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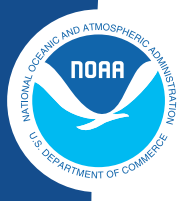

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Resource Assessment and Conservation Engineering Division

Data Report: 2022 Aleutian Islands Bottom Trawl Survey

NOVEMBER 2023

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AFSC Processed Report

This document should be cited as follows:
von Szalay, P. G., Raring, N. W., Siple, M. C., Dowlin, A. N, Riggle, B. C., and Laman, E. A. 2023. Data Report: 2022 Aleutian Islands bottom trawl survey. AFSC Processed Rep. 2023-07, 230 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.

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Data Report: 2022 Aleutian Islands Bottom Trawl Survey

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November 2023

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Preface

This report presents data from the 2022 Aleutian Islands groundfish bottom trawl survey conducted by the Alaska Fisheries Science Center of the National Marine Fisheries Service. It contains detailed descriptions of the survey planning and operations, species distribution and abundance charts, length frequency plots, tables of estimated biomass and abundance, catch per unit effort, average weight and length estimates, length-weight regressions, lists of identified species, survey strata specifications and charts, and trawl descriptions and diagrams.

Abstract

The 2022 biennial groundfish assessment survey of the Aleutian Islands (AI) region was conducted during the summer of 2022 by the Alaska Fisheries Science Center (AFSC) Resource Assessment and Conservation Engineering Division's Groundfish Assessment Program (RACE-GAP). This effort constitutes the 20th AI survey in a series that began in 1980. The surveyed area comprises the continental shelf and upper continental slope to a depth of 500 m in the Aleutian archipelago, from Islands of Four Mountains (170° W longitude) to Stalemate Bank (170° E longitude). It includes Petrel Bank and Petrel Spur (180° longitude), as well as the northern side of the AI between Unimak Pass (165° W longitude) and the Islands of Four Mountains. The survey was conducted aboard two chartered trawlers, the FV *Ocean Explorer* and the FV *Alaska Provider*. Samples were collected successfully at 398 survey stations using standard RACE Division Poly Nor'Eastern high-opening bottom trawl nets with rubber bobbin roller gear.

The primary objectives of the survey were to describe the distribution and estimate the relative abundance of commercially or ecologically important groundfish and invertebrate species that inhabit the Aleutian marine habitat and to collect additional data to define biological parameters useful to fisheries researchers and managers such as growth rates; length-weight relationships; feeding habits; and length, sex, and age compositions. Pacific ocean perch (*Sebastes alutus*) had the highest estimated biomass of 1,063,030 metric tons (t), followed by Atka mackerel (*Pleurogrammus monopterygius*; 672,262 t), northern rockfish (*Sebastes polyspinis*; 287,315 t), and walleye pollock (*Gadus chalcogrammus*; 163,806 t). Arrowtooth flounder (*Atheresthes stomias*; 57,993 t) and northern rock sole (*Lepidopsetta polyxystra*; 28,770 t) were the flatfish species with the highest estimated biomass. The three elasmobranchs with the highest biomass estimated from the survey were, in order, whiteblotched skate (*Bathyraja maculata*), salmon shark (*Lamna ditropis*), and Aleutian skate (*Bathyraja aleutica*). The highest species richness of fishes was found in the Central Aleutians (78 species) and the highest invertebrate species richness was found in the Eastern Aleutians (192 species).

Introduction

The 2022 biennial bottom trawl survey of the Aleutian Islands (AI) region was conducted from June 6th through August 14th, 2022 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 marked the 20th comprehensive RACE-GAP bottom trawl survey of this area since 1980. The surveys conducted prior to 1991 were cooperative efforts involving U.S. and Japanese scientists and vessels. From 1991 to 2000 the surveys were planned and conducted every three years with RACE-GAP deploying chartered U.S. fishing vessels. Biennial surveys of the AI began in 2000; the 2008 survey was canceled due to insufficient funds and the 2020 survey was preempted by the COVID-19 pandemic. The primary focus of RACE-GAP bottom trawl surveys is to extend the time series of standardized data collections used to assess, describe, and monitor the distribution, abundance, and biological condition of Aleutian groundfish and invertebrate stocks (Stauffer 2004). This report presents the 2022 survey results for the principal groundfish and invertebrate species from three North Pacific Fishery Management Council (NPFMC) regulatory areas corresponding to the Eastern, Central, and Western Aleutians subdistricts of the Bering Sea-Aleutian Islands (BSAI) management area, along with the southern Bering Sea area on the northern side of the archipelago in the eastern Aleutians. Most time series of principal groundfish and invertebrate species preceding this 2022 report are available through the North Pacific Groundfish Stock Assessments and Fishery Evaluation Reports[1].

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

Special collection requests are solicited annually with a request for proposals (RFP) and typically cover a wide range of studies. Specimen requests in 2022 included collections of tissues for genetics of flatfishes, Pacific herring, sponges, octocorals, and population genetics of Pacific sleeper and salmon sharks. Whole specimens of snailfishes, Pacific lamprey, deep-sea cup corals, ronquils, pricklebacks, wrymouths, crabs, and mollusks were preserved for voucher collections as well as in support of outreach programs and fisheries observer training. Our survey also supported Pacific halibut tagging and data collection for the IPHC (International Pacific Halibut Commission), provided a platform for the study of spatial variability in the body condition and reproductive success of rockfishes, collected water samples to evaluate concordance between waterborne eDNA and adjacent bottom trawl samples, provided data on harmful algal bloom toxins

[1] https://www.npfmc.org/about-the-council/plan-teams/bsai-and-goa-groundfish/

in Alaska food webs, collected data to assess the ecological impact of salmon sharks in the northeast Pacific Ocean, characterized irradiance and acoustic profiles of the water column, and recovered and deployed an acoustic marine mammal mooring in Umnak Pass.

Methods

Survey Area

The Aleutian region is an extensive archipelago formed by the subduction of the Pacific Plate under the North American Plate. It is typified by a relatively narrow continental shelf and a steep continental slope that drops quickly into the Aleutian Trench on the south side and into the Aleutian Basin and Bowers Basin on the north side (Fig. **1**). The islands are separated by numerous deep passes and relatively narrow channels. Strong currents flow through the passes and across the shelf, sometimes making sampling operations difficult. The continental shelf and upper continental slope are typified by hard and sometimes irregular terrain necessitating the use of bobbin-style roller gear on our research trawls in this region (Stauffer 2004). Extending over 1,670 km from east to west, the survey area covers the continental shelf and upper slope from Islands of Four Mountains (170°W longitude) to Stalemate Bank (170°E longitude), including Petrel Bank (180° longitude), and the northern side of the archipelago between Unimak Pass (165°W longitude) and the Islands of Four Mountains (Fig. **1**). Survey depths range from near shore waters to 500 m. The total survey area is approximately 64,400 km^2. The Western Aleutian Islands district (WAI) represents approximately 24% of the total survey area, the Central Aleutian Islands district (CAI) 26%, the Eastern Aleutian Islands district (EAI) 39%, and the Southern Bering Sea district (SBS) approximately 11%. In terms of the sampled depths, the 1–100 m and 101–200 m depth intervals comprise 33.5% and 30.3% of the total survey area. Because the upper continental slope is relatively narrow and steep, the areas represented by the 201–300 m and 301–500 m depth intervals account for only 14.4% and 21.7% of the total survey area.

Vessels

The two U.S. commercial fishing vessels chartered for the 2022 AI bottom trawl survey were the *Ocean Explorer* and the *Alaska Provider*.

- The *Alaska Provider* is 53.6 m in overall length (LOA) and is powered by two main engines with 2,200 continuous horsepower (HP). It is equipped with two forward and one stern net reel, but only the aft reel was used during the AI 2022 bottom trawl survey.
- The *Ocean Explorer* is 47.2 m LOA with a 1,500 HP main engine. It is equipped with two forward net reels, both of which were used during the AI 2022 bottom trawl survey.

Both vessels are house-forward stern trawlers with hydraulic net reels and paired constant tension (autotrawl) hydraulic trawl winches carrying 2.54 cm diameter steel core cable of sufficient length to sample the maximum survey depths in the study area. Both vessels have articulating hydraulic cranes for handling catches and gear and are

equipped with global positioning systems (GPS) integrated with radar, computerized plotting, and autopilots. Other essential electronics supplied by the vessels include color video fish finders, recording depth profilers, and trawl warp measuring systems. The survey was divided into three legs of approximately equal length with a port call between each to accommodate crew changes and to resupply. Captain Dan Carney operated the *Ocean Explorer* and Captain Loren Reynolds operated the *Alaska Provider* for all three 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 6.6 m based on acoustic net mensuration sensors mounted on the wing-tips and headrope of the trawl. Each trawl was certified as conforming to measurement and dimension standards prior to its use on the survey.

Survey Design

The biennial AI bottom trawl survey uses a stratified-random survey design of trawlable areas shallower than 500 m. Strata are defined by four depth intervals (1–100 m, 101–200 m, 201–300 m, and 301–500 m) within established survey districts and subdistricts. The AI survey area is comprised of four survey districts within the BSAI Management Area regulated by a federal Fisheries Management Plan (FMP) administered by the North Pacific Fishery Management Council (NPFMC)[2]. The RACE-GAP AI survey districts were designed using the International North Pacific Fisheries Commission (INPFC) district boundaries, which roughly correspond to the BSAI FMP subareas (EAI, CAI, and WAI), though the SBS district on the northern side of the archipelago east of the EAI combines several other NMFS statistical reporting areas. There are some boundary differences between the AI survey sampling districts and the BSAI FMP management subareas[3]. The four AI survey sampling districts are subdivided into 45 strata defined by geographic subdistricts and corresponding depth intervals. Subdistricts are defined by two to four roughly equal geographical areas within a survey district designated by cardinal points (N, S, E, W), sub-cardinal points (NW, NE, SE, SW), or in some cases by a "combined" subdistrict where a narrow or limited depth interval is integrated over several subdistricts (Appendix A).

The AI bottom trawl survey sampling frame consists of successfully sampled stations from previous Aleutian surveys since 1991. Consistent with recent RACE-GAP

[2] https://www.npfmc.org/about-the-council/plan-teams/bsai-and-goa-groundfish/

[3] https://media.fisheries.noaa.gov/dam-migration/alaska-fisheries-boundaries-map.pdf

assessment surveys (e.g., Szalay et al. 2008, 2010, Szalay and Raring 2017), sampling effort within each subdistrict was determined using a modified Neyman optimum allocation sampling strategy (Cochran 1977), which balances stratum catch-per-unit-effort (the product of the estimated distance towed (km) and the estimated mean net spread (m) for each haul; CPUE) variance, ex-vessel price (expanded by previous biomass estimates so it is total measure of fishery value; Table 1), and stratum area. Ex-vessel prices for 15 species 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 420 stations were selected for sampling in the 2022 survey. This station allocation total reflects an historical expectation based on stations completed during the standard two-vessel, 70-day, AI bottom trawl survey charters in recent years. Assigned sample densities were highest in the 101 to 200 and 201 to 300 m depth intervals at approximately 10-12 stations per 1,000 km^2 in each interval (Table 2). At a sample size of 420 stations, the survey-wide sampling density was ca. 6.5 tows per 1,000 km^2. In 2022, recognition of high numbers of ergonomic and repetitive motion injuries among seagoing teams led to a deliberate culture change within RACE-GAP aimed at reducing the frequency and intensity of the tasks most likely responsible for this high injury rate. In practical terms, this meant reducing the total number of survey stations targeted for completion. However, this effort was made after the survey station allocation had been completed so that we reduced the number of stations to be sampled while in the field. In future survey years, RACE-GAP plans to allocate fewer stations to each vessel by design and to provide the option to add stations, prioritized by stratum, as time and crew condition allows.

The station allocation software[4] draws stations at random without replacement from the pool of previously successfully sampled stations within each stratum and assigns these to the vessels. The allocation routine currently requires that a minimum of two stations are allocated to each stratum, which can result in new stations (not previously trawled) being assigned to vessels. In 2022, we altered the station assignment process for the AI bottom trawl survey to include a fixed percentage of the total allocation as new stations to be found. To identify the new stations, we began with the assumption that it is more difficult to locate trawlable ground in long thin strata compared to wider strata. Each stratum was first identified as either a large or a long thin stratum based on its shape and size. The ratio of the total perimeter to total area (P:A) was used to distinguish between large and long thin strata, where the latter has higher values. Strata with a P:A ratio less than the mean P:A ratio and an area greater than 1,000 km^2 were classified as “large” strata. Strata with a P:A ratio greater than the mean and an area smaller than 1,000 km^2 were classified as “long thin” strata. Then, for each survey district (SBS, EAI, CAI, WAI), one large stratum and one long thin stratum was randomly chosen for new station exploration. This was done to spread out the station exploration evenly over space. For each chosen large stratum, each vessel needed to find one new station (i.e., eight total new stations) and, for each long thin stratum, vessels were assigned one new station, divided equally between the two vessels (four total new stations). The result of this modified allocation process was 6 new stations per vessel and 12 total over the

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

course of the survey. Thus, 12 stations of the target 420-station allocation were randomly identified in the field.

In the event of fishing gear conflicts or an untrawlable bottom at a preselected station, an alternate station in the same subdistrict and depth stratum was identified as a substitute for the originally allocated station. Alternate trawl stations could either be previously trawled locations not assigned to either vessel in that survey year, or new trawl sites located by systematically searching for patches of trawlable bottom sufficiently large to accommodate a 15-minute tow within the proper stratum. Operations in Steller sea lion no-transit zones were avoided. Search time to find an alternate station was limited to 2 hours of searching a 5 × 5 km grid cell; maximum search time was proportionally reduced when stations represented less than 25 km^2 of the total grid cell.

Trawl Performance Data Collection

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

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

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

deployed during the haul. A haul was considered successful if the following conditions were met:

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

The minimum acceptable duration for a satisfactory haul was 10 minutes, except when a large catch altered the trawl fishing configuration precipitating the need to haul back early. General guidance for short-duration, large-catch hauls has been to assign them a positive performance code when catch rates meet or exceed 1,000 kg/min. and all other standards apply (e.g., good bottom contact, no damage to the trawl web, etc.).

Catch Processing and Data Collection

Trawl catches were brought on board and sorted. Catches weighing up to approximately 1 metric ton (mt; 1,000 kg) were dumped directly onto a sorting table where taxa were identified to the lowest possible taxonomic level (e.g., species-level identification). Taxon groups estimated at more than a few kilos were then weighed to the nearest 10 g using a motion compensated Marel® electronic digital platform scale; non-colonial taxa were enumerated. Taxon groups weighing around 2 kg or less were weighed to the nearest 2 g on a smaller capacity, electronic Marel® model M60 digital scale. Catches larger than ca. 1 mt were often serially processed by dumping aliquots of the total catch onto the sorting table in two or more 1-mt portions. Very large catches that could be lifted off the deck with the crane (5-8 mt) were weighed with a dynamometer (load cell) when the sea state allowed. The weights of some of the largest catches (exceeding ca. 8 mt) were estimated volumetrically. For catches where total weight was determined with a load cell, less abundant species were separated from the catch, their weights determined, and then subtracted from the load cell weight. The remainder was then added to the subsample of the abundant species on deck to yield their total weight. For very large catches with more than one abundant species, subsamples of the dominant species were weighed to estimate their relative proportions in the catch, which were then extrapolated to obtain total weights for each species. A similar procedure was used for volumetrically estimated catches, except that the total catch weight was estimated by multiplying the density of a representative sample of the total catch (containing both the abundant and less abundant species) by the total catch volume. An alternative volumetric method was used for dominant species by weighing and averaging a minimum of 30 full sorting baskets and applying the mean weight to the count of unweighed baskets discarded back to the sea (Rugolo et al. 2020).

Pacific halibut (scientific names for all species encountered during the survey are listed in Appendix Table B1) were immediately measured and released when they were not retained for biological samples. Halibut catch weights were estimated from their measured lengths during data entry using length-weight parameters supplied by the IPHC. A random subsample of 50-100 (150 for arrowtooth flounder) specimens (target

sample size was species-dependent) of each of the major fish species was collected and measured to generate length frequencies. A smaller length frequency sample was collected for some minor catch components such as sculpins. All sharks, skates, and Pacific halibut were measured. Unsexed length frequencies were collected for shortspine thornyhead and yellow Irish lord. Lengths for forage fishes such as Pacific herring, capelin, and eulachon are not required by survey protocols, but were occasionally collected. Length measurements were collected with barcode-reader data loggers and barcoded length boards, downloaded to the data entry computer, and appended to the length database after each haul. Target sample sizes for determining length compositions are listed in Table 3.

When recording fish length, the most common measurement used was fork length (FL). However, sharks, skates, and flatfishes without a fork were measured using total length (TL) and giant grenadier were measured from the tip of the snout to the insertion of the anal fin. Fish that could not be readily sexed were classified as unsexed and measured. Fish length was measured to the nearest centimeter and weight was estimated to the nearest 2–10 g (scale accuracy depended on the weight of the specimen, weather conditions, etc.) with the digital scales. In this report, length data are presented as length compositions by year and sex, and as individual lengths by bottom depth. When lengths by bottom depth are presented, a Locally estimated scatterplot smoothing (LOESS) curve is shown with the data, to visualize changes in length by depth. Otoliths were collected from a subset of fish species to determine age composition and parameterize age-length keys. In 2022, otolith samples were selected randomly for all species for the first time in the Aleutian Islands bottom trawl survey. 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 an area-swept method (Alverson and Pereyra 1969, Wakabayashi et al. 1985). The area swept by the trawl (i.e., fishing effort) is the product of the estimated distance towed (km) and the estimated mean net spread (m) for each haul. The distance towed was estimated by computing the distance traveled over ground by the vessel between the time when the footrope came into contact with the bottom (on-bottom) and the time when the center of the footrope left the bottom (off-bottom). The distance traveled by the vessel was estimated by smoothing the GPS position data and measuring the distance along this line. The mean net spread was estimated by averaging the Marport net spread readings collected during the on-bottom time period. For each species, CPUE was calculated as the quotient of catch weight (kg) and the trawl area swept in square kilometers (km^2). The mean CPUE was calculated as the mean of the individual station CPUEs (including zero catches) within each subdistrict. Mean CPUEs for combined subdistricts were calculated as the weighted average of the individual subdistrict CPUE means (weighted by subdistrict area). Biomass estimates (t) were calculated by multiplying the mean CPUE of each subdistrict by its area and summing the results to obtain estimates by survey district and depth interval. The 95% confidence interval was calculated for each biomass estimate.

A detailed description of the analytical procedures is presented in Wakabayashi et al. (1985).

Population length compositions were estimated by applying the proportional contribution of sexed length categories from the length frequency data to the total catch for each species at each station (Wakabayashi et al. 1985). The district/depth range population within a sex-length category was calculated by multiplying the district/depth range population by the proportion of fish in that category from the summed station data. Population size composition estimates were summed over subdistricts to derive estimates by area. Lengths and weights collected from individual fish were used to estimate length-weight relationships based on a nonlinear, least-squares regression algorithm. The length weight relationship assumes isometric growth and was expressed as

$$W = aL^b,$$

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

Data Limitations

This survey supports management and conservation of multiple fish and benthic invertebrate species. Indexes of abundance derived from survey catch rates and abundance estimates provide relative measures of abundance that are then used to fit stock assessment models and monitor population trends and status. The expectation that catchability varies among species and species groups emphasizes the relative nature of the abundance estimates derived from this survey. The bottom trawl survey produces a relative index of abundance. This is particularly relevant in the Aleutians where there are extensive areas of untrawlable habitat that remain unsampled, yet mean CPUE is applied to the total stratum area inclusive of those untrawlable areas. The survey design, a stratified random allocation of previously successfully sampled stations, further emphasizes the nature of the relative abundance index produced.

Table 1. -- Ex-vessel prices used to allocate stations in the AI 2022 bottom trawl survey. The prices used for station allocation in 2022 are from 2020.

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

Table 2. -- Stations allocated and sampled during the 2022 AI bottom trawl survey.

Survey district	Depth range	Stations allocated	Stations attempted	Stations completed	Total area (km^2)	Stations per 1,000 km^2
Southern Bering Sea	1 - 100 m	19	23	20	4,026	4.97
	101 - 200 m	16	17	15	1,849	8.11
	201 - 300 m	8	9	8	564	14.19
	301 - 500 m	4	6	4	1,043	3.83
	All depths	47	55	47	7,482	6.28
Eastern Aleutians	1 - 100 m	14	14	14	6,848	2.04
	101 - 200 m	62	64	61	7,768	7.85
	201 - 300 m	50	52	49	4,902	10.00
	301 - 500 m	9	9	7	5,683	1.23
	All depths	135	139	131	25,200	5.20
Central Aleutians	1 - 100 m	30	29	29	5,847	4.96
	101 - 200 m	47	49	47	4,606	10.20
	201 - 300 m	28	29	27	2,109	12.80
	301 - 500 m	10	10	9	3,981	2.26
	All depths	115	117	112	16,543	6.77
Western Aleutians	1 - 100 m	23	20	20	4,877	4.10
	101 - 200 m	65	57	56	5,318	10.53
	201 - 300 m	26	24	24	1,724	13.92
	301 - 500 m	9	8	8	3,272	2.44
	All depths	123	109	108	15,190	7.11
All areas	1 - 100 m	86	86	83	21,598	3.84
	101 - 200 m	190	187	179	19,540	9.16
	201 - 300 m	112	114	108	9,298	11.62
	301 - 500 m	32	33	28	13,979	2.00
	All depths	420	420	398	64,415	0.01

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

Species or species group	Target sample size
Walleye pollock (*Gadus chalcogrammus*)	100
Pacific cod (*Gadus macrocephalus*)	100
Arrowtooth flounder (ATF) (*Atheresthes stomias*)	150
All rockfish species (*Sebastes*spp.)	100
Sablefish (*Anoplopoma fimbria*)	100
Atka mackerel (*Pleurogrammus monopterygius*)	100
All species of flatfish (except ATF) (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
Commander squid (*Berryteuthis magister*)	100
Skates and Sharks (total length) (Class Chondrichthyes)	50
Grenadiers (tip of snout to insertion of first anal ray) (Subfamily Macrourinae)	50

Table 4. -- Mean CPUE (kg/ha) for the 20 most abundant groundfish species in each survey district during the 2022 Aleutian Islands bottom trawl survey.

Species	CPUE (kg/ha)
Southern Bering Sea	
Pacific ocean perch	152.0
northern rockfish	78.1
walleye pollock	71.8
arrowtooth flounder	25.7
Pacific cod	20.5
sablefish	13.9
southern rock sole	10.0
Pacific halibut	9.0
rex sole	7.7
flathead sole	7.1
northern rock sole	3.2
Irish lord	1.9
yellow Irish lord	1.9
shortspine thornyhead	1.7
whiteblotched skate	1.1
Atka mackerel	1.0
Kamchatka flounder	0.8
blackspotted rockfish	0.6
Aleutian skate	0.4
giant octopus	0.4
magistrate armhook squid	0.3
Eastern Aleutians	
Atka mackerel	139.3
Pacific ocean perch	92.1
walleye pollock	35.9
northern rockfish	29.4
arrowtooth flounder	10.0
Pacific cod	9.5
sablefish	5.6
whiteblotched skate	4.6
Pacific halibut	4.5
blackspotted rockfish	4.3
Irish lord	3.4
yellow Irish lord	3.4
Kamchatka flounder	2.9
shortraker rockfish	2.4
northern rock sole	1.9
southern rock sole	1.1
rex sole	1.0
shortspine thornyhead	0.7
flathead sole	0.6
darkfin sculpin	0.5
Aleutian skate	0.4

Species	CPUE (kg/ha)
Central Aleutians	
Pacific ocean perch	88.8
Atka mackerel	65.1
northern rockfish	19.5
giant grenadier	15.4
Pacific cod	8.5
walleye pollock	8.3
northern rock sole	8.2
shortraker rockfish	7.6
sablefish	4.4
Kamchatka flounder	3.4
arrowtooth flounder	2.4
Irish lord	2.2
yellow Irish lord	2.2
blackspotted rockfish	1.8
shortspine thornyhead	1.5
salmon shark	1.3
Pacific halibut	0.7
rex sole	0.6
whiteblotched skate	0.4
dusky rockfish	0.3
magistrate armhook squid	0.2
Western Aleutians	
Pacific ocean perch	375.4
Atka mackerel	140.0
northern rockfish	80.8
Pacific cod	9.0
arrowtooth flounder	6.3
shortspine thornyhead	5.6
northern rock sole	5.2
walleye pollock	3.9
whiteblotched skate	3.4
flathead sole	2.4
giant grenadier	2.2
Kamchatka flounder	2.2
magistrate armhook squid	1.9
sablefish	1.8
rex sole	1.3
blackspotted rockfish	1.2
Pacific halibut	0.5
shortraker rockfish	0.5
prowfish	0.4
Irish lord	0.3
yellow Irish lord	0.3

Species	CPUE (kg/ha)
Combined Aleutian Districts	
Pacific ocean perch	166.7
Atka mackerel	118.0
northern rockfish	40.2
walleye pollock	19.3
Pacific cod	9.1
arrowtooth flounder	6.8
giant grenadier	5.2
northern rock sole	4.6
sablefish	4.2
shortraker rockfish	3.4
whiteblotched skate	3.1
Kamchatka flounder	2.9
blackspotted rockfish	2.7
Pacific halibut	2.3
shortspine thornyhead	2.3
Irish lord	2.2
yellow Irish lord	2.2
flathead sole	1.0
rex sole	1.0
magistrate armhook squid	0.7
southern rock sole	0.6
All Districts Combined	
Pacific ocean perch	165.0
Atka mackerel	104.4
northern rockfish	44.6
walleye pollock	25.4
Pacific cod	10.4
arrowtooth flounder	9.0
sablefish	5.3
giant grenadier	4.6
northern rock sole	4.5
Pacific halibut	3.1
shortraker rockfish	3.0
whiteblotched skate	2.8
Kamchatka flounder	2.6
blackspotted rockfish	2.5
shortspine thornyhead	2.2
Irish lord	2.2
yellow Irish lord	2.2
rex sole	1.7
flathead sole	1.7
southern rock sole	1.7
magistrate armhook squid	0.6

Table 5. -- Otolith samples collected by INPFC area and depth range.

INPFC area	Depth range	Number of otoliths collected
Southern Bering Sea	1 - 100 m	418
	101 - 200 m	353
	201 - 300 m	169
	301 - 500 m	97
Eastern Aleutians	1 - 100 m	151
	101 - 200 m	846
	201 - 300 m	899
	301 - 500 m	173
Central Aleutians	1 - 100 m	405
	101 - 200 m	1,002
	201 - 300 m	626
	301 - 500 m	172
Western Aleutians	1 - 100 m	362
	101 - 200 m	1,338
	201 - 300 m	494
	301 - 500 m	136

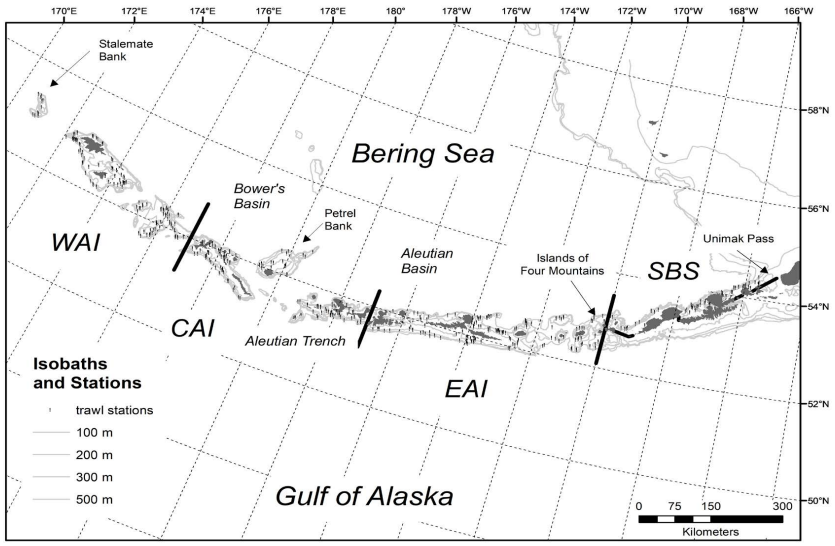

Figure 1. -- Map of the Aleutian Islands 2022 bottom trawl survey area indicating survey districts (WAI = Western Aleutian Islands, CAI = Central Aleutian Islands, EAI = Eastern Aleutian Islands, SBS = Southern Bering Sea). Black dots = isobaths from 100–500 m and stations sampled.

Results

We successfully sampled 398 stations from a total allocation of 420 (Table 2); 6 previously untrawled locations were assigned to each vessel in 2022. Among the 12 total new stations assigned, 9 were successfully found and trawled. There were 451 attempted tows in total across the survey for the 420 stations. All successful tows were included in the biomass, length, and age composition analyses. Net mensuration data collections were attempted at all trawl haul stations. Net spread was successfully measured using Marport acoustic net mensuration sensors at 381 of the successfully sampled stations. For the 17 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 53 unsuccessful tows during the 2022 survey. Temperatures at depth were recorded for all but 2 of the hauls and surface temperature data were recorded for all but 3 hauls. Bottom temperatures ranged from 3.7 to 6.8 °C (Fig. 2). Surface temperatures ranged from 4.6 to 12.2 °C (Fig. 3).

We measured 97,394 lengths (96,703 fishes and 691 armhook squid) and collected 7,641 pairs of otoliths. A summary of the total otoliths sampled by management area and depth can be found in Table 5.

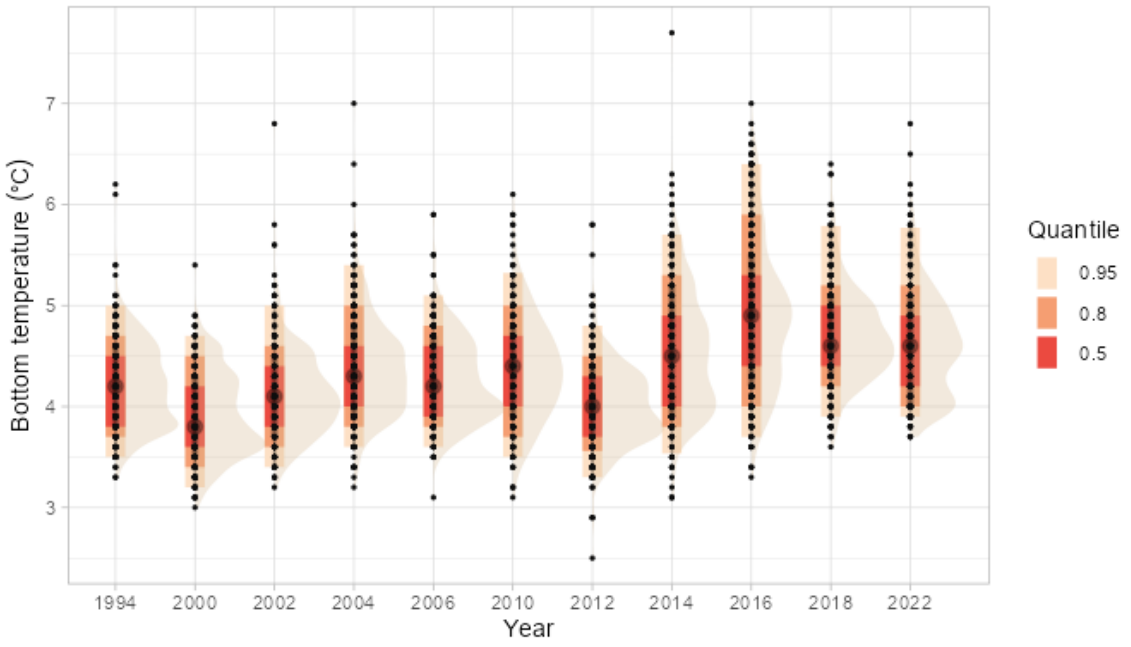

Figure 2. -- Bottom temperatures as measured by survey gear. Brown points represent the median.

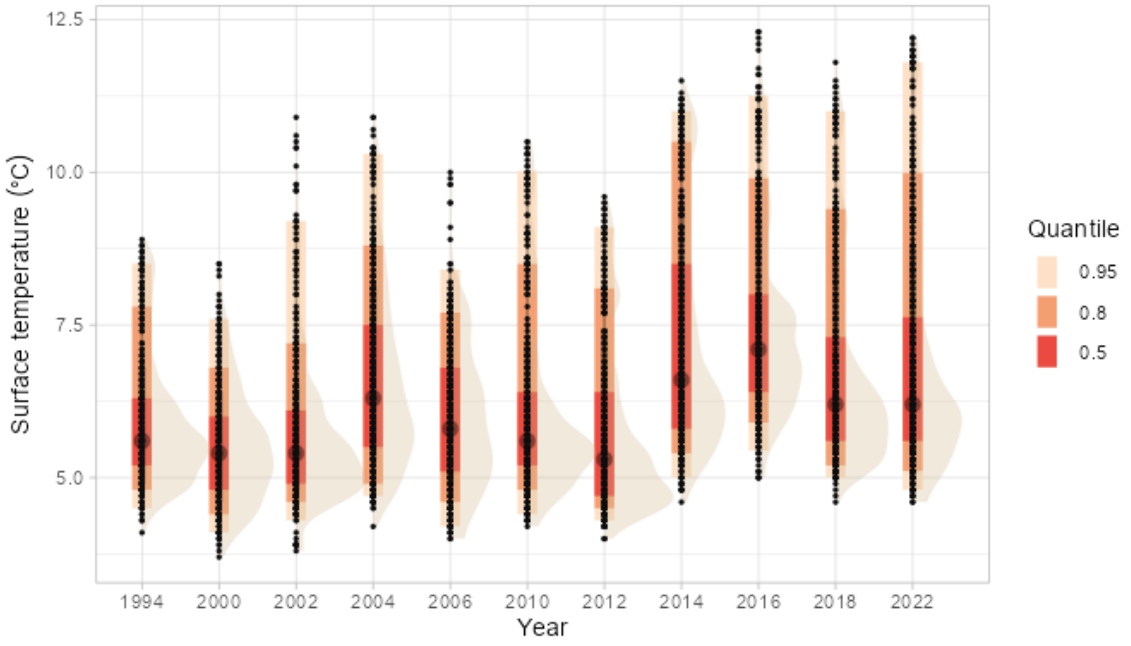

Figure 3. -- Surface temperatures as measured by survey gear. Brown points represent the median.

Results by Area

Total catches across the survey area included 126 fish species from 33 families, and 276 invertebrate species or taxa from 9 phyla. Appendix B lists all fish and invertebrate taxa encountered during the survey. Since groundfish populations are the primary focus of this bottom trawl survey and data report, we present relative abundance estimates for the 20 most abundant groundfish species in each of the four survey districts surveyed in 2022, for combined Aleutian areas, and for the entire survey region (Table 4). Pacific ocean perch was the most abundant species over the entire survey area, followed by Atka mackerel, northern rockfish, and walleye pollock (Table 4). The elasmobranch with the highest estimated biomass was whiteblotched skate, and the most abundant flatfish by weight was arrowtooth flounder.

Results by Species

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

The following information is presented for most but not all species:

1) A brief summary of the data and data analyses
2) A table with the number of hauls attempted, number of hauls that caught the species, mean CPUE, estimated biomass with confidence intervals, and mean weight by survey district and depth interval
3) A table with mean CPUE and estimated biomass with confidence intervals by subdistrict and depth range
4) A figure showing the spatial distribution of CPUE across the survey area
5) A figure showing the length distribution of the population. The species nomenclature generally follows the Integrated Taxonomic Information System (ITIS).

Arrowtooth flounder (*Atheresthes stomias*)

Arrowtooth flounder was the 6th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the SBS and Eastern AI (Fig. 4 and Table 6). Confident identification and separation of arrowtooth flounder from its close congener Kamchatka flounder on Aleutian surveys began in 1994. Arrowtooth flounder were caught throughout the survey area and in all depth intervals. Their CPUE was higher at all depths sampled in the SBS compared to other survey districts though the highest arrowtooth flounder biomass estimate came from the Eastern AI. There is a consistent trend across survey districts of arrowtooth flounder length increasing with depth of capture. There are no trends in the length frequency distributions over time: median lengths have remained relatively constant for a given sex over the survey period. The median length of females is higher than that of males (41 cm FL vs. 38 cm FL) and females achieve much larger maximum length than males. On average, the largest individuals were found in the SBS (Fig. 6). The total biomass of arrowtooth flounder in the 2022 Aleutian Islands bottom trawl survey was estimated to be 57,993 t. The largest estimated biomass for arrowtooth flounder was in the Eastern AI (Fig. 4 and Table 6). Length distributions by year are provided in Figure 5.

Table 6. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing arrowtooth flounder, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	19	19.46	7,834	4,843	10,825	0.575
	101 - 200	15	15	44.03	8,140	4,221	12,059	0.847
	201 - 300	8	8	14.23	802	181	1,424	1.050
	301 - 500	4	4	23.84	2,486	1,313	3,660	0.977
	All depths	47	46	25.75	19,262	14,430	24,094	0.725
Western Aleutians	1 - 100	20	15	7.10	3,464	530	6,398	0.550
	101 - 200	56	45	10.63	5,654	3,442	7,866	0.750
	201 - 300	24	15	1.28	221	112	331	1.289
	301 - 500	8	3	0.66	215	0	607	3.110
	All depths	108	78	6.29	9,554	5,897	13,211	0.679
Central Aleutians	1 - 100	29	11	0.77	451	29	873	0.568
	101 - 200	47	33	3.09	1,424	716	2,133	0.731
	201 - 300	28	22	6.05	1,276	68	2,484	0.810
	301 - 500	9	7	2.22	882	195	1,570	1.576
	All depths	113	73	2.44	4,034	2,639	5,428	0.827
Eastern Aleutians	1 - 100	14	6	3.51	2,406	0	10,916	0.542
	101 - 200	61	43	7.79	6,048	2,124	9,972	0.588
	201 - 300	49	45	22.62	11,085	2,944	19,225	0.797
	301 - 500	7	4	9.86	5,604	0	24,644	1.803
	All depths	131	98	9.98	25,143	4,818	45,467	0.792
Combined Aleutian Districts	1 - 100	63	32	3.60	6,321	0	13,928	0.548
	101 - 200	164	121	7.42	13,126	8,781	17,472	0.664
	201 - 300	101	82	14.41	12,582	4,371	20,793	0.804
	301 - 500	24	14	5.18	6,701	0	25,784	1.793
	All depths	352	249	6.80	38,730	17,565	59,896	0.764

Table 7. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing arrowtooth flounder, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	18	31.1	7,600	4,615	10,585
Southern Bering Sea	1-100	W Southern Bering Sea	2	1	1.5	234	0	3,205
Southern Bering Sea	101-200	E Southern Bering Sea	13	13	68.2	8,047	4,097	11,997
Southern Bering Sea	101-200	W Southern Bering Sea	2	2	1.4	93	0	1,089
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	8	14.2	802	165	1,440
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	4	23.8	2,486	1,141	3,832
Eastern Aleutians	1-100	NW Eastern Aleutians	2	2	11.0	2,134	0	27,129
Eastern Aleutians	1-100	SW Eastern Aleutians	2	2	1.2	222	0	2,767
Eastern Aleutians	1-100	NE Eastern Aleutians	2	1	0.3	36	0	495
Eastern Aleutians	1-100	SE Eastern Aleutians	8	1	0.1	14	0	46
Eastern Aleutians	101-200	NW Eastern Aleutians	5	5	16.6	2,639	0	5,746
Eastern Aleutians	101-200	NE Eastern Aleutians	26	19	10.9	2,189	0	4,887
Eastern Aleutians	101-200	SW Eastern Aleutians	13	13	4.6	1,042	263	1,820
Eastern Aleutians	101-200	SE Eastern Aleutians	17	6	0.9	179	1	356
Eastern Aleutians	201-300	NW Eastern Aleutians	6	6	45.8	715	0	1,880
Eastern Aleutians	201-300	SE Eastern Aleutians	12	10	32.6	6,723	0	14,554
Eastern Aleutians	201-300	SW Eastern Aleutians	6	6	15.4	1,104	0	3,140
Eastern Aleutians	201-300	NE Eastern Aleutians	25	23	12.9	2,543	799	4,287
Eastern Aleutians	301-500	SE Eastern Aleutians	2	1	17.0	4,386	0	60,118
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	2	4.3	1,150	0	3,647
Eastern Aleutians	301-500	SW Eastern Aleutians	2	1	1.5	68	0	926
Central Aleutians	1-100	SW Central Aleutians	3	2	1.2	199	0	738
Central Aleutians	1-100	SE Central Aleutians	7	2	0.8	94	0	247
Central Aleutians	1-100	N Central Aleutians	12	5	0.7	147	0	335
Central Aleutians	1-100	Petrel Bank	7	2	0.1	11	0	28
Central Aleutians	101-200	N Central Aleutians	8	7	6.3	674	39	1,309
Central Aleutians	101-200	SE Central Aleutians	11	10	4.8	359	96	622
Central Aleutians	101-200	Petrel Bank	7	4	1.6	274	0	657
Central Aleutians	101-200	SW Central Aleutians	21	12	1.1	117	47	188
Central Aleutians	201-300	SE Central Aleutians	5	5	15.6	745	0	2,033
Central Aleutians	201-300	N Central Aleutians	11	10	9.6	423	64	781
Central Aleutians	201-300	SW Central Aleutians	7	5	1.1	47	0	101
Central Aleutians	201-300	Petrel Bank	5	2	0.8	61	0	186
Central Aleutians	301-500	N Central Aleutians	3	3	3.2	402	0	1,269
Central Aleutians	301-500	Petrel Bank	2	2	2.6	316	6	625
Central Aleutians	301-500	SE Central Aleutians	2	2	2.3	165	0	1,970
Western Aleutians	1-100	W Western Aleutians	11	11	8.9	3,295	336	6,253
Western Aleutians	1-100	E Western Aleutians	9	4	1.4	169	0	445
Western Aleutians	101-200	W Western Aleutians	39	36	12.9	5,227	3,037	7,416
Western Aleutians	101-200	E Western Aleutians	17	9	3.4	427	0	891
Western Aleutians	201-300	E Western Aleutians	10	7	1.4	108	24	193
Western Aleutians	201-300	W Western Aleutians	14	8	1.2	113	32	194
Western Aleutians	301-500	W Western Aleutians	6	3	1.3	215	0	626

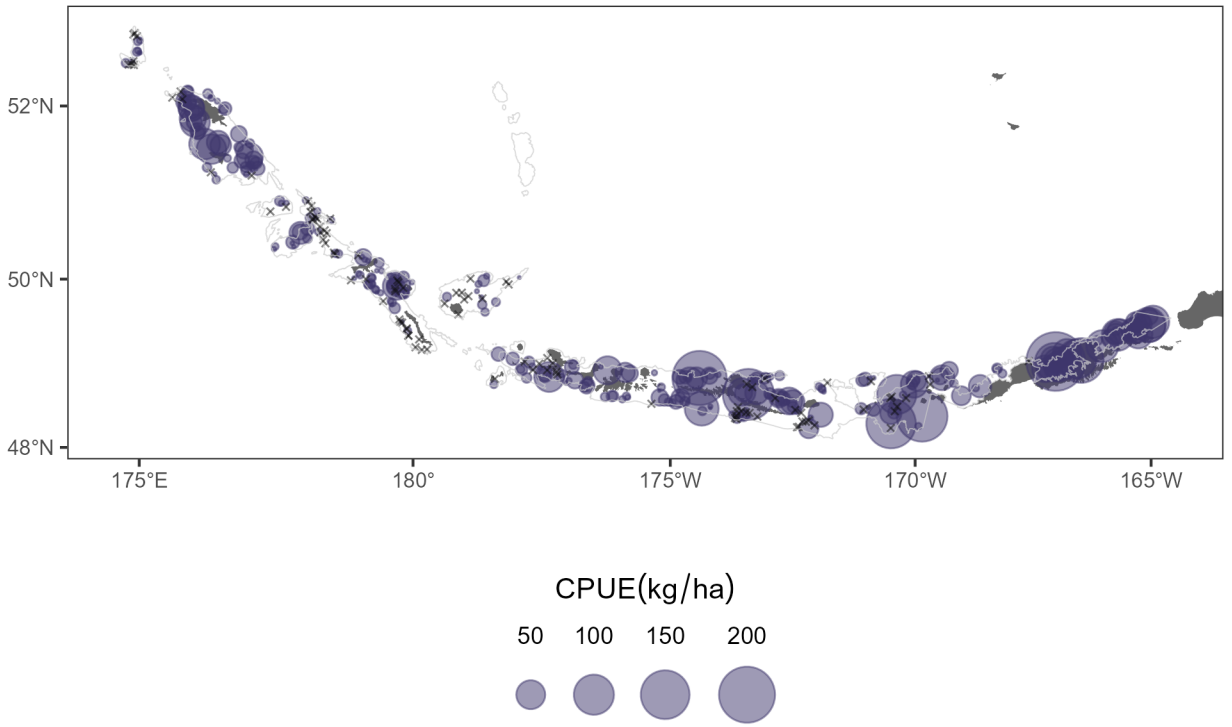

Figure 4. -- Relative abundance of arrowtooth flounder in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

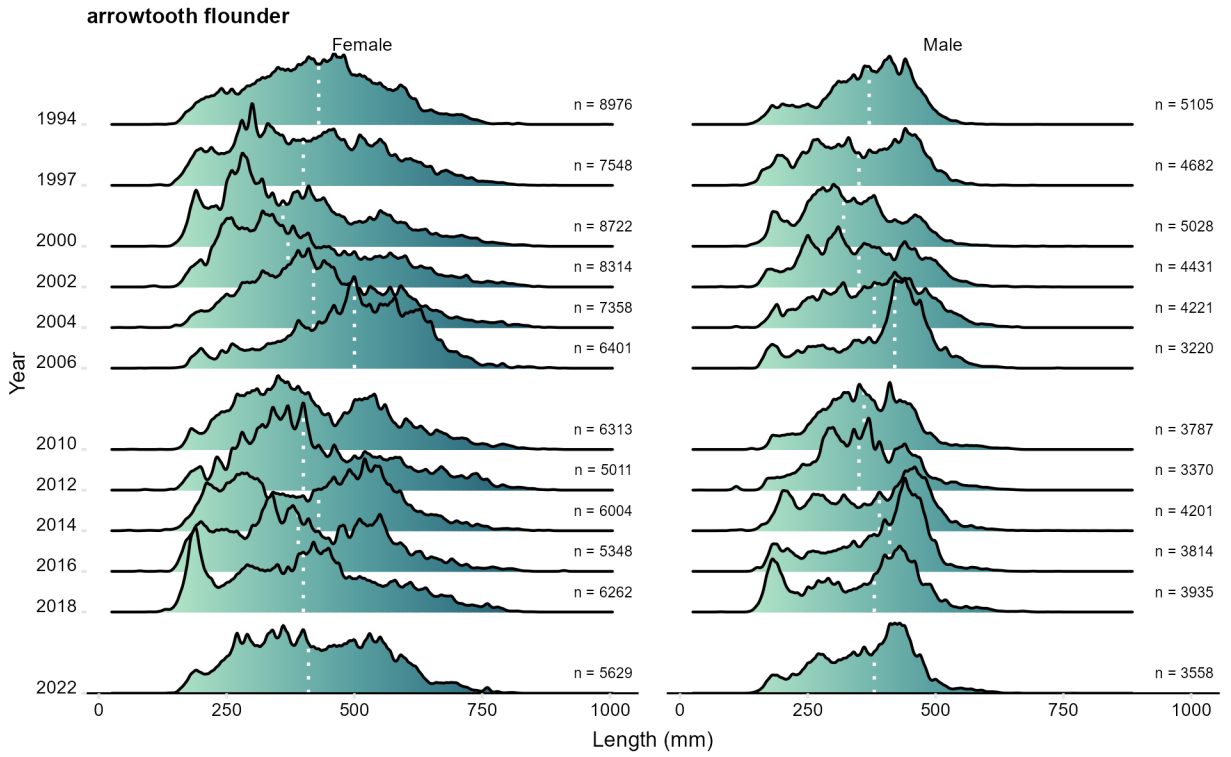

Figure 5. -- Population length composition of arrowtooth flounder in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

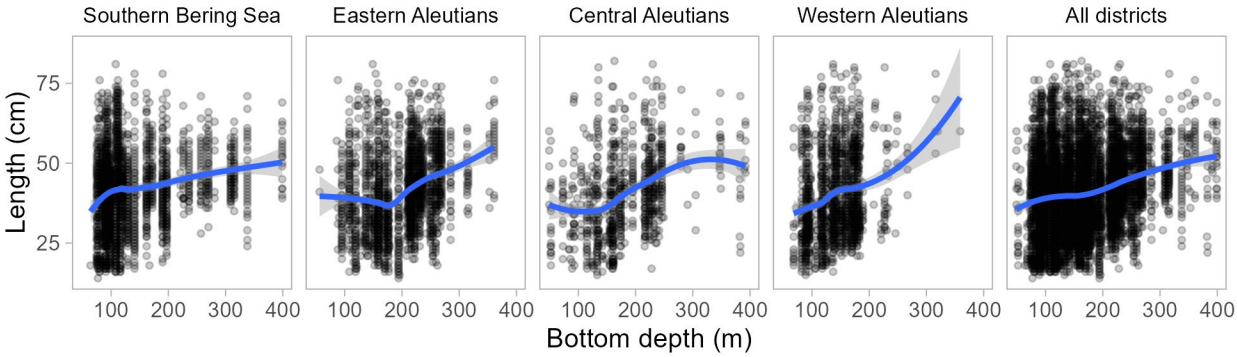

Figure 6. -- Length versus depth for arrowtooth flounder by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Kamchatka flounder (*Atheresthes evermanni*)

Kamchatka flounder was the 13th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Central AI and Eastern AI (Fig. 7 and Table 8). Confident identification and separation of Kamchatka flounder from its close congener arrowtooth flounder on Aleutian surveys began in 1994. Kamchatka flounder were caught throughout the AI and at all depths, but were most frequently caught between 100 and 200 m in all survey districts. Lengths appear to be unimodal for both males and females. Size generally increased with depth. Females (median 41 cm FL) were slightly larger than males (37 cm FL), a pattern that has been consistent through time. On average, the largest individuals were found in the SBS (Fig. 9). The total biomass of Kamchatka flounder in the 2022 Aleutian Islands bottom trawl survey was estimated to be 16,864 t. The largest estimated biomass for Kamchatka flounder was in the Eastern AI (Fig. 7 and Table 8). Length distributions by year are provided in Figure 8.

Table 8. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing Kamchatka flounder, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	4	0.06	25	0	66	0.265
	101 - 200	15	5	0.21	39	0	85	0.420
	201 - 300	8	2	0.25	14	0	36	0.892
	301 - 500	4	3	4.78	498	0	1,435	1.211
	All depths	47	14	0.77	576	0	1,517	0.939
Western Aleutians	1 - 100	20	7	0.13	64	0	129	0.232
	101 - 200	56	41	1.17	625	396	854	0.428
	201 - 300	24	18	2.40	413	147	679	1.983
	301 - 500	8	6	6.80	2,224	0	4,983	1.255
	All depths	108	72	2.19	3,326	537	6,115	0.895
Central Aleutians	1 - 100	29	10	0.10	59	0	118	0.277
	101 - 200	47	35	0.61	279	142	417	0.283
	201 - 300	28	22	5.14	1,084	0	2,600	1.080
	301 - 500	9	5	10.68	4,251	0	9,212	2.536
	All depths	113	72	3.43	5,673	364	10,981	1.462
Eastern Aleutians	1 - 100	14	2	0.02	17	0	88	0.525
	101 - 200	61	28	0.65	506	180	831	0.227
	201 - 300	49	31	1.52	747	312	1,181	0.370
	301 - 500	7	5	10.59	6,020	0	16,150	1.642
	All depths	131	66	2.89	7,290	0	17,442	0.917
Combined Aleutian Districts	1 - 100	63	19	0.08	140	56	224	0.268
	101 - 200	164	104	0.80	1,409	1,009	1,809	0.301
	201 - 300	101	71	2.57	2,244	768	3,720	0.695
	301 - 500	24	16	9.66	12,495	1,195	23,794	1.756
	All depths	352	210	2.86	16,288	4,858	27,719	1.048

Table 9. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing Kamchatka flounder, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	4	0.1	25	0	66
Southern Bering Sea	101-200	E Southern Bering Sea	13	5	0.3	39	0	85
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	2	0.3	14	0	36
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	3	4.8	498	0	1,572
Eastern Aleutians	1-100	NE Eastern Aleutians	2	1	0.1	16	0	226
Eastern Aleutians	1-100	SE Eastern Aleutians	8	1	0.0	0	0	2
Eastern Aleutians	101-200	NE Eastern Aleutians	26	13	1.3	253	36	470
Eastern Aleutians	101-200	NW Eastern Aleutians	5	3	1.0	157	0	423
Eastern Aleutians	101-200	SW Eastern Aleutians	13	11	0.4	93	21	165
Eastern Aleutians	101-200	SE Eastern Aleutians	17	1	0.0	2	0	7
Eastern Aleutians	201-300	NW Eastern Aleutians	6	6	6.4	100	0	205
Eastern Aleutians	201-300	NE Eastern Aleutians	25	17	2.5	500	89	910
Eastern Aleutians	201-300	SW Eastern Aleutians	6	5	0.8	58	0	118
Eastern Aleutians	201-300	SE Eastern Aleutians	12	3	0.4	89	0	220
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	3	13.1	3,484	0	16,559
Eastern Aleutians	301-500	SE Eastern Aleutians	2	1	9.7	2,508	0	34,377
Eastern Aleutians	301-500	SW Eastern Aleutians	2	1	0.6	28	0	382
Central Aleutians	1-100	SW Central Aleutians	3	3	0.2	39	0	118
Central Aleutians	1-100	SE Central Aleutians	7	1	0.1	10	0	35
Central Aleutians	1-100	N Central Aleutians	12	4	0.0	7	0	16
Central Aleutians	1-100	Petrel Bank	7	2	0.0	2	0	6
Central Aleutians	101-200	N Central Aleutians	8	6	1.3	138	16	261
Central Aleutians	101-200	SW Central Aleutians	21	16	0.5	56	24	87
Central Aleutians	101-200	SE Central Aleutians	11	10	0.4	32	13	52
Central Aleutians	101-200	Petrel Bank	7	3	0.3	52	0	136
Central Aleutians	201-300	N Central Aleutians	11	11	8.5	372	88	656
Central Aleutians	201-300	Petrel Bank	5	3	8.4	644	0	2,241
Central Aleutians	201-300	SE Central Aleutians	5	4	1.0	46	9	83
Central Aleutians	201-300	SW Central Aleutians	7	4	0.5	22	0	52
Central Aleutians	301-500	N Central Aleutians	3	3	33.3	4,131	0	10,839
Central Aleutians	301-500	Petrel Bank	2	2	1.0	120	0	499
Western Aleutians	1-100	W Western Aleutians	11	6	0.2	62	0	128
Western Aleutians	1-100	E Western Aleutians	9	1	0.0	2	0	6
Western Aleutians	101-200	W Western Aleutians	39	32	1.4	555	333	777
Western Aleutians	101-200	E Western Aleutians	17	9	0.6	70	1	138
Western Aleutians	201-300	E Western Aleutians	10	10	3.4	270	66	473
Western Aleutians	201-300	W Western Aleutians	14	8	1.5	144	0	342
Western Aleutians	301-500	W Western Aleutians	6	4	8.7	1,488	0	4,450
Western Aleutians	301-500	E Western Aleutians	2	2	4.7	736	0	3,048

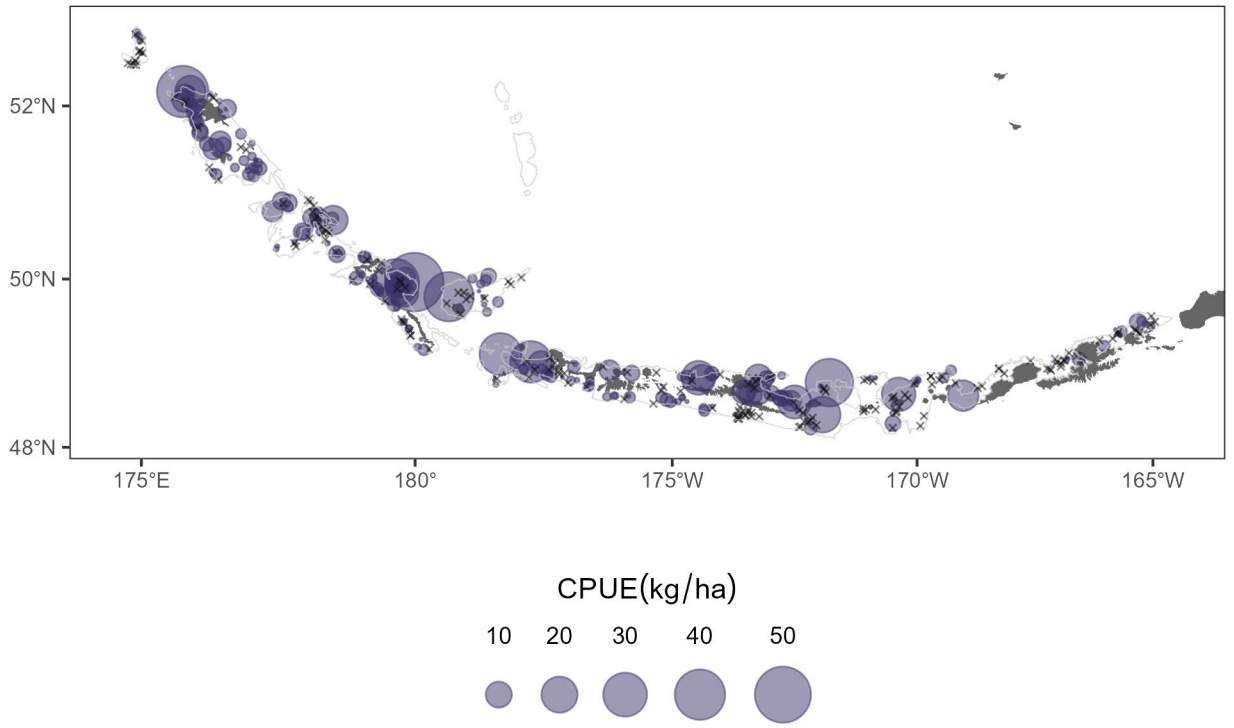

Figure 7. -- Relative abundance of Kamchatka flounder in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

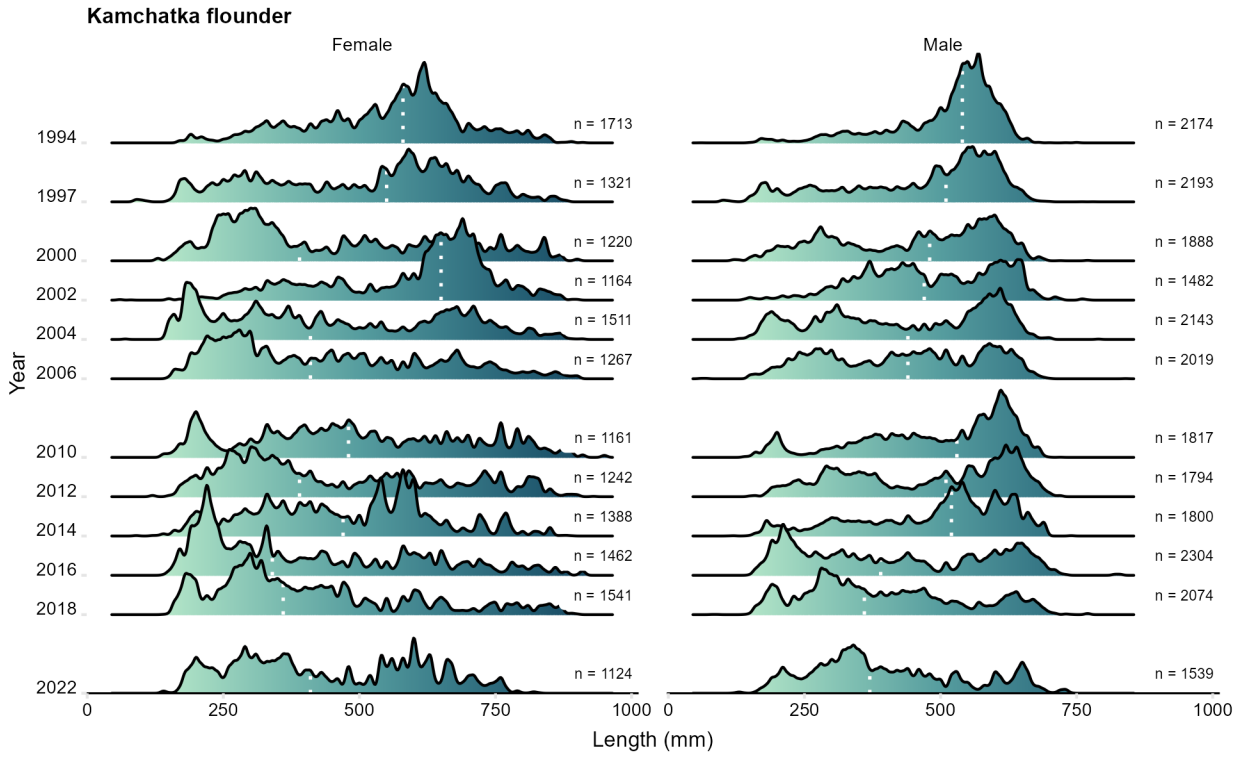

Figure 8. -- Population length composition of Kamchatka flounder in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

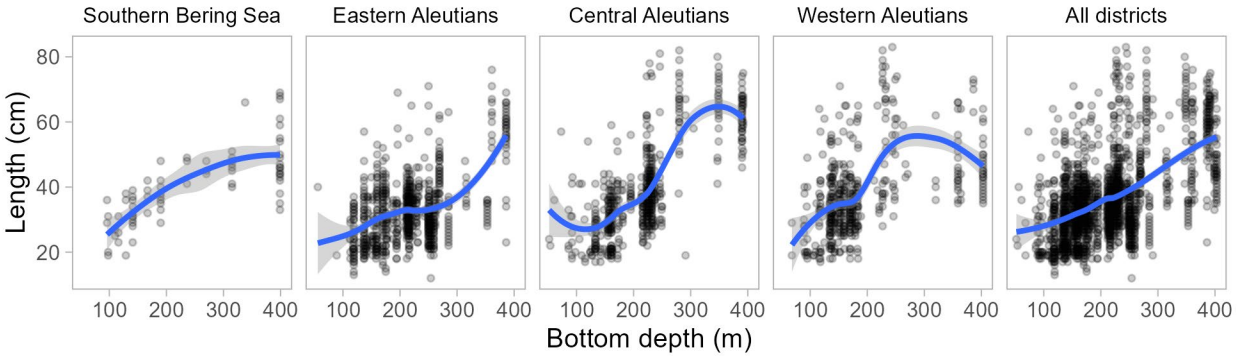

Figure 9. -- Length versus depth for Kamchatka flounder by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Northern rock sole (*Lepidopsetta polyxystra*)

Northern rock sole was the 9th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Central AI and Western AI (Fig. 10 and Table 10). The identification and separation of northern rock sole from its close congener southern rock sole began in 1996. Northern rock sole occurred throughout the Aleutian survey area. They were commonly caught in water shallower than 300 m with the highest CPUE observed in the Central AI. Northern rock sole lengths increased with increasing depth of capture and females grow longer than males (36 cm median FL for females; 30 cm for males). Female and male length modes were similar and consistent through time with no trend in median length over the course of the survey. On average, the largest individuals were found in the Eastern AI (Fig. 12). The total biomass of Northern rock sole in the 2022 Aleutian Islands bottom trawl survey was estimated to be 28,770 t. The largest estimated biomass for Northern rock sole was in the Central AI (Fig. 10 and Table 10). Length distributions by year are provided in Figure 11.

Table 10. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing Northern rock sole, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	18	3.5	1,410	247	2,572	0.446
	101 - 200	15	12	4.88	902	0	2,820	0.65
	201 - 300	8	1	1.1	62	0	206	0.764
	301 - 500	4	0	---	---	---	---	---
	All depths	47	31	3.17	2,374	865	3,882	0.512
Western Aleutians	1 - 100	20	19	9.23	4,502	2,953	6,051	0.337
	101 - 200	56	44	6.26	3,329	2,181	4,476	0.486
	201 - 300	24	4	0.27	46	0	107	0.684
	301 - 500	8	0	---	---	---	---	---
	All depths	108	67	5.19	7,877	5,968	9,786	0.388
Central Aleutians	1 - 100	29	26	16.17	9,453	1,272	17,634	0.431
	101 - 200	47	41	6.71	3,088	1,831	4,345	0.456
	201 - 300	28	21	2.82	595	213	977	0.643
	301 - 500	9	2	1.21	481	0	2,481	0.598
	All depths	113	90	8.23	13,617	5,333	21,900	0.448
Eastern Aleutians	1 - 100	14	11	1.53	1,049	292	1,806	0.534
	101 - 200	61	51	4.35	3,382	2,084	4,679	0.61
	201 - 300	49	15	0.69	337	151	522	0.636
	301 - 500	7	1	0.24	136	0	719	0.957
	All depths	131	78	1.95	4,903	3,477	6,329	0.599
Combined Aleutian Districts	1 - 100	63	56	8.54	15,004	6,822	23,187	0.403
	101 - 200	164	136	5.54	9,799	7,754	11,843	0.511
	201 - 300	101	40	1.12	978	587	1,368	0.642
	301 - 500	24	3	0.48	616	0	1,960	0.652
	All depths	352	235	4.64	26,397	17,975	34,818	0.448

Table 11. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing Northern rock sole, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	16	4.1	1,010	196	1,824
Southern Bering Sea	1-100	W Southern Bering Sea	2	2	2.5	399	0	3,394
Southern Bering Sea	101-200	W Southern Bering Sea	2	2	8.1	544	0	6,042
Southern Bering Sea	101-200	E Southern Bering Sea	13	10	3.0	358	126	591
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	1	1.1	62	0	209
Eastern Aleutians	1-100	SW Eastern Aleutians	2	2	1.9	364	0	2,440
Eastern Aleutians	1-100	NW Eastern Aleutians	2	2	1.8	350	28	671
Eastern Aleutians	1-100	NE Eastern Aleutians	2	1	1.2	147	0	2,019
Eastern Aleutians	1-100	SE Eastern Aleutians	8	6	1.1	188	0	394
Eastern Aleutians	101-200	SW Eastern Aleutians	13	12	8.6	1,946	713	3,179
Eastern Aleutians	101-200	NE Eastern Aleutians	26	20	3.0	600	281	918
Eastern Aleutians	101-200	NW Eastern Aleutians	5	5	2.8	447	62	832
Eastern Aleutians	101-200	SE Eastern Aleutians	17	14	2.0	389	165	612
Eastern Aleutians	201-300	SW Eastern Aleutians	6	5	3.4	243	44	441
Eastern Aleutians	201-300	NW Eastern Aleutians	6	3	1.6	25	0	60
Eastern Aleutians	201-300	NE Eastern Aleutians	25	4	0.3	54	0	125
Eastern Aleutians	201-300	SE Eastern Aleutians	12	3	0.1	15	0	36
Eastern Aleutians	301-500	SE Eastern Aleutians	2	1	0.5	136	0	1,860
Central Aleutians	1-100	N Central Aleutians	12	11	29.6	6,235	0	14,369
Central Aleutians	1-100	Petrel Bank	7	5	14.4	1,383	0	2,814
Central Aleutians	1-100	SE Central Aleutians	7	7	7.1	828	0	2,003
Central Aleutians	1-100	SW Central Aleutians	3	3	6.2	1,007	0	2,461
Central Aleutians	101-200	SW Central Aleutians	21	19	9.6	1,005	510	1,500
Central Aleutians	101-200	SE Central Aleutians	11	9	8.2	615	194	1,035
Central Aleutians	101-200	N Central Aleutians	8	8	7.6	812	170	1,453
Central Aleutians	101-200	Petrel Bank	7	5	3.8	657	0	1,638
Central Aleutians	201-300	SE Central Aleutians	5	5	6.3	300	0	688
Central Aleutians	201-300	N Central Aleutians	11	10	4.6	201	40	362
Central Aleutians	201-300	SW Central Aleutians	7	5	1.6	68	2	134
Central Aleutians	201-300	Petrel Bank	5	1	0.3	26	0	96
Central Aleutians	301-500	SW Central Aleutians	2	2	6.1	480	0	6,386
Western Aleutians	1-100	W Western Aleutians	11	11	10.5	3,892	2,405	5,379
Western Aleutians	1-100	E Western Aleutians	9	8	5.2	610	94	1,126
Western Aleutians	101-200	W Western Aleutians	39	34	7.5	3,067	1,934	4,200
Western Aleutians	101-200	E Western Aleutians	17	10	2.1	262	7	516
Western Aleutians	201-300	W Western Aleutians	14	4	0.5	46	0	107

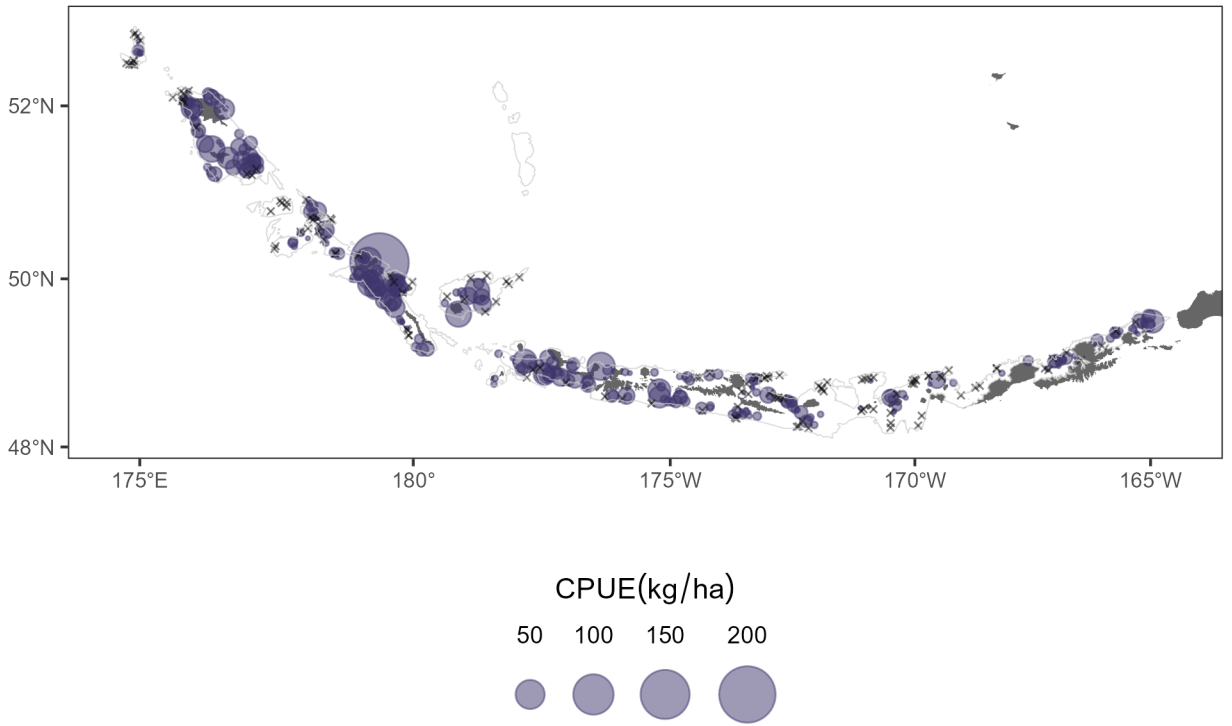

Figure 10. -- Relative abundance of Northern rock sole in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

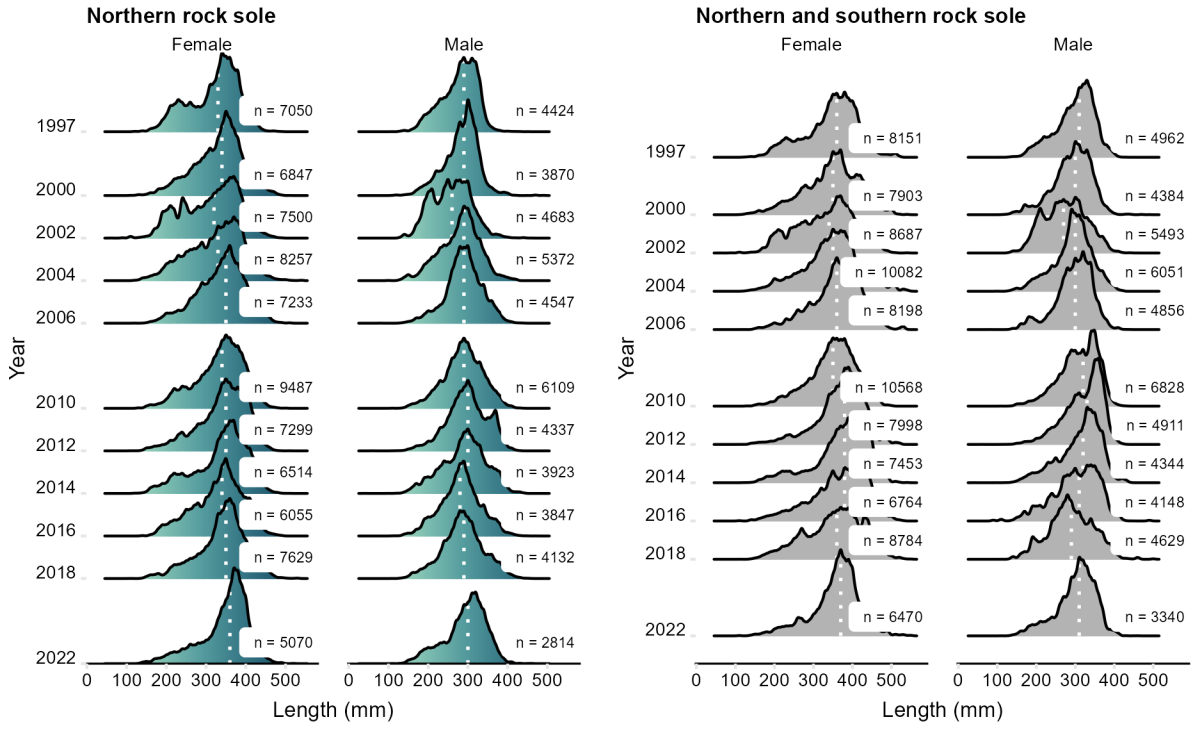

Figure 11. -- Population length composition of Northern rock sole in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length. Since this species was not identified as distinct from its close congener for the entirety of the survey time period, combined lengths are presented in grey for the full time series. The years in the time series before this species was identified as separate, with confidence, are marked with an asterisk.

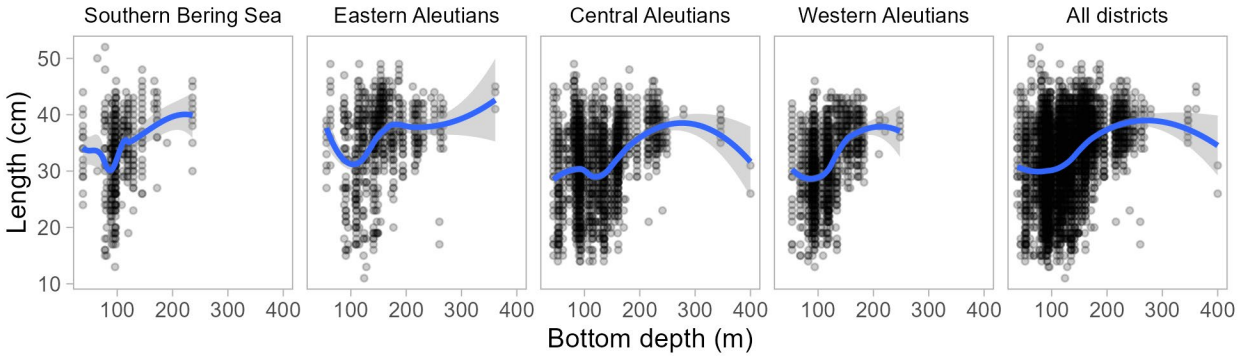

Figure 12. -- Length versus depth for Northern rock sole by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Southern rock sole (*Lepidopsetta bilineata*)

Southern rock sole was the 19th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the SBS and Eastern AI (Fig. 13 and Table 12). The identification and separation of southern rock sole from its close congener northern rock sole began on Aleutian surveys in 1996. Although southern rock sole were caught in all survey districts and at all depths shallower than 200 m, the highest estimated biomass was in the SBS at shallower than 100 m. The SBS had a larger estimated biomass than the other survey districts combined. As in previous years, the median length for females (37 cm FL in 2022) was larger than the median size for males (32 cm). There was no clear pattern of size with depth. On average, the largest individuals were found in the Western AI (Fig. 15). The total biomass of Southern rock sole in the 2022 Aleutian Islands bottom trawl survey was estimated to be 10,678 t. The largest estimated biomass for Southern rock sole was in the SBS (Fig. 13 and Table 12). Length distributions by year are provided in Figure 14.

Table 12. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing Southern rock sole, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	19	17.2	6,923	3,966	9,881	0.591
	101 - 200	15	8	2.84	525	0	1,095	0.685
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	All depths	47	27	9.96	7,449	4,429	10,468	0.597
Western Aleutians	1 - 100	20	2	0.09	42	0	113	0.519
	101 - 200	56	0	---	---	---	---	---
	201 - 300	24	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	All depths	108	2	0.03	42	0	113	0.519
Central Aleutians	1 - 100	29	15	0.56	325	14	636	0.486
	101 - 200	47	6	0.03	16	0	32	0.617
	201 - 300	28	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	All depths	113	21	0.21	341	29	652	0.491
Eastern Aleutians	1 - 100	14	12	3.73	2,558	0	7,003	0.571
	101 - 200	61	14	0.37	289	0	611	0.619
	201 - 300	49	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	All depths	131	26	1.13	2,847	0	7,316	0.575
Combined Aleutian Districts	1 - 100	63	29	1.66	2,925	0	7,385	0.559
	101 - 200	164	20	0.17	305	0	627	0.619
	201 - 300	101	0	---	---	---	---	---
	301 - 500	24	0	---	---	---	---	---
	All depths	352	49	0.57	3,230	0	7,714	0.564

Table 13. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing Southern rock sole, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	17	23.9	5,844	3,396	8,292
Southern Bering Sea	1-100	W Southern Bering Sea	2	2	6.8	1,080	0	8,024
Southern Bering Sea	101-200	E Southern Bering Sea	13	8	4.5	525	0	1,100
Eastern Aleutians	1-100	NW Eastern Aleutians	2	2	6.8	1,322	0	17,158
Eastern Aleutians	1-100	SW Eastern Aleutians	2	2	3.2	613	0	8,070
Eastern Aleutians	1-100	SE Eastern Aleutians	8	7	2.7	476	47	905
Eastern Aleutians	1-100	NE Eastern Aleutians	2	1	1.1	146	0	1,997
Eastern Aleutians	101-200	NW Eastern Aleutians	5	1	0.7	110	0	416
Eastern Aleutians	101-200	SW Eastern Aleutians	13	5	0.6	124	0	320
Eastern Aleutians	101-200	SE Eastern Aleutians	17	4	0.2	34	0	84
Eastern Aleutians	101-200	NE Eastern Aleutians	26	4	0.1	20	0	41
Central Aleutians	1-100	SE Central Aleutians	7	5	0.8	94	0	206
Central Aleutians	1-100	SW Central Aleutians	3	2	0.6	101	0	484
Central Aleutians	1-100	N Central Aleutians	12	7	0.6	127	17	238
Central Aleutians	1-100	Petrel Bank	7	1	0.0	2	0	6
Central Aleutians	101-200	SE Central Aleutians	11	3	0.1	6	0	18
Central Aleutians	101-200	N Central Aleutians	8	2	0.1	8	0	20
Central Aleutians	101-200	SW Central Aleutians	21	1	0.0	2	0	6
Western Aleutians	1-100	E Western Aleutians	9	2	0.4	42	0	114

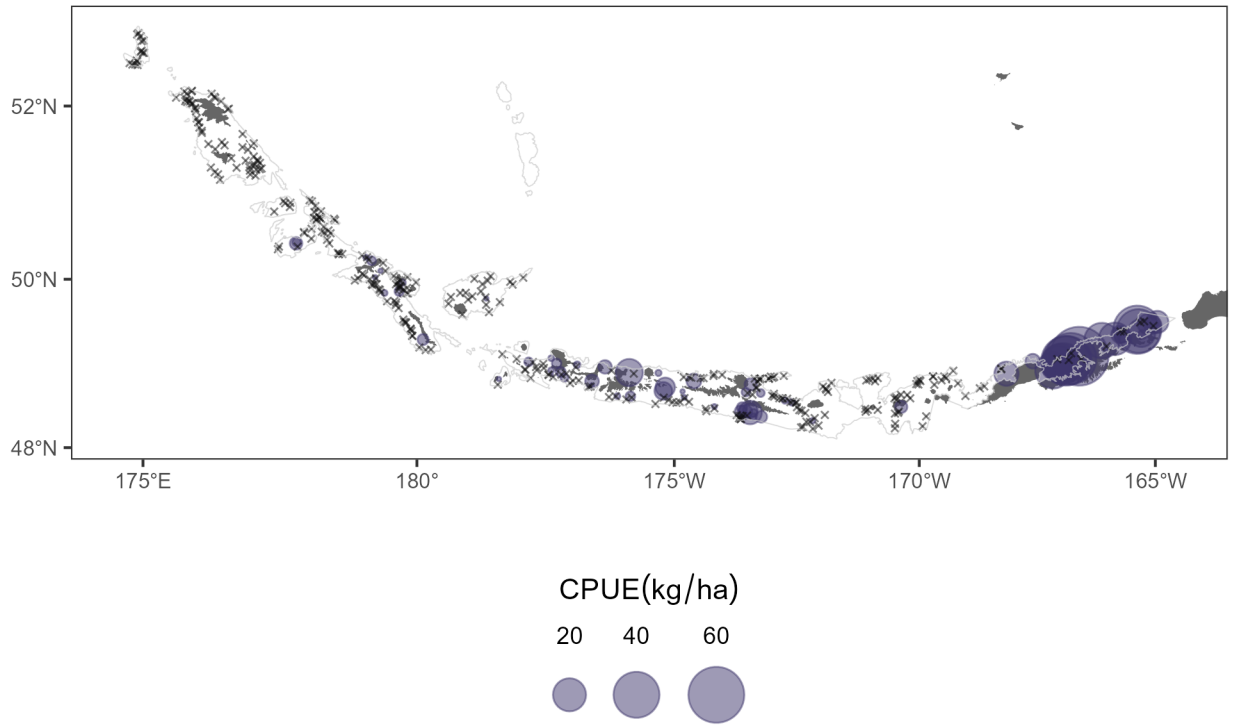

Figure 13. -- Relative abundance of Southern rock sole in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

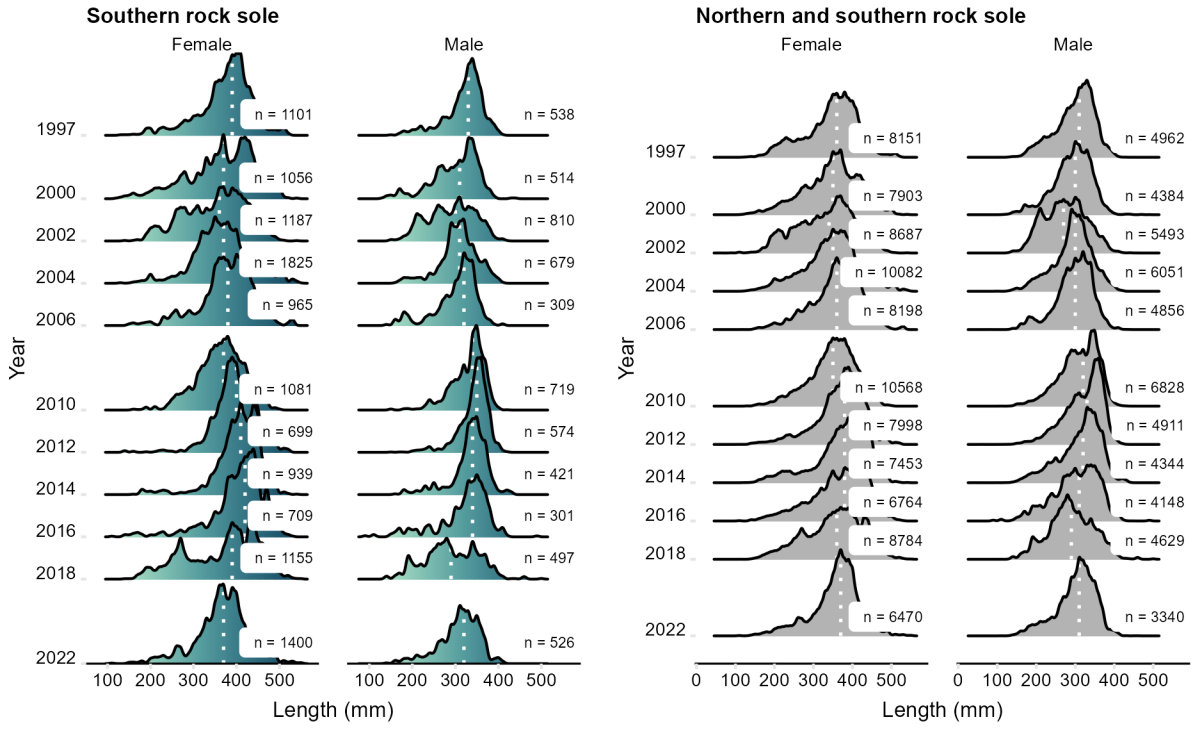

Figure 14. -- Population length composition of Southern rock sole in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length. Since this species was not identified as distinct from its close congener for the entirety of the survey time period, combined lengths are presented in grey for the full time series. The years in the time series before this species was identified as separate, with confidence, are marked with an asterisk.

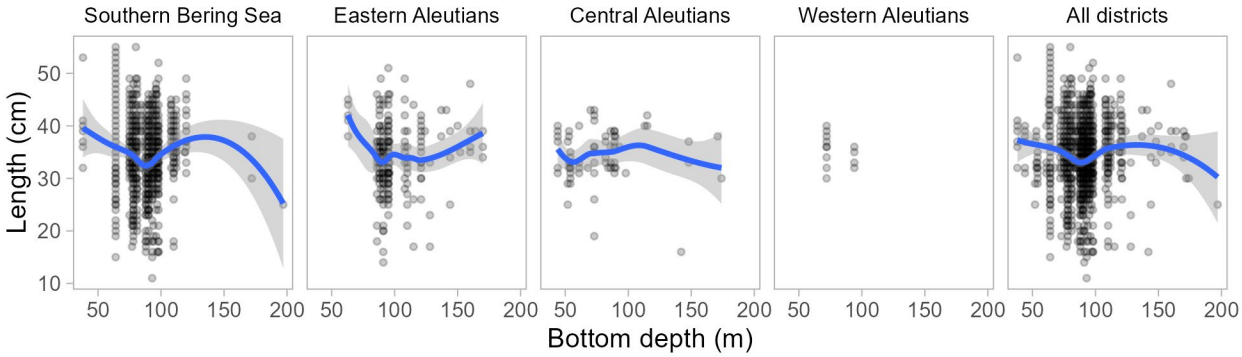

Figure 15. -- Length versus depth for Southern rock sole by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Pacific halibut (*Hippoglossus stenolepis*)

Pacific halibut was the 10th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the SBS and Eastern AI (Fig. 16 and Table 14). Pacific halibut were caught in all depth ranges in the SBS and Eastern AI survey districts at 1 to 200 m. Males and females had comparable median lengths (females 55 cm FL; males 57 cm). Size distributions for both sexes were unimodal. Fork length increased with depth within each survey district and across the entire survey area. On average, the largest individuals were found in the Western AI (Fig. 18). The total biomass of Pacific halibut in the 2022 Aleutian Islands bottom trawl survey was estimated to be 19,988 t. The largest estimated biomass for Pacific halibut was in the Eastern AI (Fig. 16 and Table 14). Length distributions by year are provided in Figure 17.

Table 14. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing Pacific halibut, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	20	11.09	4,466	68	8,864	1.190
	101 - 200	15	15	11.46	2,119	0	5,658	3.261
	201 - 300	8	5	1.62	91	17	165	4.988
	301 - 500	4	1	0.58	61	0	230	5.794
	All depths	47	41	9	6,737	2,557	10,917	1.521
Western Aleutians	1 - 100	20	6	0.37	182	0	368	2.000
	101 - 200	56	5	1.11	590	0	1,359	18.189
	201 - 300	24	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	All depths	108	11	0.51	772	0	1,552	6.258
Central Aleutians	1 - 100	29	12	1.19	699	289	1,108	1.871
	101 - 200	47	9	0.64	297	50	543	4.811
	201 - 300	28	0	---	---	---	---	---
	301 - 500	9	1	0.34	134	0	708	9.902
	All depths	113	22	0.68	1,129	578	1,680	2.516
Eastern Aleutians	1 - 100	14	10	6.74	4,613	0	13,004	3.278
	101 - 200	61	50	5.84	4,537	3,370	5,705	4.086
	201 - 300	49	18	2.86	1,400	629	2,171	5.797
	301 - 500	7	3	1.41	800	0	2,536	8.906
	All depths	131	81	4.5	11,351	4,551	18,150	3.984
Combined Aleutian Districts	1 - 100	63	28	3.13	5,493	0	13,934	2.935
	101 - 200	164	64	3.07	5,424	4,025	6,823	4.503
	201 - 300	101	18	1.6	1,400	629	2,171	5.797
	301 - 500	24	4	0.72	934	0	2,720	9.036
	All depths	352	114	2.33	13,251	6,290	20,211	3.873

Table 15. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing Pacific halibut, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	W Southern Bering Sea	2	2	11.6	1,833	0	13,339
Southern Bering Sea	1-100	E Southern Bering Sea	18	18	10.8	2,633	1,633	3,633
Southern Bering Sea	101-200	W Southern Bering Sea	2	2	23.0	1,542	0	11,861
Southern Bering Sea	101-200	E Southern Bering Sea	13	13	4.9	577	294	861
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	5	1.6	91	15	167
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	1	0.6	61	0	254
Eastern Aleutians	1-100	NW Eastern Aleutians	2	2	15.2	2,936	0	25,167
Eastern Aleutians	1-100	NE Eastern Aleutians	2	2	8.2	1,034	0	11,128
Eastern Aleutians	1-100	SE Eastern Aleutians	8	5	1.9	334	36	632
Eastern Aleutians	1-100	SW Eastern Aleutians	2	1	1.6	308	0	4,223
Eastern Aleutians	101-200	SE Eastern Aleutians	17	14	8.4	1,592	773	2,410
Eastern Aleutians	101-200	NE Eastern Aleutians	26	22	7.7	1,558	850	2,266
Eastern Aleutians	101-200	NW Eastern Aleutians	5	4	4.3	684	181	1,186
Eastern Aleutians	101-200	SW Eastern Aleutians	13	10	3.1	704	305	1,103
Eastern Aleutians	201-300	NE Eastern Aleutians	25	13	3.8	741	366	1,116
Eastern Aleutians	201-300	SE Eastern Aleutians	12	4	3.2	656	0	1,349
Eastern Aleutians	201-300	NW Eastern Aleutians	6	1	0.2	3	0	12
Eastern Aleutians	301-500	SE Eastern Aleutians	2	1	1.8	473	0	6,485
Eastern Aleutians	301-500	SW Eastern Aleutians	2	1	1.5	64	0	872
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	1	1.0	264	0	1,398
Central Aleutians	1-100	SE Central Aleutians	7	4	2.3	273	0	561
Central Aleutians	1-100	N Central Aleutians	12	6	1.5	308	0	619
Central Aleutians	1-100	SW Central Aleutians	3	2	0.7	118	0	405
Central Aleutians	101-200	SE Central Aleutians	11	7	2.5	190	0	397
Central Aleutians	101-200	N Central Aleutians	8	2	1.0	107	0	273
Central Aleutians	301-500	SE Central Aleutians	2	1	1.9	134	0	1,829
Western Aleutians	1-100	W Western Aleutians	11	4	0.5	179	0	367
Western Aleutians	1-100	E Western Aleutians	9	2	0.0	3	0	8
Western Aleutians	101-200	W Western Aleutians	39	5	1.5	590	0	1,359

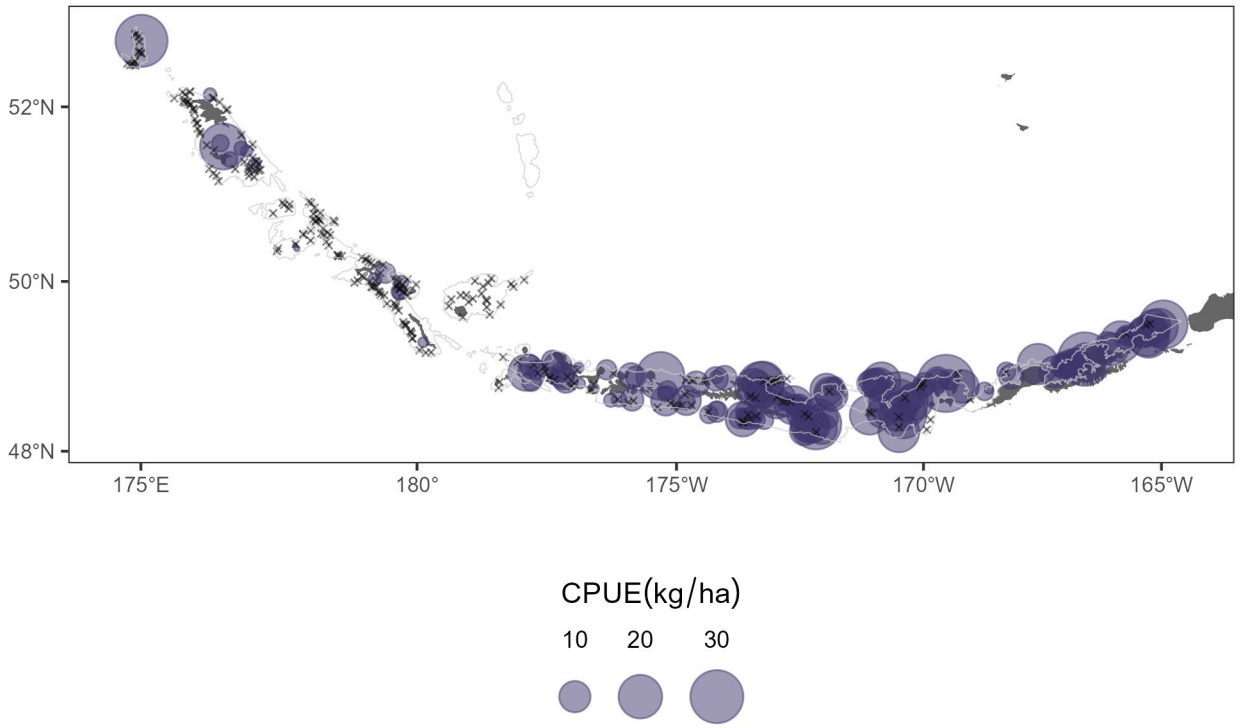

Figure 16. -- Relative abundance of Pacific halibut in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

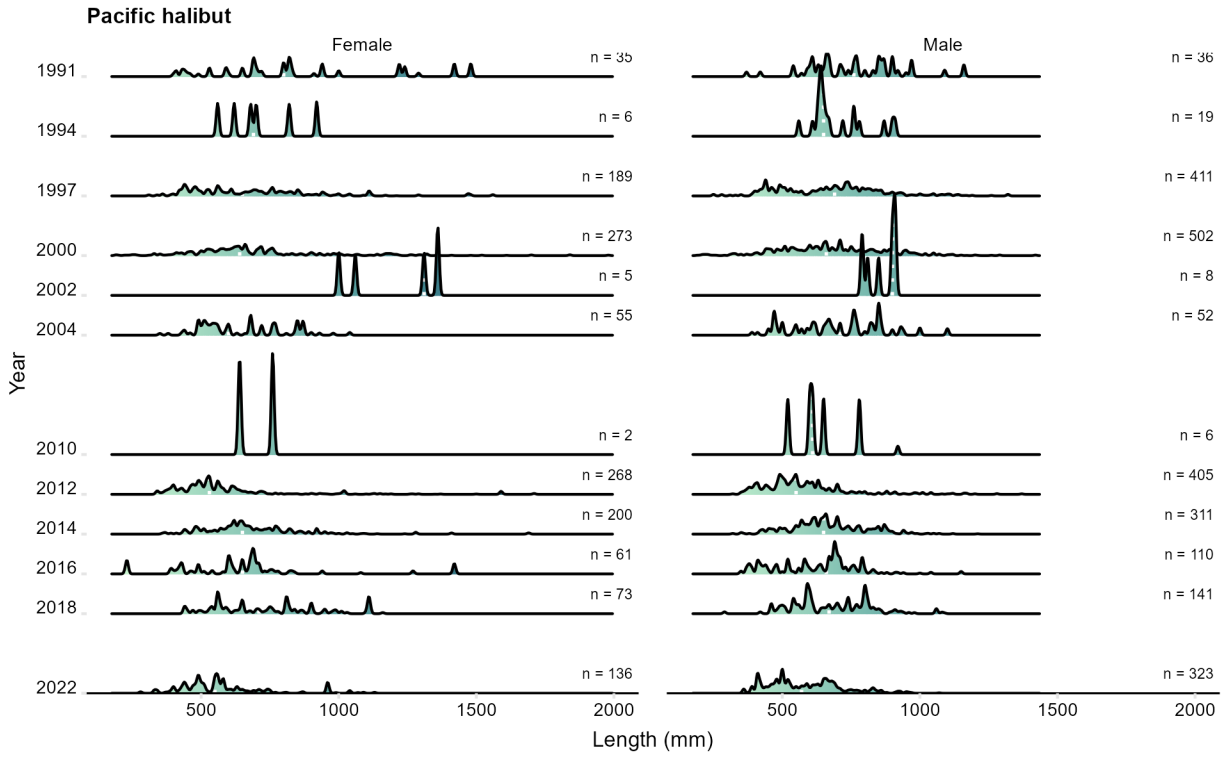

Figure 17. -- Population length composition of Pacific halibut in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

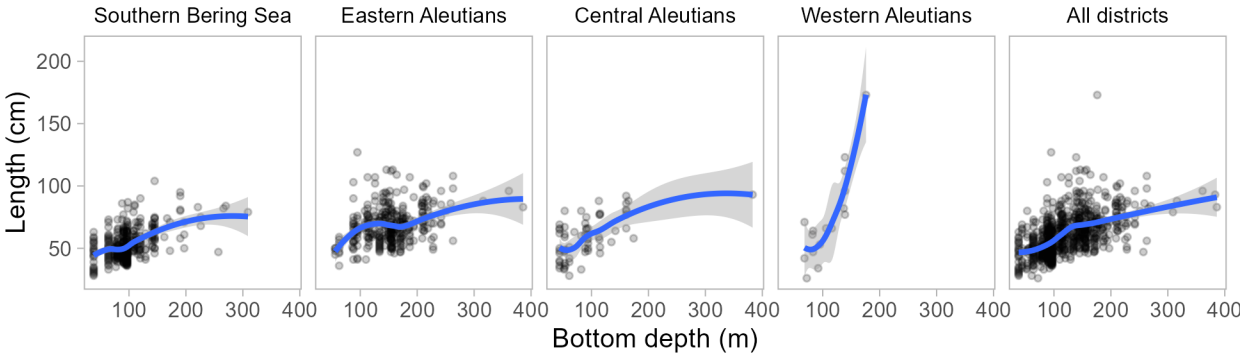

Figure 18. -- Length versus depth for Pacific halibut by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Greenland turbot (*Reinhardtius hippoglossoides*)

Greenland turbot was the 33rd most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Central AI, Eastern AI and Western AI (Fig. 19 and Table 16). Although Greenland turbot were caught in all of the survey districts, they were rare, encountered in only seven hauls during the entire survey, and occurred only in depths >200 m. The highest estimated biomass of Greenland turbot was at 300 to 500 m in the Eastern AI. Length data were insufficient to detect changes in size with depth. On average, the largest individuals were found in the Eastern AI (Fig. 21). The total biomass of Greenland turbot in the 2022 Aleutian Islands bottom trawl survey was estimated to be 512 t. The largest estimated biomass for Greenland turbot was in the Eastern AI (Fig. 19 and Table 16). Length distributions by year are provided in Figure 20.

Table 16. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing Greenland turbot, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	0	---	---	---	---	---
	101 - 200	15	0	---	---	---	---	---
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	1	0.2	21	0	79	2.197
	All depths	47	1	0.03	21	0	79	2.197
Western Aleutians	1 - 100	20	0	---	---	---	---	---
	101 - 200	56	0	---	---	---	---	---
	201 - 300	24	0	---	---	---	---	---
	301 - 500	8	2	0.19	62	0	174	1.887
	All depths	108	2	0.04	62	0	174	1.887
Central Aleutians	1 - 100	29	0	---	---	---	---	---
	101 - 200	47	0	---	---	---	---	---
	201 - 300	28	2	0.52	109	0	344	2.581
	301 - 500	9	1	0.15	60	0	319	2.620
	All depths	113	3	0.1	169	0	473	2.595
Eastern Aleutians	1 - 100	14	0	---	---	---	---	---
	101 - 200	61	0	---	---	---	---	---
	201 - 300	49	0	---	---	---	---	---
	301 - 500	7	1	0.46	260	0	1,088	3.731
	All depths	131	1	0.1	260	0	1,088	3.731
Combined Aleutian Districts	1 - 100	63	0	---	---	---	---	---
	101 - 200	164	0	---	---	---	---	---
	201 - 300	101	2	0.12	109	0	344	2.581
	301 - 500	24	4	0.3	382	0	1,244	3.045
	All depths	352	6	0.09	491	0	1,401	2.928

Table 17. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing Greenland turbot, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	1	0.2	21	0	88
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	1	1.0	260	0	1,379
Central Aleutians	201-300	Petrel Bank	5	2	1.4	109	0	363
Central Aleutians	301-500	Petrel Bank	2	1	0.5	60	0	823
Western Aleutians	301-500	W Western Aleutians	6	2	0.4	62	0	179

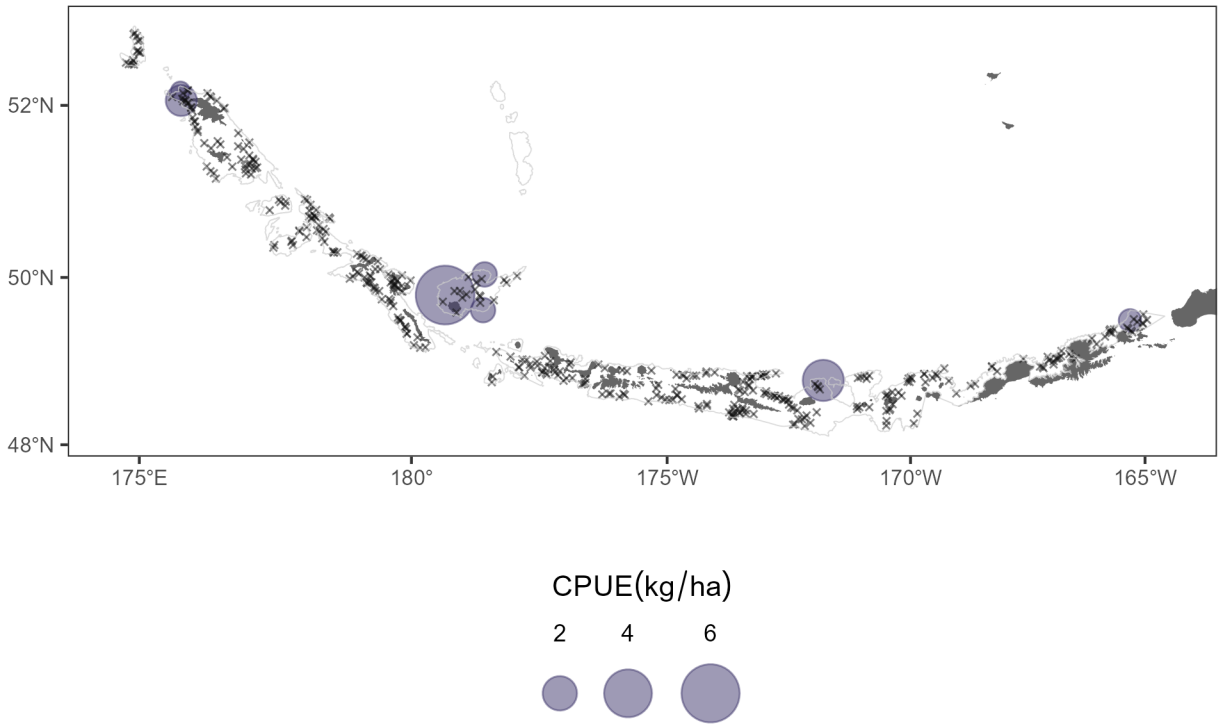

Figure 19. -- Relative abundance of Greenland turbot in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

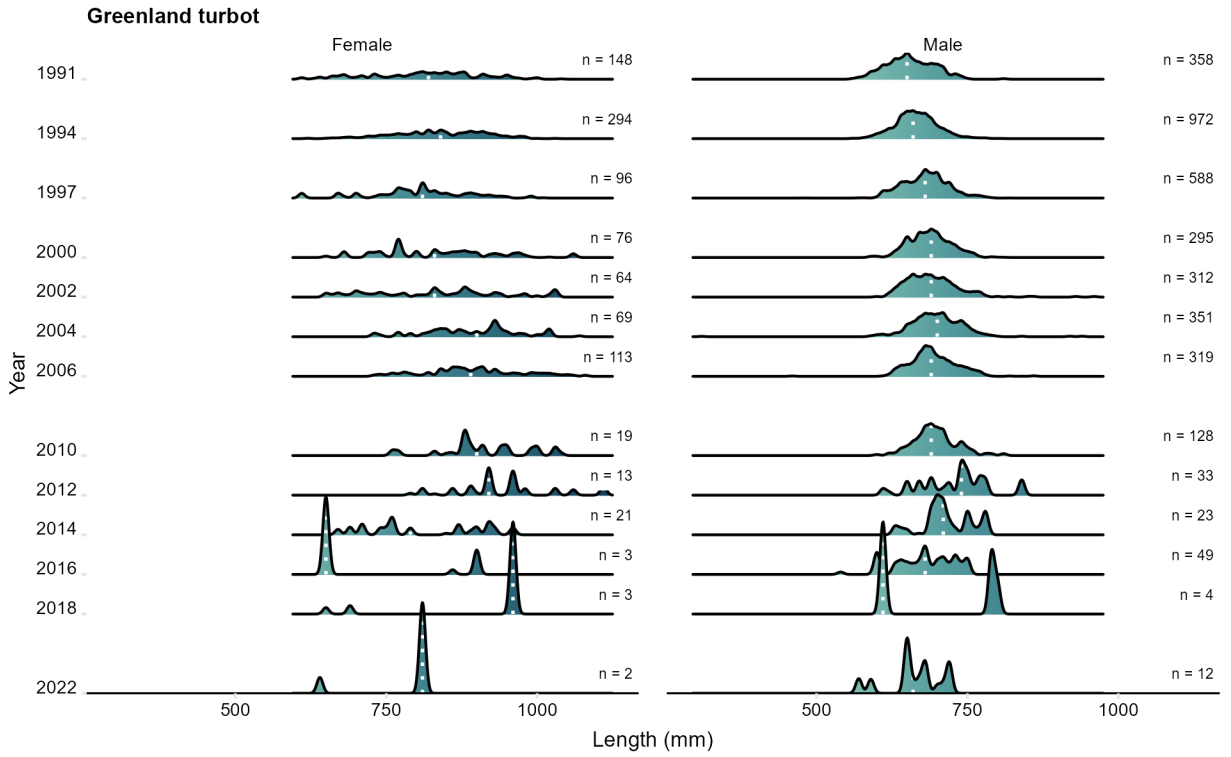

Figure 20. -- Population length composition of Greenland turbot in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

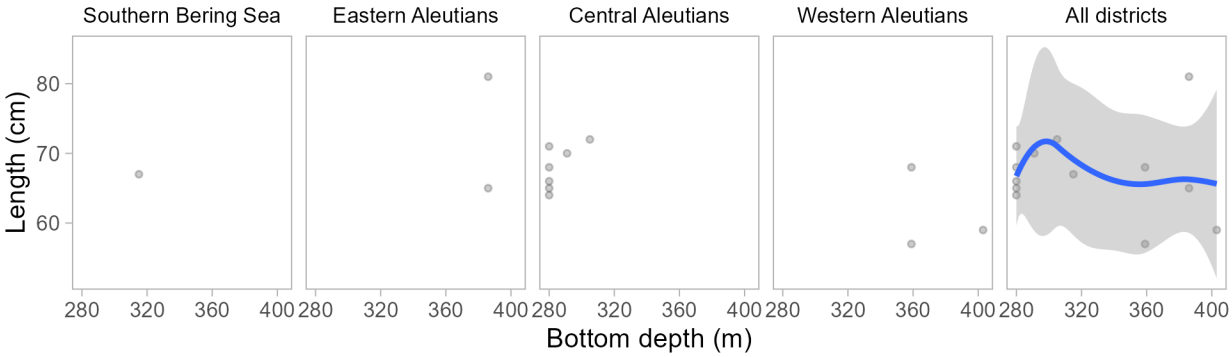

Figure 21. -- Length versus depth for Greenland turbot by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Flathead sole (*Hippoglossoides elassodon*)

Flathead sole was the 18th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the SBS and Western AI (Fig. 22 and Table 18). Although flathead sole were caught throughout the survey and at all depth ranges, they were caught most frequently in the Western AI at 100 to 200 m, and the highest estimated biomass occurred in the SBS at 100 to 200 m. Females were slightly larger than males (31 cm FL compared to 29 cm FL, in 2022); female flathead sole have historically been larger than males, and length distributions for both are unimodal. On average, the smallest individual flathead sole were caught between 100-200 m depth, with larger individuals at shallower (<100 m) and deeper (>200 m) depths. On average, the largest individuals were found in the Central AI (Fig. 24). The total biomass of flathead sole in the 2022 Aleutian Islands bottom trawl survey was estimated to be 10,897 t. The largest estimated biomass for flathead sole was in the SBS (Fig. 22 and Table 18). Length distributions by year are provided in Figure 23.

Table 18. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing flathead sole, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	17	4.59	1,848	480	3,217	0.356
	101 - 200	15	13	17.49	3,234	0	7,106	0.231
	201 - 300	8	2	0.18	10	0	26	0.448
	301 - 500	4	2	2.08	217	0	586	0.488
	All depths	47	34	7.10	5,309	1,362	9,256	0.270
Western Aleutians	1 - 100	20	13	2.86	1,395	669	2,121	0.359
	101 - 200	56	35	4.01	2,131	1,157	3,104	0.278
	201 - 300	24	10	0.45	78	17	138	0.364
	301 - 500	8	1	0.08	27	0	92	0.397
	All depths	108	59	2.39	3,630	2,442	4,818	0.307
Central Aleutians	1 - 100	29	5	0.42	245	0	694	0.936
	101 - 200	47	14	0.21	95	9	180	0.508
	201 - 300	28	6	0.09	19	1	36	0.571
	301 - 500	9	0	0.00	---	---	---	---
	All depths	113	25	0.22	359	0	827	0.745
Eastern Aleutians	1 - 100	14	1	0.19	131	0	694	0.530
	101 - 200	61	15	1.65	1,284	227	2,340	0.285
	201 - 300	49	17	0.38	185	96	275	0.454
	301 - 500	7	0	0.00	---	---	---	---
	All depths	131	33	0.63	1,600	432	2,768	0.310
Combined Aleutian Districts	1 - 100	63	19	1.01	1,771	958	2,585	0.403
	101 - 200	164	64	1.98	3,509	2,092	4,926	0.284
	201 - 300	101	33	0.32	282	174	389	0.430
	301 - 500	24	1	0.02	27	0	92	0.397
	All depths	352	117	0.98	5,588	3,957	7,220	0.320

Table 19. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing flathead sole, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	17	7.6	1,848	474	3,223
Southern Bering Sea	101-200	E Southern Bering Sea	13	13	27.4	3,234	0	7,140
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	2	0.2	10	0	26
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	2	2.1	217	0	640
Eastern Aleutians	1-100	NW Eastern Aleutians	2	1	0.7	131	0	1,793
Eastern Aleutians	101-200	NE Eastern Aleutians	26	8	4.5	897	0	1,839
Eastern Aleutians	101-200	SW Eastern Aleutians	13	3	1.3	304	0	844
Eastern Aleutians	101-200	NW Eastern Aleutians	5	3	0.5	78	0	223
Eastern Aleutians	101-200	SE Eastern Aleutians	17	1	0.0	5	0	14
Eastern Aleutians	201-300	NW Eastern Aleutians	6	5	1.1	17	0	40
Eastern Aleutians	201-300	SW Eastern Aleutians	6	4	0.9	66	5	127
Eastern Aleutians	201-300	NE Eastern Aleutians	25	8	0.5	102	28	177
Central Aleutians	1-100	SW Central Aleutians	3	2	1.3	203	0	801
Central Aleutians	1-100	N Central Aleutians	12	3	0.2	42	0	96
Central Aleutians	101-200	SW Central Aleutians	21	9	0.6	58	0	130
Central Aleutians	101-200	N Central Aleutians	8	2	0.2	22	0	71
Central Aleutians	101-200	SE Central Aleutians	11	3	0.2	15	0	40
Central Aleutians	201-300	SW Central Aleutians	7	3	0.2	10	0	24
Central Aleutians	201-300	SE Central Aleutians	5	3	0.2	9	0	24
Western Aleutians	1-100	W Western Aleutians	11	11	3.8	1,388	653	2,122
Western Aleutians	1-100	E Western Aleutians	9	2	0.1	7	0	18
Western Aleutians	101-200	W Western Aleutians	39	32	5.0	2,030	1,067	2,994
Western Aleutians	101-200	E Western Aleutians	17	3	0.8	100	0	246
Western Aleutians	201-300	W Western Aleutians	14	8	0.7	65	7	123
Western Aleutians	201-300	E Western Aleutians	10	2	0.2	13	0	33
Western Aleutians	301-500	W Western Aleutians	6	1	0.2	27	0	95

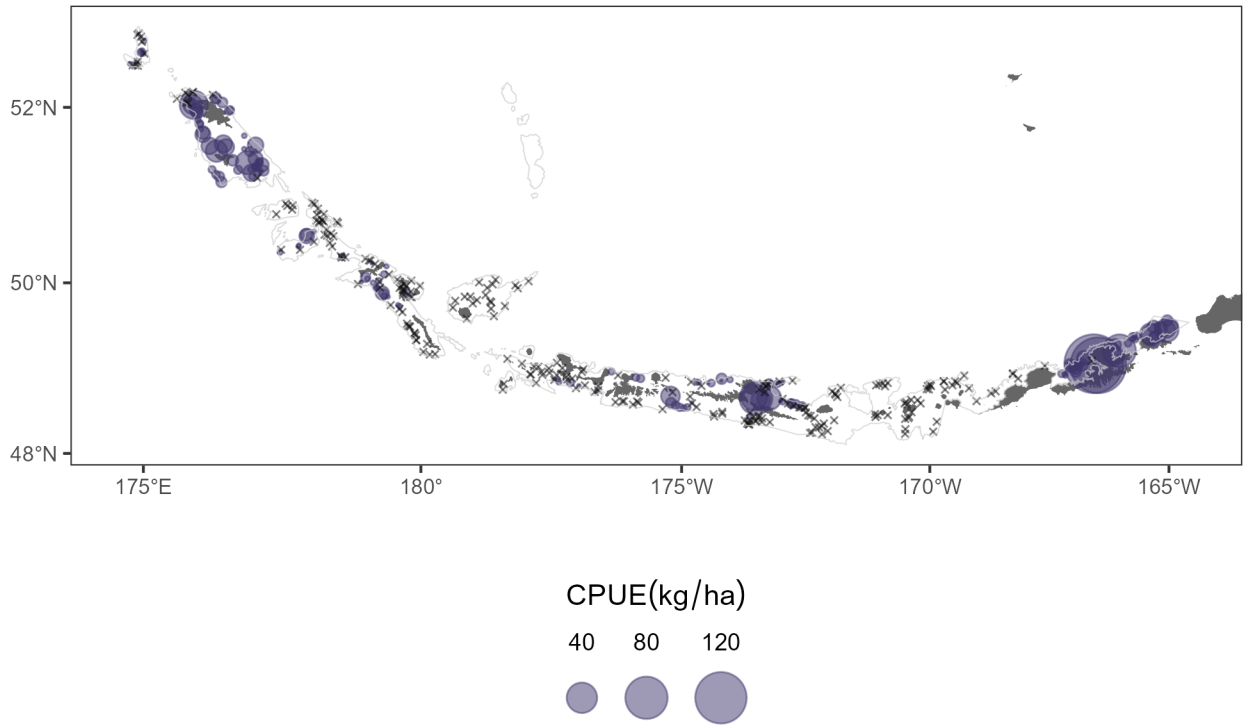

Figure 22. -- Relative abundance of flathead sole in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

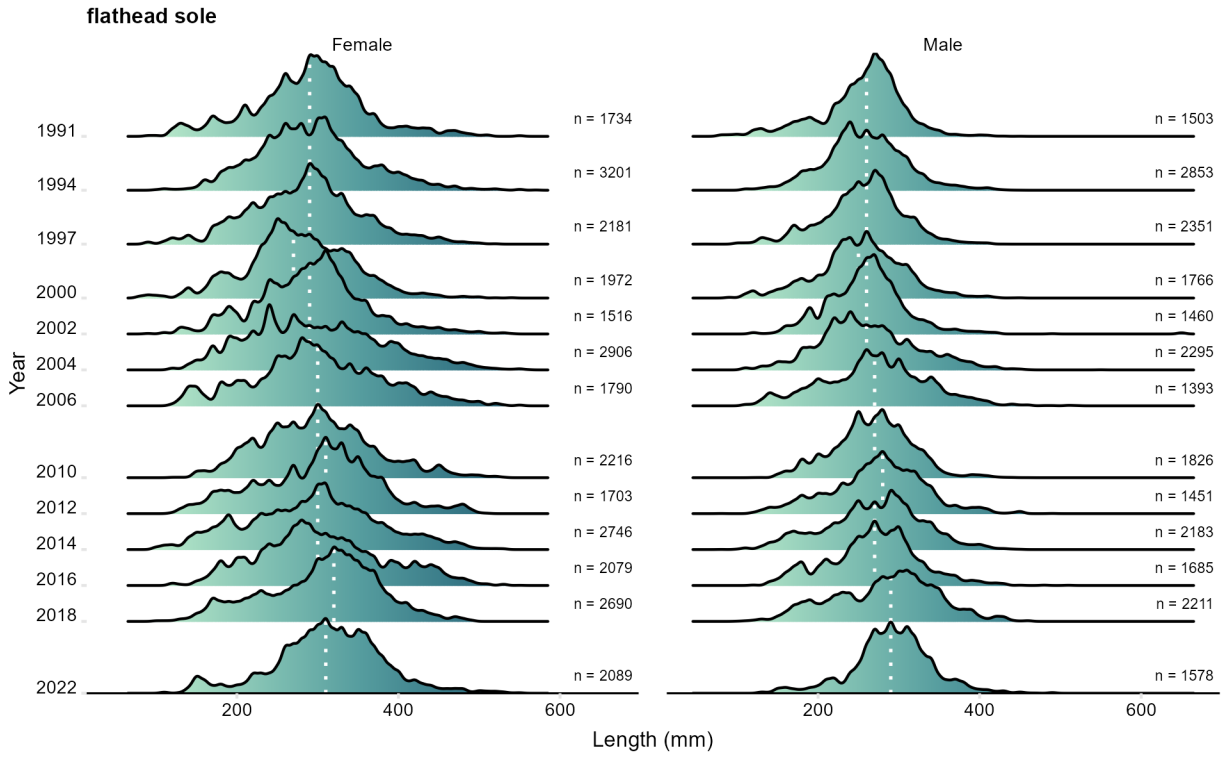

Figure 23. -- Population length composition of flathead sole in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

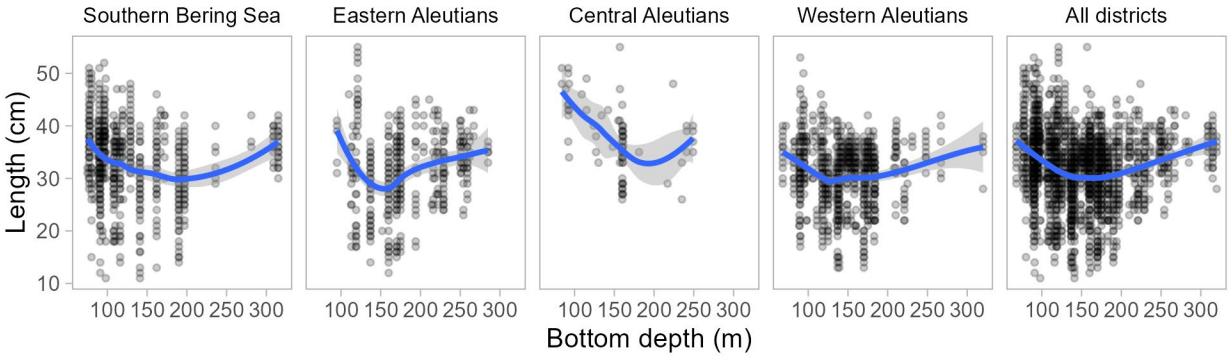

Figure 24. -- Length versus depth for flathead sole by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Rex sole (*Glyptocephalus zachirus*)

Rex sole was the 17th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the SBS and Western AI (Fig. 25 and Table 20). Although rex sole were caught throughout the survey area and at all depths, the highest estimated biomasses were at depths less than 200 m. CPUE was particularly high in the SBS and Eastern AI. As in previous years, female rex sole were slightly larger than males (median 44 cm FL compared to median 41 cm FL in 2022), and the size distributions of both males and females were unimodal. There was no clear pattern of size with depth for rex sole in any of the survey districts or across the AI. On average, the largest individuals were found in the Central AI (Fig. 27). The total biomass of rex sole in the 2022 Aleutian Islands bottom trawl survey was estimated to be 11,233 t. The largest estimated biomass for rex sole was in the SBS (Fig. 25 and Table 20). Length distributions by year are provided in Figure 26.

Table 20. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing rex sole, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	14	3.56	1,434	0	3,089	0.546
	101 - 200	15	12	11.98	2,214	745	3,684	0.518
	201 - 300	8	4	6.49	366	0	943	0.504
	301 - 500	4	4	16.63	1,734	0	4,407	0.565
	All depths	47	34	7.68	5,749	2,661	8,837	0.537
Western Aleutians	1 - 100	20	8	0.85	416	0	895	0.795
	101 - 200	56	31	2.12	1,128	549	1,706	0.632
	201 - 300	24	9	0.65	112	26	197	0.548
	301 - 500	8	5	1.13	370	0	860	0.473
	All depths	108	53	1.33	2,026	1,169	2,882	0.615
Central Aleutians	1 - 100	29	2	0.03	20	0	57	0.497
	101 - 200	47	18	0.77	352	93	612	0.700
	201 - 300	28	15	0.98	206	17	395	0.587
	301 - 500	9	5	0.87	345	0	759	0.638
	All depths	113	40	0.56	923	460	1,387	0.643
Eastern Aleutians	1 - 100	14	2	0.06	42	0	139	0.352
	101 - 200	61	15	1.25	967	156	1,778	0.611
	201 - 300	49	21	2.33	1,140	450	1,831	0.672
	301 - 500	7	3	0.68	386	0	1,391	0.350
	All depths	131	41	1.01	2,535	986	4,084	0.563
Combined Aleutian Districts	1 - 100	63	12	0.27	478	0	957	0.701
	101 - 200	164	64	1.38	2,448	1,444	3,451	0.632
	201 - 300	101	45	1.67	1,458	749	2,167	0.648
	301 - 500	24	13	0.85	1,101	0	2,236	0.454
	All depths	352	134	0.96	5,484	3,786	7,182	0.594

Table 21. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing rex sole, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	14	5.9	1,434	0	3,096
Southern Bering Sea	101-200	E Southern Bering Sea	13	12	18.8	2,214	732	3,696
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	4	6.5	366	0	958
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	4	16.6	1,734	0	4,798
Eastern Aleutians	1-100	NW Eastern Aleutians	2	1	0.1	26	0	360
Eastern Aleutians	1-100	SW Eastern Aleutians	2	1	0.1	16	0	213
Eastern Aleutians	101-200	SW Eastern Aleutians	13	5	2.3	515	0	1,185
Eastern Aleutians	101-200	NE Eastern Aleutians	26	9	1.4	272	0	595
Eastern Aleutians	101-200	NW Eastern Aleutians	5	1	1.1	180	0	679
Eastern Aleutians	201-300	SW Eastern Aleutians	6	6	10.0	718	0	1,438
Eastern Aleutians	201-300	NW Eastern Aleutians	6	5	4.3	68	0	155
Eastern Aleutians	201-300	NE Eastern Aleutians	25	8	1.1	221	0	497
Eastern Aleutians	201-300	SE Eastern Aleutians	12	2	0.6	134	0	389
Eastern Aleutians	301-500	SW Eastern Aleutians	2	2	1.7	76	0	869
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	1	1.2	310	0	1,643
Central Aleutians	1-100	Petrel Bank	7	1	0.2	16	0	56
Central Aleutians	1-100	SW Central Aleutians	3	1	0.0	3	0	17
Central Aleutians	101-200	SW Central Aleutians	21	10	2.0	212	31	393
Central Aleutians	101-200	Petrel Bank	7	2	0.6	102	0	286
Central Aleutians	101-200	N Central Aleutians	8	4	0.3	30	0	73
Central Aleutians	101-200	SE Central Aleutians	11	2	0.1	8	0	23
Central Aleutians	201-300	SW Central Aleutians	7	5	1.4	61	0	132
Central Aleutians	201-300	N Central Aleutians	11	6	1.1	50	12	87
Central Aleutians	201-300	Petrel Bank	5	1	0.9	68	0	258
Central Aleutians	201-300	SE Central Aleutians	5	3	0.6	27	0	62
Central Aleutians	301-500	SE Central Aleutians	2	1	1.8	125	0	1,716
Central Aleutians	301-500	Petrel Bank	2	2	1.4	170	0	1,100
Central Aleutians	301-500	SW Central Aleutians	2	2	0.6	50	0	481
Western Aleutians	1-100	W Western Aleutians	11	4	0.9	347	0	826
Western Aleutians	1-100	E Western Aleutians	9	4	0.6	69	0	146
Western Aleutians	101-200	W Western Aleutians	39	27	2.5	1,024	451	1,598
Western Aleutians	101-200	E Western Aleutians	17	4	0.8	103	0	220
Western Aleutians	201-300	W Western Aleutians	14	6	1.0	94	10	178
Western Aleutians	201-300	E Western Aleutians	10	3	0.2	18	0	39
Western Aleutians	301-500	W Western Aleutians	6	4	1.7	295	0	805
Western Aleutians	301-500	E Western Aleutians	2	1	0.5	76	0	1,036

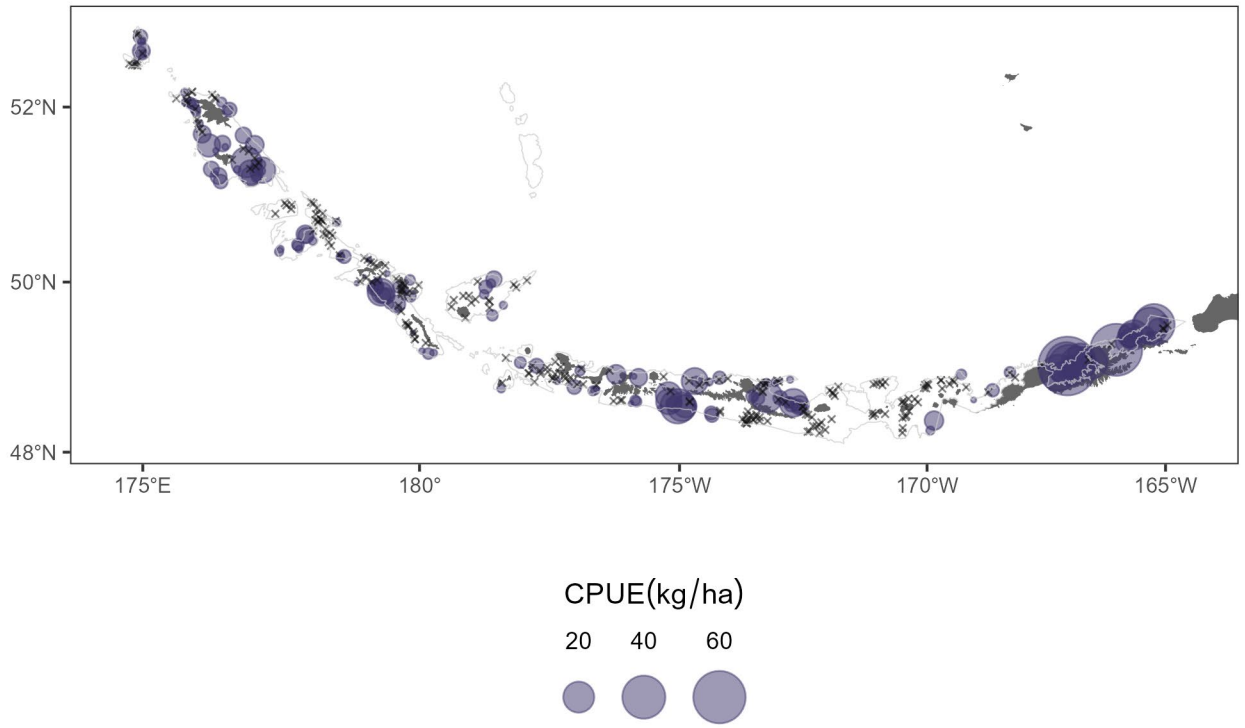

Figure 25. -- Relative abundance of rex sole in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

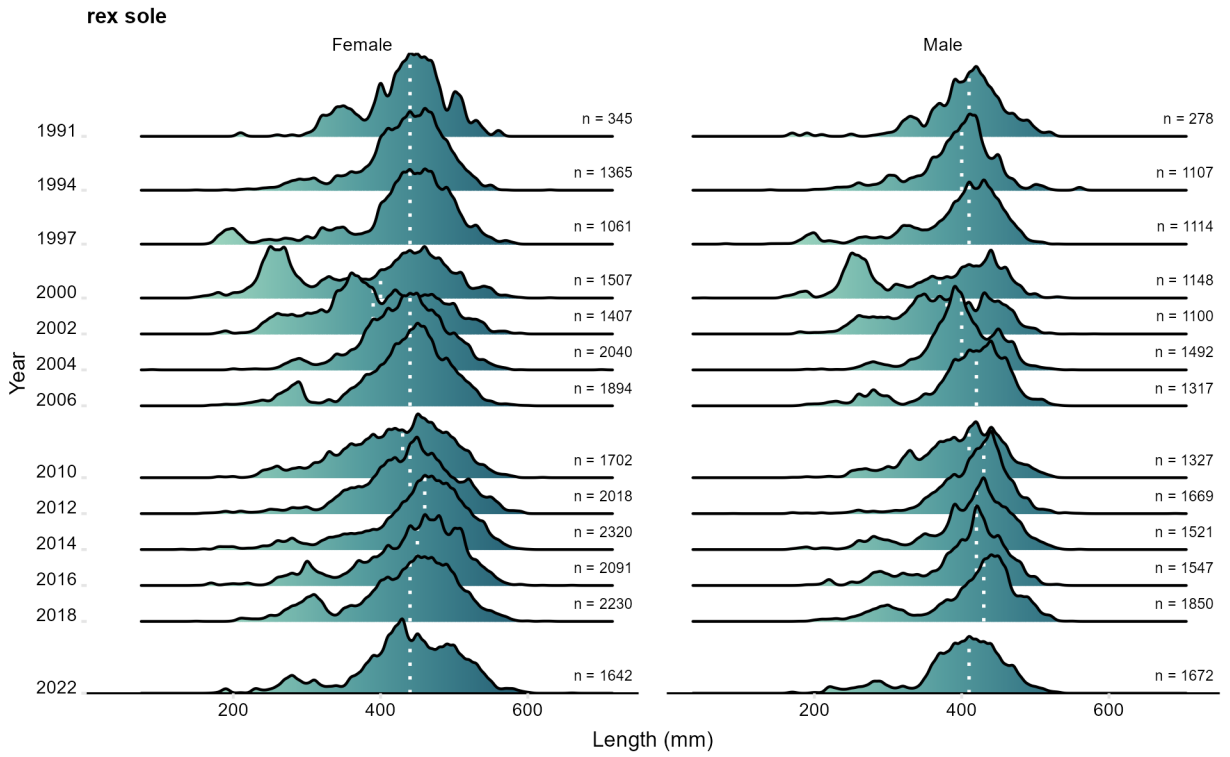

Figure 26. -- Population length composition of rex sole in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

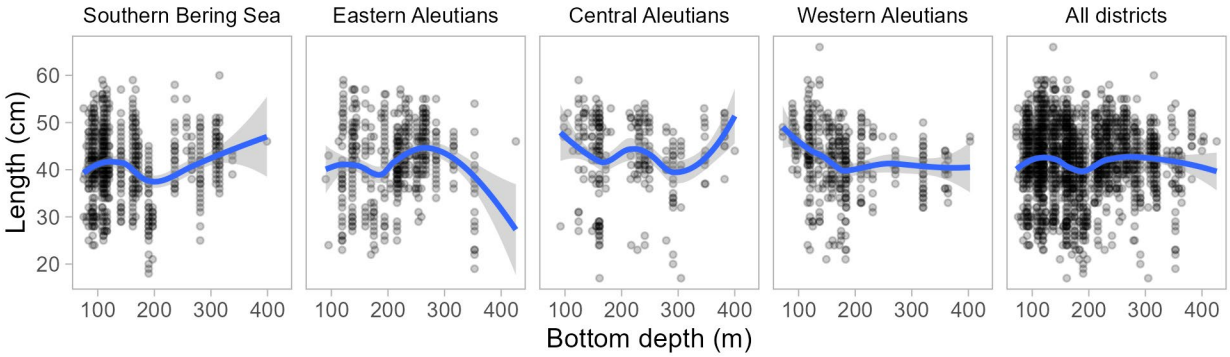

Figure 27. -- Length versus depth for rex sole by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Atka mackerel (*Pleurogrammus monopterygius*)

Atka mackerel was the 2nd most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Western AI and Eastern AI (Fig. 28 and Table 22). Atka mackerel were most abundant in the Aleutian survey districts, though they were caught in all survey districts and at nearly all survey depths. Their highest CPUEs were generally recorded in the 101 to 200 m depth interval, with their highest biomass estimated in the Eastern and Western AI. The relationship of Atka mackerel length with depth suggests a length maximum at about 200 m capture depth. Female and male length frequency distributions have remained fairly consistent through the last two decades with no clear trend in median length for either sex. On average, the largest individuals were found in the SBS (Fig. 30). The total biomass of Atka mackerel in the 2022 Aleutian Islands bottom trawl survey was estimated to be 672,262 t. The largest estimated biomass for Atka mackerel was in the Eastern AI (Fig. 28 and Table 22). Length distributions by year are provided in Figure 29.

Table 22. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing Atka mackerel, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	6	1.19	479	0	1,285	1.191
	101 - 200	15	7	0.56	104	0	391	0.874
	201 - 300	8	4	1.43	81	0	206	0.977
	301 - 500	4	1	0.5	52	0	196	0.869
	All depths	47	18	0.96	716	0	1,545	1.079
Western Aleutians	1 - 100	20	18	79.94	38,985	8,086	69,885	0.594
	101 - 200	56	30	325.72	173,207	44,948	301,466	0.630
	201 - 300	24	9	2.75	475	0	1,279	0.505
	301 - 500	8	2	0.08	27	0	99	0.228
	All depths	108	59	140.02	212,694	81,034	344,354	0.623
Central Aleutians	1 - 100	29	23	47.92	28,023	2,150	53,896	0.579
	101 - 200	47	37	172.32	79,367	0	195,479	0.739
	201 - 300	28	9	1.54	324	0	827	0.802
	301 - 500	9	0	---	---	---	---	---
	All depths	113	69	65.11	107,714	0	221,811	0.689
Eastern Aleutians	1 - 100	14	3	17.8	12,190	0	31,748	0.759
	101 - 200	61	22	435.76	338,503	0	765,267	0.997
	201 - 300	49	11	0.8	390	24	756	0.986
	301 - 500	7	1	0.1	56	0	232	0.874
	All depths	131	37	139.34	351,139	0	778,265	0.986
Combined Aleutian Districts	1 - 100	63	44	45.07	79,198	36,893	121,504	0.609
	101 - 200	164	89	334.1	591,077	137,700	1,044,455	0.819
	201 - 300	101	29	1.36	1,188	229	2,148	0.683
	301 - 500	24	3	0.06	82	0	267	0.455
	All depths	352	165	117.95	671,546	216,860	1,126,232	0.786

Table 23. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing Atka mackerel, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	6	2.0	479	0	1,289
Southern Bering Sea	101-200	W Southern Bering Sea	2	1	1.0	65	0	888
Southern Bering Sea	101-200	E Southern Bering Sea	13	6	0.3	39	3	74
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	4	1.4	81	0	210
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	1	0.5	52	0	218
Eastern Aleutians	1-100	SE Eastern Aleutians	8	3	70.0	12,190	0	32,249
Eastern Aleutians	101-200	SE Eastern Aleutians	17	9	1,224.8	232,739	0	630,072
Eastern Aleutians	101-200	NE Eastern Aleutians	26	9	525.4	105,738	0	280,702
Eastern Aleutians	101-200	SW Eastern Aleutians	13	3	0.1	18	0	40
Eastern Aleutians	101-200	NW Eastern Aleutians	5	1	0.0	8	0	29
Eastern Aleutians	201-300	NE Eastern Aleutians	25	6	1.3	250	0	592
Eastern Aleutians	201-300	SE Eastern Aleutians	12	5	0.7	140	0	290
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	1	0.2	56	0	294
Central Aleutians	1-100	N Central Aleutians	12	10	110.9	23,360	0	49,220
Central Aleutians	1-100	Petrel Bank	7	7	32.4	3,107	131	6,082
Central Aleutians	1-100	SE Central Aleutians	7	4	13.0	1,514	0	4,468
Central Aleutians	1-100	SW Central Aleutians	3	2	0.3	42	0	151
Central Aleutians	101-200	SE Central Aleutians	11	6	1,008.7	75,836	0	193,342
Central Aleutians	101-200	SW Central Aleutians	21	19	12.5	1,310	61	2,560
Central Aleutians	101-200	N Central Aleutians	8	7	12.2	1,299	0	3,675
Central Aleutians	101-200	Petrel Bank	7	5	5.3	921	166	1,676
Central Aleutians	201-300	SW Central Aleutians	7	4	5.6	238	0	740
Central Aleutians	201-300	N Central Aleutians	11	3	1.8	78	0	244
Central Aleutians	201-300	SE Central Aleutians	5	1	0.1	4	0	14
Central Aleutians	201-300	Petrel Bank	5	1	0.1	5	0	17
Western Aleutians	1-100	E Western Aleutians	9	9	259.8	30,738	0	63,209
Western Aleutians	1-100	W Western Aleutians	11	9	22.3	8,247	0	17,705
Western Aleutians	101-200	E Western Aleutians	17	12	750.7	94,018	0	190,178
Western Aleutians	101-200	W Western Aleutians	39	18	194.8	79,189	0	169,827
Western Aleutians	201-300	W Western Aleutians	14	6	4.9	465	0	1,274
Western Aleutians	201-300	E Western Aleutians	10	3	0.1	10	0	22
Western Aleutians	301-500	E Western Aleutians	2	2	0.2	27	0	240

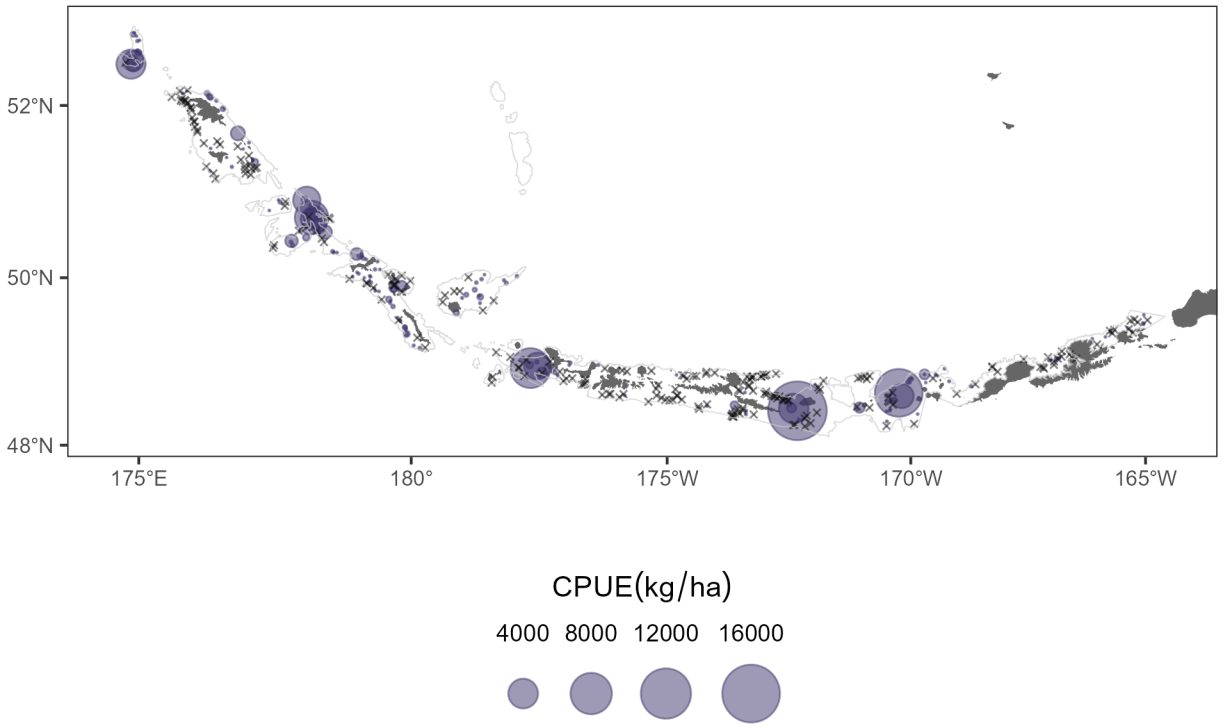

Figure 28. -- Relative abundance of Atka mackerel in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

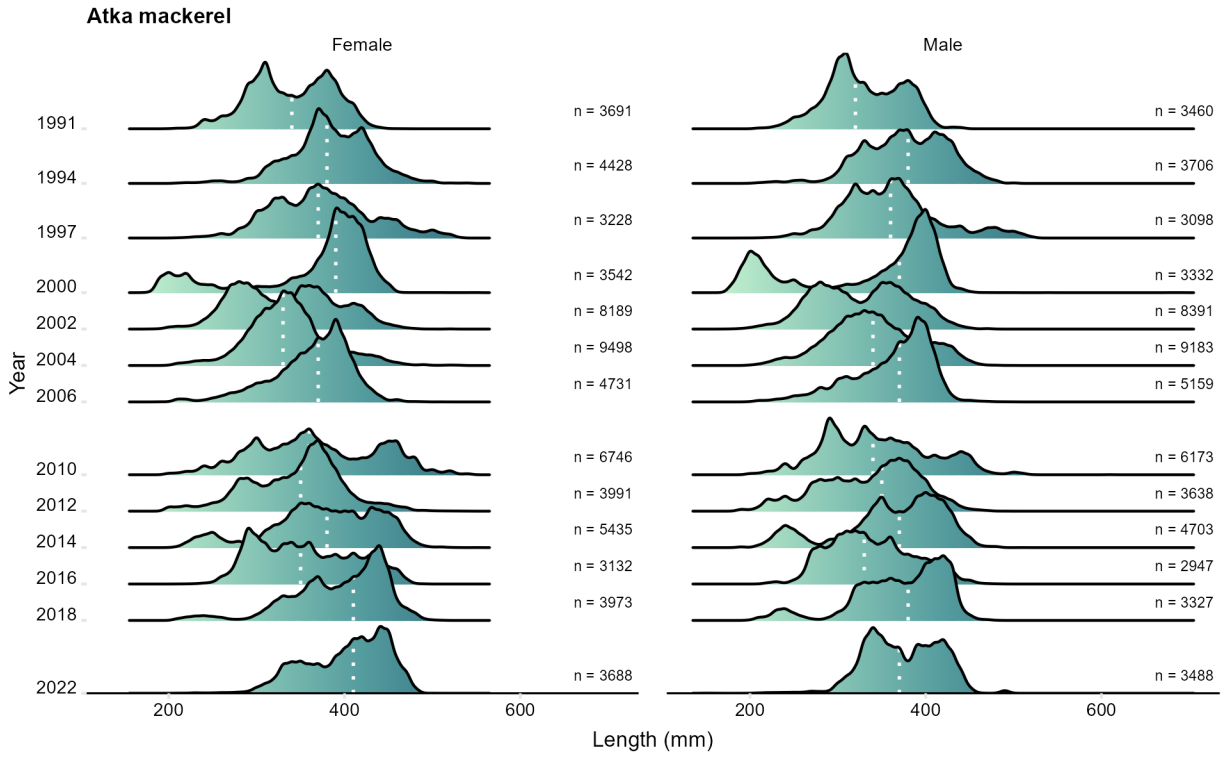

Figure 29. -- Population length composition of Atka mackerel in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

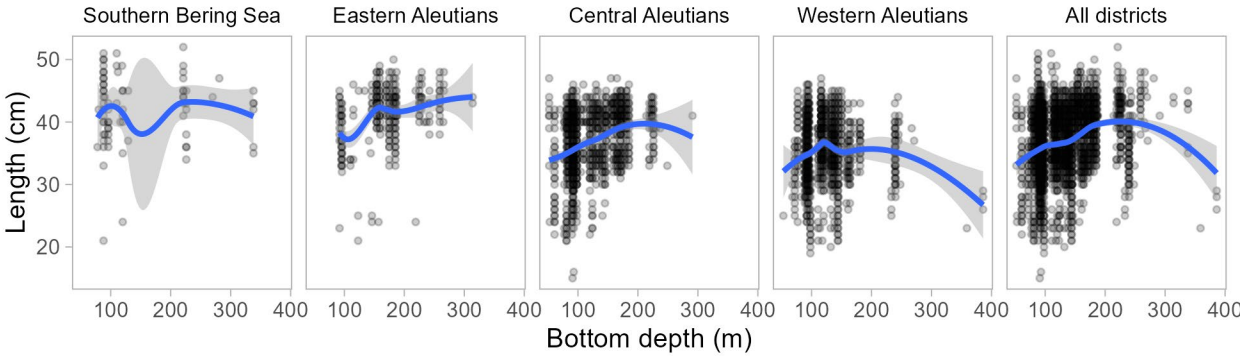

Figure 30. -- Length versus depth for Atka mackerel by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Pacific cod (*Gadus macrocephalus*)

Pacific cod was the 5th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the SBS and Eastern AI (Fig. 31 and Table 24). Pacific cod occurred throughout the survey districts at all depths, with the exception of the 301 to 500 m depth interval in the Central AI. The highest Pacific cod CPUEs were recorded in the SBS and high CPUEs were consistently recorded shallower than 200 m in all districts. There appears to be a length maximum for Pacific cod caught between 101 and 200 m, but there is no clear trend of length with depth. Female and male length distributions have varied slightly over time in the Aleutian Islands survey area, oscillating around median lengths of 56 and 57 cm FL, respectively. On average, the largest individuals were found in the Western AI (Fig. 33). The total biomass of Pacific cod in the 2022 Aleutian Islands bottom trawl survey was estimated to be 66,907 t. The largest estimated biomass for Pacific cod was in the Eastern AI (Fig. 31 and Table 24). Length distributions by year are provided in Figure 32.

Table 24. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing Pacific cod, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	19	25.12	10,114	1,351	18,878	2.653
	101 - 200	15	15	26.48	4,896	121	9,670	3.225
	201 - 300	8	6	5.05	285	79	491	2.586
	301 - 500	4	2	0.71	74	0	227	1.876
	All depths	47	42	20.54	15,368	5,383	25,354	2.805
Western Aleutians	1 - 100	20	16	13.14	6,406	2,019	10,793	2.533
	101 - 200	56	39	13.19	7,014	3,208	10,819	3.377
	201 - 300	24	10	1.22	211	36	386	1.836
	301 - 500	8	1	0.09	30	0	104	2.556
	All depths	108	66	8.99	13,661	7,908	19,414	2.887
Central Aleutians	1 - 100	29	26	9.47	5,539	2,971	8,107	2.540
	101 - 200	47	43	16.23	7,474	3,157	11,791	3.212
	201 - 300	28	18	4.88	1,028	375	1,681	2.634
	301 - 500	9	0	---	---	---	---	---
	All depths	113	87	8.49	14,041	9,187	18,895	2.867
Eastern Aleutians	1 - 100	14	5	2.55	1,748	0	4,766	1.728
	101 - 200	61	52	23.28	18,085	7,167	29,002	2.510
	201 - 300	49	38	7.8	3,823	2,375	5,271	2.620
	301 - 500	7	2	0.32	181	0	399	1.821
	All depths	131	97	9.46	23,837	12,670	35,004	2.439
Combined Aleutian Districts	1 - 100	63	47	7.79	13,693	8,178	19,208	2.394
	101 - 200	164	134	18.41	32,572	20,563	44,581	2.806
	201 - 300	101	66	5.8	5,063	3,472	6,654	2.577
	301 - 500	24	3	0.16	211	0	465	1.899
	All depths	352	250	9.05	51,539	38,448	64,629	2.656

Table 25. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing Pacific cod, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	17	28.2	6,889	3,126	10,652
Southern Bering Sea	1-100	W Southern Bering Sea	2	2	20.3	3,226	0	29,892
Southern Bering Sea	101-200	W Southern Bering Sea	2	2	33.2	2,225	0	19,107
Southern Bering Sea	101-200	E Southern Bering Sea	13	13	22.6	2,670	1,151	4,189
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	6	5.1	285	74	496
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	2	0.7	74	0	249
Eastern Aleutians	1-100	NW Eastern Aleutians	2	1	4.6	895	0	12,262
Eastern Aleutians	1-100	SW Eastern Aleutians	2	1	3.1	591	0	8,106
Eastern Aleutians	1-100	SE Eastern Aleutians	8	3	1.5	262	0	682
Eastern Aleutians	101-200	SE Eastern Aleutians	17	14	31.7	6,023	0	15,480
Eastern Aleutians	101-200	NE Eastern Aleutians	26	21	29.7	5,985	2,891	9,079
Eastern Aleutians	101-200	NW Eastern Aleutians	5	5	25.1	4,009	0	10,192
Eastern Aleutians	101-200	SW Eastern Aleutians	13	12	9.1	2,068	385	3,750
Eastern Aleutians	201-300	NW Eastern Aleutians	6	5	18.8	293	0	687
Eastern Aleutians	201-300	NE Eastern Aleutians	25	21	10.3	2,034	1,043	3,026
Eastern Aleutians	201-300	SE Eastern Aleutians	12	9	5.9	1,208	184	2,232
Eastern Aleutians	201-300	SW Eastern Aleutians	6	3	4.0	288	0	664
Eastern Aleutians	301-500	SE Eastern Aleutians	2	2	0.7	181	0	826
Central Aleutians	1-100	Petrel Bank	7	6	17.8	1,704	346	3,063
Central Aleutians	1-100	SE Central Aleutians	7	6	10.9	1,264	0	2,708
Central Aleutians	1-100	N Central Aleutians	12	11	10.6	2,242	208	4,276
Central Aleutians	1-100	SW Central Aleutians	3	3	2.0	328	0	980
Central Aleutians	101-200	Petrel Bank	7	7	26.2	4,542	203	8,880
Central Aleutians	101-200	N Central Aleutians	8	8	11.6	1,240	696	1,785
Central Aleutians	101-200	SE Central Aleutians	11	9	10.6	796	251	1,342
Central Aleutians	101-200	SW Central Aleutians	21	19	8.5	895	323	1,467
Central Aleutians	201-300	N Central Aleutians	11	9	13.0	573	0	1,203
Central Aleutians	201-300	SE Central Aleutians	5	5	5.8	277	97	456
Central Aleutians	201-300	SW Central Aleutians	7	3	3.8	162	0	439
Central Aleutians	201-300	Petrel Bank	5	1	0.2	16	0	62
Western Aleutians	1-100	E Western Aleutians	9	7	21.2	2,506	0	5,145
Western Aleutians	1-100	W Western Aleutians	11	9	10.6	3,900	210	7,590
Western Aleutians	101-200	E Western Aleutians	17	13	27.4	3,435	705	6,165
Western Aleutians	101-200	W Western Aleutians	39	26	8.8	3,579	774	6,384
Western Aleutians	201-300	W Western Aleutians	14	8	1.7	163	6	320
Western Aleutians	201-300	E Western Aleutians	10	2	0.6	48	0	141
Western Aleutians	301-500	W Western Aleutians	6	1	0.2	30	0	107

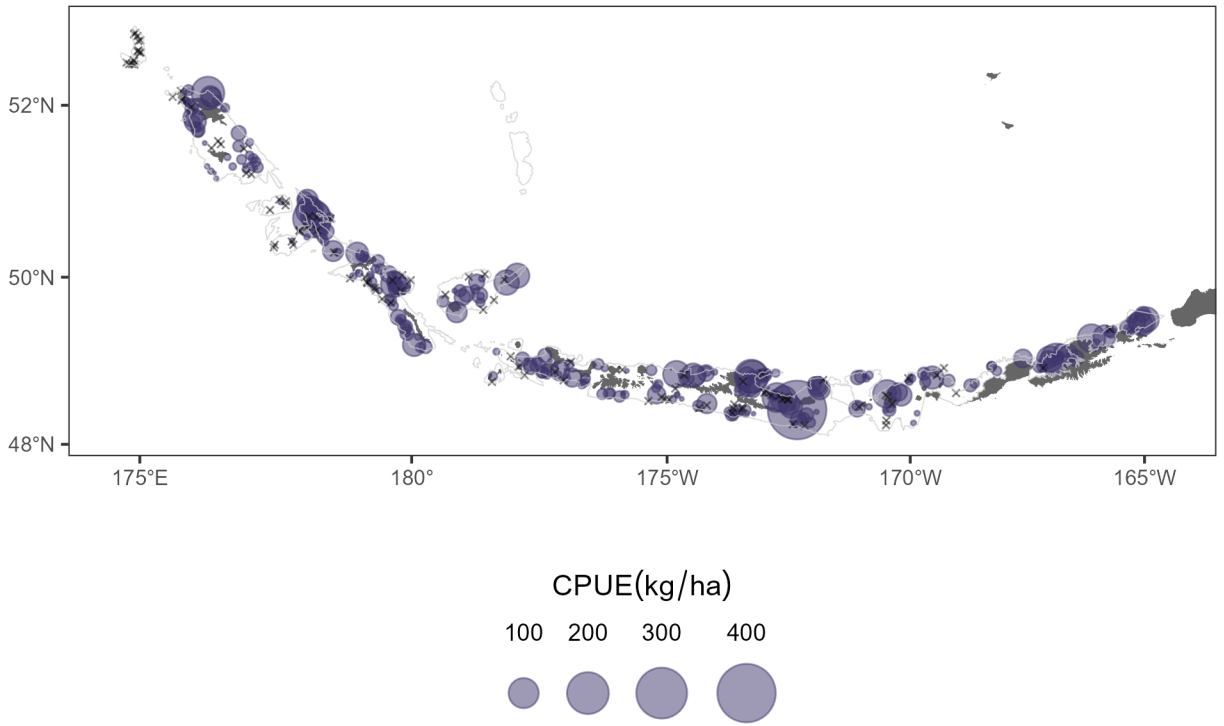

Figure 31. -- Relative abundance of Pacific cod in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

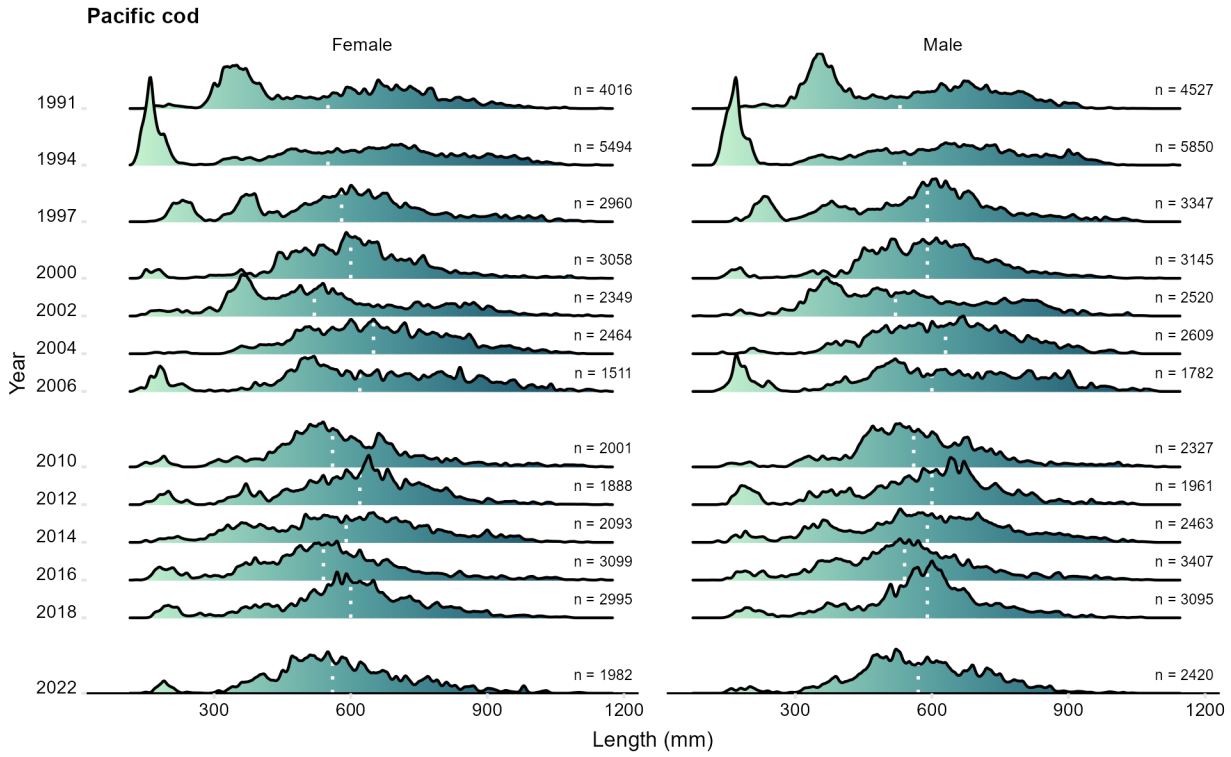

Figure 32. -- Population length composition of Pacific cod in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

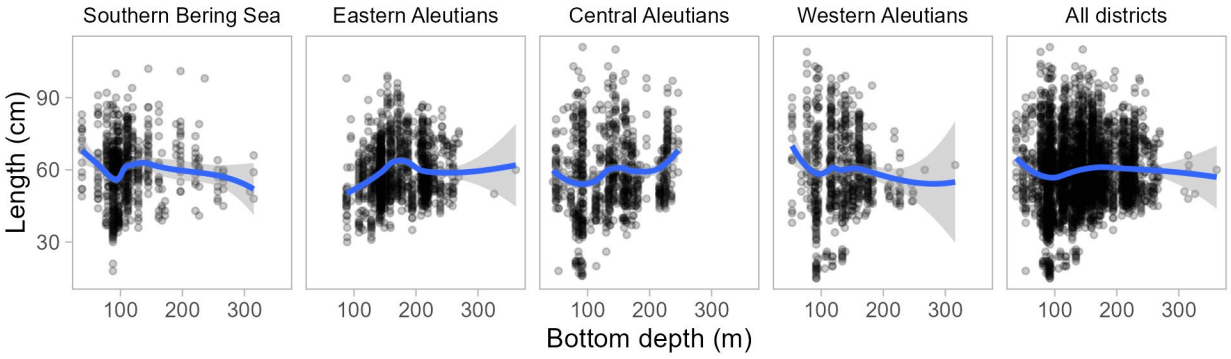

Figure 33. -- Length versus depth for Pacific cod by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Walleye pollock (*Gadus chalcogrammus*)

Walleye pollock was the 4th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the SBS and Eastern AI (Fig. 34 and Table 26). Walleye pollock occurred in trawl catches throughout the survey area and at all depths sampled. The highest pollock CPUE was recorded from the SBS between 100 and 200 m, while the highest biomass estimate for all depths combined was in the Eastern AI. Walleye pollock length increased with depth of capture across the survey area. Female and male length frequency distributions have changed over time and do not show a strong pattern over the course of the survey. On average, the largest individuals were found in the SBS (Fig. 36). The total biomass of walleye pollock in the 2022 Aleutian Islands bottom trawl survey was estimated to be 163,806 t. The largest estimated biomass for walleye pollock was in the Eastern AI (Fig. 34 and Table 26). Length distributions by year are provided in Figure 35.

Table 26. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing walleye pollock, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	10	31.27	12,588	0	25,776	0.745
	101 - 200	15	12	188.36	34,821	0	124,090	0.753
	201 - 300	8	8	36.41	2,053	299	3,807	1.076
	301 - 500	4	4	40.60	4,235	0	12,708	0.913
	All depths	47	34	71.77	53,696	0	123,388	0.770
Western Aleutians	1 - 100	20	4	0.15	74	0	202	0.219
	101 - 200	56	40	4.67	2,481	1,259	3,704	0.481
	201 - 300	24	19	19.06	3,285	0	7,356	1.261
	301 - 500	8	1	0.13	44	0	152	1.316
	All depths	108	64	3.87	5,885	1,856	9,913	0.723
Central Aleutians	1 - 100	29	10	0.49	287	0	616	0.293
	101 - 200	47	32	11.09	5,107	948	9,266	0.943
	201 - 300	28	24	36.18	7,630	1,088	14,173	1.524
	301 - 500	9	2	1.83	728	0	2,786	1.666
	All depths	113	68	8.31	13,753	5,946	21,560	1.161
Eastern Aleutians	1 - 100	14	1	0.00	<1	0	1	0.047
	101 - 200	61	29	3.87	3,004	0	6,319	0.733
	201 - 300	49	44	61.25	30,024	6,640	53,408	1.134
	301 - 500	7	5	101.08	57,445	0	219,021	1.232
	All depths	131	79	35.90	90,473	0	256,117	1.172
Combined Aleutian Districts	1 - 100	63	15	0.21	361	24	698	0.272
	101 - 200	164	101	5.99	10,592	5,308	15,876	0.722
	201 - 300	101	87	46.87	40,940	16,523	65,356	1.201
	301 - 500	24	8	45.00	58,217	0	219,806	1.236
	All depths	352	211	19.34	110,110	0	276,262	1.133

Table 27. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing walleye pollock, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	10	51.6	12,588	0	25,833
Southern Bering Sea	101-200	W Southern Bering Sea	2	1	291.3	19,506	0	267,347
Southern Bering Sea	101-200	E Southern Bering Sea	13	11	129.9	15,315	0	30,709
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	8	36.4	2,053	254	3,852
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	4	40.6	4,235	0	13,948
Eastern Aleutians	1-100	SE Eastern Aleutians	8	1	0.0	0	0	1
Eastern Aleutians	101-200	NE Eastern Aleutians	26	16	12.9	2,600	0	5,910
Eastern Aleutians	101-200	SE Eastern Aleutians	17	3	0.9	170	0	412
Eastern Aleutians	101-200	SW Eastern Aleutians	13	8	0.7	168	0	388
Eastern Aleutians	101-200	NW Eastern Aleutians	5	2	0.4	67	0	248
Eastern Aleutians	201-300	NE Eastern Aleutians	25	24	141.2	27,795	4,415	51,174
Eastern Aleutians	201-300	SE Eastern Aleutians	12	11	10.1	2,077	454	3,700
Eastern Aleutians	201-300	NW Eastern Aleutians	6	4	3.7	58	0	168
Eastern Aleutians	201-300	SW Eastern Aleutians	6	5	1.3	94	12	177
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	2	198.2	52,908	0	271,220
Eastern Aleutians	301-500	SE Eastern Aleutians	2	2	17.3	4,454	0	31,123
Eastern Aleutians	301-500	SW Eastern Aleutians	2	1	1.9	83	0	1,134
Central Aleutians	1-100	Petrel Bank	7	3	1.8	171	0	521
Central Aleutians	1-100	N Central Aleutians	12	6	0.4	94	0	200
Central Aleutians	1-100	SW Central Aleutians	3	1	0.1	22	0	118
Central Aleutians	101-200	Petrel Bank	7	7	24.6	4,266	12	8,520
Central Aleutians	101-200	SW Central Aleutians	21	18	4.2	447	112	782
Central Aleutians	101-200	N Central Aleutians	8	5	3.7	391	0	889
Central Aleutians	101-200	SE Central Aleutians	11	2	0.0	3	0	7
Central Aleutians	201-300	N Central Aleutians	11	9	146.0	6,409	0	13,113
Central Aleutians	201-300	Petrel Bank	5	3	9.7	744	0	2,003
Central Aleutians	201-300	SE Central Aleutians	5	5	5.8	277	0	802
Central Aleutians	201-300	SW Central Aleutians	7	7	4.7	200	0	418
Central Aleutians	301-500	N Central Aleutians	3	1	5.2	641	0	3,398
Central Aleutians	301-500	Petrel Bank	2	1	0.7	87	0	1,198
Western Aleutians	1-100	W Western Aleutians	11	4	0.2	74	0	204
Western Aleutians	101-200	E Western Aleutians	17	12	5.5	687	0	1,509
Western Aleutians	101-200	W Western Aleutians	39	28	4.4	1,794	845	2,742
Western Aleutians	201-300	E Western Aleutians	10	10	33.0	2,583	0	6,733
Western Aleutians	201-300	W Western Aleutians	14	9	7.5	702	197	1,208
Western Aleutians	301-500	W Western Aleutians	6	1	0.3	44	0	158

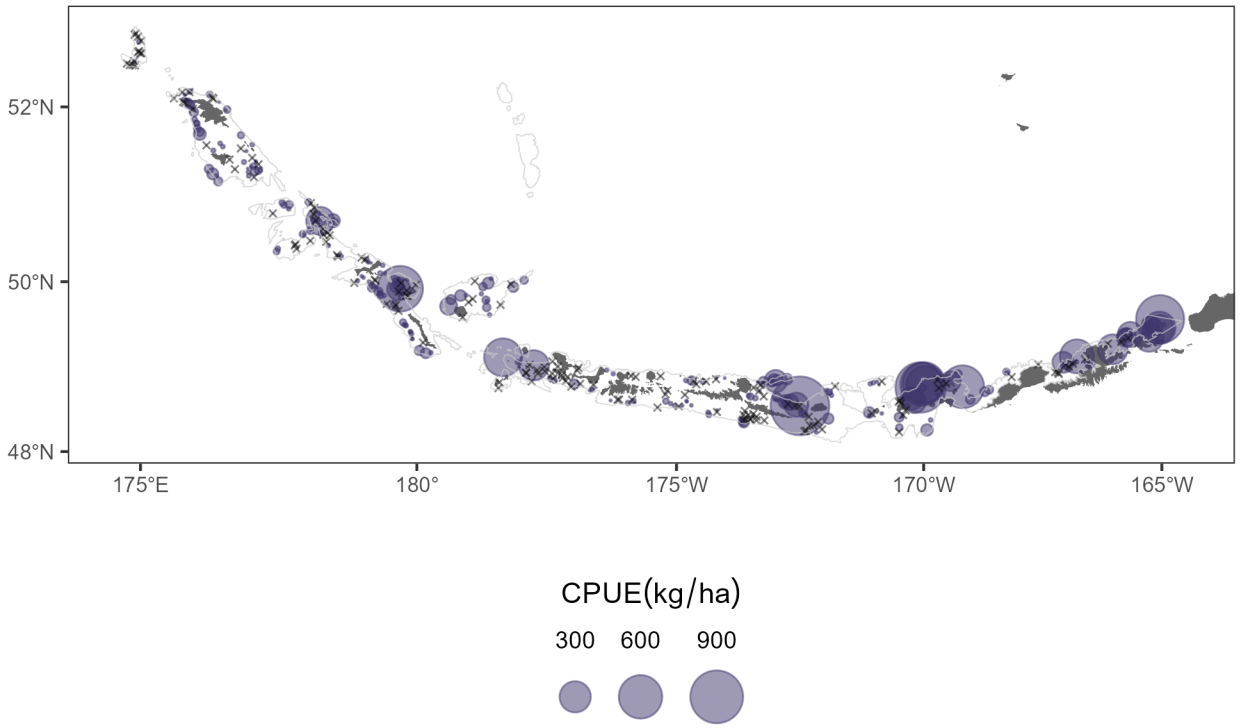

Figure 34. -- Relative abundance of walleye pollock in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

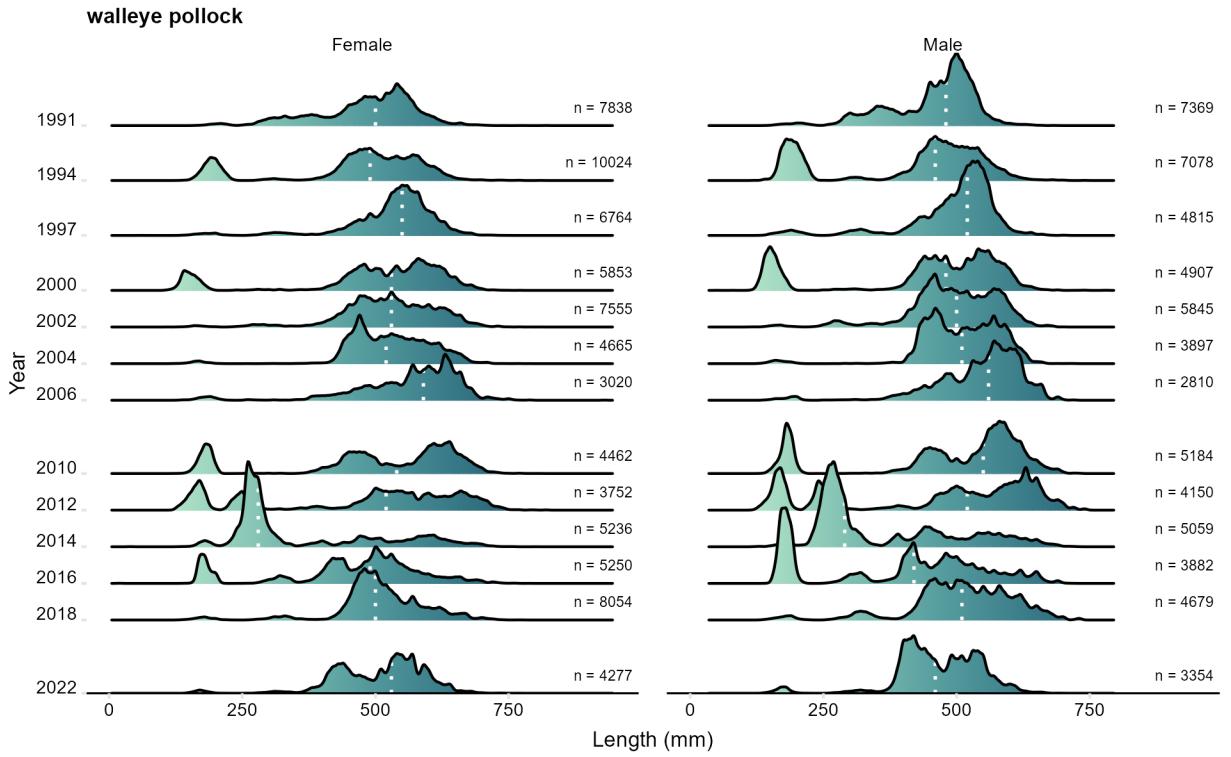

Figure 35. -- Population length composition of walleye pollock in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

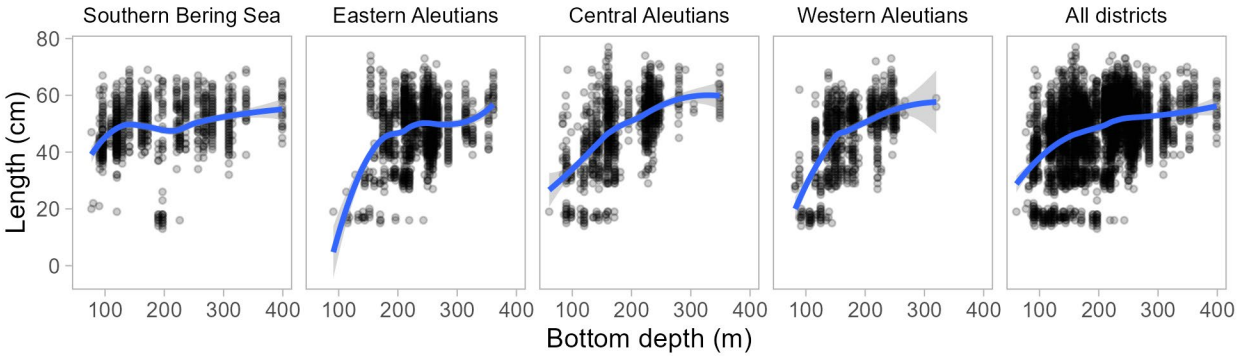

Figure 36. -- Length versus depth for walleye pollock by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Sablefish (*Anoplopoma fimbria*)

Sablefish was the 7th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the SBS and Eastern AI (Fig. 37 and Table 28). Sablefish were caught in all depth intervals sampled in the SBS, but did not occur in catches shallower than 100 m in the Western, Central, and Eastern AI. The highest CPUEs for this species occurred between 200 and 500 m throughout the survey area and the SBS had the highest CPUEs in this depth range compared to the other survey districts. There does not appear to be a consistent relationship between sablefish length and depth of capture across the survey area though it does appear that smaller individuals are found shallower in the SBS. Female and male length frequency distributions are similar through time. Over the three most recent Aleutian surveys since 2016, there has been a slight increase in median length in male sablefish (46 cm FL in 2016; 54 cm FL in 2022). On average, the largest individuals were found in the Eastern AI (Fig. 39). The total biomass of sablefish in the 2022 Aleutian Islands bottom trawl survey was estimated to be 34,436 t. The largest estimated biomass for sablefish was in the Eastern AI (Fig. 37 and Table 28). Length distributions by year are provided in Figure 38.

Table 28. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing sablefish, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	1	0.09	37	0	114	0.622
	101 - 200	15	5	1.46	269	3	536	0.979
	201 - 300	8	8	25.26	1,425	122	2,727	1.878
	301 - 500	4	4	82.79	8,637	0	18,616	1.881
	All depths	47	18	13.86	10,367	259	20,475	1.824
Western Aleutians	1 - 100	20	0	---	---	---	---	---
	101 - 200	56	2	0.02	13	0	33	1.675
	201 - 300	24	7	0.49	85	17	153	1.901
	301 - 500	8	7	8.14	2,665	41	5,289	1.558
	All depths	108	16	1.82	2,763	138	5,388	1.568
Central Aleutians	1 - 100	29	0	---	---	---	---	---
	101 - 200	47	12	0.72	330	27	633	1.791
	201 - 300	28	20	17.8	3,754	1,259	6,250	1.667
	301 - 500	9	7	7.82	3,114	823	5,404	1.649
	All depths	113	39	4.35	7,198	3,398	10,998	1.664
Eastern Aleutians	1 - 100	14	0	---	---	---	---	---
	101 - 200	61	7	0.61	473	0	1,251	2.214
	201 - 300	49	33	9.26	4,537	1,448	7,627	1.497
	301 - 500	7	7	16.01	9,096	2,724	15,468	1.686
	All depths	131	47	5.6	14,107	6,424	21,789	1.633
Combined Aleutian Districts	1 - 100	63	0	---	---	---	---	---
	101 - 200	164	21	0.46	817	0	1,649	2.012
	201 - 300	101	60	9.59	8,377	4,474	12,279	1.572
	301 - 500	24	21	11.5	14,875	7,901	21,849	1.654
	All depths	352	102	4.23	24,068	15,488	32,649	1.634

Table 29. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing sablefish, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	1	0.2	37	0	115
Southern Bering Sea	101-200	E Southern Bering Sea	13	5	2.3	269	0	538
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	8	25.3	1,424	89	2,760
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	4	82.8	8,637	0	20,075
Eastern Aleutians	101-200	SW Eastern Aleutians	13	3	1.7	382	0	1,154
Eastern Aleutians	101-200	NE Eastern Aleutians	26	3	0.4	88	0	246
Eastern Aleutians	101-200	SE Eastern Aleutians	17	1	0.0	3	0	10
Eastern Aleutians	201-300	SW Eastern Aleutians	6	4	10.3	738	0	2,296
Eastern Aleutians	201-300	NE Eastern Aleutians	25	16	10.3	2,021	0	4,050
Eastern Aleutians	201-300	SE Eastern Aleutians	12	10	8.6	1,768	0	3,883
Eastern Aleutians	201-300	NW Eastern Aleutians	6	3	0.7	11	0	26
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	3	26.9	7,172	0	16,362
Eastern Aleutians	301-500	SW Eastern Aleutians	2	2	7.1	309	0	1,664
Eastern Aleutians	301-500	SE Eastern Aleutians	2	2	6.3	1,615	0	12,217
Central Aleutians	101-200	SE Central Aleutians	11	9	4.0	300	0	603
Central Aleutians	101-200	SW Central Aleutians	21	3	0.3	30	0	74
Central Aleutians	201-300	N Central Aleutians	11	7	52.2	2,290	0	4,789
Central Aleutians	201-300	SE Central Aleutians	5	5	23.9	1,139	266	2,013
Central Aleutians	201-300	SW Central Aleutians	7	5	4.3	182	0	432
Central Aleutians	201-300	Petrel Bank	5	3	1.9	143	0	321
Central Aleutians	301-500	SE Central Aleutians	2	2	12.7	906	0	4,451
Central Aleutians	301-500	N Central Aleutians	3	2	10.6	1,311	0	4,426
Central Aleutians	301-500	SW Central Aleutians	2	1	4.4	350	0	4,799
Central Aleutians	301-500	Petrel Bank	2	2	4.4	547	0	3,898
Western Aleutians	101-200	E Western Aleutians	17	2	0.1	13	0	33
Western Aleutians	201-300	E Western Aleutians	10	6	1.0	79	10	147
Western Aleutians	201-300	W Western Aleutians	14	1	0.1	6	0	20
Western Aleutians	301-500	W Western Aleutians	6	5	11.5	1,968	0	4,700
Western Aleutians	301-500	E Western Aleutians	2	2	4.5	698	0	5,860

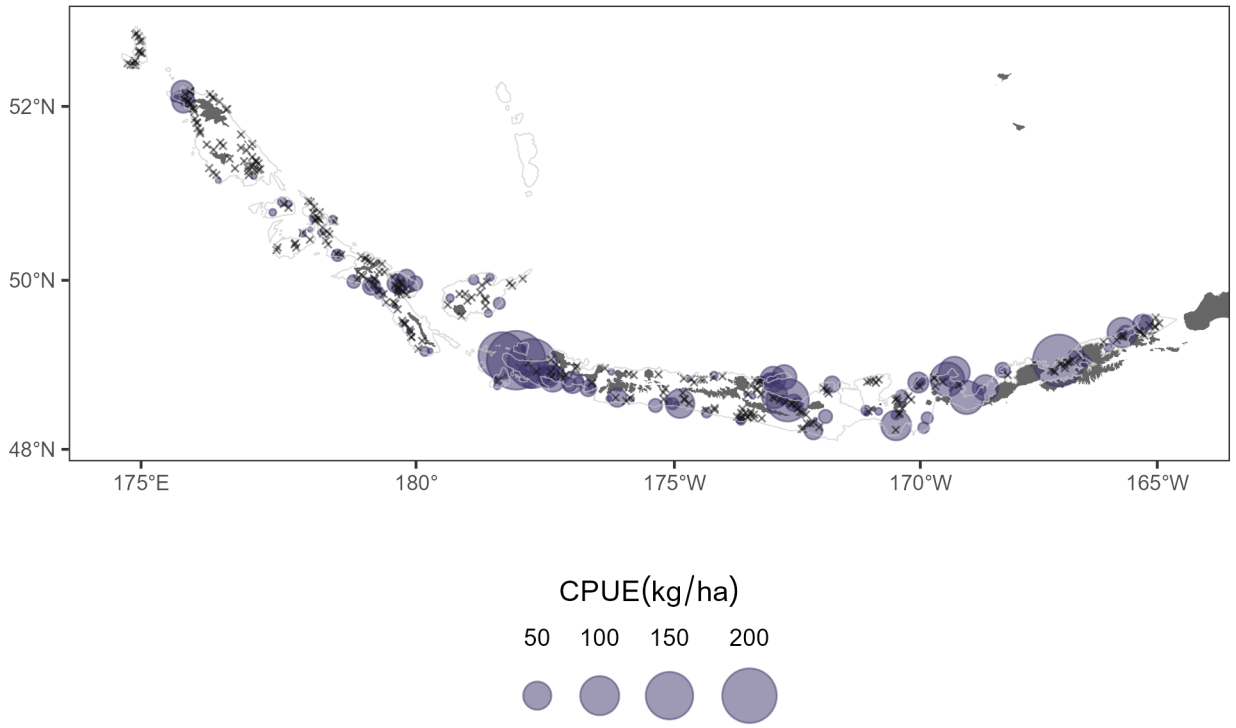

Figure 37. -- Relative abundance of sablefish in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

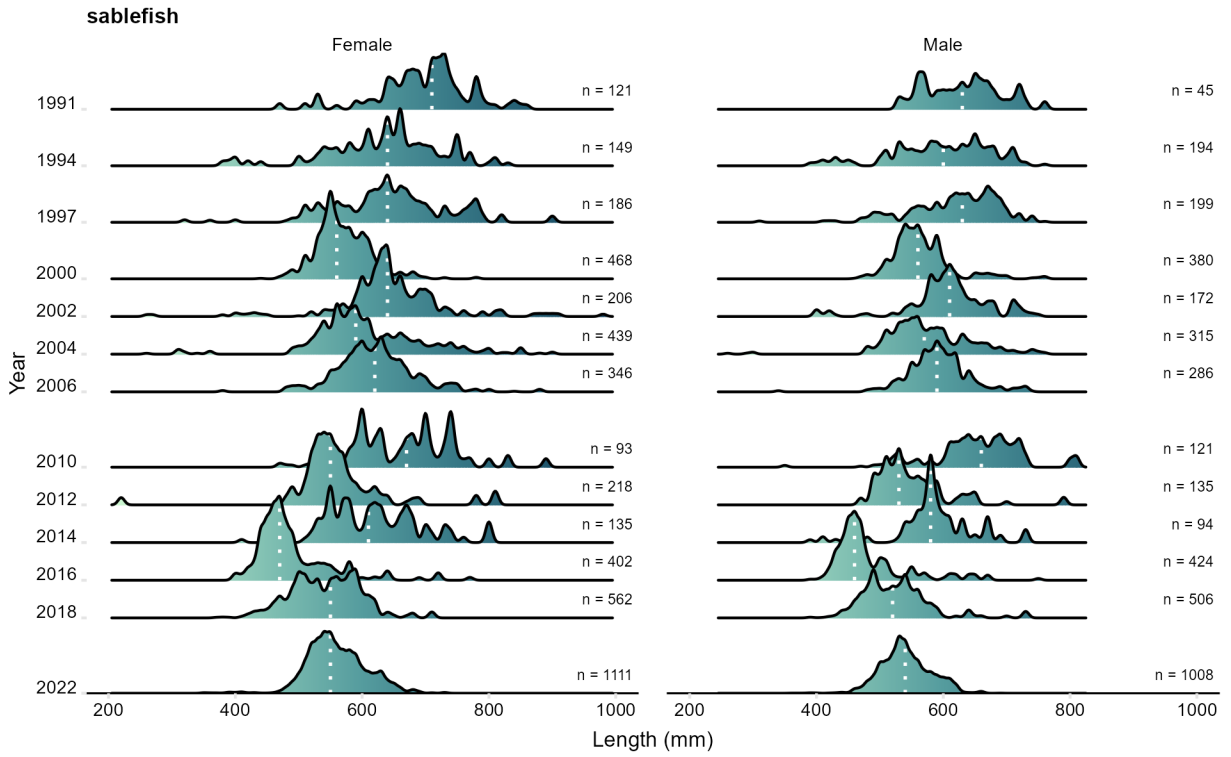

Figure 38. -- Population length composition of sablefish in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

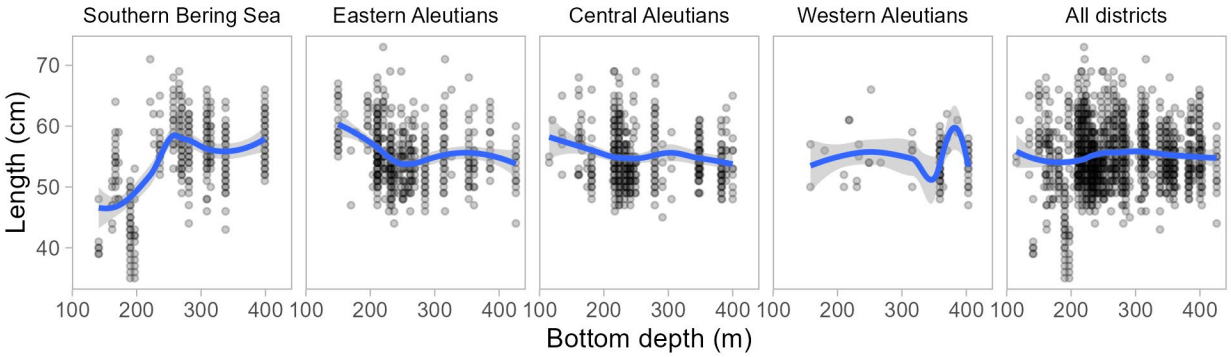

Figure 39. -- Length versus depth for sablefish by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Giant grenadier (*Coryphaenoides pectoralis*)

Giant grenadier was the 8th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Central AI and Western AI (Fig. 40 and Table 30). No giant grenadier were caught in the SBS survey district, and, with the exception of four tows in the 200 and 300 m depth range, they were only caught at depths deeper than 300 m. The largest catches were concentrated between Kiska and Kanaga Islands. Almost all recorded lengths were from females, which were much more abundant than males across the AI. Unlike all other species in this report whose length is either fork or total length, giant grenadier were measured from the tip of the snout to the insertion of the anal fin. There were insufficient length data to draw conclusions about changes in length with depth, or size differences between sexes. On average, the largest individuals were found in the Western AI (Fig. 42). The total biomass of giant grenadier in the 2022 Aleutian Islands bottom trawl survey was estimated to be 29,650 t. The largest estimated biomass for giant grenadier was in the Central AI (Fig. 40 and Table 30). Length distributions by year are provided in Figure 41.

Table 30. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing giant grenadier, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	0	---	---	---	---	---
	101 - 200	15	0	---	---	---	---	---
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	All depths	47	0	---	---	---	---	---
Western Aleutians	1 - 100	20	0	---	---	---	---	---
	101 - 200	56	0	---	---	---	---	---
	201 - 300	24	0	---	---	---	---	---
	301 - 500	8	4	10.32	3,376	0	7,349	3.812
	All depths	108	4	2.22	3,376	0	7,349	3.812
Central Aleutians	1 - 100	29	0	---	---	---	---	---
	101 - 200	47	0	---	---	---	---	---
	201 - 300	28	4	5.75	1,213	0	3,023	3.198
	301 - 500	9	8	60.94	24,259	0	53,270	3.199
	All depths	113	12	15.4	25,472	0	54,560	3.199
Eastern Aleutians	1 - 100	14	0	---	---	---	---	---
	101 - 200	61	0	---	---	---	---	---
	201 - 300	49	0	---	---	---	---	---
	301 - 500	7	2	1.41	802	0	2,721	2.851
	All depths	131	2	0.32	802	0	2,721	2.851
Combined Aleutian Districts	1 - 100	63	0	---	---	---	---	---
	101 - 200	164	0	---	---	---	---	---
	201 - 300	101	4	1.39	1,213	0	3,023	3.198
	301 - 500	24	14	21.98	28,437	454	56,420	3.250
	All depths	352	18	5.21	29,650	1,594	57,705	3.248

Table 31. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing giant grenadier, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Eastern Aleutians	301-500	SW Eastern Aleutians	2	1	15.5	680	0	9,326
Eastern Aleutians	301-500	SE Eastern Aleutians	2	1	0.5	122	0	1,665
Central Aleutians	201-300	N Central Aleutians	11	3	26.9	1,181	0	3,012
Central Aleutians	201-300	Petrel Bank	5	1	0.4	32	0	120
Central Aleutians	301-500	SE Central Aleutians	2	2	78.3	5,592	0	69,501
Central Aleutians	301-500	N Central Aleutians	3	3	76.0	9,426	0	38,811
Central Aleutians	301-500	Petrel Bank	2	2	73.4	9,085	0	103,631
Central Aleutians	301-500	SW Central Aleutians	2	1	2.0	156	0	2,144
Western Aleutians	301-500	W Western Aleutians	6	3	16.1	2,750	0	6,877
Western Aleutians	301-500	E Western Aleutians	2	1	4.0	626	0	8,581

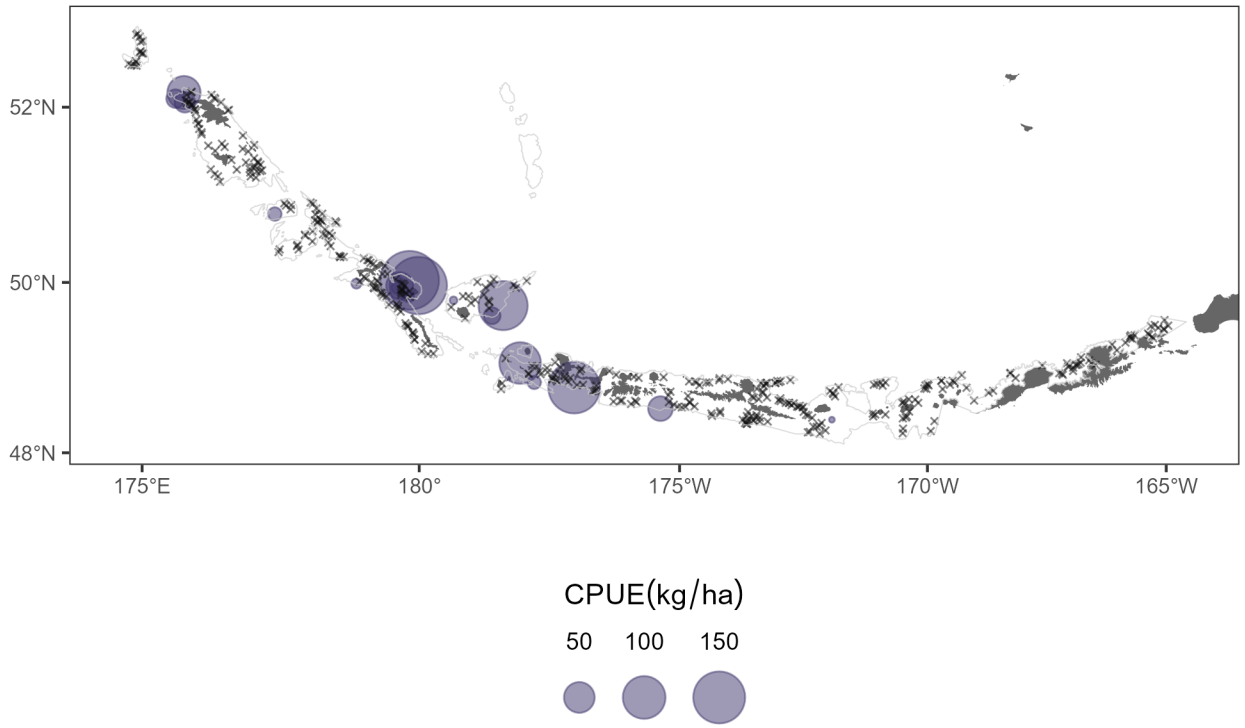

Figure 40. -- Relative abundance of giant grenadier in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

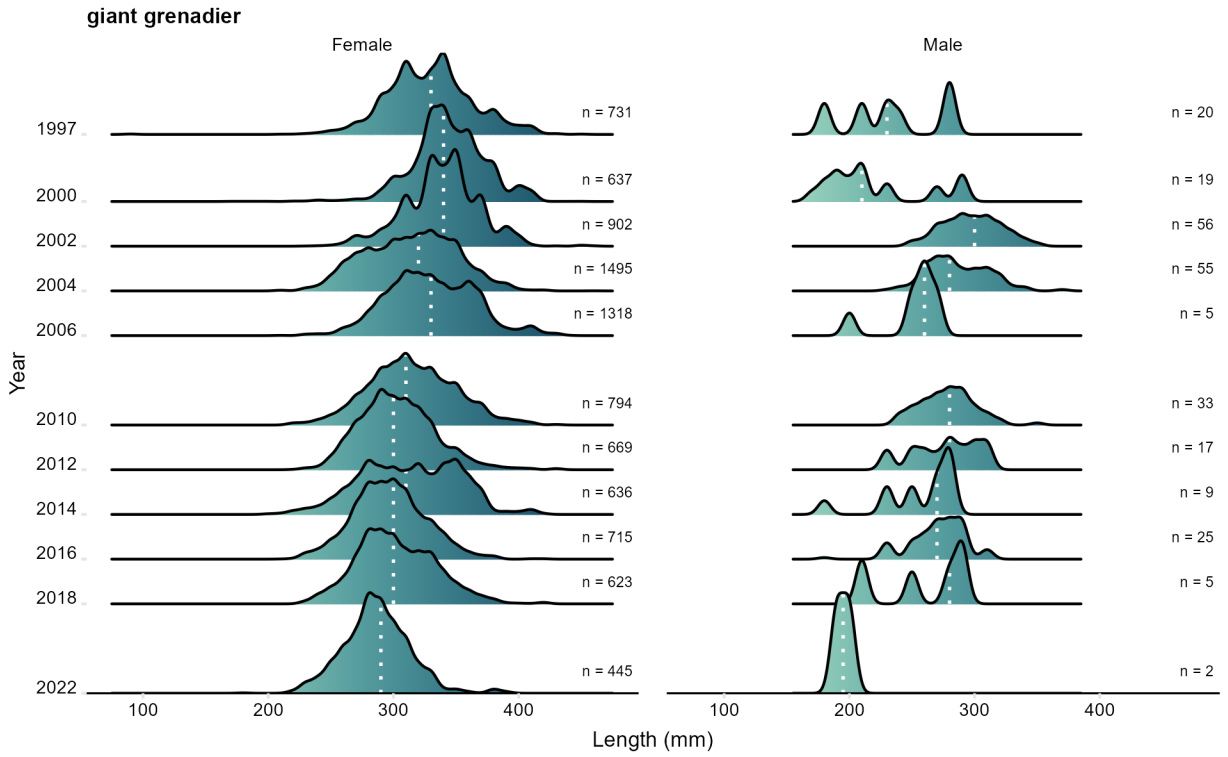

Figure 41. -- Population length composition of giant grenadier in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

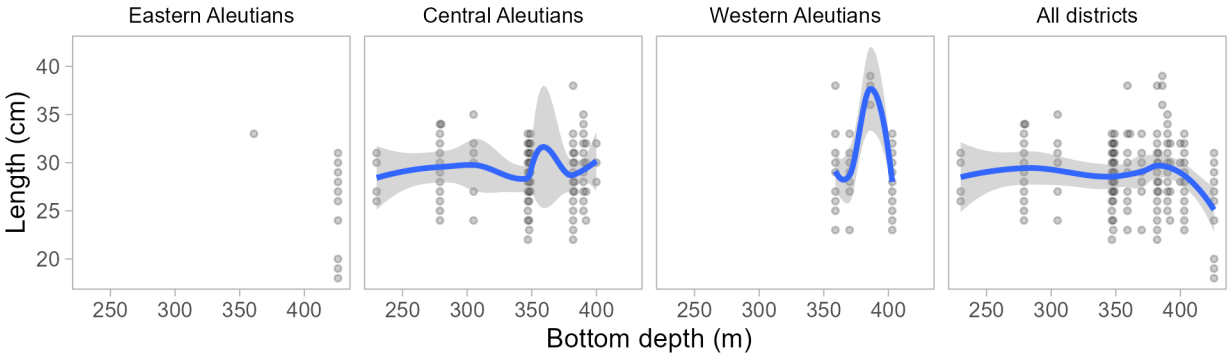

Figure 42. -- Length versus depth for giant grenadier by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Yellow Irish lord (*Hemilepidotus jordani*)

Yellow Irish lord was the 16th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Eastern AI and Central AI (Fig. 43 and Table 32). Yellow Irish lords were primarily caught at stations shallower than 300 m and were most abundant in the 100 to 200 m depth stratum of the Eastern AI. They were not particularly abundant in the Western AI. Across all survey districts there does not appear to be a strong trend in length with depth of capture. Female length distributions were consistently unimodal through time, with a median length of 37 cm in recent surveys. Male length distributions appear to be more variable and have had a greater median length since 2014 (median length 43 cm FL in 2022). On average, the largest individuals were found in the SBS (Fig. 45). The total biomass of yellow Irish lord in the 2022 Aleutian Islands bottom trawl survey was estimated to be 14,049 t. The largest estimated biomass for yellow Irish lord was in the Eastern AI (Fig. 43 and Table 32). Length distributions by year are provided in Figure 44.

Table 32. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing yellow Irish lord, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	11	1.25	502	0	1,010	0.796
	101 - 200	15	11	4.37	807	434	1,180	0.782
	201 - 300	8	5	2.1	119	0	242	0.803
	301 - 500	4	1	0.22	23	0	87	0.802
	All depths	47	28	1.94	1,451	835	2,067	0.789
Western Aleutians	1 - 100	20	10	0.59	290	37	542	0.774
	101 - 200	56	21	0.41	216	91	341	0.780
	201 - 300	24	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	All depths	108	31	0.33	505	226	784	0.777
Central Aleutians	1 - 100	29	22	4.6	2,692	314	5,070	0.779
	101 - 200	47	29	1.76	812	262	1,363	0.622
	201 - 300	28	7	0.5	106	0	247	0.699
	301 - 500	9	0	---	---	---	---	---
	All depths	113	58	2.18	3,610	1,190	6,031	0.735
Eastern Aleutians	1 - 100	14	10	1.5	1,028	0	3,083	0.872
	101 - 200	61	39	9.06	7,035	275	13,795	0.968
	201 - 300	49	15	0.85	419	116	722	0.729
	301 - 500	7	0	---	---	---	---	---
	All depths	131	64	3.37	8,482	1,679	15,285	0.940
Combined Aleutian Districts	1 - 100	63	42	2.28	4,010	988	7,032	0.801
	101 - 200	164	89	4.56	8,063	1,280	14,846	0.911
	201 - 300	101	22	0.6	525	201	848	0.723
	301 - 500	24	0	---	---	---	---	---
	All depths	352	153	2.21	12,598	5,464	19,732	0.864

Table 33. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing yellow Irish lord, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	11	2.1	502	0	1,012
Southern Bering Sea	101-200	W Southern Bering Sea	2	2	6.1	405	0	1,463
Southern Bering Sea	101-200	E Southern Bering Sea	13	9	3.4	402	92	712
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	5	2.1	119	0	245
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	1	0.2	23	0	96
Eastern Aleutians	1-100	SE Eastern Aleutians	8	8	3.1	542	0	1,084
Eastern Aleutians	1-100	NW Eastern Aleutians	2	2	2.5	487	0	5,807
Eastern Aleutians	101-200	SE Eastern Aleutians	17	16	26.7	5,075	0	11,787
Eastern Aleutians	101-200	SW Eastern Aleutians	13	9	4.5	1,007	0	2,157
Eastern Aleutians	101-200	NW Eastern Aleutians	5	2	3.8	607	0	1,936
Eastern Aleutians	101-200	NE Eastern Aleutians	26	12	1.7	346	0	704
Eastern Aleutians	201-300	SE Eastern Aleutians	12	7	1.4	280	32	529
Eastern Aleutians	201-300	NE Eastern Aleutians	25	4	0.6	126	0	313
Eastern Aleutians	201-300	NW Eastern Aleutians	6	3	0.4	6	0	13
Eastern Aleutians	201-300	SW Eastern Aleutians	6	1	0.1	6	0	23
Central Aleutians	1-100	Petrel Bank	7	6	18.6	1,783	0	4,297
Central Aleutians	1-100	SE Central Aleutians	7	6	3.1	358	5	712
Central Aleutians	1-100	N Central Aleutians	12	8	2.3	488	0	1,033
Central Aleutians	1-100	SW Central Aleutians	3	2	0.4	63	0	211
Central Aleutians	101-200	N Central Aleutians	8	6	3.1	331	0	847
Central Aleutians	101-200	SE Central Aleutians	11	9	3.0	228	54	401
Central Aleutians	101-200	Petrel Bank	7	2	1.0	173	0	447
Central Aleutians	101-200	SW Central Aleutians	21	12	0.8	81	9	152
Central Aleutians	201-300	SE Central Aleutians	5	3	1.8	84	0	232
Central Aleutians	201-300	N Central Aleutians	11	2	0.4	15	0	43
Central Aleutians	201-300	Petrel Bank	5	1	0.1	5	0	20
Central Aleutians	201-300	SW Central Aleutians	7	1	0.0	1	0	4
Western Aleutians	1-100	E Western Aleutians	9	5	1.5	178	0	418
Western Aleutians	1-100	W Western Aleutians	11	5	0.3	111	0	246
Western Aleutians	101-200	E Western Aleutians	17	7	0.6	72	0	156
Western Aleutians	101-200	W Western Aleutians	39	14	0.4	143	46	240

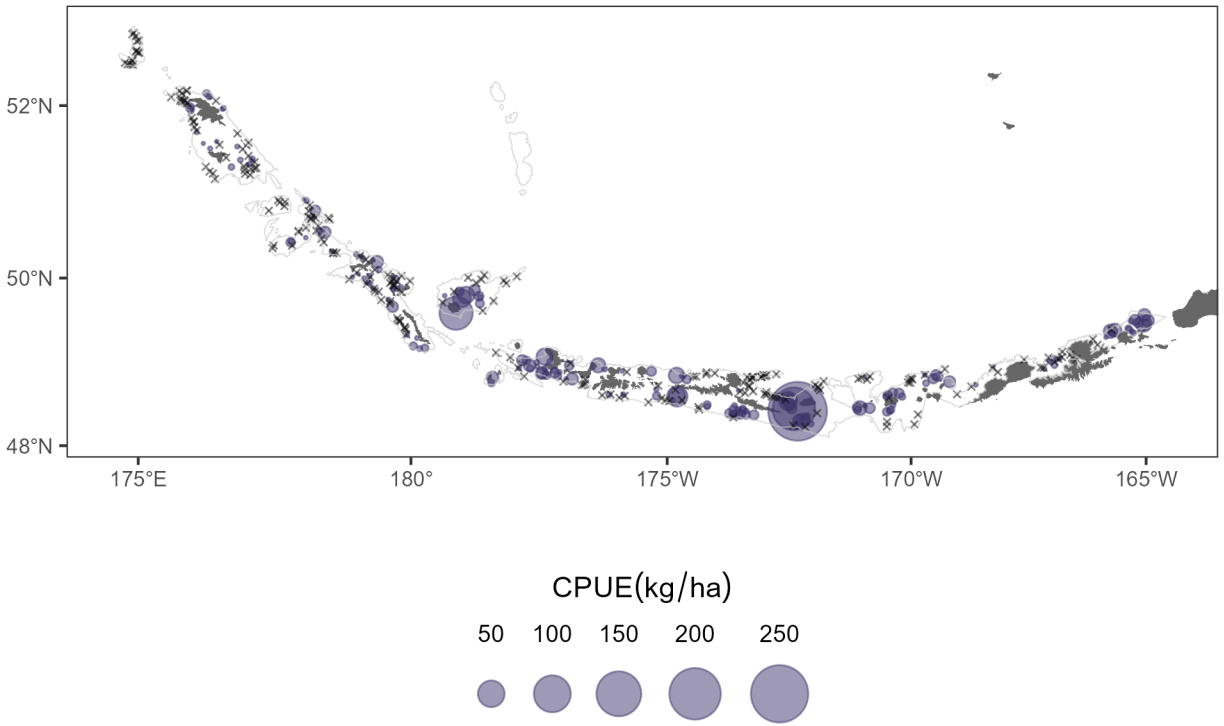

Figure 43. -- Relative abundance of yellow Irish lord in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

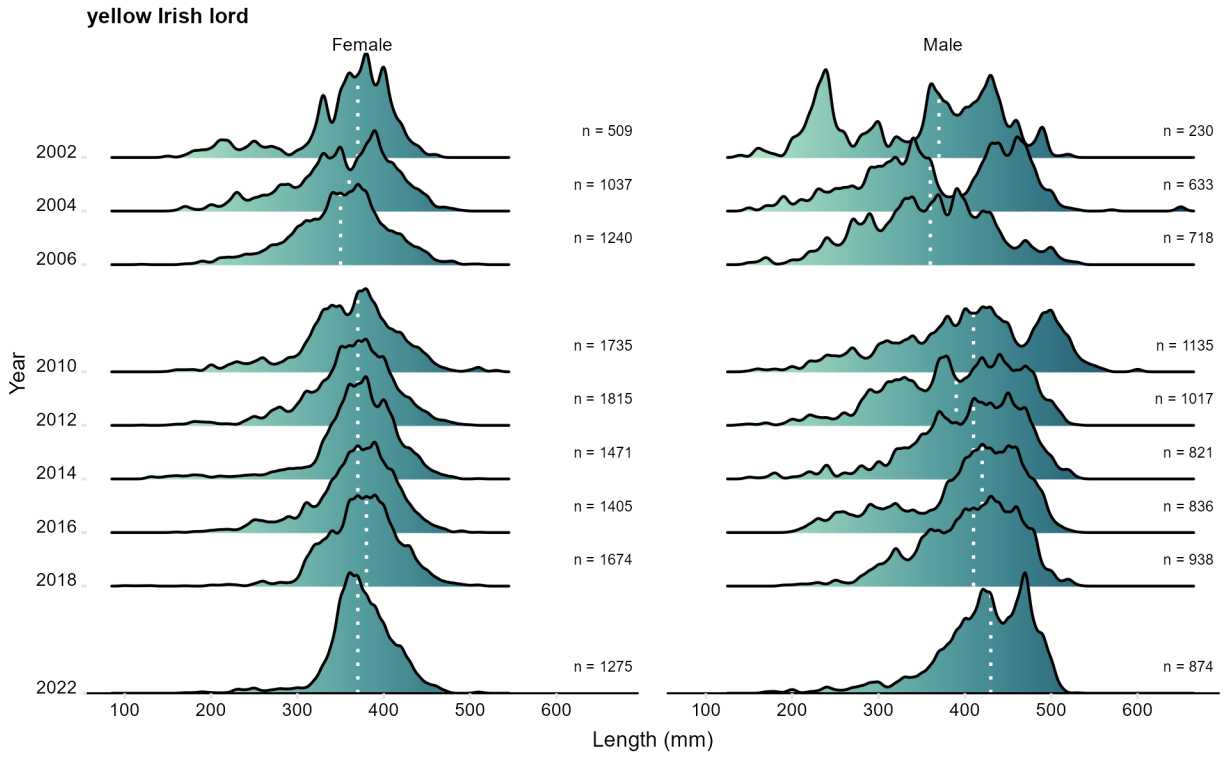

Figure 44. -- Population length composition of yellow Irish lord in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

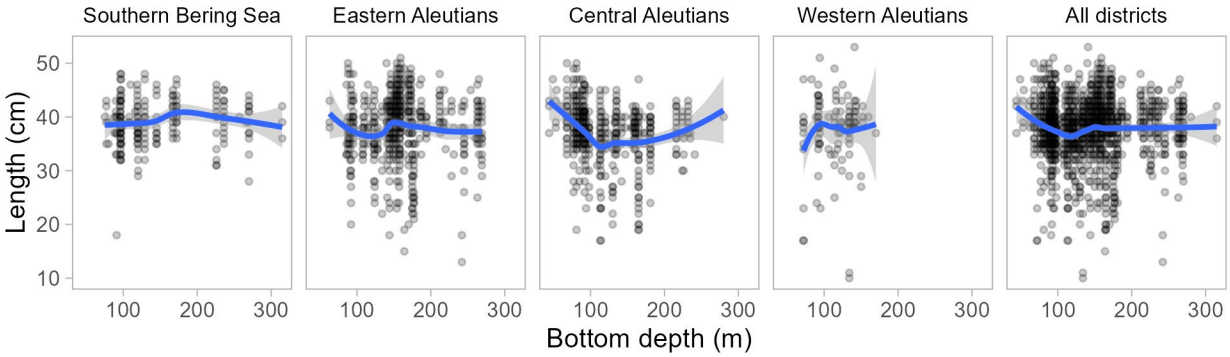

Figure 45. -- Length versus depth for yellow Irish lord by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Great sculpin (*Myoxocephalus polyacanthocephalus*)

Great sculpin was the 29th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the SBS and Western AI (Fig. 46 and Table 34). Great sculpin were caught everywhere in the survey area, but only at depths less than 200 m. Historically, females have been larger than males; this pattern persisted in 2022 but the sample size was so small (15 lengthed males and 24 lengthed females) that we do not report conclusions here about systematic differences in fork length between the sexes. There were no systematic patterns of great sculpin size with depth. On average, the largest individuals were found in the Eastern AI (Fig. 48). The total biomass of great sculpin in the 2022 Aleutian Islands bottom trawl survey was estimated to be 944 t. The largest estimated biomass for great sculpin was in the Eastern AI (Fig. 46 and Table 34). Length distributions by year are provided in Figure 47.

Table 34. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing great sculpin, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	5	0.37	149	18	281	2.819
	101 - 200	15	3	0.15	29	0	64	2.796
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	All depths	47	8	0.24	178	42	313	2.815
Western Aleutians	1 - 100	20	2	0.3	145	0	366	2.097
	101 - 200	56	7	0.32	171	22	321	2.912
	201 - 300	24	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	All depths	108	9	0.21	316	51	581	2.472
Central Aleutians	1 - 100	29	4	0.12	70	0	145	2.590
	101 - 200	47	1	0.06	27	0	90	5.258
	201 - 300	28	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	All depths	113	5	0.06	97	5	189	3.019
Eastern Aleutians	1 - 100	14	1	0.47	322	0	1,710	8.361
	101 - 200	61	2	0.04	31	0	82	4.772
	201 - 300	49	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	All depths	131	3	0.14	353	0	1,744	7.847
Combined Aleutian Districts	1 - 100	63	7	0.31	537	0	1,998	3.989
	101 - 200	164	10	0.13	229	64	395	3.255
	201 - 300	101	0	---	---	---	---	---
	301 - 500	24	0	---	---	---	---	---
	All depths	352	17	0.13	767	0	2,269	3.737

Table 35. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing great sculpin, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	5	0.6	149	17	281
Southern Bering Sea	101-200	E Southern Bering Sea	13	3	0.2	29	0	65
Eastern Aleutians	1-100	NW Eastern Aleutians	2	1	1.7	322	0	4,418
Eastern Aleutians	101-200	NE Eastern Aleutians	26	2	0.2	31	0	82
Central Aleutians	1-100	N Central Aleutians	12	3	0.3	57	0	128
Central Aleutians	1-100	SE Central Aleutians	7	1	0.1	13	0	46
Central Aleutians	101-200	N Central Aleutians	8	1	0.3	27	0	92
Western Aleutians	1-100	W Western Aleutians	11	2	0.4	145	0	369
Western Aleutians	101-200	W Western Aleutians	39	7	0.4	171	22	321

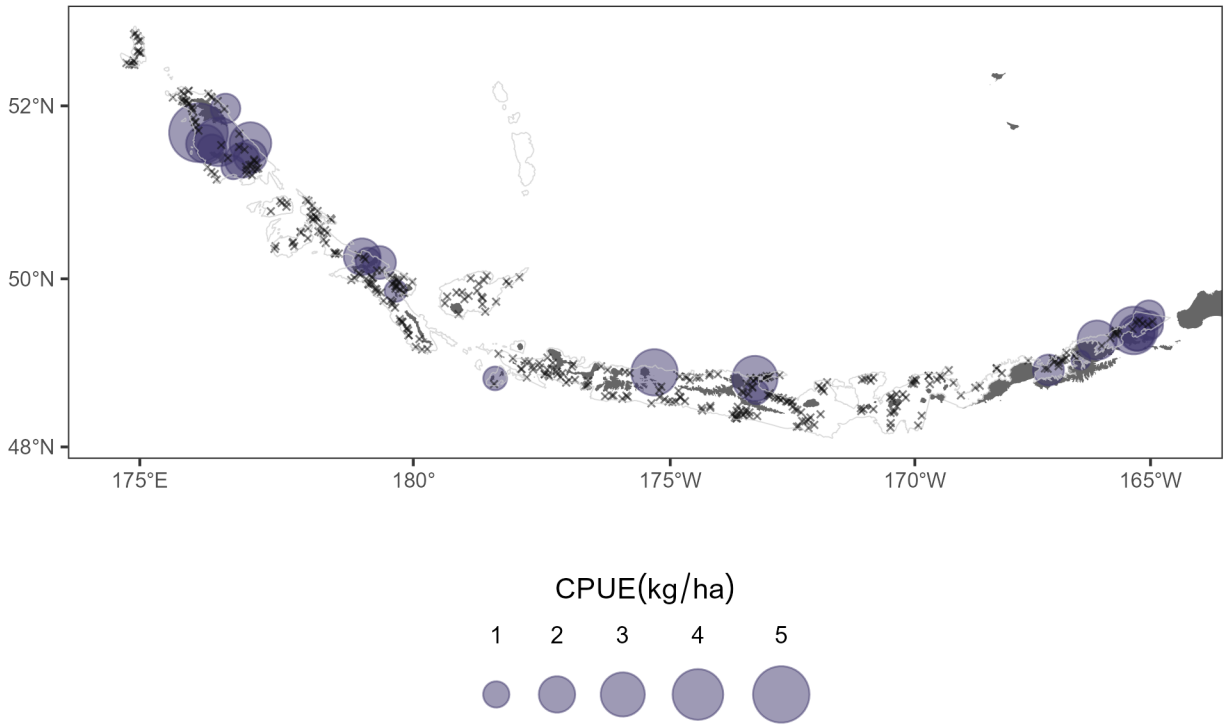

Figure 46. -- Relative abundance of great sculpin in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

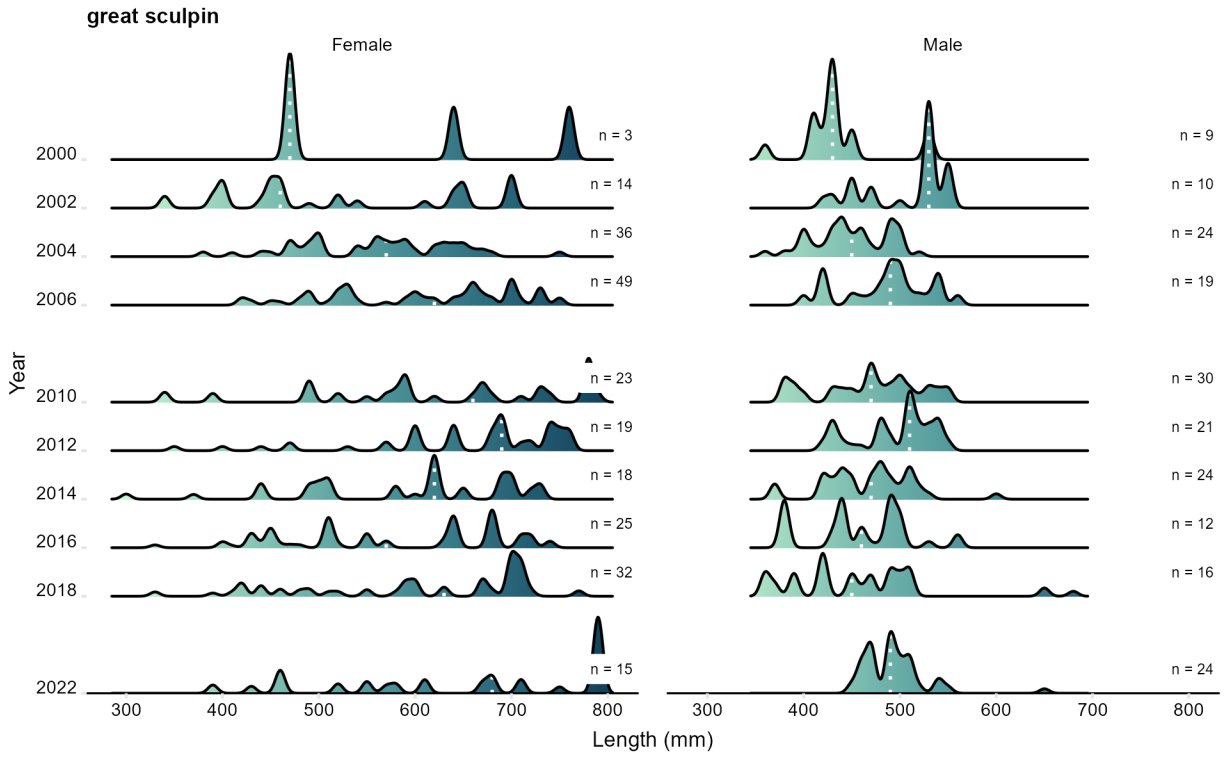

Figure 47. -- Population length composition of great sculpin in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

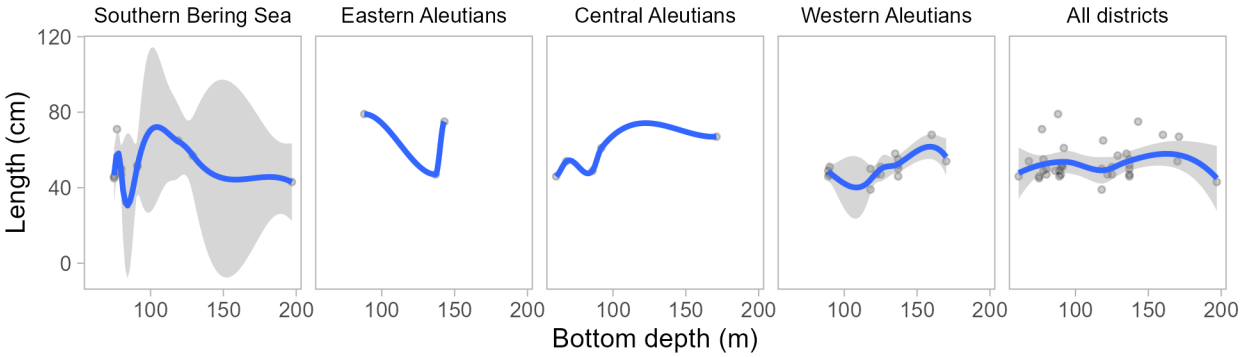

Figure 48. -- Length versus depth for great sculpin by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Pacific ocean perch (*Sebastes alutus*)

Pacific ocean perch was the most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Western AI and SBS (Fig. 49 and Table 36). Pacific ocean perch were caught in all depths and all districts of the Aleutian survey. They were most abundant in the Western AI at depths between 200 and 300 m and least abundant in the SBS. Pacific ocean perch length appears to increase with increasing depth up to around 250 m. Female and male length frequency distributions were primarily unimodal with a high degree of overlap in the length ranges between the sexes, centered around 36.5 cm. There does not appear to be a trend in median length during the time series. On average, the largest individuals were found in the SBS (Fig. 51). The total biomass of Pacific ocean perch in the 2022 Aleutian Islands bottom trawl survey was estimated to be 1,063,030 t. The largest estimated biomass for Pacific ocean perch was in the Western AI (Fig. 49 and Table 36). Length distributions by year are provided in Figure 50.

Table 36. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing Pacific ocean perch, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	1	0.08	32	0	99	0.371
	101 - 200	15	10	344.38	63,664	0	143,982	0.868
	201 - 300	8	8	306.78	17,298	3,547	31,050	0.737
	301 - 500	4	4	313.89	32,744	0	85,209	0.868
	All depths	47	23	152.02	113,739	23,947	203,530	0.845
Western Aleutians	1 - 100	20	7	0.52	256	2	509	0.259
	101 - 200	56	50	404.03	214,848	64,112	365,584	0.592
	201 - 300	24	24	1,882.24	324,428	145,273	503,584	0.657
	301 - 500	8	8	93.94	30,741	0	97,387	0.763
	All depths	108	89	375.42	570,272	338,369	802,176	0.635
Central Aleutians	1 - 100	29	6	0.37	218	0	477	0.163
	101 - 200	47	36	140.59	64,753	4,405	125,101	0.814
	201 - 300	28	27	360.46	76,014	31,676	120,353	0.837
	301 - 500	9	5	15.10	6,012	0	27,316	0.897
	All depths	113	74	88.86	146,998	75,965	218,030	0.824
Eastern Aleutians	1 - 100	14	3	0.54	372	0	1,914	0.770
	101 - 200	61	40	67.25	52,239	0	113,045	0.455
	201 - 300	49	49	327.44	160,495	50,179	270,810	0.643
	301 - 500	7	6	33.28	18,915	0	61,733	0.750
	All depths	131	98	92.07	232,021	110,668	353,374	0.595
Combined Aleutian Districts	1 - 100	63	16	0.48	846	0	2,554	0.301
	101 - 200	164	126	187.57	331,840	164,773	498,907	0.595
	201 - 300	101	100	642.25	560,937	356,864	765,011	0.672
	301 - 500	24	19	43.03	55,668	0	126,646	0.771
	All depths	352	261	166.74	949,291	683,422	1,215,160	0.647

Table 37. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing Pacific ocean perch, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	1	0.1	32	0	100
Southern Bering Sea	101-200	E Southern Bering Sea	13	9	539.8	63,653	0	144,678
Southern Bering Sea	101-200	W Southern Bering Sea	2	1	0.2	11	0	145
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	8	306.8	17,298	3,195	31,402
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	4	313.9	32,744	0	92,882
Eastern Aleutians	1-100	SW Eastern Aleutians	2	1	1.9	358	0	4,907
Eastern Aleutians	1-100	NE Eastern Aleutians	2	1	0.1	11	0	152
Eastern Aleutians	1-100	SE Eastern Aleutians	8	1	0.0	3	0	11
Eastern Aleutians	101-200	NW Eastern Aleutians	5	4	149.1	23,766	0	89,561
Eastern Aleutians	101-200	SW Eastern Aleutians	13	10	91.2	20,619	6,908	34,329
Eastern Aleutians	101-200	SE Eastern Aleutians	17	14	32.0	6,090	0	14,072
Eastern Aleutians	101-200	NE Eastern Aleutians	26	12	8.8	1,765	0	4,652
Eastern Aleutians	201-300	NW Eastern Aleutians	6	6	511.7	7,979	2,947	13,012
Eastern Aleutians	201-300	SW Eastern Aleutians	6	6	372.7	26,701	0	54,218
Eastern Aleutians	201-300	SE Eastern Aleutians	12	12	368.9	76,012	0	183,788
Eastern Aleutians	201-300	NE Eastern Aleutians	25	25	253.0	49,802	35,666	63,939
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	3	56.5	15,086	0	71,769
Eastern Aleutians	301-500	SW Eastern Aleutians	2	1	32.5	1,426	0	19,547
Eastern Aleutians	301-500	SE Eastern Aleutians	2	2	9.3	2,403	0	32,230
Central Aleutians	1-100	SE Central Aleutians	7	2	0.6	71	0	202
Central Aleutians	1-100	N Central Aleutians	12	2	0.6	119	0	357
Central Aleutians	1-100	Petrel Bank	7	1	0.1	13	0	45
Central Aleutians	1-100	SW Central Aleutians	3	1	0.1	15	0	80
Central Aleutians	101-200	SW Central Aleutians	21	18	280.2	29,482	0	74,896
Central Aleutians	101-200	SE Central Aleutians	11	7	170.5	12,818	0	27,882
Central Aleutians	101-200	Petrel Bank	7	6	107.5	18,658	0	56,717
Central Aleutians	101-200	N Central Aleutians	8	5	35.6	3,795	0	9,314
Central Aleutians	201-300	SE Central Aleutians	5	5	571.8	27,297	1,729	52,865
Central Aleutians	201-300	N Central Aleutians	11	11	372.4	16,350	4,602	28,099
Central Aleutians	201-300	Petrel Bank	5	4	320.9	24,598	0	66,581
Central Aleutians	201-300	SW Central Aleutians	7	7	182.4	7,769	0	15,555
Central Aleutians	301-500	Petrel Bank	2	2	47.8	5,918	0	68,820
Central Aleutians	301-500	N Central Aleutians	3	3	0.8	94	0	330
Western Aleutians	1-100	E Western Aleutians	9	3	0.9	110	0	330
Western Aleutians	1-100	W Western Aleutians	11	4	0.4	145	0	305
Western Aleutians	101-200	W Western Aleutians	39	34	452.8	184,078	34,754	333,403
Western Aleutians	101-200	E Western Aleutians	17	16	245.7	30,770	9,403	52,136
Western Aleutians	201-300	W Western Aleutians	14	14	2,958.3	278,149	99,355	456,943
Western Aleutians	201-300	E Western Aleutians	10	10	590.7	46,279	21,064	71,494
Western Aleutians	301-500	W Western Aleutians	6	6	175.5	30,038	0	100,041
Western Aleutians	301-500	E Western Aleutians	2	2	4.5	703	0	9,058

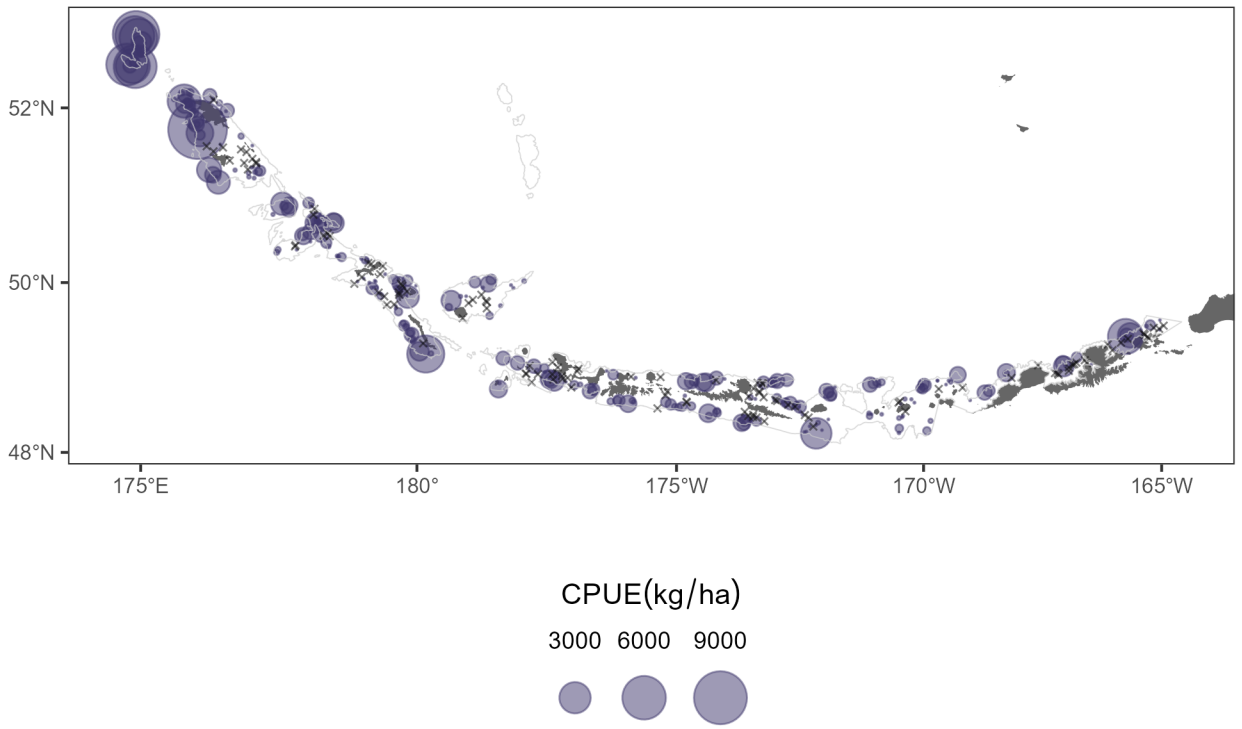

Figure 49. -- Relative abundance of Pacific ocean perch in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

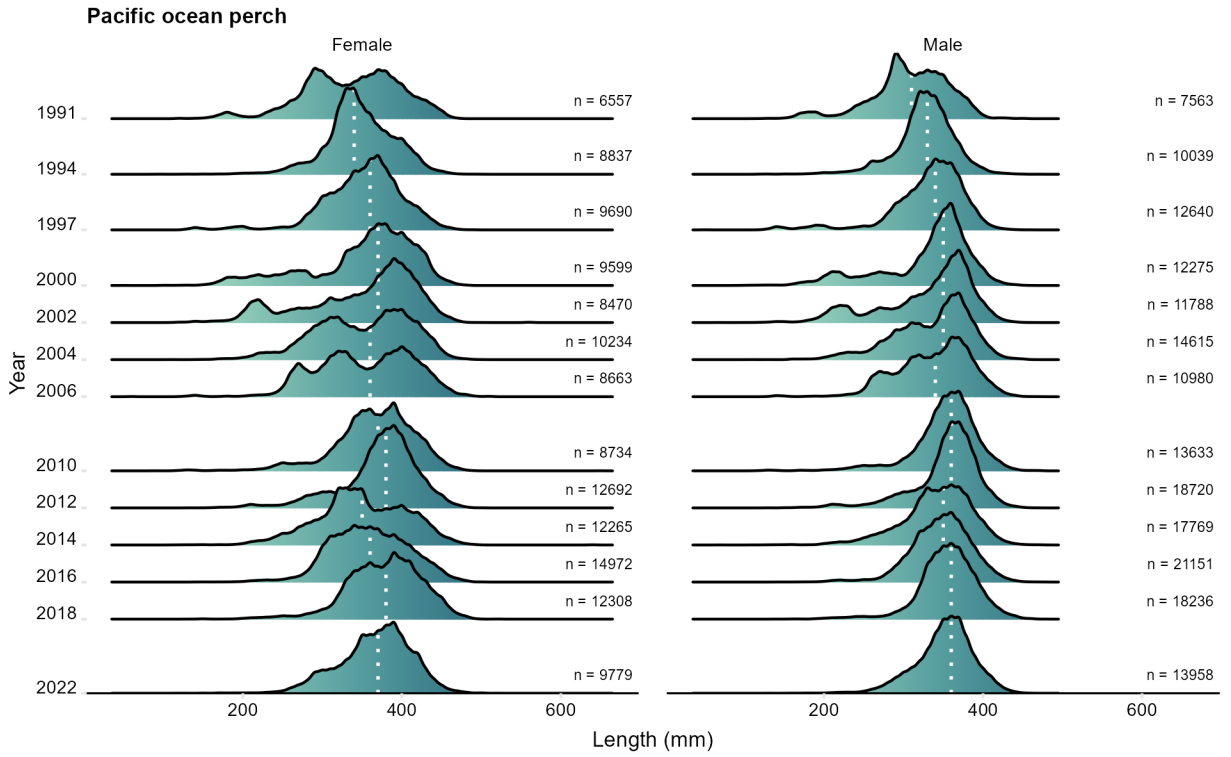

Figure 50. -- Population length composition of Pacific ocean perch in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

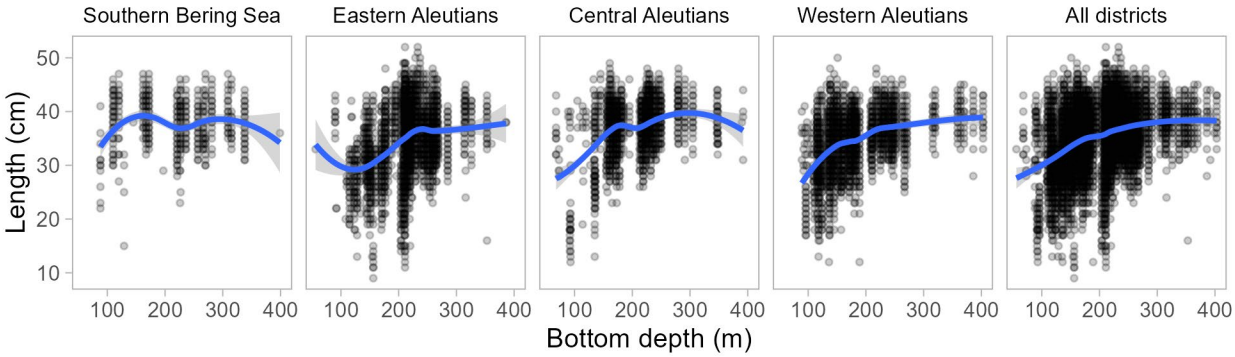

Figure 51. -- Length versus depth for Pacific ocean perch by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Northern rockfish (*Sebastes polyspinis*)

Northern rockfish was the 3rd most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Western AI and SBS (Fig. 52 and Table 38). Northern rockfish were caught most frequently in the Western AI, with the highest biomasses estimated to be at 100 to 200 m in the Aleutian districts and 1 and 100 m in the SBS. The length frequencies of northern rockfishes were unimodal and symmetrical in 2022 for males and females, and females were slightly larger (33 cm median FL for females compared to 32 cm median FL for males). There were no strong patterns across depth except that the smallest individuals were found at depths less than 100 m. On average, the largest individuals were found in the SBS (Fig. 54). The total biomass of northern rockfish in the 2022 Aleutian Islands bottom trawl survey was estimated to be 287,315 t. The largest estimated biomass for northern rockfish was in the Western AI (Fig. 52 and Table 38). Length distributions by year are provided in Figure 53.

Table 38. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing northern rockfish, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	4	140.74	56,661	0	149,841	0.627
	101 - 200	15	9	9.44	1,745	0	4,184	0.776
	201 - 300	8	4	0.22	12	0	27	0.683
	301 - 500	4	1	0.07	7	0	26	0.682
	All depths	47	18	78.09	58,425	0	151,635	0.630
Western Aleutians	1 - 100	20	15	111.04	54,148	12,931	95,365	0.455
	101 - 200	56	47	128.72	68,449	23,435	113,462	0.451
	201 - 300	24	10	0.47	80	7	154	0.531
	301 - 500	8	2	0.04	14	0	63	0.361
	All depths	108	74	80.77	122,692	63,075	182,309	0.453
Central Aleutians	1 - 100	29	11	35.15	20,555	0	50,350	0.430
	101 - 200	47	35	25.23	11,622	403	22,841	0.576
	201 - 300	28	11	0.17	35	0	74	0.530
	301 - 500	9	0	---	---	---	---	---
	All depths	113	57	19.47	32,212	488	63,936	0.474
Eastern Aleutians	1 - 100	14	5	1.6	1,094	0	2,798	0.599
	101 - 200	61	29	92.25	71,661	0	145,476	0.541
	201 - 300	49	16	2.03	994	0	2,568	0.753
	301 - 500	7	2	0.42	238	0	911	0.989
	All depths	131	52	29.36	73,987	134	147,839	0.544
Combined Aleutian Districts	1 - 100	63	31	43.14	75,797	26,765	124,830	0.450
	101 - 200	164	111	85.77	151,732	67,066	236,398	0.498
	201 - 300	101	37	1.27	1,110	0	2,685	0.721
	301 - 500	24	4	0.19	252	0	926	0.901
	All depths	352	183	40.2	228,890	132,573	325,208	0.482

Table 39. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing northern rockfish, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	4	232.2	56,660	0	150,240
Southern Bering Sea	101-200	E Southern Bering Sea	13	8	14.4	1,700	0	4,158
Southern Bering Sea	101-200	W Southern Bering Sea	2	1	0.7	45	0	616
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	4	0.2	12	0	28
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	1	0.1	7	0	29
Eastern Aleutians	1-100	SE Eastern Aleutians	8	5	6.3	1,094	0	2,842
Eastern Aleutians	101-200	SW Eastern Aleutians	13	9	254.6	57,571	0	130,359
Eastern Aleutians	101-200	SE Eastern Aleutians	17	11	69.4	13,192	0	30,662
Eastern Aleutians	101-200	NW Eastern Aleutians	5	3	4.6	735	0	2,683
Eastern Aleutians	101-200	NE Eastern Aleutians	26	6	0.8	162	0	332
Eastern Aleutians	201-300	NE Eastern Aleutians	25	8	4.6	904	0	2,478
Eastern Aleutians	201-300	NW Eastern Aleutians	6	5	1.5	24	2	45
Eastern Aleutians	201-300	SE Eastern Aleutians	12	2	0.3	65	0	204
Eastern Aleutians	201-300	SW Eastern Aleutians	6	1	0.0	1	0	5
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	1	0.8	210	0	1,112
Eastern Aleutians	301-500	SW Eastern Aleutians	2	1	0.6	28	0	382
Central Aleutians	1-100	N Central Aleutians	12	7	95.0	20,005	0	50,091
Central Aleutians	1-100	Petrel Bank	7	1	3.3	314	0	1,084
Central Aleutians	1-100	SW Central Aleutians	3	2	1.0	168	0	824
Central Aleutians	1-100	SE Central Aleutians	7	1	0.6	68	0	233
Central Aleutians	101-200	SE Central Aleutians	11	6	68.0	5,111	0	15,597
Central Aleutians	101-200	SW Central Aleutians	21	20	49.7	5,234	313	10,155
Central Aleutians	101-200	N Central Aleutians	8	5	11.6	1,234	0	3,617
Central Aleutians	101-200	Petrel Bank	7	4	0.2	43	1	84
Central Aleutians	201-300	SW Central Aleutians	7	4	0.5	23	0	63
Central Aleutians	201-300	N Central Aleutians	11	5	0.2	8	0	16
Central Aleutians	201-300	Petrel Bank	5	1	0.0	3	0	13
Central Aleutians	201-300	SE Central Aleutians	5	1	0.0	1	0	5
Western Aleutians	1-100	E Western Aleutians	9	9	222.3	26,304	0	61,243
Western Aleutians	1-100	W Western Aleutians	11	6	75.4	27,844	1,059	54,630
Western Aleutians	101-200	W Western Aleutians	39	31	132.9	54,029	10,496	97,562
Western Aleutians	101-200	E Western Aleutians	17	16	115.1	14,420	747	28,093
Western Aleutians	201-300	E Western Aleutians	10	4	0.5	39	0	100
Western Aleutians	201-300	W Western Aleutians	14	6	0.4	42	0	92
Western Aleutians	301-500	E Western Aleutians	2	1	0.1	11	0	147
Western Aleutians	301-500	W Western Aleutians	6	1	0.0	4	0	13

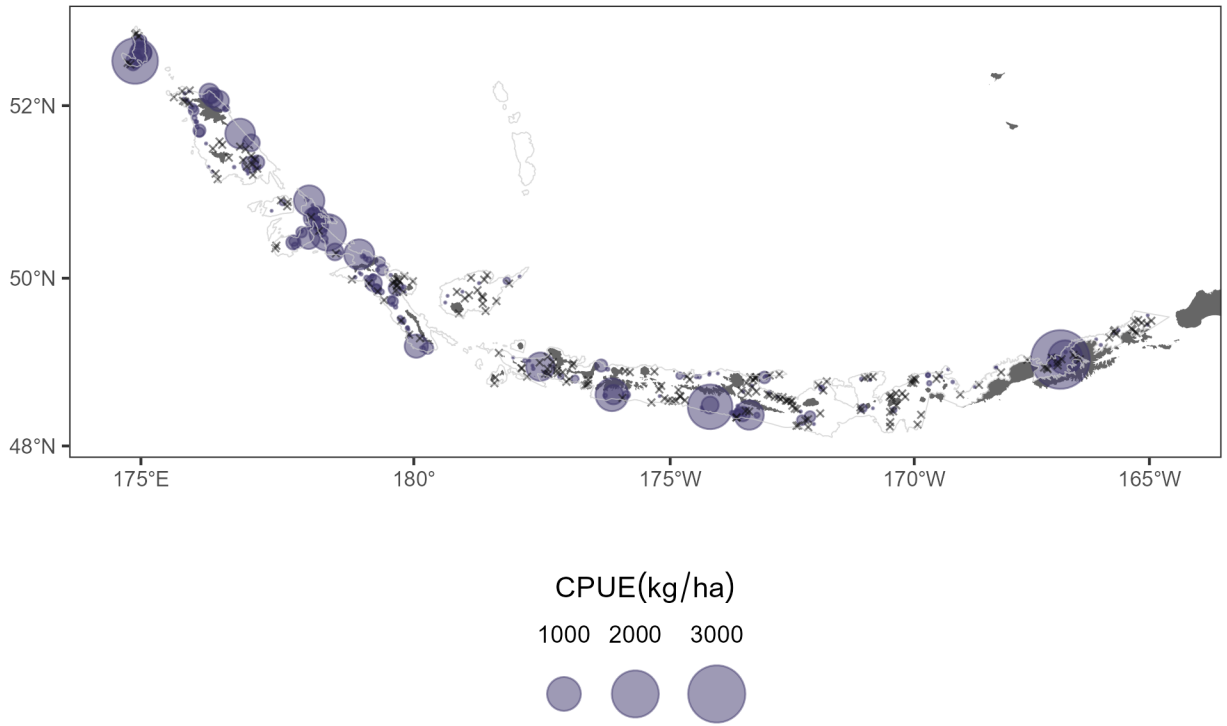

Figure 52. -- Relative abundance of northern rockfish in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

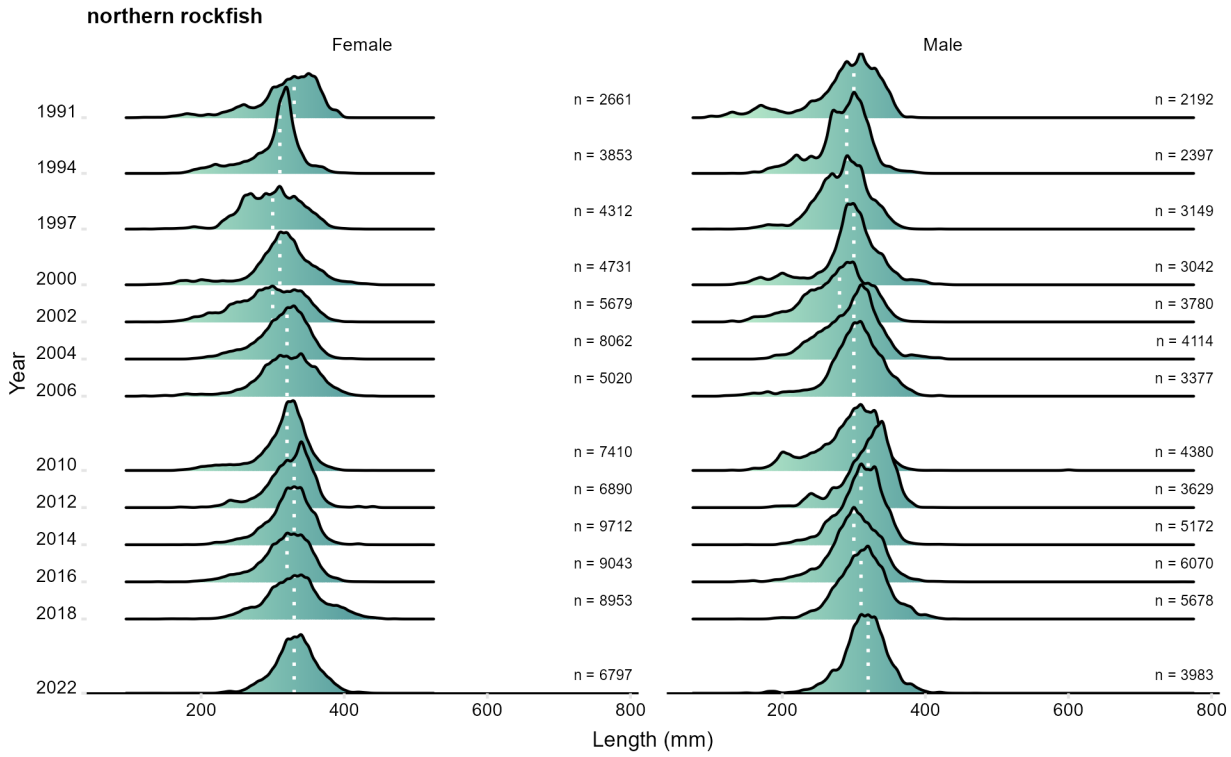

Figure 53. -- Population length composition of northern rockfish in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

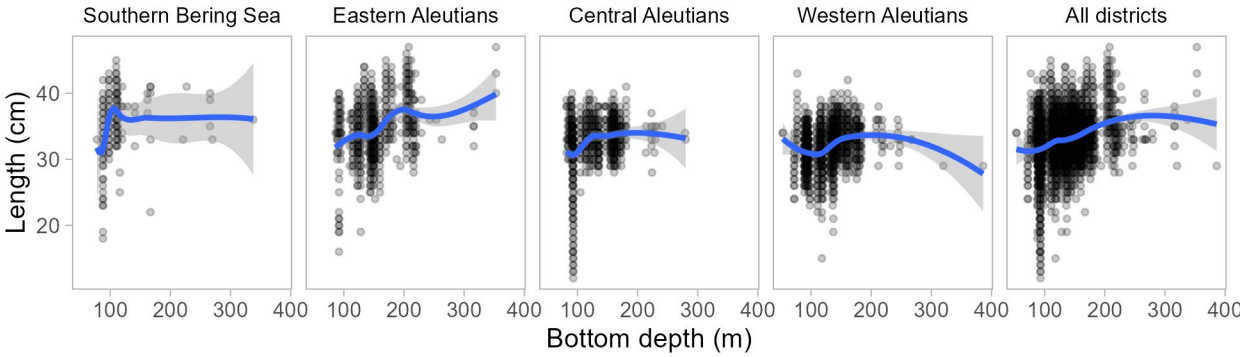

Figure 54. -- Length versus depth for northern rockfish by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Shortraker rockfish (*Sebastes borealis*)

Shortraker rockfish was the 11th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Central AI and Eastern AI (Fig. 55 and Table 40). Most shortraker rockfish catches occurred in depths between 300 and 500 m in the Aleutian districts; few shortrakers were caught in the SBS. The highest CPUE and biomass estimates for this species came from the Central and Eastern AI. There was no clear relationship between shortraker length and depth of capture. Female and male length frequency distributions were similar through time with no clear trend in median length over the course of the survey. On average, the largest individuals were found in the SBS (Fig. 57). The total biomass of shortraker rockfish in the 2022 Aleutian Islands bottom trawl survey was estimated to be 19,632 t. The largest estimated biomass for shortraker rockfish was in the Central AI (Fig. 55 and Table 40). Length distributions by year are provided in Figure 56.

Table 40. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing shortraker rockfish, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	0	---	---	---	---	---
	101 - 200	15	0	---	---	---	---	---
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	2	1.22	127	0	338	2.936
	All depths	47	2	0.17	127	0	338	2.936
Western Aleutians	1 - 100	20	0	---	---	---	---	---
	101 - 200	56	1	< 0.01	1	0	2	0.245
	201 - 300	24	3	1.31	226	0	509	6.396
	301 - 500	8	4	1.6	523	120	927	0.733
	All depths	108	8	0.49	750	253	1,247	0.998
Central Aleutians	1 - 100	29	0	---	---	---	---	---
	101 - 200	47	0	---	---	---	---	---
	201 - 300	28	3	0.11	24	0	53	1.595
	301 - 500	9	6	31.56	12,564	0	36,952	1.548
	All depths	113	9	7.61	12,587	0	36,975	1.548
Eastern Aleutians	1 - 100	14	0	---	---	---	---	---
	101 - 200	61	2	0.05	39	0	97	1.715
	201 - 300	49	3	0.18	89	0	204	2.008
	301 - 500	7	5	10.63	6,041	0	17,142	1.222
	All depths	131	10	2.45	6,168	0	17,271	1.231
Combined Aleutian Districts	1 - 100	63	0	---	---	---	---	---
	101 - 200	164	3	0.02	39	0	97	1.549
	201 - 300	101	9	0.39	339	43	634	3.588
	301 - 500	24	15	14.79	19,127	1,288	36,967	1.389
	All depths	352	27	3.43	19,505	1,662	37,348	1.404

Table 41. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing shortraker rockfish, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	2	1.2	127	0	369
Eastern Aleutians	101-200	SW Eastern Aleutians	13	2	0.2	38	0	97
Eastern Aleutians	201-300	SW Eastern Aleutians	6	1	0.4	30	0	106
Eastern Aleutians	201-300	SE Eastern Aleutians	12	1	0.2	43	0	137
Eastern Aleutians	201-300	NE Eastern Aleutians	25	1	0.1	16	0	49
Eastern Aleutians	301-500	SE Eastern Aleutians	2	1	12.8	3,300	0	45,231
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	2	9.8	2,616	0	12,335
Eastern Aleutians	301-500	SW Eastern Aleutians	2	2	2.8	124	0	586
Central Aleutians	201-300	N Central Aleutians	11	3	0.5	24	0	54
Central Aleutians	301-500	SE Central Aleutians	2	2	146.0	10,429	0	81,252
Central Aleutians	301-500	N Central Aleutians	3	2	16.5	2,048	0	6,456
Central Aleutians	301-500	Petrel Bank	2	1	0.4	54	0	746
Central Aleutians	301-500	SW Central Aleutians	2	1	0.4	32	0	437
Western Aleutians	101-200	E Western Aleutians	17	1	0.0	1	0	2
Western Aleutians	201-300	W Western Aleutians	14	3	2.4	226	0	511
Western Aleutians	301-500	E Western Aleutians	2	2	1.9	299	12	586
Western Aleutians	301-500	W Western Aleutians	6	2	1.3	224	0	659

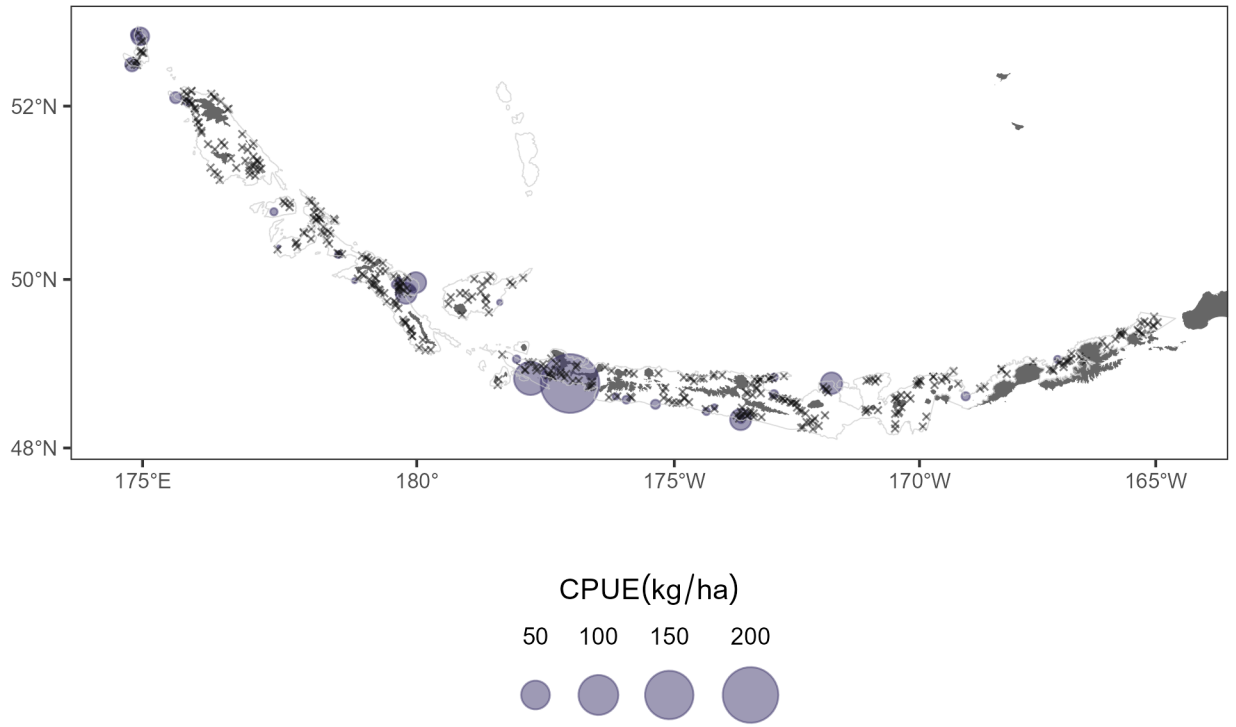

Figure 55. -- Relative abundance of shortraker rockfish in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

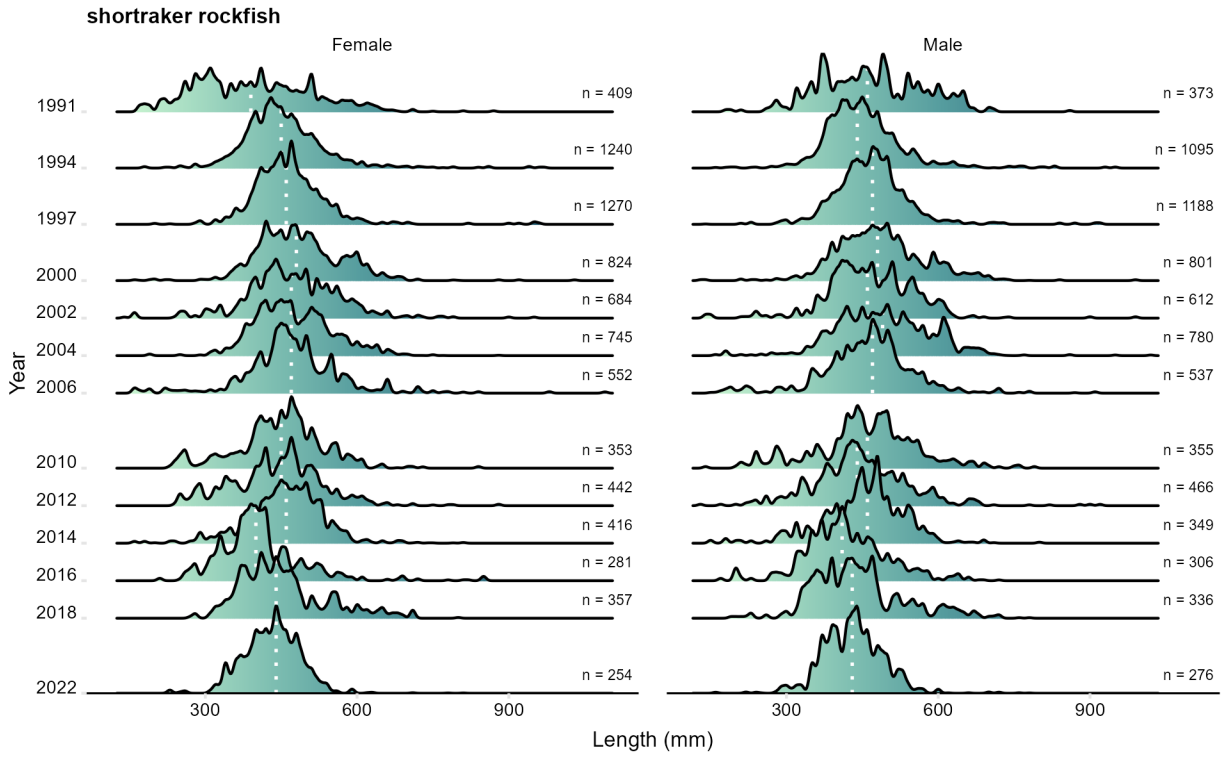

Figure 56. -- Population length composition of shortraker rockfish in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

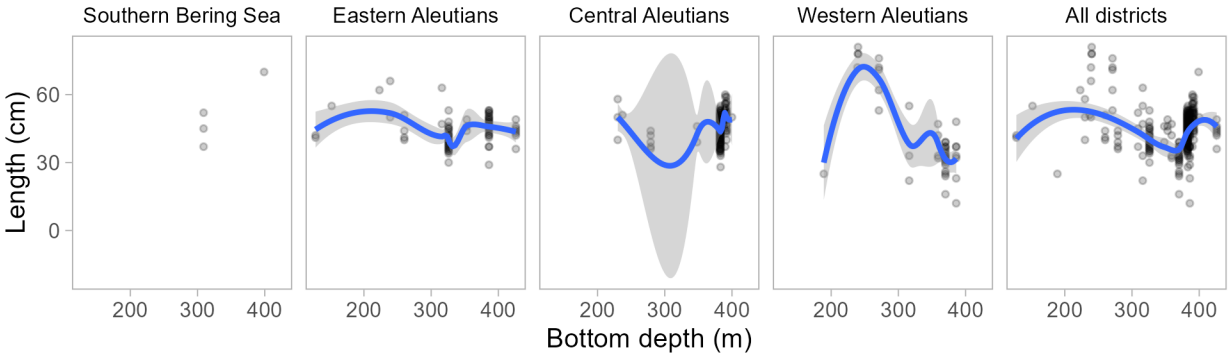

Figure 57. -- Length versus depth for shortraker rockfish by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Rougheye rockfish (*Sebastes aleutianus*)

Rougheye rockfish was the 35th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the SBS and Central AI, Eastern AI (Fig. 58 and Table 42). The identification and separation of rougheye rockfish from its close congener blackspotted rockfish began on Aleutian surveys in 2006. Rougheye rockfish occur in very low numbers in Aleutian Islands survey trawl catches so it is difficult to confidently identify and interpret patterns in these data. They were more common in the SBS and Eastern AI than in other survey districts and they were collected in all depth intervals sampled in the SBS, but were only caught below 100 m depth in the Aleutian districts. Data were insufficient to draw a conclusion about the relationship between rougheye rockfish length and depth of capture. Expanded length frequencies suggest that males may achieve a larger maximum length than females in our samples and that the median length of both sexes are lower in 2022 than when we last sampled the region in 2018. On average, the largest individuals were found in the Central AI (Fig. 60). The total biomass of rougheye rockfish in the 2022 Aleutian Islands bottom trawl survey was estimated to be 310 t. The largest estimated biomass for rougheye rockfish was in the SBS (Fig. 58 and Table 42). Length distributions by year are provided in Figure 59.

Table 42. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing rougheye rockfish, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	1	0.04	15	0	47	0.463
	101 - 200	15	2	0.67	125	0	338	0.612
	201 - 300	8	2	0.42	23	0	71	1.136
	301 - 500	4	1	0.47	49	0	187	1.652
	All depths	47	6	0.28	213	0	451	0.742
Western Aleutians	1 - 100	20	0	---	---	---	---	---
	101 - 200	56	1	< 0.01	<1	0	1	0.112
	201 - 300	24	3	0.03	6	0	14	0.475
	301 - 500	8	0	---	---	---	---	---
	All depths	108	4	< 0.01	6	0	14	0.412
Central Aleutians	1 - 100	29	0	---	---	---	---	---
	101 - 200	47	0	---	---	---	---	---
	201 - 300	28	1	0.07	14	0	44	3.117
	301 - 500	9	1	0.04	15	0	78	1.090
	All depths	113	2	0.02	29	0	116	1.594
Eastern Aleutians	1 - 100	14	0	---	---	---	---	---
	101 - 200	61	0	---	---	---	---	---
	201 - 300	49	2	0.01	5	0	13	0.446
	301 - 500	7	1	0.1	58	0	307	1.112
	All depths	131	3	0.02	63	0	313	0.996
Combined Aleutian Districts	1 - 100	63	0	---	---	---	---	---
	101 - 200	164	1	< 0.01	<1	0	1	0.112
	201 - 300	101	6	0.03	25	0	55	0.883
	301 - 500	24	2	0.06	73	0	330	1.108
	All depths	352	9	0.02	98	0	363	1.015

Table 43. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing rougheye rockfish, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	1	0.1	15	0	47
Southern Bering Sea	101-200	E Southern Bering Sea	13	2	1.1	125	0	340
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	2	0.4	23	0	72
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	1	0.5	49	0	207
Eastern Aleutians	201-300	NE Eastern Aleutians	25	1	0.0	4	0	12
Eastern Aleutians	201-300	SE Eastern Aleutians	12	1	0.0	1	0	3
Eastern Aleutians	301-500	SE Eastern Aleutians	2	1	0.2	58	0	794
Central Aleutians	201-300	N Central Aleutians	11	1	0.3	14	0	45
Central Aleutians	301-500	SE Central Aleutians	2	1	0.2	15	0	202
Western Aleutians	101-200	E Western Aleutians	17	1	0.0	0	0	1
Western Aleutians	201-300	E Western Aleutians	10	1	0.0	3	0	10
Western Aleutians	201-300	W Western Aleutians	14	2	0.0	3	0	7

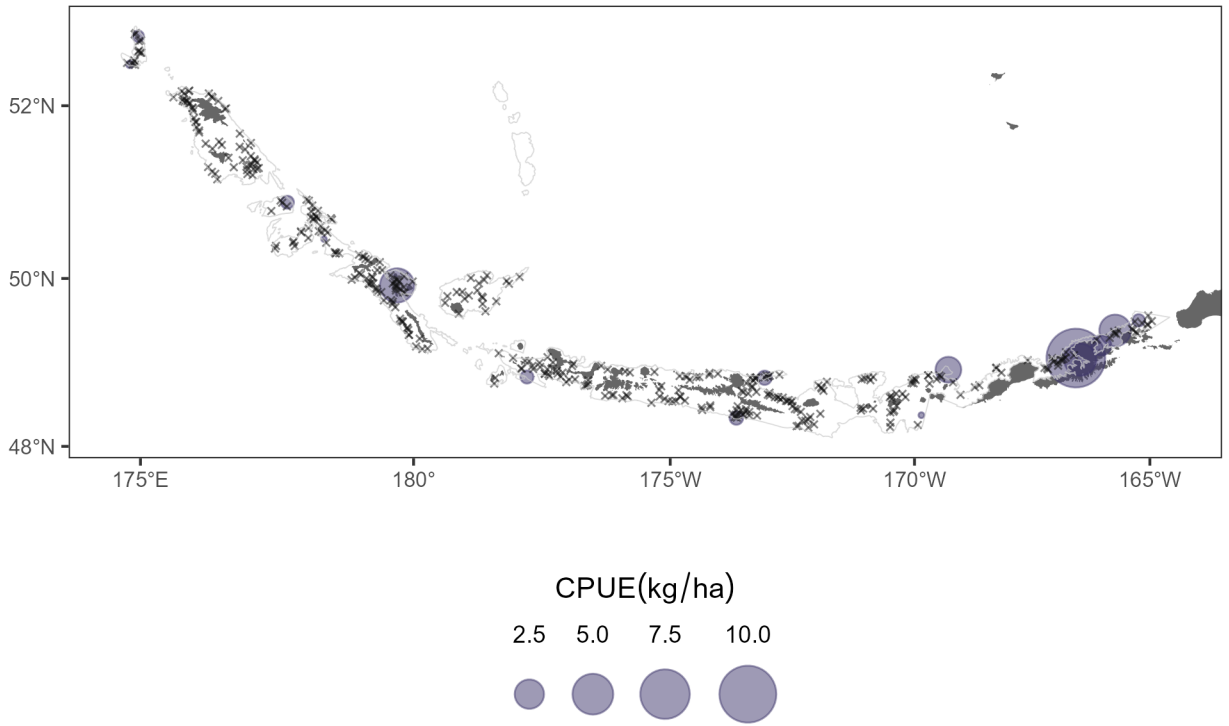

Figure 58. -- Relative abundance of rougheye rockfish in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

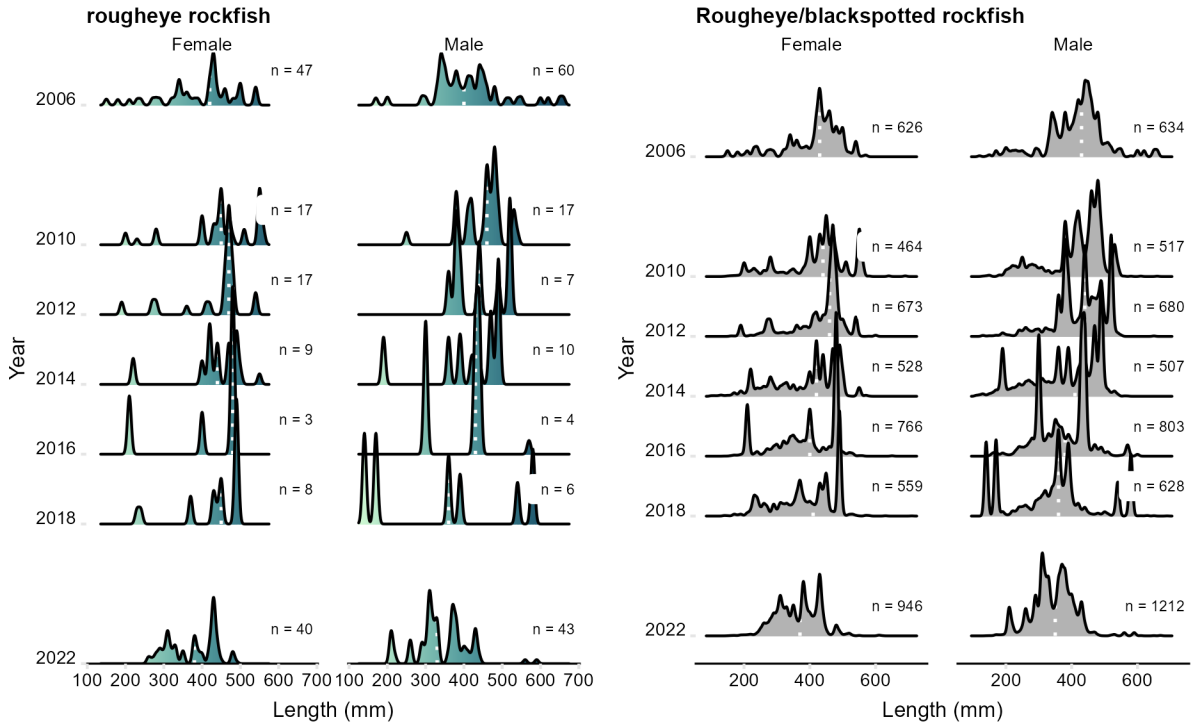

Figure 59. -- Population length composition of rougheye rockfish in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length. Since this species was not identified as distinct from its close congener for the entirety of the survey time period, combined lengths are presented in grey for the full time series.

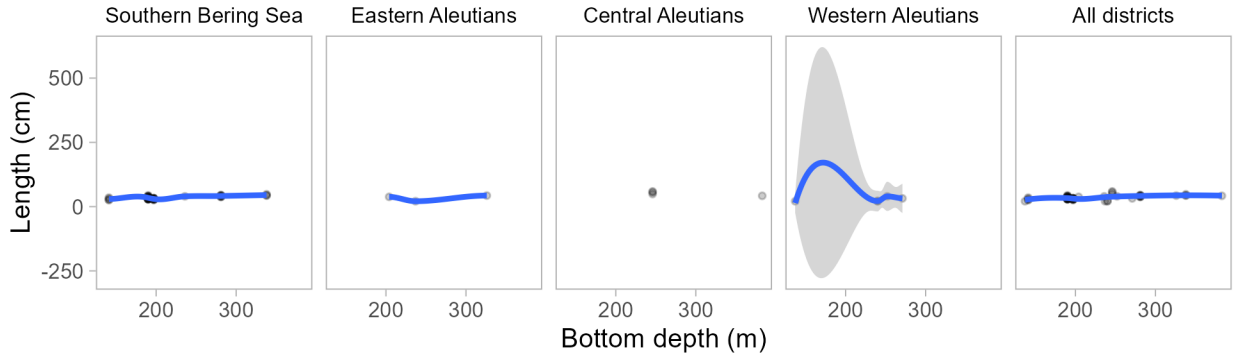

Figure 60. -- Length versus depth for rougheye rockfish by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Blackspotted rockfish (*Sebastes melanostictus*)

Blackspotted rockfish was the 14th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Eastern AI and Central AI (Fig. 61 and Table 44). The identification and separation of blackspotted rockfish from its close congener rougheye rockfish began on Aleutian surveys in 2006. Blackspotted rockfish are somewhat more abundant in Aleutian Islands survey trawl catches than rougheye rockfish. They were caught in all survey districts, occurring primarily between depths of 100 and 300 m and were more abundant in the Aleutian districts than in SBS. The highest blackspotted rockfish CPUE occurred in the Eastern AI in 300 to 500 m, with the highest total district biomass estimated for the Eastern AI as well. Blackspotted rockfish length increased with increasing depth of capture across all survey districts while length frequency distributions and median lengths remained fairly consistent within and across survey years. On average, the largest individuals were found in the Central AI (Fig. 63). The total biomass of blackspotted rockfish in the 2022 Aleutian Islands bottom trawl survey was estimated to be 16,012 t. The largest estimated biomass for blackspotted rockfish was in the Eastern AI (Fig. 61 and Table 44). Length distributions by year are provided in Figure 62.

Table 44. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing blackspotted rockfish, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	1	0.01	2	0	7	0.445
	101 - 200	15	3	0.2	37	0	81	0.990
	201 - 300	8	5	2.48	140	0	336	0.599
	301 - 500	4	3	2.4	251	0	734	0.908
	All depths	47	12	0.58	430	0	971	0.778
Western Aleutians	1 - 100	20	0	---	---	---	---	---
	101 - 200	56	17	1.06	561	129	994	0.451
	201 - 300	24	16	4.3	742	257	1,227	0.664
	301 - 500	8	6	1.48	483	0	1,106	1.268
	All depths	108	39	1.18	1,786	890	2,683	0.651
Central Aleutians	1 - 100	29	0	---	---	---	---	---
	101 - 200	47	9	0.1	45	11	79	0.771
	201 - 300	28	18	3.17	668	0	1,340	0.560
	301 - 500	9	8	5.81	2,311	0	7,051	1.149
	All depths	113	35	1.83	3,024	0	7,934	0.927
Eastern Aleutians	1 - 100	14	0	---	---	---	---	---
	101 - 200	61	10	0.41	320	3	637	0.514
	201 - 300	49	30	3.29	1,611	0	3,294	0.525
	301 - 500	7	6	15.56	8,840	0	41,766	0.756
	All depths	131	46	4.27	10,771	0	43,876	0.700
Combined Aleutian Districts	1 - 100	63	0	---	---	---	---	---
	101 - 200	164	36	0.52	927	401	1,452	0.481
	201 - 300	101	64	3.46	3,021	1,164	4,877	0.562
	301 - 500	24	20	8.99	11,634	0	44,905	0.826
	All depths	352	120	2.74	15,582	0	49,082	0.728

Table 45. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing blackspotted rockfish, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	1	0.0	2	0	7
Southern Bering Sea	101-200	E Southern Bering Sea	13	3	0.3	37	0	82
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	5	2.5	140	0	341
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	3	2.4	251	0	804
Eastern Aleutians	101-200	SW Eastern Aleutians	13	6	1.3	293	0	609
Eastern Aleutians	101-200	SE Eastern Aleutians	17	3	0.1	25	0	67
Eastern Aleutians	101-200	NE Eastern Aleutians	26	1	0.0	3	0	8
Eastern Aleutians	201-300	SW Eastern Aleutians	6	3	5.8	416	0	1,469
Eastern Aleutians	201-300	SE Eastern Aleutians	12	7	5.0	1,038	0	2,508
Eastern Aleutians	201-300	NE Eastern Aleutians	25	18	0.8	152	58	247
Eastern Aleutians	201-300	NW Eastern Aleutians	6	2	0.3	4	0	12
Eastern Aleutians	301-500	SE Eastern Aleutians	2	1	29.7	7,646	0	104,802
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	3	4.2	1,114	0	2,315
Eastern Aleutians	301-500	SW Eastern Aleutians	2	2	1.8	79	0	933
Central Aleutians	101-200	SW Central Aleutians	21	7	0.3	29	4	54
Central Aleutians	101-200	N Central Aleutians	8	2	0.2	16	0	42
Central Aleutians	201-300	SW Central Aleutians	7	5	7.4	315	0	1,009
Central Aleutians	201-300	SE Central Aleutians	5	5	4.3	205	41	368
Central Aleutians	201-300	N Central Aleutians	11	7	3.1	136	0	282
Central Aleutians	201-300	Petrel Bank	5	1	0.2	12	0	46
Central Aleutians	301-500	Petrel Bank	2	2	9.6	1,184	0	14,182
Central Aleutians	301-500	SE Central Aleutians	2	2	8.2	589	0	4,523
Central Aleutians	301-500	N Central Aleutians	3	3	4.1	510	0	1,648
Central Aleutians	301-500	SW Central Aleutians	2	1	0.4	29	0	393
Western Aleutians	101-200	E Western Aleutians	17	11	3.4	425	48	802
Western Aleutians	101-200	W Western Aleutians	39	6	0.3	136	0	380
Western Aleutians	201-300	W Western Aleutians	14	9	4.4	413	11	816
Western Aleutians	201-300	E Western Aleutians	10	7	4.2	328	8	648
Western Aleutians	301-500	E Western Aleutians	2	2	2.7	422	0	2,232
Western Aleutians	301-500	W Western Aleutians	6	4	0.4	62	0	126

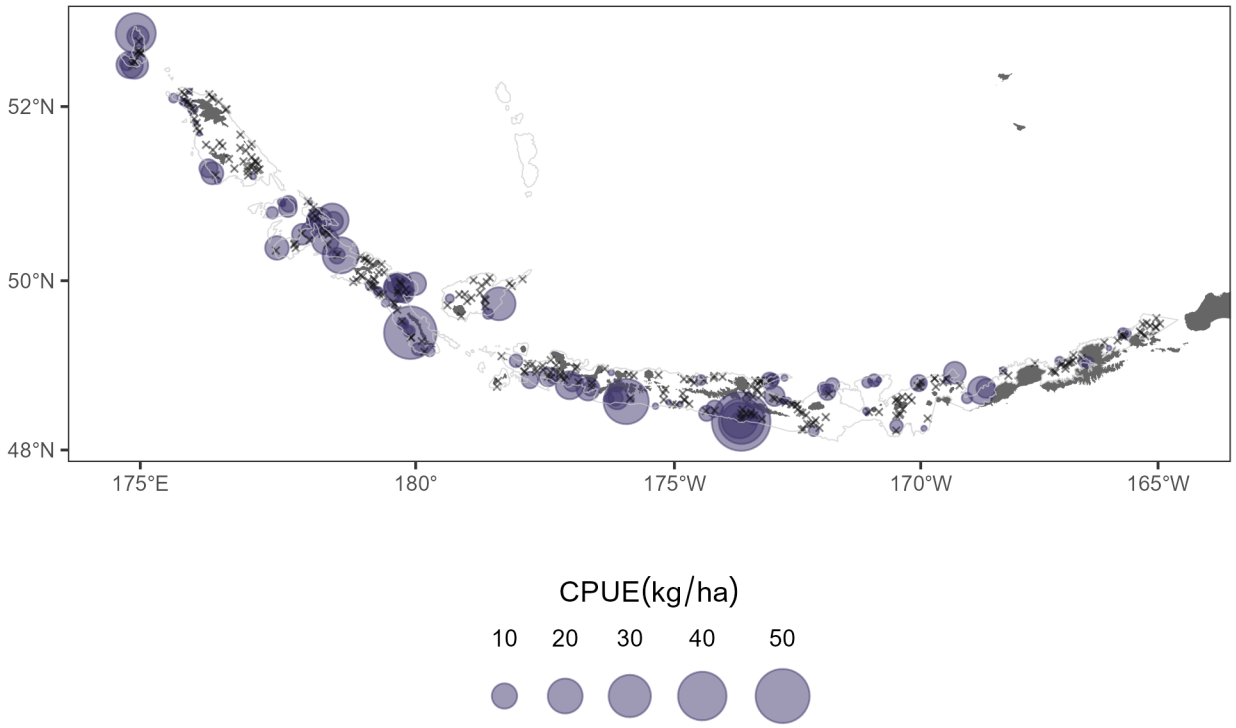

Figure 61. -- Relative abundance of blackspotted rockfish in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

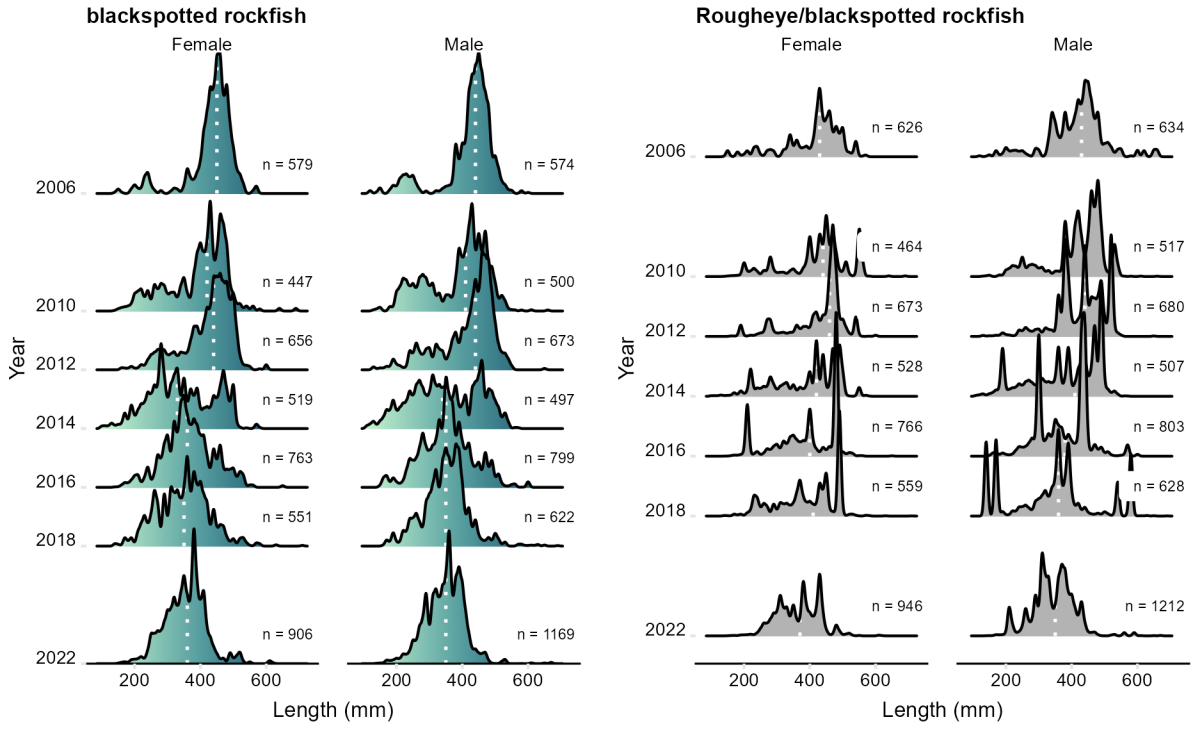

Figure 62. -- Population length composition of blackspotted rockfish in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length. Since this species was not identified as distinct from its close congener for the entirety of the survey time period, combined lengths are presented in grey for the full time series.

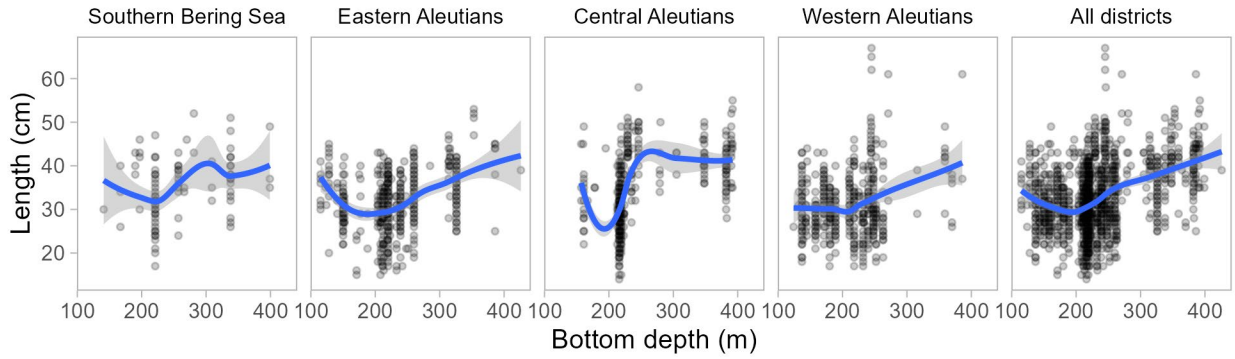

Figure 63. -- Length versus depth for blackspotted rockfish by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Shortspine thornyhead (*Sebastolobus alascanus*)

Shortspine thornyhead was the 15th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Western AI and SBS (Fig. 64 and Table 46). Shortspine thornyhead were most frequently caught in the Western AI. The highest estimated biomasses were between 300 to 500 m in all survey districts except the Western AI, where they had large catches at all depths >100 m. Lengths collected for shortspine thornyhead in 2022 were not separated by sex for length frequencies; sex data were only collected in conjunction with otolith collections. Historically, males and females have had similar length distributions; in 2022, the median length for sexed otolith fish indicated slightly larger females (37 cm median FL) than males (34 cm median FL). On average, individuals caught in deeper hauls were slightly smaller. On average, the largest individuals were found in the Eastern AI (Fig. 66). The total biomass of shortspine thornyhead in the 2022 Aleutian Islands bottom trawl survey was estimated to be 14,145 t. The largest estimated biomass for shortspine thornyhead was in the Western AI (Fig. 64 and Table 46). Length distributions by year are provided in Figure 65.

Table 46. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing shortspine thornyhead, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	0	---	---	---	---	---
	101 - 200	15	0	---	---	---	---	---
	201 - 300	8	3	0.19	11	0	32	0.253
	301 - 500	4	2	12.15	1,267	0	3,911	0.604
	All depths	47	5	1.71	1,278	0	3,921	0.597
Western Aleutians	1 - 100	20	3	0.03	12	0	31	0.501
	101 - 200	56	23	3.25	1,729	563	2,896	0.810
	201 - 300	24	24	16.13	2,781	1,585	3,976	0.703
	301 - 500	8	8	12.25	4,007	1,149	6,865	0.390
	All depths	108	58	5.62	8,529	5,404	11,655	0.521
Central Aleutians	1 - 100	29	0	---	---	---	---	---
	101 - 200	47	11	0.67	311	55	566	1.621
	201 - 300	28	16	3.05	643	0	1,416	0.276
	301 - 500	9	8	3.84	1,529	254	2,803	0.229
	All depths	113	36	1.5	2,484	1,016	3,952	0.270
Eastern Aleutians	1 - 100	14	0	---	---	---	---	---
	101 - 200	61	1	0.02	12	0	39	1.905
	201 - 300	49	3	0.25	125	0	304	0.740
	301 - 500	7	4	3.02	1,717	0	7,239	0.685
	All depths	131	8	0.74	1,854	0	7,388	0.691
Combined Aleutian Districts	1 - 100	63	4	0.01	14	0	33	0.464
	101 - 200	164	35	1.16	2,052	871	3,234	0.880
	201 - 300	101	43	4.06	3,548	2,198	4,898	0.550
	301 - 500	24	20	5.61	7,253	1,541	12,965	0.373
	All depths	352	102	2.26	12,867	6,505	19,229	0.455

Table 47. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing shortspine thornyhead, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	3	0.2	10	0	32
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	2	12.1	1,267	0	4,297
Eastern Aleutians	101-200	SW Eastern Aleutians	13	1	0.1	12	0	39
Eastern Aleutians	201-300	SW Eastern Aleutians	6	1	0.5	36	0	128
Eastern Aleutians	201-300	SE Eastern Aleutians	12	2	0.4	89	0	254
Eastern Aleutians	301-500	SE Eastern Aleutians	2	1	4.8	1,248	0	17,108
Eastern Aleutians	301-500	SW Eastern Aleutians	2	2	4.1	178	0	1,049
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	1	1.1	291	0	1,542
Central Aleutians	1-100	SE Central Aleutians	7	1	0.0	2	0	7
Central Aleutians	101-200	SW Central Aleutians	21	9	2.5	266	15	518
Central Aleutians	101-200	SE Central Aleutians	11	1	0.2	18	0	57
Central Aleutians	101-200	Petrel Bank	7	1	0.2	26	0	92
Central Aleutians	201-300	SE Central Aleutians	5	3	4.6	220	0	622
Central Aleutians	201-300	Petrel Bank	5	1	3.6	278	0	1,048
Central Aleutians	201-300	SW Central Aleutians	7	6	2.4	102	4	201
Central Aleutians	201-300	N Central Aleutians	11	6	1.0	42	5	80
Central Aleutians	301-500	Petrel Bank	2	2	6.4	787	0	5,039
Central Aleutians	301-500	SE Central Aleutians	2	2	3.9	280	0	3,400
Central Aleutians	301-500	N Central Aleutians	3	2	2.8	347	0	1,154
Central Aleutians	301-500	SW Central Aleutians	2	2	1.5	115	0	845
Western Aleutians	1-100	E Western Aleutians	9	2	0.0	6	0	18
Western Aleutians	1-100	W Western Aleutians	11	1	0.0	6	0	21
Western Aleutians	101-200	W Western Aleutians	39	17	3.9	1,592	438	2,745
Western Aleutians	101-200	E Western Aleutians	17	6	1.1	138	0	316
Western Aleutians	201-300	W Western Aleutians	14	14	20.3	1,907	817	2,996
Western Aleutians	201-300	E Western Aleutians	10	10	11.2	874	268	1,480
Western Aleutians	301-500	W Western Aleutians	6	6	17.1	2,931	0	5,917
Western Aleutians	301-500	E Western Aleutians	2	2	6.9	1,076	0	2,668

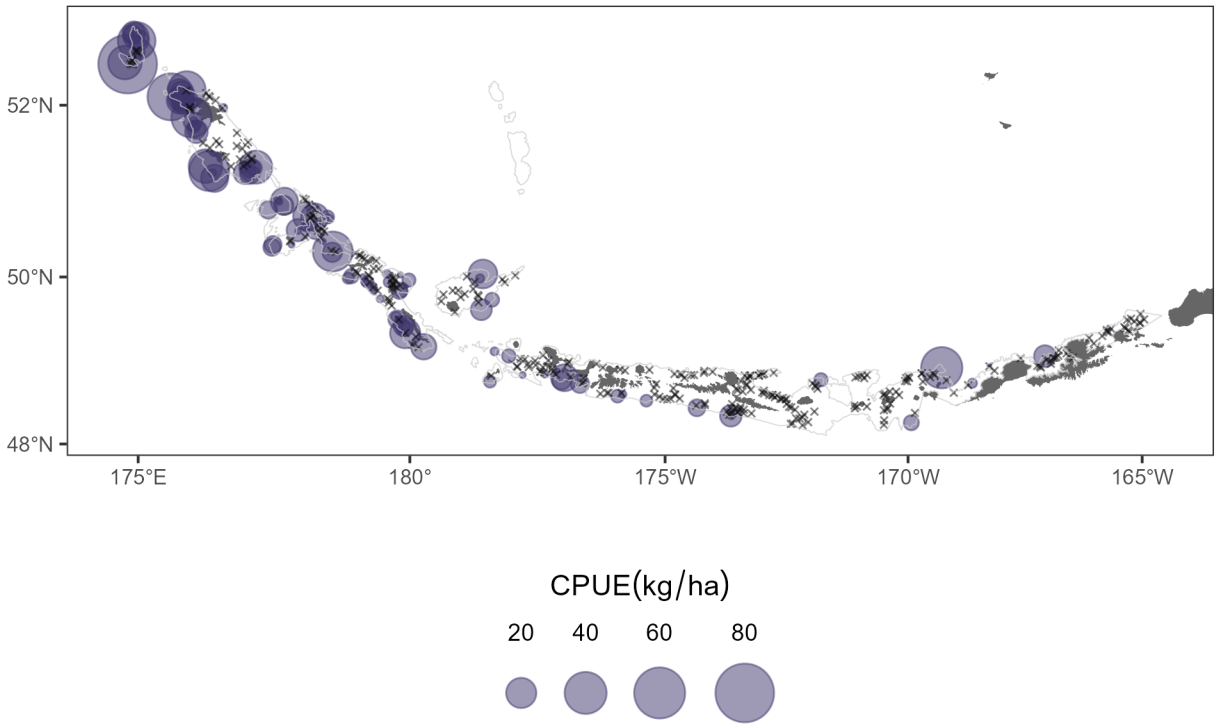

Figure 64. -- Relative abundance of shortspine thornyhead in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

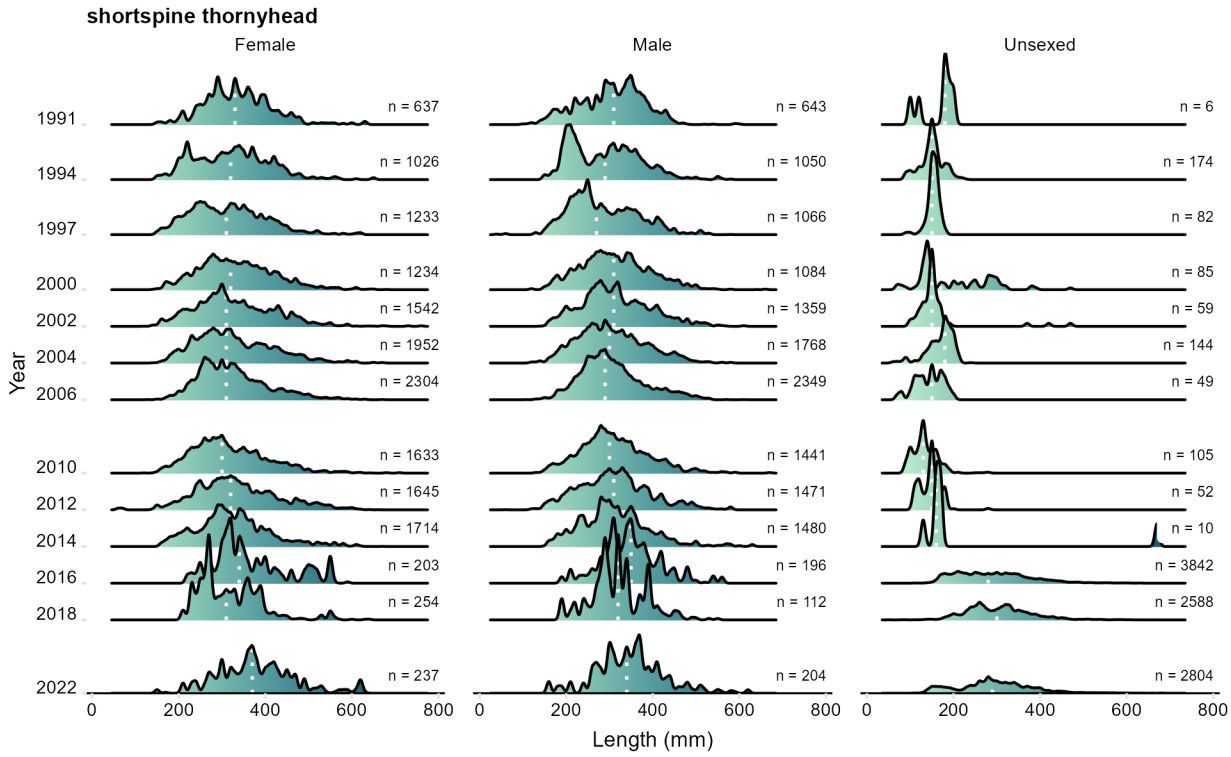

Figure 65. -- Population length composition of shortspine thornyhead in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

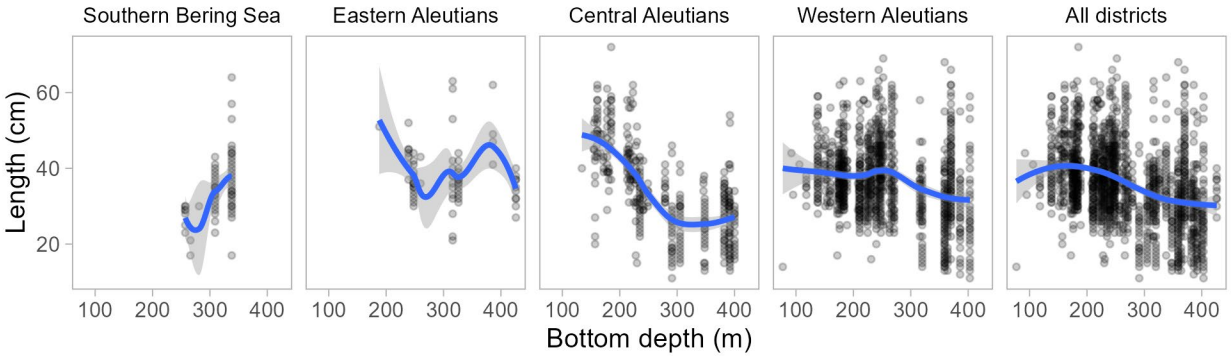

Figure 66. -- Length versus depth for shortspine thornyhead by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Dusky rockfish (*Sebastes variabilis*)

Dusky rockfish was the 24th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Eastern AI and Central AI (Fig. 67 and Table 48). Dusky rockfish were caught throughout the survey area and only at depths less than 300 m. Female and male dusky rockfish shared a similar median size of 40 cm FL There were insufficient data to identify trends in dusky rockfish size with depth, or systematic differences in fork length between the sexes. On average, the largest individuals were found in the Western AI (Fig. 69). The total biomass of dusky rockfish in the 2022 Aleutian Islands bottom trawl survey was estimated to be 1,520 t. The largest estimated biomass for dusky rockfish was in the Eastern AI (Fig. 67 and Table 48). Length distributions by year are provided in Figure 68.

Table 48. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing dusky rockfish, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	3	0.15	62	0	134	0.670
	101 - 200	15	6	0.79	147	0	311	1.226
	201 - 300	8	1	0.12	7	0	23	1.117
	301 - 500	4	0	---	---	---	---	---
	All depths	47	10	0.29	216	43	388	0.988
Western Aleutians	1 - 100	20	0	---	---	---	---	---
	101 - 200	56	0	---	---	---	---	---
	201 - 300	24	2	0.05	8	0	21	1.551
	301 - 500	8	0	---	---	---	---	---
	All depths	108	2	0.01	8	0	21	1.551
Central Aleutians	1 - 100	29	1	0.01	8	0	25	1.142
	101 - 200	47	7	1.01	464	0	1,109	1.317
	201 - 300	28	5	0.15	31	0	67	1.475
	301 - 500	9	0	---	---	---	---	---
	All depths	113	13	0.3	503	0	1,149	1.323
Eastern Aleutians	1 - 100	14	1	0.01	5	0	16	0.477
	101 - 200	61	10	0.96	743	0	2,126	1.143
	201 - 300	49	6	0.09	46	2	89	1.421
	301 - 500	7	0	---	---	---	---	---
	All depths	131	17	0.31	793	0	2,177	1.146
Combined Aleutian Districts	1 - 100	63	2	0.01	13	0	32	0.745
	101 - 200	164	17	0.68	1,206	0	2,733	1.204
	201 - 300	101	13	0.1	86	30	141	1.453
	301 - 500	24	0	---	---	---	---	---
	All depths	352	32	0.23	1,305	0	2,832	1.210

Table 49. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing dusky rockfish, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	3	0.3	62	0	135
Southern Bering Sea	101-200	E Southern Bering Sea	13	6	1.2	147	0	313
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	1	0.1	7	0	23
Eastern Aleutians	1-100	SE Eastern Aleutians	8	1	0.0	5	0	17
Eastern Aleutians	101-200	SW Eastern Aleutians	13	5	3.0	681	0	2,074
Eastern Aleutians	101-200	SE Eastern Aleutians	17	4	0.3	52	0	126
Eastern Aleutians	101-200	NE Eastern Aleutians	26	1	0.0	10	0	30
Eastern Aleutians	201-300	SE Eastern Aleutians	12	2	0.1	24	0	63
Eastern Aleutians	201-300	NE Eastern Aleutians	25	3	0.1	16	0	35
Eastern Aleutians	201-300	SW Eastern Aleutians	6	1	0.1	5	0	18
Central Aleutians	1-100	N Central Aleutians	12	1	0.0	8	0	25
Central Aleutians	101-200	SW Central Aleutians	21	4	4.2	446	0	1,092
Central Aleutians	101-200	SE Central Aleutians	11	3	0.2	18	0	41
Central Aleutians	201-300	SE Central Aleutians	5	1	0.3	12	0	46
Central Aleutians	201-300	SW Central Aleutians	7	2	0.2	10	0	26
Central Aleutians	201-300	N Central Aleutians	11	2	0.2	10	0	24
Western Aleutians	201-300	E Western Aleutians	10	1	0.0	4	0	13
Western Aleutians	201-300	W Western Aleutians	14	1	0.0	4	0	14

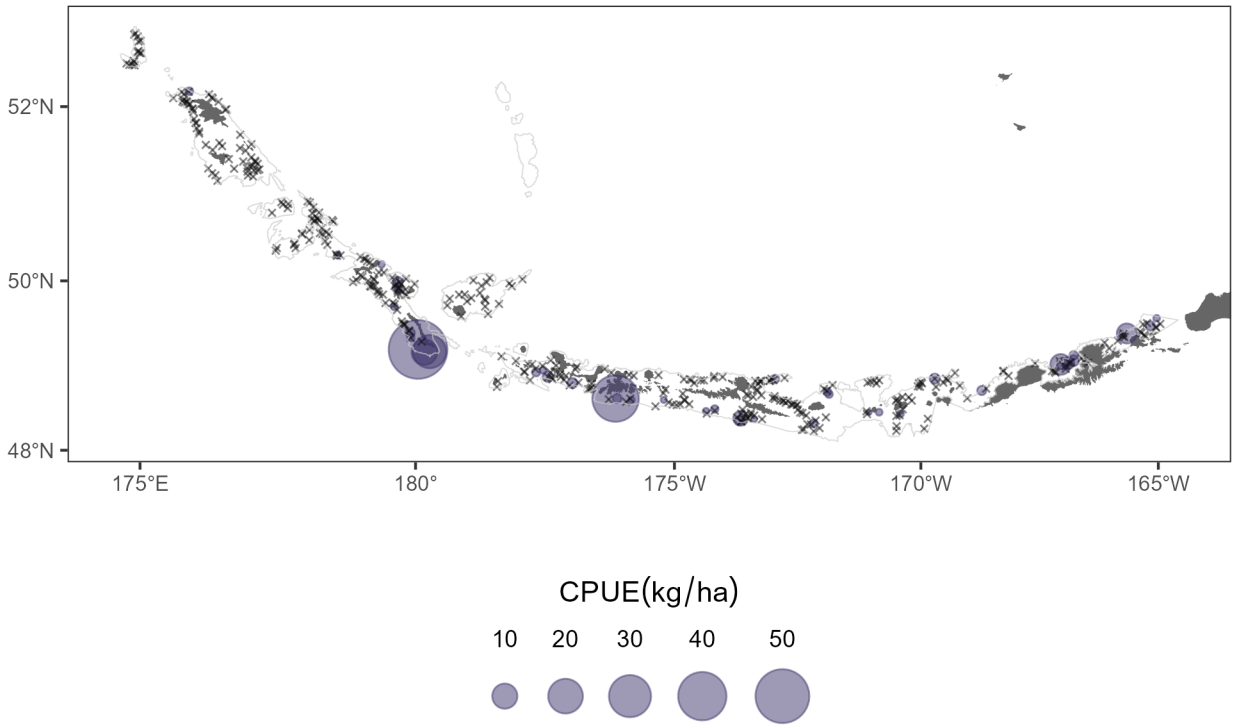

Figure 67. -- Relative abundance of dusky rockfish in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

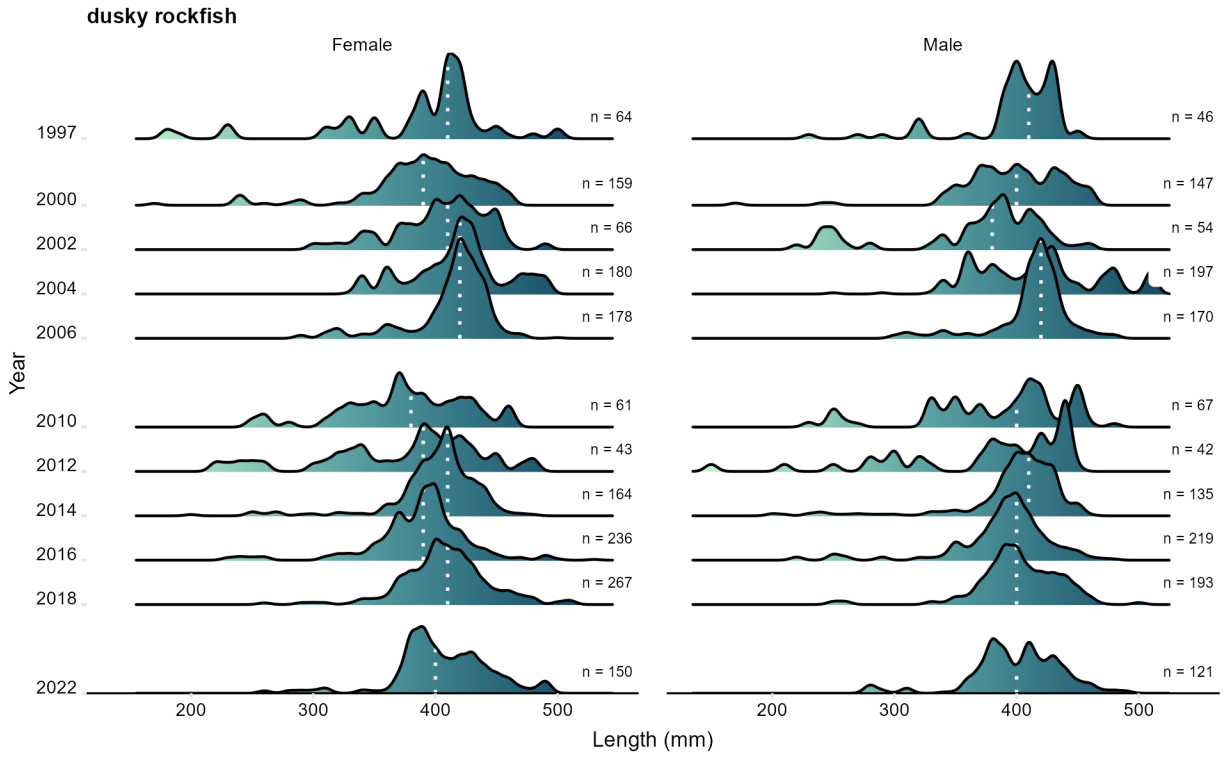

Figure 68. -- Population length composition of dusky rockfish in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

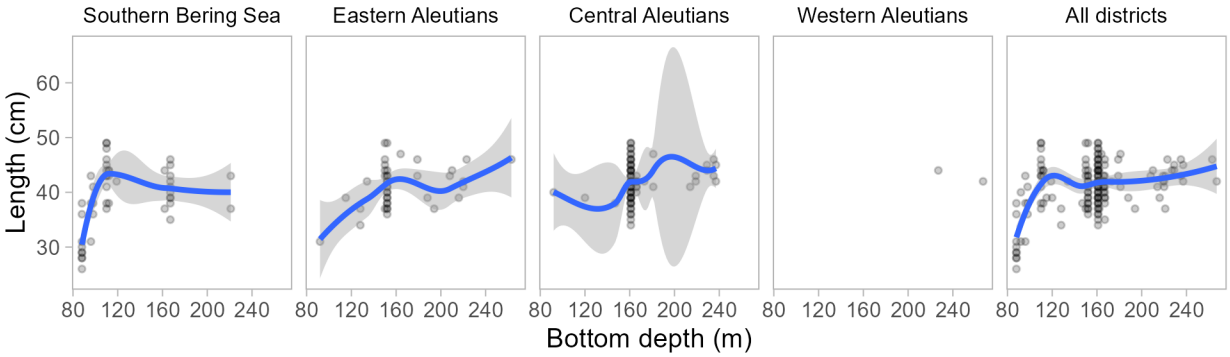

Figure 69. -- Length versus depth for dusky rockfish by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Dark rockfish (*Sebastes ciliatus*)

Dark rockfish was the 40th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Western AI and Central AI (Fig. 70 and Table 50). Dark rockfish were not caught in the Eastern AI or SBS. In the Western and Central AI, they were only caught at depths less than 200m. There were insufficient data to identify trends in size with depth, or systematic differences in fork length between the sexes. On average, the largest individuals were found in the Western AI (Fig. 72). The total biomass of dark rockfish in the 2022 Aleutian Islands bottom trawl survey was estimated to be 96 t. The largest estimated biomass for dark rockfish was in the Western AI (Fig. 70 and Table 50). Length distributions by year are provided in Figure 71.

Table 50. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing dark rockfish, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	0	---	---	---	---	---
	101 - 200	15	0	---	---	---	---	---
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	All depths	47	0	---	---	---	---	---
Western Aleutians	1 - 100	20	4	0.17	82	0	185	0.970
	101 - 200	56	0	---	---	---	---	---
	201 - 300	24	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	All depths	108	4	0.05	82	0	185	0.970
Central Aleutians	1 - 100	29	1	0.01	7	0	21	0.895
	101 - 200	47	3	0.02	8	0	19	0.847
	201 - 300	28	0	---	---	---	---	---
	301 - 500	9	0	---	---	---	---	---
	All depths	113	4	0.01	14	0	32	0.869
Eastern Aleutians	1 - 100	14	0	---	---	---	---	---
	101 - 200	61	0	---	---	---	---	---
	201 - 300	49	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	All depths	131	0	---	---	---	---	---
Combined Aleutian Districts	1 - 100	63	5	0.05	89	0	191	0.964
	101 - 200	164	3	0	8	0	19	0.847
	201 - 300	101	0	---	---	---	---	---
	301 - 500	24	0	---	---	---	---	---
	All depths	352	8	0.02	96	0	199	0.954

Table 51. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing dark rockfish, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Central Aleutians	1-100	N Central Aleutians	12	1	0.0	7	0	22
Central Aleutians	101-200	N Central Aleutians	8	1	0.0	4	0	15
Central Aleutians	101-200	SW Central Aleutians	21	2	0.0	3	0	9
Western Aleutians	1-100	E Western Aleutians	9	4	0.7	82	0	187

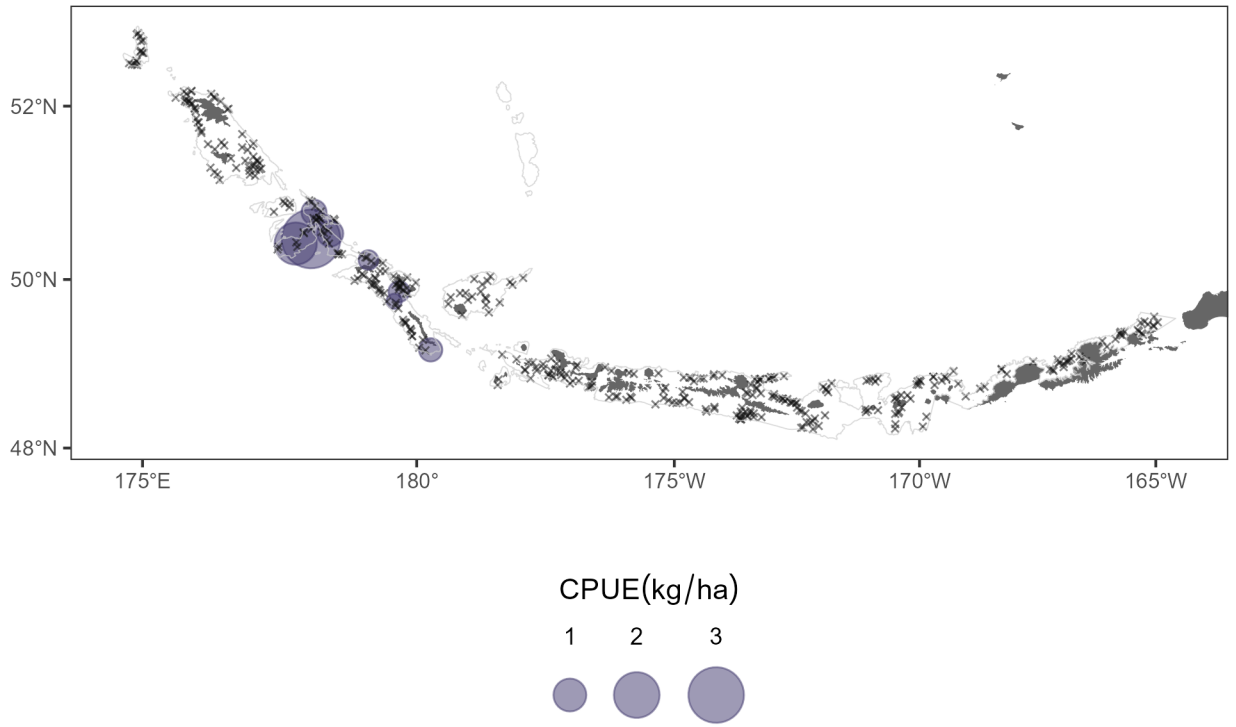

Figure 70. -- Relative abundance of dark rockfish in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

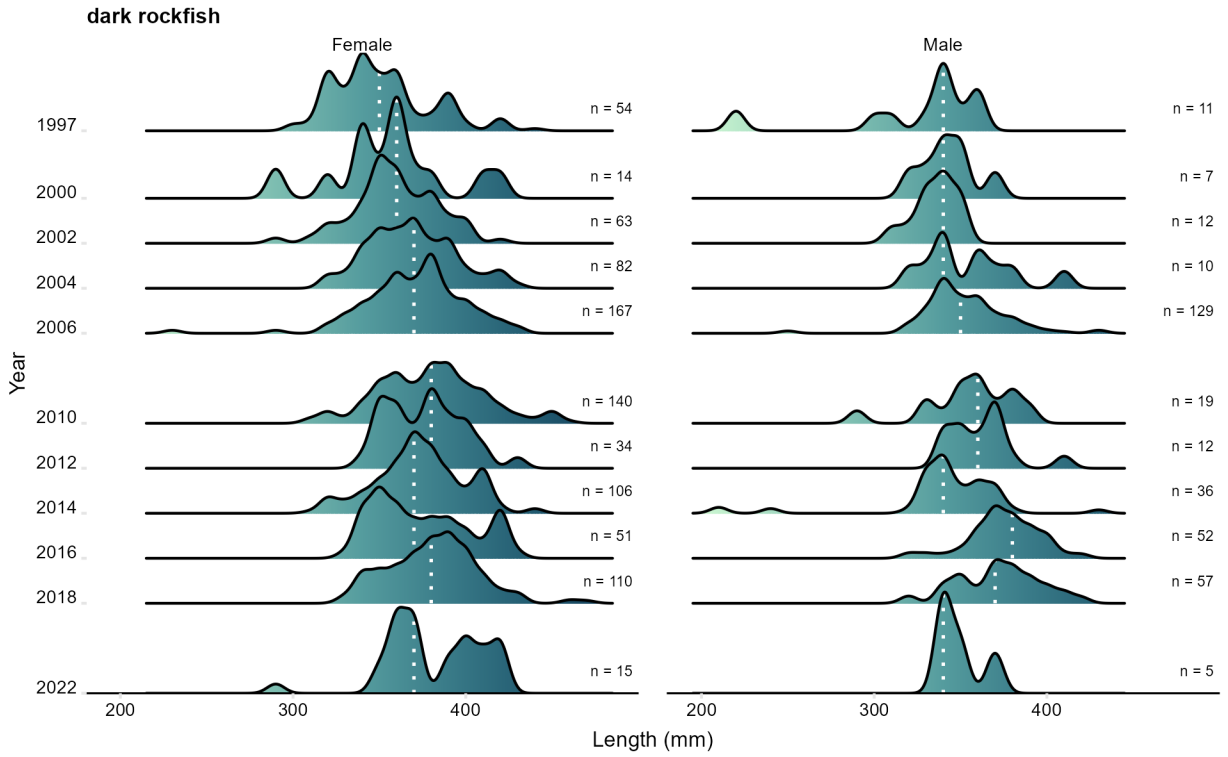

Figure 71. -- Population length composition of dark rockfish in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

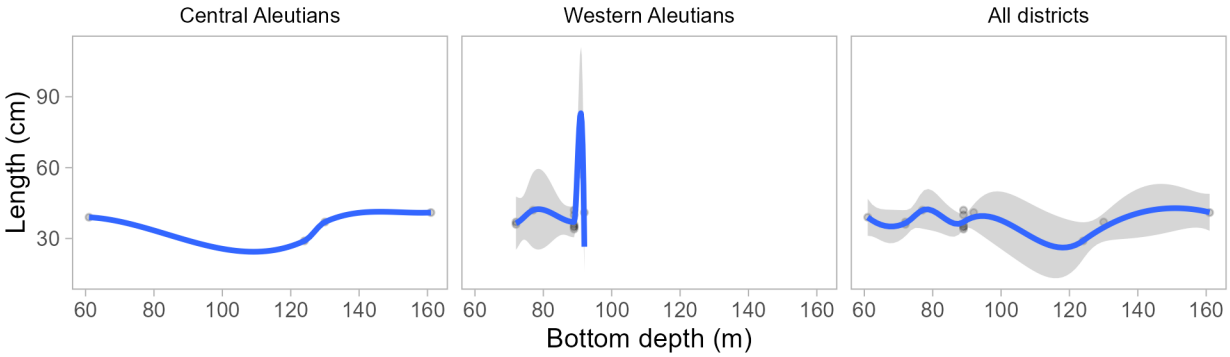

Figure 72. -- Length versus depth for dark rockfish by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

White blotched skate (*Bathyraja maculata*)

White blotched skate was the 12th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Eastern AI and Western AI (Fig. 73 and Table 52). Although whiteblotched skates were caught throughout the AI and at all depths, they were caught most frequently at depths of 100 to 200 m in the Western and Eastern AI, and had a high estimated biomass across all depth strata in the Eastern AI. Male and female length frequencies both appear to be bimodal, with no consistent length differences between males and females across survey years. There were no strong patterns of total length with depth. On average, the largest individuals were found in the Western AI (Fig. 75). The total biomass of white blotched skate in the 2022 Aleutian Islands bottom trawl survey was estimated to be 18,238 t. The largest estimated biomass for white blotched skate was in the Eastern AI (Fig. 73 and Table 52). Length distributions by year are provided in Figure 74.

Table 52. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing white blotched skate, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	0	---	---	---	---	---
	101 - 200	15	3	1.87	346	248	444	8.395
	201 - 300	8	5	4.35	245	76	414	7.590
	301 - 500	4	2	2.3	240	0	800	2.599
	All depths	47	10	1.11	831	222	1,440	5.009
Western Aleutians	1 - 100	20	1	0.93	452	0	1,447	6.805
	101 - 200	56	8	8.92	4,745	0	10,534	8.068
	201 - 300	24	1	0.04	7	0	23	0.914
	301 - 500	8	0	---	---	---	---	---
	All depths	108	10	3.43	5,205	0	11,006	7.855
Central Aleutians	1 - 100	29	0	---	---	---	---	---
	101 - 200	47	5	0.68	312	0	771	7.262
	201 - 300	28	7	1.48	312	0	722	5.866
	301 - 500	9	1	< 0.01	2	0	8	0.103
	All depths	113	13	0.38	625	71	1,180	5.463
Eastern Aleutians	1 - 100	14	2	0.17	117	0	293	6.445
	101 - 200	61	22	8.5	6,605	132	13,078	6.447
	201 - 300	49	25	3.72	1,823	908	2,737	3.573
	301 - 500	7	2	5.34	3,033	0	15,881	5.036
	All depths	131	51	4.59	11,577	0	30,402	5.372
Combined Aleutian Districts	1 - 100	63	3	0.32	569	0	1,578	6.728
	101 - 200	164	35	6.59	11,662	3,153	20,171	7.044
	201 - 300	101	33	2.45	2,142	1,172	3,111	3.749
	301 - 500	24	3	2.35	3,034	0	15,883	4.890
	All depths	352	74	3.06	17,407	735	34,078	5.937

Table 53. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing white blotched skate, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	101-200	W Southern Bering Sea	2	2	4.5	300	263	338
Southern Bering Sea	101-200	E Southern Bering Sea	13	1	0.4	45	0	144
Southern Bering Sea	201-300	Combined Southern Bering Sea	8	5	4.3	245	72	418
Southern Bering Sea	301-500	Combined Southern Bering Sea	4	2	2.3	240	0	882
Eastern Aleutians	1-100	SE Eastern Aleutians	8	2	0.7	117	0	298
Eastern Aleutians	101-200	NE Eastern Aleutians	26	9	22.5	4,527	0	10,918
Eastern Aleutians	101-200	SE Eastern Aleutians	17	12	10.6	2,007	688	3,325
Eastern Aleutians	101-200	SW Eastern Aleutians	13	1	0.3	72	0	227
Eastern Aleutians	201-300	NE Eastern Aleutians	25	16	4.5	893	162	1,624
Eastern Aleutians	201-300	SE Eastern Aleutians	12	8	4.5	924	323	1,524
Eastern Aleutians	201-300	NW Eastern Aleutians	6	1	0.4	6	0	21
Eastern Aleutians	301-500	SE Eastern Aleutians	2	1	11.6	2,986	0	40,921
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	1	0.2	47	0	249
Central Aleutians	101-200	SE Central Aleutians	11	2	2.4	181	0	564
Central Aleutians	101-200	Petrel Bank	7	1	0.7	118	0	407
Central Aleutians	101-200	SW Central Aleutians	21	1	0.1	9	0	28
Central Aleutians	101-200	N Central Aleutians	8	1	0.0	4	0	12
Central Aleutians	201-300	Petrel Bank	5	2	3.2	244	0	669
Central Aleutians	201-300	SE Central Aleutians	5	1	0.9	42	0	157
Central Aleutians	201-300	N Central Aleutians	11	4	0.6	27	0	59
Central Aleutians	301-500	N Central Aleutians	3	1	0.0	2	0	10
Western Aleutians	1-100	W Western Aleutians	11	1	1.2	452	0	1,459
Western Aleutians	101-200	W Western Aleutians	39	8	11.7	4,745	0	10,534
Western Aleutians	201-300	W Western Aleutians	14	1	0.1	7	0	23

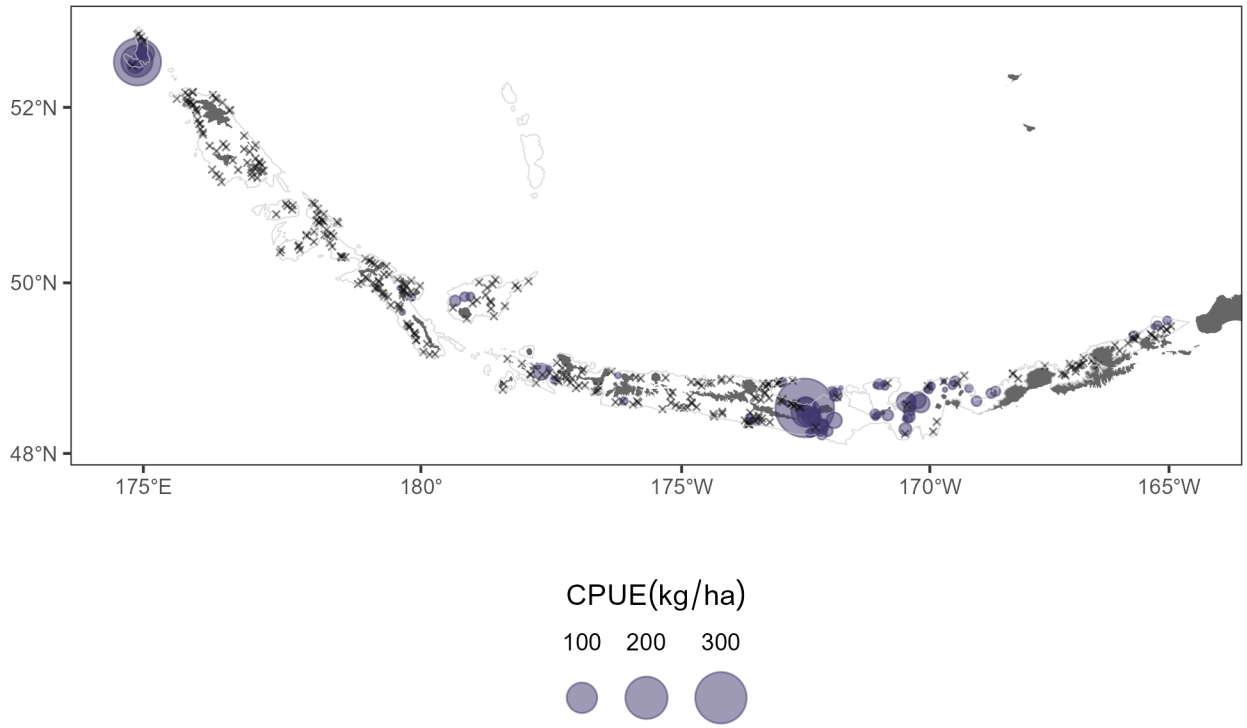

Figure 73. -- Relative abundance of white blotched skate in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

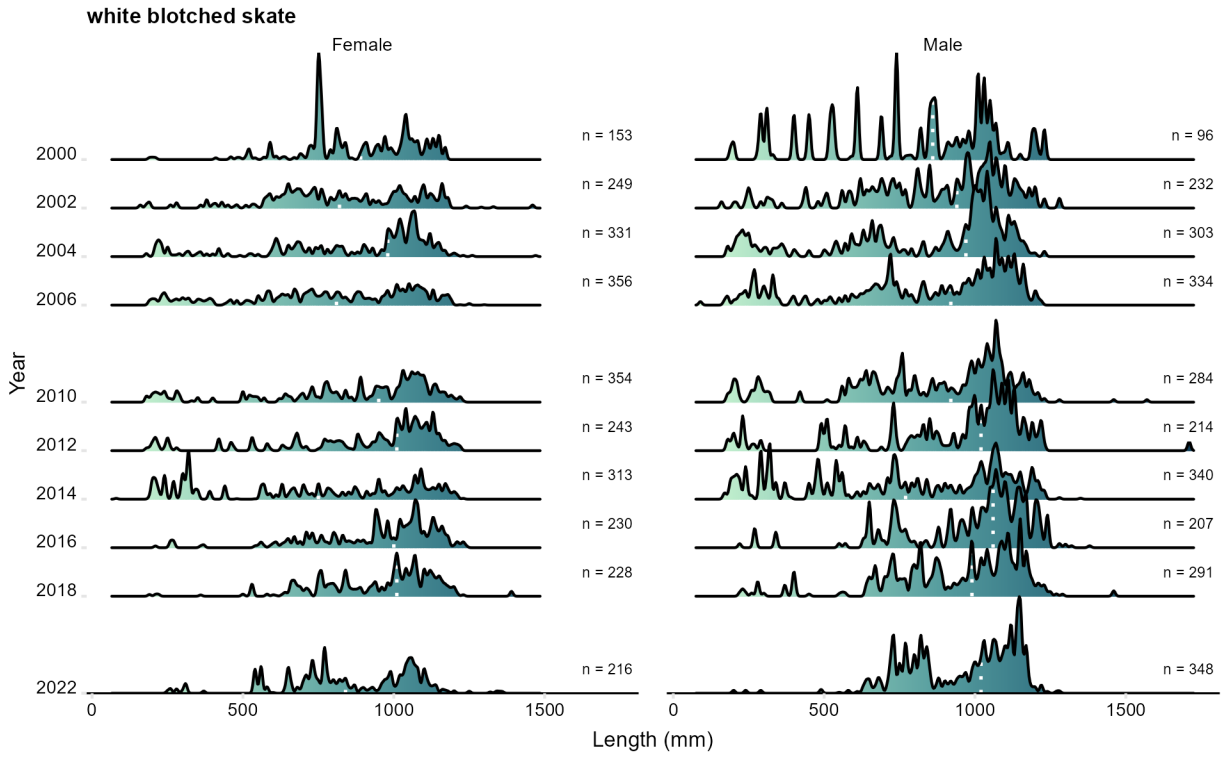

Figure 74. -- Population length composition of white blotched skate in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

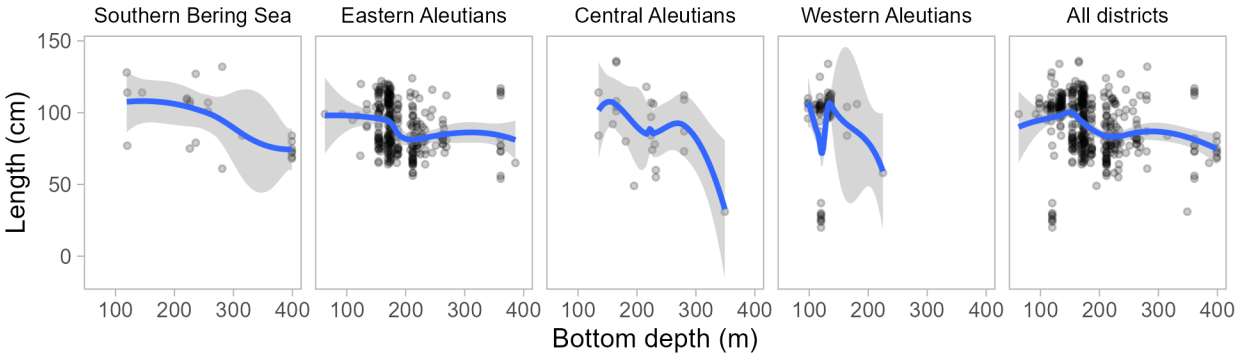

Figure 75. -- Length versus depth for white blotched skate by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Leopard skate (*Bathyraja panthera*)

Leopard skate was the 32nd most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Western AI and Central AI (Fig. 76 and Table 54). Leopard skates were caught everywhere in the survey area except the SBS, with small catches throughout and the largest catches occurring in the Western AI. There were insufficient data to identify trends in size with depth, or systematic differences in fork length between the sexes. On average, the largest individuals were found in the Eastern AI (Fig. 78). The total biomass of leopard skate in the 2022 Aleutian Islands bottom trawl survey was estimated to be 542 t. The largest estimated biomass for leopard skate was in the Western AI (Fig. 76 and Table 54). Length distributions by year are provided in Figure 77.

Table 54. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing leopard skate, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	0	---	---	---	---	---
	101 - 200	15	0	---	---	---	---	---
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	All depths	47	0	---	---	---	---	---
Western Aleutians	1 - 100	20	0	---	---	---	---	---
	101 - 200	56	9	0.56	297	59	535	7.890
	201 - 300	24	2	0.12	21	0	62	1.506
	301 - 500	8	0	---	---	---	---	---
	All depths	108	12	0.22	328	86	570	6.342
Central Aleutians	1 - 100	29	2	0.23	134	0	337	10.485
	101 - 200	47	1	0.02	11	0	33	2.677
	201 - 300	28	1	0.01	2	0	7	1.461
	301 - 500	9	0	---	---	---	---	---
	All depths	113	4	0.09	147	0	351	7.997
Eastern Aleutians	1 - 100	14	1	0.1	67	0	220	4.283
	101 - 200	61	0	---	---	---	---	---
	201 - 300	49	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	All depths	131	1	0.03	67	0	220	4.283
Combined Aleutian Districts	1 - 100	63	4	0.12	211	0	453	7.436
	101 - 200	164	10	0.17	308	68	547	7.385
	201 - 300	101	3	0.03	24	0	64	1.501
	301 - 500	24	0	0	---	---	---	---
	All depths	352	17	0.1	542	203	881	6.322

Table 55. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing leopard skate, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Eastern Aleutians	1-100	SE Eastern Aleutians	8	1	0.4	67	0	224
Central Aleutians	1-100	SE Central Aleutians	7	1	0.5	54	0	186
Central Aleutians	1-100	N Central Aleutians	12	1	0.4	80	0	256
Central Aleutians	101-200	SW Central Aleutians	21	1	0.1	11	0	33
Central Aleutians	201-300	N Central Aleutians	11	1	0.1	2	0	7
Western Aleutians	1-100	E Western Aleutians	9	1	0.1	10	0	34
Western Aleutians	101-200	E Western Aleutians	17	4	1.4	181	0	388
Western Aleutians	101-200	W Western Aleutians	39	5	0.3	116	0	251
Western Aleutians	201-300	E Western Aleutians	10	2	0.3	21	0	62

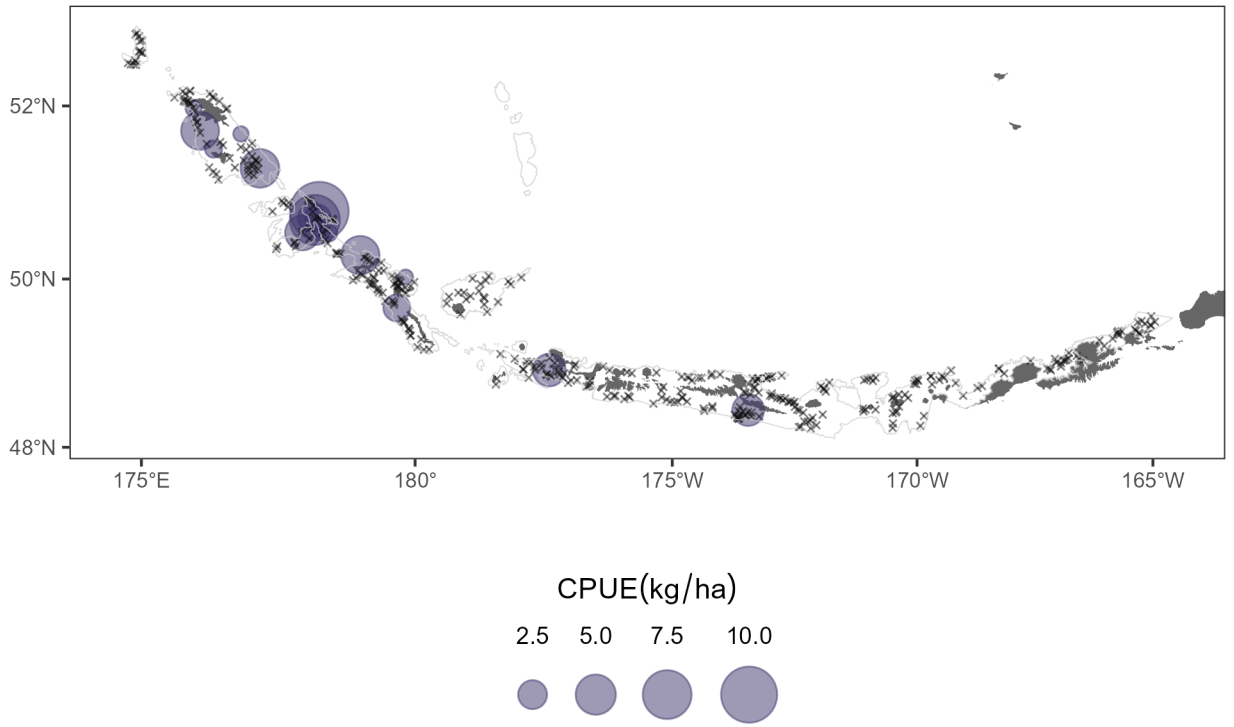

Figure 76. -- Relative abundance of leopard skate in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

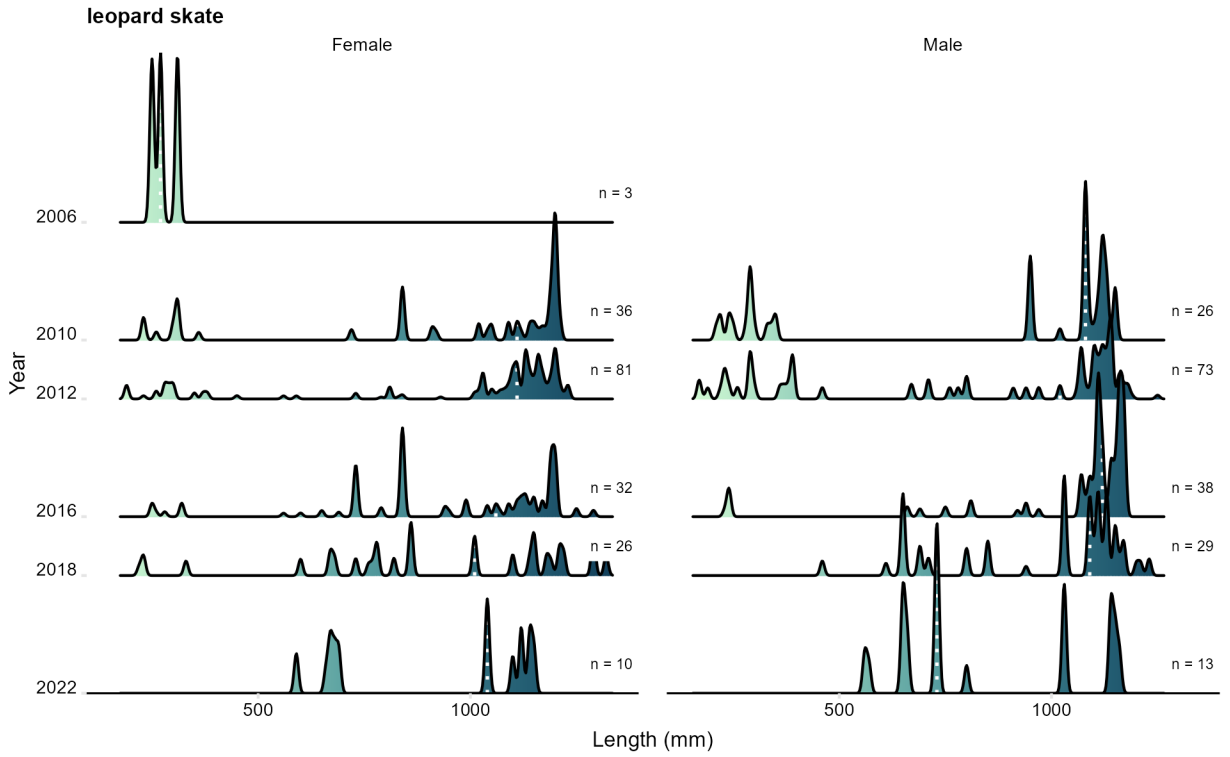

Figure 77. -- Population length composition of leopard skate in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

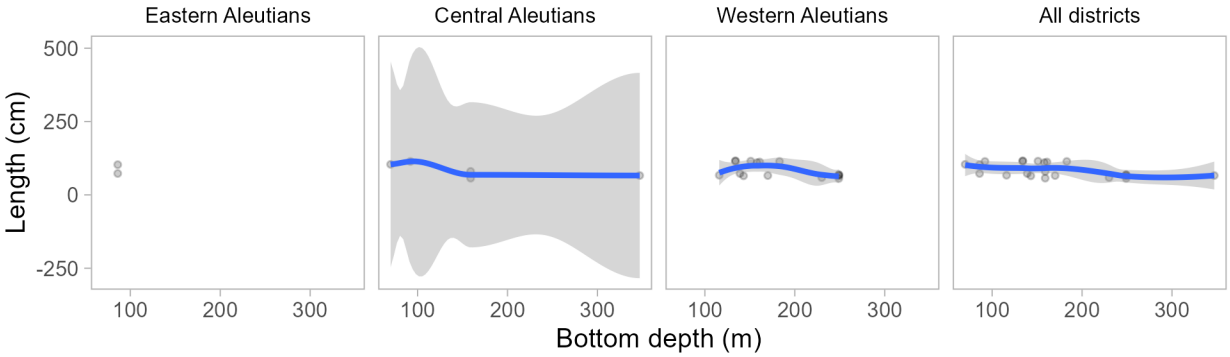

Figure 78. -- Length versus depth for leopard skate by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Aleutian skate (*Bathyraja aleutica*)

Aleutian skate was the 23rd most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the SBS and Eastern AI (Fig. 79 and Table 56). Aleutian skate were caught throughout the survey area and at all depths but were most frequently encountered at depths between 100 and 200 m in the Eastern AI and shallower than 100 m in the SBS. The highest estimated biomass of Aleutian skate occurred between 100 and 200 m in the SW Eastern AI and Eastern SBS as well as between 200 and 300 m in the E Western AI. Male and female Aleutian skates had a similar mode around 110 cm total length (TL) In the Eastern AI where Aleutian skates were most common, total lengths were similar across depths. On average, the largest individuals were found in the SBS (Fig. 81). The total biomass of Aleutian skate in the 2022 Aleutian Islands bottom trawl survey was estimated to be 1,538 t. The largest estimated biomass for Aleutian skate was in the Eastern AI (Fig. 79 and Table 56). Length distributions by year are provided in Figure 80.

Table 56. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing Aleutian skate, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	3	0.47	189	0	421	12.793
	101 - 200	15	4	0.7	130	0	307	9.078
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	All depths	47	7	0.43	319	36	602	10.962
Western Aleutians	1 - 100	20	0	---	---	---	---	---
	101 - 200	56	2	0.19	102	0	247	15.430
	201 - 300	24	1	0.48	82	0	266	5.584
	301 - 500	8	1	0.28	93	0	494	2.820
	All depths	108	4	0.18	277	0	734	5.097
Central Aleutians	1 - 100	29	0	---	---	---	---	---
	101 - 200	47	1	0.03	15	0	49	2.843
	201 - 300	28	0	---	---	---	---	---
	301 - 500	9	1	0.05	19	0	99	1.380
	All depths	113	2	0.02	34	0	111	1.797
Eastern Aleutians	1 - 100	14	0	---	---	---	---	---
	101 - 200	61	7	0.6	464	41	888	7.349
	201 - 300	49	4	0.53	258	0	590	8.561
	301 - 500	7	2	0.33	185	0	738	3.585
	All depths	131	13	0.36	908	106	1,710	6.262
Combined Aleutian Districts	1 - 100	63	0	---	---	---	---	---
	101 - 200	164	10	0.33	581	136	1,026	7.735
	201 - 300	101	5	0.39	341	0	709	7.584
	301 - 500	24	4	0.23	297	0	847	3.024
	All depths	352	19	0.21	1,219	376	2,061	5.585

Table 57. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing Aleutian skate, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	3	0.8	189	0	422
Southern Bering Sea	101-200	E Southern Bering Sea	13	4	1.1	130	0	308
Eastern Aleutians	101-200	SW Eastern Aleutians	13	4	1.5	335	0	714
Eastern Aleutians	101-200	SE Eastern Aleutians	17	1	0.5	98	0	307
Eastern Aleutians	101-200	NE Eastern Aleutians	26	2	0.2	31	0	84
Eastern Aleutians	201-300	NE Eastern Aleutians	25	2	0.9	176	0	489
Eastern Aleutians	201-300	SW Eastern Aleutians	6	1	0.5	34	0	122
Eastern Aleutians	201-300	SE Eastern Aleutians	12	1	0.2	48	0	153
Eastern Aleutians	301-500	Combined Eastern Aleutian Islands	3	1	0.7	174	0	921
Eastern Aleutians	301-500	SW Eastern Aleutians	2	1	0.3	11	0	156
Central Aleutians	101-200	SE Central Aleutians	11	1	0.2	15	0	49
Central Aleutians	301-500	SE Central Aleutians	2	1	0.3	19	0	255
Western Aleutians	101-200	E Western Aleutians	17	1	0.4	53	0	166
Western Aleutians	101-200	W Western Aleutians	39	1	0.1	48	0	147
Western Aleutians	201-300	E Western Aleutians	10	1	1.0	82	0	268
Western Aleutians	301-500	E Western Aleutians	2	1	0.6	93	0	1,278

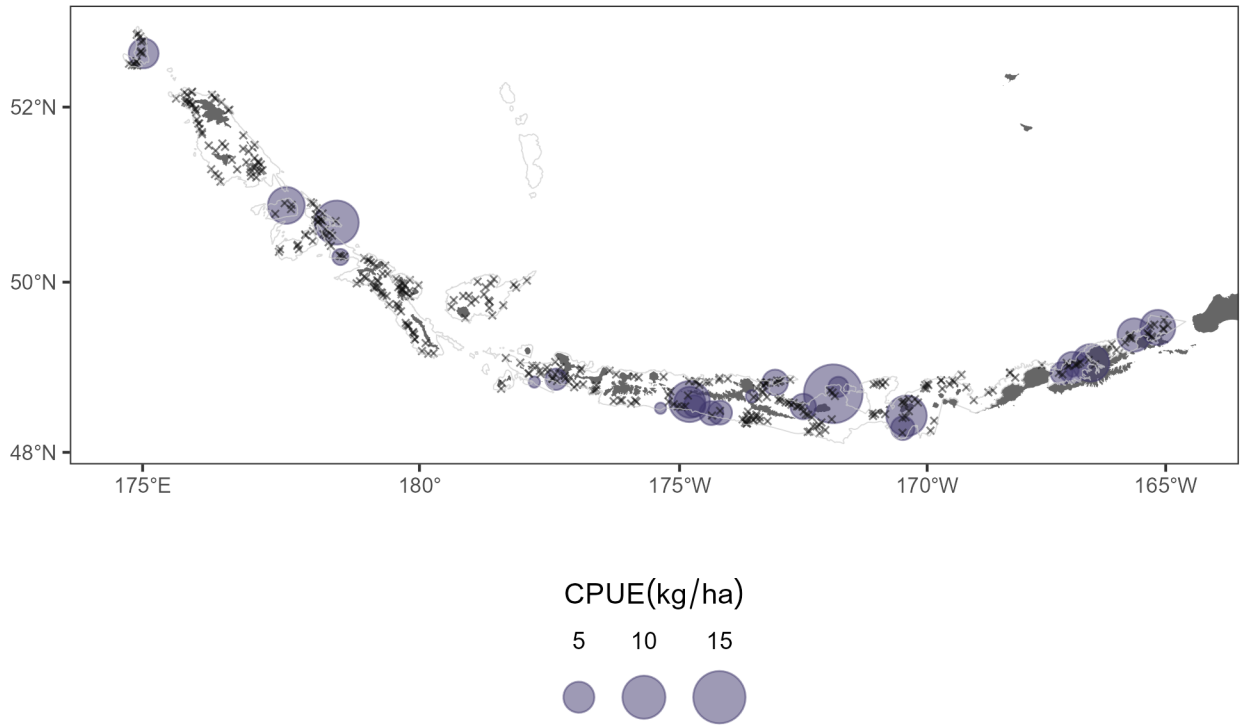

Figure 79. -- Relative abundance of Aleutian skate in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

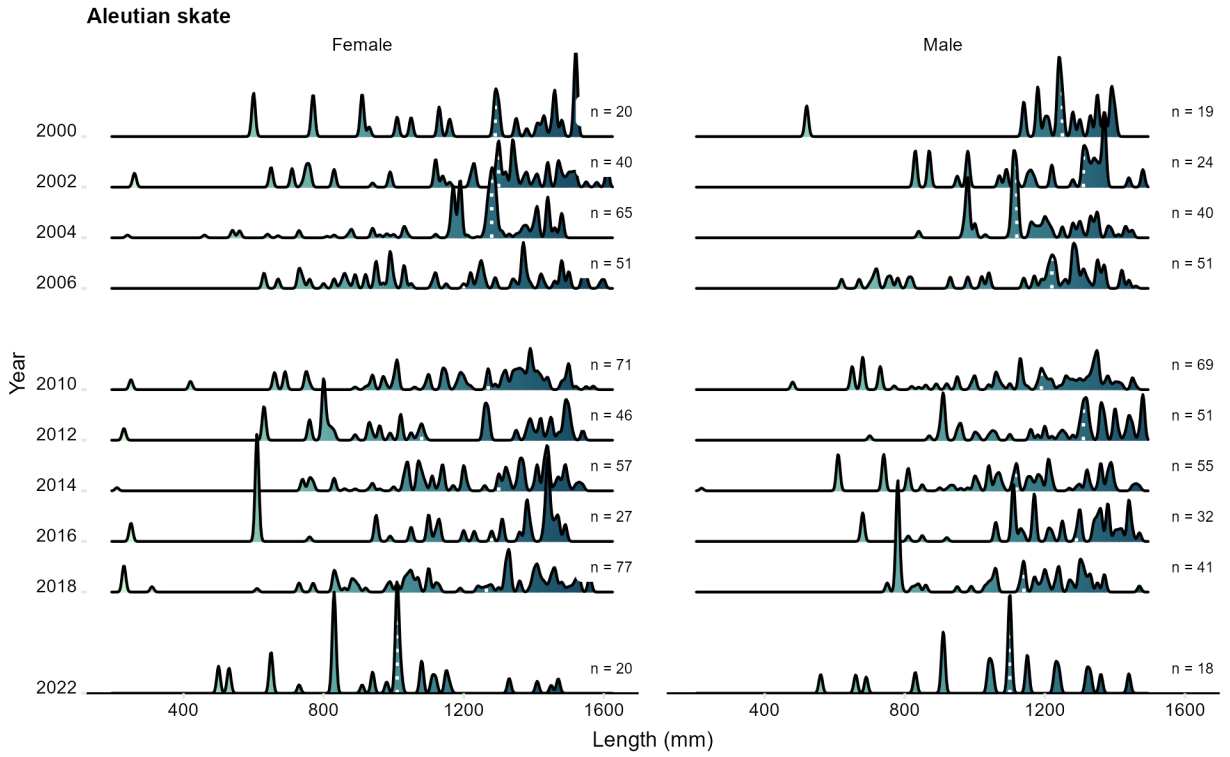

Figure 80. -- Population length composition of Aleutian skate in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

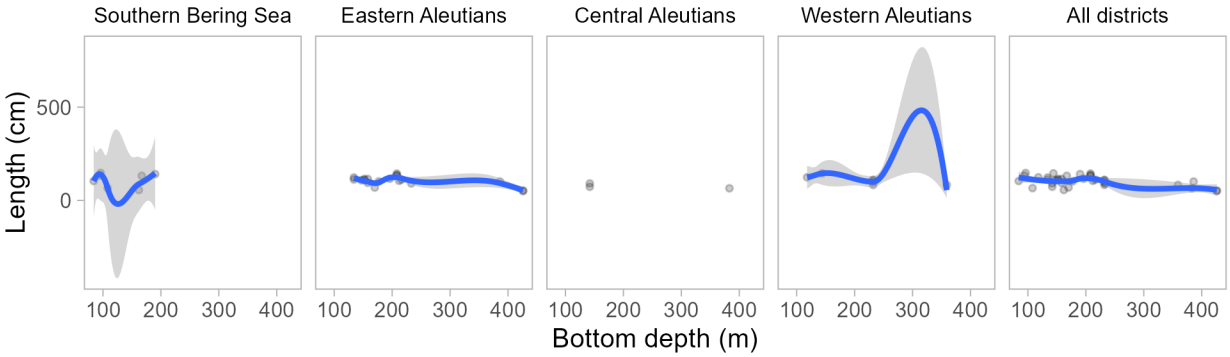

Figure 81. -- Length versus depth for Aleutian skate by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

Alaska skate (*Bathyraja parmifera*)

Alaska skate was the 27th most abundant species caught in the 2022 Aleutian Islands survey (Table 4). The highest densities were recorded in the Eastern AI and Central AI (Fig. 82 and Table 58). Alaska skate were caught throughout the survey area. Length data have been insufficient to identify systematic differences in male and female size in the survey over time or changes in size with depth, though median female length has historically been higher than that of males. On average, the largest individuals were found in the SBS (Fig. 84). The total biomass of Alaska skate in the 2022 Aleutian Islands bottom trawl survey was estimated to be 1,194 t. The largest estimated biomass for Alaska skate was in the Eastern AI (Fig. 82 and Table 58). Length distributions by year are provided in Figure 83.

Table 58. -- Summary by survey districts and depth intervals of 2022 Aleutian Islands trawl effort (number of trawl hauls), number of hauls containing Alaska skate, their mean CPUE and biomass estimates with lower and upper 95% confidence limits, and average fish weight.

Survey district	Depth (m)	Haul count	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI	Mean weight (kg)
Southern Bering Sea	1 - 100	20	1	0.14	58	0	178	10.543
	101 - 200	15	1	0.14	26	0	83	7.444
	201 - 300	8	0	---	---	---	---	---
	301 - 500	4	0	---	---	---	---	---
	All depths	47	2	0.11	84	0	216	9.325
Western Aleutians	1 - 100	20	0	---	---	---	---	---
	101 - 200	56	2	0.19	101	0	306	5.796
	201 - 300	24	0	---	---	---	---	---
	301 - 500	8	0	---	---	---	---	---
	All depths	108	2	0.07	101	0	306	5.796
Central Aleutians	1 - 100	29	3	0.28	166	0	389	5.030
	101 - 200	47	1	0.07	31	0	99	10.339
	201 - 300	28	1	< 0.01	<1	0	1	0.126
	301 - 500	9	0	---	---	---	---	---
	All depths	113	5	0.12	197	0	428	5.243
Eastern Aleutians	1 - 100	14	4	1.02	698	0	2,699	4.989
	101 - 200	61	3	0.15	114	0	294	5.052
	201 - 300	49	0	---	---	---	---	---
	301 - 500	7	0	---	---	---	---	---
	All depths	131	7	0.32	811	0	2,837	4.998
Combined Aleutian Districts	1 - 100	63	7	0.49	864	0	2,916	4.997
	101 - 200	164	6	0.14	246	0	507	5.722
	201 - 300	101	1	< 0.01	<1	0	1	0.126
	301 - 500	24	0	---	---	---	---	---
	All depths	352	14	0.19	1,110	0	3,235	5.104

Table 59. -- Summary by survey district (INPFC area), survey subdistrict, and depth intervals of 2022 Aleutian Islands survey trawl effort (number of hauls), number of hauls containing Alaska skate, and their mean CPUE and biomass estimates with lower and upper 95% confidence intervals (CI).

Survey district	Depth range (m)	Subdistrict	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Lower 95% CI	Upper 95% CI
Southern Bering Sea	1-100	E Southern Bering Sea	18	1	0.2	58	0	179
Southern Bering Sea	101-200	E Southern Bering Sea	13	1	0.2	26	0	84
Eastern Aleutians	1-100	NW Eastern Aleutians	2	1	2.3	442	0	6,057
Eastern Aleutians	1-100	SE Eastern Aleutians	8	2	1.0	172	0	452
Eastern Aleutians	1-100	SW Eastern Aleutians	2	1	0.4	84	0	1,148
Eastern Aleutians	101-200	NW Eastern Aleutians	5	1	0.4	64	0	243
Eastern Aleutians	101-200	NE Eastern Aleutians	26	2	0.2	49	0	123
Central Aleutians	1-100	Petrel Bank	7	1	0.7	67	0	232
Central Aleutians	1-100	N Central Aleutians	12	2	0.5	99	0	278
Central Aleutians	101-200	SE Central Aleutians	11	1	0.4	31	0	99
Central Aleutians	201-300	N Central Aleutians	11	1	0.0	0	0	1
Western Aleutians	101-200	W Western Aleutians	39	2	0.2	101	0	306

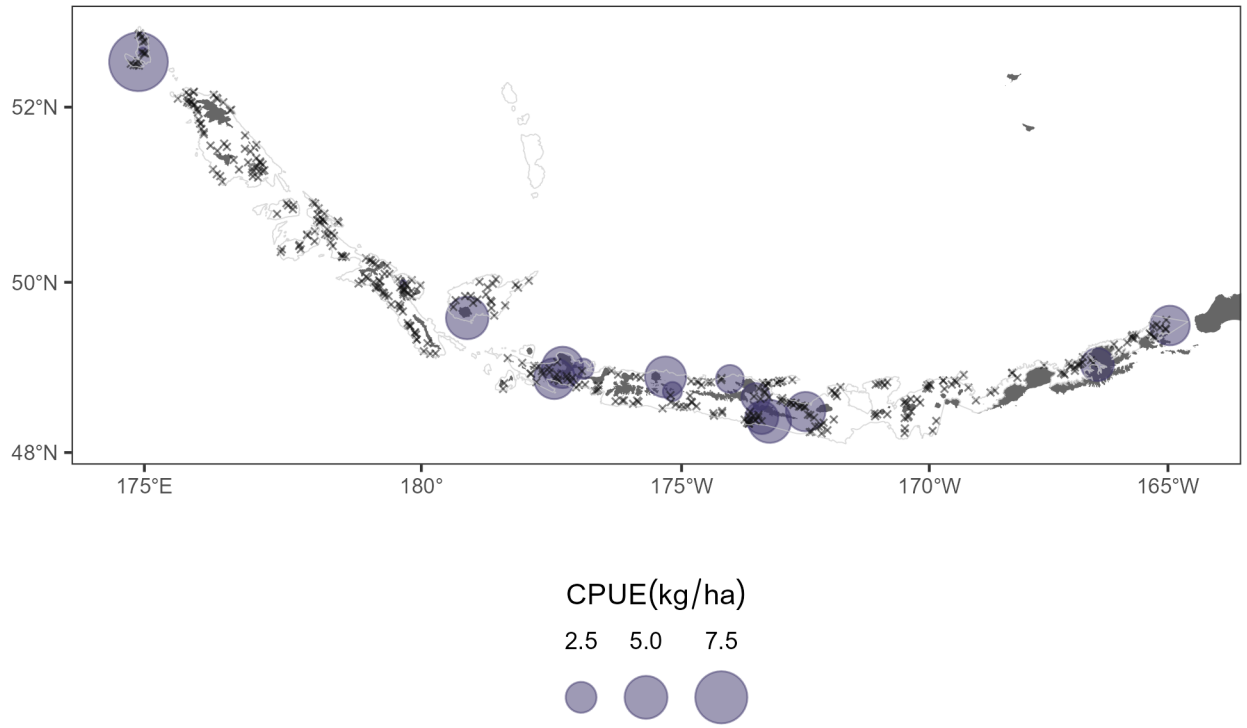

Figure 82. -- Relative abundance of Alaska skate in units of catch-per-unit-effort (CPUE, kg/ha; X = no catch) in the 2022 NMFS-AFSC-RACE Groundfish Assessment Program's Aleutian Islands summer bottom trawl survey catches.

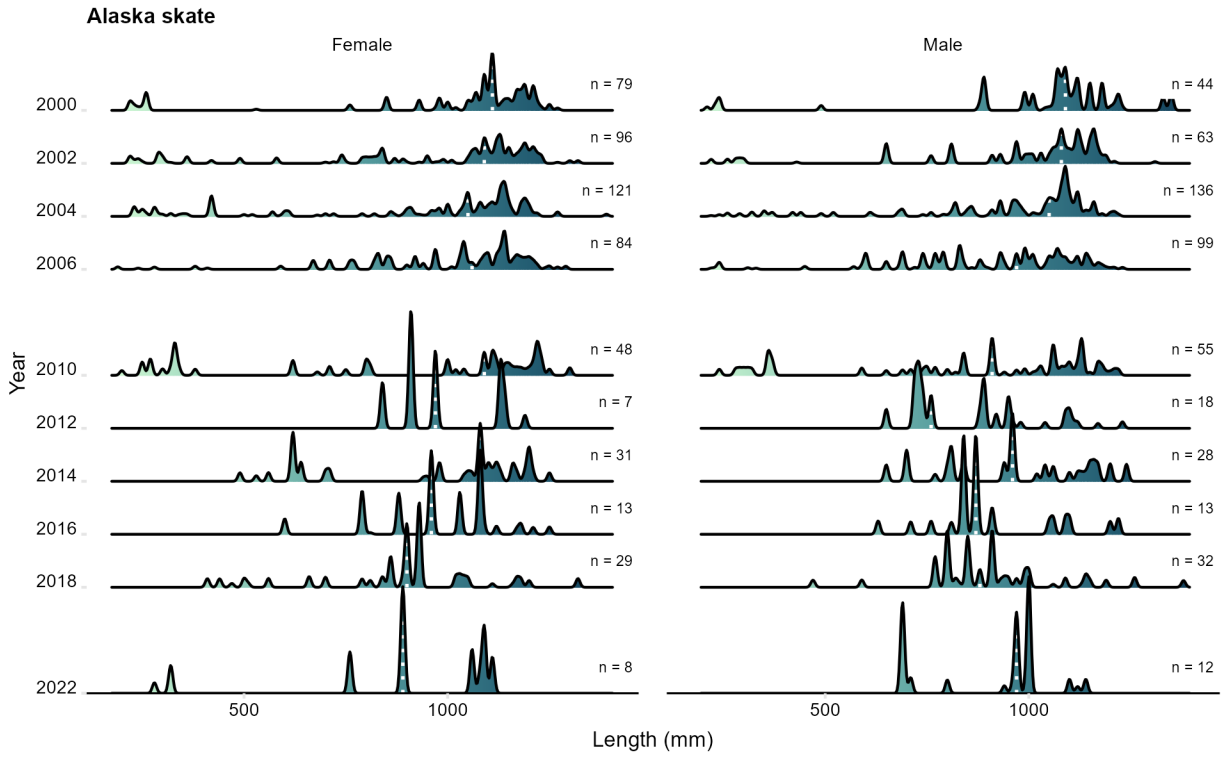

Figure 83. -- Population length composition of Alaska skate in the Aleutian Islands bottom trawl survey since the start of the sampling stanza. The dotted vertical line indicates median length.

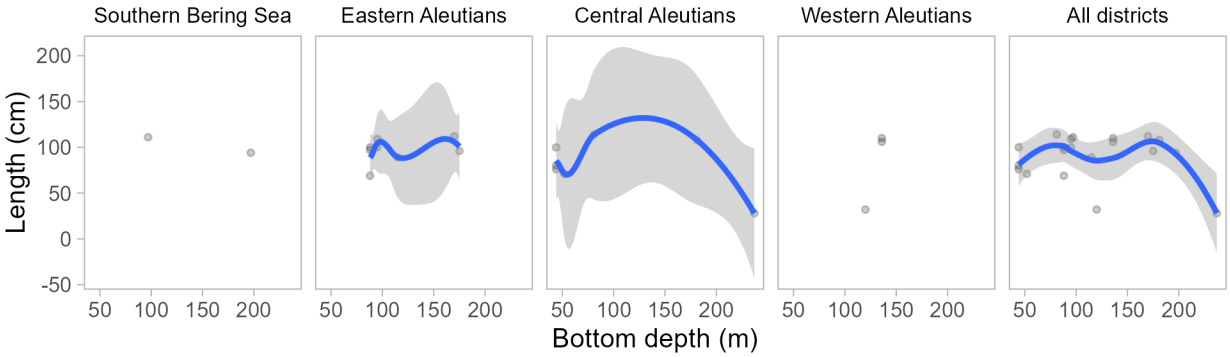

Figure 84. -- Length versus depth for Alaska skate by survey district in the 2022 Aleutian Islands bottom trawl survey. Lines represent locally estimated scatterplot smoothing (LOESS) smooths added to show trends in length. Shaded bands indicate 95% confidence intervals. Data shown are raw (unexpanded) lengths.

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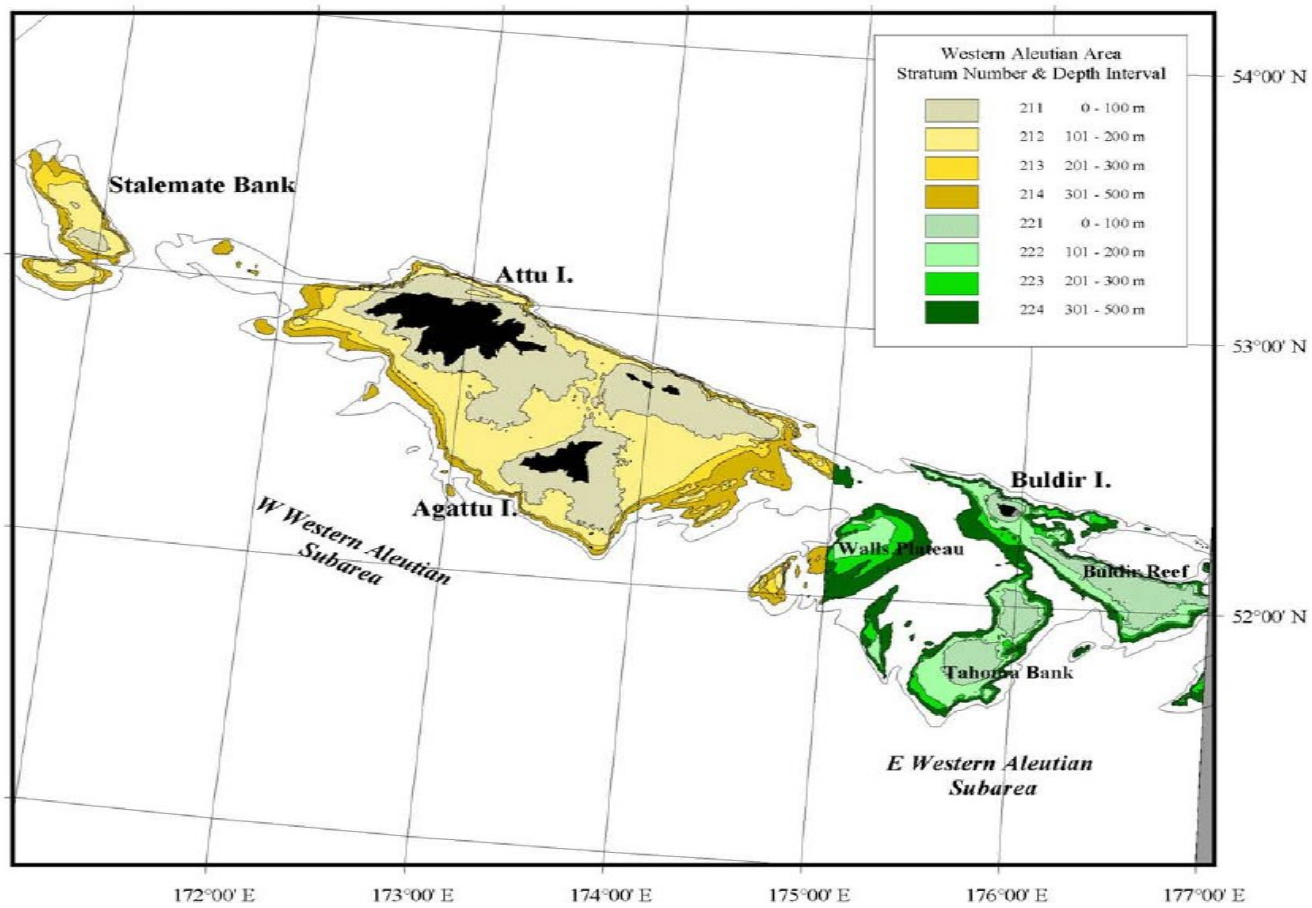
Appendices

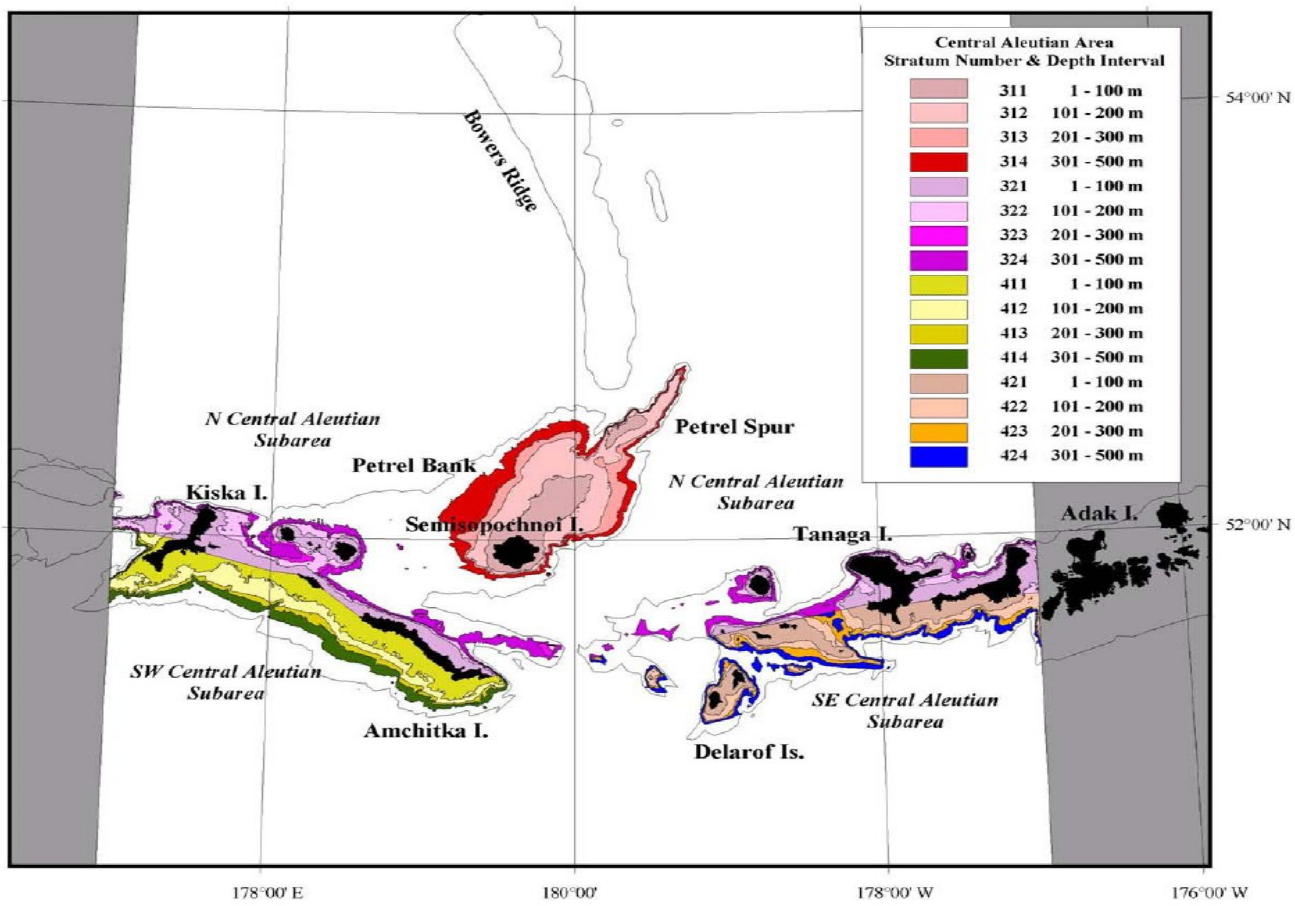
Appendix A

Appendix Table A-1. -- Survey strata including sampling districts, subdistricts, subdistrict codes, depth intervals, and areas.

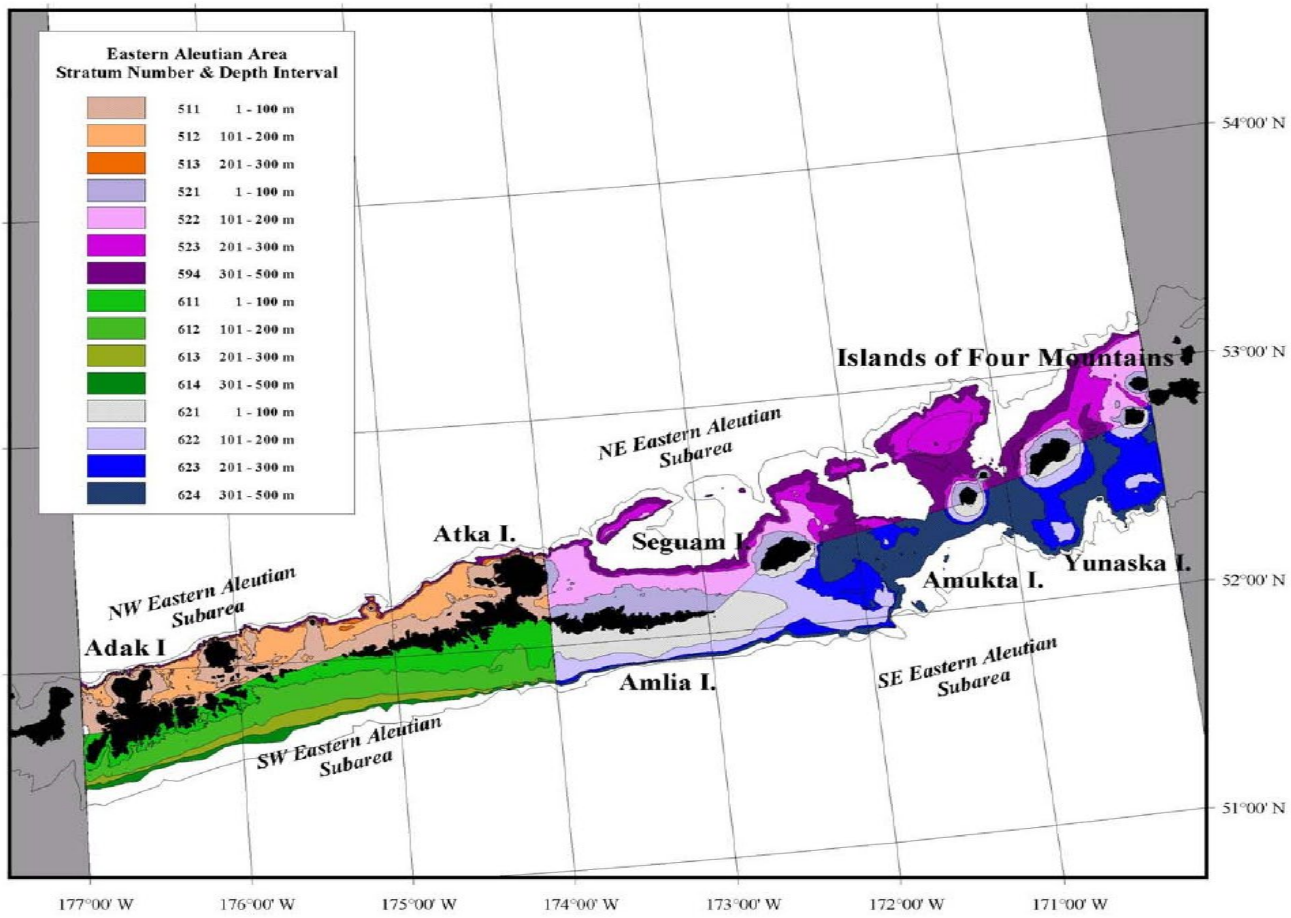
Survey district	Stratum name	Stratum Code	Depth Interval (m)	Area (km^2)
Western Aleutians	W Western Aleutians	211	1-100	3,693
	W Western Aleutians	212	101-200	4,065
	W Western Aleutians	213	201-300	940
	W Western Aleutians	214	301-500	1,711
	E Western Aleutians	221	1-100	1,183
	E Western Aleutians	222	101-200	1,252
	E Western Aleutians	223	201-300	783
	E Western Aleutians	224	301-500	1,561
Central Aleutians	Petrel Bank	311	1-100	960
	Petrel Bank	312	101-200	1,736
	Petrel Bank	313	201-300	766
	Petrel Bank	314	301-500	1,237
	N Central Aleutians	321	1-100	2,106
	N Central Aleutians	322	101-200	1,066
	N Central Aleutians	323	201-300	439
	N Central Aleutians	324	301-500	1,240
	SW Central Aleutians	411	1-100	1,618
	SW Central Aleutians	412	101-200	1,052
	SW Central Aleutians	413	201-300	426
	SW Central Aleutians	414	301-500	789
	SE Central Aleutians	421	1-100	1,164
	SE Central Aleutians	422	101-200	752
	SE Central Aleutians	423	201-300	477
	SE Central Aleutians	424	301-500	714
Eastern Aleutians	NW Eastern Aleutians	511	1-100	1,932
	NW Eastern Aleutians	512	101-200	1,594
	NW Eastern Aleutians	513	201-300	156
	NE Eastern Aleutians	521	1-100	1,268
	NE Eastern Aleutians	522	101-200	2,013
	NE Eastern Aleutians	523	201-300	1,969
	Combined Eastern Aleutian Islands	594	301-500	2,670
	SW Eastern Aleutians	611	1-100	1,907
	SW Eastern Aleutians	612	101-200	2,261
	SW Eastern Aleutians	613	201-300	716
	SW Eastern Aleutians	614	301-500	438
	SE Eastern Aleutians	621	1-100	1,741
	SE Eastern Aleutians	622	101-200	1,900
	SE Eastern Aleutians	623	201-300	2,061
	SE Eastern Aleutians	624	301-500	2,575
Southern Bering Sea	W Southern Bering Sea	711	1-100	1,586
	W Southern Bering Sea	712	101-200	670
	E Southern Bering Sea	721	1-100	2,440
	E Southern Bering Sea	722	101-200	1,179
	Combined Southern Bering Sea	793	201-300	564
	Combined Southern Bering Sea	794	301-500	1,043



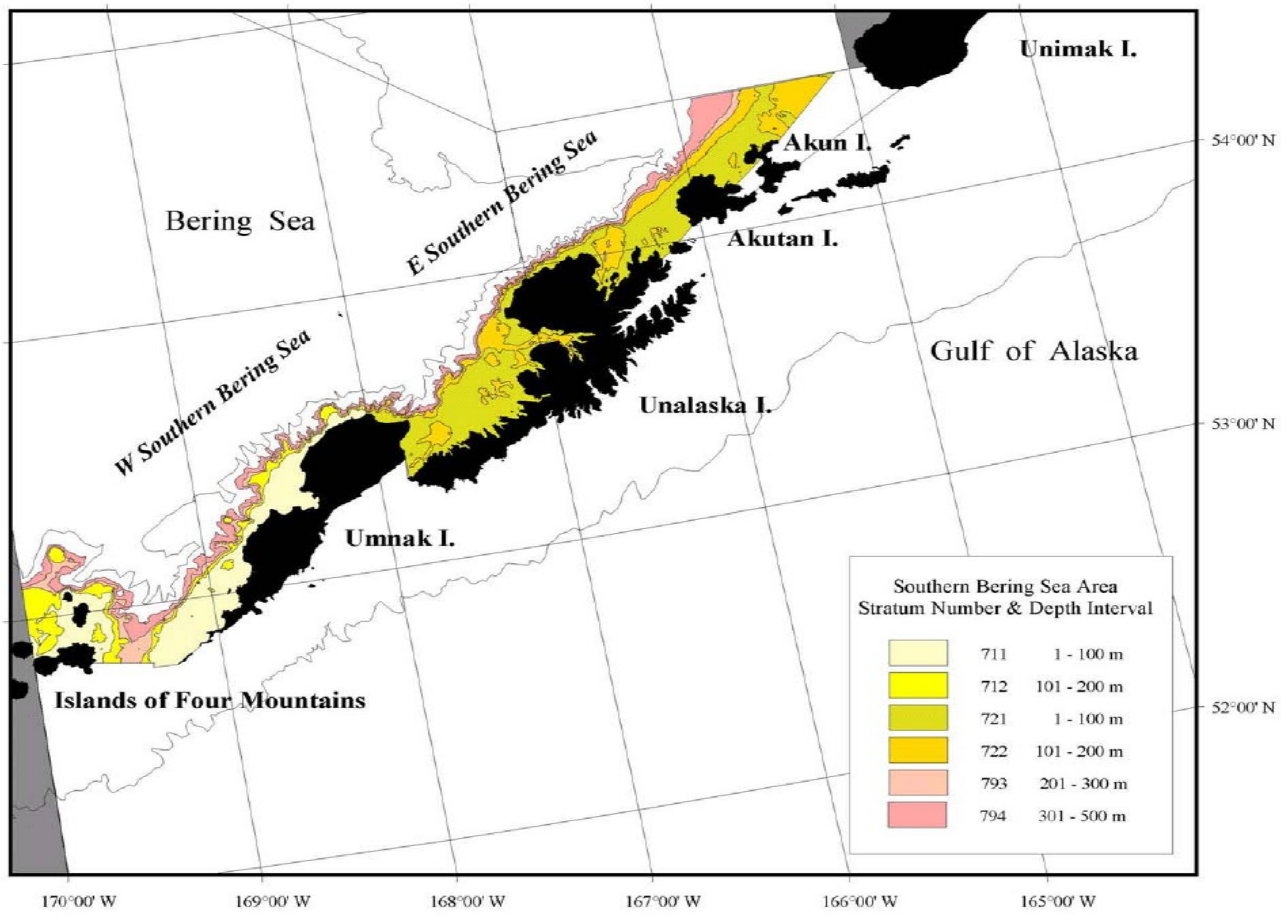
Appendix Figure A-1. -- AI survey strata by subdistricts and depth zones sampled during the 2022 Aleutian Islands groundfish trawl survey by survey district and sampling subarea.



Appendix Figure A-2. -- AI survey strata by subdistricts and depth zones sampled during the 2022 Aleutian Islands groundfish trawl survey by survey district and sampling subarea.



Appendix Figure A-3. -- AI survey strata by subdistricts and depth zones sampled during the 2022 Aleutian Islands groundfish trawl survey by survey district and sampling subarea.



Appendix Figure A-4. -- AI survey strata by subdistricts and depth zones sampled during the 2022 Aleutian Islands groundfish trawl survey by survey district and sampling subarea.

Appendix B

Appendix Table B1. -- Fish and invertebrate species encountered and identified during the 2022 Aleutian Islands bottom trawl survey.

INPFC area	Family	Common name	Species name
Central Aleutians	Rajidae	Aleutian skate	*Bathyraja aleutica*
	Rajidae	Commander skate	*Bathyraja lindbergi*
	Rajidae	whiteblotched skate	*Bathyraja maculata*
	Rajidae	butterfly skate	*Bathyraja mariposa*
	Rajidae	leopard skate	*Bathyraja panthera*
	Rajidae	Alaska skate	*Bathyraja parmifera*
	Rajidae	mud skate	*Bathyraja taranetzi*
	Rajidae	Okhotsk skate	*Bathyraja violacea*
	Lamnidae	salmon shark	*Lamna ditropis*
	Somniosidae	Pacific sleeper shark	*Somniosus pacificus*
	Pleuronectidae	Kamchatka flounder	*Atheresthes evermanni*
	Pleuronectidae	arrowtooth flounder	*Atheresthes stomias*
	Pleuronectidae	rex sole	*Glyptocephalus zachirus*
	Pleuronectidae	flathead sole	*Hippoglossoides elassodon*
	Pleuronectidae	Pacific halibut	*Hippoglossus stenolepis*
	Pleuronectidae	southern rock sole	*Lepidopsetta bilineata*
	Pleuronectidae	northern rock sole	*Lepidopsetta polyxystra*
	Pleuronectidae	Dover sole	*Microstomus pacificus*
	Pleuronectidae	Greenland turbot	*Reinhardtius hippoglossoides*
	Macrouridae	giant grenadier	*Albatrossia pectoralis*
	Anoplopomatidae	sablefish	*Anoplopoma fimbria*
	Cyclopteridae	smooth lumpsucker	*Aptocyclus ventricosus*
	Bathylagidae	robust blacksmelt	*Bathylagus milleri*
	Bathymasteridae	searcher	*Bathymaster signatus*
	Liparidae	bigeye snailfish	*Careproctus candidus*
	Liparidae	mischievous snailfish	*Careproctus faunus*
	Liparidae	emarginate snailfish	*Careproctus furcellus*
	Liparidae	microdisk snailfish	*Careproctus ostentum*
	Liparidae	salmon snailfish	*Careproctus rastrinus*
	Liparidae	peachskin snailfish	*Careproctus scottae*
	Stomiidae	Pacific viperfish	*Chauliodus macouni*
	Liparidae	blotched snailfish	*Crystallichthys cyclospilus*
	Cyclopteridae	pimpled lumpsucker	*Eumicrotremus andriashevi*
	Cyclopteridae	Alaskan lumpsucker	*Eumicrotremus gyrinops*
	Cyclopteridae	Pacific spiny lumpsucker	*Eumicrotremus orbis*
	Gadidae	walleye pollock	*Gadus chalcogrammus*
	Gadidae	Pacific cod	*Gadus macrocephalus*
	Cottidae	armorhead sculpin	*Gymnocanthus galeatus*
	Cottidae	red Irish lord	*Hemilepidotus hemilepidotus*
	Cottidae	yellow Irish lord	*Hemilepidotus jordani*
	Cottidae	butterfly sculpin	*Hemilepidotus papilio*
	Cottidae	longfin Irish lord	*Hemilepidotus zapus*
	Hexagrammidae	kelp greenling	*Hexagrammos decagrammus*
	Agonidae	fourhorn poacher	*Hypsagonus quadricornis*
	Myctophidae	brokenline lampfish	*Lampanyctus jordani*
	Agonidae	sawback poacher	*Leptagonus frenatus*
	Agonidae	longnose poacher	*Leptagonus leptorhynchus*
	Cottidae	Pacific staghorn sculpin	*Leptocottus armatus*

INPFC area	Family	Common name	Species name
	Liparidae	variegated snailfish	*Liparis gibbus*
	Zoarcidae	Bering eelpout	*Lycodes beringi*
	Zoarcidae	ebony eelpout	*Lycodes concolor*
	Psychrolutidae	darkfin sculpin	*Malacocottus zonurus*
	Cottidae	great sculpin	*Myoxocephalus polyacanthocephalus*
	Myctophidae	pinpoint lampfish	*Nannobrachium regale*
	Hemitripteridae	sailfin sculpin	*Nautichthys oculofasciatus*
	Salmonidae	chum salmon	*Oncorhynchus keta*
	Salmonidae	Chinook salmon	*Oncorhynchus tshawytscha*
	Hexagrammidae	Atka mackerel	*Pleurogrammus monopterygius*
	Agonidae	sturgeon poacher	*Podothecus accipenserinus*
	Cottidae	roughskin sculpin	*Rastrinus scutiger*
	Scorpaenidae	rougheye rockfish	*Sebastes aleutianus*
	Scorpaenidae	Pacific ocean perch	*Sebastes alutus*
	Scorpaenidae	shortraker rockfish	*Sebastes borealis*
	Scorpaenidae	dark rockfish	*Sebastes ciliatus*
	Scorpaenidae	black rockfish	*Sebastes melanops*
	Scorpaenidae	blackspotted rockfish	*Sebastes melanostictus*
	Scorpaenidae	northern rockfish	*Sebastes polyspinis*
	Scorpaenidae	dusky rockfish	*Sebastes variabilis*
	Scorpaenidae	harlequin rockfish	*Sebastes variegatus*
	Scorpaenidae	shortspine thornyhead	*Sebastolobus alascanus*
	Myctophidae	northern lampfish	*Stenobrachius leucopsarus*
	Myctophidae	garnet lampfish	*Stenobrachius nannochir*
	Cottidae	scissortail sculpin	*Triglops forficata*
	Cottidae	roughspine sculpin	*Triglops macellus*
	Cottidae	spectacled sculpin	*Triglops scepticus*
	Zaproridae	prowfish	*Zaprora silenus*
	Sertulariidae	bushy white hydroid	*Abietinaria greenei*
	Lithodidae	fuzzy crab	*Acantholithodes hispidus*
	Alcyonidiidae	fruit leather bryozoan	*Alcyonidium pedunculatum*
	Alcyonidiidae	medusa bryozoan	*Alcyonidium* sp. A
	Polyclinidae	sand-grain imbedded ascidian	*Amaroucium soldatovi*
	Aphrocallistidae	clay pipe sponge	*Aphrocallistes vastus*
	Microcionidae		*Artemisina arcigera*
	Cladorhizidae	fuzzy sponge	*Asbestopluma* sp. A (Clark 2006)
	Ascidiidae	glassy tunicate	*Ascidia paratropa*
	Rossellidae	vase sponge	*Aulosaccus schulzei*
	Ulmaridae		*Aurelia labiata*
	Axinellidae	firm finger sponge	*Axinella blanca*
	Balanidae		*Balanus nubilus*
	Balanidae	beaked barnacle	*Balanus rostratus*
	Buccinidae	rotund whelk	*Beringius rotundus*
	Gonatidae	magistrate armhook squid	*Berryteuthis magister*
	Bonneviellidae	champagne flute hydroid	*Bonneviella* sp. A (Clark 2006)
	Buccinidae	lirate whelk	*Buccinum eugrammatum*

INPFC area	Family	Common name	Species name
	Buccinidae	two-ribbed chestnut whelk	*Buccinum* sp. E (McLean and Clark)
	Buccinidae	three-ribbed chestnut whelk	*Buccinum triplostephanum*
	Bugulidae		*Bugula pacifica*
	Goniasteridae		*Ceramaster clarki*
	Benthopectinidae	fragile sea star	*Cheiraster dawsoni*
	Oregoniidae	Tanner crab	*Chionoecetes bairdi*
	Balanidae	giant barnacle	*Chirona evermanni*
	Pelagiidae	sea nettle	*Chrysaora fuscescens*
	Pelagiidae		*Chrysaora melanaster*
	Chalinidae	rough hat sponge	*Cladocroce attu*
	Tetillidae		*Craniella arb*
	Tetillidae	baseball sponge	*Craniella craniana*
	Tetillidae	knobby ball sponge	*Craniella* sp. B
	Tetillidae	furry ball sponge	*Craniella spinosa*
	Tetillidae	spiky ball sponge	*Craniella sputnika*
	Crellidae	soft brown sponge	*Crella brunnea*
	Solasteridae	rose sea star	*Crossaster papposus*
	Solasteridae	pink rose star	*Crossaster* sp. B (Clark)
	Plexauridae		*Cryogorgia koolsae*
	Cucumariidae	sea football	*Cucumaria fallax*
	Cucumariidae		*Cucumaria frondosa*
	Cucumariidae		*Cucumaria japonica*
	Pterasteridae	pincushion sea star	*Diplopteraster multipes*
	Clavelinidae	globular ascidian	*Distaplia occidentalis*
	Clavelinidae	peach ascidian	*Distaplia* sp. A (Clark 2006)
	Paguridae	purple hermit	*Elassochirus cavimanus*
	Paguridae	widehand hermit crab	*Elassochirus tenuimanus*
	Octopodidae	giant octopus	*Enteroctopus dofleini*
	Cheiragonidae	horsehair crab	*Erimacrus isenbeckii*
	Primnoidae		*Fanellia compressa*
	Primnoidae		*Fanellia fraseri*
	Ranellidae	Oregon triton	*Fusitriton oregonensis*
	Cranchiidae		*Galiteuthis phyllura*
	Geodiidae	calcareous finger sponge	*Geodinella lendenfeldi*
	Cancridae	Oregon rock crab	*Glebocarcinus oregonensis*
	Gonatidae	boreopacific armhook squid	*Gonatopsis borealis*
	Gonatidae		*Gonatopsis* sp. A (Jorgensen)
	Gonatidae	clawed armhook squid	*Gonatus onyx*
	Gorgonocephalidae	basketstar	*Gorgonocephalus eucnemis*
	Halichondriidae	barrel sponge	*Halichondria panicea*
	Chalinidae		*Haliclona digitata*
	Pyuridae	sea peach	*Halocynthia aurantium*
	Lithodidae	soft crab	*Hapalogaster grebnitzkii*
	Echinasteridae	blood sea star	*Henricia leviuscula*
	Echinasteridae	mottled Henricia	*Henricia rhytisma*
	Alcyoniidae	red mushroom coral	*Heteropolypus (=Anthomastus)* sp. A

INPFC area	Family	Common name	Species name
	Goniasteridae	Aleutian spiny star	*Hippasteria aleutica*
	Goniasteridae	spiny red sea star	*Hippasteria phrygiana (=spinosa)*
	Coelosphaeridae	spud sponge	*Histodermella kagigunensis*
	Oregoniidae	Pacific lyre crab	*Hyas lyratus*
	Coelosphaeridae	yellow ball sponge	*Inflatella globosa*
	Isodictyidae	orange finger sponge	*Isodictya rigida*
	Buccinidae		*Japelion* sp. A
	Latrunculiidae	green papillate sponge	*Latrunculia oparinae*
	Asteriidae		*Leptasterias arctica*
	Asteriidae	giant Aleutian six-rayed star	*Leptasterias truculenta*
	Asteriidae	blackspined sea star	*Lethasterias nanimensis*
	Grantiidae		*Leucandra tuba*
	Lithodidae	golden king crab	*Lithodes aequispinus*
	Calpensiidae		*Microporina articulata*
	Mytilidae	northern horsemussel	*Modiolus modiolus*
	Crambeidae	yellow leafy sponge	*Monanchora pulchra*
	Plexauridae		*Muriceides nigra*
	Mycalidae	trumpet sponge	*Mycale carlilei*
	Mycalidae	tree sponge	*Mycale loveni*
	Mycalidae	slimy kelp sponge	*Mycale tylota*
	Myxillidae	scallop sponge	*Myxilla parasitica*
	Buccinidae		*Neptunea* sp. C (McLean and Clark)
	Piscicolidae	striped sea leech	*Notostomum cyclostomum*
	Echinasteridae		*Odontohenricia ahearnae*
	Echinasteridae		*Odontohenricia* sp. A (Clark)
	Echinasteridae		*Odontohenricia* sp. B (Clark)
	Ophiactidae		*Ophiopholis japonica*
	Ophiuridae	gray brittle star	*Ophiura luetkenii*
	Ophiuridae	notched brittlestar	*Ophiura sarsii*
	Oregoniidae	graceful decorator crab	*Oregonia gracilis*
	Paguridae	Aleutian hermit	*Pagurus aleuticus*
	Paguridae	sponge hermit	*Pagurus brandti*
	Paguridae	hairy hermit crab	*Pagurus capillatus*
	Paguridae	longfinger hermit	*Pagurus rathbuni*
	Paguridae	fuzzy hermit crab	*Pagurus trigonocheirus*
	Pandalidae	Alaskan pink shrimp	*Pandalus eous*
	Pandalidae	roughpatch shrimp	*Pandalus stenolepis*
	Pandalidae	yellowleg pandalid	*Pandalus tridens*
	Paragorgiidae	Kamchatka coral	*Paragorgia arborea*
	Pasiphaeidae	Pacific glass shrimp	*Pasiphaea pacifica*
	Pedicellasteridae	majestic sea star	*Pedicellaster magister*
	Periphyllidae	helmet jelly	*Periphylla periphylla*
	Ulmaridae	egg yolk jelly	*Phacellophora camtschatica*
	Hymedesmiidae		*Phorbas paucistylifer*
	Lithodidae	scaled crab	*Placetron wosnessenskii*
	Primnoidae	loose-branched Plumarella	*Plumarella nuttingi*

INPFC area	Family	Common name	Species name
		feathery Plumarella	*Plumarella* sp. 1 (Bayer)
	Primnoidae	bushy coral	*Plumarella superba*
	Anomiidae	abalone jingle	*Pododesmus cepio*
	Anomiidae	Alaska falsejingle	*Pododesmus macrochisma*
	Polymastiidae	Flugel nippled sponge	*Polymastia fluegeli*
	Polymastiidae	orange nipple-ball sponge	*Polymastia pacifica*
	Polymastiidae	prolific nipple sponge	*Polymastia* sp. A (Clark 2006)
	Goniasteridae	scarlet sea star	*Pseudarchaster parelii*
	Suberitidae	peach sponge	*Pseudosuberites montiniger*
	Psolidae		*Psolus japonicus*
	Psolidae		*Psolus* sp. A (Clark 2006)
	Psolidae	whitescaled sea cucumber	*Psolus squamatus*
	Pterasteridae		*Pteraster jordani*
	Pterasteridae		*Pteraster* sp. A (Clark 1999)
	Pterasteridae		*Pteraster tesselatus*
	Pterasteridae		*Pteraster willsi*
	Pennatulidae	orange sea pen	*Ptilosarcus gurneyi*
	Buccinidae		*Pyrulofusus dexius*
	Buccinidae		*Pyrulofusus melonis*
	Pyuridae	wrinkled tunicate	*Pyura haustor*
	Mucronellidae	ribbed bryozoan	*Rhamphostomella costata*
	Lithodidae	rhinoceros crab	*Rhinolithodes wosnessenskii*
	Aegidae	sea cockroach	*Rocinela angustata*
	Sepiolidae	eastern Pacific bobtail	*Rossia pacifica*
	Esperiopsidae	cat-o-nine-tails sponge	*Semisuberites cribrosa*
	Solasteridae	beautiful sun star	*Solaster spectabilis*
	Ophiuridae		*Stegophiura ponderosa*
	Myxillidae	scapula sponge	*Stelodoryx oxeata*
	Strongylocentrotidae		*Strongylocentrotus polyacanthus*
	Styelidae	sea potato	*Styela rustica*
	Stylocordylidae	slender stalked sponge	*Stylocordyla borealis*
	Suberitidae	hermit sponge	*Suberites domuncula*
	Synallactidae		*Synallactes challengeri*
	Synallactidae		*Synallactes* sp. A (Clark 2006)
	Tedaniidae	club sponge	*Tedania kagalaskai*
	Tritoniidae	festive Tritonia	*Tritonia festiva*
	Pachastrellidae	fuzzy cratered sponge	*Vulcanella* sp. 1
	Polymastiidae	pale mammilated sponge	*Weberella bursa*
Eastern Aleutians	Rajidae	Aleutian skate	*Bathyraja aleutica*
	Rajidae	whiteblotched skate	*Bathyraja maculata*
	Rajidae	butterfly skate	*Bathyraja mariposa*
	Rajidae	leopard skate	*Bathyraja panthera*
	Rajidae	Alaska skate	*Bathyraja parmifera*
	Rajidae	mud skate	*Bathyraja taranetzi*
	Pleuronectidae	Kamchatka flounder	*Atheresthes evermanni*
	Pleuronectidae	arrowtooth flounder	*Atheresthes stomias*
	Pleuronectidae	rex sole	*Glyptocephalus zachirus*

INPFC area	Family	Common name	Species name
	Pleuronectidae	flathead sole	*Hippoglossoides elassodon*
	Pleuronectidae	Pacific halibut	*Hippoglossus stenolepis*
	Pleuronectidae	southern rock sole	*Lepidopsetta bilineata*
	Pleuronectidae	northern rock sole	*Lepidopsetta polyxystra*
	Pleuronectidae	slender sole	*Lyopsetta exilis*
	Pleuronectidae	Dover sole	*Microstomus pacificus*
	Pleuronectidae	Greenland turbot	*Reinhardtius hippoglossoides*
	Macrouridae	giant grenadier	*Albatrossia pectoralis*
	Liparidae	whiskered snailfish	*Allocareproctus ungak*
	Anoplopomatidae	sablefish	*Anoplopoma fimbria*
	Cyclopteridae	smooth lumpsucker	*Aptocyclus ventricosus*
	Cottidae	scaled sculpin	*Archistes biseriatus*
	Agonidae	Aleutian alligatorfish	*Aspidophoroides monopterygius*
	Bathymasteridae	searcher	*Bathymaster signatus*
	Cottidae	broadfin sculpin	*Bolinia euryptera*
	Liparidae	blacktail snailfish	*Careproctus melanurus*
	Liparidae	monster snailfish	*Careproctus phasma*
	Liparidae	salmon snailfish	*Careproctus rastrinus*
	Liparidae	peachskin snailfish	*Careproctus scottae*
	Liparidae	proboscis snailfish	*Careproctus simus*
	Caulophrynidae	fanfin angler	*Caulophryne jordani*
	Liparidae	blotched snailfish	*Crystallichthys cyclospilus*
	Psychrolutidae	spinyhead sculpin	*Dasycottus setiger*
	Cyclopteridae	Alaskan lumpsucker	*Eumicrotremus gyrinops*
	Cyclopteridae	Pacific spiny lumpsucker	*Eumicrotremus orbis*
	Gadidae	walleye pollock	*Gadus chalcogrammus*
	Gadidae	Pacific cod	*Gadus macrocephalus*
	Cottidae	armorhead sculpin	*Gymnocanthus galeatus*
	Cottidae	yellow Irish lord	*Hemilepidotus jordani*
	Cottidae	longfin Irish lord	*Hemilepidotus zapus*
	Hemitripteridae	bigmouth sculpin	*Hemitripterus bolini*
	Hexagrammidae	kelp greenling	*Hexagrammos decagrammus*
	Agonidae	fourhorn poacher	*Hypsagonus quadricornis*
	Cottidae	northern sculpin	*Icelinus borealis*
	Agonidae	sawback poacher	*Leptagonus frenatus*
	Agonidae	longnose poacher	*Leptagonus leptorhynchus*
	Cottidae	Pacific staghorn sculpin	*Leptocottus armatus*
	Bathylagidae	northern smoothtongue	*Leuroglossus schmidti*
	Zoarcidae	bicolor eelpout	*Lycodes akuugun*
	Zoarcidae	ebony eelpout	*Lycodes concolor*
	Zoarcidae	wattled eelpout	*Lycodes palearis*
	Opisthoproctidae	barreleye	*Macropinna microstoma*
	Psychrolutidae	darkfin sculpin	*Malacocottus zonurus*
	Cottidae	great sculpin	*Myoxocephalus polyacanthocephalus*
	Hemitripteridae	eyeshade sculpin	*Nautichthys pribilovius*
	Salmonidae	chum salmon	*Oncorhynchus keta*
	Salmonidae	chinook salmon	*Oncorhynchus tshawytscha*
	Hexagrammidae	Atka mackerel	*Pleurogrammus monopterygius*

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	Agonidae	sturgeon poacher	*Podothecus accipenserinus*
	Zoarcidae	coral eelpout	*Puzanovia rubra*
	Cottidae	roughskin sculpin	*Rastrinus scutiger*
	Scorpaenidae	rougheye rockfish	*Sebastes aleutianus*
	Scorpaenidae	Pacific ocean perch	*Sebastes alutus*
	Scorpaenidae	shortraker rockfish	*Sebastes borealis*
	Scorpaenidae	blackspotted rockfish	*Sebastes melanostictus*
	Scorpaenidae	northern rockfish	*Sebastes polyspinis*
	Scorpaenidae	dusky rockfish	*Sebastes variabilis*
	Scorpaenidae	harlequin rockfish	*Sebastes variegatus*
	Scorpaenidae	shortspine thornyhead	*Sebastolobus alascanus*
	Myctophidae	northern lampfish	*Stenobrachius leucopsarus*
	Stomiidae	longfin dragonfish	*Tactostoma macropus*
	Cottidae	scissortail sculpin	*Triglops forficata*
	Cottidae	roughspine sculpin	*Triglops macellus*
	Cottidae	spectacled sculpin	*Triglops scepticus*
	Zaproridae	prowfish	*Zaprora silenus*
	Petromyzontidae	Pacific lamprey	*Lampetra tridentata*
	Sertulariidae	bushy white hydroid	*Abietinaria greenei*
	Lithodidae	fuzzy crab	*Acantholithodes hispidus*
	Alcyonidiidae	fruit leather bryozoan	*Alcyonidium pedunculatum*
	Alcyonidiidae	medusa bryozoan	*Alcyonidium* sp. A
	Polyclinidae	sand-grain imbedded ascidian	*Amaroucium soldatovi*
	Aphrocallistidae	clay pipe sponge	*Aphrocallistes vastus*
	Volutidae		*Arctomelon borealis*
	Volutidae	Alaska volute	*Arctomelon stearnsii*
	Volutidae		*Arctomelon tamikoae*
	Crangonidae	Arctic argid	*Argis dentata*
	Crangonidae	Nelson argid	*Argis levior*
	Microcionidae		*Artemisina arcigera*
	Cladorhizidae	fuzzy sponge	*Asbestopluma* sp. A (Clark 2006)
	Ascidiidae	glassy tunicate	*Ascidia paratropa*
	Asteriidae	purple-orange sea star	*Asterias amurensis*
	Rossellidae	vase sponge	*Aulosaccus schulzei*
	Ulmaridae		*Aurelia labiata*
	Axinellidae	firm finger sponge	*Axinella blanca*
	Octopodidae	smoothskin octopus	*Benthoctopus leioderma*
	Buccinidae		*Beringius aleuticus*
	Buccinidae		*Beringius* sp. D (McLean and Clark)
	Gonatidae	magistrate armhook squid	*Berryteuthis magister*
	Bonneviellidae	champagne flute hydroid	*Bonneviella* sp. A (Clark 2006)
	Bugulidae		*Bugula pacifica*
	Acanthogorgiidae	Bering red sea fan	*Calcigorgia beringi*
	Cancridae	red rock crab	*Cancer productus*
	Goniasteridae		*Ceramaster clarki*
	Goniasteridae	orange bat sea star	*Ceramaster patagonicus*
	Goniasteridae		*Ceramaster stellatus*

INPFC area	Family	Common name	Species name
	Benthopectinidae	fragile sea star	*Cheiraster dawsoni*
	Oregoniidae	Tanner crab	*Chionoecetes bairdi*
	Balanidae	giant barnacle	*Chirona evermanni*
	Cladorhizidae	lobed tree sponge	*Chondrocladia concrescens*
	Pisidae	longhorned decorator crab	*Chorilia longipes*
	Pelagiidae	sea nettle	*Chrysaora fuscescens*
	Pelagiidae		*Chrysaora melanaster*
	Goniasteridae		*Cladaster validus*
	Chalinidae	rough hat sponge	*Cladocroce attu*
	Chalinidae		*Cladocroce infundibulum*
	Chalinidae		*Cladocroce kiska*
	Clavulariidae	encrusting coral	*Clavularia incrustans*
	Tetillidae		*Craniella arb*
	Tetillidae	furry ball sponge	*Craniella spinosa*
	Crellidae	soft brown sponge	*Crella brunnea*
	Solasteridae	rose sea star	*Crossaster papposus*
	Solasteridae	white rose star	*Crossaster* sp. A (Clark)
	Plexauridae		*Cryogorgia koolsae*
	Ctenodiscidae	common mud star	*Ctenodiscus crispatus*
	Cucumariidae	sea football	*Cucumaria fallax*
	Cucumariidae		*Cucumaria frondosa*
	Cyaneidae	lion's mane jelly	*Cyanea capillata*
	Stylasteridae		*Cyclohelia lamellata*
	Pterasteridae	pincushion sea star	*Diplopteraster multipes*
	Clavelinidae	globular ascidian	*Distaplia occidentalis*
	Archidorididae	white night doris	*Doris odhneri*
	Microcionidae	hat sponge	*Echinoclathria beringensis*
	Paguridae	purple hermit	*Elassochirus cavimanus*
	Paguridae	Pacific red hermit	*Elassochirus gilli*
	Paguridae	widehand hermit crab	*Elassochirus tenuimanus*
	Octopodidae	giant octopus	*Enteroctopus dofleini*
	Cheiragonidae	horsehair crab	*Erimacrus isenbeckii*
	Hippolytidae	deepsea eualid	*Eualus biunguis*
	Polynoidae	giant scale worm	*Eunoe nodosa*
	Primnoidae		*Fanellia compressa*
	Primnoidae		*Fanellia fraseri*
	Ranellidae	Oregon triton	*Fusitriton oregonensis*
	Goniasteridae	Swift sea star	*Gephyreaster swifti*
	Cancridae	Oregon rock crab	*Glebocarcinus oregonensis*
	Gonatidae	boreopacific armhook squid	*Gonatopsis borealis*
	Gorgonocephalidae	basketstar	*Gorgonocephalus eucnemis*
	Halichondriidae	ginseng sponge	*Halichondria oblonga*
	Halichondriidae	barrel sponge	*Halichondria panicea*
	Halichondriidae		*Halichondria sitiens*
	Chalinidae		*Haliclona digitata*
	Halipteridae		*Halipteris willemoesi*
	Pyuridae	sea peach	*Halocynthia aurantium*
	Polynoidae	eighteen-scaled worm	*Halosydna brevisetosa*
	Lithodidae	soft crab	*Hapalogaster grebnitzkii*

INPFC area	Family	Common name	Species name
	Echinasteridae		*Henricia aleutica*
	Echinasteridae	blood sea star	*Henricia leviuscula*
	Aphrocallistidae	goblet sponge	*Heterochone calyx*
	Alcyoniidae	red mushroom coral	*Heteropolypus (=Anthomastus)* sp. A
	Hiatellidae	Arctic Hiatella	*Hiatella arctica*
	Goniasteridae	Aleutian spiny star	*Hippasteria aleutica*
	Goniasteridae		*Hippasteria heathi*
	Goniasteridae	spiny red sea star	*Hippasteria phrygiana (=spinosa)*
	Coelosphaeridae	spud sponge	*Histodermella kagigunensis*
	Oregoniidae	Pacific lyre crab	*Hyas lyratus*
	Halichondriidae	coalescent finger sponge	*Hymeniacidon assimilis*
	Isodictyidae	orange finger sponge	*Isodictya rigida*
	Latrunculiidae	green papillate sponge	*Latrunculia oparinae*
	Hippolytidae	spiny lebbeid	*Lebbeus groenlandicus*
	Asteriidae	Aleutian sea star	*Leptasterias hylodes*
	Astropectinidae	North Pacific sea star	*Leptychaster arcticus*
	Asteriidae	blackspined sea star	*Lethasterias nanimensis*
	Grantiidae		*Leucandra tuba*
	Lithodidae	golden king crab	*Lithodes aequispinus*
	Goniasteridae	vermilion sea star	*Mediaster aequalis*
	Metridiidae	gigantic anemone	*Metridium farcimen*
	Calpensiidae		*Microporina articulata*
	Mytilidae	northern horsemussel	*Modiolus modiolus*
	Crambeidae		*Monanchora alaskensis*
	Crambeidae	yellow leafy sponge	*Monanchora pulchra*
	Plexauridae		*Muriceides nigra*
	Mycalidae	trumpet sponge	*Mycale carlilei*
	Mycalidae	tree sponge	*Mycale loveni*
	Mycalidae	red mycale	*Mycale* sp. A (Clark 2006)
	Mycalidae	slimy kelp sponge	*Mycale tylota*
	Myxillidae	scallop sponge	*Myxilla parasitica*
	Buccinidae	white neptune	*Neptunea amianta*
	Buccinidae		*Neptunea insularis*
	Buccinidae		*Neptunea* sp. C (McLean and Clark)
	Piscicolidae	striped sea leech	*Notostomum cyclostomum*
	Echinasteridae		*Odontohenricia ahearnae*
	Ophiactidae	ubiquitous brittle star	*Ophiopholis aculeata*
	Ophiactidae		*Ophiopholis japonica*
	Ophiactidae		*Ophiopholis longispina*
	Ophiuridae	gray brittle star	*Ophiura luetkenii*
	Oregoniidae	split-nose decorator crab	*Oregonia bifurca*
	Oregoniidae	graceful decorator crab	*Oregonia gracilis*
	Plakinidae	stalked ball sponge	*Oscarella lobularis*
	Pachastrellidae	mushroom sponge	*Pachastrellidae* sp. 1
	Paguridae	Aleutian hermit	*Pagurus aleuticus*
	Paguridae	sponge hermit	*Pagurus brandti*
	Paguridae	knobbyhand hermit	*Pagurus confragosus*
	Paguridae	hornyhand hermit	*Pagurus cornutus*
	Paguridae	bluespine hermit	*Pagurus kennerlyi*
	Paguridae	fuzzy hermit crab	*Pagurus trigonocheirus*

INPFC area	Family	Common name	Species name
	Pandalidae	Alaskan pink shrimp	*Pandalus eous*
	Pandalidae	ocean shrimp	*Pandalus jordani*
	Pandalidae	roughpatch shrimp	*Pandalus stenolepis*
	Pandalidae	yellowleg pandalid	*Pandalus tridens*
	Paragorgiidae	Kamchatka coral	*Paragorgia arborea*
	Pedicellasteridae	majestic sea star	*Pedicellaster magister*
	Periphyllidae	helmet jelly	*Periphylla periphylla*
	Ulmaridae	egg yolk jelly	*Phacellophora camtschatica*
	Hymedesmiidae		*Phorbas paucistylifer*
	Lithodidae	scaled crab	*Placetron wosnessenskii*
	Primnoidae	loose-branched Plumarella	*Plumarella nuttingi*
	Primnoidae	pale Plumarella	*Plumarella* sp. A
	Primnoidae	pinnate Plumarella	*Plumarella* sp. B
	Primnoidae	bushy coral	*Plumarella superba*
	Anomiidae	abalone jingle	*Pododesmus cepio*
	Anomiidae	Alaska falsejingle	*Pododesmus macrochisma*
	Polymastiidae	Flugel nippled sponge	*Polymastia fluegeli*
	Polymastiidae	black-orange spud sponge	*Polymastia pachymastia*
	Polymastiidae	orange nipple-ball sponge	*Polymastia pacifica*
	Polymastiidae	prolific nipple sponge	*Polymastia* sp. A (Clark 2006)
	Polymastiidae	orange nipple ball sponge	*Polymastia* sp. B (Clark 2006)
	Primnoidae		*Primnoa pacifica*
	Primnoidae		*Primnoa wingi*
	Goniasteridae		*Pseudarchaster alascensis*
	Psolidae		*Psolus chitonoides*
	Psolidae		*Psolus* sp. A (Clark 2006)
	Pterasteridae		*Pteraster jordani*
	Pterasteridae		*Pteraster marssipus*
	Pterasteridae	wrinkled star	*Pteraster militaris*
	Pterasteridae	obscure sea star	*Pteraster obscurus*
	Pterasteridae		*Pteraster* sp. A (Clark 1999)
	Pterasteridae		*Pteraster* sp. B (Clark 1997)
	Pterasteridae		*Pteraster tesselatus*
	Pterasteridae		*Pteraster willsi*
	Buccinidae		*Pyrulofusus dexius*
	Euplectellidae	lacy basket sponge	*Regadrella okinoseana*
	Mucronellidae	ribbed bryozoan	*Rhamphostomella costata*
	Lithodidae	rhinoceros crab	*Rhinolithodes wosnessenskii*
	Aegidae	sea cockroach	*Rocinela angustata*
	Sepiolidae	eastern Pacific bobtail	*Rossia pacifica*
	Crangonidae	sculptured shrimp	*Sclerocrangon boreas*
	Cardiidae	oblique smoothcockle	*Serripes notabilis*
	Solasteridae	morning sun sea star	*Solaster dawsoni*
	Solasteridae		*Solaster* sp. A (Clark 1997)

INPFC area	Family	Common name	Species name
	Hippolytidae	Rathbun blade shrimp	*Spirontocaris arcuata*
	Ophiuridae		*Stegophiura ponderosa*
	Myxillidae	Alaskan lobed sponge	*Stelodoryx alaskensis*
	Myxillidae	scapula sponge	*Stelodoryx oxeata*
	Actinostolidae	swimming anemone	*Stomphia coccinea*
	Strongylocentrotidae	green sea urchin	*Strongylocentrotus droebachiensis*
	Strongylocentrotidae		*Strongylocentrotus polyacanthus*
	Styelidae	sea potato	*Styela rustica*
	Stylasteridae		*Stylaster verrilli*
	Suberitidae	hermit sponge	*Suberites domuncula*
	Suberitidae	wax sponge	*Suberites* sp. A (Clark 2006)
	Buccinidae	Aleutian sulcated whelk	*Sulcosinus* sp. A (McLean and Clark)
	Synallactidae		*Synallactes challengeri*
	Tedaniidae	club sponge	*Tedania kagalaskai*
	Polymastiidae	two nipple sponge	*Tentorium semisuberites*
	Buccinidae	simple whelk	*Volutopsius simplex*
	Buccinidae		*Volutopsius* sp. C (Clark and McLean)
	Buccinidae		*Volutopsius* sp. D (Clark and McLean)
	Pachastrellidae	fuzzy cratered sponge	*Vulcanella* sp. 1
	Zoanthidae	hot dog zoanthid	*Zoanthidae* sp. A
Southern Bering Sea	Rajidae	Aleutian skate	*Bathyraja aleutica*
	Rajidae	Bering skate	*Bathyraja interrupta*
	Rajidae	whiteblotched skate	*Bathyraja maculata*
	Rajidae	Alaska skate	*Bathyraja parmifera*
	Rajidae	mud skate	*Bathyraja taranetzi*
	Rajidae	big skate	*Beringraja binoculata*
	Pleuronectidae	Kamchatka flounder	*Atheresthes evermanni*
	Pleuronectidae	arrowtooth flounder	*Atheresthes stomias*
	Pleuronectidae	rex sole	*Glyptocephalus zachirus*
	Pleuronectidae	flathead sole	*Hippoglossoides elassodon*
	Pleuronectidae	Pacific halibut	*Hippoglossus stenolepis*
	Pleuronectidae	southern rock sole	*Lepidopsetta bilineata*
	Pleuronectidae	northern rock sole	*Lepidopsetta polyxystra*
	Pleuronectidae	slender sole	*Lyopsetta exilis*
	Pleuronectidae	Dover sole	*Microstomus pacificus*
	Pleuronectidae	English sole	*Parophrys vetulus*
	Pleuronectidae	Greenland turbot	*Reinhardtius hippoglossoides*
	Anarhichadidae	wolf-eel	*Anarrhichthys ocellatus*
	Anoplopomatidae	sablefish	*Anoplopoma fimbria*
	Bathymasteridae	searcher	*Bathymaster signatus*
	Liparidae	smalldisk snailfish	*Careproctus gilberti*
	Liparidae	peachskin snailfish	*Careproctus scottae*
	Clupeidae	Pacific herring	*Clupea pallasii*
	Liparidae	blotched snailfish	*Crystallichthys cyclospilus*
	Psychrolutidae	spinyhead sculpin	*Dasycottus setiger*
	Myctophidae	California headlightfish	*Diaphus theta*
	Cyclopteridae	Pacific spiny lumpsucker	*Eumicrotremus orbis*
	Gadidae	walleye pollock	*Gadus chalcogrammus*

INPFC area	Family	Common name	Species name
	Gadidae	Pacific cod	*Gadus macrocephalus*
	Cottidae	armorhead sculpin	*Gymnocanthus galeatus*
	Cottidae	yellow Irish lord	*Hemilepidotus jordani*
	Hemitripteridae	bigmouth sculpin	*Hemitripterus bolini*
	Hexagrammidae	kelp greenling	*Hexagrammos decagrammus*
	Agonidae	sawback poacher	*Leptagonus frenatus*
	Stichaeidae	longsnout prickleback	*Lumpenella longirostris*
	Zoarcidae	shortfin eelpout	*Lycodes brevipes*
	Psychrolutidae	darkfin sculpin	*Malacocottus zonurus*
	Osmeridae	Pacific capelin	*Mallotus catervarius (=villosus)*
	Cottidae	great sculpin	*Myoxocephalus polyacanthocephalus*
	Hexagrammidae	Atka mackerel	*Pleurogrammus monopterygius*
	Agonidae	sturgeon poacher	*Podothecus accipenserinus*
	Stichaeidae	whitebarred prickleback	*Poroclinus rothrocki*
	Myctophidae	northern flashlightfish	*Protomyctophum thompsoni*
	Scorpaenidae	rougheye rockfish	*Sebastes aleutianus*
	Scorpaenidae	Pacific ocean perch	*Sebastes alutus*
	Scorpaenidae	shortraker rockfish	*Sebastes borealis*
	Scorpaenidae	dark rockfish	*Sebastes ciliatus*
	Scorpaenidae	blackspotted rockfish	*Sebastes melanostictus*
	Scorpaenidae	northern rockfish	*Sebastes polyspinis*
	Scorpaenidae	redstripe rockfish	*Sebastes proriger*
	Scorpaenidae	dusky rockfish	*Sebastes variabilis*
	Scorpaenidae	harlequin rockfish	*Sebastes variegatus*
	Scorpaenidae	shortspine thornyhead	*Sebastolobus alascanus*
	Myctophidae	northern lampfish	*Stenobrachius leucopsarus*
	Osmeridae	eulachon	*Thaleichthys pacificus*
	Cottidae	sponge sculpin	*Thyriscus anoplus*
	Cottidae	scissortail sculpin	*Triglops forficata*
	Cottidae	roughspine sculpin	*Triglops macellus*
	Cottidae	spectacled sculpin	*Triglops scepticus*
	Zaproridae	prowfish	*Zaprora silenus*
	Lithodidae	fuzzy crab	*Acantholithodes hispidus*
	Aphrocallistidae	clay pipe sponge	*Aphrocallistes vastus*
	Aphroditidae		*Aphrodita negligens*
	Crangonidae	Arctic argid	*Argis dentata*
	Ascidiidae	glassy tunicate	*Ascidia paratropa*
	Axinellidae	firm finger sponge	*Axinella blanca*
	Buccinidae	Bering beringius	*Beringius behringi*
	Gonatidae	magistrate armhook squid	*Berryteuthis magister*
	Bonneviellidae	champagne flute hydroid	*Bonneviella* sp. A (Clark 2006)
	Buccinidae	sinuous whelk	*Buccinum plectrum*
	Goniasteridae	red bat star	*Ceramaster japonicus*
	Goniasteridae	orange bat sea star	*Ceramaster patagonicus*
	Goniasteridae		*Ceramaster stellatus*
	Oregoniidae	Tanner crab	*Chionoecetes bairdi*
	Pisidae	longhorned decorator crab	*Chorilia longipes*
	Pelagiidae		*Chrysaora melanaster*

INPFC area	Family	Common name	Species name
	Cardiidae	Nuttall cockle	*Clinocardium nuttallii*
	Actiniidae	chevron-tentacled anemone	*Cribrinopsis fernaldi*
	Solasteridae	rose sea star	*Crossaster papposus*
	Ctenodiscidae	common mud star	*Ctenodiscus crispatus*
	Cucumariidae	sea football	*Cucumaria fallax*
	Cucumariidae		*Cucumaria frondosa*
	Pterasteridae	pincushion sea star	*Diplopteraster multipes*
	Archidorididae	white night doris	*Doris odhneri*
	Paguridae	purple hermit	*Elassochirus cavimanus*
	Paguridae	Pacific red hermit	*Elassochirus gilli*
	Paguridae	widehand hermit crab	*Elassochirus tenuimanus*
	Octopodidae	giant octopus	*Enteroctopus dofleini*
	Asteriidae	mottled sea star	*Evasterias troschelii*
	Ranellidae	Oregon triton	*Fusitriton oregonensis*
	Geodiidae	pita sponge	*Geodia starki*
	Gorgonocephalidae	basketstar	*Gorgonocephalus eucnemis*
	Halichondriidae	ginseng sponge	*Halichondria oblonga*
	Pyuridae	sea peach	*Halocynthia aurantium*
	Alcyoniidae	red mushroom coral	*Heteropolypus (=Anthomastus)* sp. A
	Coelosphaeridae	spud sponge	*Histodermella kagigunensis*
	Oregoniidae	Pacific lyre crab	*Hyas lyratus*
	Paguridae	splendid hermit	*Labidochirus splendescens*
	Latrunculiidae	green papillate sponge	*Latrunculia oparinae*
	Asteriidae	blackspined sea star	*Lethasterias nanimensis*
	Grantiidae		*Leucandra tuba*
	Lithodidae	golden king crab	*Lithodes aequispinus*
	Metridiidae	gigantic anemone	*Metridium farcimen*
	Mytilidae	northern horsemussel	*Modiolus modiolus*
	Crambeidae	yellow leafy sponge	*Monanchora pulchra*
	Mycalidae	tree sponge	*Mycale loveni*
	Piscicolidae	striped sea leech	*Notostomum cyclostomum*
	Ophiactidae	ubiquitous brittle star	*Ophiopholis aculeata*
	Ophiuridae	notched brittlestar	*Ophiura sarsii*
	Oregoniidae	graceful decorator crab	*Oregonia gracilis*
	Paguridae	Aleutian hermit	*Pagurus aleuticus*
	Paguridae	sponge hermit	*Pagurus brandti*
	Paguridae	hairy hermit crab	*Pagurus capillatus*
	Paguridae	knobbyhand hermit	*Pagurus confragosus*
	Paguridae	hornyhand hermit	*Pagurus cornutus*
	Paguridae	whiteknee hermit	*Pagurus dalli*
	Paguridae	bluespine hermit	*Pagurus kennerlyi*
	Paguridae	Alaskan hermit	*Pagurus ochotensis*
	Paguridae	longhand hermit	*Pagurus tanneri*
	Paguridae	fuzzy hermit crab	*Pagurus trigonocheirus*
	Pandalidae	sidestripe shrimp	*Pandalopsis dispar*
	Pandalidae	Alaskan pink shrimp	*Pandalus eous*
	Pandalidae	roughpatch shrimp	*Pandalus stenolepis*
	Lithodidae	red king crab	*Paralithodes camtschaticus*
	Pectinidae	weathervane scallop	*Patinopecten caurinus*
	Periphyllidae	helmet jelly	*Periphylla periphylla*

INPFC area	Family	Common name	Species name
	Ulmaridae	egg yolk jelly	*Phacellophora camtschatica*
	Lithodidae	scaled crab	*Placetron wosnessenskii*
	Primnoidae	pinnate Plumarella	*Plumarella* sp. B
	Primnoidae	bushy coral	*Plumarella superba*
	Anomiidae	Alaska falsejingle	*Pododesmus macrochisma*
	Goniasteridae		*Pseudarchaster alascensis*
	Goniasteridae	scarlet sea star	*Pseudarchaster parelii*
	Pterasteridae		*Pteraster marssipus*
	Pterasteridae	wrinkled star	*Pteraster militaris*
	Asteriidae	sunflower sea star	*Pycnopodia helianthoides*
	Lithodidae	rhinoceros crab	*Rhinolithodes wosnessenskii*
	Sepiolidae	eastern Pacific bobtail	*Rossia pacifica*
	Crangonidae	sculptured shrimp	*Sclerocrangon boreas*
	Cardiidae	oblique smoothcockle	*Serripes notabilis*
	Solasteridae		*Solaster* sp. A (Clark 1997)
	Ophiuridae		*Stegophiura ponderosa*
	Myxillidae	scapula sponge	*Stelodoryx oxeata*
	Strongylocentrotidae	green sea urchin	*Strongylocentrotus droebachiensis*
	Virgulariidae	roughstem seawhip	*Stylatula gracile*
	Suberitidae	hermit sponge	*Suberites domuncula*
	Synallactidae		*Synallactes challengeri*
	Tedaniidae	club sponge	*Tedania kagalaskai*
Western Aleutians	Rajidae	Aleutian skate	*Bathyraja aleutica*
	Rajidae	whiteblotched skate	*Bathyraja maculata*
	Rajidae	leopard skate	*Bathyraja panthera*
	Rajidae	Alaska skate	*Bathyraja parmifera*
	Rajidae	mud skate	*Bathyraja taranetzi*
	Pleuronectidae	Kamchatka flounder	*Atheresthes evermanni*
	Pleuronectidae	arrowtooth flounder	*Atheresthes stomias*
	Pleuronectidae	rex sole	*Glyptocephalus zachirus*
	Pleuronectidae	flathead sole	*Hippoglossoides elassodon*
	Pleuronectidae	Pacific halibut	*Hippoglossus stenolepis*
	Pleuronectidae	southern rock sole	*Lepidopsetta bilineata*
	Pleuronectidae	northern rock sole	*Lepidopsetta polyxystra*
	Pleuronectidae	Dover sole	*Microstomus pacificus*
	Pleuronectidae	Greenland turbot	*Reinhardtius hippoglossoides*
	Macrouridae	giant grenadier	*Albatrossia pectoralis*
	Ammodytidae	Pacific sand lance	*Ammodytes personatus*
	Anoplopomatidae	sablefish	*Anoplopoma fimbria*
	Cyclopteridae	smooth lumpsucker	*Aptocyclus ventricosus*
	Agonidae	bigeye poacher	*Bathyagonus pentacanthus*
	Bathymasteridae	Alaskan ronquil	*Bathymaster caeruleofasciatus*
	Bathymasteridae	searcher	*Bathymaster signatus*
	Liparidae	blacktail snailfish	*Careproctus melanurus*
	Stomiidae	Pacific viperfish	*Chauliodus macouni*
	Psychrolutidae	spinyhead sculpin	*Dasycottus setiger*

INPFC area	Family	Common name	Species name
	Cyclopteridae	Alaskan lumpsucker	*Eumicrotremus gyrinops*
	Cyclopteridae	Pacific spiny lumpsucker	*Eumicrotremus orbis*
	Cyclopteridae	toad lumpsucker	*Eumicrotremus phrynoides*
	Gadidae	walleye pollock	*Gadus chalcogrammus*
	Gadidae	Pacific cod	*Gadus macrocephalus*
	Cottidae	armorhead sculpin	*Gymnocanthus galeatus*
	Cottidae	threaded sculpin	*Gymnocanthus pistilliger*
	Cottidae	yellow Irish lord	*Hemilepidotus jordani*
	Cottidae	longfin Irish lord	*Hemilepidotus zapus*
	Hexagrammidae	kelp greenling	*Hexagrammos decagrammus*
	Cottidae	northern sculpin	*Icelinus borealis*
	Cottidae	spatulate sculpin	*Icelus spatula*
	Myctophidae	brokenline lampfish	*Lampanyctus jordani*
	Agonidae	sawback poacher	*Leptagonus frenatus*
	Agonidae	longnose poacher	*Leptagonus leptorhynchus*
	Bathylagidae	northern smoothtongue	*Leuroglossus schmidti*
	Zoarcidae	Bering eelpout	*Lycodes beringi*
	Psychrolutidae	darkfin sculpin	*Malacocottus zonurus*
	Cottidae	great sculpin	*Myoxocephalus polyacanthocephalus*
	Cottidae	fourhorn sculpin	*Myoxocephalus quadricornis*
	Salmonidae	chum salmon	*Oncorhynchus keta*
	Hexagrammidae	Atka mackerel	*Pleurogrammus monopterygius*
	Agonidae	sturgeon poacher	*Podothecus accipenserinus*
	Melamphaidae	crested bigscale	*Poromitra curilensis (=crassiceps)*
	Scorpaenidae	rougheye rockfish	*Sebastes aleutianus*
	Scorpaenidae	Pacific ocean perch	*Sebastes alutus*
	Scorpaenidae	redbanded rockfish	*Sebastes babcocki*
	Scorpaenidae	shortraker rockfish	*Sebastes borealis*
	Scorpaenidae	dark rockfish	*Sebastes ciliatus*
	Scorpaenidae	blackspotted rockfish	*Sebastes melanostictus*
	Scorpaenidae	northern rockfish	*Sebastes polyspinis*
	Scorpaenidae	dusky rockfish	*Sebastes variabilis*
	Scorpaenidae	harlequin rockfish	*Sebastes variegatus*
	Scorpaenidae	shortspine thornyhead	*Sebastolobus alascanus*
	Scorpaenidae	broadfin thornyhead	*Sebastolobus macrochir*
	Gonostomatidae	slender fangjaw	*Sigmops gracilis*
	Myctophidae	northern lampfish	*Stenobrachius leucopsarus*
	Cottidae	spectacled sculpin	*Triglops scepticus*
	Zaproridae	prowfish	*Zaprora silenus*
	Petromyzontidae	Pacific lamprey	*Lampetra tridentata*
	Sertulariidae	bushy white hydroid	*Abietinaria greenei*
	Sertulariidae	white tangled hydroid	*Abietinaria* sp. A (Clark 2006)
	Plexauridae		*Alaskagorgia aleutiana*
	Alcyonidiidae	fruit leather bryozoan	*Alcyonidium pedunculatum*
	Polyclinidae	sand-grain imbedded ascidian	*Amaroucium soldatovi*

INPFC area	Family	Common name	Species name
	Aphrocallistidae	clay pipe sponge	*Aphrocallistes vastus*
	Volutidae	Alaska volute	*Arctomelon stearnsii*
	Crangonidae	Arctic argid	*Argis dentata*
	Cladorhizidae	fuzzy sponge	*Asbestopluma* sp. A (Clark 2006)
	Asteronychidae	serpent sea star	*Asteronyx loveni*
	Rossellidae	vase sponge	*Aulosaccus schulzei*
	Ulmaridae		*Aurelia labiata*
	Axinellidae	firm finger sponge	*Axinella blanca*
	Balanidae		*Balanus nubilus*
	Balanidae	beaked barnacle	*Balanus rostratus*
	Buccinidae	thick-cord whelk	*Beringius crebricostatus*
	Buccinidae		*Beringius* sp. I (McLean and Clark)
	Gonatidae	magistrate armhook squid	*Berryteuthis magister*
	Bugulidae		*Bugula pacifica*
	Goniasteridae	orange bat sea star	*Ceramaster patagonicus*
	Goniasteridae		*Ceramaster stellatus*
	Benthopectinidae	fragile sea star	*Cheiraster dawsoni*
	Benthopectinidae	Aleutian fragile sea star	*Cheiraster* sp. A (Clark 2006)
	Oregoniidae	Tanner crab	*Chionoecetes bairdi*
	Balanidae	giant barnacle	*Chirona evermanni*
	Pisidae	longhorned decorator crab	*Chorilia longipes*
	Pelagiidae	sea nettle	*Chrysaora fuscescens*
	Pelagiidae		*Chrysaora melanaster*
	Chalinidae	rough hat sponge	*Cladocroce attu*
	Tetillidae	baseball sponge	*Craniella craniana*
	Tetillidae	knobby ball sponge	*Craniella* sp. B
	Tetillidae	furry ball sponge	*Craniella spinosa*
	Tetillidae	tennis ball sponge	*Craniella villosa*
	Crellidae	soft brown sponge	*Crella brunnea*
	Caryophylliidae	cup coral	*Crispatotrochus foxi*
	Solasteridae	grooved sea star	*Crossaster borealis*
	Solasteridae	rose sea star	*Crossaster papposus*
	Plexauridae		*Cryogorgia koolsae*
	Cucumariidae	sea football	*Cucumaria fallax*
	Amphiuridae		*Diamphiodia occidentalis*
	Pterasteridae	pincushion sea star	*Diplopteraster multipes*
	Paguridae	purple hermit	*Elassochirus cavimanus*
	Octopodidae	giant octopus	*Enteroctopus dofleini*
	Cheiragonidae	horsehair crab	*Erimacrus isenbeckii*
	Primnoidae		*Fanellia compressa*
	Primnoidae		*Fanellia fraseri*
	Ranellidae	Oregon triton	*Fusitriton oregonensis*
	Cranchiidae		*Galiteuthis phyllura*
	Geodiidae	calcareous finger sponge	*Geodinella lendenfeldi*
	Gonatidae	boreopacific armhook squid	*Gonatopsis borealis*
	Gonatidae	fiery armhook squid	*Gonatus pyros*
	Gorgonocephalidae	basketstar	*Gorgonocephalus eucnemis*
	Halichondriidae	ginseng sponge	*Halichondria oblonga*
	Halichondriidae	barrel sponge	*Halichondria panicea*

INPFC area	Family	Common name	Species name
	Chalinidae		*Haliclona digitata*
	Halipteridae	maroon sea whip	*Halipteris* sp. A (Stone 2015)
	Halipteridae		*Halipteris willemoesi*
	Echinasteridae	ridged blood star	*Henricia aspera*
	Hiatellidae	Arctic Hiatella	*Hiatella arctica*
	Goniasteridae	Aleutian spiny star	*Hippasteria aleutica*
	Goniasteridae		*Hippasteria kurilensis*
	Goniasteridae	spiny red sea star	*Hippasteria phrygiana (=spinosa)*
	Coelosphaeridae	spud sponge	*Histodermella kagigunensis*
	Oregoniidae	Pacific lyre crab	*Hyas lyratus*
	Halichondriidae	coalescent finger sponge	*Hymeniacidon assimilis*
	Coelosphaeridae	yellow ball sponge	*Inflatella globosa*
	Isodictyidae	orange finger sponge	*Isodictya rigida*
	Latrunculiidae	green papillate sponge	*Latrunculia oparinae*
	Astropectinidae	North Pacific sea star	*Leptychaster arcticus*
	Asteriidae	blackspined sea star	*Lethasterias nanimensis*
	Grantiidae		*Leucandra tuba*
	Lithodidae	golden king crab	*Lithodes aequispinus*
	Metridiidae	gigantic anemone	*Metridium farcimen*
	Crambeidae	yellow leafy sponge	*Monanchora pulchra*
	Plexauridae		*Muriceides nigra*
	Mycalidae	tree sponge	*Mycale loveni*
	Myxillidae	scallop sponge	*Myxilla parasitica*
	Piscicolidae	striped sea leech	*Notostomum cyclostomum*
	Echinasteridae		*Odontohenricia ahearnae*
	Echinasteridae	giant toothed Henricia	*Odontohenricia* sp. E (Clark 2006)
	Ophiactidae	ubiquitous brittle star	*Ophiopholis aculeata*
	Ophiactidae		*Ophiopholis japonica*
	Ophiactidae		*Ophiopholis longispina*
	Ophiomyxidae		*Ophioscolex corynetes*
	Ophiuridae	notched brittlestar	*Ophiura sarsii*
	Oregoniidae	graceful decorator crab	*Oregonia gracilis*
	Paguridae	Aleutian hermit	*Pagurus aleuticus*
	Paguridae	sponge hermit	*Pagurus brandti*
	Paguridae	fuzzy hermit crab	*Pagurus trigonocheirus*
	Pandalidae	Alaskan pink shrimp	*Pandalus eous*
	Pandalidae	ocean shrimp	*Pandalus jordani*
	Pandalidae	roughpatch shrimp	*Pandalus stenolepis*
	Pandalidae	yellowleg pandalid	*Pandalus tridens*
	Paragorgiidae	Kamchatka coral	*Paragorgia arborea*
	Paragorgiidae		*Paragorgia pacifica*
	Periphyllidae	helmet jelly	*Periphylla periphylla*
	Ulmaridae	egg yolk jelly	*Phacellophora camtschatica*
	Hymedesmiidae		*Phorbas paucistylifer*
	Mopaliidae		*Placiphorella pacifica*
		feathery Plumarella	*Plumarella* sp. 1 (Bayer)
	Primnoidae	pale Plumarella	*Plumarella* sp. A
	Anomiidae	abalone jingle	*Pododesmus cepio*

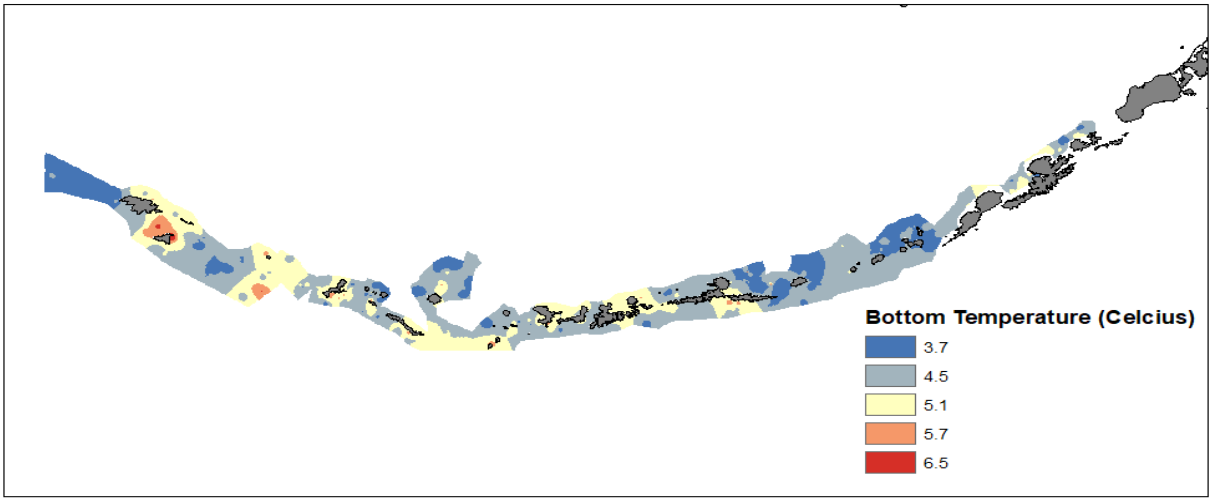
INPFC area	Family	Common name	Species name
	Polymastiidae	Flugel nippled sponge	*Polymastia fluegeli*
	Polymastiidae	long nippled sponge	*Polymastia robusta*
	Polymastiidae	prolific nipple sponge	*Polymastia* sp. A (Clark 2006)
	Goniasteridae	scarlet sea star	*Pseudarchaster parelii*
	Psolidae		*Psolus* sp. A (Clark 2006)
	Pterasteridae		*Pteraster jordani*
	Pterasteridae		*Pteraster marssipus*
	Pterasteridae	wrinkled star	*Pteraster militaris*
	Pterasteridae		*Pteraster* sp. A (Clark 1999)
	Pterasteridae	cushion sea star	*Pteraster temnochiton*
	Pterasteridae		*Pteraster willsi*
	Pennatulidae	orange sea pen	*Ptilosarcus gurneyi*
	Euplectellidae	lacy basket sponge	*Regadrella okinoseana*
	Sepiolidae	eastern Pacific bobtail	*Rossia pacifica*
	Serpulidae	red trumpet calcareous tubeworm	*Serpula columbiana*
	Solasteridae	morning sun sea star	*Solaster dawsoni*
	Solasteridae		*Solaster hypothrissus*
	Solasteridae	Fisher sun star	*Solaster* sp. F (Clark)
	Solasteridae	beautiful sun star	*Solaster spectabilis*
	Hippolytidae	Rathbun blade shrimp	*Spirontocaris arcuata*
	Ophiuridae		*Stegophiura ponderosa*
	Myxillidae	Alaskan lobed sponge	*Stelodoryx alaskensis*
	Myxillidae	scapula sponge	*Stelodoryx oxeata*
	Strongylocentrotidae	green sea urchin	*Strongylocentrotus droebachiensis*
	Styelidae	sea potato	*Styela rustica*
	Styelidae	hexagonal tunicate	*Styela* sp. B (Clark 2006)
	Suberitidae	hermit sponge	*Suberites domuncula*
	Suberitidae	wax sponge	*Suberites* sp. A (Clark 2006)
	Synallactidae		*Synallactes challengeri*
	Tedaniidae	club sponge	*Tedania kagalaskai*
	Primnoidae	bottlebrush coral	*Thouarella cristata*
	Didemnidae	purple-gray ascidian	*Tridemnum opacum*
	Polymastiidae	pale mammilated sponge	*Weberella bursa*
	Zoanthidae	hot dog zoanthid	*Zoanthidae* sp. A

Appendix C

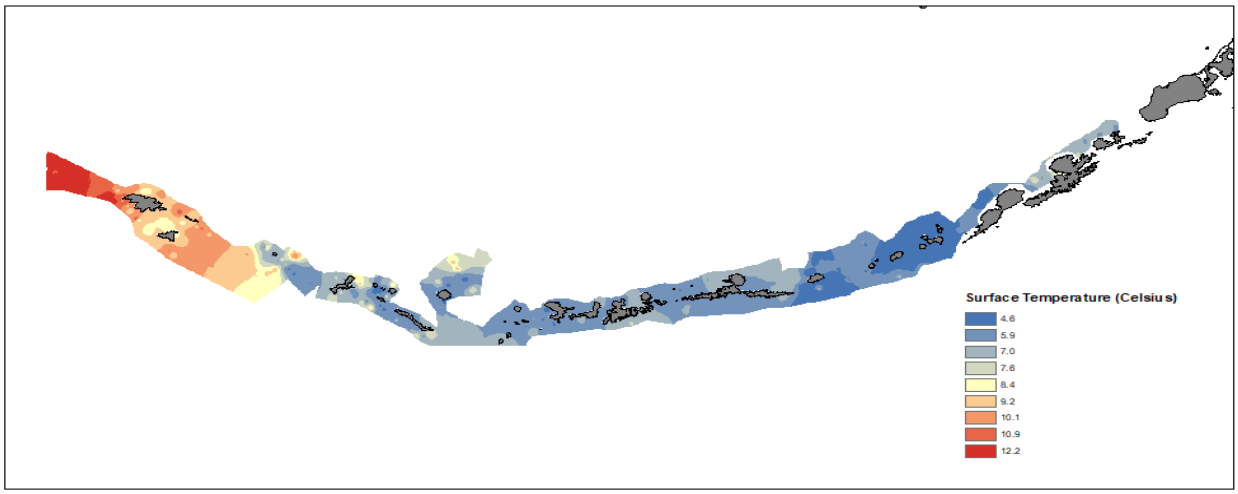
Appendix Table C-1. -- Length-weight parameters (a and b) for species where individual length and weight data were collected and fitted to the model $W = aL^b$. The number of individuals measured and weighed (n) is also provided.

Species	Sex	a	b	n	Species	Sex	a	b	n
Atheresthes stomias	Male	2.093E-06	3.225	196	*Gadus chalcogrammus*	Male	7.521E-06	2.997	300
	Female	1.333E-06	3.311	319		Female	7.900E-06	2.984	443
	Both	1.312E-06	3.310	515		Both	8.026E-06	2.984	743
Atheresthes evermanni	Male	2.749E-06	3.191	290	*Pleurogrammus monopterygi*	Male	5.853E-06	3.128	530
	Female	1.539E-06	3.295	247		Female	2.279E-05	2.892	560
	Both	1.923E-06	3.255	537		Both	1.283E-05	2.992	1090
Reinhardtius hippoglossoides	Male	--	--	7	*Sebastes melanostictus*	Male	3.852E-06	3.234	337
	Female	--	--	1		Female	3.817E-06	3.237	268
	Both	9.520E-07	3.323	8		Both	3.844E-06	3.235	605
Lepidopsetta polyxystra	Male	2.696E-06	3.243	136	*Sebastes alutus*	Male	9.404E-06	3.066	688
	Female	4.120E-06	3.172	351		Female	1.200E-05	3.020	521
	Both	3.431E-06	3.202	487		Both	1.086E-05	3.040	1209
Lepidopsetta bilineata	Male	9.876E-06	3.022	77	*Sebastes polyspinis*	Male	7.379E-06	3.108	235
	Female	2.736E-06	3.251	251		Female	6.264E-06	3.136	430
	Both	2.963E-06	3.236	328		Both	6.840E-06	3.121	665
Gadus macrocephalus	Male	4.009E-06	3.158	421	*Sebastes borealis*	Male	7.448E-06	3.128	80
	Female	2.934E-06	3.209	344		Female	5.910E-06	3.173	69
	Both	3.499E-06	3.180	765		Both	6.950E-06	3.143	149

Appendix D



Appendix Figure D-1. -- Bottom temperatures AI 2022 bottom trawl survey.



Appendix Figure D-2. -- Surface temperatures AI 2022 bottom trawl survey.

U.S. Secretary of Commerce
Gina M. Raimondo

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

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November 2023

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