Summary of the West Coast Haida Gwaii Synoptic Bottom Trawl Survey, September 2 -24, 2018

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ABSTRACT

Williams, D. C., Wyeth, M. R., and Olsen, N. 2020. Summary of the West Coast Haida Gwaii synoptic bottom trawl survey, September 2 - 24, 2018. Can. Manuscr. Rep. Fish. Aquat. Sci. 3196: viii + 54 p.

A bottom trawl survey off the west coast of Haida Gwaii was conducted on the F/V Nordic Pearl between September 2 - 24, 2018. The survey was jointly conducted and funded by the Canadian Groundfish Research and Conservation Society (CGRCS) and Fisheries and Oceans Canada (DFO). The West Coast Haida Gwaii synoptic bottom trawl survey was first conducted annually from 2006 to 2008 and has since been repeated every second year on even numbered years. This survey is one of a set of long-term and coordinated surveys that together cover the continental shelf and upper slope of most of the British Columbia coast. The objectives of these surveys are to provide fishery independent abundance indices of all demersal fish species available to bottom trawling and to collect biological samples of selected species.

The survey follows a random depth-stratified design and the sampling units are 2 km by 2 km blocks. One hundred and nineteen (90.2%) of the 132 blocks assessed in 2018 were successfully fished. The mean catch per tow was 1,420 kg with an average of 22 species per tow. The most abundant fish species by weight encountered was Pacific Ocean Perch (*Sebastes alutus)* followed by Sharpchin Rockfish (*Sebastes zacentrus*), Rougheye Rockfish (*Sebastes aleutianus*), Silvergray Rockfish (*Sebastes brevispinus)*, and Shortspine Thornyhead (*Sebastolobus alascanus*). Biological data including individual length, weight, sex, maturity, and ageing structures were collected from 44 different species of fish. Oceanographic and fishing gear data including water temperature, depth, salinity, and dissolved oxygen, were also recorded for most tows.

RÉSUMÉ

Williams, D. C., Wyeth, M. R., and Olsen, N. 2020. Summary of the West Coast Haida Gwaii synoptic bottom trawl survey, September 2 - 24, 2018. Can. Manuscr. Rep. Fish. Aquat. Sci. 3196: viii + 54 p.

Un relevé au chalut de fond au large de la côte ouest d'Haida Gwaii a été effectué par le navire de pêche Nordic Pearl entre le 2 et le 24 septembre 2018. Le relevé a été réalisé et financé conjointement par la Canadian Groundfish Research and Conservation Society et Pêches et Océans Canada (MPO). Le premier relevé synoptique au chalut de fond de la côte ouest d'Haida Gwaii a été réalisé de 2006 à 2008, puis on a répété l'opération tous les deux ans depuis. Ce relevé fait partie d'un ensemble de relevés à long terme coordonnés qui couvre le plateau continental et le haut du talus de la majorité de la côte de la Colombie-Britannique. Ces relevés servent à obtenir des indices d'abondance indépendants de la pêche pour toutes les espèces de poissons démersaux pouvant être pêchées au chalut de fond, ainsi qu'à prélever des échantillons biologiques d'espèces précises.

Ce relevé est réalisé selon un plan d'échantillonnage aléatoire stratifié, et les unités d'échantillonnage sont des blocs de deux kilomètres carrés. Parmi les 132 blocs évalués en 2018, 119 (90,2%) ont fait l'objet d'une pêche. La moyenne de prises par trait était de 1420 kg, avec le nombre moyen d'espèces par trait était de 22. Les espèces de poissons les plus abondantes observées étaient le sébaste à longue mâchoire (*Sebastes alutus*), le sébaste à menton pointu (*Sebastes zacentrus*), le sébaste à œil épineux (*Sebastes aleutianus*), le sébaste argenté (*Sebastes brevispinus*) et le sébastolobe à courtes épines (*Sebastolobus alascanus*). On a recueilli des données biologiques sur certaines espèces, notamment la longueur, le poids, le sexe, la maturité et la structure par âge. Les échantillons ont été prélevés sur un total de 44 espèces de poissons différentes. Des données océanographiques et sur les engins de pêche, y compris la température de l'eau, la profondeur, la salinité et l'oxygène dissous, ont également été consignées pour la plupart des traits.

INTRODUCTION

In 2003, a report by the Pacific Scientific Advice Review Committee recommended development of fishery-independent relative abundance indices using bottom trawl surveys in British Columbia waters (Sinclair et al. 2003). The report recommended that a pilot survey be conducted in Queen Charlotte Sound (Figure 1). The survey design was synoptic in that is was intended to provide indices for as many species as possible rather than focusing on a limited number of target species.

In February 2003, funding was committed by the Canadian Groundfish Research and Conservation Society for the principal portion of the required vessel and net costs in addition to a significant portion of the scientific staff needed to conduct the survey and analyze the results. Funding by the Science Branch of Fisheries and Oceans Canada (DFO) was committed for additional scientific and sampling staff, and to provide the scientific sampling equipment.

The first Queen Charlotte Sound (QCS) synoptic bottom trawl survey was successfully completed in the summer of 2003 (Olsen et al. 2007). Following that, additional surveys were planned for the west coast of Vancouver Island (WCVI) beginning in 2004, Hecate Strait (HS) beginning in 2005, and the west coast of Haida Gwaii (WCHG, previously Queen Charlotte Islands) beginning in 2006. These surveys are conducted on a rotating biennial schedule with the QCS and HS surveys conducted in odd-numbered years and the WCVI and WCHG surveys conducted in even-numbered years. These four synoptic bottom trawl surveys provide comprehensive coverage of the continental shelf and upper slope of the British Columbia coast (Figure 1). Surveys are conducted on both chartered commercial fishing vessels as well as Canadian Coast Guard research trawlers.

The WCHG synoptic bottom trawl survey was successfully conducted annually from 2006 to 2008 (Workman et al. 2007, Workman et al. 2008 and Olsen et al. 2008) and has been repeated every second year since (Olsen et al. 2017, Nottingham et al. 2018 and Williams et al. 2018). This document provides a brief summary of the results and methods from the eighth WCHG synoptic bottom trawl survey which occurred between September 2- 24, 2018. It is not intended as a comprehensive review of the survey, nor does it provide interpretive analysis of the survey results.

METHODS

SURVEY DESIGN

The survey area is the west coast of Haida Gwaii from approximately latitude 52° 45' N to latitude 54° 35' N (Figure 1). The northern region, extending into Dixon Entrance, is nearly contiguous with the northwestern-most extent of the Hecate Strait survey except for a gap around Learmonth Bank, which was omitted from the survey to avoid catches of Red Tree Coral (*Primnoa* sp.) that are common to that area.

Depth Strata

All of the synoptic bottom trawl surveys along the British Columbia coast have followed the same random depth-stratified design. Each survey area is divided into 2 km by 2 km blocks and each block is assigned one of four depth strata based on the average bottom depth in the block. The four depth strata vary between areas. The depth strata for the WCHG synoptic bottom trawl survey are 180-330 m, 330-500 m, 500-800 m, and 800-1,300 m (Table 1). For each survey in the WCHG series, blocks are randomly selected within each depth stratum.

Block Allocation

Following the methods in Sinclair et al. (2003), commercial fishery catch data were used to model the expected groundfish catches prior to the first survey in each area. The target number of tows in each stratum was based on providing the most precise catch rate indices for as many species as possible. However, in any given year, not all of the randomly selected blocks will be fishable. Further, after the inaugural survey, a block that has been fished in a previous year may be re-selected. The results of previous surveys in each area are used to estimate both the expected proportion of blocks in each stratum that would not result in a useable tow (predicted failure rate) as well as the expected probability of returning to a block that was successfully fished in a previous survey (predicted revisit rate). The predicted failure and revisit rates are combined into a single probability for each survey area and depth stratum. These probabilities are then used to calculate the anticipated number of blocks per stratum required to complete the target number of tows.

When a synoptic bottom trawl survey is conducted on a chartered commercial fishing vessel the contract has been structured such that the survey will continue until the entire set of blocks that have been selected are assessed. Assuming that the predicted failure and revisit rates prove to be accurate, at the end of the survey the final distribution of tows in each strata should match the initial target allocation that was modeled based on the commercial fishing data.

For the 2018 WCHG survey, 136 blocks were randomly selected with the target of 125 successful tows (Table 1 and Figure 2).

VESSEL

The survey was conducted aboard the chartered fishing vessel Nordic Pearl, a 35 metre commercial stern trawler (Figure 3).

FISHING GEAR

The research trawl was an Atlantic Western IIA box trawl net connected to 963 kg Thyboron Type II heavy duty 107 doors (Figure 4). The net was thoroughly cleaned between tows to prevent cross-contamination of catches. The net was also inspected for damage after every tow. If the net was damaged, it was repaired and restored to its original dimensions prior to resuming fishing. Two nets were rigged at the start of the survey so that if one net was damaged beyond what could be immediately repaired, the second one could be used.

The net included a main body (wing and belly sections), two lengthening pieces, and a codend with liner (Figure 5 and Figure 6). The main body of the net had an 11 mm long-link steel chain frame and is constructed from a mix of double 4.5 mm strand 5 inch web, single 3.5 mm strand 5 inch web, and single 3.5 mm strand 4 ½ inch web (Figure 7). The intermediate sections were constructed from single 4.5 mm strand 4½ inch web (Figure 8). All web in the main body and lengthening pieces was constructed from a compacted strand braided polyethylene (Euroline Premium). The codend was constructed from double 5 mm strand 4 inch regular braided polyethylene web with a ½ inch 210/20 knotless nylon liner (Figure 8).

The Rockhopper footgear included flying wing, mid wing, bunt wing, and bosom sections (Figure 9). The bosom section was built from 16 inch diameter (worn 18 inch) aircraft tires, while the bunt and mid wing sections had 16 inch Rockhopper disks. The flying wings had 5 inch rubber disks with swivel center 16 inch solid bunt bobbins at each end.

The specifications of net and footgear components are shown in Table 2 and dimensions for the assembled trawl pieces are shown in Figure 7 through Figure 9.

SCHEDULE

The survey was split into two sections or “legs” of eight to 16 days in duration with five science staff in each leg. The crew change occured on September 17 (Table 4).

FISHING PROTOCOL

Fishing was carried out during daylight hours, commencing approximately 30 minutes after sunrise and ending 30 minutes before sunset each day. An average working day length of 13 hours, starting at approximately 0800 hrs and ending at approximately 2100 hrs was typical.

Prior to fishing, the selected blocks were reviewed by the fishing master and chief scientist to determine a candidate set to visit each day. During this review process, one or more blocks might be determined not fishable based on the fishing master’s experience and knowledge of the area. In such cases the blocks were marked as “rejected based on prior knowledge”. After compiling a list of blocks to be visited, the most efficient route of travel between blocks was planned.

The fishing master was asked to inspect each selected block and find a suitable tow location using the following criteria:

1. All tows should follow a depth contour.
2. If a block had been fished in a previous year then follow the same track so as to minimize the survey footprint.
3. If a block had not been fished in a previous year then make a tow entirely within the block and pass through the center of the block.
4. If it is not possible to make a tow through the center of the block then make a tow entirely within the block that passes as close to the center as possible.
5. If it is not possible to make a tow entirely within the block then make a tow such that at least 50 % of the tow is within the block.

The target tow length was 20 minutes long for the two shallow depth strata (180-330 m and 330-500 m) and 30 minutes for the two deeper depth strata (500-800 m and 800-1,300 m). The tow start was defined as the time at which the net mensuration data indicated stable bottom contact and the headline collapsed to 3-4 m above the bottom. After 20 minutes had elapsed, net haul back was initiated. Although the target on-bottom time was 20 or 30 minutes, tows that were at least 15 minutes in length were accepted. This pragmatic approach allowed for the retention of many tows that would otherwise have been unusable due to hang-ups or early haul-backs.

Tows were conducted at a target speed of 2.8 to 3.0 nautical miles per hour (5.2 - 5.6 km/hr). When retrieving the net, the fishing master was asked to maintain a water velocity through the net that was consistent with the rest of the tow.

Tows were made in the target depth stratum of the block. If the only possible tow was in a different depth stratum than that assigned to the block, then the tow was conducted, and the block was reassigned to the appropriate depth stratum.

If it was not possible to find a suitable tow location then the block was marked as "rejected based on on-ground inspection". The vessel would move on to the next selected block.

The result of trawling was either a useable or unusable tow. The most common reasons for deeming a tow unusable were a hang-up of the fishing gear, tear-up of the trawl net or not achieving the minimum bottom contact time. In the event of an unusable tow, additional attempts to fish the block could be made at either the same location or a different location within the block. Alternatively, the block could be deemed unfishable, in which case it was rejected.

If fishing was attempted in a block, the final status of the block would be recorded as "successfully fished on first attempt", "successfully fished after multiple attempts", or "rejected after last attempt failed". Rejected blocks were removed from the sampling frame for all future surveys to increase the survey efficiency as less time will be spent inspecting blocks that cannot be fished. Some selected blocks were neither successfully fished nor rejected. This result occurred when a temporary obstacle (e.g. trap fishing gear, another vessel, or strong tidal currents) prevents fishing, or when there was insufficient time available to fish a block without spending another day in the area, or if fishing was attempted and although the tow was not successful, the block was not rejected. These blocks were considered unassessed at the end of the survey and have a

final status of "block not fished but remains in sampling frame" or "not rejected but last attempt failed".

Fishing Data

The start and end positions, times, and bottom depths, as well as the direction, vessel speed, weather and environmental conditions, and warp length were recorded for every tow. In addition, global positioning system (GPS) data and bottom sounder data were logged continuously for the duration of the survey.

CATCH PROCESSING

At the end of each tow the net was retrieved and the catch dumped into a hopper which emptied into the wetlab below the trawl deck. Catch was sorted in the wetlab by species into separate baskets as it moved along a conveyor system. The catch from all tows, including both useable and unusable tows was recorded. Unusable tows, although not sampled for biological data, were recorded to track catch amounts. Whenever possible, the catch was completely sorted and weighed. However, for large catches in excess of 2,000 kg or for catches with large numbers of small individuals, some method of total catch estimation and sub-sampling for species composition was conducted and the method used was recorded. The specific method of catch estimation and sub-sampling varied based on the total weight and volume of the catch being subsampled as well as the composition of the catch. Large catches were typically visually estimated, although volumetric estimates were sometimes used. In all cases a representative sample of the catch was sorted to determine species composition and to provide individuals for biological sampling.

Baskets of species were weighed to the nearest 0.02 kg using a motion-compensating electronic balance. For small catches the number of individuals was often recorded in addition to the weight. Weights less than 0.02 kg were recorded as trace amounts. Catch was sorted to the lowest taxonomic group possible. For most fishes this was to the level of species although small and fragile species such as snailfish, lantern fish, or some young-of-the-year rockfish may have only been identified to genus or family. In some cases a few representative individuals may have been frozen for later identification. Invertebrates may have only been identified to phylum or order.

BIOLOGICAL SAMPLING

While the primary purpose of the survey was to generate fishery-independent indices of relative abundance, the secondary goal was to collect biological information to characterize the size, sex, and age-composition of each species caught. Two types of biological samples were conducted: "Length" samples, consisting of individual fish length and sex, and "Age" samples, consisting of length, sex, weight, maturity, and age structure. In an effort to maintain a manageable workload, a minimum catch threshold was established for each species that triggered biological sampling. For rare species or species of special conservation concern the minimum catch could be one fish, whereas for common and abundant species the number might be 25 or 50. The choice of the species from which age samples were collected depended on the weight caught and the "desirability" of the species. The weight of the catch was considered because the intent

was to collect age structures from the largest catches of each species in each stratum over the survey. The "desirability" of the species was based on knowledge of conservation concerns and whether or not the species was commercially exploited. Biological samples were typically not collected from unusable tows.

There are some species that are unlikely to ever be assessed using age-structured models. The list includes species such as North Pacific Spiny Dogfish (*Squalus suckleyi*) where the cost of ageing the spines is prohibitive. Other species such as Flathead Sole (*Hippoglossoides elassodon*), Pacific Sanddab (*Citharichthys sordidus*), Greenstriped Rockfish (*Sebastes elongatus*), or Pygmy Rockfish (*Sebastes wilsoni*) are also unlikely candidates for an age-structured assessment as they are not exploited by the commercial fishery. Starting in 2016, a new length-stratified age sample protocol was implemented for these species. The intent of the new protocol was that the data could be used to construct age-at-maturity or growth curves. There were 22 species identified for the length-stratified ageing protocol and each survey year three or four species will be targeted (Table 3). Given the rotating schedule of the surveys, each species will be targeted for one or two years at a time and then will not be targeted for another nine years. The species targeted in the 2018 synoptic bottom trawl surveys were Curlfin Sole (*Pleuronichthys decurrens*), Greenstriped Rockfish (*Sebastes elongatus*), Pacific Flatnose (*Antimora microlepis*), Pacific Tomcod (*Microgadus proximus*), and Shortbelly Rockfish (*Sebastes jordani*).

Individual fish were measured to fork length, total length, standard length or other length depending on the species. All length measurements were collected to the nearest 0.5 cm using an electronic fish measuring board. Fish were weighed using a motion-compensating electronic balance. Measurements were to the nearest 1, 2, or 5 grams depending on the size of the fish as well as the model and weight range of the scale in use.

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There are a variety of hard parts of a fish that can be used to determine its age (Chilton and Beamish 1982). The specific structure that provides the most accurate and efficient estimate of age varies by species but all the structures have the common trait of a series of annular rings that can be counted. Sagittal otoliths (calcareous accretions of the inner ear) were collected from rockfish and flatfish species while fin rays were taken from Walleye Pollock (*Theragra chalcogramma*). Dorsal spines were collected from North Pacific Spiny Dogfish (*Squalus suckleyi*). All age samples collected on this survey were submitted to the Sclerochronology Lab located at the Pacific Biological Station in Nanaimo, BC for storage and future analysis. In addition to the biological sampling described above, specific data, specimens or tissue samples are routinely collected following requests from other institutions or researchers. In 2018, genetic tissue from Eulachon (*Thaleichthys pacificus*), Yelloweye Rockfish (*Sebastes ruberrimus*), Quillback

Rockfish (*Sebastes maliger*), and Blackspotted (*Sebastes melanostictus*) /Rougheye Rockfish (*Sebastes aleutianus*) complex were collected.

Until the mid-2000s, Rougheye Rockfish (*Sebastes aleutianus*) was considered to be a single, highly variable species with light and dark colour morphs. Genetic and morphological analysis has since confirmed that there are two distinct species (Orr and Hawkins 2008): Rougheye Rockfish (*S. aleutianus*) and Blackspotted Rockfish (*S. melanostictus*). Historical biological and catch information for *S. aleutianus* must now be considered to be the aggregate of both species. During the 2008 WCHG survey an attempt was made to differentiate between the two species. That preliminary work showed that the two species cannot be reliably distinguished in the field because the morphological characteristics overlap. Further, there is evidence that the two species hybridize (Gharrett et al. 2005). Given that the historical data is recorded as *S. aleutianus* and that attempting to separate the species at the catch level is both time consuming and unreliable, beginning with the 2010 WCHG survey biological samples were collected from every catch that included both a visual assessment of the species (*S. aleutianus* or *S. melanostictus*) as well as a tissue sample for genetic confirmation of the species. The survey catch data, which continues to be recorded as *S. aleutianus*, can then be partitioned into the two species using either the visual assessment or the results of genetic analyses. We did not attempt to partition the catch data for this report.

NET-MOUNTED SENSORS AND DATA RECORDERS

The F/V Nordic Pearl was equipped with a Scanmar trawl mensuration system. Sensors attached to the net used acoustic signals to communicate with each other and the vessel and provided real-time net geometry including headline height and depth, as well as doorspread and wingspread which were used to calculate swept area. The Scanmar output was logged continuously during the survey and monitored in real-time during fishing operations.

A Mac Marine Industries Bottom Contact Sensor (BCS) was attached to the footrope to record contact with the sea floor. The BCS consists of a pressure housing with an Onset Hobo data recorder in a stainless steel sled that trailed behind the footrope. The Hobo recorder measured acceleration in three axes which was then converted into angles. The recorder was mounted in the sled such that the x-axis tilt indicated the angle of the steel sled. When the footgear contacted the bottom, the sled angle was approximately 80 degrees. When the footrope was off the bottom, the sled hung down and the angle was approximately 40 degrees. These data were used to determine the exact times in each tow that the trawl net first and last contacted the sea floor, thus providing an accurate measure of total bottom contact time.

A Seabird SBE39 temperature and pressure recorder (TDR) was attached to the starboard wing of the trawl. A Seabird SBE19plus recorder (CTD) equipped with a SBE43 dissolved oxygen sensor was attached to the center of the headline. The SBE19plus recorded conductivity, temperature and pressure data with derived values for salinity (Seabird, 1989) and depth (Seabird 2002). The SBE43 recorded oxygen voltage output data with calculated values for dissolved oxygen (ml/l) using temperature, pressure, and salinity data (Seabird 2012). The SBE39 was activated prior to the first tow of the day and turned off after the last tow of the day, while the SBE19plus and SBE43

were turned on and off manually before and after each tow. All data recorders were downloaded at the end of each day.

DATA RECORDING

All the fishing, catch, and biological data were recorded directly into a Microsoft SQL server database through a Microsoft Access interface. Details of the electronic data acquisition system used for this survey can be found in Olsen (2010).

All the data from the survey are archived in an Oracle relational database called "GFBio", the Groundfish Biological Samples database maintained by the Groundfish Data Unit (Fisheries and Oceans Canada, Science Branch, Pacific Region) located at the Pacific Biological Station in Nanaimo, B.C.

RESULTS

FISHING

The 2018 WCHG synoptic bottom trawl survey was divided into two legs of eight to sixteen days. From a total of 23 survey days, one day was spent loading and setting up the vessel at the start of the survey, two days were required for travel at the start and two days at end of the survey, two days were required for offloading catch, changing crews and returning to fishing grounds, and one day was spent unloading the vessel. Thus, there were a total of approximately 15 fishing days (Table 4).

From a total of 132 blocks assessed during the 2018 survey, 119 blocks were successfully fished,11 blocks were rejected based on prior knowledge or on-ground inspection, and two blocks were rejected after one or more failed fishing attempts (Table 5 and Figure 10). Four blocks were not assessed but remained in the sampling frame for future surveys.

A total of 132 tows, of which 119 were useable, were completed during days that fishing occurred. Table 6 shows tow results by stratum for this survey. The scope (ratio of warp length to bottom depth) used for tows in 2018 is shown in Table 7 and Figure 11. Complete information for each tow including date, duration, location, average depth, average speed, warp, total catch weight and usability is presented in Appendix A.

CATCH

A total of 187,396 kg of fish and invertebrates was caught during the 2018 WCHG survey. The total catch weight for tows averaged 1,420 kg per tow (Figure 12). The majority of the catch (186,903 kg, 99.7%) consisted of 95 different species of fish, including 26 rockfish and 8 flatfish species. The remainder (493 kg) consisted of 142 invertebrate groups. The average number of species identified in useable tows was 22 (Figure 13). The frequency of occurrence, maximum catch weight, mean catch weight per tow and total survey catch weight of each species are shown in Table 8.

Pacific Ocean Perch (*Sebastes alutus*; 119,266 kg) was the most dominant fish species caught by weight, followed by Sharpchin Rockfish (*Sebastes zacentrus*; 18,358 kg), Rougheye Rockfish (*Sebastes aleutianus*; 11,067 kg), Silvergray Rockfish (*Sebastes brevispinus*; 5,261 kg), and Shortspine Thornyhead (*Sebastolobus alascanus*; 4,984 kg).

The most dominant species by occurrence were Shortspine Thornyhead (*Sebastolobus alascanus*; n= 120 tows) followed by Sablefish (*Anoplopoma fimbria*; n= 111), Rex Sole (*Glyptocephalus zachirus*; n= 98), Pacific Ocean Perch (*Sebastes alutus*; n= 97), and Dover Sole (*Microstomus pacificus*; n= 88). Catch weights by tow for the 50 most commonly encountered species in this survey are included in Appendix B.

Commercially marketable fish were retained and sold with the proceeds going to the Canadian Groundfish Research and Conservation Society to offset survey costs (Table 9).

BIOLOGICAL SAMPLES AND SPECIMENS

Biological samples were collected from a total of 17,511 individuals of 44 species of fish. The number of samples and recorded biological attributes per species is shown in Table 10. A summary of the biological data collected for each species is shown in Table 11.

NET-MOUNTED SENSORS AND DATA RECORDERS

Seabird SBE39 data (water temperature and depth) were collected from 115 tows while Seabird SBE19plus and SBE43 data (conductivity, water temperature, depth, and dissolved oxygen) were collected from 107 tows (Table 12 and Figure 14).

BCS data were collected from 102 tows (Table 12). An example of the type of data collected by the BCS is shown in Figure 15.

Global positioning system (GPS), net mensuration, and bottom sounder data are available for all 132 tows.

ACKNOWLEDGEMENTS

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Table 1. 2018 WCHG synoptic bottom trawl survey design showing block allocation per stratum based on the target tow allocation and the combined predicted failure and revisit rates (predicted adjustment).

Depth Stratum (m)	Target Tows	Predicted Adjustment	Total Block Allocation	Primary Set	Secondary Set
180-330	74	0.04	78	77	1
330-500	31	0.06	35	33	2
500-800	10	0.11	12	11	1
800-1300	10	0.06	11	11	0
Total	**125**		**136**	**132**	**4**

Table 2. Atlantic Western IIa box trawl net specifications on the 2018 WCHG synoptic bottom trawl survey.

Component	Dimension
Wings, square, and bottom belly netting	combination of 5 inch double strand 4.5mm Euroline Premium and 5 inch single strand 3.5 mm Euroline Premium
Belly netting	4 ½ inch single strand 3.5mm Euroline Premium
Lengthening piece netting	4 ½ inch single strand 4.5 mm Euroline Premium
Codend	4 inch double 5 mm orange braided polyethylene
Codend liner	½ inch 210/20 knotless nylon
Floats	8 inch diameter center hole rated to 2000 m
Net frame chain	11 mm long link (64 mm inner length) grade 80 steel chain
Net frame rope	1 inch 3-strand twisted Polysteel
Net frame rope to chain lashing	3/8 inch 3-strand twisted Esterpro
Riblines	1 ¼ inch 3-strand twisted Polysteel
Footgear bosom	16 inch diameter tires (worn 18 inch aircraft tires)
Rubber spacers	4 inch, 5 inch, and 6 inch diameter disks cut from tires
Footgear wing center chain	16 mm mid link (65 mm inner length) grade 80 steel chain
Footgear wing top chain	11 mm long link (64 mm inner length) grade 80 steel chain
Rockhopper disk	16 inch diameter
Solid rubber bunt bobbin with steel tube center	16 inch diameter by 10 inch
Steel toggles	5 inch diameter by 3 inch long with 13 inches of chain (from center of toggle)

Table 3. Length-stratified species age sample schedule by year for all Pacific synoptic bottom trawl surveys.

Species	Scientific Name	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Butter Sole	*Isopsetta isolepis*						x				
Curlfin Sole	*Pleuronichthys decurrens*			x	x						
Darkblotched Rockfish	*Sebastes crameri*							x	x		
Flathead Sole	*Hippoglossoides elassodon*					x	x				
Giant Grenadier	*Albatrossia pectoralis*	x									
Greenstriped Rockfish	*Sebastes elongatus*			x	x						
Harlequin Rockfish	*Sebastes variegatus*					x	x				
North Pacific Spiny Dogfish	*Squalus suckleyi*	x	x								
Pacific Flatnose	*Antimora microlepis*			x							
Pacific Grenadier	*Coryphaenoides acrolepis*					x					
Pacific Sanddab	*Citharichthys sordidus*									x	x
Pacific Tomcod	*Microgadus proximus*			x	x						
Popeye Grenadier	*Coryphaenoides cinereus*							x			
Puget Sound Rockfish	*Sebastes emphaeus*	x	x								
Pygmy Rockfish	*Sebastes wilsoni*					x	x				
Rosethorn Rockfish	*Sebastes helvomaculatus*							x	x		
Sand Sole	*Psettichthys melanostictus*		x								
Sharpchin Rockfish	*Sebastes zacentrus*									x	x
Shortbelly Rockfish	*Sebastes jordani*			x	x						
Slender Sole	*Lyopsetta exilis*							x	x		
Splitnose Rockfish	*Sebastes diploproa*	x	x								
Stripetail Rockfish	*Sebastes saxicola*									x	x

Table 4. Summary of operations during the 2018 WCHG synoptic bottom trawl survey.

	Fishing			Tows				
Date	**Start**	**End**	**Hours**	**Blocks Assessed**	**Useable**	**Not Useable**	**Total**	**Notes**
2018-09-02	-	-	-	-	-	-	-	load boat and depart PBS
2018-09-03	-	-	-	-	-	-	-	pick up ice totes in Port Hardy/ travel
2018-09-04	-	-	-	-	-	-	-	travel
2018-09-05	7:45	20:04	13	12	7	1	8	start of survey operations
2018-09-06	7:29	19:00	12	9	7	1	8	
2018-09-07	7:31	19:18	12	9	8	2	10	
2018-09-08	7:44	18:37	11	10	8	2	10	
2018-09-09	7:50	19:15	12	6	6	0	6	
2018-09-10	7:44	17:25	10	12	12	0	12	
2018-09-11	-	-	-	-	-	-	-	offload in Port Hardy
2018-09-12	8:19	19:17	11	9	9	1	10	
2018-09-13	7:42	19:05	12	11	11	0	11	
2018-09-14	8:02	19:43	11	10	10	1	11	
2018-09-15	8:01	19:34	11	9	7	2	9	
2018-09-16	8:13	17:55	9	10	9	1	10	
2018-09-17	-	-	-	-	-	-	-	science crew change Prince Rupert
2018-09-18	8:39	19:40	11	10	10	0	10	
2018-09-19	8:03	16:48	8	10	10	0	10	
2018-09-20	7:58	17:08	10	5	5	2	7	
2018-09-21	-	-	-	4	-	-	-	end of survey
2018-09-22	-	-	-	-	-	-	-	travel
2018-09-23	-	-	-	-	-	-	-	offload in Port Hardy/ travel
2018-09-24	-	-	-	-	-	-	-	arrive at PBS and offload
Total				**136**	**119**	**13**	**132**	
Average Per Day				**9.1**	**8.5**	**0.9**	**9.4**	

Table 5. Block results by stratum for the 2018 WCHG synoptic bottom trawl survey.

Depth Stratum (m)	Successful	Rejected Prior	Rejected Inspected	Rejected Failed	Not Assessed-Not visited
180-330	67	1	5	2	3
330-500	31	2	2	0	0
500-800	10	1	0	0	1
800-1300	11	0	0	0	0
Total	**119**	**4**	**7**	**2**	**4**

Table 6. Tow results by stratum for the 2018 WCHG synoptic bottom trawl survey.

Depth Stratum (m)	Useable	Unusable
180-330	67	7
330-500	31	3
500-800	10	2
800-1300	11	1
Total	119	13

Table 7. Mean warp length and scope by 50 meter depth interval for the 2018 WCHG synoptic bottom trawl survey.

Depth (m)	Mean Warp (m)	Mean Scope
150-200	539	2.8
200-250	600	2.6
250-300	682	2.49
300-350	816	2.47
350-400	963	2.62
400-450	1007	2.34
450-500	1073	2.33
500-550	1152	2.18
550-600	1207	2.11
600-650	1463	2.33
650-700	1298	1.97
700-750	1463	2
750-800	1509	1.93
900-950	1658	1.79
1000-1050	1646	1.6
1050-1100	1737	1.64
1100-1150	1747	1.53
1150-1200	1756	1.51
1200-1250	1756	1.43

Table 8. Frequency of occurrence, maximum catch weight, mean catch weight per tow, and total survey catch weight of each species captured during the 2018 WCHG synoptic bottom trawl survey. Trace amounts (<0.02 kg) are entered as -.

Common Name	Scientific Name	Number of Tows	Catch Weight (kg)		
			Max	Mean	Total
Rockfishes	**Family Scorpaenidae**				
Shortspine Thornyhead	*Sebastolobus alascanus*	120	203.92	41.53	4983.50
Pacific Ocean Perch	*Sebastes alutus*	97	13280.30	1217.00	119266.43
Redbanded Rockfish	*Sebastes babcocki*	76	91.90	13.39	1004.62
Sharpchin Rockfish	*Sebastes zacentrus*	73	5216.91	254.98	18358.25
Silvergray Rockfish	*Sebastes brevispinis*	70	790.44	75.16	5261.29
Rosethorn Rockfish	*Sebastes helvomaculatus*	68	57.73	10.62	722.12
Redstripe Rockfish	*Sebastes proriger*	64	834.47	68.55	4386.97
Rougheye Rockfish	*Sebastes aleutianus/ melanostictus*	58	1979.51	187.57	11066.87
Harlequin Rockfish	*Sebastes variegatus*	50	135.01	4.43	221.43
Yellowmouth Rockfish	*Sebastes reedi*	45	2211.10	106.30	4783.62
Widow Rockfish	*Sebastes entomelas*	29	69.12	12.47	361.63
Longspine Thornyhead	*Sebastolobus altivelis*	26	83.66	24.33	608.18
Greenstriped Rockfish	*Sebastes elongatus*	26	16.70	3.20	83.21
Shortraker Rockfish	*Sebastes borealis*	20	294.90	42.37	847.46
Splitnose Rockfish	*Sebastes diploproa*	14	787.27	91.55	1281.68
Canary Rockfish	*Sebastes pinniger*	14	419.00	52.72	738.05
Dusky Rockfish	*Sebastes variabilis*	11	13.48	2.98	32.79
Pygmy Rockfish	*Sebastes wilsoni*	10	1.82	0.55	2.77
Bocaccio	Sebastes paucispinis	9	43.98	9.66	86.94
Darkblotched Rockfish	*Sebastes crameri*	7	149.28	28.28	169.68
Aurora Rockfish	*Sebastes aurora*	7	7.36	2.83	19.82
Yelloweye Rockfish	*Sebastes ruberrimus*	6	14.58	5.92	35.50
Yellowtail Rockfish	*Sebastes flavidus*	5	31.90	11.71	58.55
Shortbelly Rockfish	*Sebastes jordani*	5	1.86	0.83	3.31
Rockfishes	*Sebastes* (Genus)	5	0.22	0.22	0.22
Blackgill Rockfish	*Sebastes melanostomus*	2	2.86	2.65	5.30
Flatfishes	**Order Pleuronectiformes**				
Rex Sole	*Glyptocephalus zachirus*	98	128.08	9.29	873.07
Dover Sole	*Microstomus pacificus*	88	64.76	10.05	864.42
Arrowtooth Flounder	*Atheresthes stomias*	83	448.15	22.07	1787.65
Slender Sole	*Lyopsetta exilis*	37	1.47	0.36	13.07
Pacific Halibut	*Hippoglossus stenolepis*	28	229.85	16.53	462.74
English Sole	*Parophrys vetulus*	12	34.02	4.01	48.12
Deepsea Sole	*Embassichthys bathybius*	11	1.28	0.73	7.98
Petrale Sole	*Eopsetta jordani*	5	26.58	6.67	33.36
Cod-Like Fishes	**Order Gadiformes**				
Pacific Hake	*Merluccius productus*	46	78.72	14.34	659.66
Walleye Pollock	*Gadus chalcogrammus*	43	117.84	10.19	438.16
Pacific Cod	*Gadus macrocephalus*	22	20.42	7.32	160.97
Giant Grenadier	*Albatrossia pectoralis*	19	130.47	21.49	408.35
Pacific Grenadier	*Coryphaenoides acrolepis*	18	130.03	20.00	359.92
Popeye	*Coryphaenoides cinereus*	18	28.88	4.71	89.41
Pacific Flatnose	*Antimora microlepis*	15	8.40	1.27	16.45
Grenadiers	Macrouridae (Family)	1	-	-	-
Cartilaginous Fish	**Class Chondrichthyes**				
Spotted Ratfish	*Hydrolagus colliei*	74	80.84	4.74	346.21
Longnose Skate	*Raja rhina*	32	23.64	10.17	325.51
Sandpaper Skate	*Bathyraja interrupta*	21	7.89	2.79	58.67
Aleutian Skate	*Bathyraja aleutica*	8	15.52	5.07	40.52

Common Name	Scientific Name	Number of Tows	Catch Weight (kg)		
			Max	Mean	Total
North Pacific Spiny Dogfish	*Squalus suckleyi*	7	5.68	2.73	19.11
Brown Cat Shark	*Apristurus brunneus*	7	4.30	1.36	9.50
Roughtail Skate	*Bathyraja trachura*	5	6.18	2.87	14.35
Whitebrow Skate	*Bathyraja minispinosa*	1	1.06	1.06	1.06
Greenlings	**Family Hexagrammidae**				
Lingcod	*Ophiodon elongatus*	25	38.36	12.39	309.76
Sculpins	**Family Cottidae**				
Darkfin Sculpin	*Malacocottus zonurus*	66	2.28	0.55	29.28
Whitetail Sculpin	*Malacocottus aleuticus*	6	-	-	-
Bigmouth Sculpin	*Hemitripterus bolini*	4	8.26	5.72	22.88
Spotfin Sculpin	*Icelinus tenuis*	4	0.19	0.19	0.19
Eelpouts	**Family Zoarcidae**				
Twoline Eelpout	*Bothrocara brunneum*	11	6.82	2.88	31.70
Black Eelpout	*Lycodes diapterus*	7	0.52	0.28	1.67
Pallid Eelpout	*Lycodapus mandibularis*	6	0.07	0.05	0.09
Snakehead Eelpout	*Lycenchelys crotalina*	3	0.43	0.22	0.65
Poachers	**Family Agonidae**				
Bigeye Poacher	*Bathyagonus pentacanthus*	23	0.20	0.08	0.60
Smootheye Poacher	*Xeneretmus leiops*	9	0.11	0.11	0.11
Blackfin Poacher	*Bathyagonus nigripinnis*	7	0.13	0.13	0.13
Gray Starsnout	*Bathyagonus alascanus*	1	-	-	-
Lanternfishes	**Family Myctophidae**				
Lanternfishes	Myctophidae (Family)	24	0.30	0.16	1.29
Northern Lampfish	*Stenobrachius leucopsarus*	17	-	-	-
California Headlightfish	*Diaphus theta*	5	-	-	-
Blue Lanternfish	*Tarletonbeania crenularis*	5	-	-	-
Lanternfish	*Tarletonbeania* (Genus)	2	0.30	0.19	0.37
Pinpoint Lampfish	*Nannobrachium regale*	1	0.16	0.16	0.16
Garnet Lanternfish	*Stenobrachius nannochir*	1	-	-	-
Other Fish					
Sablefish	*Anoplopoma fimbria*	111	191.30	34.28	3804.95
Deepsea Smelts	Bathylagidae (Family)	15	0.44	0.18	1.65
Pacific Viperfish	*Chauliodus macouni*	14	0.24	0.10	0.49
-	*Paraliparis* (Genus)	8	0.14	0.14	0.14
Crested Bigscale	*Poromitra crassiceps*	7	0.07	0.06	0.12
Blacktail Snailfish	*Careproctus melanurus*	6	0.62	0.38	2.25
Longfin Dragonfish	*Tactostoma macropus*	5	0.17	0.10	0.31
Ragfish	*Icosteus aenigmaticus*	3	0.72	0.51	1.53
Falcate Snailfish	*Careproctus cypselurus*	3	0.35	0.16	0.47
White Barracudina	*Arctozenus risso*	3	-	-	-
Prowfish	*Zaprora silenus*	2	7.34	5.27	10.54
Chum Salmon	*Oncorhynchus keta*	2	4.94	3.59	7.18
Northern Ronquil	*Ronquilus jordani*	2	0.19	0.19	0.19
Swellhead Snailfish	*Paraliparis cephalus*	2	-	-	-
Slim Snailfish	*Rhinoliparis attenuatus*	2	-	-	-
Pacific Pompano	*Peprilus simillimus*	1	1.50	1.50	1.50
Black Hagfish	*Eptatretus deani*	1	0.22	0.22	0.22
Pearly Prickleback	*Bryozoichthys marjorius*	1	0.19	0.19	0.19
Threadfin Slickhead	*Talismania bifurcata*	1	0.18	0.18	0.18
Shining Tubeshoulder	*Sagamichthys abei*	1	0.10	0.10	0.10
Northern Pearleye	*Benthalbella dentata*	1	-	-	-
Snipe Eels	Nemichthyidae (Family)	1	-	-	-
Snailfishes	*Liparis* (Genus)	1	-	-	-
Pectoral Snailfish	*Paraliparis pectoralis*	1	-	-	-

Common Name	Scientific Name	Number of Tows	Catch Weight (kg)		
			Max	Mean	Total
Snailfishes	Liparidae (Family)	1	-	-	-
Crabs and Shrimp	**Class Malacostraca**				
Prawn	*Pandalus platyceros*	39	0.82	0.34	12.86
Sidestripe Shrimp	*Pandalopsis dispar*	21	0.14	0.12	0.36
Glass Shrimp	*Pasiphaea pacifica*	20	0.52	0.50	1.00
Yellowleg Shrimp	*Pandalus tridens*	17	-	-	-
Grooved Tanner Crab	*Chionoecetes tanneri*	15	4.46	1.70	22.06
Large Eyed Eualid	*Eualus macropthalmus*	13	-	-	-
Isopods	Isopoda (Order)	9	-	-	-
Barbed Eualid	*Eualus barbatus*	6	-	-	-
Redclaw Crab	*Chorilia longipes*	6	-	-	-
-	*Lithodes couesi*	5	1.34	0.97	2.90
Pandalid Shrimp	Pandalidae (Family)	5	-	-	-
Pink Shrimp (smooth)	*Pandalus jordani*	4	-	-	-
-	*Paralomis multispina*	3	0.40	0.27	0.82
Spider Crabs	Majidae (Family)	3	-	-	-
Right-handed Hermits	Paguridae (Family)	2	-	-	-
Crimson Pasiphaeid	*Pasiphaea tarda*	1	0.08	0.08	0.08
Squat Lobster	*Munida quadrispina*	1	-	-	-
Graceful Decorator Crab	*Oregonia gracilis*	1	-	-	-
Deepwater Decorator Crab	*Oregonia bifurca*	1	-	-	-
-	*Neognathophausia gigas*	1	-	-	-
-	Crangonidae (Family)	1	-	-	-
Spike Shrimp (horned Shrimp)	*Paracrangon echinata*	1	-	-	-
-	Pasiphaeidae (Family)	1	-	-	-
Grooved-back Shrimp	*Parapasiphae sulcatifrons*	1	-	-	-
Spiny Ridge Shrimp	*Notostomus japonicus*	1	-	-	-
Sea Stars	**Class Asteroidea**				
Cushion Star	*Pteraster tesselatus*	15	0.11	0.11	0.11
-	*Henricia* (Genus)	14	-	-	-
-	*Cheiraster dawsoni*	11	0.10	0.08	0.24
Rose Starfish	*Crossaster papposus*	7	-	-	-
-	*Lophaster furcilliger vexator* (Sub Species)	7	-	-	-
-	Solasteridae (Family)	5	-	-	-
-	*Hippasteria californica*	5	0.14	0.10	0.20
-	Poraniidae (Family)	5	0.10	0.10	0.10
-	Echinasteridae (Family)	4	-	-	-
-	*Tarsaster alaskanus*	4	-	-	-
-	*Pteraster* (Genus)	3	-	-	-
-	*Crossaster* (Genus)	3	0.31	0.21	0.41
-	*Solaster* (Genus)	3	0.13	0.09	0.18
-	*Poraniopsis inflatus inflatus* (Sub Species)	3	-	-	-
-	*Leptychaster arcticus*	3	-	-	-
Cookie Star	*Ceramaster patagonicus*	3	-	-	-
Spiny Red Sea Star	*Hippasteria spinosa*	2	4.61	2.38	4.75
-	*Heterozonias alternatus*	2	0.14	0.12	0.24
-	*Nearchaster* (Genus)	2	-	-	-
-	Astropectinidae (Family)	2	-	-	-
-	Zoroasteridae (Family)	2	-	-	-
-	*Thrissacanthias penicillatus*	1	0.15	0.15	0.15
-	*Benthopecten* (Genus)	1	0.11	0.11	0.11
-	*Zoroaster evermani*	1	0.09	0.09	0.09

Common Name	Scientific Name	Number of Tows	Catch Weight (kg)		
			Max	Mean	Total
-	*Dipsacaster* (Genus)	1	0.06	0.06	0.06
-	*Lophaster furcilliger*	1	-	-	-
-	*Ampheraster marianus*	1	-	-	-
-	*Tarsaster* (Genus)	1	-	-	-
-	Goniasteridae (Family)	1	-	-	-
Vermillion Starfish	*Mediaster aequalis*	1	-	-	-
-	*Hippasteria* (Genus)	1	-	-	-
-	*Ceramaster* (Genus)	1	-	-	-
-	*Gephyreaster swifti*	1	-	-	-
Brittle Stars	**Class Ophiuroidea**				
-	*Amphiophiura ponderosa*	14	0.22	0.13	0.26
-	Ophiuroidea (Class)	9	-	-	-
Basket Star	*Gorgonocephalus eucnemis*	5	0.95	0.43	1.30
-	Ophiacanthidae (Family)	3	-	-	-
-	*Ophiura* (Genus)	3	-	-	-
-	Ophiactidae (Family)	2	-	-	-
-	Ophiuridae (Family)	1	-	-	-
-	*Amphiophiura* (Genus)	1	-	-	-
Sea Cucumbers	**Class Holothuroidea**				
Soft Sea Cucumber	*Pseudostichopus mollis*	24	0.13	0.07	0.34
-	*Psolus (*Genus)	2	0.13	0.13	0.13
Sea Cucumbers	Holothuroidea (Class)	2	-	-	-
Armoured Sea Cucumber	*Psolus chitinoides*	2	-	-	-
Scaly Sea Cucumber	*Psolus squamatus*	1	-	-	-
Papillose Sea Cucumber	*Synallactes challengeri*	1	-	-	-
Octopuses and Squid	**Class Cephalopoda**				
Schoolmaster Gonate Squid	*Berryteuthis magister*	62	16.86	3.01	174.78
-	*Stigmatoteuthis dofleini*	9	0.58	0.36	2.14
Pacific Bobtail Squid	*Rossia pacifica*	7	-	-	-
-	*Octopoteuthis deletron*	4	0.20	0.14	0.43
Smoothskin Octopus	*Benthoctopus leioderma*	3	0.32	0.18	0.55
Gonate Squids	Gonatidae (Family)	3	-	-	-
Robust Clubhook Squid	*Moroteuthis robusta*	2	9.54	8.85	17.70
Humboldt Squid	*Dosidicus gigas*	2	8.79	6.08	12.15
Flapjack Devilfish	*Opisthoteuthis californiana*	2	0.80	0.47	0.94
-	*Japetella diaphana*	2	0.06	0.06	0.06
-	*Belonella borealis*	1	0.18	0.18	0.18
Octopus	Octopoda (Order)	1	-	-	-
Sea Urchins	**Super Order Echinacea**				
Fragile Urchin	*Allocentrotus fragilis*	22	1.00	0.62	2.46
Pallid Urchin	*Strongylocentrotus pallidus*	6	0.14	0.09	0.18
Jellyfish	**Phylum Cnidaria**				
Jellyfish	Scyphozoa (Class)	25	4.68	0.93	13.01
Lions Mane	Cyanea capillata	11	2.44	0.96	8.67
-	Atolla (Genus)	6	0.34	0.14	0.7
-	Periphylla periphylla	4	-	-	-
-	Chrysaora (Genus)	2	1.48	1.48	1.48
Fried Egg Jellyfish	Phacellophora camtschatica	1	0.34	0.34	0.34
Moon Jelly	Aurelia aurita	1	0.06	0.06	0.06
Anemones and Corals	**Class Anthozoa**				
Reticulate Anemone	*Actinauge verrilli*	39	1.67	0.78	5.44
-	*Primnoa* (Genus)	11	70.23	12.68	139.51
Anemone	Actiniaria (Order)	11	0.76	0.32	1.26
-	*Paractinostola faeculenta*	6	1.16	0.46	2.74

Common Name	Scientific Name	Number of Tows	Catch Weight (kg)		
			Max	Mean	Total
-	*Lillipathes* (Genus)	5	-	-	-
Sea Whip	*Balticina septentrionalis*	5	-	-	-
-	*Stomphia* (Genus)	4	0.37	0.21	0.41
-	*Liponema* (Genus)	3	0.16	0.12	0.23
-	*Paragorgia* (Genus)	3	0.06	0.06	0.06
-	*Virgularia* (Genus)	3	0.05	0.05	0.05
-	*Isidella* (Genus)	2	1.46	0.78	1.55
-	Liponematidae (Family)	2	-	-	-
-	*Paractinostola* (Genus)	1	0.90	0.90	0.90
Bubble Gum Coral	*Paragorgia arborea*	1	0.38	0.38	0.38
-	*Keratoisis* (Genus)	1	0.33	0.33	0.33
Cockscomb Cup Coral	*Desmophyllum dianthus*	1	0.18	0.18	0.18
-	*Gersemia* (Genus)	1	0.10	0.10	0.10
-	Isididae (Family)	1	0.06	0.06	0.06
-	Haloclavidae (Family)	1	-	-	-
-	*Actinoscyphia* (Genus)	1	-	-	-
-	Hormathiidae (Family)	1	-	-	-
-	Anthoptilidae (Family)	1	-	-	-
-	Umbellulidae (Family)	1	-	-	-
Snails and Seaslugs	**Class Gastropoda**				
Oregontriton	*Fusitriton oregonensis*	8	0.07	0.06	0.12
Seaslugs	Nudibranchia (Order)	3	-	-	-
-	*Bathybembix bairdii*	2	-	-	-
-	*Neptunea* (Genus)	2	-	-	-
White Night Doris	*Doris odhneri*	1	0.28	0.28	0.28
Whelks	Buccinidae (Family)	1	-	-	-
Rosy Tritonia	*Tritonia diomedea*	1	-	-	-
Other Invertebrate Species					
Sponges	Porifera (Phylum)	28	1.85	0.64	7.63
Glass Sponges	Hexactinellida (Class)	11	8.84	1.80	17.96
Polychaete Worms	Polychaeta (Class)	8	-	-	-
Calcareous Sponges	Calcarea (Class)	5	7.98	2.26	11.31
Bath Sponges	Demospongiae (Class)	4	24.40	8.84	26.53
-	*Hyalonema* (Genus)	4	0.40	0.23	0.68
Sea Lilies And Feather Stars	Crinoidea (Class)	3	-	-	-
-	Antedonidae (Family)	3	-	-	-
Sea Mouse	*Aphrodita* (Genus)	3	-	-	-
Ascidians And Tunicates	Ascidiacea (Class)	2	2.02	1.03	2.07
-	Aplacophora (Class)	2	-	-	-
-	*Halocynthia* (Genus)	1	-	-	-
-	*Styela* (Genus)	1	-	-	-
Seaspider	Pycnogonida (Class)	1	-	-	-
-	*Pyrosoma* (Genus)	1	-	-	-
-	Laodiceidae (Family)	1	-	-	-
-	*Delectopecten* (Genus)	1	-	-	-
Heart Urchin	*Brisaster latifrons*	1	-	-	-
-	Neomeniidae (Family)	1	-	-	-

Table 9. Offloaded catch weight by species for the 2018 WCHG synoptic bottom trawl survey.

Species	Weight (kg)
Canary Rockfish	431.95
Darkblotched Rockfish	130.96
Dover Sole	256.60
Dusky Rockfish	20.87
English Sole	2.22
Greenstriped Rockfish	4.88
Harlequin Rockfish	16.43
Lingcod	168.25
Pacific Cod	87.46
Pacific Ocean Perch	100301.58
Petrale Sole	5.33
Redbanded Rockfish	230.85
Redstripe Rockfish	2720.46
Rex Sole	0.89
Rosethorn Rockfish	65.26
Rougheye Rockfish	7615.79
Sablefish	1976.85
Sharpchin Rockfish	5266.46
Shortraker Rockfish	67.03
Shortspine Thornyhead	3529.32
Silvergray Rockfish	3597.25
Splitnose Rockfish	32.41
Walleye Pollock	8.43
Widow Rockfish	155.38
Yellowmouth Rockfish	5007.20
Yellowtail Rockfish	44.84
Total	**131744.95**

Table 10. Species sampled during the 2018 WCHG synoptic bottom trawl survey. The number of samples and number of recorded biological attributes are shown for each species.

Common Name	Scientific Name	Number of Samples	Number of Recorded Biological Attributes				
			Length	Weight	Sex	Maturity	Age
Aleutian Skate	*Bathyraja aleutica*	8	9	9	9	0	0
Arrowtooth Flounder	*Atheresthes stomias*	6	148	148	148	67	66
Bocaccio	*Sebastes paucispinis*	9	21	21	21	21	19
Brown Cat Shark	*Apristurus brunneus*	5	19	19	19	0	0
Canary Rockfish	*Sebastes pinniger*	5	82	82	82	72	72
Darkblotched Rockfish	*Sebastes crameri*	2	34	34	34	29	29
Dover Sole	*Microstomus pacificus*	34	783	782	783	299	289
English Sole	*Parophrys vetulus*	1	27	27	27	0	0
Giant Grenadier	*Albatrossia pectoralis*	18	165	165	165	155	152
Greenstriped Rockfish	*Sebastes elongatus*	10	237	237	237	0	0
Harlequin Rockfish	*Sebastes variegatus*	6	186	186	186	0	0
Lingcod	*Ophiodon elongatus*	24	43	43	21	5	5
Longnose Skate	*Raja rhina*	31	44	44	44	0	0
Longspine Thornyhead	*Sebastolobus altivelis*	21	667	667	667	0	615
North Pacific Spiny Dogfish	*Squalus suckleyi*	2	2	2	2	0	0
Pacific Cod	*Gadus macrocephalus*	5	37	37	37	0	0
Pacific Flatnose	*Antimora microlepis*	15	50	50	50	50	49
Pacific Grenadier	*Coryphaenoides acrolepis*	16	438	438	437	0	0
Pacific Hake	*Merluccius productus*	13	264	264	264	0	0
Pacific Halibut	*Hippoglossus stenolepis*	27	44	44	3	0	0
Pacific Ocean Perch	*Sebastes alutus*	80	2195	2195	2195	1807	1799
Petrale Sole	*Eopsetta jordani*	2	27	27	27	17	15
Popeye	*Coryphaenoides cinereus*	15	341	341	341	0	0
Pygmy Rockfish	*Sebastes wilsoni*	1	25	25	25	0	0
Redbanded Rockfish	*Sebastes babcocki*	46	627	627	627	620	615
Redstripe Rockfish	*Sebastes proriger*	33	969	969	969	415	411
Rex Sole	*Glyptocephalus zachirus*	29	850	849	850	27	27
Rosethorn Rockfish	*Sebastes helvomaculatus*	37	1089	1089	1089	0	0
Rougheye Rockfish	*Sebastes aleutianus/melanostictus*	54	757	757	757	757	755
Roughtail Skate	*Bathyraja trachura*	4	6	6	6	0	0
Sablefish	*Anoplopoma fimbria*	63	1126	1124	1126	515	502
Sandpaper Skate	*Bathyraja interrupta*	18	37	37	37	0	0
Sharpchin Rockfish	*Sebastes zacentrus*	39	1432	1431	1432	0	0
Shortraker Rockfish	*Sebastes borealis*	20	161	160	161	161	161
Shortspine Thornyhead	*Sebastolobus alascanus*	91	2783	2778	2780	0	628
Silvergray Rockfish	*Sebastes brevispinis*	28	657	655	657	398	393
Slender Sole	*Lyopsetta exilis*	1	25	25	25	0	0
Splitnose Rockfish	*Sebastes diploproa*	5	129	129	129	0	0
Spotted Ratfish	*Hydrolagus colliei*	3	97	97	97	0	0
Walleye Pollock	*Gadus chalcogrammus*	13	362	362	362	0	0
Whitebrow Skate	*Bathyraja minispinosa*	1	1	1	1	0	0
Widow Rockfish	*Sebastes entomelas*	8	162	161	162	24	24
Yelloweye Rockfish	*Sebastes ruberrimus*	6	8	8	8	8	8
Yellowmouth Rockfish	*Sebastes reedi*	12	345	345	345	222	222
Total		**867**	**17511**	**17497**	**17444**	**5669**	**6856**

Table 11. Summary of biological data collected during the 2018 WCHG synoptic bottom trawl survey. For each species the number of samples and specimens, the minimum, maximum, and mean length, the minimum, maximum, and mean weight, and female proportion is shown. Weights less than 0.1 kg are entered as <0.1 and no data collected is -.

		Number of			Length (cm)			Weight (kg)			
Common Name	Scientific Name	Samples	Specimens	Length Type	Min.	Max.	Mean	Min.	Max.	Mean	Female Proportion
Aleutian Skate	*Bathyraja aleutica*	8	9	Total	52	137	79	0.8	15.5	4.5	0.56
Arrowtooth Flounder	*Atheresthes stomias*	6	148	Fork	38	77	49	0.5	5.1	1.3	0.61
Bocaccio	*Sebastes paucispinis*	9	21	Fork	34	87	64	0.4	8.9	4.1	0.38
Brown Cat Shark	*Apristurus brunneus*	5	19	Total	35	64	49	0.2	0.9	0.5	0.42
Canary Rockfish	*Sebastes pinniger*	5	82	Fork	39	60	50	1	3.5	2.2	0.39
Darkblotched Rockfish	*Sebastes crameri*	2	34	Fork	34	54	41	0.7	3	1.3	0.29
Dover Sole	*Microstomus pacificus*	34	783	Total	27	59	40	0.2	2.4	0.7	0.20
English Sole	*Parophrys vetulus*	1	27	Total	32	46	37	0.3	0.9	0.5	0.44
Giant Grenadier	*Albatrossia pectoralis*	18	165	-	-	-	-	0.2	21.3	2.1	0.66
Greenstriped Rockfish	*Sebastes elongatus*	10	237	Fork	16	35	27	<0.1	0.6	0.3	0.38
Harlequin Rockfish	*Sebastes variegatus*	6	186	Fork	17	33	26	<0.1	0.5	0.2	0.56
Lingcod	*Ophiodon elongatus*	24	43	Fork	51	104	86	1	13.4	6.9	0.86
Longnose Skate	*Raja rhina*	31	44	Total	58	137	100	1	16.8	7.2	0.39
Longspine Thornyhead	*Sebastolobus altivelis*	21	667	Total	8	32	21	<0.1	0.4	0.1	0.52
North Pacific Spiny Dogfish	*Squalus suckleyi*	2	2	Total	75	82	79	1.9	2.4	2.2	0.50
Pacific Cod	*Gadus macrocephalus*	5	37	Fork	44	82	60	0.8	5	2.2	0.62
Pacific Flatnose	*Antimora microlepis*	15	50	Total	14	57	28	<0.1	1.4	0.3	0.36
Pacific Grenadier	*Coryphaenoides acrolepis*	16	438	-	-	-	-	<0.1	1.1	0.3	0.43
Pacific Hake	*Merluccius productus*	13	264	Fork	24	73	54	0.1	3.1	1.2	0.84
Pacific Halibut	*Hippoglossus stenolepis*	27	44	Fork	51	125	81	1.4	27.4	7.4	-
Pacific Ocean Perch	*Sebastes alutus*	80	2195	Fork	14	51	39	<0.1	2	0.8	0.46
Petrale Sole	*Eopsetta jordani*	2	27	Total	36	50	42	0.5	1.5	0.9	0.41
Popeye	*Coryphaenoides cinereus*	15	341	-	-	-	-	<0.1	0.4	0.2	0.50
Pygmy Rockfish	*Sebastes wilsoni*	1	25	Fork	16	22	19	<0.1	0.1	0.1	0.76
Redbanded Rockfish	*Sebastes babcocki*	46	627	Fork	12	62	39	<0.1	4.2	1.2	0.46
Redstripe Rockfish	*Sebastes proriger*	33	969	Fork	23	44	34	0.1	1.1	0.5	0.47
Rex Sole	*Glyptocephalus zachirus*	29	850	Total	20	44	33	<0.1	0.6	0.2	0.39
Rosethorn Rockfish	*Sebastes helvomaculatus*	37	1089	Fork	10	36	26	<0.1	0.7	0.3	0.45
Rougheye/BS Rockfish	*Sebastes aleutianus/melanostictus*	54	757	Fork	17	77	47	0.1	7.3	1.7	0.46
Roughtail Skate	*Bathyraja trachura*	4	6	Total	33	79	65	0.2	3.1	1.9	0.17
Sablefish	*Anoplopoma fimbria*	63	1126	Fork	38	106	58	0.5	13.7	2.2	0.36

Common Name	Scientific Name	Number of		Length Type	Length (cm)			Weight (kg)			Female Proportion
		Samples	Specimens		Min.	Max.	Mean	Min.	Max.	Mean	
Sandpaper Skate	*Bathyraja interrupta*	18	37	Total	44	66	61	0.5	1.8	1.4	0.41
Sharpchin Rockfish	*Sebastes zacentrus*	39	1432	Fork	13	40	29	<0.1	1.1	0.4	0.58
Shortraker Rockfish	*Sebastes borealis*	20	161	Fork	34	96	62	0.6	15.3	4.2	0.58
Shortspine Thornyhead	*Sebastolobus alascanus*	91	2783	Total	6	79	27	<0.1	7.9	0.3	0.51
Silvergray Rockfish	*Sebastes brevispinis*	28	657	Fork	37	72	52	0.7	5	1.9	0.45
Slender Sole	*Lyopsetta exilis*	1	25	Total	11	26	21	<0.1	0.1	0.1	0.48
Splitnose Rockfish	*Sebastes diploproa*	5	129	Fork	12	33	24	<0.1	0.7	0.3	0.57
Spotted Ratfish	*Hydrolagus colliei*	3	97	2nd Dorsal	19	52	35	0.1	1.6	0.5	0.52
Walleye Pollock	*Gadus chalcogrammus*	13	362	Fork	8	66	39	<0.1	1.9	0.6	0.65
Whitebrow Skate	*Bathyraja minispinosa*	1	1	Total	59	59	59	1.1	1.1	1.1	0.00
Widow Rockfish	*Sebastes entomelas*	8	162	Fork	32	58	49	0.5	2.8	1.8	0.33
Yelloweye Rockfish	*Sebastes ruberrimus*	6	8	Fork	44	67	61	1.4	5.8	4.5	0.38
Yellowmouth Rockfish	*Sebastes reedi*	12	345	Fork	28	55	42	0.3	2.5	1.2	0.53

Table 12. Summary of data from net-mounted recorders during the 2018 WCHG synoptic bottom trawl survey, showing the number of tows and total number of records. A total of 132 survey tows were conducted, of which 119 were useable.

		Number of	
Data Recorder	**Attribute**	**Tows**	**Records**
Hobo Pendant Acceleration Data Logger	Bottom Contact Sensor Tilt Angle	102	1199333
Seabird Sbe19plus Seacat Profiler	Conductivity of sea water (S/m)	107	275676
	Pressure (db)/ Depth (m)	107	275676
	Salinity (PSU)	107	275676
	Water temperature (ºC)	107	275676
Seabird SBE43	Oxygen Voltage (V)/ Dissolved Oxygen (ml/L)	107	551352
Seabird SBE39 Temperature And Pressure Recorder	Water temperature (ºC)	115	596826
	Pressure (db)/ depth (m)	115	596826

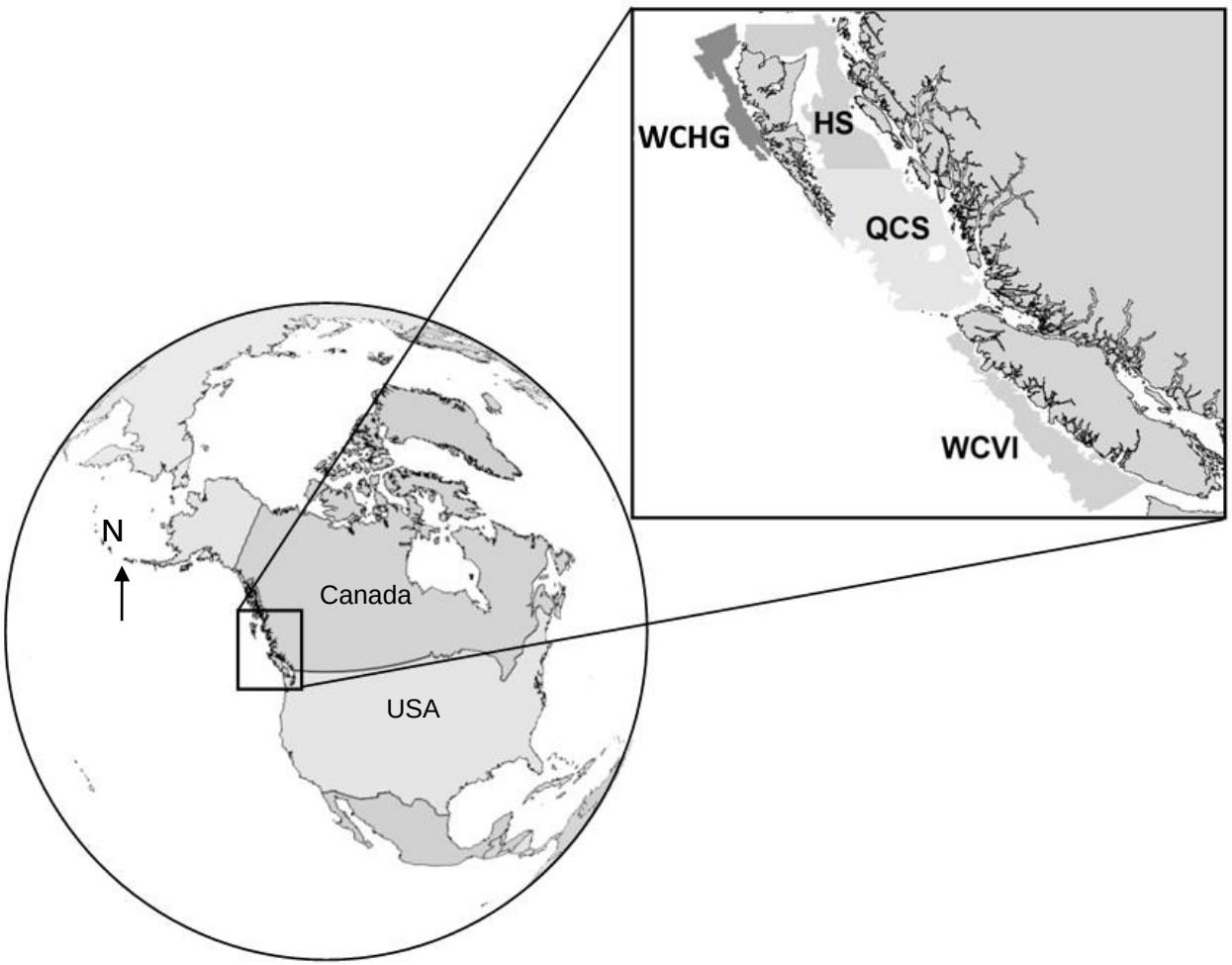

Figure 1. Locations of the current synoptic bottom trawl surveys on the coast of British Columbia, Canada. WCHG = West Coast Haida Gwaii; HS = Hecate Strait; QCS = Queen Charlotte Sound; WCVI = West Coast Vancouver Island.

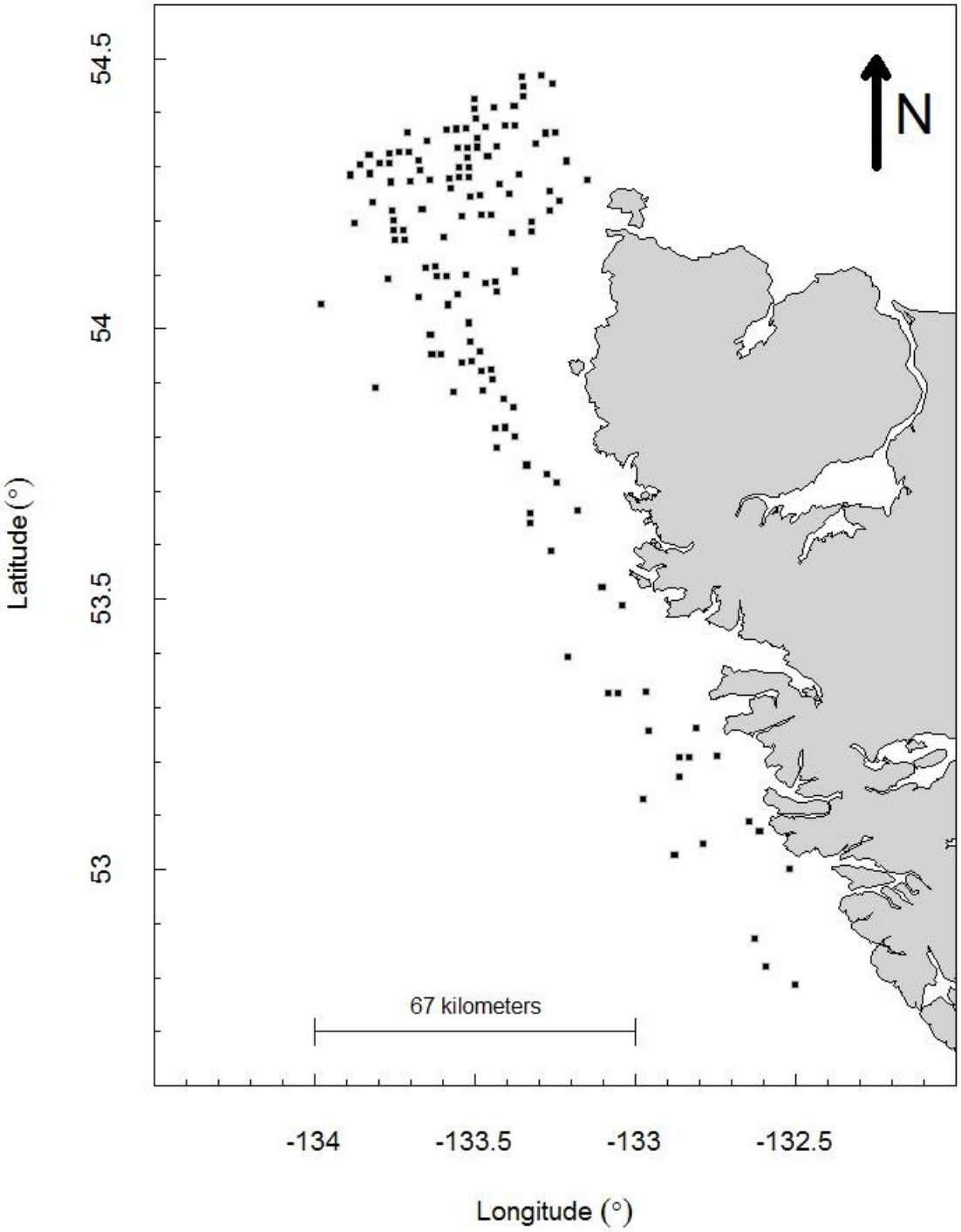

Figure 2. The 2018 WCHG synoptic bottom trawl survey area showing the 136 randomly selected blocks.

Figure 3. The FV Nordic Pearl used for the 2018 WCHG synoptic bottom trawl survey (photo Schon Acheson).

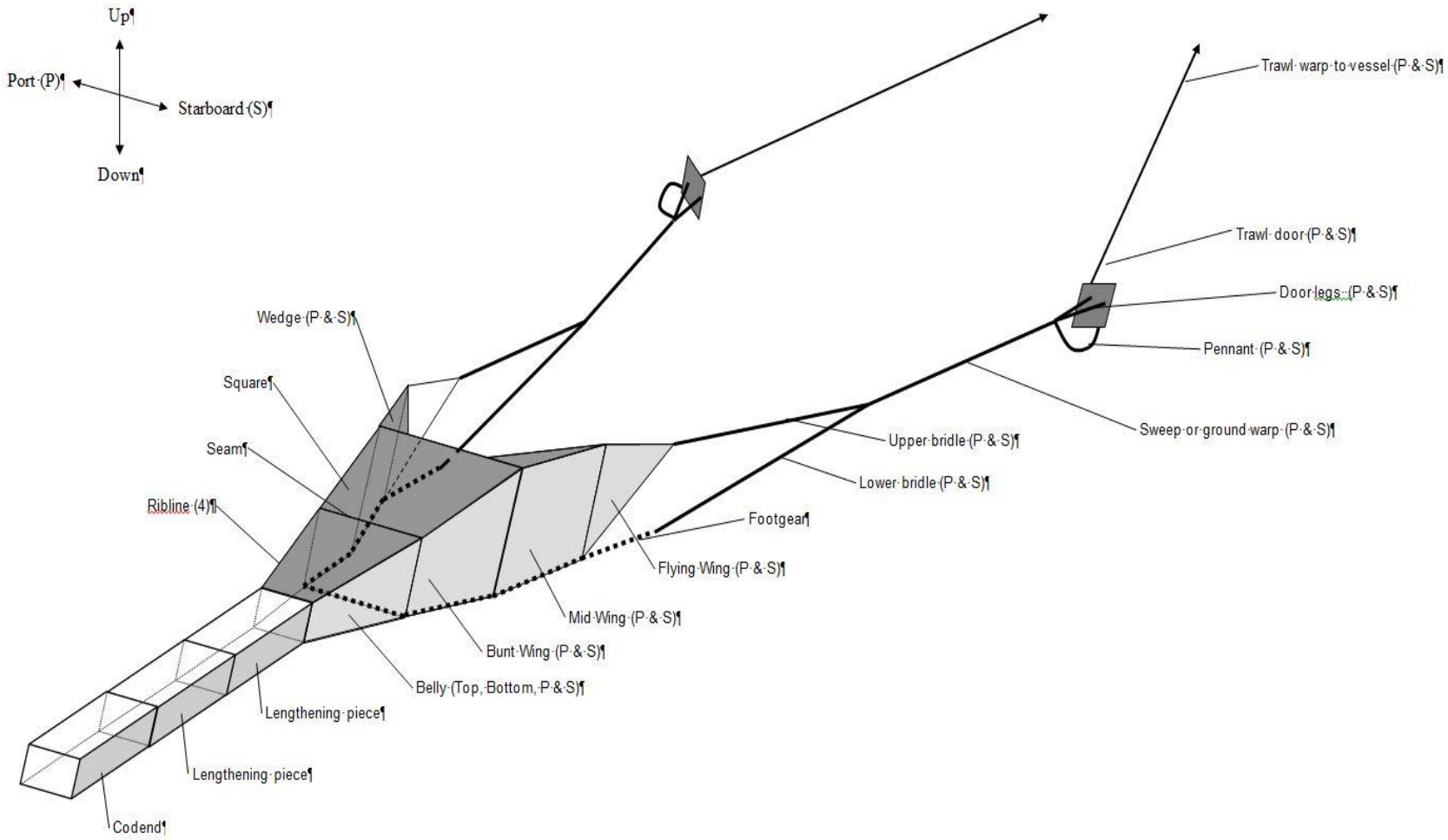

Figure 4. Overview diagram of the Atlantic Western IIa box trawl used on the 2018 WCHG synoptic bottom trawl survey.

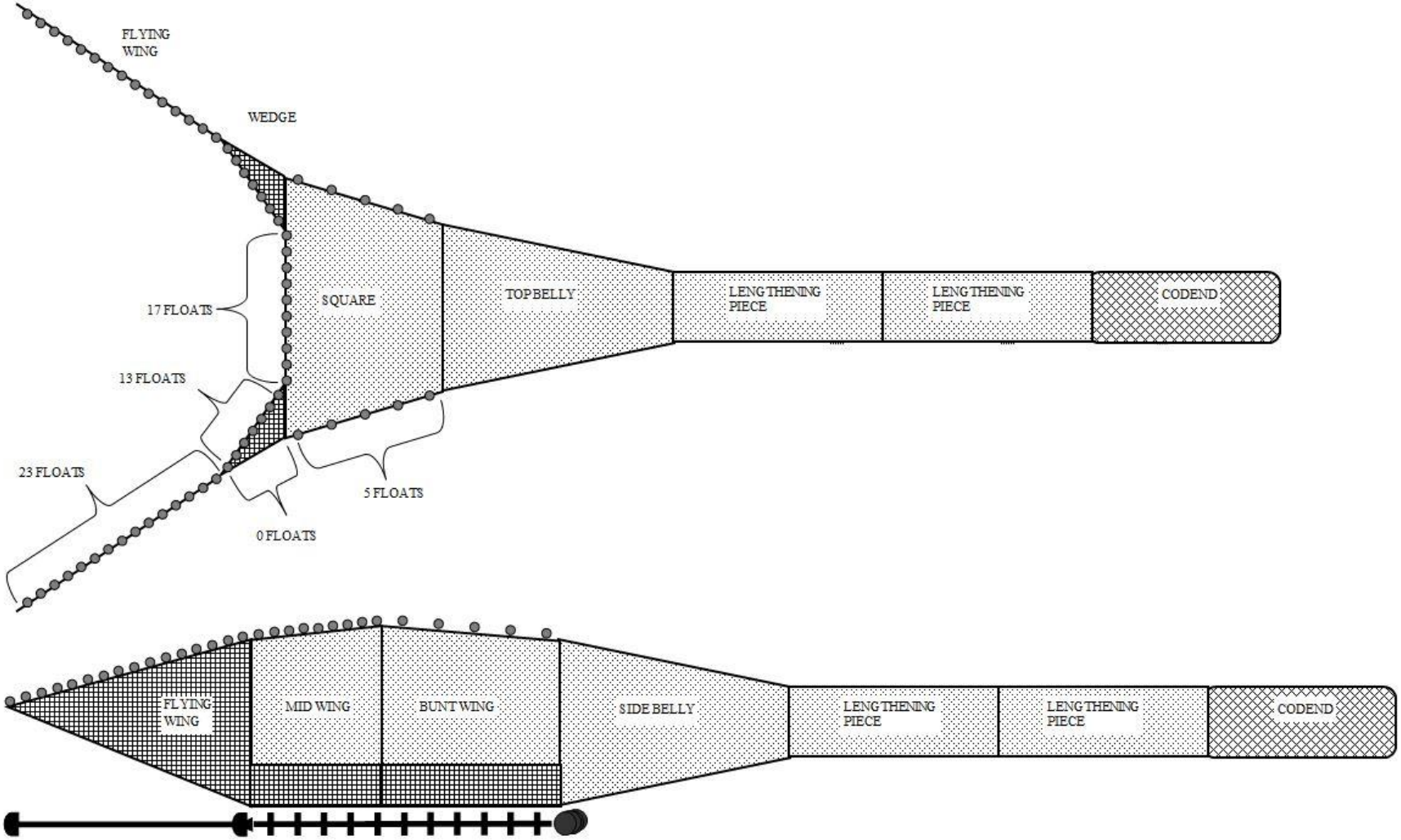

Figure 5. Top and side view of the Atlantic Western IIa box trawl used on the 2018 WCHG synoptic bottom trawl survey.

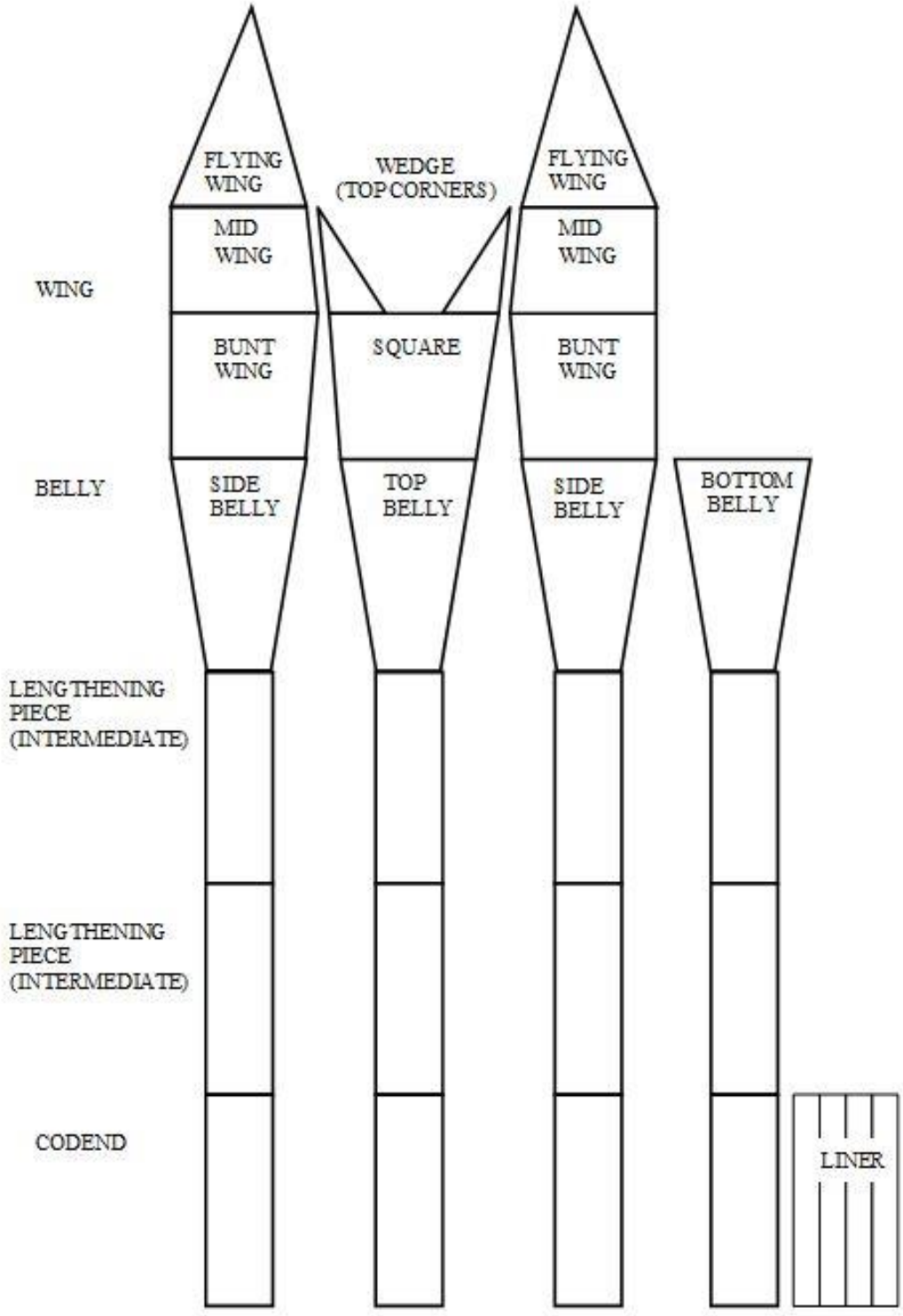

Figure 6. Diagram of the net panels with section names for the Atlantic Western IIa box trawl used on the 2018 WCHG synoptic bottom trawl survey.

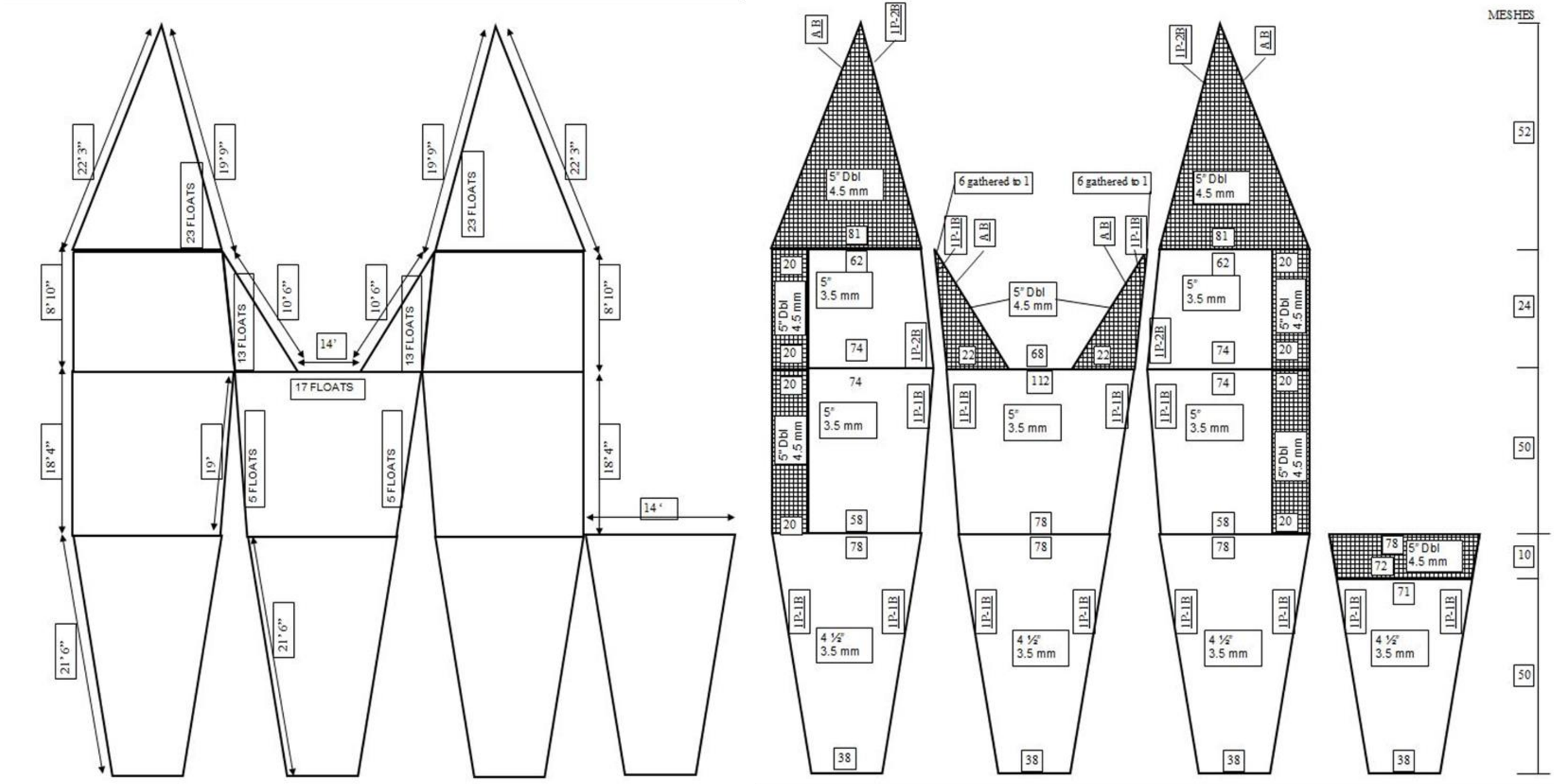

Figure 7. Schematics of the wing and belly sections of the Atlantic Western IIa box trawl used on the 2018 WCHG synoptic bottom trawl survey. Dimensions and the float arrangement are shown on the left while netting details, mesh counts, and mesh cuts are shown on the right side of the diagram.

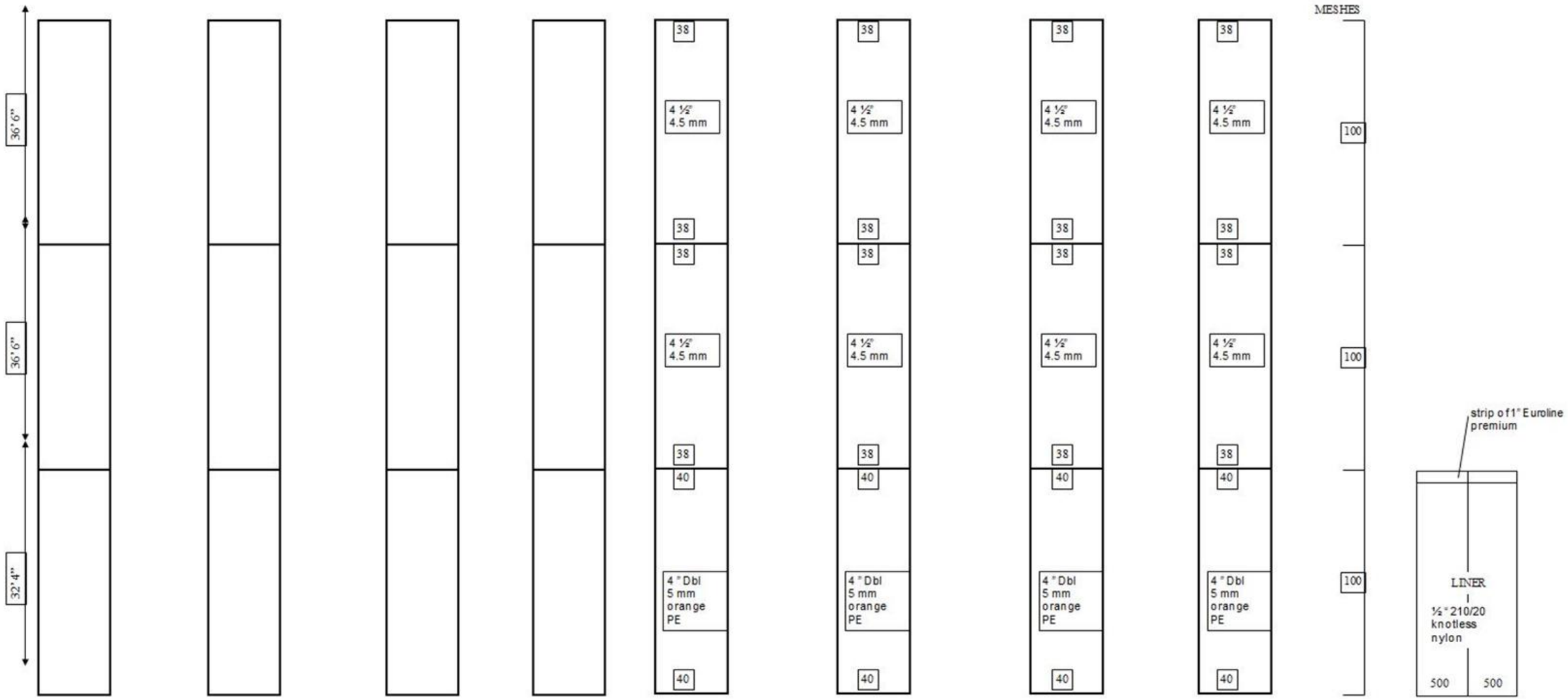

Figure 8. Details of the lengthening (intermediate) pieces and codend sections of the Atlantic Western IIa box trawl used on the 2018 WCHG synoptic bottom trawl survey. Dimensions are shown on the left while netting details, mesh counts, and mesh cuts including the codend liner are shown on the right side of the diagram.

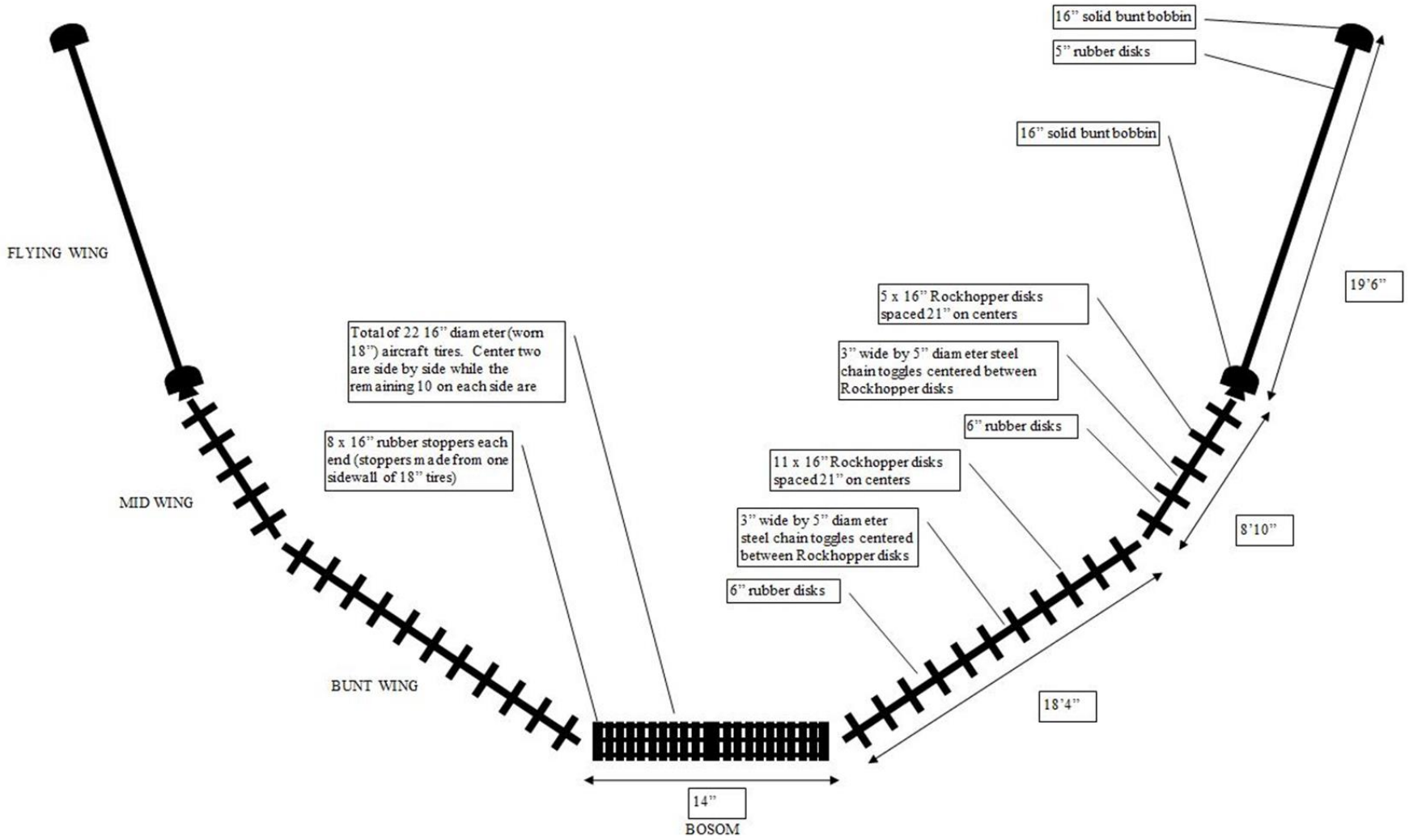

Figure 9. Details of the Rockhopper foot gear for the Atlantic Western IIa box trawl used on the 2018 WCHG synoptic bottom trawl survey.

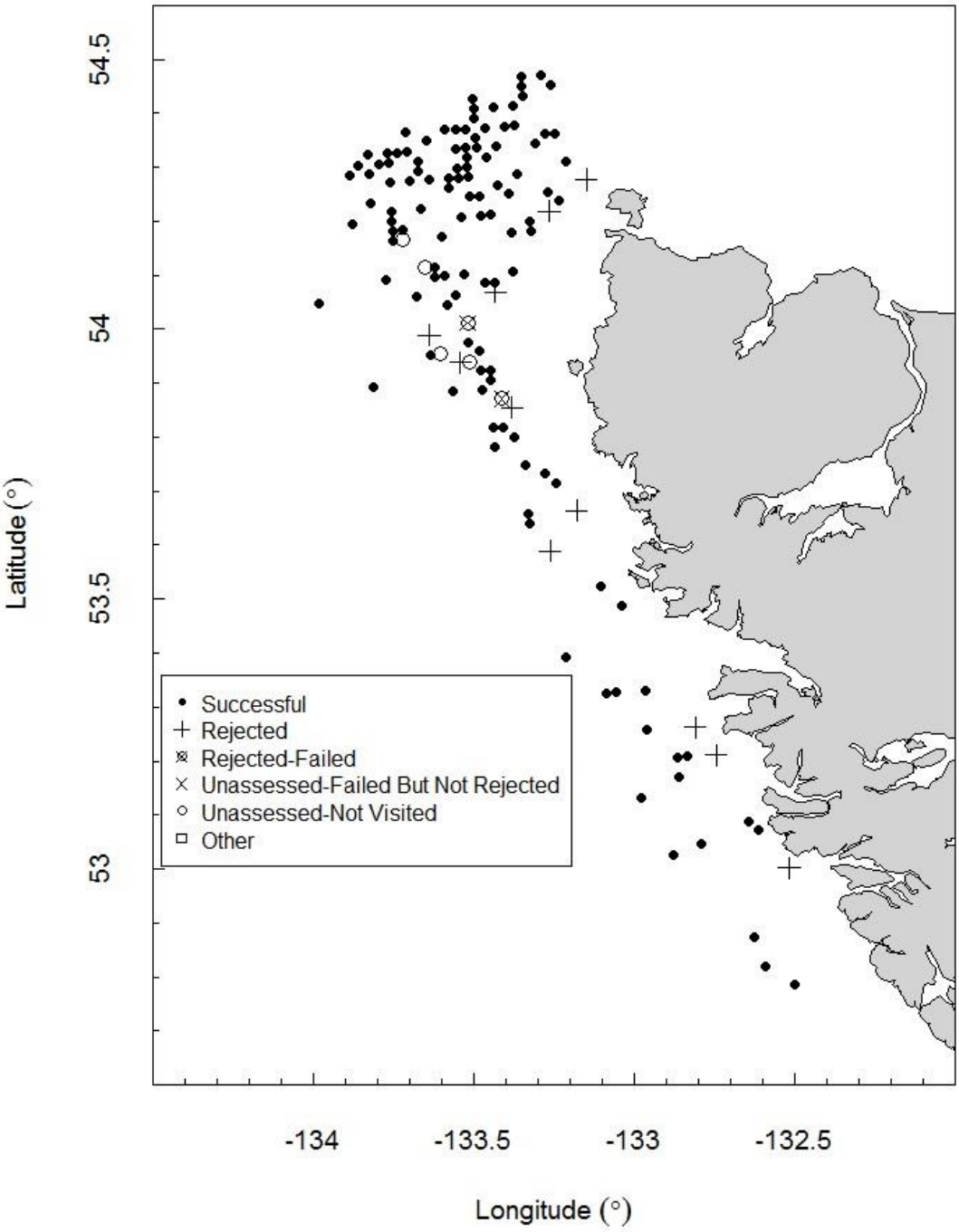

Figure 10. Final status of the 2018 WCHG synoptic bottom trawl survey showing 119 successfully fished blocks (Successful), 11 blocks rejected with prior knowledge or after inspection (Rejected), 2 blocks rejected after one or more failed fishing attempts (Rejected-Failed) and 4 blocks that remained unassessed at the end of the survey.

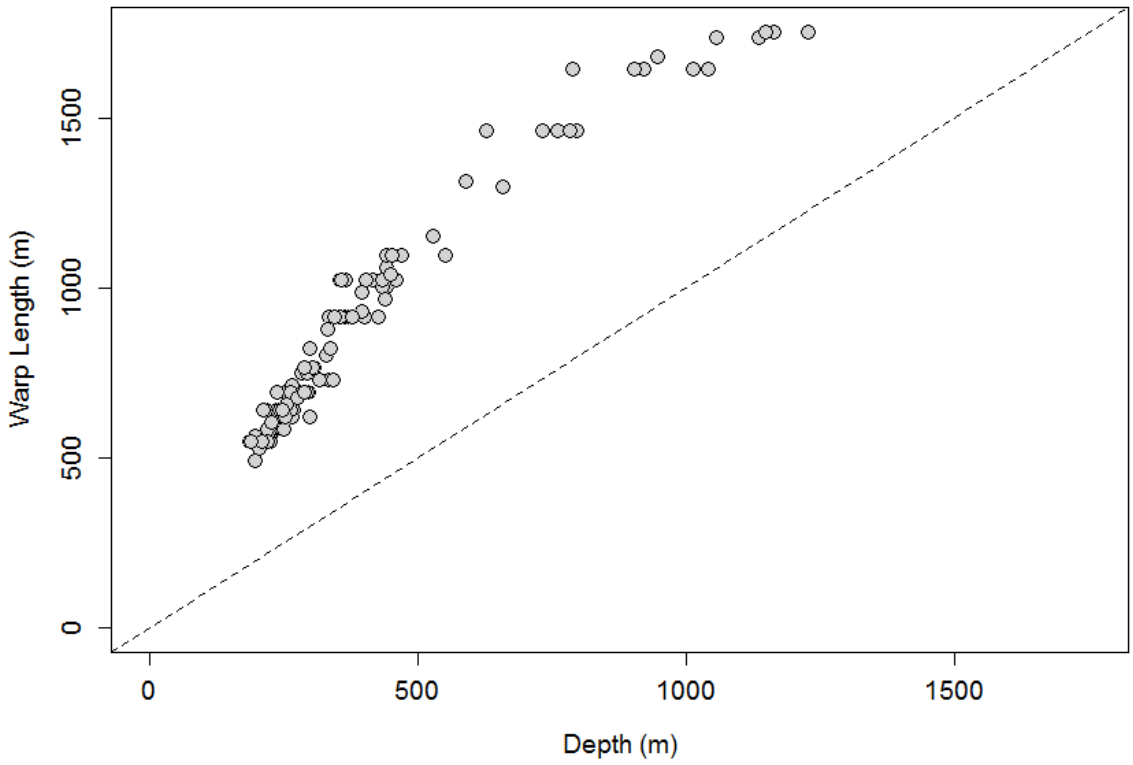

Figure 11. Warp length versus starting depth for each tow during the 2018 WCHG synoptic bottom trawl survey (dashed line represents 1:1 ratio).

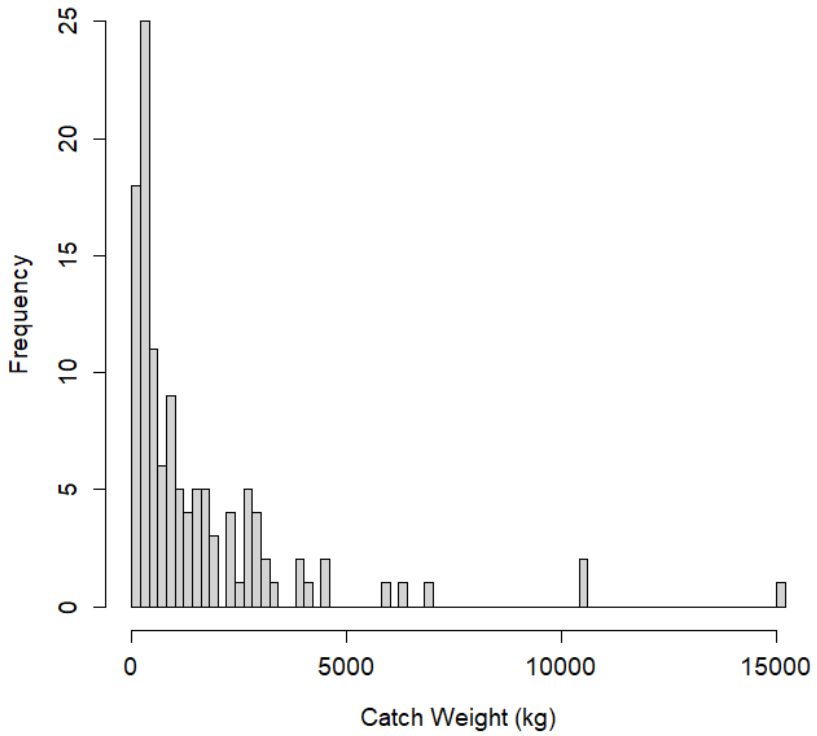

Figure 12. Histogram of catch weight per useable tow during the 2018 WCHG synoptic bottom trawl survey.

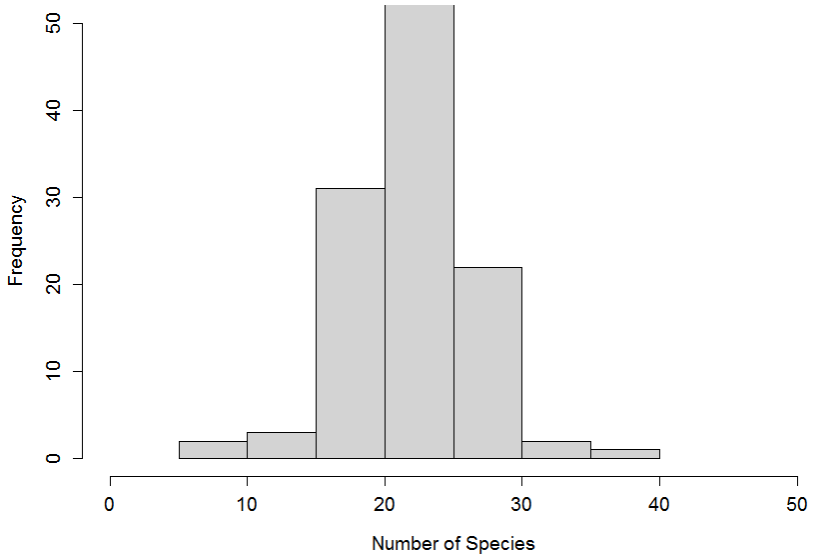

Figure 13. Histogram of the number of species caught in useable tows during the 2018 WCHG synoptic bottom trawl survey.

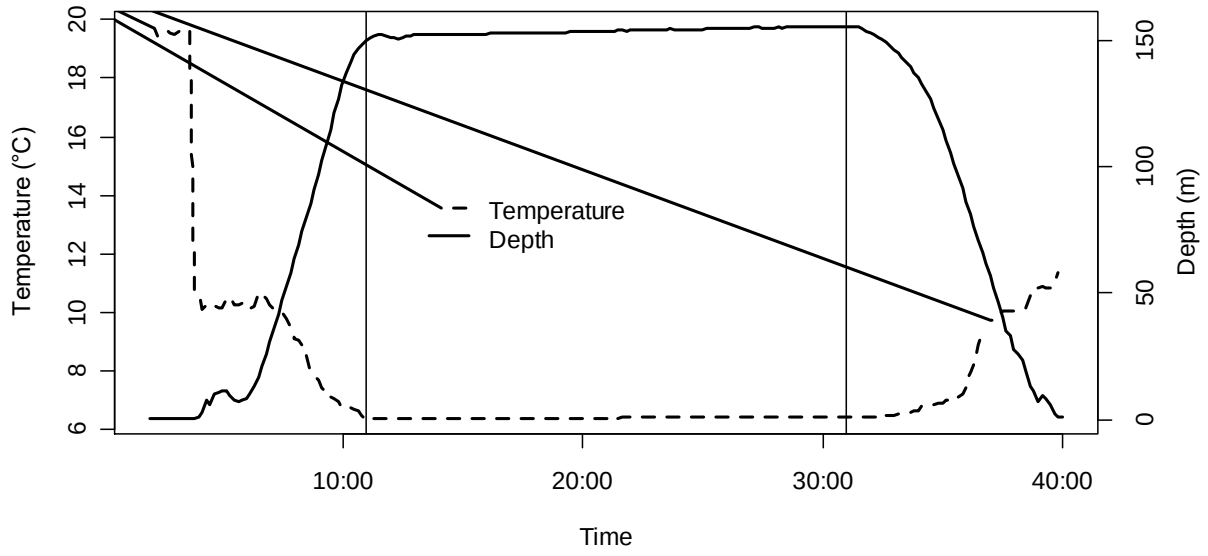

Figure 14. Example of a Seabird 39 temperature and depth profile collected during a synoptic bottom trawl survey. The vertical lines indicate the start and end of net contact with the sea floor.

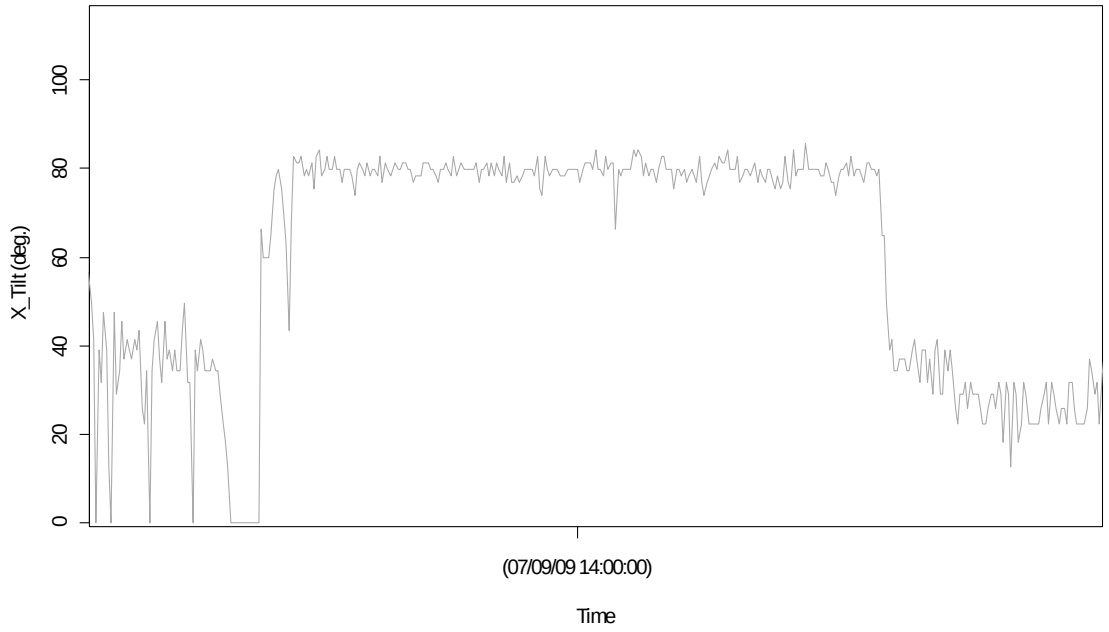

Figure 15. Example of a Mac Marine Industries bottom contact sensor profile collected during a bottom trawl survey. The raised segment in the middle of the profile at approximately 80° indicates where the net made contact with the sea floor.

APPENDIX A: WCHG 2018 SURVEY BRIDGE LOG

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Useable?
1	5-Sep	7:18	52.7758	132.4880	852	34	3.9	1609	30.8	No
2	5-Sep	9:14	52.7777	132.4849	789	31	5.1	1646	49.2	Yes
3	5-Sep	10:35	52.8167	132.5878	1057	31	4.6	1737	226.1	Yes
4	5-Sep	12:11	52.8625	132.6190	1137	29	4.2	1737	79.6	Yes
5	5-Sep	14:49	53.0617	132.6164	205	21	5.3	530	1577.0	Yes
6	5-Sep	15:46	53.0783	132.6485	224	20	5.9	567	2209.4	Yes
7	5-Sep	17:04	53.0509	132.7938	1227	31	4.2	1756	150.8	Yes
8	5-Sep	19:14	53.0224	132.8795	1043	26	5.0	1646	42.1	Yes
9	6-Sep	7:07	53.1296	132.9691	1014	31	5.0	1646	153.4	Yes
10	6-Sep	9:01	53.1714	132.8531	760	31	5.0	1463	142.1	Yes
11	6-Sep	10:21	53.2029	132.8619	796	1	1.0	1463	-	No
12	6-Sep	11:28	53.2185	132.8652	784	30	4.8	1463	212.7	Yes
13	6-Sep	12:48	53.2014	132.8369	733	31	5.4	1463	203.6	Yes
14	6-Sep	15:34	53.2654	132.9768	330	20	6.0	805	1316.7	Yes
15	6-Sep	16:49	53.3173	133.0806	221	21	5.4	549	7303.6	Yes
16	6-Sep	18:15	53.3311	132.9728	628	31	5.0	1463	158.5	Yes
17	7-Sep	7:25	53.3379	133.0724	195	4	4.4	512	193.8	No
18	7-Sep	7:53	53.3378	133.0727	196	20	5.4	494	1586.3	Yes
19	7-Sep	9:20	53.3885	133.2124	922	30	5.2	1646	187.4	Yes
20	7-Sep	11:25	53.5009	133.0494	210	21	5.3	549	1697.6	Yes
21	7-Sep	12:34	53.5348	133.1175	249	20	5.5	640	2728.4	Yes
22	7-Sep	14:53	53.6373	133.3125	459	22	5.3	1024	898.3	Yes
23	7-Sep	16:02	53.6573	133.3188	798	31	5.0	1463	214.0	Yes
24	7-Sep	17:34	53.7101	133.2487	220	8	5.9	567	186.3	No
25	7-Sep	18:04	53.7116	133.2520	220	21	6.2	567	585.6	Yes
26	7-Sep	18:54	53.7262	133.2691	225	21	6.2	-	350.8	Yes
27	8-Sep	7:30	53.7371	133.3210	374	20	5.3	914	366.5	Yes
28	8-Sep	8:32	53.7780	133.4239	528	11	5.1	1097	133.4	No
29	8-Sep	9:26	53.7795	133.4303	552	31	5.6	1097	358.4	Yes
30	8-Sep	10:44	53.8309	133.4445	334	22	5.9	914	557.4	Yes
31	8-Sep	11:57	53.8267	133.4081	277	20	5.6	677	2014.3	Yes
32	8-Sep	13:48	53.7934	133.3639	274	21	5.5	677	3500.0	Yes
33	8-Sep	16:01	53.8790	133.4120	162	5	4.5	494	6.8	No
34	8-Sep	16:28	53.8821	133.4624	259	20	5.8	640	652.9	Yes
35	8-Sep	17:18	53.9139	133.4794	248	20	5.7	640	1983.4	Yes
36	8-Sep	18:07	53.9344	133.4641	189	20	5.4	549	909.4	Yes
37	9-Sep	7:43	53.9169	133.4566	188	21	5.8	549	993.2	Yes
38	9-Sep	8:50	53.8962	133.5584	298	20	5.5	823	15170.5	Yes
39	9-Sep	13:03	53.9004	133.8040	1149	31	4.4	1756	120.4	Yes
40	9-Sep	15:04	53.9451	133.6356	590	22	5.1	1317	337.2	Yes
41	9-Sep	17:57	53.9861	133.5302	213	21	5.5	640	960.4	Yes
42	9-Sep	18:42	53.9648	133.4960	215	20	5.7	549	635.5	Yes
43	10-Sep	7:37	54.4210	133.4978	227	20	5.6	604	558.3	Yes
44	10-Sep	8:28	54.4167	133.4954	238	21	5.3	604	720.4	Yes
45	10-Sep	9:18	54.3866	133.5109	236	20	5.8	604	958.2	Yes
46	10-Sep	10:06	54.4205	133.4464	268	21	5.3	640	401.0	Yes
47	10-Sep	11:06	54.3709	133.3882	257	20	5.0	658	525.5	Yes
48	10-Sep	11:57	54.3745	133.3658	342	21	5.5	732	206.0	Yes
49	10-Sep	12:46	54.4090	133.3839	304	21	5.5	768	190.6	Yes
50	10-Sep	13:36	54.4246	133.3495	308	21	5.7	768	209.7	Yes
51	10-Sep	14:23	54.4468	133.3522	290	21	5.4	768	318.8	Yes
52	10-Sep	15:19	54.4613	133.3611	283	21	5.1	750	204.7	Yes

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Useable?
53	10-Sep	16:03	54.4671	133.3069	283	20	5.1	750	213.9	Yes
54	10-Sep	16:57	54.4499	133.2739	294	20	5.1	750	284.3	Yes
55	12-Sep	8:08	54.3563	133.2433	442	24	4.8	1097	167.3	Yes
56	12-Sep	9:01	54.3695	133.2800	434	20	5.5	1006	187.1	Yes
57	12-Sep	9:56	54.3503	133.3078	441	21	4.9	1006	265.2	Yes
58	12-Sep	11:16	54.3452	133.4464	221	0	4.1	640	-	No
59	12-Sep	11:41	54.3440	133.4477	219	20	6.2	585	4037.5	Yes
60	12-Sep	12:42	54.3247	133.4521	227	20	5.1	585	14000.0	Yes
61	12-Sep	16:03	54.3317	133.4950	246	20	5.2	585	888.9	Yes
62	12-Sep	17:06	54.3481	133.4878	243	21	5.2	622	1105.3	Yes
63	12-Sep	17:59	54.3788	133.4916	238	20	5.6	622	221.0	Yes
64	12-Sep	18:47	54.3784	133.5116	240	20	5.7	622	2634.1	Yes
65	13-Sep	7:36	54.3794	133.5443	230	21	5.9	622	1443.9	Yes
66	13-Sep	8:28	54.3620	133.5631	234	21	5.9	622	3874.1	Yes
67	13-Sep	9:28	54.3419	133.6273	242	20	5.6	640	1305.6	Yes
68	13-Sep	11:06	54.3599	133.6806	217	19	5.9	640	694.8	Yes
69	13-Sep	12:02	54.3275	133.6922	244	20	5.2	640	979.9	Yes
70	13-Sep	12:55	54.3337	133.7214	241	21	5.2	640	719.4	Yes
71	13-Sep	13:47	54.3156	133.7451	237	20	5.5	640	2774.3	Yes
72	13-Sep	14:49	54.3265	133.8239	402	20	5.1	914	430.2	Yes
73	13-Sep	15:58	54.3143	133.8542	529	31	5.2	1152	485.2	Yes
74	13-Sep	17:08	54.2900	133.8878	659	34	4.8	1298	198.3	Yes
75	13-Sep	18:31	54.2788	133.8339	469	20	5.0	1097	356.0	Yes
76	14-Sep	7:51	54.2961	133.7904	222	20	5.5	585	5934.7	Yes
77	14-Sep	8:44	54.3170	133.7675	231	20	5.8	585	7731.2	Yes
78	14-Sep	10:38	54.2929	133.6874	251	20	5.2	585	1200.8	Yes
79	14-Sep	11:47	54.3050	133.6618	251	20	5.6	585	1157.1	Yes
80	14-Sep	13:08	54.3279	133.5604	249	20	5.5	585	1308.4	Yes
81	14-Sep	14:03	54.3463	133.5328	245	20	5.6	585	940.0	Yes
82	14-Sep	14:54	54.3267	133.4972	253	21	5.7	622	2794.9	Yes
83	14-Sep	16:08	54.3121	133.4988	265	21	5.4	622	3180.8	Yes
84	14-Sep	17:23	54.2752	133.4292	428	12	3.9	933	100.1	No
85	14-Sep	18:09	54.2564	133.4442	416	26	5.1	1024	212.5	Yes
86	14-Sep	19:06	54.2809	133.3772	440	21	5.1	969	258.8	Yes
87	15-Sep	7:38	54.0490	133.9831	1164	31	3.9	1756	313.0	Yes
88	15-Sep	9:49	54.0763	133.7808	905	29	4.5	1646	191.5	Yes
89	15-Sep	11:17	54.0693	133.6881	442	20	5.3	1061	488.2	Yes
90	15-Sep	12:36	54.0581	133.6038	338	20	5.4	823	6289.2	Yes
91	15-Sep	14:08	54.0283	133.5182	155	7	5.4	384	12.8	No
92	15-Sep	15:55	54.0947	133.4188	226	19	5.4	549	2865.6	Yes
93	15-Sep	17:29	54.1710	133.3997	399	15	4.9	1024	217.5	No
94	15-Sep	18:12	54.1731	133.3986	403	21	5.4	1024	548.5	Yes
95	15-Sep	19:03	54.1952	133.3453	434	20	5.8	1024	572.1	Yes
96	16-Sep	8:03	54.2002	133.4825	366	21	5.4	1024	257.0	Yes
97	16-Sep	9:07	54.2052	133.5333	359	23	5.3	1024	163.0	Yes
98	16-Sep	10:03	54.2401	133.5153	355	21	5.7	1024	165.9	Yes
99	16-Sep	10:57	54.2585	133.4794	358	21	5.3	1024	254.0	Yes
100	16-Sep	11:47	54.2220	133.4527	396	20	5.5	988	250.2	Yes
101	16-Sep	12:55	54.1781	133.3360	378	15	5.7	914	472.2	Yes
102	16-Sep	14:41	54.2479	133.2219	299	18	5.2	622	1018.7	Yes
103	16-Sep	15:47	54.2534	133.2868	453	5	5.0	1097	74.7	No
104	16-Sep	16:27	54.2566	133.2826	452	20	6.0	1097	371.6	Yes
105	16-Sep	17:21	54.3069	133.2250	449	20	5.7	1042	196.8	Yes
106	18-Sep	8:29	54.2589	133.3816	428	21	5.7	914	42.1	Yes

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Useable?
107	18-Sep	10:02	54.1213	133.3619	198	20	5.9	567	9000.0	Yes
108	18-Sep	11:04	54.0945	133.4584	318	19	5.3	732	4000.0	Yes
109	18-Sep	12:24	54.1097	133.5396	362	20	5.4	914	988.1	Yes
110	18-Sep	13:16	54.0747	133.5435	344	19	5.8	914	1145.8	Yes
111	18-Sep	14:38	54.0939	133.5966	356	21	6.0	914	1900.9	Yes
112	18-Sep	16:01	54.0892	133.6123	353	21	6.3	914	6000.0	Yes
113	18-Sep	17:06	54.1109	133.6286	344	20	5.4	914	6000.0	Yes
114	18-Sep	18:03	54.1623	133.6105	332	21	6.0	878	613.7	Yes
115	18-Sep	19:07	54.2149	133.6602	266	20	5.8	713	1660.8	Yes
116	19-Sep	7:56	54.3122	133.5268	264	20	5.4	640	1404.0	Yes
117	19-Sep	8:50	54.2901	133.5081	297	21	5.7	695	1173.9	Yes
118	19-Sep	9:41	54.2892	133.5304	288	21	5.4	695	4800.0	Yes
119	19-Sep	10:35	54.2714	133.5593	293	20	5.5	695	4800.0	Yes
120	19-Sep	11:39	54.2900	133.5621	278	20	5.8	695	6000.0	Yes
121	19-Sep	12:44	54.2800	133.6274	264	20	5.8	695	3200.0	Yes
122	19-Sep	13:40	54.2796	133.686	254	20	5.9	695	5600.0	Yes
123	19-Sep	14:30	54.2814	133.7527	237	21	5.7	695	6000.0	Yes
124	19-Sep	15:26	54.2468	133.8135	397	21	5.6	933	4600.0	Yes
125	19-Sep	16:21	54.2286	133.755	226	20	6.2	585	12000.0	Yes
126	20-Sep	7:38	54.1834	133.8701	948	30	4.9	1683	314.7	Yes
127	20-Sep	9:17	54.2105	133.7679	224	11	5.4	604	5600.0	No
128	20-Sep	9:56	54.2144	133.758	222	20	5.9	549	21000.0	Yes
129	20-Sep	14:09	54.1919	133.7628	283	0	1.4	677	-	No
130	20-Sep	14:34	54.1934	133.763	271	20	5.8	677	6600.0	Yes
131	20-Sep	15:29	54.1767	133.7582	335	17	5.1	732	9000.0	Yes
132	20-Sep	16:45	54.1961	133.7329	224	16	5.8	585	21000.0	Yes

APPENDIX B: CATCH BY TOW (KG). <0.01 KG ENTERED AS –

Common Name	Scientific Name	Weight (Kg)	1	2	3	4	5
Aleutian Skate	*Bathyraja aleutica*	40.5					
Arrowtooth Flounder	*Atheresthes stomias*	3262.4					11.5
Aurora Rockfish	*Sebastes aurora*	19.8					
Bigmouth Sculpin	*Hemitripterus bolini*	22.9					
Bocaccio	*Sebastes paucispinis*	86.9					
Brown Cat Shark	*Apristurus brunneus*	9.5					
Canary Rockfish	*Sebastes pinniger*	738.1					10.1
Darkblotched Rockfish	*Sebastes crameri*	169.7					
Darkfin Sculpin	*Malacocottus zonurus*	29.3					-
Deepsea Sole	*Embassichthys bathybius*	11.6	0.3				
Dover Sole	*Microstomus pacificus*	1109.4		0.9	0.7		0.3
Dusky Rockfish	*Sebastes variabilis*	32.8					
English Sole	*Parophrys vetulus*	32.9					0.6
Giant Grenadier	*Albatrossia pectoralis*	408.4	1.7		25.2		
Greenstriped Rockfish	*Sebastes elongatus*	83.2					3.1
Harlequin Rockfish	*Sebastes variegatus*	221.4					
Lingcod	*Ophiodon elongatus*	309.8					
Longnose Skate	*Raja rhina*	325.5					14.2
Longspine Thornyhead	*Sebastolobus altivelis*	608.2	19.3	27.8	58.7	18.7	
North Pac. Spiny Dogfish	*Squalus suckleyi*	19.1					1.9
Pacific Cod	*Gadus macrocephalus*	161.0					3.8
Pacific Flatnose	*Antimora microlepis*	16.5			0.4	0.1	
Pacific Grenadier	*Coryphaenoides acrolepis*	359.9			46.8	40.5	1.8
Pacific Hake	*Merluccius productus*	659.7					0.3
Pacific Halibut	*Hippoglossus stenolepis*	326.9					5.3
Pacific Ocean Perch	*Sebastes alutus*	119266.4					1344.1
Petrale Sole	*Eopsetta jordani*	32.1					
Popeye	*Coryphaenoides cinereus*	89.4	0.1	0.1	0.8		
Prowfish	*Zaprora silenus*	10.5					
Redbanded Rockfish	*Sebastes babcocki*	1004.6					0.3
Redstripe Rockfish	*Sebastes proriger*	4387.0					76.6
Rex Sole	*Glyptocephalus zachirus*	565.9					3.2
Rosethorn Rockfish	*Sebastes helvomaculatus*	722.1					
Rougheye/ BS Rockfish	*S. aleutianus/melanostictus*	11066.9					
Roughtail Skate	*Bathyraja trachura*	14.4				2.7	
Sablefish	*Anoplopoma fimbria*	3805.0	5.0	10.5	61.2	15.5	11.5
Sandpaper Skate	*Bathyraja interrupta*	58.7					
Sharpchin Rockfish	*Sebastes zacentrus*	18358.3					
Shortraker Rockfish	*Sebastes borealis*	847.5					
Shortspine Thornyhead	*Sebastolobus alascanus*	4983.5	3.8	9.7	26.7	1.8	3.2
Silvergray Rockfish	*Sebastes brevispinis*	5261.3					67.2
Slender Sole	*Lyopsetta exilis*	11.4					
Splitnose Rockfish	*Sebastes diploproa*	1281.7					
Spotted Ratfish	*Hydrolagus colliei*	346.2					6.2
Twoline Eelpout	*Bothrocara brunneum*	11.1					
Walleye Pollock	*Gadus chalcogrammus*	438.2					4.3
Widow Rockfish	*Sebastes entomelas*	361.6					
Yelloweye Rockfish	*Sebastes ruberrimus*	35.5					
Yellowmouth Rockfish	*Sebastes reedi*	4783.6					
Yellowtail Rockfish	*Sebastes flavidus*	58.6					
Other		540.9	0.7	0.2	5.7	0.3	7.4
Total			**30.8**	**49.2**	**226.1**	**79.6**	**1577.0**

Common Name	6	7	8	9	10	11	12	13	14	15	16
Aleutian Skate											
Arrowtooth Flounder	2.5										
Aurora Rockfish											
Bigmouth Sculpin											
Bocaccio	44.0										
Brown Cat Shark								1.2			0.8
Canary Rockfish	2.1										
Darkblotched Rockfish									5.8		
Darkfin Sculpin									2.3	0.2	
Deepsea Sole		0.4			0.3		1.2	0.6			1.5
Dover Sole	0.2				15.0		3.0	10.5	11.1	0.4	27.8
Dusky Rockfish											
English Sole	0.5										
Giant Grenadier		55.4	4.3	11.8	3.6		3.4				6.3
Greenstriped Rockfish	0.4									9.4	
Harlequin Rockfish	0.4										
Lingcod	35.7										
Longnose Skate	3.4										
Longspine Thornyhead	-	8.6	12.1	27.6	66.4		37.4	30.8			1.9
North Pacific Spiny Dogfish											
Pacific Cod											
Pacific Flatnose		2.7			1.5		0.1	0.2			0.3
Pacific Grenadier		37.7	6.1	13.7	1.0		3.6	2.2			
Pacific Hake	3.1										
Pacific Halibut											
Pacific Ocean Perch	1998.4								280.5	1700.2	
Petrale Sole											
Popeye		28.9	4.5	9.2	1.5		1.8	1.9			0.4
Prowfish										7.3	
Redbanded Rockfish	3.8								1.3	1.3	
Redstripe Rockfish	12.5								0.7	491.8	
Rex Sole	1.4								1.3	0.6	3.3
Rosethorn Rockfish									3.9	57.7	
Rougheye/ BS Rockfish									899.0		
Roughtail Skate				0.2				2.2			
Sablefish	9.4	8.2	7.3	76.0	21.1		95.2	107.8	5.1	3.1	72.6
Sandpaper Skate									2.4		
Sharpchin Rockfish	4.8									1.2	
Shortraker Rockfish											
Shortspine Thornyhead		1.9	3.8	7.0	28.4		60.0	44.3	101.2		37.2
Silvergray Rockfish	50.4									790.4	
Slender Sole	0.6	0.1							0.2		
Splitnose Rockfish											
Spotted Ratfish	22.8										
Twoline Eelpout		0.7	0.4	1.7	0.7						1.3
Walleye Pollock	13.2		0.6								
Widow Rockfish										6.9	
Yelloweye Rockfish											
Yellowmouth Rockfish									0.9	1002.2	
Yellowtail Rockfish											
Other	-	6.2	3.1	6.2	2.5		7.1	1.7	0.9	0.1	5.1
Total	**2209.4**	**150.8**	**42.1**	**153.4**	**142.1**		**212.7**	**203.6**	**1316.7**	**4072.6**	**158.5**

Common Name	17	18	19	20	21	22	23	24	25	26	27
Aleutian Skate											
Arrowtooth Flounder				19.5	2.2			3.1	10.1	3.1	1.9
Aurora Rockfish						7.4					
Bigmouth Sculpin											
Bocaccio					4.9						
Brown Cat Shark											
Canary Rockfish								3.1		2.6	
Darkblotched Rockfish											
Darkfin Sculpin				0.1	-	-		0.5	0.1	0.1	
Deepsea Sole			0.8								
Dover Sole			1.9			11.3	9.0	2.3	0.2	0.6	16.4
Dusky Rockfish										1.3	
English Sole											
Giant Grenadier			11.2				13.2				
Greenstriped Rockfish	0.8	0.2		4.1	5.4			2.7	2.7	5.2	
Harlequin Rockfish		2.5		0.3	0.2				0.6	0.9	0.3
Lingcod					13.2				3.7	5.5	
Longnose Skate											
Longspine Thornyhead			38.0				53.4				
North Pacific Spiny Dogfish									2.4	1.8	
Pacific Cod										1.6	
Pacific Flatnose							-				
Pacific Grenadier			10.5				0.4				
Pacific Hake				9.9	45.4	2.1				65.3	15.3
Pacific Halibut				14.8	20.0						
Pacific Ocean Perch	9.9	287.5		1332.5	2223.2			76.4	337.4	127.7	41.2
Petrale Sole											
Popeye			16.5				2.1				
Prowfish											
Redbanded Rockfish					76.9			14.6	28.8	21.6	28.0
Redstripe Rockfish	40.2	271.0		11.8				2.7	24.8	6.3	
Rex Sole	0.8			2.3	0.3	0.1		4.1	5.1	5.0	5.9
Rosethorn Rockfish	4.6	26.5		2.1	2.4			7.1	8.2	3.9	
Rougheye/ BS Rockfish						473.2	11.1				158.5
Roughtail Skate											
Sablefish			74.6	9.3		16.5	88.3	10.4	9.3	9.2	34.7
Sandpaper Skate				1.4							1.0
Sharpchin Rockfish		4.9		0.3	161.5			5.1	14.3	6.5	
Shortraker Rockfish						294.9					
Shortspine Thornyhead	4.0		28.6	1.0	62.1	92.8	33.0	18.1	10.7	11.9	58.5
Silvergray Rockfish	78.1	377.0		271.5	56.5			35.2	119.0	60.3	
Slender Sole		0.1		0.2	0.8				0.1	0.3	0.3
Splitnose Rockfish					3.5						
Spotted Ratfish				0.6	3.1			0.2	0.1	0.2	
Twoline Eelpout											
Walleye Pollock				15.7	41.2			0.4	2.4	5.4	2.6
Widow Rockfish					3.2						
Yelloweye Rockfish											
Yellowmouth Rockfish	54.5	612.1			0.7						
Yellowtail Rockfish									3.3		
Other	1.0	4.3	5.2	0.3	1.7	0.2	3.4	0.1	2.3	4.2	2.0
Total	**193.8**	**1586.3**	**187.4**	**1697.6**	**2728.4**	**898.3**	**214.0**	**186.3**	**585.6**	**350.8**	**366.5**

Common Name	28	29	30	31	32	33	34	35	36	37	38
Aleutian Skate											
Arrowtooth Flounder			8.3	1.9	4.0	6.3	2.7	11.1	294.1	393.8	106.5
Aurora Rockfish		1.0									
Bigmouth Sculpin					8.3						
Bocaccio				6.0			4.4	10.8			
Brown Cat Shark	0.6	4.3	0.3								
Canary Rockfish							1.8	8.6	185.0	82.6	4.6
Darkblotched Rockfish					0.0						149.3
Darkfin Sculpin			-		-		-				1.0
Deepsea Sole		0.6									
Dover Sole	12.1	16.7	18.1	5.5	1.3			3.4	1.3	3.5	17.7
Dusky Rockfish									4.3		
English Sole				0.7	1.7				13.2	3.3	
Giant Grenadier	7.9	7.0									
Greenstriped Rockfish					2.3			0.4	7.8	16.7	
Harlequin Rockfish							0.6	1.9			
Lingcod				24.8	38.4		7.2		10.2	32.7	
Longnose Skate			3.6								
Longspine Thornyhead		7.1									
North Pacific Spiny Dogfish									2.5	2.5	
Pacific Cod								2.5	18.5	2.3	
Pacific Flatnose		0.2									
Pacific Grenadier		0.2									
Pacific Hake	4.1	19.3	13.7	57.5	61.8		4.0	17.6	4.2		
Pacific Halibut								12.3	10.2	6.9	8.6
Pacific Ocean Perch	2.3		286.6	959.6	737.8		467.8	1721.6	26.8	5.2	13280
Petrale Sole									17.1	0.7	
Popeye											
Prowfish											
Redbanded Rockfish			19.9	38.8	30.1		15.1	91.9	2.6		9.6
Redstripe Rockfish					2.0			19.3	37.1	102.3	6.1
Rex Sole	1.6	1.9	0.4	5.5	3.1		0.2	3.5	33.5	30.2	6.1
Rosethorn Rockfish			3.9	11.5							13.0
Rougheye/ BS Rockfish	13.2	6.7	15.2								1442.2
Roughtail Skate											
Sablefish	28.5	58.1	18.2	7.9	11.8		8.0	4.4	21.6	10.9	13.9
Sandpaper Skate											
Sharpchin Rockfish				74.1	1.9		2.4	2.8	0.1		
Shortraker Rockfish	26.6	158.0	47.0								
Shortspine Thornyhead	35.7	73.1	97.2	21.8	14.4		23.8	25.7	0.4		34.3
Silvergray Rockfish			4.0	26.2	23.9		19.1	27.2	125.7	273.8	22.3
Slender Sole			1.2	0.5	0.0		0.0	0.4	0.6	0.1	
Splitnose Rockfish				392.2	787.3		84.2	10.0			1.2
Spotted Ratfish			0.6	0.3		0.5	1.6		1.4	1.5	4.9
Twoline Eelpout		0.8									
Walleye Pollock			6.2	8.4	17.1		9.5	6.4	7.8	12.3	3.0
Widow Rockfish					2.3				50.8	1.8	
Yelloweye Rockfish										5.9	
Yellowmouth Rockfish								0.7			45.1
Yellowtail Rockfish									31.9	4.1	
Other	0.8	3.5	13.1	8.0	0.7		0.6	0.7	0.5	0.3	0.8
Total	**133.4**	**358.4**	**557.4**	**1651.1**	**1750.0**	**6.8**	**652.9**	**1983.4**	**909.4**	**993.2**	**15170**

Common Name	39	40	41	42	43	44	45	46	47	48	49
Aleutian Skate											
Arrowtooth Flounder		0.5	3.0	29.3	4.3	3.6	2.6	0.1			1.2
Aurora Rockfish			0.9								
Bigmouth Sculpin											
Bocaccio			3.6								
Brown Cat Shark											
Canary Rockfish			2.3	2.3							
Darkblotched Rockfish											9.4
Darkfin Sculpin			-			0.1			0.2	0.1	
Deepsea Sole		5.1									
Dover Sole		32.8	0.3	1.3	4.5	4.6	1.9	16.0	2.0	10.5	13.0
Dusky Rockfish											
English Sole			1.3	2.9				0.9			
Giant Grenadier	11.5	16.0									
Greenstriped Rockfish			6.5	9.9							
Harlequin Rockfish			1.4	1.2			0.6		0.2	0.2	
Lingcod			5.3				8.6	7.7	3.3		
Longnose Skate				11.8	4.7		14.5		9.4		
Longspine Thornyhead	29.0	33.0									
North Pacific Spiny Dogfish											
Pacific Cod			3.9	15.5	2.7		16.3	6.9			
Pacific Flatnose		0.4									
Pacific Grenadier	44.6	3.5									
Pacific Hake		21.4		1.0							
Pacific Halibut			24.3		6.5						
Pacific Ocean Perch			8.8	38.8	433.2	623.8	814.0	295.1	378.8	103.7	80.1
Petrale Sole							7.3				
Popeye	2.9										
Prowfish											
Redbanded Rockfish			77.1	9.6	8.4	2.8	2.8	4.7	3.7	1.2	10.6
Redstripe Rockfish			55.0	57.6	10.8	19.2	19.5	0.2	3.1	0.5	
Rex Sole		2.0	3.4	9.1	3.3	5.9	31.8	35.2	6.9	6.6	18.4
Rosethorn Rockfish			54.8	12.3	2.2	6.9		0.7	6.6		
Rougheye/ BS Rockfish		11.9						1.2		5.1	2.5
Roughtail Skate		6.2									
Sablefish	23.9	155.3		0.9	5.0	5.5	5.0	9.2	4.5	9.3	6.0
Sandpaper Skate										1.5	
Sharpchin Rockfish			232.1	18.6	16.0	13.1			44.2	5.8	-
Shortraker Rockfish		14.2	1.5								
Shortspine Thornyhead	6.1	30.6	2.0	0.9	6.4	12.2	1.2	16.8	42.3	60.7	30.4
Silvergray Rockfish			428.0	379.3	6.8	5.9	3.5		8.0		8.2
Slender Sole			0.1	0.4	0.1	0.5	1.7	0.2			
Splitnose Rockfish											0.4
Spotted Ratfish			9.3	1.7	9.1	3.6		1.3	3.9	0.7	2.5
Twoline Eelpout											
Walleye Pollock			0.2	14.7	1.3	1.2	0.3				3.6
Widow Rockfish				3.1	1.3			2.0	2.6		
Yelloweye Rockfish			4.5	4.7							
Yellowmouth Rockfish			3.6		31.8	11.1	26.5	2.5	5.1		
Yellowtail Rockfish				5.2							
Other	2.4	4.4	27.1	3.4	-	0.2	0.1	0.4	0.5	0.1	4.4
Total	**120.4**	**337.2**	**960.4**	**635.5**	**558.3**	**720.4**	**958.2**	**401.0**	**525.5**	**206.0**	**190.6**

Common Name	50	51	52	53	54	55	56	57	58	59	60
Aleutian Skate											
Arrowtooth Flounder		1.6	0.1	2.9	0.8			2.0		1.7	2.0
Aurora Rockfish											
Bigmouth Sculpin											
Bocaccio											
Brown Cat Shark						0.9	1.5				
Canary Rockfish											
Darkblotched Rockfish		2.5									
Darkfin Sculpin	0.1	0.5	0.6	1.1	0.6						
Deepsea Sole											
Dover Sole	7.9	9.4	8.4	5.9	14.5	16.2	7.6	14.7		3.2	0.3
Dusky Rockfish				3.0							13.5
English Sole											
Giant Grenadier											
Greenstriped Rockfish										0.5	
Harlequin Rockfish		0.4								2.2	135.0
Lingcod				1.0						20.2	10.7
Longnose Skate	13.0	16.8		8.4		12.9	14.4	5.1		15.5	
Longspine Thornyhead											
North Pacific Spiny Dogfish											
Pacific Cod										4.4	1.6
Pacific Flatnose											
Pacific Grenadier											
Pacific Hake						13.2	11.8	13.5			
Pacific Halibut								2.9		40.0	
Pacific Ocean Perch	123.2	191.7	86.4	102.7	127.6		0.8			1603.7	2211.1
Petrale Sole											
Popeye											
Prowfish											
Redbanded Rockfish	2.2	1.5	1.0	3.8	43.4					1.4	-
Redstripe Rockfish		1.0	0.5	0.8						32.3	5.0
Rex Sole	11.1	5.2	3.8	2.4	8.1	3.7	0.5	0.4		4.8	0.4
Rosethorn Rockfish	0.3		1.6		1.1					18.9	9.5
Rougheye/ BS Rockfish	4.2	7.3	6.0	10.7	7.8	3.7	9.8	34.6			
Roughtail Skate											
Sablefish	3.7	2.1	1.1			71.5	96.0	144.8		4.2	
Sandpaper Skate			1.2		1.6		2.8				
Sharpchin Rockfish		0.1		0.1						234.1	2230.3
Shortraker Rockfish	11.8				8.8						
Shortspine Thornyhead	30.5	71.3	83.7	62.7	47.6	28.6	24.2	14.6		6.9	1.3
Silvergray Rockfish	1.6		3.1	4.8	1.1					19.1	74.5
Slender Sole											
Splitnose Rockfish											
Spotted Ratfish			2.5	0.5	1.4	6.3	5.1	21.5		25.2	2.9
Twoline Eelpout											
Walleye Pollock			4.6		6.0					0.5	
Widow Rockfish											
Yelloweye Rockfish											14.6
Yellowmouth Rockfish										397.1	2211.1
Yellowtail Rockfish											
Other	-	7.5	-	3.2	14.0	10.3	12.5	11.2		1.7	76.3
Total	**209.7**	**318.8**	**204.7**	**213.9**	**284.3**	**167.3**	**187.1**	**265.2**		**2437.5**	**7000.0**

Common Name	61	62	63	64	65	66	67	68	69	70	71
Aleutian Skate		15.5									
Arrowtooth Flounder	0.1	0.3	0.1	5.3	16.0	3.3	0.5	3.3	1.5	3.4	0.3
Aurora Rockfish											
Bigmouth Sculpin											
Bocaccio											
Brown Cat Shark											
Canary Rockfish											
Darkblotched Rockfish											
Darkfin Sculpin	-	0.3	0.2		0.7	0.4	1.0		0.3	-	0.5
Deepsea Sole											
Dover Sole		0.3		6.1			2.3	1.2	6.3	1.0	0.9
Dusky Rockfish	1.2				1.1	1.1		2.2	1.4		
English Sole											
Giant Grenadier											
Greenstriped Rockfish					1.3	0.2	0.1				0.7
Harlequin Rockfish	0.3			0.5	0.4	1.7	0.2	0.3	0.7	0.5	0.6
Lingcod				5.9							
Longnose Skate	12.2				11.2				12.2		
Longspine Thornyhead											
North Pacific Spiny Dogfish											2.3
Pacific Cod				11.9	3.6	7.3				2.2	4.3
Pacific Flatnose											
Pacific Grenadier											
Pacific Hake											
Pacific Halibut				26.0	21.8						25.3
Pacific Ocean Perch	679.5	967.1	201.5	2401.8	777.2	3342.6	1045.2	579.4	796.9	532.5	2404.2
Petrale Sole				2.8				0.8			
Popeye											
Prowfish											
Redbanded Rockfish	1.2	3.7		23.0	18.1	17.4	8.8	13.5	9.3	5.0	1.3
Redstripe Rockfish	7.1	16.2	1.8	13.8	299.7	119.1	7.8	3.1	1.5	1.9	39.1
Rex Sole	2.2	1.8	0.3	29.5	2.3	0.9	6.6	1.4	6.3	6.8	3.0
Rosethorn Rockfish	8.4	19.0	2.1	1.6	5.6	13.3	15.2	0.9	12.4	6.4	3.9
Rougheye/ BS Rockfish											
Roughtail Skate											
Sablefish		4.7		5.4	0.7		1.1		9.5	2.8	13.4
Sandpaper Skate											
Sharpchin Rockfish	141.9	57.1	12.6	30.3	161.9	227.6	163.4	58.4	102.2	132.3	143.8
Shortraker Rockfish											
Shortspine Thornyhead	8.5	11.4	2.1	4.8	19.3	33.1	26.0	1.3	7.2	5.7	4.1
Silvergray Rockfish	11.1			22.5	20.0	29.1	9.2	5.5	4.0	13.3	112.3
Slender Sole			-	1.3		-	0.2		0.1		0.2
Splitnose Rockfish											
Spotted Ratfish				2.6	14.1	3.9	4.2	1.1	0.4	0.6	1.1
Twoline Eelpout											
Walleye Pollock		1.2		0.8	0.7		0.2	1.1		1.0	
Widow Rockfish					1.9	3.3	1.6	1.9	4.7		4.4
Yelloweye Rockfish					1.6						
Yellowmouth Rockfish	14.6	6.5		38.5	62.1	68.3	9.5	3.8	3.0	3.5	8.4
Yellowtail Rockfish											
Other	0.5	0.3	0.3	-	2.7	1.3	2.5	15.6	0.1	0.2	0.3
Total	**888.9**	**1105.3**	**221.0**	**2634.1**	**1443.9**	**3874.1**	**1305.6**	**694.8**	**979.9**	**719.4**	**2774.3**

Common Name	72	73	74	75	76	77	78	79	80	81	82
Aleutian Skate		13.8									
Arrowtooth Flounder	6.0	7.0		4.4	0.2			1.2	2.7	0.5	
Aurora Rockfish	1.5			0.4							
Bigmouth Sculpin								3.5			
Bocaccio									0.6		
Brown Cat Shark											
Canary Rockfish											
Darkblotched Rockfish											
Darkfin Sculpin	0.1				1.5	1.1	0.7		0.7	0.2	-
Deepsea Sole	0.9										
Dover Sole	21.9	31.9	50.8	94.6	2.0	0.9	0.8	3.4	1.9	0.6	0.4
Dusky Rockfish						2.4					
English Sole											
Giant Grenadier		60.6	8.2								
Greenstriped Rockfish					0.2		0.4				
Harlequin Rockfish					6.1	0.6	0.3	0.1	0.5	0.5	0.5
Lingcod											
Longnose Skate											
Longspine Thornyhead	0.4		7.7	0.4							
North Pacific Spiny Dogfish											
Pacific Cod									5.3		4.8
Pacific Flatnose			0.6	-							
Pacific Grenadier											
Pacific Hake	10.7	26.2		25.7	1.2						
Pacific Halibut						24.2	10.2	8.5			
Pacific Ocean Perch					1767.2	2651.9	917.1	975.7	1011.6	791.8	2619.3
Petrale Sole											
Popeye			0.4								
Prowfish											
Redbanded Rockfish					6.9	9.6	38.5	4.0	8.7	0.8	13.2
Redstripe Rockfish					26.7	522.0	13.5	3.0	5.9	8.7	3.9
Rex Sole	3.4	15.7	7.8	13.5	2.0	2.3	5.4	2.9	4.7	2.9	2.0
Rosethorn Rockfish					6.5	22.7	13.3	14.9	23.4	14.3	4.6
Rougheye/ BS Rockfish	213.5	35.4	9.4	53.0	5.9		0.1				
Roughtail Skate											
Sablefish	60.4	93.0	47.0	79.6		3.8	6.3	1.6		8.9	
Sandpaper Skate		3.8		1.2							
Sharpchin Rockfish					1103.6	613.9	144.5	118.7	147.5	90.0	117.7
Shortraker Rockfish	30.2	28.0		2.8	6.5						
Shortspine Thornyhead	78.2	163.0	64.8	78.6	6.9	9.1	18.6	5.6	21.1	12.2	14.1
Silvergray Rockfish					45.8	48.1	6.9	5.6	2.1	6.9	
Slender Sole							0.1		0.1	-	
Splitnose Rockfish						0.5			0.2		
Spotted Ratfish	2.0				4.2	6.5	0.3		0.4	0.6	
Twoline Eelpout		4.3	1.3								
Walleye Pollock					1.0			0.4			
Widow Rockfish					64.3	16.9		5.3	69.1		3.2
Yelloweye Rockfish											
Yellowmouth Rockfish					4.1	6.5		2.1	0.9	0.7	10.9
Yellowtail Rockfish											
Other	1.1	2.4	0.6	1.7	0.8	0.6	23.6	0.4	0.9	0.4	0.5
Total	**430.2**	**485.2**	**198.3**	**356.0**	**3063.9**	**3943.4**	**1200.8**	**1157.1**	**1308.4**	**940.0**	**2794.9**

Common Name	83	84	85	86	87	88	89	90	91	92	93
Aleutian Skate											
Arrowtooth Flounder	0.6		1.3	0.9	0.8		1.5	5.1		17.0	0.3
Aurora Rockfish							2.6				
Bigmouth Sculpin											
Bocaccio										9.5	
Brown Cat Shark											
Canary Rockfish	2.8									11.3	
Darkblotched Rockfish								1.3			
Darkfin Sculpin	0.4							0.5			0.3
Deepsea Sole											
Dover Sole	2.2	27.4	6.0	1.7			3.4	10.5			8.9
Dusky Rockfish											
English Sole											
Giant Grenadier					130.5	23.0					
Greenstriped Rockfish										0.6	
Harlequin Rockfish	1.0						0.1				
Lingcod	2.4							18.2		8.8	
Longnose Skate		5.2	19.2							7.8	
Longspine Thornyhead					8.3	3.7	20.8				
North Pacific Spiny Dogfish											
Pacific Cod											
Pacific Flatnose					8.4	1.1					
Pacific Grenadier					130.0	7.2	7.2				
Pacific Hake					1.5		15.0	2.5			5.8
Pacific Halibut											
Pacific Ocean Perch	2820.2		1.7	2.6			1.5	5025.1		1546.6	40.1
Petrale Sole											
Popeye					3.5	1.5	7.0				
Prowfish											
Redbanded Rockfish	11.9							3.8			
Redstripe Rockfish	10.4									69.6	
Rex Sole	3.6	4.2	0.4	0.3				1.0		2.7	0.6
Rosethorn Rockfish	14.5							12.8			
Rougheye/ BS Rockfish	0.5	3.0	10.1	78.7			318.0	1071.8			95.9
Roughtail Skate							3.0				
Sablefish		14.1	98.5	133.5	6.2	152.0	45.5	15.7		0.8	13.4
Sandpaper Skate		1.5	4.4	3.3							1.5
Sharpchin Rockfish	205.9		0.1					1.0	0.2	1.5	0.1
Shortraker Rockfish							22.5	7.5			
Shortspine Thornyhead	56.5	40.7	58.4	12.1	7.7		28.7	103.8			49.9
Silvergray Rockfish	3.5							4.5	9.4	59.3	
Slender Sole											
Splitnose Rockfish											
Spotted Ratfish		1.2	10.2	5.5				2.9		0.6	
Twoline Eelpout											
Walleye Pollock										0.6	
Widow Rockfish											
Yelloweye Rockfish										4.3	
Yellowmouth Rockfish	44.1							0.5		6.8	
Yellowtail Rockfish											
Other	0.3	2.7	2.3	20.1	16.1	3.1	11.4	0.6	3.2		0.7
Total	**3180.8**	**100.1**	**212.5**	**258.8**	**313.0**	**191.5**	**488.2**	**6289.2**	**12.8**	**1747.6**	**217.5**

Common Name	94	95	96	97	98	99	100	101	102	103	104
Aleutian Skate											
Arrowtooth Flounder	0.2	19.2		3.9	12.6	2.8		20.1	136.8	1.7	
Aurora Rockfish											
Bigmouth Sculpin								5.8			
Bocaccio											
Brown Cat Shark											
Canary Rockfish											
Darkblotched Rockfish											
Darkfin Sculpin	-	0.3			-						0.5
Deepsea Sole											
Dover Sole	10.8	59.9		0.4	21.8	13.6	0.9	45.3	1.9	8.3	50.8
Dusky Rockfish											
English Sole									0.6		
Giant Grenadier											
Greenstriped Rockfish											
Harlequin Rockfish						0.2			0.2		
Lingcod									4.2		
Longnose Skate			2.2	12.5	4.5		6.4	10.6	6.7		15.0
Longspine Thornyhead										4.4	9.1
North Pacific Spiny Dogfish											
Pacific Cod											
Pacific Flatnose											
Pacific Grenadier											
Pacific Hake	2.5	10.9		1.4			5.8	6.1	1.2	1.2	18.7
Pacific Halibut		3.1						2.7			
Pacific Ocean Perch	42.5	13.1	121.3	59.5	4.1	9.3	22.5	91.9	602.6	12.4	
Petrale Sole											
Popeye											
Prowfish											
Redbanded Rockfish				5.6	7.6	6.6		15.7	48.5		
Redstripe Rockfish					0.6						
Rex Sole	2.3	8.7		0.5	8.6	8.1	0.7	24.2	2.5	0.7	1.9
Rosethorn Rockfish					0.5		0.7				
Rougheye/ BS Rockfish	340.8	214.9	46.8	14.0	1.5	4.8	72.4	27.2	15.5	5.7	49.5
Roughtail Skate											
Sablefish	67.9	112.4	49.5	26.0	34.2	30.6	94.9	18.1	104.4	2.4	96.0
Sandpaper Skate		1.4	4.5	1.3		7.4		1.1		3.5	7.9
Sharpchin Rockfish	0.9		0.3		0.4				0.3		
Shortraker Rockfish											
Shortspine Thornyhead	76.9	123.5	22.4	32.8	67.3	156.7	30.9	79.8	7.9	30.1	99.5
Silvergray Rockfish				1.8			1.6				
Slender Sole											
Splitnose Rockfish											
Spotted Ratfish	1.0	1.3	1.2		1.1			1.6	3.0		3.9
Twoline Eelpout											
Walleye Pollock								117.8	82.4	3.9	1.6
Widow Rockfish											
Yelloweye Rockfish											
Yellowmouth Rockfish											
Yellowtail Rockfish											
Other	2.9	3.3	8.7	3.5	1.1	13.7	13.4	4.2	0.3	0.3	17.2
Total	**548.5**	**572.1**	**257.0**	**163.0**	**165.9**	**254.0**	**250.2**	**472.2**	**1018.7**	**74.7**	**371.6**

Common Name	105	106	107	108	109	110	111	112	113	114	115
Aleutian Skate				3.9				2.2		1.6	
Arrowtooth Flounder	0.7		1849.8	123.0	4.4	7.3	3.0	2.8	9.1	1.6	
Aurora Rockfish											
Bigmouth Sculpin											
Bocaccio			3.2								
Brown Cat Shark											
Canary Rockfish			419.0								
Darkblotched Rockfish											
Darkfin Sculpin					0.6	0.8	0.5	0.2	0.8	0.1	0.1
Deepsea Sole											
Dover Sole	45.4			36.4	9.9	26.8	1.6	10.2	31.0	2.6	3.3
Dusky Rockfish											
English Sole			7.2								
Giant Grenadier											
Greenstriped Rockfish			1.2								
Harlequin Rockfish			0.5			0.2				0.2	
Lingcod			1.3	27.7							
Longnose Skate			7.9	3.6		23.6					
Longspine Thornyhead											
North Pacific Spiny Dogfish					5.7						
Pacific Cod			15.5								
Pacific Flatnose											
Pacific Grenadier											
Pacific Hake	4.8	2.4	3.1	78.7	1.3	6.8	10.9	12.3	2.7		
Pacific Halibut			4.4		4.5						
Pacific Ocean Perch			734.6	1535.1	306.6	767.2	750.9	1400.3	2668.9	507.7	1511.4
Petrale Sole			1.9								
Popeye											
Prowfish											
Redbanded Rockfish			0.5	6.4		1.6			1.4	1.3	5.0
Redstripe Rockfish			709.6	2.6					0.5	0.5	0.6
Rex Sole	5.2			31.8	4.9	1.2	1.6	0.6	4.7	2.6	1.7
Rosethorn Rockfish			6.5	1.4	1.8	5.4	7.1	3.3	7.1	1.0	12.4
Rougheye/ BS Rockfish	23.0				411.2	31.3	935.2	1401.1	71.5		
Roughtail Skate											
Sablefish	53.6	27.5	1.0	26.9	21.6	20.9	25.9	30.5	47.3	11.4	11.5
Sandpaper Skate	3.7										
Sharpchin Rockfish			102.5	0.8	0.4		1.0	1.1	1.0		32.6
Shortraker Rockfish						47.1			15.4	6.5	
Shortspine Thornyhead	43.8	1.0	19.3	78.9	203.9	166.6	153.9	135.4	127.4	69.0	24.0
Silvergray Rockfish			582.7	9.8		2.2	6.1		5.0	3.9	56.2
Slender Sole											0.2
Splitnose Rockfish				0.5					0.5		
Spotted Ratfish	1.4		3.0	0.0	0.7				1.1		
Twoline Eelpout											
Walleye Pollock				31.7	1.8				1.8		
Widow Rockfish						32.7	2.4				
Yelloweye Rockfish											
Yellowmouth Rockfish			11.2								1.1
Yellowtail Rockfish			14.1								
Other	15.3	11.3	-	1.0	8.9	4.1	1.0	-	2.8	3.8	0.6
Total	**196.8**	**42.1**	**4500.0**	**2000.0**	**988.1**	**1145.8**	**1900.9**	**3000.0**	**3000.0**	**613.7**	**1660.8**

Common Name	116	117	118	119	120	121	122	123	124	125	126
Aleutian Skate			1.3						1.2	1.0	
Arrowtooth Flounder	0.4		1.8	2.0	2.3	4.1	6.4	3.6	5.9	2.3	
Aurora Rockfish									6.1		
Bigmouth Sculpin										5.3	
Bocaccio											
Brown Cat Shark											
Canary Rockfish											
Darkblotched Rockfish											
Darkfin Sculpin	0.7	1.3	1.1	0.4	0.5	0.4	0.4	0.5	0.6	0.4	
Deepsea Sole											
Dover Sole	3.1	1.4	0.5	3.2	1.4	4.4	2.4	4.6	7.7	0.9	10.3
Dusky Rockfish					1.3						
English Sole											
Giant Grenadier											7.7
Greenstriped Rockfish								0.5			
Harlequin Rockfish		0.2	0.2	0.2			0.5	2.6		8.7	
Lingcod			10.8								
Longnose Skate			12.3							4.8	
Longspine Thornyhead											83.7
North Pacific Spiny Dogfish											
Pacific Cod								20.4		5.8	
Pacific Flatnose											0.6
Pacific Grenadier											2.9
Pacific Hake									15.9		
Pacific Halibut							3.9		3.5	4.1	
Pacific Ocean Perch	1248.6	1018.9	2243.5	2272.0	2877.0	1398.4	2397.9	1552.7	74.0	4425.7	
Petrale Sole											
Popeye											6.2
Prowfish								3.2			
Redbanded Rockfish	2.2	3.9	10.2	6.6	3.7	4.0	5.3	41.9		7.2	
Redstripe Rockfish						2.6	1.3	28.5	0.7	110.8	
Rex Sole	3.3	1.9	2.8	2.0	3.5	6.5	3.9	6.4	2.5	0.4	
Rosethorn Rockfish	8.2	6.9	10.7	19.7	20.7	26.1	22.5	38.3		3.9	
Rougheye/ BS Rockfish		5.2	3.3	0.6	0.6				1979.5	7.1	
Roughtail Skate											
Sablefish	2.3	1.2	5.3	5.1	6.4	1.3	1.1	21.4	85.8	5.5	163.0
Sandpaper Skate											
Sharpchin Rockfish	82.0	2.8	0.6	0.9	2.1	106.9	312.2	1099.7		1312.9	
Shortraker Rockfish		9.0							22.8		
Shortspine Thornyhead	41.0	117.1	91.8	82.0	64.3	19.6	28.7	14.4	80.9	1.6	30.2
Silvergray Rockfish					5.8	17.6	9.0	65.6	8.5	74.9	
Slender Sole					0.2	0.2	0.2				
Splitnose Rockfish				0.5							
Spotted Ratfish	2.4	1.6		1.8	1.8	1.3	2.9	9.5	0.7	2.7	
Twoline Eelpout											
Walleye Pollock											
Widow Rockfish	2.2				1.2			48.0		9.9	
Yelloweye Rockfish											
Yellowmouth Rockfish	5.2		2.0	1.9	7.0	6.1		37.7	1.7	4.1	
Yellowtail Rockfish											
Other	2.3	2.4	1.8	1.3	0.2	0.4	1.6	0.6	2.0	0.2	10.2
Total	**1404.0**	**1173.9**	**2400.0**	**2400.0**	**3000.0**	**1600.0**	**2800.0**	**3000.0**	**2300.0**	**6000.0**	**314.7**

Common Name	127	128	129	130	131	132
Aleutian Skate						
Arrowtooth Flounder	0.4	0.4		1.5	10.7	
Aurora Rockfish						
Bigmouth Sculpin						
Bocaccio						
Brown Cat Shark						
Canary Rockfish						
Darkblotched Rockfish				1.5		
Darkfin Sculpin		0.1		1.4	1.4	-
Deepsea Sole						
Dover Sole	2.0	1.2		6.8	25.4	
Dusky Rockfish						
English Sole						
Giant Grenadier						
Greenstriped Rockfish						
Harlequin Rockfish	1.2	10.4			0.6	31.8
Lingcod		2.2				
Longnose Skate						
Longspine Thornyhead						
North Pacific Spiny Dogfish						
Pacific Cod						
Pacific Flatnose						
Pacific Grenadier						
Pacific Hake						
Pacific Halibut	23.1	1.5			8.1	
Pacific Ocean Perch	2280.8	4012.6		2757.0	3757.8	7416.6
Petrale Sole	1.6					
Popeye						
Prowfish						
Redbanded Rockfish	4.1	18.0		1.5	3.5	34.8
Redstripe Rockfish	10.4	834.5		42.4	2.6	153.1
Rex Sole		0.4			1.3	
Rosethorn Rockfish	1.6	6.5		20.1	9.2	4.8
Rougheye/ BS Rockfish				10.2	375.1	
Roughtail Skate						
Sablefish	6.2	21.4		62.0	191.3	
Sandpaper Skate						
Sharpchin Rockfish	404.7	5216.9		116.2	28.2	2680.4
Shortraker Rockfish				86.1		
Shortspine Thornyhead	14.1			61.3	70.5	4.6
Silvergray Rockfish	41.1	349.4		44.9	10.3	174.0
Slender Sole						
Splitnose Rockfish				0.3	0.4	
Spotted Ratfish	6.8	7.8		80.8	3.0	
Twoline Eelpout						
Walleye Pollock				1.2		
Widow Rockfish	1.9	10.3		2.2		
Yelloweye Rockfish						
Yellowmouth Rockfish		6.1				
Yellowtail Rockfish						
Other		-		2.4	0.7	
Total	**2800.0**	**10500**		**3300.0**	**4500.0**	**10500**