentrotidae	orange-pink sea urchin	*Allocentrotus fragilis*
Chirikof	Aphrocallistidae	clay pipe sponge	*Aphrocallistes vastus*
Chirikof	Aphroditidae		*Aphrodita negligens*
Chirikof	Stichopodidae	California sea cucumber	*Apostichopus californicus*
Chirikof	Volutidae		*Arctomelon borealis*
Chirikof	Volutidae	Alaska volute	*Arctomelon stearnsii*
Chirikof	Ascidiidae	glassy tunicate	*Ascidia paratropa*
Chirikof	Astartidae		*Astarte arctica*
Chirikof	Ulmaridae		*Aurelia labiata*
Chirikof	Octopodidae	smoothskin octopus	*Benthoctopus leioderma*
Chirikof	Buccinidae		*Beringius aleuticus*
Chirikof	Buccinidae		*Beringius kennicottii*
Chirikof	Buccinidae		*Beringius* sp. F (McLean and Clark)
Chirikof	Gonatidae	magistrate armhook squid	*Berryteuthis magister*
Chirikof	Schizasteridae	heart urchin	*Brisaster latifrons*

INPFC area	Family	Common name	Species name
Chirikof	Bugulidae		*Bugula pacifica*
Chirikof	Goniasteridae	red bat star	*Ceramaster japonicus*
Chirikof	Goniasteridae		*Ceramaster stellatus*
Chirikof	Lineidae	light-edged ribbon worm	*Cerebratulus californienesis*
Chirikof	Benthopectinidae	fragile sea star	*Cheiraster dawsoni*
Chirikof	Oregoniidae	Tanner crab	*Chionoecetes bairdi*
Chirikof	Oregoniidae	grooved Tanner crab	*Chionoecetes tanneri*
Chirikof	Balanidae	giant barnacle	*Chirona evermanni*
Chirikof	Pectinidae	reddish scallop	*Chlamys rubida*
Chirikof	Pisidae	longhorned decorator crab	*Chorilia longipes*
Chirikof	Pelagiidae		*Chrysaora melanaster*
Chirikof	Trochidae		*Cidarina cidaris*
Chirikof	Cardiidae	low-rib cockle	*Clinocardium blandum*
Chirikof	Polyceridae	Pacific Colga	*Colga pacifica*
Chirikof	Crangonidae	ridged Crangon	*Crangon dalli*
Chirikof	Actiniidae	chevron-tentacled anemone	*Cribrinopsis fernaldi*
Chirikof	Solasteridae	grooved sea star	*Crossaster borealis*
Chirikof	Solasteridae	rose sea star	*Crossaster papposus*
Chirikof	Solasteridae	pink rose star	*Crossaster* sp. B (Clark)
Chirikof	Naticidae	Aleutian moonsnail	*Cryptonatica aleutica*
Chirikof	Ctenodiscidae	common mud star	*Ctenodiscus crispatus*
Chirikof	Cucumariidae	sea football	*Cucumaria fallax*
Chirikof	Cyaneidae	lion's mane jelly	*Cyanea capillata*
Chirikof	Discodorididae		*Diaulula* sp. A (Clark 2006)
Chirikof	Pterasteridae	pincushion sea star	*Diplopteraster multipes*
Chirikof	Astropectinidae	northern sea star	*Dipsacaster borealis*
Chirikof	Clavelinidae	globular ascidian	*Distaplia occidentalis*
Chirikof	Archidorididae	white night doris	*Doris odhneri*
Chirikof	Echinarachniidae	parma sand dollar	*Echinarachnius parma*
Chirikof	Paguridae	purple hermit	*Elassochirus cavimanus*
Chirikof	Paguridae	Pacific red hermit	*Elassochirus gilli*
Chirikof	Paguridae	widehand hermit crab	*Elassochirus tenuimanus*
Chirikof	Emplectonematidae	black specked ribbon worm	*Emplectonema* sp. (Clark 2006)
Chirikof	Octopodidae	giant octopus	*Enteroctopus dofleini*
Chirikof	Eunicidae	iridescent tubeworm	*Eunice valens*
Chirikof	Asteriidae	giant sea star	*Evasterias echinosoma*
Chirikof	Primnoidae		*Fanellia compressa*
Chirikof	Primnoidae		*Fanellia fraseri*
Chirikof	Ranellidae	Oregon triton	*Fusitriton oregonensis*
Chirikof	Geodiidae	pita sponge	*Geodia starki*
Chirikof	Goniasteridae	Swift sea star	*Gephyreaster swifti*
Chirikof	Cancridae	Oregon rock crab	*Glebocarcinus oregonensis*
Chirikof	Gorgonocephalidae	basketstar	*Gorgonocephalus eucnemis*
Chirikof	Halichondriidae	ginseng sponge	*Halichondria oblonga*
Chirikof	Halipteridae	maroon sea whip	*Halipteris* sp. A (Stone 2015)
Chirikof	Halipteridae		*Halipteris willemoesi*
Chirikof	Pyuridae	sea peach	*Halocynthia aurantium*
Chirikof	Pyuridae	hairy tunicate	*Halocynthia hispidus*
Chirikof	Pyuridae	bristly tunicate	*Halocynthia igaboja*
Chirikof	Echinasteridae	ridged blood star	*Henricia aspera*
Chirikof	Echinasteridae		*Henricia asthenactis*
Chirikof	Echinasteridae	spiny Henricia	*Henricia multispina*
Chirikof	Solasteridae	cannonball sun star	*Heterozonias alternatus*
Chirikof	Hiatellidae	Arctic Hiatella	*Hiatella arctica*
Chirikof	Goniasteridae	Aleutian spiny star	*Hippasteria aleutica*
Chirikof	Goniasteridae		*Hippasteria californica*

INPFC area	Family	Common name	Species name
Chirikof	Goniasteridae	spiny red sea star	*Hippasteria phrygiana (=spinosa)*
Chirikof	Coelosphaeridae	spud sponge	*Histodermella kagigunensis*
Chirikof	Oregoniidae	Pacific lyre crab	*Hyas lyratus*
Chirikof	Paguridae	splendid hermit	*Labidochirus splendescens*
Chirikof	Laqueidae	California lamp shell	*Laqueus californianus*
Chirikof	Latrunculiidae	green papillate sponge	*Latrunculia oparinae*
Chirikof	Asteriidae	blackspined sea star	*Lethasterias nanimensis*
Chirikof	Limopsidae	Akutan limops	*Limopsis akutanica*
Chirikof	Liponematidae	tentacle-shedding anemone	*Liponema brevicorne*
Chirikof	Lithodidae	golden king crab	*Lithodes aequispinus*
Chirikof	Lithodidae	scarlet king crab	*Lithodes couesi*
Chirikof	Lithodidae	brown box crab	*Lopholithodes foraminatus*
Chirikof	Luidiidae	sand sea star	*Luidia foliolata*
Chirikof	Mactridae	Arctic surfclam	*Mactromeris polynyma*
Chirikof	Goniasteridae		*Mediaster tenellus*
Chirikof	Cancridae	Dungeness crab	*Metacarcinus magister*
Chirikof	Metridiidae	gigantic anemone	*Metridium farcimen*
Chirikof	Calpensiidae		*Microporina articulata*
Chirikof	Mytilidae	northern horsemussel	*Modiolus modiolus*
Chirikof	Molpadiidae	sweet sea potato	*Molpadia intermedia*
Chirikof	Mycalidae	tree sponge	*Mycale loveni*
Chirikof	Benthopectinidae		*Nearchaster aciculosus*
Chirikof	Buccinidae	white neptune	*Neptunea amianta*
Chirikof	Buccinidae	lyre whelk	*Neptunea lyrata*
Chirikof	Buccinidae	Pribilof whelk	*Neptunea pribiloffensis*
Chirikof	Buccinidae		*Neptunea* sp. C (McLean and Clark)
Chirikof	Piscicolidae	striped sea leech	*Notostomum cyclostomum*
Chirikof	Muricidae	frilled dogwinkle	*Nucella lamellosa*
Chirikof	Nuculanidae	northern nutclam	*Nuculana pernula*
Chirikof	Echinasteridae		*Odontohenricia fisheri*
Chirikof	Ophiactidae	ubiquitous brittle star	*Ophiopholis aculeata*
Chirikof	Ophiactidae		*Ophiopholis japonica*
Chirikof	Ophiacanthidae	thick spined brittle star	*Ophiosemnotes pachybactra*
Chirikof	Ophiuridae	gray brittle star	*Ophiura luetkenii*
Chirikof	Ophiuridae	notched brittlestar	*Ophiura sarsii*
Chirikof	Oregoniidae	split-nose decorator crab	*Oregonia bifurca*
Chirikof	Oregoniidae	graceful decorator crab	*Oregonia gracilis*
Chirikof	Asteriidae	redbanded sea star	*Orthasterias koehleri*
Chirikof	Paguridae	Aleutian hermit	*Pagurus aleuticus*
Chirikof	Paguridae	sponge hermit	*Pagurus brandti*
Chirikof	Paguridae	hairy hermit crab	*Pagurus capillatus*
Chirikof	Paguridae	knobbyhand hermit	*Pagurus confragosus*
Chirikof	Paguridae	hornyhand hermit	*Pagurus cornutus*
Chirikof	Paguridae	bluespine hermit	*Pagurus kennerlyi*
Chirikof	Paguridae	Alaskan hermit	*Pagurus ochotensis*
Chirikof	Paguridae	longfinger hermit	*Pagurus rathbuni*
Chirikof	Paguridae	setose hermit	*Pagurus setosus*
Chirikof	Paguridae	fuzzy hermit crab	*Pagurus trigonocheirus*
Chirikof	Pandalidae	sidestripe shrimp	*Pandalopsis dispar*
Chirikof	Pandalidae	dock shrimp	*Pandalus danae*
Chirikof	Pandalidae	Alaskan pink shrimp	*Pandalus eous*
Chirikof	Pandalidae	ocean shrimp	*Pandalus jordani*
Chirikof	Pandalidae	roughpatch shrimp	*Pandalus stenolepis*
Chirikof	Lithodidae	red king crab	*Paralithodes camtschaticus*
Chirikof	Pasiphaeidae	Pacific glass shrimp	*Pasiphaea pacifica*
Chirikof	Pectinidae	weathervane scallop	*Patinopecten caurinus*

INPFC area	Family	Common name	Species name
Chirikof	Periphyllidae	helmet jelly	*Periphylla periphylla*
Chirikof	Ulmaridae	egg yolk jelly	*Phacellophora camtschatica*
Chirikof	Plakinidae	red convoluted sponge	*Plakina atka*
Chirikof	Anomiidae	abalone jingle	*Pododesmus cepio*
Chirikof	Polymastiidae	prolific nipple sponge	*Polymastia* sp. A (Clark 2006)
Chirikof	Primnoidae		*Primnoa pacifica*
Chirikof	Goniasteridae		*Pseudarchaster alascensis*
Chirikof	Goniasteridae	scarlet sea star	*Pseudarchaster parelii*
Chirikof	Psolidae	whitescaled sea cucumber	*Psolus squamatus*
Chirikof	Pterasteridae		*Pteraster jordani*
Chirikof	Pterasteridae		*Pteraster marssipus*
Chirikof	Pterasteridae	obscure sea star	*Pteraster obscurus*
Chirikof	Pterasteridae		*Pteraster tesselatus*
Chirikof	Pennatulidae	orange sea pen	*Ptilosarcus gurneyi*
Chirikof	Asteriidae	sunflower sea star	*Pycnopodia helianthoides*
Chirikof	Buccinidae	left-hand whelk	*Pyrulofusus harpa*
Chirikof	Pyuridae	wrinkled tunicate	*Pyura haustor*
Chirikof	Lithodidae	rhinoceros crab	*Rhinolithodes wosnessenskii*
Chirikof	Aegidae	sea cockroach	*Rocinela angustata*
Chirikof	Sepiolidae	eastern Pacific bobtail	*Rossia pacifica*
Chirikof	Serpulidae	red trumpet calcareous tubeworm	*Serpula columbiana*
Chirikof	Cardiidae	oblique smoothcockle	*Serripes notabilis*
Chirikof	Solasteridae		*Solaster hypothrissus*
Chirikof	Solasteridae	Kessler sun star	*Solaster* sp. E (Clark)
Chirikof	Solasteridae	ocher sun star	*Solaster* sp. G (Clark)
Chirikof	Solasteridae	beautiful sun star	*Solaster spectabilis*
Chirikof	Ophiuridae		*Stegophiura nodosa*
Chirikof	Ophiuridae		*Stegophiura ponderosa*
Chirikof	Strongylocentrotidae	green sea urchin	*Strongylocentrotus droebachiensis*
Chirikof	Strongylocentrotidae	red sea urchin	*Strongylocentrotus franciscanus*
Chirikof	Strongylocentrotidae	white sea urchin	*Strongylocentrotus pallidus*
Chirikof	Strongylocentrotidae		*Strongylocentrotus polyacanthus*
Chirikof	Styelidae	sea potato	*Styela rustica*
Chirikof	Asteriidae	long-rayed star	*Stylasterias forreri*
Chirikof	Suberitidae	hermit sponge	*Suberites domuncula*
Chirikof	Suberitidae		*Suberites ficus*
Chirikof	Synallactidae		*Synallactes challengeri*
Chirikof	Laqueidae	common brachiopod	*Terebratalia transversa*
Chirikof	Cancellothyrididae	snakeshead brachiopod	*Terebratulina unguicula*
Chirikof	Tritoniidae	giant orange tochui	*Tochuina gigantea*
Chirikof	Actiniidae	mottled anemone	*Urticina crassicornis*
Chirikof	Polymastiidae	pale mammilated sponge	*Weberella bursa*
Chirikof	Yoldiidae	crisscrossed Yoldia	*Yoldia seminuda*
Kodiak	Rajidae	Aleutian skate	*Bathyraja aleutica*
Kodiak	Rajidae	Bering skate	*Bathyraja interrupta*
Kodiak	Rajidae	big skate	*Beringraja binoculata*
Kodiak	Rajidae	longnose skate	*Beringraja rhina*
Kodiak	Squalidae	spiny dogfish	*Squalus suckleyi*
Kodiak	Pleuronectidae	arrowtooth flounder	*Atheresthes stomias*
Kodiak	Pleuronectidae	petrale sole	*Eopsetta jordani*
Kodiak	Pleuronectidae	rex sole	*Glyptocephalus zachirus*
Kodiak	Pleuronectidae	flathead sole	*Hippoglossoides elassodon*
Kodiak	Pleuronectidae	Pacific halibut	*Hippoglossus stenolepis*
Kodiak	Pleuronectidae	butter sole	*Isopsetta isolepis*
Kodiak	Pleuronectidae	southern rock sole	*Lepidopsetta bilineata*
Kodiak	Pleuronectidae	northern rock sole	*Lepidopsetta polyxystra*

INPFC area	Family	Common name	Species name
Kodiak	Pleuronectidae	yellowfin sole	*Limanda aspera*
Kodiak	Pleuronectidae	slender sole	*Lyopsetta exilis*
Kodiak	Pleuronectidae	deepsea sole	*Microstomus bathybius*
Kodiak	Pleuronectidae	Dover sole	*Microstomus pacificus*
Kodiak	Pleuronectidae	English sole	*Parophrys vetulus*
Kodiak	Pleuronectidae	starry flounder	*Platichthys stellatus*
Kodiak	Pleuronectidae	Alaska plaice	*Pleuronectes quadrituberculatus*
Kodiak	Pleuronectidae	sand sole	*Psettichthys melanostictus*
Kodiak	Agonidae	northern spearnose poacher	*Agonopsis vulsa*
Kodiak	Macrouridae	giant grenadier	*Albatrossia pectoralis*
Kodiak	Ammodytidae	Pacific sand lance	*Ammodytes personatus*
Kodiak	Anarhichadidae	wolf-eel	*Anarrhichthys ocellatus*
Kodiak	Anoplopomatidae	sablefish	*Anoplopoma fimbria*
Kodiak	Cyclopteridae	smooth lumpsucker	*Aptocyclus ventricosus*
Kodiak	Bathymasteridae	Alaskan ronquil	*Bathymaster caeruleofasciatus*
Kodiak	Bathymasteridae	searcher	*Bathymaster signatus*
Kodiak	Zoarcidae	Alaska eelpout	*Bothrocara pusillum*
Kodiak	Liparidae	scorched snailfish	*Careproctus ambustus*
Kodiak	Liparidae	blackfin snailfish	*Careproctus cypselurus*
Kodiak	Liparidae	smalldisk snailfish	*Careproctus gilberti*
Kodiak	Stomiidae	Pacific viperfish	*Chauliodus macouni*
Kodiak	Clupeidae	Pacific herring	*Clupea pallasii*
Kodiak	Macrouridae	popeye grenadier	*Coryphaenoides cinereus*
Kodiak	Cryptacanthodidae	giant wrymouth	*Cryptacanthodes giganteus*
Kodiak	Liparidae	blotched snailfish	*Crystallichthys cyclospilus*
Kodiak	Psychrolutidae	spinyhead sculpin	*Dasycottus setiger*
Kodiak	Liparidae	blacklip snailfish	*Elassodiscus tremebundus*
Kodiak	Gadidae	saffron cod	*Eleginus gracilis*
Kodiak	Cyclopteridae	pimpled lumpsucker	*Eumicrotremus andriashevi*
Kodiak	Cyclopteridae	Alaskan lumpsucker	*Eumicrotremus gyrinops*
Kodiak	Cyclopteridae	Pacific spiny lumpsucker	*Eumicrotremus orbis*
Kodiak	Gadidae	walleye pollock	*Gadus chalcogrammus*
Kodiak	Gadidae	Pacific cod	*Gadus macrocephalus*
Kodiak	Cottidae	armorhead sculpin	*Gymnocanthus galeatus*
Kodiak	Cottidae	yellow Irish lord	*Hemilepidotus jordani*
Kodiak	Hemitripteridae	bigmouth sculpin	*Hemitripterus bolini*
Kodiak	Hexagrammidae	kelp greenling	*Hexagrammos decagrammus*
Kodiak	Hexagrammidae	whitespotted greenling	*Hexagrammos stelleri*
Kodiak	Agonidae	fourhorn poacher	*Hypsagonus quadricornis*
Kodiak	Cottidae	thorny sculpin	*Icelus spiniger*
Kodiak	Myctophidae	brokenline lampfish	*Lampanyctus jordani*
Kodiak	Myctophidae	pinpoint lampfish	*Lampanyctus regalis*
Kodiak	Stichaeidae	daubed shanny	*Leptoclinus maculatus*
Kodiak	Cottidae	Pacific staghorn sculpin	*Leptocottus armatus*
Kodiak	Bathylagidae	northern smoothtongue	*Leuroglossus schmidti*
Kodiak	Bathylagidae	California smoothtongue	*Leuroglossus stilbius*
Kodiak	Stichaeidae	longsnout prickleback	*Lumpenella longirostris*
Kodiak	Zoarcidae	Bering eelpout	*Lycodes beringi*
Kodiak	Zoarcidae	shortfin eelpout	*Lycodes brevipes*
Kodiak	Zoarcidae	blackbelly eelpout	*Lycodes pacificus*
Kodiak	Zoarcidae	wattled eelpout	*Lycodes palearis*
Kodiak	Opisthoproctidae	barreleye	*Macropinna microstoma*
Kodiak	Psychrolutidae	darkfin sculpin	*Malacocottus zonurus*
Kodiak	Osmeridae	Pacific capelin	*Mallotus catervarius (=villosus)*
Kodiak	Merlucciidae	Pacific hake	*Merluccius productus*
Kodiak	Gadidae	Pacific tomcod	*Microgadus proximus*

INPFC area	Family	Common name	Species name
Kodiak	Cottidae	plain sculpin	*Myoxocephalus jaok*
Kodiak	Cottidae	great sculpin	*Myoxocephalus polyacanthocephalus*
Kodiak	Salmonidae	pink salmon	*Oncorhynchus gorbuscha*
Kodiak	Salmonidae	chum salmon	*Oncorhynchus keta*
Kodiak	Salmonidae	coho salmon	*Oncorhynchus kisutch*
Kodiak	Salmonidae	chinook salmon	*Oncorhynchus tshawytscha*
Kodiak	Hexagrammidae	lingcod	*Ophiodon elongatus*
Kodiak	Cottidae	thornback sculpin	*Paricelinus hopliticus*
Kodiak	Hexagrammidae	Atka mackerel	*Pleurogrammus monopterygius*
Kodiak	Agonidae	sturgeon poacher	*Podothecus accipenserinus*
Kodiak	Melamphaidae	crested bigscale	*Poromitra curilensis (=crassiceps)*
Kodiak	Psychrolutidae	tadpole sculpin	*Psychrolutes paradoxus*
Kodiak	Rhamphocottidae	grunt sculpin	*Rhamphocottus richardsonii*
Kodiak	Scorpaenidae	rougheye rockfish	*Sebastes aleutianus*
Kodiak	Scorpaenidae	Pacific ocean perch	*Sebastes alutus*
Kodiak	Scorpaenidae	redbanded rockfish	*Sebastes babcocki*
Kodiak	Scorpaenidae	shortraker rockfish	*Sebastes borealis*
Kodiak	Scorpaenidae	silvergray rockfish	*Sebastes brevispinis*
Kodiak	Scorpaenidae	dark rockfish	*Sebastes ciliatus*
Kodiak	Scorpaenidae	darkblotched rockfish	*Sebastes crameri*
Kodiak	Scorpaenidae	splitnose rockfish	*Sebastes diploproa*
Kodiak	Scorpaenidae	widow rockfish	*Sebastes entomelas*
Kodiak	Scorpaenidae	yellowtail rockfish	*Sebastes flavidus*
Kodiak	Scorpaenidae	quillback rockfish	*Sebastes maliger*
Kodiak	Scorpaenidae	blackspotted rockfish	*Sebastes melanostictus*
Kodiak	Scorpaenidae	northern rockfish	*Sebastes polyspinis*
Kodiak	Scorpaenidae	redstripe rockfish	*Sebastes proriger*
Kodiak	Scorpaenidae	yelloweye rockfish	*Sebastes ruberrimus*
Kodiak	Scorpaenidae	dusky rockfish	*Sebastes variabilis*
Kodiak	Scorpaenidae	harlequin rockfish	*Sebastes variegatus*
Kodiak	Scorpaenidae	sharpchin rockfish	*Sebastes zacentrus*
Kodiak	Scorpaenidae	shortspine thornyhead	*Sebastolobus alascanus*
Kodiak	Myctophidae	northern lampfish	*Stenobrachius leucopsarus*
Kodiak	Stomiidae	longfin dragonfish	*Tactostoma macropus*
Kodiak	Osmeridae	eulachon	*Thaleichthys pacificus*
Kodiak	Trichodontidae	Pacific sandfish	*Trichodon trichodon*
Kodiak	Cottidae	scissortail sculpin	*Triglops forficatus*
Kodiak	Cottidae	roughspine sculpin	*Triglops macellus*
Kodiak	Zaproridae	prowfish	*Zaprora silenus*
Kodiak	Sertulariidae	bushy white hydroid	*Abietinaria greenei*
Kodiak	Sertulariidae	white tangled hydroid	*Abietinaria* sp. A (Clark 2006)
Kodiak	Lithodidae	fuzzy crab	*Acantholithodes hispidus*
Kodiak	Hormathiidae	reticulate anemone	*Actinauge verrilli*
Kodiak	Actinostolidae	rough purple sea anemone	*Actinostola faeculenta*
Kodiak	Turridae	keeled Aforia	*Aforia circinata*
Kodiak	Alcyonidiidae	fruit leather bryozoan	*Alcyonidium pedunculatum*
Kodiak	Strongylocentrotidae	orange-pink sea urchin	*Allocentrotus fragilis*
Kodiak	Polyclinidae	sand-grain imbedded ascidian	*Amaroucium soldatovi*
Kodiak	Buccinidae	two-ribbed whelk	*Ancistrolepis bicinctus*
Kodiak	Anuropidae	giant isopod	*Anuropus bathypelagica*
Kodiak	Aphrocallistidae	clay pipe sponge	*Aphrocallistes vastus*
Kodiak	Aphroditidae		*Aphrodita negligens*
Kodiak	Stichopodidae	California sea cucumber	*Apostichopus californicus*
Kodiak	Volutidae		*Arctomelon borealis*
Kodiak	Volutidae	Alaska volute	*Arctomelon stearnsii*

INPFC area	Family	Common name	Species name
Kodiak	Crangonidae	split-eye argid	*Argis ovifer*
Kodiak	Crangonidae		*Argis* sp. cf. ovifer (CAS)
Kodiak	Arminidae	California Armina	*Armina californica*
Kodiak	Astartidae	boreal Astarte	*Astarte borealis*
Kodiak	Asteriidae	purple-orange sea star	*Asterias amurensis*
Kodiak	Gorgonocephalidae		*Astrochele laevis*
Kodiak	Rossellidae	vase sponge	*Aulosaccus schulzei*
Kodiak	Ulmaridae		*Aurelia labiata*
Kodiak	Balanidae		*Balanus nubilus*
Kodiak	Trochidae		*Bathybembix bairdii*
Kodiak	Octopodidae	smoothskin octopus	*Benthoctopus leioderma*
Kodiak	Buccinidae		*Beringius eyerdami*
Kodiak	Gonatidae	magistrate armhook squid	*Berryteuthis magister*
Kodiak	Schizasteridae	heart urchin	*Brisaster latifrons*
Kodiak	Schizasteridae		*Brisaster townsendi*
Kodiak	Brisingidae		*Brisingella exilis*
Kodiak	Buccinidae	swollen whelk	*Buccinum oedematum*
Kodiak	Buccinidae	sinuous whelk	*Buccinum plectrum*
Kodiak	Acanthogorgiidae	Bering red sea fan	*Calcigorgia beringi*
Kodiak	Calliostomatidae		*Calliostoma variegatum*
Kodiak	Goniasteridae	orange bat sea star	*Ceramaster patagonicus*
Kodiak	Goniasteridae		*Ceramaster stellatus*
Kodiak	Lineidae	light-edged ribbon worm	*Cerebratulus californienesis*
Kodiak	Benthopectinidae	fragile sea star	*Cheiraster dawsoni*
Kodiak	Oregoniidae	Tanner crab	*Chionoecetes bairdi*
Kodiak	Balanidae	giant barnacle	*Chirona evermanni*
Kodiak	Chiroteuthidae		*Chiroteuthis calyx*
Kodiak	Pectinidae	reddish scallop	*Chlamys rubida*
Kodiak	Pisidae	longhorned decorator crab	*Chorilia longipes*
Kodiak	Pelagiidae	sea nettle	*Chrysaora fuscescens*
Kodiak	Pelagiidae		*Chrysaora melanaster*
Kodiak	Cladopathidae		*Chrysopathes speciosa*
Kodiak	Goniasteridae		*Cladaster validus*
Kodiak	Styelidae	broad base tunicate	*Cnemidocarpa finmarkiensis*
Kodiak	Buccinidae	shrew whelk	*Colus halli*
Kodiak	Buccinidae		*Colus virens*
Kodiak	Crangonidae	twospine Crangon	*Crangon communis*
Kodiak	Crangonidae	ridged Crangon	*Crangon dalli*
Kodiak	Crellidae	soft brown sponge	*Crella brunnea*
Kodiak	Actiniidae	chevron-tentacled anemone	*Cribrinopsis fernaldi*
Kodiak	Solasteridae	grooved sea star	*Crossaster borealis*
Kodiak	Solasteridae	rose sea star	*Crossaster papposus*
Kodiak	Solasteridae	pink rose star	*Crossaster* sp. B (Clark)
Kodiak	Naticidae	Aleutian moonsnail	*Cryptonatica aleutica*
Kodiak	Ctenodiscidae	common mud star	*Ctenodiscus crispatus*
Kodiak	Cucumariidae	sea football	*Cucumaria fallax*
Kodiak	Cucumariidae		*Cucumaria frondosa*
Kodiak	Cyaneidae	lion's mane jelly	*Cyanea capillata*
Kodiak	Dendronotidae	Dall dendronotid	*Dendronotus dalli*
Kodiak	Pterasteridae	pincushion sea star	*Diplopteraster multipes*
Kodiak	Astropectinidae	northern sea star	*Dipsacaster borealis*
Kodiak	Astropectinidae		*Dipsacaster eximus*
Kodiak	Clavelinidae	globular ascidian	*Distaplia occidentalis*
Kodiak	Clavelinidae	paddle ascidian	*Distaplia smithi*
Kodiak	Archidorididae	white night doris	*Doris odhneri*
Kodiak	Echinarachniidae	parma sand dollar	*Echinarachnius parma*

INPFC area	Family	Common name	Species name
Kodiak	Microcionidae	hat sponge	*Echinoclathria beringensis*
Kodiak	Paguridae	purple hermit	*Elassochirus cavimanus*
Kodiak	Paguridae	Pacific red hermit	*Elassochirus gilli*
Kodiak	Paguridae	widehand hermit crab	*Elassochirus tenuimanus*
Kodiak	Octopodidae	giant octopus	*Enteroctopus dofleini*
Kodiak	Epizoanthidae	orange zooanthid	*Epizoanthus scotinus*
Kodiak	Eunicidae	iridescent tubeworm	*Eunice valens*
Kodiak	Asteriidae	giant sea star	*Evasterias echinosoma*
Kodiak	Asteriidae	mottled sea star	*Evasterias troschelii*
Kodiak	Primnoidae		*Fanellia fraseri*
Kodiak	Antedonidae	common northern feather star	*Florometra asperrima*
Kodiak	Ranellidae	Oregon triton	*Fusitriton oregonensis*
Kodiak	Psammobiidae		*Gari californica*
Kodiak	Goniasteridae	Swift sea star	*Gephyreaster swifti*
Kodiak	Cancridae	Oregon rock crab	*Glebocarcinus oregonensis*
Kodiak	Gorgonocephalidae	basketstar	*Gorgonocephalus eucnemis*
Kodiak	Halipteridae	maroon sea whip	*Halipteris* sp. A (Stone 2015)
Kodiak	Halipteridae		*Halipteris willemoesi*
Kodiak	Pyuridae	sea peach	*Halocynthia aurantium*
Kodiak	Pyuridae	hairy tunicate	*Halocynthia hispidus*
Kodiak	Pyuridae	bristly tunicate	*Halocynthia igaboja*
Kodiak	Echinasteridae	ridged blood star	*Henricia aspera*
Kodiak	Echinasteridae	blood sea star	*Henricia leviuscula*
Kodiak	Echinasteridae		*Henricia longispina*
Kodiak	Echinasteridae	spiny Henricia	*Henricia multispina*
Kodiak	Hiatellidae	Arctic Hiatella	*Hiatella arctica*
Kodiak	Goniasteridae	Aleutian spiny star	*Hippasteria aleutica*
Kodiak	Goniasteridae		*Hippasteria californica*
Kodiak	Goniasteridae	spiny red sea star	*Hippasteria phrygiana (=spinosa)*
Kodiak	Goniasteridae	Alaskan spiny star	*Hippasteria* sp. E (Clark)
Kodiak	Oregoniidae	Pacific lyre crab	*Hyas lyratus*
Kodiak	Halichondriidae	coalescent finger sponge	*Hymeniacidon assimilis*
Kodiak	Paguridae	splendid hermit	*Labidochirus splendescens*
Kodiak	Laqueidae	California lamp shell	*Laqueus californianus*
Kodiak	Laqueidae	Vancouver lampshell	*Laqueus vancouverensis*
Kodiak	Asteriidae		*Leptasterias coei*
Kodiak	Asteriidae	Aleutian sea star	*Leptasterias hylodes*
Kodiak	Asteriidae		*Leptasterias katharinae*
Kodiak	Astropectinidae	North Pacific sea star	*Leptychaster arcticus*
Kodiak	Asteriidae	blackspined sea star	*Lethasterias nanimensis*
Kodiak	Grantiidae	spiny vase sponge	*Leucandra heathi*
Kodiak	Grantiidae		*Leucandra tuba*
Kodiak	Liponematidae	tentacle-shedding anemone	*Liponema brevicorne*
Kodiak	Lithodidae	golden king crab	*Lithodes aequispinus*
Kodiak		crested sea star	*Lophaster furcilliger*
Kodiak		crested star	*Lophaster vexator*
Kodiak	Lithodidae	brown box crab	*Lopholithodes foraminatus*
Kodiak	Lithodidae	red box crab	*Lopholithodes mandtii*
Kodiak	Luidiidae	sand sea star	*Luidia foliolata*
Kodiak	Naticidae	pale moonsnail	*Lunatia pallida*
Kodiak	Goniasteridae	vermilion sea star	*Mediaster aequalis*
Kodiak	Goniasteridae		*Mediaster tenellus*
Kodiak	Cancridae	Dungeness crab	*Metacarcinus magister*
Kodiak	Metridiidae	gigantic anemone	*Metridium farcimen*
Kodiak	Metridiidae	clonal plumose anemone	*Metridium senile*
Kodiak	Mytilidae	northern horsemussel	*Modiolus modiolus*

INPFC area	Family	Common name	Species name
Kodiak	Molgulidae	sea grape	*Molgula griffithsii*
Kodiak	Molpadiidae	sweet sea potato	*Molpadia intermedia*
Kodiak	Galatheidae	pinchbug	*Munida quadrispina*
Kodiak	Mycalidae	tree sponge	*Mycale loveni*
Kodiak	Myxillidae	sulfur sponge	*Myxilla lacunosa*
Kodiak	Benthopectinidae		*Nearchaster aciculosus*
Kodiak	Buccinidae	white neptune	*Neptunea amianta*
Kodiak	Buccinidae	lyre whelk	*Neptunea lyrata*
Kodiak	Piscicolidae	striped sea leech	*Notostomum cyclostomum*
Kodiak	Nuculanidae	northern nutclam	*Nuculana pernula*
Kodiak	Octopoteuthidae		*Octopoteuthis deletron*
Kodiak	Echinasteridae		*Odontohenricia fisheri*
Kodiak		purple olive	*Olivella biplicata*
Kodiak	Ophiactidae	ubiquitous brittle star	*Ophiopholis aculeata*
Kodiak	Ophiactidae		*Ophiopholis longispina*
Kodiak	Ophiacanthidae		*Ophiophthalmus cataleimmoidus*
Kodiak	Ophiacanthidae		*Ophiophthalmus normani*
Kodiak	Ophiuridae	gray brittle star	*Ophiura luetkenii*
Kodiak	Ophiuridae	notched brittlestar	*Ophiura sarsii*
Kodiak	Oregoniidae	split-nose decorator crab	*Oregonia bifurca*
Kodiak	Oregoniidae	graceful decorator crab	*Oregonia gracilis*
Kodiak	Asteriidae	redbanded sea star	*Orthasterias koehleri*
Kodiak	Paguridae	Aleutian hermit	*Pagurus aleuticus*
Kodiak	Paguridae	sponge hermit	*Pagurus brandti*
Kodiak	Paguridae	hairy hermit crab	*Pagurus capillatus*
Kodiak	Paguridae	knobbyhand hermit	*Pagurus confragosus*
Kodiak	Paguridae	hornyhand hermit	*Pagurus cornutus*
Kodiak	Paguridae	whiteknee hermit	*Pagurus dalli*
Kodiak	Paguridae	Alaskan hermit	*Pagurus ochotensis*
Kodiak	Paguridae	longfinger hermit	*Pagurus rathbuni*
Kodiak	Paguridae	setose hermit	*Pagurus setosus*
Kodiak	Paguridae	longhand hermit	*Pagurus tanneri*
Kodiak	Paguridae	fuzzy hermit crab	*Pagurus trigonocheirus*
Kodiak	Pandalidae	sidestripe shrimp	*Pandalopsis dispar*
Kodiak	Pandalidae	Alaskan pink shrimp	*Pandalus eous*
Kodiak	Pandalidae	ocean shrimp	*Pandalus jordani*
Kodiak	Pandalidae	spot shrimp	*Pandalus platyceros*
Kodiak	Pandalidae	yellowleg pandalid	*Pandalus tridens*
Kodiak	Pasiphaeidae	Pacific glass shrimp	*Pasiphaea pacifica*
Kodiak	Pectinidae	weathervane scallop	*Patinopecten caurinus*
Kodiak	Discodoridae	Pacific sea lemon	*Peltodoris nobilis*
Kodiak	Phyllophoridae	crescent sea cucumber	*Pentamera lissoplaca*
Kodiak	Periphyllidae	helmet jelly	*Periphylla periphylla*
Kodiak	Ulmaridae	egg yolk jelly	*Phacellophora camtschatica*
Kodiak	Lithodidae	scaled crab	*Placetron wosnessenskii*
Kodiak	Anomiidae	Alaska falsejingle	*Pododesmus macrochisma*
Kodiak	Polymastiidae	Flugel nippled sponge	*Polymastia fluegeli*
Kodiak	Echinasteridae	thorny sea star	*Poraniopsis inflata*
Kodiak	Mucronellidae	flattened bryozoan	*Porella compressa*
Kodiak	Primnoidae		*Primnoa pacifica*
Kodiak	Goniasteridae		*Pseudarchaster alascensis*
Kodiak	Goniasteridae	scarlet sea star	*Pseudarchaster parelii*
Kodiak	Synallactidae	sandy sea cucumber	*Pseudostichopus mollis*
Kodiak	Psolidae	whitescaled sea cucumber	*Psolus squamatus*
Kodiak	Pterasteridae		*Pteraster jordani*
Kodiak	Pterasteridae	obscure sea star	*Pteraster obscurus*

INPFC area	Family	Common name	Species name
Kodiak	Pterasteridae		*Pteraster tesselatus*
Kodiak	Pennatulidae	orange sea pen	*Ptilosarcus gurneyi*
Kodiak	Asteriidae	sunflower sea star	*Pycnopodia helianthoides*
Kodiak	Buccinidae	left-hand whelk	*Pyrulofusus harpa*
Kodiak	Pyuridae	wrinkled tunicate	*Pyura haustor*
Kodiak	Aegidae	sea cockroach	*Rocinela angustata*
Kodiak	Sepiolidae	eastern Pacific bobtail	*Rossia pacifica*
Kodiak	Serpulidae	red trumpet calcareous tubeworm	*Serpula columbiana*
Kodiak	Cardiidae	oblique smoothcockle	*Serripes notabilis*
Kodiak	Solasteridae	morning sun sea star	*Solaster dawsoni*
Kodiak	Solasteridae	northern sun sea star	*Solaster endeca*
Kodiak	Solasteridae	Kessler sun star	*Solaster* sp. E (Clark)
Kodiak	Solasteridae	ocher sun star	*Solaster* sp. G (Clark)
Kodiak	Solasteridae	beautiful sun star	*Solaster spectabilis*
Kodiak	Solasteridae	striped sun sea star	*Solaster stimpsoni*
Kodiak	Ophiuridae		*Stegophiura nodosa*
Kodiak	Ophiuridae		*Stegophiura ponderosa*
Kodiak	Myxillidae	scapula sponge	*Stelodoryx oxeata*
Kodiak	Actinostolidae	swimming anemone	*Stomphia coccinea*
Kodiak	Strongylocentrotidae	green sea urchin	*Strongylocentrotus droebachiensis*
Kodiak	Strongylocentrotidae	red sea urchin	*Strongylocentrotus franciscanus*
Kodiak	Strongylocentrotidae	white sea urchin	*Strongylocentrotus pallidus*
Kodiak	Strongylocentrotidae		*Strongylocentrotus polyacanthus*
Kodiak	Styelidae	sea potato	*Styela rustica*
Kodiak	Asteriidae	long-rayed star	*Stylasterias forreri*
Kodiak	Suberitidae	hermit sponge	*Suberites domuncula*
Kodiak	Synallactidae		*Synallactes challengeri*
Kodiak	Pedicellasteridae		*Tarsaster alaskanus*
Kodiak	Laqueidae	common brachiopod	*Terebratalia transversa*
Kodiak	Salpidae	common salp	*Thetys vagina*
Kodiak	Tritoniidae	giant orange tochui	*Tochuina gigantea*
Kodiak	Tritoniidae	rosy Tritonia	*Tritonia diomedea*
Kodiak	Tritoniidae	festive Tritonia	*Tritonia festiva*
Kodiak	Zoanthidae	hot dog zoanthid	*Zoanthidae* sp. A
Shumagin	Rajidae	Alaska skate	*Arctoraja parmifera*
Shumagin	Rajidae	Aleutian skate	*Bathyraja aleutica*
Shumagin	Rajidae	Bering skate	*Bathyraja interrupta*
Shumagin	Rajidae	whiteblotched skate	*Bathyraja maculata*
Shumagin	Rajidae	butterfly skate	*Bathyraja mariposa*
Shumagin	Rajidae	big skate	*Beringraja binoculata*
Shumagin	Rajidae	longnose skate	*Beringraja rhina*
Shumagin	Lamnidae	salmon shark	*Lamna ditropis*
Shumagin	Squalidae	spiny dogfish	*Squalus suckleyi*
Shumagin	Pleuronectidae	Kamchatka flounder	*Atheresthes evermanni*
Shumagin	Pleuronectidae	arrowtooth flounder	*Atheresthes stomias*
Shumagin	Pleuronectidae	rex sole	*Glyptocephalus zachirus*
Shumagin	Pleuronectidae	flathead sole	*Hippoglossoides elassodon*
Shumagin	Pleuronectidae	Pacific halibut	*Hippoglossus stenolepis*
Shumagin	Pleuronectidae	butter sole	*Isopsetta isolepis*
Shumagin	Pleuronectidae	southern rock sole	*Lepidopsetta bilineata*
Shumagin	Pleuronectidae	northern rock sole	*Lepidopsetta polyxystra*
Shumagin	Pleuronectidae	yellowfin sole	*Limanda aspera*
Shumagin	Pleuronectidae	slender sole	*Lyopsetta exilis*
Shumagin	Pleuronectidae	Dover sole	*Microstomus pacificus*
Shumagin	Pleuronectidae	English sole	*Parophrys vetulus*
Shumagin	Pleuronectidae	starry flounder	*Platichthys stellatus*

INPFC area	Family	Common name	Species name
Shumagin	Pleuronectidae	Alaska plaice	*Pleuronectes quadrituberculatus*
Shumagin	Pleuronectidae	sand sole	*Psettichthys melanostictus*
Shumagin	Macrouridae	giant grenadier	*Albatrossia pectoralis*
Shumagin	Ammodytidae	Pacific sand lance	*Ammodytes personatus*
Shumagin	Anarhichadidae	Bering wolffish	*Anarhichas orientalis*
Shumagin	Anoplopomatidae	sablefish	*Anoplopoma fimbria*
Shumagin	Cyclopteridae	smooth lumpsucker	*Aptocyclus ventricosus*
Shumagin	Bathymasteridae	searcher	*Bathymaster signatus*
Shumagin	Liparidae	blacktail snailfish	*Careproctus melanurus*
Shumagin	Liparidae	salmon snailfish	*Careproctus rastrinus*
Shumagin	Stomiidae	Pacific viperfish	*Chauliodus macouni*
Shumagin	Clupeidae	Pacific herring	*Clupea pallasii*
Shumagin	Macrouridae	popeye grenadier	*Coryphaenoides cinereus*
Shumagin	Cryptacanthodidae	dwarf wrymouth	*Cryptacanthodes aleutensis*
Shumagin	Psychrolutidae	spinyhead sculpin	*Dasycottus setiger*
Shumagin	Gadidae	walleye pollock	*Gadus chalcogrammus*
Shumagin	Gadidae	Pacific cod	*Gadus macrocephalus*
Shumagin	Cottidae	armorhead sculpin	*Gymnocanthus galeatus*
Shumagin	Cottidae	yellow Irish lord	*Hemilepidotus jordani*
Shumagin	Hemitripteridae	bigmouth sculpin	*Hemitripterus bolini*
Shumagin	Hexagrammidae	kelp greenling	*Hexagrammos decagrammus*
Shumagin	Hexagrammidae	whitespotted greenling	*Hexagrammos stelleri*
Shumagin	Myctophidae	brokenline lampfish	*Lampanyctus jordani*
Shumagin	Stichaeidae	daubed shanny	*Leptoclinus maculatus*
Shumagin	Bathylagidae	northern smoothtongue	*Leuroglossus schmidti*
Shumagin	Bathylagidae	popeye blacksmelt	*Lipolagus ochotensis*
Shumagin	Stichaeidae	longsnout prickleback	*Lumpenella longirostris*
Shumagin	Stichaeidae	snake prickleback	*Lumpenus sagitta*
Shumagin	Zoarcidae	shortfin eelpout	*Lycodes brevipes*
Shumagin	Zoarcidae	wattled eelpout	*Lycodes palearis*
Shumagin	Psychrolutidae	darkfin sculpin	*Malacocottus zonurus*
Shumagin	Osmeridae	Pacific capelin	*Mallotus catervarius (=villosus)*
Shumagin	Gadidae	Pacific tomcod	*Microgadus proximus*
Shumagin	Cottidae	plain sculpin	*Myoxocephalus jaok*
Shumagin	Cottidae	great sculpin	*Myoxocephalus polyacanthocephalus*
Shumagin	Salmonidae	chum salmon	*Oncorhynchus keta*
Shumagin	Salmonidae	sockeye salmon	*Oncorhynchus nerka*
Shumagin	Salmonidae	chinook salmon	*Oncorhynchus tshawytscha*
Shumagin	Hexagrammidae	lingcod	*Ophiodon elongatus*
Shumagin	Liparidae	bluntnose snailfish	*Paraliparis* sp. cf. dactylosus (Orr and Baldwin)
Shumagin	Hexagrammidae	Atka mackerel	*Pleurogrammus monopterygius*
Shumagin	Agonidae	sturgeon poacher	*Podothecus accipenserinus*
Shumagin	Stichaeidae	whitebarred prickleback	*Poroclinus rothrocki*
Shumagin	Bathylagidae	robust blacksmelt	*Pseudobathylagus milleri*
Shumagin	Psychrolutidae	tadpole sculpin	*Psychrolutes paradoxus*
Shumagin	Rhamphocottidae	grunt sculpin	*Rhamphocottus richardsonii*
Shumagin	Agonidae	sawback poacher	*Sarritor frenatus*
Shumagin	Scorpaenidae	rougheye rockfish	*Sebastes aleutianus*
Shumagin	Scorpaenidae	Pacific ocean perch	*Sebastes alutus*
Shumagin	Scorpaenidae	redbanded rockfish	*Sebastes babcocki*
Shumagin	Scorpaenidae	shortraker rockfish	*Sebastes borealis*
Shumagin	Scorpaenidae	dark rockfish	*Sebastes ciliatus*
Shumagin	Scorpaenidae	quillback rockfish	*Sebastes maliger*
Shumagin	Scorpaenidae	black rockfish	*Sebastes melanops*

INPFC area	Family	Common name	Species name
Shumagin	Scorpaenidae	blackspotted rockfish	*Sebastes melanostictus*
Shumagin	Scorpaenidae	northern rockfish	*Sebastes polyspinis*
Shumagin	Scorpaenidae	yelloweye rockfish	*Sebastes ruberrimus*
Shumagin	Scorpaenidae	dusky rockfish	*Sebastes variabilis*
Shumagin	Scorpaenidae	harlequin rockfish	*Sebastes variegatus*
Shumagin	Scorpaenidae	shortspine thornyhead	*Sebastolobus alascanus*
Shumagin	Myctophidae	northern lampfish	*Stenobrachius leucopsarus*
Shumagin	Osmeridae	eulachon	*Thaleichthys pacificus*
Shumagin	Trichodontidae	Pacific sandfish	*Trichodon trichodon*
Shumagin	Cottidae	scissortail sculpin	*Triglops forficatus*
Shumagin	Cottidae	roughspine sculpin	*Triglops macellus*
Shumagin	Cottidae	ribbed sculpin	*Triglops pingelii*
Shumagin	Cottidae	spectacled sculpin	*Triglops scepticus*
Shumagin	Zaproridae	prowfish	*Zaprora silenus*
Shumagin	Hormathiidae	reticulate anemone	*Actinauge verrilli*
Shumagin	Actinostolidae	rough purple sea anemone	*Actinostola faeculenta*
Shumagin	Actinostolidae		*Actinostola* sp. A (Clark 2006)
Shumagin	Alcyonidiidae	fruit leather bryozoan	*Alcyonidium pedunculatum*
Shumagin	Strongylocentrotidae	orange-pink sea urchin	*Allocentrotus fragilis*
Shumagin	Polyclinidae	sand-grain imbedded ascidian	*Amaroucium soldatovi*
Shumagin	Aphrocallistidae	clay pipe sponge	*Aphrocallistes vastus*
Shumagin	Aphroditidae		*Aphrodita negligens*
Shumagin	Stichopodidae	California sea cucumber	*Apostichopus californicus*
Shumagin	Volutidae	Alaska volute	*Arctomelon stearnsii*
Shumagin	Volutidae		*Arctomelon tamikoae*
Shumagin	Crangonidae	Arctic argid	*Argis dentata*
Shumagin	Crangonidae	kuro argid	*Argis lar*
Shumagin	Crangonidae	Nelson argid	*Argis levior*
Shumagin	Ascidiidae	glassy tunicate	*Ascidia paratropa*
Shumagin	Asteronychidae	serpent sea star	*Asteronyx loveni*
Shumagin	Ulmaridae		*Aurelia labiata*
Shumagin	Axinellidae	firm finger sponge	*Axinella blanca*
Shumagin	Octopodidae	smoothskin octopus	*Benthoctopus leioderma*
Shumagin	Buccinidae	Bering beringius	*Beringius behringi*
Shumagin	Gonatidae	magistrate armhook squid	*Berryteuthis magister*
Shumagin	Schizasteridae	heart urchin	*Brisaster latifrons*
Shumagin	Schizasteridae		*Brisaster owstoni*
Shumagin	Buccinidae	sinuous whelk	*Buccinum plectrum*
Shumagin	Goniasteridae	red bat star	*Ceramaster japonicus*
Shumagin	Goniasteridae	orange bat sea star	*Ceramaster patagonicus*
Shumagin	Benthopectinidae	fragile sea star	*Cheiraster dawsoni*
Shumagin	Oregoniidae	Tanner crab	*Chionoecetes bairdi*
Shumagin	Chiroteuthidae		*Chiroteuthis calyx*
Shumagin	Pectinidae	reddish scallop	*Chlamys rubida*
Shumagin	Pisidae	longhorned decorator crab	*Chorilia longipes*
Shumagin	Pelagiidae		*Chrysaora melanaster*
Shumagin	Cladopathidae		*Chrysopathes speciosa*
Shumagin	Trochidae		*Cidarina cidaris*
Shumagin	Chalinidae	rough hat sponge	*Cladocroce attu*
Shumagin	Chalinidae		*Cladocroce kiska*
Shumagin	Cardiidae	low-rib cockle	*Clinocardium blandum*
Shumagin	Buccinidae	oblique whelk	*Colus aphelus*
Shumagin	Crangonidae	ridged Crangon	*Crangon dalli*
Shumagin	Tetillidae		*Craniella arb*
Shumagin	Tetillidae	tennis ball sponge	*Craniella villosa*
Shumagin	Actiniidae	chevron-tentacled anemone	*Cribrinopsis fernaldi*

INPFC area	Family	Common name	Species name
Shumagin	Solasteridae	grooved sea star	*Crossaster borealis*
Shumagin	Solasteridae	rose sea star	*Crossaster papposus*
Shumagin	Ctenodiscidae	common mud star	*Ctenodiscus crispatus*
Shumagin	Cucumariidae		*Cucumaria frondosa*
Shumagin	Cyaneidae	lion's mane jelly	*Cyanea capillata*
Shumagin	Pterasteridae	pincushion sea star	*Diplopteraster multipes*
Shumagin	Astropectinidae	northern sea star	*Dipsacaster borealis*
Shumagin	Clavelinidae	globular ascidian	*Distaplia occidentalis*
Shumagin	Archidorididae	white night doris	*Doris odhneri*
Shumagin	Echinarachniidae	parma sand dollar	*Echinarachnius parma*
Shumagin	Microcionidae	hat sponge	*Echinoclathria beringensis*
Shumagin	Paguridae	purple hermit	*Elassochirus cavimanus*
Shumagin	Paguridae	widehand hermit crab	*Elassochirus tenuimanus*
Shumagin	Limopsidae	vaginated limops	*Empleconia vaginata*
Shumagin	Octopodidae	giant octopus	*Enteroctopus dofleini*
Shumagin	Stylasteridae	undulate-fan hydrocoral	*Errinopora undulata*
Shumagin	Hippolytidae	deepsea eualid	*Eualus biunguis*
Shumagin	Asteriidae	giant sea star	*Evasterias echinosoma*
Shumagin	Asteriidae		*Evasterias retifera*
Shumagin	Asteriidae	mottled sea star	*Evasterias troschelii*
Shumagin	Primnoidae		*Fanellia compressa*
Shumagin	Primnoidae		*Fanellia fraseri*
Shumagin	Antedonidae	common northern feather star	*Florometra asperrima*
Shumagin	Flustrellidridae		*Flustrellidra corniculata*
Shumagin	Ranellidae	Oregon triton	*Fusitriton oregonensis*
Shumagin	Geodiidae	soccer ball sponge	*Geodia mesotriaena*
Shumagin	Geodiidae	pita sponge	*Geodia starki*
Shumagin	Cancridae	Oregon rock crab	*Glebocarcinus oregonensis*
Shumagin	Glycymerididae		*Glycymeris septentrionalis*
Shumagin	Gonatidae	fiery armhook squid	*Gonatus pyros*
Shumagin	Gorgonocephalidae	basketstar	*Gorgonocephalus eucnemis*
Shumagin	Halichondriidae	barrel sponge	*Halichondria panicea*
Shumagin	Halipteridae	maroon sea whip	*Halipteris* sp. A (Stone 2015)
Shumagin	Halipteridae		*Halipteris willemoesi*
Shumagin	Pyuridae	sea peach	*Halocynthia aurantium*
Shumagin	Pyuridae	bristly tunicate	*Halocynthia igaboja*
Shumagin	Echinasteridae	ridged blood star	*Henricia aspera*
Shumagin	Echinasteridae	short-spined Henricia	*Henricia dyscrita*
Shumagin	Echinasteridae	blood sea star	*Henricia leviuscula*
Shumagin	Alcyoniidae	red mushroom coral	*Heteropolypus (=Anthomastus)* sp. A
Shumagin	Alcyoniidae	gray mushroom coral	*Heteropolypus (=Anthomastus)* sp. B
Shumagin	Goniasteridae	spiny red sea star	*Hippasteria phrygiana (=spinosa)*
Shumagin	Coelosphaeridae	spud sponge	*Histodermella kagigunensis*
Shumagin	Veneridae	Kennerleys venus	*Humilaria kennerleyi*
Shumagin	Oregoniidae	Pacific lyre crab	*Hyas lyratus*
Shumagin	Laqueidae	California lamp shell	*Laqueus californianus*
Shumagin	Latrunculiidae	green papillate sponge	*Latrunculia oparinae*
Shumagin	Latrunculiidae	smooth green sponge	*Latrunculia* sp. B (Clark 2006)
Shumagin	Asteriidae		*Leptasterias arctica*
Shumagin	Astropectinidae	North Pacific sea star	*Leptychaster arcticus*
Shumagin	Asteriidae	blackspined sea star	*Lethasterias nanimensis*
Shumagin	Liponematidae	tentacle-shedding anemone	*Liponema brevicorne*
Shumagin	Lithodidae	golden king crab	*Lithodes aequispinus*
Shumagin	Luidiidae	sand sea star	*Luidia foliolata*

INPFC area	Family	Common name	Species name
Shumagin	Naticidae	pale moonsnail	*Lunatia pallida*
Shumagin	Goniasteridae	vermilion sea star	*Mediaster aequalis*
Shumagin	Metridiidae	gigantic anemone	*Metridium farcimen*
Shumagin	Mytilidae	northern horsemussel	*Modiolus modiolus*
Shumagin	Molpadiidae	sweet sea potato	*Molpadia intermedia*
Shumagin	Crambeidae	yellow leafy sponge	*Monanchora pulchra*
Shumagin	Plexauridae		*Muriceides nigra*
Shumagin	Mytilidae	discordant mussel	*Musculus discors*
Shumagin	Mycalidae	lampshade sponge	*Mycale bellabellensis*
Shumagin	Mycalidae	trumpet sponge	*Mycale carlilei*
Shumagin	Mycalidae	tree sponge	*Mycale loveni*
Shumagin	Benthopectinidae		*Nearchaster aciculosus*
Shumagin	Buccinidae	white neptune	*Neptunea amianta*
Shumagin	Buccinidae	lyre whelk	*Neptunea lyrata*
Shumagin	Ophiactidae		*Ophiopholis japonica*
Shumagin	Ophiuridae	gray brittle star	*Ophiura luetkenii*
Shumagin	Ophiuridae	notched brittlestar	*Ophiura sarsii*
Shumagin	Opisthoteuthidae	flapjack devilfish	*Opisthoteuthis californiana*
Shumagin	Oregoniidae	split-nose decorator crab	*Oregonia bifurca*
Shumagin	Oregoniidae	graceful decorator crab	*Oregonia gracilis*
Shumagin	Asteriidae	redbanded sea star	*Orthasterias koehleri*
Shumagin	Paguridae	Aleutian hermit	*Pagurus aleuticus*
Shumagin	Paguridae	sponge hermit	*Pagurus brandti*
Shumagin	Paguridae	hairy hermit crab	*Pagurus capillatus*
Shumagin	Paguridae	knobbyhand hermit	*Pagurus confragosus*
Shumagin	Paguridae	whiteknee hermit	*Pagurus dalli*
Shumagin	Paguridae	bluespine hermit	*Pagurus kennerlyi*
Shumagin	Paguridae	Alaskan hermit	*Pagurus ochotensis*
Shumagin	Paguridae	longfinger hermit	*Pagurus rathbuni*
Shumagin	Paguridae	longhand hermit	*Pagurus tanneri*
Shumagin	Paguridae	fuzzy hermit crab	*Pagurus trigonocheirus*
Shumagin	Pandalidae	sidestripe shrimp	*Pandalopsis dispar*
Shumagin	Pandalidae	northern longbeak	*Pandalopsis longirostris*
Shumagin	Pandalidae	Alaskan pink shrimp	*Pandalus eous*
Shumagin	Pandalidae	ocean shrimp	*Pandalus jordani*
Shumagin	Pandalidae	roughpatch shrimp	*Pandalus stenolepis*
Shumagin	Paragorgiidae	Kamchatka coral	*Paragorgia arborea*
Shumagin	Pasiphaeidae	Pacific glass shrimp	*Pasiphaea pacifica*
Shumagin	Pectinidae	weathervane scallop	*Patinopecten caurinus*
Shumagin	Ulmaridae	egg yolk jelly	*Phacellophora camtschatica*
Shumagin	Primnoidae		*Plumarella hapala*
Shumagin	Primnoidae	feathery Plumarella	*Plumarella* sp. 1 (Bayer)
Shumagin	Primnoidae	pale Plumarella	*Plumarella* sp. A
Shumagin	Primnoidae	pinnate Plumarella	*Plumarella* sp. B
Shumagin	Primnoidae	bushy coral	*Plumarella superba*
Shumagin	Anomiidae	abalone jingle	*Pododesmus cepio*
Shumagin	Anomiidae	Alaska falsejingle	*Pododesmus macrochisma*
Shumagin	Polymastiidae	orange nipple-ball sponge	*Polymastia pacifica*
Shumagin	Polymastiidae	prolific nipple sponge	*Polymastia* sp. A (Clark 2006)
Shumagin	Primnoidae		*Primnoa pacifica*
Shumagin	Goniasteridae	scarlet sea star	*Pseudarchaster parelii*
Shumagin	Synallactidae	sandy sea cucumber	*Pseudostichopus mollis*
Shumagin	Psolidae		*Psolus japonicus*
Shumagin	Pterasteridae		*Pteraster jordani*
Shumagin	Pterasteridae		*Pteraster marssipus*
Shumagin	Pterasteridae	cushion sea star	*Pteraster temnochiton*

INPFC area	Family	Common name	Species name
Shumagin	Pterasteridae		*Pteraster tesselatus*
Shumagin	Asteriidae	sunflower sea star	*Pycnopodia helianthoides*
Shumagin	Euplectellidae	lacy basket sponge	*Regadrella okinoseana*
Shumagin	Aegidae	sea cockroach	*Rocinela angustata*
Shumagin	Sepiolidae	eastern Pacific bobtail	*Rossia pacifica*
Shumagin	Serpulidae	red trumpet calcareous tubeworm	*Serpula columbiana*
Shumagin	Solasteridae		*Solaster* sp. A (Clark 1997)
Shumagin	Solasteridae	Kessler sun star	*Solaster* sp. E (Clark)
Shumagin	Solasteridae	Fisher sun star	*Solaster* sp. F (Clark)
Shumagin	Solasteridae	ocher sun star	*Solaster* sp. G (Clark)
Shumagin	Ophiuridae		*Stegophiura ponderosa*
Shumagin	Myxillidae	scapula sponge	*Stelodoryx oxeata*
Shumagin	Actinostolidae	swimming anemone	*Stomphia coccinea*
Shumagin	Strongylocentrotidae	green sea urchin	*Strongylocentrotus droebachiensis*
Shumagin	Strongylocentrotidae	white sea urchin	*Strongylocentrotus pallidus*
Shumagin	Strongylocentrotidae		*Strongylocentrotus polyacanthus*
Shumagin	Styelidae	sea potato	*Styela rustica*
Shumagin	Stylasteridae	undulate hydrocoral	*Stylaster repandus*
Shumagin	Stylasteridae		*Stylaster venustus*
Shumagin	Asteriidae	long-rayed star	*Stylasterias forreri*
Shumagin	Suberitidae	hermit sponge	*Suberites domuncula*
Shumagin	Plexauridae		*Swiftia pacifica*
Shumagin	Synallactidae		*Synallactes challengeri*
Shumagin	Tedaniidae	club sponge	*Tedania kagalaskai*
Shumagin	Laqueidae	common brachiopod	*Terebratalia transversa*
Shumagin	Actiniidae	mottled anemone	*Urticina crassicornis*
Shumagin	Polymastiidae	pale mammilated sponge	*Weberella bursa*
Shumagin	Yoldiidae	northern Yoldia	*Yoldia hyperborea*
Southeastern	Rajidae	Bering skate	*Bathyraja interrupta*
Southeastern	Rajidae	big skate	*Beringraja binoculata*
Southeastern	Rajidae	longnose skate	*Beringraja rhina*
Southeastern	Chimaeridae	spotted ratfish	*Hydrolagus colliei*
Southeastern	Squalidae	spiny dogfish	*Squalus suckleyi*
Southeastern	Pleuronectidae	arrowtooth flounder	*Atheresthes stomias*
Southeastern	Paralichthyidae	Pacific sanddab	*Citharichthys sordidus*
Southeastern	Pleuronectidae	petrale sole	*Eopsetta jordani*
Southeastern	Pleuronectidae	rex sole	*Glyptocephalus zachirus*
Southeastern	Pleuronectidae	flathead sole	*Hippoglossoides elassodon*
Southeastern	Pleuronectidae	Pacific halibut	*Hippoglossus stenolepis*
Southeastern	Pleuronectidae	southern rock sole	*Lepidopsetta bilineata*
Southeastern	Pleuronectidae	slender sole	*Lyopsetta exilis*
Southeastern	Pleuronectidae	deepsea sole	*Microstomus bathybius*
Southeastern	Pleuronectidae	Dover sole	*Microstomus pacificus*
Southeastern	Pleuronectidae	English sole	*Parophrys vetulus*
Southeastern	Pleuronectidae	curlfin sole	*Pleuronichthys decurrens*
Southeastern	Macrouridae	giant grenadier	*Albatrossia pectoralis*
Southeastern	Anoplopomatidae	sablefish	*Anoplopoma fimbria*
Southeastern	Agonidae	blackfin poacher	*Bathyagonus nigripinnis*
Southeastern	Agonidae	bigeye poacher	*Bathyagonus pentacanthus*
Southeastern	Bathymasteridae	searcher	*Bathymaster signatus*
Southeastern	Scopelarchidae	northern pearleye	*Benthalbella dentata*
Southeastern	Stomiidae	Pacific viperfish	*Chauliodus macouni*
Southeastern	Clupeidae	Pacific herring	*Clupea pallasii*
Southeastern	Psychrolutidae	spinyhead sculpin	*Dasycottus setiger*
Southeastern	Gadidae	walleye pollock	*Gadus chalcogrammus*
Southeastern	Gadidae	Pacific cod	*Gadus macrocephalus*

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Southeastern	Myctophidae	brokenline lampfish	*Lampanyctus jordani*
Southeastern	Myctophidae	pinpoint lampfish	*Lampanyctus regalis*
Southeastern	Bathylagidae	northern smoothtongue	*Leuroglossus schmidti*
Southeastern	Stichaeidae	longsnout prickleback	*Lumpenella longirostris*
Southeastern	Zoarcidae	snakehead eelpout	*Lycenchelys crotalinus*
Southeastern	Zoarcidae	Bering eelpout	*Lycodes beringi*
Southeastern	Zoarcidae	shortfin eelpout	*Lycodes brevipes*
Southeastern	Zoarcidae	bigfin eelpout	*Lycodes cortezianus*
Southeastern	Zoarcidae	blackbelly eelpout	*Lycodes pacificus*
Southeastern	Zoarcidae	wattled eelpout	*Lycodes palearis*
Southeastern	Psychrolutidae	darkfin sculpin	*Malacocottus zonurus*
Southeastern	Merlucciidae	Pacific hake	*Merluccius productus*
Southeastern	Gadidae	Pacific tomcod	*Microgadus proximus*
Southeastern	Salmonidae	pink salmon	*Oncorhynchus gorbuscha*
Southeastern	Salmonidae	chum salmon	*Oncorhynchus keta*
Southeastern	Salmonidae	coho salmon	*Oncorhynchus kisutch*
Southeastern	Salmonidae	chinook salmon	*Oncorhynchus tshawytscha*
Southeastern	Hexagrammidae	lingcod	*Ophiodon elongatus*
Southeastern	Liparidae	red snailfish	*Paraliparis dactylosus*
Southeastern	Scorpaenidae	rougheye rockfish	*Sebastes aleutianus*
Southeastern	Scorpaenidae	Pacific ocean perch	*Sebastes alutus*
Southeastern	Scorpaenidae	redbanded rockfish	*Sebastes babcocki*
Southeastern	Scorpaenidae	shortraker rockfish	*Sebastes borealis*
Southeastern	Scorpaenidae	silvergray rockfish	*Sebastes brevispinis*
Southeastern	Scorpaenidae	darkblotched rockfish	*Sebastes crameri*
Southeastern	Scorpaenidae	splitnose rockfish	*Sebastes diploproa*
Southeastern	Scorpaenidae	greenstriped rockfish	*Sebastes elongatus*
Southeastern	Scorpaenidae	widow rockfish	*Sebastes entomelas*
Southeastern	Scorpaenidae	yellowtail rockfish	*Sebastes flavidus*
Southeastern	Scorpaenidae	rosethorn rockfish	*Sebastes helvomaculatus*
Southeastern	Scorpaenidae	quillback rockfish	*Sebastes maliger*
Southeastern	Scorpaenidae	blackspotted rockfish	*Sebastes melanostictus*
Southeastern	Scorpaenidae	bocaccio	*Sebastes paucispinis*
Southeastern	Scorpaenidae	canary rockfish	*Sebastes pinniger*
Southeastern	Scorpaenidae	redstripe rockfish	*Sebastes proriger*
Southeastern	Scorpaenidae	yellowmouth rockfish	*Sebastes reedi*
Southeastern	Scorpaenidae	yelloweye rockfish	*Sebastes ruberrimus*
Southeastern	Scorpaenidae	dusky rockfish	*Sebastes variabilis*
Southeastern	Scorpaenidae	harlequin rockfish	*Sebastes variegatus*
Southeastern	Scorpaenidae	pygmy rockfish	*Sebastes wilsoni*
Southeastern	Scorpaenidae	sharpchin rockfish	*Sebastes zacentrus*
Southeastern	Scorpaenidae	shortspine thornyhead	*Sebastolobus alascanus*
Southeastern	Scorpaenidae	longspine thornyhead	*Sebastolobus altivelis*
Southeastern	Myctophidae	northern lampfish	*Stenobrachius leucopsarus*
Southeastern	Stomiidae	longfin dragonfish	*Tactostoma macropus*
Southeastern	Osmeridae	eulachon	*Thaleichthys pacificus*
Southeastern	Agonidae	smootheye poacher	*Xeneretmus leiops*
Southeastern	Zaproridae	prowfish	*Zaprora silenus*
Southeastern	Hormathiidae	reticulate anemone	*Actinauge verrilli*
Southeastern	Actinostolidae		*Actinostola* sp. A (Clark 2006)
Southeastern	Strongylocentrotidae	orange-pink sea urchin	*Allocentrotus fragilis*
Southeastern	Aphrocallistidae	clay pipe sponge	*Aphrocallistes vastus*
Southeastern	Volutidae		*Arctomelon tamikoae*
Southeastern	Rossellidae	vase sponge	*Aulosaccus schulzei*
Southeastern	Ulmaridae		*Aurelia labiata*
Southeastern	Buccinidae		*Beringius undatus*

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Southeastern	Gonatidae	magistrate armhook squid	*Berryteuthis magister*
Southeastern	Schizasteridae	heart urchin	*Brisaster latifrons*
Southeastern	Calliostomatidae		*Calliostoma variegatum*
Southeastern	Pisidae	longhorned decorator crab	*Chorilia longipes*
Southeastern	Pelagiidae	sea nettle	*Chrysaora fuscescens*
Southeastern	Pelagiidae		*Chrysaora melanaster*
Southeastern	Trochidae		*Cidarina cidaris*
Southeastern	Solasteridae	grooved sea star	*Crossaster borealis*
Southeastern	Solasteridae	rose sea star	*Crossaster papposus*
Southeastern	Naticidae	Aleutian moonsnail	*Cryptonatica aleutica*
Southeastern	Cyaneidae	lion's mane jelly	*Cyanea capillata*
Southeastern	Pterasteridae	pincushion sea star	*Diplopteraster multipes*
Southeastern	Astropectinidae	northern sea star	*Dipsacaster borealis*
Southeastern	Astropectinidae		*Dipsacaster eximus*
Southeastern	Octopodidae	giant octopus	*Enteroctopus dofleini*
Southeastern	Sergestidae	Pacific sergestid	*Eusergestes similis*
Southeastern	Antedonidae	featherstar crinoid	*Florometra serratissima*
Southeastern	Ranellidae	Oregon triton	*Fusitriton oregonensis*
Southeastern	Goniasteridae	Swift sea star	*Gephyreaster swifti*
Southeastern	Halipteridae	maroon sea whip	*Halipteris* sp. A (Stone 2015)
Southeastern	Halipteridae		*Halipteris willemoesi*
Southeastern	Echinasteridae		*Henricia asthenactis*
Southeastern	Alcyoniidae	gray mushroom coral	*Heteropolypus (=Anthomastus)* sp. B
Southeastern	Goniasteridae	spiny red sea star	*Hippasteria phrygiana (=spinosa)*
Southeastern	Oregoniidae	Pacific lyre crab	*Hyas lyratus*
Southeastern	Lithodidae	brown box crab	*Lopholithodes foraminatus*
Southeastern	Luidiidae	sand sea star	*Luidia foliolata*
Southeastern	Yoldiidae	broad Yoldia	*Megayoldia thraciaeformis*
Southeastern	Molpadiidae	sweet sea potato	*Molpadia intermedia*
Southeastern	Onychoteuthidae	robust clubhook squid	*Moroteuthis robusta*
Southeastern	Galatheidae	pinchbug	*Munida quadrispina*
Southeastern	Mycalidae	tree sponge	*Mycale loveni*
Southeastern	Benthopectinidae		*Nearchaster aciculosus*
Southeastern	Oplophoridae	spinyridge shrimp	*Notostomus japonicus*
Southeastern	Octopoteuthidae		*Octopoteuthis deletron*
Southeastern	Asteriidae	redbanded sea star	*Orthasterias koehleri*
Southeastern	Paguridae	Aleutian hermit	*Pagurus aleuticus*
Southeastern	Paguridae	setose hermit	*Pagurus setosus*
Southeastern	Pandalidae	sidestripe shrimp	*Pandalopsis dispar*
Southeastern	Pandalidae	Alaskan pink shrimp	*Pandalus eous*
Southeastern	Pandalidae	ocean shrimp	*Pandalus jordani*
Southeastern	Pandalidae	spot shrimp	*Pandalus platyceros*
Southeastern	Paragorgiidae	Kamchatka coral	*Paragorgia arborea*
Southeastern	Pasiphaeidae	Pacific glass shrimp	*Pasiphaea pacifica*
Southeastern	Periphyllidae	helmet jelly	*Periphylla periphylla*
Southeastern	Ulmaridae	egg yolk jelly	*Phacellophora camtschatica*
Southeastern	Primnoidae		*Primnoa pacifica*
Southeastern	Goniasteridae		*Pseudarchaster alascensis*
Southeastern	Goniasteridae	scarlet sea star	*Pseudarchaster parelii*
Southeastern	Synallactidae	sandy sea cucumber	*Pseudostichopus mollis*
Southeastern	Pterasteridae		*Pteraster marssipus*
Southeastern	Aegidae	sea cockroach	*Rocinela angustata*
Southeastern	Sepiolidae	eastern Pacific bobtail	*Rossia pacifica*
Southeastern	Ophiuridae		*Stegophiura ponderosa*
Southeastern	Strongylocentrotidae	red sea urchin	*Strongylocentrotus franciscanus*

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Southeastern	Asteriidae	long-rayed star	*Stylasterias forreri*
Southeastern	Synallactidae		*Synallactes challengeri*
Southeastern	Yoldiidae	northern Yoldia	*Yoldia hyperborea*
Yakutat	Rajidae	Aleutian skate	*Bathyraja aleutica*
Yakutat	Rajidae	Bering skate	*Bathyraja interrupta*
Yakutat	Rajidae	big skate	*Beringraja binoculata*
Yakutat	Rajidae	longnose skate	*Beringraja rhina*
Yakutat	Chimaeridae	spotted ratfish	*Hydrolagus colliei*
Yakutat	Squalidae	spiny dogfish	*Squalus suckleyi*
Yakutat	Pleuronectidae	arrowtooth flounder	*Atheresthes stomias*
Yakutat	Paralichthyidae	Pacific sanddab	*Citharichthys sordidus*
Yakutat	Pleuronectidae	petrale sole	*Eopsetta jordani*
Yakutat	Pleuronectidae	rex sole	*Glyptocephalus zachirus*
Yakutat	Pleuronectidae	flathead sole	*Hippoglossoides elassodon*
Yakutat	Pleuronectidae	Pacific halibut	*Hippoglossus stenolepis*
Yakutat	Pleuronectidae	butter sole	*Isopsetta isolepis*
Yakutat	Pleuronectidae	southern rock sole	*Lepidopsetta bilineata*
Yakutat	Pleuronectidae	slender sole	*Lyopsetta exilis*
Yakutat	Pleuronectidae	deepsea sole	*Microstomus bathybius*
Yakutat	Pleuronectidae	Dover sole	*Microstomus pacificus*
Yakutat	Pleuronectidae	English sole	*Parophrys vetulus*
Yakutat	Pleuronectidae	starry flounder	*Platichthys stellatus*
Yakutat	Macrouridae	giant grenadier	*Albatrossia pectoralis*
Yakutat	Anoplopomatidae	sablefish	*Anoplopoma fimbria*
Yakutat	Agonidae	gray starsnout	*Bathyagonus alascanus*
Yakutat	Agonidae	bigeye poacher	*Bathyagonus pentacanthus*
Yakutat	Bathymasteridae	searcher	*Bathymaster signatus*
Yakutat	Liparidae	blacktail snailfish	*Careproctus melanurus*
Yakutat	Stomiidae	Pacific viperfish	*Chauliodus macouni*
Yakutat	Clupeidae	Pacific herring	*Clupea pallasii*
Yakutat	Psychrolutidae	spinyhead sculpin	*Dasycottus setiger*
Yakutat	Liparidae	humpback snailfish	*Elassodiscus caudatus*
Yakutat	Gadidae	walleye pollock	*Gadus chalcogrammus*
Yakutat	Gadidae	Pacific cod	*Gadus macrocephalus*
Yakutat	Hemitripteridae	bigmouth sculpin	*Hemitripterus bolini*
Yakutat	Stichaeidae	longsnout prickleback	*Lumpenella longirostris*
Yakutat	Zoarcidae	Bering eelpout	*Lycodes beringi*
Yakutat	Zoarcidae	shortfin eelpout	*Lycodes brevipes*
Yakutat	Zoarcidae	blackbelly eelpout	*Lycodes pacificus*
Yakutat	Zoarcidae	wattled eelpout	*Lycodes palearis*
Yakutat	Paralepididae	duckbill barracudina	*Magnisudis atlantica*
Yakutat	Psychrolutidae	blackfin sculpin	*Malacocottus kincaidi*
Yakutat	Psychrolutidae	darkfin sculpin	*Malacocottus zonurus*
Yakutat	Osmeridae	Pacific capelin	*Mallotus catervarius (=villosus)*
Yakutat	Gadidae	Pacific tomcod	*Microgadus proximus*
Yakutat	Salmonidae	pink salmon	*Oncorhynchus gorbuscha*
Yakutat	Salmonidae	chum salmon	*Oncorhynchus keta*
Yakutat	Salmonidae	chinook salmon	*Oncorhynchus tshawytscha*
Yakutat	Hexagrammidae	lingcod	*Ophiodon elongatus*
Yakutat	Stichaeidae	whitebarred prickleback	*Poroclinus rothrocki*
Yakutat	Bathylagidae	robust blacksmelt	*Pseudobathylagus milleri*
Yakutat	Psychrolutidae	tadpole sculpin	*Psychrolutes paradoxus*
Yakutat	Cottidae	slim sculpin	*Radulinus asprellus*
Yakutat	Scorpaenidae	rougheye rockfish	*Sebastes aleutianus*
Yakutat	Scorpaenidae	Pacific ocean perch	*Sebastes alutus*
Yakutat	Scorpaenidae	redbanded rockfish	*Sebastes babcocki*

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Yakutat	Scorpaenidae	shortraker rockfish	*Sebastes borealis*
Yakutat	Scorpaenidae	silvergray rockfish	*Sebastes brevispinis*
Yakutat	Scorpaenidae	darkblotched rockfish	*Sebastes crameri*
Yakutat	Scorpaenidae	greenstriped rockfish	*Sebastes elongatus*
Yakutat	Scorpaenidae	yellowtail rockfish	*Sebastes flavidus*
Yakutat	Scorpaenidae	rosethorn rockfish	*Sebastes helvomaculatus*
Yakutat	Scorpaenidae	quillback rockfish	*Sebastes maliger*
Yakutat	Scorpaenidae	black rockfish	*Sebastes melanops*
Yakutat	Scorpaenidae	blackspotted rockfish	*Sebastes melanostictus*
Yakutat	Scorpaenidae	canary rockfish	*Sebastes pinniger*
Yakutat	Scorpaenidae	redstripe rockfish	*Sebastes proriger*
Yakutat	Scorpaenidae	dusky rockfish	*Sebastes variabilis*
Yakutat	Scorpaenidae	harlequin rockfish	*Sebastes variegatus*
Yakutat	Scorpaenidae	sharpchin rockfish	*Sebastes zacentrus*
Yakutat	Scorpaenidae	shortspine thornyhead	*Sebastolobus alascanus*
Yakutat	Myctophidae	northern lampfish	*Stenobrachius leucopsarus*
Yakutat	Stomiidae	longfin dragonfish	*Tactostoma macropus*
Yakutat	Osmeridae	eulachon	*Thaleichthys pacificus*
Yakutat	Trichodontidae	Pacific sandfish	*Trichodon trichodon*
Yakutat	Cottidae	roughspine sculpin	*Triglops macellus*
Yakutat	Zaproridae	prowfish	*Zaprora silenus*
Yakutat	Rossellidae	angel-hair vase sponge	*Acanthascus* sp. A
Yakutat	Lithodidae	fuzzy crab	*Acantholithodes hispidus*
Yakutat	Hormathiidae	reticulate anemone	*Actinauge verrilli*
Yakutat	Actinostolidae	rough purple sea anemone	*Actinostola faeculenta*
Yakutat	Strongylocentrotidae	orange-pink sea urchin	*Allocentrotus fragilis*
Yakutat	Anuropidae	giant isopod	*Anuropus bathypelagica*
Yakutat	Aphrocallistidae	clay pipe sponge	*Aphrocallistes vastus*
Yakutat	Aphroditidae		*Aphrodita negligens*
Yakutat	Stichopodidae	California sea cucumber	*Apostichopus californicus*
Yakutat	Crangonidae	split-eye argid	*Argis ovifer*
Yakutat	Astartidae		*Astarte compacta*
Yakutat	Rossellidae	vase sponge	*Aulosaccus schulzei*
Yakutat	Axinellidae	firm finger sponge	*Axinella blanca*
Yakutat	Trochidae		*Bathybembix bairdii*
Yakutat	Antipathidae		*Bathypathes patula*
Yakutat	Octopodidae	smoothskin octopus	*Benthoctopus leioderma*
Yakutat	Gonatidae	magistrate armhook squid	*Berryteuthis magister*
Yakutat	Schizasteridae	heart urchin	*Brisaster latifrons*
Yakutat	Buccinidae	swollen whelk	*Buccinum oedematum*
Yakutat	Goniasteridae	orange bat sea star	*Ceramaster patagonicus*
Yakutat	Benthopectinidae	fragile sea star	*Cheiraster dawsoni*
Yakutat	Oregoniidae	Tanner crab	*Chionoecetes bairdi*
Yakutat	Chiroteuthidae		*Chiroteuthis calyx*
Yakutat	Pelagiidae	sea nettle	*Chrysaora fuscescens*
Yakutat	Pelagiidae		*Chrysaora melanaster*
Yakutat	Crangonidae	ridged Crangon	*Crangon dalli*
Yakutat	Solasteridae	rose sea star	*Crossaster papposus*
Yakutat	Naticidae	Aleutian moonsnail	*Cryptonatica aleutica*
Yakutat	Ctenodiscidae	common mud star	*Ctenodiscus crispatus*
Yakutat	Cyaneidae	lion's mane jelly	*Cyanea capillata*
Yakutat	Pterasteridae	pincushion sea star	*Diplopteraster multipes*
Yakutat	Astropectinidae	northern sea star	*Dipsacaster borealis*
Yakutat	Archidoridae	white night doris	*Doris odhneri*
Yakutat	Microcionidae	hat sponge	*Echinoclathria beringensis*
Yakutat	Octopodidae	giant octopus	*Enteroctopus dofleini*

INPFC area	Family	Common name	Species name
Yakutat	Hippolytidae	deepsea eualid	*Eualus biunguis*
Yakutat	Polynoidae	giant scale worm	*Eunoe nodosa*
Yakutat	Sergestidae	Pacific sergestid	*Eusergestes similis*
Yakutat	Antedonidae	common northern feather star	*Florometra asperrima*
Yakutat	Ranellidae	Oregon triton	*Fusitriton oregonensis*
Yakutat	Cranchiidae		*Galiteuthis phyllura*
Yakutat	Gorgonocephalidae	basketstar	*Gorgonocephalus eucnemis*
Yakutat	Halipteridae		*Halipteris willemoesi*
Yakutat	Pyuridae	bristly tunicate	*Halocynthia igaboja*
Yakutat	Alcyoniidae	gray mushroom coral	*Heteropolypus (=Anthomastus)* sp. B
Yakutat	Goniasteridae		*Hippasteria californica*
Yakutat	Goniasteridae	Alaskan spiny star	*Hippasteria* sp. E (Clark)
Yakutat	Oregoniidae	Pacific lyre crab	*Hyas lyratus*
Yakutat	Laqueidae	Vancouver lampshell	*Laqueus vancouverensis*
Yakutat	Asteriidae	blackspined sea star	*Lethasterias nanimensis*
Yakutat	Grantiidae	spiny vase sponge	*Leucandra heathi*
Yakutat	Lithodidae	brown box crab	*Lopholithodes foraminatus*
Yakutat	Lithodidae	red box crab	*Lopholithodes mandtii*
Yakutat	Luidiidae	sand sea star	*Luidia foliolata*
Yakutat	Goniasteridae	vermilion sea star	*Mediaster aequalis*
Yakutat	Yoldiidae	broad Yoldia	*Megayoldia thraciaeformis*
Yakutat	Molpadiidae	sweet sea potato	*Molpadia intermedia*
Yakutat	Galatheidae	pinchbug	*Munida quadrispina*
Yakutat	Galatheidae	long-armed pinch bug	*Munidopsis quadrata*
Yakutat	Mycalidae	tree sponge	*Mycale loveni*
Yakutat	Benthopectinidae		*Nearchaster aciculosus*
Yakutat	Benthopectinidae		*Nearchaster variabilis*
Yakutat	Buccinidae	white neptune	*Neptunea amianta*
Yakutat	Echinasteridae		*Odontohenricia fisheri*
Yakutat	Ophiuridae	notched brittlestar	*Ophiura sarsii*
Yakutat	Asteriidae	redbanded sea star	*Orthasterias koehleri*
Yakutat	Paguridae	Aleutian hermit	*Pagurus aleuticus*
Yakutat	Paguridae	hornyhand hermit	*Pagurus cornutus*
Yakutat	Paguridae	Alaskan hermit	*Pagurus ochotensis*
Yakutat	Pandalidae	sidestripe shrimp	*Pandalopsis dispar*
Yakutat	Pandalidae	dock shrimp	*Pandalus danae*
Yakutat	Pandalidae	Alaskan pink shrimp	*Pandalus eous*
Yakutat	Pandalidae	ocean shrimp	*Pandalus jordani*
Yakutat	Pandalidae	spot shrimp	*Pandalus platyceros*
Yakutat	Pandalidae	yellowleg pandalid	*Pandalus tridens*
Yakutat	Paragorgiidae		*Paragorgia pacifica*
Yakutat	Pasiphaeidae	Pacific glass shrimp	*Pasiphaea pacifica*
Yakutat	Pectinidae	weathervane scallop	*Patinopecten caurinus*
Yakutat	Periphyllidae	helmet jelly	*Periphylla periphylla*
Yakutat	Ulmaridae	egg yolk jelly	*Phacellophora camtschatica*
Yakutat	Echinasteridae	thorny sea star	*Poraniopsis inflata*
Yakutat	Primnoidae		*Primnoa pacifica*
Yakutat	Goniasteridae		*Pseudarchaster alascensis*
Yakutat	Goniasteridae	scarlet sea star	*Pseudarchaster parelii*
Yakutat	Synallactidae	sandy sea cucumber	*Pseudostichopus mollis*
Yakutat	Psolidae	whitescaled sea cucumber	*Psolus squamatus*
Yakutat	Pterasteridae	obscure sea star	*Pteraster obscurus*
Yakutat	Pennatulidae	orange sea pen	*Ptilosarcus gurneyi*
Yakutat	Asteriidae	sunflower sea star	*Pycnopodia helianthoides*
Yakutat	Labidiasteridae		*Rathbunaster californicus*

INPFC area	Family	Common name	Species name
Yakutat	Aegidae	sea cockroach	*Rocinela angustata*
Yakutat	Sepiolidae	eastern Pacific bobtail	*Rossia pacifica*
Yakutat	Hippolytidae	Dana blade shrimp	*Spirontocaris lamellicornis*
Yakutat	Ophiuridae		*Stegophiura nodosa*
Yakutat	Ophiuridae		*Stegophiura ponderosa*
Yakutat	Histioteuthidae		*Stigmatoteuthis dofleini*
Yakutat	Strongylocentrotidae	red sea urchin	*Strongylocentrotus franciscanus*
Yakutat	Strongylocentrotidae		*Strongylocentrotus polyacanthus*
Yakutat	Styelidae	sea potato	*Styela rustica*
Yakutat	Asteriidae	long-rayed star	*Stylasterias forreri*
Yakutat	Suberitidae	hermit sponge	*Suberites domuncula*
Yakutat	Synallactidae		*Synallactes challengeri*
Yakutat	Ischnochitonidae	Bering chiton	*Tripoplax abyssicola*
Yakutat	Tritoniidae	rosy Tritonia	*Tritonia diomedea*
Yakutat	Actiniidae	mottled anemone	*Urticina crassicornis*

Appendix C

Appendix Table C1. -- Length-weight parameters (*alpha* and *beta*) fitted for species caught in the Gulf of Alaska bottom trawl survey. These values are used to expand biomass from subsample lengths in survey data.

Common name	Scientific name	Sex	Sample size (n)	R^2	Max length (mm)	alpha (g)	beta
arrowtooth flounder	*Atheresthes stomias*	male	308	0.99	580	0.000002627	3.191738
arrowtooth flounder	*Atheresthes stomias*	female	629	0.99	750	0.000002653	3.197399
arrowtooth flounder	*Atheresthes stomias*	all	937	0.99	750	0.000002393	3.212175
Northern rock sole	*Lepidopsetta polyxystra*	male	100	0.98	440	0.000004807	3.145663
Northern rock sole	*Lepidopsetta polyxystra*	female	168	0.97	500	0.000003356	3.212576
Northern rock sole	*Lepidopsetta polyxystra*	all	268	0.98	500	0.000003327	3.212605
Southern rock sole	*Lepidopsetta bilineata*	male	269	0.97	520	0.000004204	3.175377
Southern rock sole	*Lepidopsetta bilineata*	female	535	0.98	540	0.000003503	3.210199
Southern rock sole	*Lepidopsetta bilineata*	all	804	0.98	540	0.000003399	3.214484
flathead sole	*Hippoglossoides elassodon*	male	351	0.98	440	0.000000833	3.406177
flathead sole	*Hippoglossoides elassodon*	female	360	0.98	520	0.000001147	3.349979
flathead sole	*Hippoglossoides elassodon*	all	712	0.98	520	0.000001068	3.362616
rex sole	*Glyptocephalus zachirus*	male	365	0.98	540	0.000000633	3.391670
rex sole	*Glyptocephalus zachirus*	female	393	0.98	590	0.000000795	3.357188
rex sole	*Glyptocephalus zachirus*	all	759	0.98	590	0.000000625	3.396108
Dover sole	*Microstomus pacificus*	male	374	0.98	600	0.000001959	3.263155
Dover sole	*Microstomus pacificus*	female	400	0.99	620	0.000001855	3.269916
Dover sole	*Microstomus pacificus*	all	774	0.99	620	0.000001957	3.262029
Pacific cod	*Gadus macrocephalus*	male	262	0.99	960	0.000004523	3.135603
Pacific cod	*Gadus macrocephalus*	female	324	0.99	980	0.000003609	3.173048
Pacific cod	*Gadus macrocephalus*	all	586	0.99	980	0.000003912	3.159595
walleye pollock	*Gadus chalcogrammus*	male	610	0.99	600	0.000005124	3.062478
walleye pollock	*Gadus chalcogrammus*	female	742	0.99	630	0.000004847	3.070300
walleye pollock	*Gadus chalcogrammus*	all	1,352	0.99	630	0.000005011	3.065392
Atka mackerel	*Pleurogrammus monopterygius*	male	39	0.97	450	0.000001125	3.422133
Atka mackerel	*Pleurogrammus monopterygius*	female	29	0.96	490	0.000004386	3.172953
Atka mackerel	*Pleurogrammus monopterygius*	all	68	0.96	490	0.000003520	3.220129
sablefish	*Anoplopoma fimbria*	male	570	0.98	650	0.000002033	3.243237
sablefish	*Anoplopoma fimbria*	female	616	0.98	710	0.000001819	3.260540
sablefish	*Anoplopoma fimbria*	all	1,186	0.98	710	0.000001914	3.252689
Pacific ocean perch	*Sebastes alutus*	male	605	0.99	470	0.000006310	3.126185
Pacific ocean perch	*Sebastes alutus*	female	544	0.99	480	0.000009820	3.046121
Pacific ocean perch	*Sebastes alutus*	unsexed	5	0.83	110	0.000003882	3.248273
Pacific ocean perch	*Sebastes alutus*	all	1,154	0.99	480	0.000008077	3.081920

Common name	Scientific name	Sex	Sample size (n)	R^2	Max length (mm)	alpha (g)	beta
northern rockfish	*Sebastes polyspinis*	male	258	0.95	470	0.000013111	3.019880
northern rockfish	*Sebastes polyspinis*	female	257	0.94	470	0.000017027	2.975733
northern rockfish	*Sebastes polyspinis*	all	515	0.95	470	0.000015014	2.996958
rougheye rockfish	*Sebastes aleutianus*	male	402	0.99	690	0.000005444	3.178515
rougheye rockfish	*Sebastes aleutianus*	female	378	0.99	620	0.000005227	3.185214
rougheye rockfish	*Sebastes aleutianus*	all	780	0.99	690	0.000005350	3.181367
blackspotted rockfish	*Sebastes melanostictus*	male	181	0.99	550	0.000004455	3.203560
blackspotted rockfish	*Sebastes melanostictus*	female	216	0.99	530	0.000006178	3.150230
blackspotted rockfish	*Sebastes melanostictus*	unsexed	4	0.96	270	0.000003258	3.260314
blackspotted rockfish	*Sebastes melanostictus*	all	401	0.99	550	0.000005192	3.178750
dusky rockfish	*Sebastes variabilis*	male	208	0.97	510	0.000004380	3.224311
dusky rockfish	*Sebastes variabilis*	female	232	0.96	540	0.000007846	3.126412
dusky rockfish	*Sebastes variabilis*	all	440	0.97	540	0.000006086	3.168974
shortspine thornyhead	*Sebastolobus alascanus*	male	200	0.99	460	0.000003732	3.198590
shortspine thornyhead	*Sebastolobus alascanus*	female	216	0.99	500	0.000004400	3.172883
shortspine thornyhead	*Sebastolobus alascanus*	all	418	0.99	500	0.000004064	3.185316

U.S. Secretary of Commerce
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