Summary of the West Coast Haida Gwaii Synoptic Bottom Trawl Survey, August 25 - September 20, 2010

N. Olsen, M. R. Wyeth, D. C. Williams and M. K. Nottingham

Science Branch, Pacific Region
Fisheries and Oceans Canada
Pacific Biological Station
Nanaimo, BC
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by

N. Olsen, M. R. Wyeth, D. C. Williams and, M. K. Nottingham

Fisheries and Oceans Canada
Science Branch, Pacific Region
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V9T 6N7

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ABSTRACT

Olsen, N., Wyeth, M. R., Williams, D. C. and Nottingham, M. K. 2017. Summary of the West Coast Haida Gwaii synoptic bottom trawl survey, August 25 - September 20, 2010. Can. Manuscr. Rep. Fish. Aquat. Sci. 3138: viii + 55 p.

A bottom trawl survey off the west coast of Haida Gwaii was conducted on the fishing vessel Viking Storm between August 25 and September 20, 2010. 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. 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 twenty nine (92.8%) of the 139 blocks assessed in 2010 were successfully fished. The mean catch per tow was 680 kg with 9-33 species per tow. The average number of species per tow was 20. The most abundant fish species 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 selected species. Samples were collected from a total of 53 different species of fish. Oceanographic and fishing gear data including water temperature, depth, salinity, and dissolved oxygen, were also recorded for most tows.

RÉSUMÉ

Olsen, N., Wyeth, M. R., Williams, D. C., et Nottingham, M. K. 2017. Summary of the West Coast Haida Gwaii synoptic bottom trawl survey, August 25 - September 20, 2010. Rapp. manus. can. sci. halieut. aquat. 3138: viii + 55 p.

Un relevé au chalut de fond au large de la côte ouest d'Haida Gwaii a été effectué par le navire de pêche *Viking Storm* entre le 25 août et le 20 septembre 2010. 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 139 blocs évalués en 2010, 129 (92,8 %) ont fait l'objet d'une pêche. La moyenne de prises par trait était de 680 kg, avec entre 9 et 33 espèces par trait. Le nombre moyen d'espèces par trait était de 20. 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 53 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.

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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 it 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 in 2006 to 2008 (Workman et al. 2007, Workman et al. 2008 and Olsen et al. 2008) and has been repeated every second year since. This document provides a brief summary of the results and methods from the fourth WCHG synoptic bottom trawl survey which occurred between August 25 and September 20, 2010. 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 strata.

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 typically been structured such that the survey will continue until the entire set of blocks that have been selected is 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.

As indicated above, previous WCHG charters have been based on completing a set number of blocks. There was a final drop dead date (mid-October) that was several weeks later than the anticipated end date (end of September). This contract structure ensured that all blocks would be assessed even in years with abnormally high numbers of days that were unfishable due to poor weather. When using this method, the risk of poor weather was entirely on the vessel and there would be no impact to the scientific results

(assessing all the selected blocks). Unfortunately, one unintended consequence of these contracts was that vessels may have been forced to submit "worst case" scenario bids. Vessels would need to assume that the survey might run to the final drop dead date and would submit bids based on that number of days instead of the anticipated number of days. This may have been artificially inflating the cost of the bids. For the 2010 survey, an attempt was made to reduce the cost of the survey by sharing the risk of the survey running long between both the vessel and the scientific results. Given that in most years the surveys have been completed well in advance of the drop dead date, it was expected that on average, if the drop dead date was changed to be closer to the anticipated end date, the surveys would still be completed and that bids would be lower.

The anticipated end date includes a certain number of days lost to bad weather but if there are substantially more weather days, there was a risk of an uneven survey design. For example, if the survey is cut short some northern or deep areas could be missed if the vessel works in one direction through the entire set of blocks. To avoid such a situation, the selected blocks were divided into a primary set and a secondary set. The primary set consisted of three-quarters of the total blocks and was visited first. The secondary set was visited once the primary set of blocks was completed. The secondary set could be adjusted for the number of remaining days by randomly adding or removing blocks.

For the 2010 WCHG survey, 153 blocks were randomly selected with the target of 125 successful tows. The blocks were divided into 115 primary blocks and 38 secondary blocks (Table 1).

VESSEL

The survey was conducted aboard the F/V Viking Storm, a 31 m commercial stern trawler (Figure 2).

FISHING GEAR

The research trawl was an Atlantic Western IIA box trawl net connected to 1,000 kg Thyboron Type II 104 doors (Figure 3). 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 includes a main body (wing and belly sections), two lengthening pieces, and a codend with liner (Figure 4 and Figure 5). The main body of the net has 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 6). The intermediate sections are constructed from single 4.5 mm strand 4½ inch web (Figure 7). All web in the main body and lengthening pieces is constructed from a compacted strand braided polyethylene (Euroline Premium). The codend is constructed from double 5 mm strand 4 inch regular braided polyethylene web with a ½ inch 210/20 knotless nylon liner (Figure 7).

The Rockhopper footgear includes flying wing, mid wing, bunt wing, and bosom sections (Figure 8). The bosom section is built from 16 inch diameter (worn 18 inch) aircraft tires, while the bunt and mid wing sections have 16 inch Rockhopper disks. The flying wings have 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 6 through Figure 8.

SCHEDULE

The survey was split into three sections or "legs" of seven to nine days in duration with five science staff in each. Crew changes were on September 3 and September 10 (Table 3).

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 15 hours, starting at approximately 0600 hrs and ending at approximately 2100 hrs was typical.

Prior to fishing, the selected blocks were reviewed by the captain and chief scientist to determine a candidate set to visit throughout each day. During this review process, one or more blocks might be determined not fishable by the captain based on his 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 would be planned.

The captain 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, follow the same track so as to minimize the survey footprint.
3. If a block had not been fished in a previous year, 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, 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, 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 800-1300 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. Approximately one minute before the target tow length was completed, net haul back was initiated. The extra minute was intended to account for uptake of slack in the main warps. Although the target on-bottom time was 20 or 30 minutes, tows that were at least

14 minutes in length were accepted. This was a pragmatic decision that allowed for 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 captain 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 either "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. This will increase the efficiency of subsequent surveys, as less time will be spent inspecting blocks that cannot be fished. Some selected blocks may not have been fished but may also not have been rejected. This could occur 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 would be 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 onto a table or if it was large, onto the deck to be sorted by species into separate baskets. 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 large numbers of small individuals, some method of total

catch estimation and sub-sampling for species composition was conducted. 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 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, each species had a minimum catch level that had to be exceeded in the tow before biological samples would be collected. For rare species or species of special conservation concern the minimum number could be one fish, whereas for common and abundant species the number might be 25 or 50. The choice of the species to collect age samples from depended on the size of the catch of the species and the "desirability" of the species. The size 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 any conservation concerns and whether or not the species is commercially exploited. Biological samples were typically not collected from unusable tows.

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 1 cm for length samples, and 0.5 cm for age samples 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.

There are a variety of hard parts of a fish that can be used to determine the age of the fish (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*), Lingcod (*Ophiodon elongates*) and Pacific Cod (*Gadus macrocephalus*). 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 2010, whole Brown Catsharks (*Apristurus brunneus*) were collected as well as tissue for DNA analysis from Spotted Ratfish (*Hydrolagus colliei*), Longnose Skate (*Raja rhina*), Roughtail Skate (*Bathyraja trachura*), Sandpaper Skate (*Bathyraja interrupta*), Abyssal Skate (*Bathyraja abyssicola*), Whitebrow Skate (*Bathyraja minispinosa*), and Aleutian Skate (*Bathyraja aleutica*).

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 do not attempt to partition the catch data for this report.

NET-MOUNTED SENSORS AND DATA RECORDERS

The F/V Viking Storm is equipped with a Scanmar Scanbas trawl mensuration system. Sensors attached to the net use acoustic signals to communicate with each other and the vessel and provide real-time net geometry including headline height and depth, as well as doorspread which is 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 trails behind the footrope. The Hobo recorder measures acceleration in three axes which can then be converted into angles. The recorder is mounted in the sled such that the x-axis tilt indicates the angle of the steel sled. When the footgear contacts the bottom, the sled angle is approximately 80 degrees. When the footrope is off the bottom, the sled hangs down and the angle is approximately 40 degrees. These data are 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. The Hobo recorder was activated prior to the first tow of the day and downloaded at the end of each day.

A Seabird SBE39 temperature and pressure recorder (TDR) was attached to the starboard wing of the trawl. A Seabird SBE19plus recorder (CTD) equipped with an 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 was turned on and off manually before and after each tow. Both the SBE39 and SBE19plus 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 the GFBIO database maintained at the Pacific Biological Station in Nanaimo, BC.

RESULTS

FISHING

The 2010 WCHG synoptic bottom trawl survey was divided into three legs of seven to nine days each. From a total of 27 survey days, two days were required for travel at the start and two days at end of the survey, three days were required for offloading catch and changing crews, two days were also required for setting up and unloading the vessel at the end of the survey and one fishing day was lost due to weather. Thus, there was a total of about 17 full fishing days (Table 3).

The initial plan was to assess 153 blocks in order to achieve 125 useable tows. The primary set was to be conducted first and included 115 blocks while the remaining 38 blocks would be conducted after the primary set were complete. Unfortunately, due to a transcription error, the actual primary set only included 109 blocks when the survey departed and this discrepancy went unnoticed until after the trip was completed. The secondary set of 38 blocks was generated on September 9 after fishing operations were completed for the day. By September 12, it was clear that the target number of tows would be achieved in the shallowest stratum. Further, it was likely that the planned fourth leg would only be one day long as the third leg could not be extended due to the need to land fish. As such, eight blocks were removed from the secondary set of shallow stratum blocks. This allowed the survey to be completed by the end of the third leg.

From a total of 139 blocks assessed during the 2010 survey, 129 blocks were successfully fished, seven blocks were rejected based on on-ground inspection, one block was rejected after one or more failed fishing attempts and two blocks were not fished due to other reasons such as tide, weather or other vessels working in the area (Table 4 and Figure 9). Tow 18 was made in a block allocated to the 330-500 m depth stratum but the

actual depths of the tow were in the 180-330 m depth stratum. As such, both the tow and block were re-assigned to the 180-330 m depth stratum.

A total of 131 tows, of which 129 were useable, were completed during the 17 days that fishing occurred. Table 4 shows tow results by stratum for this survey. Two tows were deemed not useable due to hang-ups or tear-ups. The scope (ratio of warp length to bottom depth) used for tows in 2010 is shown in Table 6 and Figure 10. 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 88,626 kg of fish and invertebrates was caught during the 2010 WCHG survey. The total catch weight for useable tows was typically less than 1,000 kg per tow, and averaged 680 kg per tow (Figure 11). The majority of the catch (88,048 kg, 99.3%) consisted of 99 different species of fish, including 24 rockfish and nine flatfish species. The remainder (578 kg) consisted of 113 invertebrate groups. The number of species in useable tows ranged from nine to 33 with an average of 19 (Figure 12). The frequency of occurrence, maximum catch weight, mean catch weight per tow and total survey catch weight of each species are shown in Table 7. Of the fish species caught, Pacific Ocean Perch (*Sebastes alutus)* was the most dominant by weight, followed by Sharpchin Rockfish (*Sebastes zacentrus*), Rougheye Rockfish (*Sebastes aleutianus*) Silvergray Rockfish (*Sebastes brevispinus)* and Shortspine Thornyhead (*Sebastolobus alascanus*). 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 Conservation and Research Society (Table 8).

BIOLOGICAL SAMPLES AND SPECIMENS

Biological samples were collected from a total of 19,513 individuals of 53 species of fish. The number of samples and recorded biological attributes per species is shown in Table 9. A summary of the biological data collected for each species is shown in Table 10.

NET-MOUNTED SENSORS AND DATA RECORDERS

Net mensuration data was collected from 131 tows although doorspread data were only available for 130 (Table 11).

Seabird SBE39 data (water temperature and depth) were collected from 95 tows while Seabird SBE19plus and SBE43 data (salinity, water temperature, depth, and dissolved oxygen) were collected from 111 tows (Table 11 and Figure 13).

BCS data were collected from 123 tows (Table 11). An example of the type of data collected by the BCS is shown in Figure 14.

Global positioning system (GPS) data and bottom sounder data are available for all 131 tows.

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Table 1. 2010 WCHG synoptic bottom trawl survey design showing block allocation per stratum based on the target allocation and the combined predicted failure and revisit rates (Predicted Adjustment).

Depth Stratum (m)	Target Tows	Predicted Adjustment	Total Block Allocation	Intended Primary Set	Intended Secondary Set
180-330	74	0.24	97	73	24
330-500	31	0.07	33	25	8
500-800	10	0.12	11	8	3
800-1300	10	0.16	12	9	3
Total	**125**		**153**	**115**	**38**

Table 2. Atlantic Western IIa box trawl net specifications on the 2010 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. Summary of operations during the 2010 WCHG synoptic bottom trawl survey.

	Fishing				Tows			
Date	Start	End	Hours	Blocks Assessed	Useable	Not Useable	Total	Notes
08/25/2010	-	-	-	-	-	-	-	loading and travel
08/26/2010	-	-	-	-	-	-	-	maintenance stop and travel
08/27/2010	-	-	-	-	-	-	-	travel
08/28/2010	7:31	19:07	12	11	7	0	7	
08/29/2010	8:11	19:42	11	7	6	1	7	
08/30/2010	7:25	17:37	10	10	10	0	10	
08/31/2010	-	-	-	-	-	-	-	weather day
09/01/2010	7:30	20:03	13	11	10	0	10	
09/02/2010	8:10	17:38	9	7	7	0	7	
09/03/2010	-	-	-	-	-	-	-	crew change and offload
09/04/2010	8:32	19:21	11	9	9	0	9	
09/05/2010	7:44	19:10	12	9	9	0	9	
09/06/2010	7:49	19:17	12	9	9	0	9	
09/07/2010	7:43	19:28	12	8	8	0	8	
09/08/2010	7:44	18:40	11	8	8	0	8	
09/09/2010	7:46	16:15	9	7	7	0	7	
09/10/2010	-	-	-	-	-	-	-	crew change and offload
09/11/2010	8:39	17:40	9	8	6	1	7	
09/12/2010	7:52	18:12	11	6	5	0	5	
09/13/2010	7:39	18:19	11	7	7	0	7	
09/14/2010	7:54	19:34	12	7	7	0	7	
09/15/2010	7:56	17:44	10	7	7	0	7	
09/16/2010	7:56	15:42	8	8	7	0	7	
09/17/2010	-	-	-	-	-	-	-	crew change and offload
09/18/2010	-	-	-	-	-	-	-	travel
09/19/2010	-	-	-	-	-	-	-	travel
09/20/2010	-	-	-	-	-	-	-	unload
Total				**139**	**129**	**2**	**131**	
Average Per Day				**8.2**	**7.6**	**0.1**	**7.7**	

Table 4. Block results by stratum for the 2010 WCHG synoptic bottom trawl survey. The Actual Primary Set differs from the Intended Primary Set because Tow 18 was made in a block allocated to the 330-500m depth stratum but the actual depths of the tow were in the 180-330m depth stratum. Both the tow and block were re-assigned to the 180-330 m depth stratum.

Depth Stratum (m)	Actual Primary Set	Actual Secondary Set	Successful	Rejected Prior	Rejected Inspected	Rejected Failed	Unassessed-Not visited	Total
180-330	74	16	82	0	7	0	1	90
330-500	22	8	29	0	0	1	0	30
500-800	9	3	12	0	0	0	0	12
800-1300	4	3	6	0	0	0	1	7
Total	**109**	**30**	**129**	**0**	**7**	**1**	**2**	**139**

Table 5. Tow results by stratum for the 2010 WCHG synoptic bottom trawl survey.

Depth Stratum (m)	Useable	Not Useable
180-330	82	0
330-500	29	1
500-800	12	1
800-1300	6	0
Total	**129**	**2**

Table 6. Mean warp length and scope by 50 meter depth interval for the 2010 WCHG synoptic bottom trawl survey.

Depth (m)	Mean Warp (m)	Mean Scope
150-200	457	2.86
200-250	660	2.87
250-300	781	2.88
300-350	802	2.52
350-400	972	2.64
400-450	1152	2.69
450-500	1163	2.53
500-550	960	1.86
550-600	1326	2.35
600-650	1417	2.29
650-700	1372	2.08
700-750	1615	2.22
750-800	1646	2.14
850-900	2012	2.32
950-1000	2012	2.06
1050-1100	2195	2.03

Table 7. Frequency of occurrence, maximum catch weight, mean catch weight per tow, and total survey catch weight of each species captured during the 2010 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*	122	142.62	33.43	4078.58
Pacific Ocean Perch	*Sebastes alutus*	96	2781.49	397.61	38170.96
Redbanded Rockfish	*Sebastes babcocki*	84	79.09	11.29	948.44
Silvergray Rockfish	*Sebastes brevispinis*	83	1664.15	77.86	6462.29
Rosethorn Rockfish	*Sebastes helvomaculatus*	77	48.62	8.26	636.37
Sharpchin Rockfish	*Sebastes zacentrus*	70	1381.84	139.13	9738.89
Rougheye Rockfish	*Sebastes aleutianus*	59	3064.64	123.75	7301.4
Redstripe Rockfish	*Sebastes proriger*	47	890.42	69.9	3285.46
Shortraker Rockfish	*Sebastes borealis*	27	211.1	40.82	1102.06
Harlequin Rockfish	*Sebastes variegatus*	27	322.24	24.31	632.05
Greenstriped Rockfish	*Sebastes elongatus*	24	41.98	7.11	170.6
Longspine Thornyhead	*Sebastolobus altivelis*	23	40.82	13.99	321.87
Yellowmouth Rockfish	*Sebastes reedi*	22	160.74	26.16	575.46
Widow Rockfish	*Sebastes entomelas*	19	127.02	11.66	221.62
Splitnose Rockfish	*Sebastes diploproa*	16	157.06	48.09	673.29
Yellowtail Rockfish	*Sebastes flavidus*	12	24.86	8.63	103.53
Bocaccio	*Sebastes paucispinis*	9	14.82	7.18	64.58
Aurora Rockfish	*Sebastes aurora*	8	5.36	1.98	15.81
Darkblotched Rockfish	*Sebastes crameri*	8	23.58	5.61	44.88
Canary Rockfish	*Sebastes pinniger*	5	103.69	24.53	122.63
Pygmy Rockfish	*Sebastes wilsoni*	3	0.4	0.26	0.51
Yelloweye Rockfish	*Sebastes ruberrimus*	1	39.86	39.86	39.86
Stripetail Rockfish	*Sebastes saxicola*	1	0.34	0.34	0.34
Dusky Rockfish	*Sebastes variabilis*	1	3.14	3.14	3.14
Flatfishes	**Order Pleuronectiformes**				
Arrowtooth Flounder	*Reinhardtius stomias*	117	572.44	34.84	4076.84
Rex Sole	*Glyptocephalus zachirus*	106	55.07	6.6	699.99
Dover Sole	*Microstomus pacificus*	106	83.36	11.63	1233.07
Slender Sole	*Lyopsetta exilis*	59	2.02	0.46	26.83
Pacific Halibut	*Hippoglossus stenolepis*	20	58.62	10.78	215.69
English Sole	*Parophrys vetulus*	13	9.32	1.95	25.3
Petrale Sole	*Eopsetta jordani*	8	58.08	8.21	65.66
Deepsea Sole	*Microstomus bathybius*	2	1.44	1.14	2.28
Flathead Sole	*Hippoglossoides elassodon*	1	0.65	0.65	0.65
Cod-Like Fishes	**Order Gadiformes**				
Pacific Hake	*Merluccius productus*	78	320.26	31.22	2435.08
Walleye Pollock	*Theragra chalcogramma*	66	53.86	6.07	400.62
Pacific Cod	*Gadus macrocephalus*	27	128.88	9.96	268.81
Giant Grenadier	*Albatrossia pectoralis*	13	36.22	9.95	129.32
Pacific Grenadier	*Coryphaenoides acrolepis*	12	153.23	15.52	186.25
Popeye	*Coryphaenoides cinereus*	9	5.85	1.96	17.64
Pacific Flatnose	*Antimora microlepis*	7	2.7	0.72	3.6
Cartilaginous Fish	**Class Chondrichthyes**				
Spotted Ratfish	*Hydrolagus colliei*	57	44.57	4.12	235.05
Longnose Skate	*Raja rhina*	34	23	9.61	326.71
North Pacific Spiny Dogfish	*Squalus suckleyi*	28	15.18	2.92	81.78
Sandpaper Skate	*Bathyraja interrupta*	18	10.9	2.38	45.27

Common Name	Scientific Name	Number of Tows	Catch Weight (kg)		
			Max	Mean	Total
Aleutian Skate	*Bathyraja aleutica*	10	20.14	7.01	70.1
Brown Cat Shark	*Apristurus brunneus*	5	3.64	1.46	5.84
Roughtail Skate	*Bathyraja trachura*	3	2.45	1.17	3.51
Abyssal Skate	*Bathyraja abyssicola*	1	8.02	8.02	8.02
Whitebrow Skate	*Bathyraja minispinosa*	1	0.39	0.39	0.39
Greenlings	**Family Hexagrammidae**				
Lingcod	*Ophiodon elongatus*	18	94.41	15.47	278.46
Sculpins	**Family Cottidae**				
Darkfin Sculpin	*Malacocottus zonurus*	80	4.60	0.69	36.34
Whitetail Sculpin	*Malacocottus aleuticus*	11	-	-	-
Spotfin Sculpin	*Icelinus tenuis*	4	0.22	0.22	0.22
Giant Blobsculpin	*Psychrolutes phrictus*	1	-	-	-
Northern Sculpin	*Icelinus borealis*	1	-	-	-
Eelpouts	**Family Zoarcidae**				
Bigfin Eelpout	*Lycodes cortezianus*	11	1.32	0.66	7.21
Black Eelpout	*Lycodes diapterus*	4	0.46	0.31	0.94
Blackmouth Eelpout	*Lycodapus fierasfer*	3	0.05	0.05	0.05
Twoline Eelpout	*Bothrocara brunneum*	2	1.30	0.94	1.88
Looseskin Eelpout	*Lycodapus dermatinus*	2	0.21	0.21	0.21
Pallid Eelpout	*Lycodapus mandibularis*	1	-	-	-
Blackbelly Eelpout	*Lycodes pacificus*	1	-	-	-
Kamchatka Eelpout	*Lycenchelys camchatica*	1	-	-	-
Eelpouts	Zoarcidae (Family)	1	-	-	-
Poachers	**Family Agonidae**				
Smootheye Poacher	*Xeneretmus leiops*	29	0.48	0.16	1.90
Bigeye Poacher	*Bathyagonus pentacanthus*	15	0.11	0.09	0.35
Blackfin Poacher	*Bathyagonus nigripinnis*	14	0.09	0.05	0.26
Poachers	Agonidae (Family)	2	-	-	-
Lanternfishes	**Family Myctophidae**				
Northern Lampfish	*Stenobrachius leucopsarus*	29	2.31	0.38	4.57
California Headlightfish	*Diaphus theta*	8	0.01	0.01	0.01
Pinpoint Lampfish	*Nannobrachium regale*	8	0.25	0.18	1.23
Broadfin Lampfish	*Nannobrachium ritteri*	5	0.15	0.13	0.26
Blue Lanternfish	*Tarletonbeania crenularis*	2	-	-	-
Other Fish					
Sablefish	*Anoplopoma fimbria*	83	407.06	28.87	2396.07
Pacific Viperfish	*Chauliodus macouni*	21	0.30	0.14	1.59
Humpback Snailfish	*Elassodiscus caudatus*	19	0.51	0.29	1.44
Pearly Prickleback	*Bryozoichthys marjorius*	7	0.22	0.16	0.47
Stout Blacksmelt	*Pseudobathylagus milleri*	7	0.53	0.34	2.38
Chum Salmon	*Oncorhynchus keta*	5	5.88	4.31	21.55
Snailfishes	*Liparis* (Genus)	5	0.26	0.26	0.26
Longfin Dragonfish	*Tactostoma macropus*	4	0.11	0.10	0.30
Crested Bigscale	*Poromitra crassiceps*	4	0.12	0.11	0.32
Blue-eyed Searcher	*Bathymaster signatus*	3	0.14	0.14	0.14
Blacktail Snailfish	*Careproctus melanurus*	3	1.37	0.79	2.36
Pacific Blacksmelt	*Bathylagus pacificus*	2	-	-	-
Prowfish	*Zaprora silenus*	2	4.83	3.14	6.28
Smooth Lumpsucker	*Aptocyclus ventricosus*	2	0.23	0.23	0.23
Closespine Snipe Eel	*Avocettina infans*	2	0.04	0.04	0.04
Black Hagfish	*Eptatretus deani*	1	0.75	0.75	0.75
Bluethroat Argentine	*Nansenia candida*	1	-	-	-
Deepsea Smelts	Bathylagidae (Family)	1	-	-	-
Smalldisk Snailfish	*Careproctus gilberti*	1	-	-	-

Common Name	Scientific Name	Number of Tows	Catch Weight (kg)		
			Max	Mean	Total
Alaska Snailfish	*Careproctus colletti*	1	0.29	0.29	0.29
Shining Tubeshoulder	*Sagamichthys abei*	1	-	-	-
Northern Pearleye	*Benthalbella dentata*	1	-	-	-
Spiny Dreamer	*Oneirodes thompsoni*	1	0.11	0.11	0.11
Falcate Snailfish	*Careproctus cypselurus*	1	-	-	-
California Slickhead	*Alepocephalus tenebrosus*	1	0.30	0.30	0.30
Longnose Snailfish	*Rhinoliparis barbulifer*	1	-	-	-
Crabs and Shrimp	**Class Malacostraca**				
Prawn	*Pandalus platyceros*	50	2.92	0.75	34.32
Sidestripe Shrimp	*Pandalopsis dispar*	21	0.36	0.18	2.40
Yellowleg Shrimp	*Pandalus tridens*	21	-	-	-
Large Eyed Eualid	*Eualus macropthalmus*	19	-	-	-
Glass Shrimp	*Pasiphaea pacifica*	14	1.30	0.54	2.14
Pink Shrimp (smooth)	*Pandalus jordani*	9	-	-	-
Grooved Tanner Crab	*Chionoecetes tanneri*	8	5.57	1.37	8.24
Crimson Pasiphaeid	*Pasiphaea tarda*	6	0.07	0.07	0.07
-	*Lithodes couesi*	6	0.39	0.17	0.69
Squat Lobster	*Munida quadrispina*	3	-	-	-
Graceful Decorator Crab	*Oregonia gracilis*	3	-	-	-
-	*Chirostylus* (Genus)	2	0.04	0.04	0.04
Pink Shrimp	*Pandalus borealis*	2	-	-	-
Barbed Eualid	*Eualus barbatus*	2	-	-	-
Spinyheads	*Metacrangon* (Genus)	1	-	-	-
Humpback Shrimp	*Pandalus hypsinotus*	1	-	-	-
Isopods	Isopoda (Order)	1	-	-	-
Amphipods	Amphipoda (Order)	1	-	-	-
Triangle Tanner Crab	*Chionoecetes angulatus*	1	-	-	-
Golden King Crab	*Lithodes aequispinus*	1	1.32	1.32	1.32
Redclaw Crab	*Chorilia longipes*	1	-	-	-
Lyre Crabs	*Hyas* (Genus)	1	-	-	-
Sea Stars	**Class Asteroidea**				
Rose Starfish	*Crossaster papposus*	11	-	-	-
-	*Poraniopsis inflatus inflatus* (Sub Species)	10	0.18	0.18	0.18
Cushion Star	*Pteraster tesselatus*	7	-	-	-
-	*Henricia* (Genus)	7	-	-	-
-	*Nearchaster* (Genus)	6	-	-	-
Spiny Red Sea Star	*Hippasteria spinosa*	3	0.22	0.17	0.5
-	*Hippasteria* (Genus)	3	0.69	0.56	1.12
-	*Crossaster* (Genus)	3	0.28	0.18	0.35
-	*Lophaster* (Genus)	3	-	-	-
-	*Nearchaster aciculosus*	3	0.16	0.11	0.21
-	*Solaster* (Genus)	2	-	-	-
-	*Lophaster furcilliger vexator* (Sub Species)	2	0.44	0.44	0.44
Fish-eating Star	*Stylasterias forreri*	2	0.16	0.16	0.16
-	*Tarsaster alaskanus*	2	-	-	-
-	*Zoroaster evermani*	1	-	-	-
-	*Heterozonias alternatus*	1	-	-	-
-	Asteriidae (Family)	1	-	-	-
-	*Diplopteraster multipes*	1	-	-	-
-	*Ceramaster* (Genus)	1	-	-	-
-	*Henricia sanguinolenta*	1	-	-	-
Cookie Star	*Ceramaster patagonicus*	1	-	-	-
-	*Hippasteria californica*	1	-	-	-
Vermillion Starfish	*Mediaster aequalis*	1	-	-	-

Common Name	Scientific Name	Number of Tows	Catch Weight (kg)		
			Max	Mean	Total
-	*Ceramaster arcticus*	1	-	-	-
-	*Nearchaster variabilis*	1	-	-	-
-	*Dipsacaster borealis*	1	0.16	0.16	0.16
Mud Star	*Ctenodiscus crispatus*	1	-	-	-
-	Benthopectinidae (Family)	1	0.42	0.42	0.42
Brittle Stars	**Class Ophiuroidea**				
Basket Star	*Gorgonocephalus eucnemis*	12	0.34	0.21	0.42
-	Ophiuridae (Family)	5	-	-	-
-	*Amphiophiura ponderosa*	4	-	-	-
-	*Ophiura* (Genus)	2	0.14	0.14	0.14
-	*Ophiacantha* (Genus)	2	-	-	-
-	*Amphiophiura* (Genus)	1	-	-	-
-	*Ophiosphalma* (Genus)	1	-	-	-
-	Ophiuroidea (Class)	1	-	-	-
-	Phrynophiurida (Order)	1	-	-	-
Sea Cucumbers	**Class Holothuroidea**				
Soft Sea Cucumber	*Pseudostichopus mollis*	16	0.20	0.17	0.67
Sea Cucumbers	Holothuroidea (Class)	3	-	-	-
Whitespotted Sea Cucumber	*Parastichopus leukothele*	1	0.56	0.56	0.56
Octopuses and Squid	**Class Cephalopoda**				
Schoolmaster Gonate Squid	*Berryteuthis magister*	54	25.28	4.34	229.86
Smoothskin Octopus	*Benthoctopus leioderma*	8	0.68	0.23	1.59
Squids	Teuthida (Order)	8	0.51	0.27	1.62
Pacific Bobtail Squid	*Rossia pacifica*	6	-	-	-
-	*Octopoteuthis deletron*	4	0.33	0.28	0.55
-	*Chiroteuthis calyx*	2	-	-	-
Boreopacific Gonate Squid	*Gonatopsis borealis*	2	-	-	-
Robust Clubhook Squid	*Moroteuthis robusta*	2	29.02	17.60	35.20
Octopus	Octopoda (Order)	2	0.10	0.10	0.10
Flapjack Devilfish	*Opisthoteuthis californiana*	1	0.10	0.10	0.10
Giant Pacific Octopus	*Enteroctopus dofleini*	1	-	-	-
-	*Belonella borealis*	1	-	-	-
-	*Gonatus* (Genus)	1	-	-	-
Giant Squid	*Architeuthis martensi*	1	2.88	2.88	2.88
Sea Urchins	**Super Order Echinacea**				
Fragile Urchin	*Allocentrotus fragilis*	12	0.98	0.32	1.60
Sea Urchins	Echinacea (Super Order)	4	-	-	-
Jellyfish	**Phylum Cnidaria**				
Jellyfish	Scyphozoa (Class)	43	1.66	0.59	20.63
-	*Periphylla periphylla*	14	2.04	0.67	2.67
Lions Mane	*Cyanea capillata*	4	1.36	0.71	2.82
-	*Periphylla* (Genus)	1	-	-	-
Anemones and Corals	**Class Anthozoa**				
Anemone	Actiniaria (Order)	33	1.71	0.59	7.08
Sea Whip	*Balticina septentrionalis*	16	0.42	0.17	1.39
-	*Primnoa* (Genus)	8	49.60	13.24	92.66
-	*Isidella* (Genus)	3	0.34	0.34	0.34
-	*Bathypathes patula*	3	-	-	-
Sea Pen	*Ptilosarcus gurneyi*	3	-	-	-
Sea Pens	Pennatulacea (Order)	2	-	-	-
-	*Lillipathes* (Genus)	1	-	-	-
-	*Paractinostola faeculenta*	1	1.78	1.78	1.78
	Swiftia pacifica	1	-	-	-
	Anthoptilidae (Family)	1	-	-	-

Common Name	Scientific Name	Number of Tows	Catch Weight (kg)		
			Max	Mean	Total
	Anthomastus (Genus)	1	-	-	-
	Paragorgia (Genus)	1	-	-	-
	Anthozoa (Class)	1	-	-	-
Snails and Slugs	**Class Gastropoda**				
Seaslugs	Nudibranchia (Order)	7	-	-	-
Oregontriton	*Fusitriton oregonensis*	6	0.96	0.41	1.22
-	*Neptunea* (Genus)	2	-	-	-
Rosy Tritonia	*Tritonia diomedea*	2	0.34	0.22	0.44
-	Dorididae (Family)	1	-	-	-
-	*Tritonia* (Genus)	1	-	-	-
-	*Bathybembix bairdii*	1	-	-	-
Abalone Barleysnail	*Barleeia haliotiphila*	1	3.63	3.63	3.63
Other Invertebrate Species					
Sponges	Porifera (Phylum)	39	22.4	2.61	78.24
Bath Sponges	Demospongiae (Class)	12	11.52	3.24	32.43
Sea Mouse	*Aphrodita* (Genus)	8	-	-	-
Sea Lilies And Feather Stars	Crinoidea (Class)	5	-	-	-
Glass Sponges	Hexactinellida (Class)	3	2.04	0.98	2.95
Salps	Salpida (Order)	3	-	-	-
-	Styelidae (Family)	2	1.57	0.87	1.73
Polychaete Worms	Polychaeta (Class)	2	-	-	-
Salp	*Cyclosalpa affinis*	2	-	-	-
Heart Urchins	Atelostomata (Super Order)	1	-	-	-
-	*Chirona evermanni*	1	0.18	0.18	0.18
Segmented Worms	Annelida (Phylum)	1	-	-	-
Proboscis Worm	Nemertea (Phylum)	1	-	-	-
Tube Worms	Sedentaria (Sub Class)	1	-	-	-

Table 8. Offloaded catch weight by species for the 2010 WCHG synoptic bottom trawl survey.

Species	Weight (kg)
Arrowtooth Flounder	8.43
Blackfin Sculpin	4.00
Darkblotched Rockfish	2.22
Dover Sole	6.22
Harlequin Rockfish	265.48
Pacific Ocean Perch	33669.30
Redbanded Rockfish	42.62
Redstripe Rockfish	1971.54
Rex Sole	6.22
Rosethorn Rockfish	130.52
Rougheye Rockfish	863.91
Sablefish	1145.11
Sharpchin Rockfish	4387.46
Shortraker Rockfish	106.74
Shortspine Thornyhead	228.15
Silvergray Rockfish	677.90
Spotted Ratfish	16.87
Widow Rockfish	1.78
Yellowmouth Rockfish	143.39
Total	**43677.83**

Table 9. Species sampled during the 2010 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
Abyssal Skate	*Bathyraja abyssicola*	1	1	0	1	0	0
Aleutian Skate	*Bathyraja aleutica*	10	13	2	13	0	0
Arrowtooth Flounder	*Reinhardtius stomias*	41	937	584	937	556	555
Aurora Rockfish	*Sebastes aurora*	7	18	0	18	0	0
Bocaccio	*Sebastes paucispinis*	9	14	14	14	14	14
Brown Cat Shark	*Apristurus brunneus*	4	11	0	11	0	0
Canary Rockfish	*Sebastes pinniger*	5	35	27	35	27	27
Chum Salmon	*Oncorhynchus keta*	5	5	0	5	0	0
Darkblotched Rockfish	*Sebastes crameri*	3	23	0	23	0	0
Darkfin Sculpin	*Malacocottus zonurus*	2	60	0	0	0	0
Deepsea Sole	*Microstomus bathybius*	1	1	0	1	0	0
Dover Sole	*Microstomus pacificus*	37	885	424	885	369	367
Dusky Rockfish	*Sebastes variabilis*	1	2	0	2	0	0
English Sole	*Parophrys vetulus*	2	22	0	22	0	0
Giant Grenadier	*Albatrossia pectoralis*	13	90	19	90	0	0
Greenstriped Rockfish	*Sebastes elongatus*	16	381	84	381	56	56
Harlequin Rockfish	*Sebastes variegatus*	25	164	111	164	111	111
Lingcod	*Ophiodon elongatus*	17	44	25	44	25	25
Longnose Skate	*Raja rhina*	34	51	2	51	0	0
Longspine Thornyhead	*Sebastolobus altivelis*	17	546	461	546	308	314
North Pacific Spiny Dogfish	*Squalus suckleyi*	27	40	0	40	0	0
Pacific Cod	*Gadus macrocephalus*	27	116	60	116	60	38
Pacific Flatnose	*Antimora microlepis*	6	18	0	15	0	0
Pacific Grenadier	*Coryphaenoides acrolepis*	11	216	113	207	0	76
Pacific Hake	*Merluccius productus*	37	909	453	908	314	294
Pacific Halibut	*Hippoglossus stenolepis*	18	21	0	8	0	0
Pacific Ocean Perch	*Sebastes alutus*	90	2489	2212	2489	2161	2187
Petrale Sole	*Eopsetta jordani*	8	45	35	45	35	35
Popeye	*Coryphaenoides cinereus*	8	98	36	98	36	36
Prowfish	*Zaprora silenus*	2	4	0	4	0	0
Pygmy Rockfish	*Sebastes wilsoni*	2	5	0	5	0	0
Redbanded Rockfish	*Sebastes babcocki*	62	718	361	718	360	361
Redstripe Rockfish	*Sebastes proriger*	27	560	365	560	309	309
Rex Sole	*Glyptocephalus zachirus*	32	851	208	851	182	182
Rosethorn Rockfish	*Sebastes helvomaculatus*	49	1191	218	1191	157	141
Rougheye Rockfish	*Sebastes aleutianus*	57	735	734	735	690	607
Roughtail Skate	*Bathyraja trachura*	3	9	0	9	0	0
Sablefish	*Anoplopoma fimbria*	82	704	390	704	379	379
Sandpaper Skate	*Bathyraja interrupta*	18	35	2	35	0	0
Sharpchin Rockfish	*Sebastes zacentrus*	51	1410	872	1410	809	735
Shortraker Rockfish	*Sebastes borealis*	26	187	187	187	187	187
Shortspine Thornyhead	*Sebastolobus alascanus*	104	3049	1353	3050	650	651
Silvergray Rockfish	*Sebastes brevispinis*	48	1042	588	1042	588	588
Slender Sole	*Lyopsetta exilis*	13	176	0	176	0	0
Splitnose Rockfish	*Sebastes diploproa*	11	331	163	331	95	95
Spotted Ratfish	*Hydrolagus colliei*	20	479	69	479	0	0
Stripetail Rockfish	*Sebastes saxicola*	1	1	0	1	0	0
Walleye Pollock	*Theragra chalcogramma*	33	696	106	696	0	0
Whitebrow Skate	*Bathyraja minispinosa*	1	1	0	1	0	0
Widow Rockfish	*Sebastes entomelas*	19	76	30	76	0	0

Common Name	Scientific Name	Number of Samples	Number of Recorded Biological Attributes				
			Length	Weight	Sex	Maturity	Age
Yelloweye Rockfish	*Sebastes ruberrimus*	1	9	9	9	9	9
Yellowmouth Rockfish	*Sebastes reedi*	8	181	153	181	153	153
Yellowtail Rockfish	*Sebastes flavidus*	5	44	0	44	0	0
Total		**1157**	**19749**	**10470**	**19664**	**8640**	**8532**

Table 10. Summary of biological data collected during the 2010 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	Length (cm)			Weight (kg)			Female
Common Name	**Scientific Name**	**Samples**	**Specimens**	**Type**	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**	**Proportion**
Abyssal Skate	*Bathyraja abyssicola*	1	1	Total	123	123	123.0	-	-	-	0
Aleutian Skate	*Bathyraja aleutica*	10	13	Total	34	131	81.0	7.9	12.3	10.1	0.46
Arrowtooth Flounder	*Reinhardtius stomias*	41	937	Fork	14	82	49.0	0.1	6.5	1.3	0.63
Aurora Rockfish	*Sebastes aurora*	7	18	Fork	26	67	34.0	-	-	-	0.67
Bocaccio	*Sebastes paucispinis*	9	14	Fork	66	79	71.0	2.9	6.3	4.5	0.36
Brown Cat Shark	*Apristurus brunneus*	4	11	Total	44	58	53.0	-	-	-	0.09
Canary Rockfish	*Sebastes pinniger*	5	35	Fork	47	60	53.0	1.9	3.5	2.6	0.34
Chum Salmon	*Oncorhynchus keta*	5	5	Fork	59	74	68.0	-	-	-	0.4
Darkblotched Rockfish	*Sebastes crameri*	3	23	Fork	37	50	44.0	-	-	-	0.91
Darkfin Sculpin	*Malacocottus zonurus*	2	60	Total	6	22	13.0	-	-	-	-
Deepsea Sole	*Microstomus bathybius*	1	1	Total	40	40	40.0	-	-	-	-
Dover Sole	*Microstomus pacificus*	37	885	Total	25	61	40.0	0.1	2.5	0.7	0.21
Dusky Rockfish	*Sebastes variabilis*	1	2	Fork	45	48	47.0	-	-	-	1
English Sole	*Parophrys vetulus*	2	22	Total	32	46	39.0	-	-	-	0.77
Giant Grenadier	*Albatrossia pectoralis*	1	19	-	-	-	-	0.6	1.6	1.0	0.74
Greenstriped Rockfish	*Sebastes elongatus*	16	381	Fork	11	34	26.0	0.1	0.5	0.3	0.38
Harlequin Rockfish	*Sebastes variegatus*	25	164	Fork	20	35	26.0	0.1	0.4	0.2	0.57
Lingcod	*Ophiodon elongatus*	17	44	Fork	10	102	83.0	2.0	9.0	5.3	0.98
Longnose Skate	*Raja rhina*	34	51	Total	57	131	99.0	3.7	5.9	4.8	0.57
Longspine Thornyhead	*Sebastolobus altivelis*	17	546	Total	7	31	19.0	<0.1	0.4	0.1	0.53
North Pacific Spiny Dogfish	*Squalus suckleyi*	27	40	Total	57	103	78.0	-	-	-	0.23
Pacific Cod	*Gadus macrocephalus*	27	116	Fork	38	79	59.0	0.8	5.8	2.6	0.57
Pacific Flatnose	*Antimora microlepis*	6	18	Total	6	49	22.0	-	-	-	0.43
Pacific Grenadier	*Coryphaenoides acrolepis*	4	113	-	-	-	-	<0.1	1.1	0.3	0.44
Pacific Hake	*Merluccius productus*	37	909	Fork	42	74	51.0	0.5	1.7	0.9	0.69
Pacific Halibut	*Hippoglossus stenolepis*	18	21	Fork	57	129	79.0	-	-	-	0.75
Pacific Ocean Perch	*Sebastes alutus*	90	2489	Fork	10	52	38.0	<0.1	2.3	0.9	0.49
Petrale Sole	*Eopsetta jordani*	8	45	Total	27	49	40.0	0.2	1.2	0.8	0.51
Popeye	*Coryphaenoides cinereus*	1	36	-	-	-	-	0.1	0.3	0.2	0.33
Prowfish	*Zaprora silenus*	2	4	Total	47	55	51	-	-	-	-
Pygmy Rockfish	*Sebastes wilsoni*	2	5	Fork	16	21	19	-	-	-	0.6

Common Name	Scientific Name	Number of		Length Type	Length (cm)			Weight (kg)			Female Proportion
		Samples	Specimens		Min.	Max.	Mean	Min.	Max.	Mean	
Redbanded Rockfish	*Sebastes babcocki*	62	718	Fork	9	71	38.0	<0.1	4.2	1.4	0.48
Redstripe Rockfish	*Sebastes proriger*	27	560	Fork	27	44	35.0	0.3	1.1	0.6	0.48
Rex Sole	*Glyptocephalus zachirus*	32	851	Total	22	44	32.0	0.1	0.5	0.2	0.3
Rosethorn Rockfish	*Sebastes helvomaculatus*	49	1191	Fork	9	35	26.0	<0.1	0.5	0.2	0.46
Rougheye Rockfish	*Sebastes aleutianus*	57	735	Fork	15	73	46.0	<0.1	6.1	1.6	0.47
Roughtail Skate	*Bathyraja trachura*	3	9	Total	20	72	34.0	-	-	-	0.56
Sablefish	*Anoplopoma fimbria*	82	704	Fork	41	101	60.0	0.6	15.0	2.5	0.37
Sandpaper Skate	*Bathyraja interrupta*	18	35	Total	39	91	58.0	0.3	1.1	0.7	0.51
Sharpchin Rockfish	*Sebastes zacentrus*	51	1410	Fork	14	39	28.0	0.1	0.8	0.4	0.59
Shortraker Rockfish	*Sebastes borealis*	26	187	Fork	35	108	67.0	0.7	21.8	5.7	0.64
Shortspine Thornyhead	*Sebastolobus alascanus*	104	3049	Total	9	65	25.0	<0.1	4.3	0.3	0.47
Silvergray Rockfish	*Sebastes brevispinis*	48	1042	Fork	39	71	52.0	0.7	4.2	1.9	0.46
Slender Sole	*Lyopsetta exilis*	13	176	Total	14	31	22.0	-	-	-	0.68
Splitnose Rockfish	*Sebastes diploproa*	11	331	Fork	9	39	23.0	0.1	0.9	0.3	0.5
Spotted Ratfish	*Hydrolagus colliei*	20	479	2nd Dorsal	8	53	24.0	0.1	1.4	0.5	0.51
Stripetail Rockfish	*Sebastes saxicola*	1	1	Fork	25	25	25.0	-	-	-	1
Walleye Pollock	*Theragra chalcogramma*	33	696	Fork	18	72	31.0	<0.1	1.1	0.3	0.62
Whitebrow Skate	*Bathyraja minispinosa*	1	1	Total	43	43	43.0	-	-	-	1
Widow Rockfish	*Sebastes entomelas*	19	76	Fork	46	58	51.0	1.4	2.5	1.9	0.38
Yelloweye Rockfish	*Sebastes ruberrimus*	1	9	Fork	52	68	61.0	2.7	5.8	4.3	0.22
Yellowmouth Rockfish	*Sebastes reedi*	8	181	Fork	22	54	45.0	0.4	2.5	1.6	0.35
Yellowtail Rockfish	*Sebastes flavidus*	5	44	Fork	44	56	49.0	-	-	-	0.68

Table 11. Summary of data from net-mounted recorders during the 2010 WCHG synoptic bottom trawl survey, showing the number of tows and total number of records. A total of 131 survey tows were conducted, of which 129 were useable.

		Number of	
Data Recorder	**Attribute**	**Tows**	**Records**
Depth Sounder - Unknown Type	Bottom Depth	131	167,077
Hobo Pendant Acceleration Data Logger	Bottom Contact Sensor X Tilt Angle	123	42,313
Scanmar Scanbas Sru 06 / Sgm 15	Headline Depth (m)	131	312,731
	Doorspread (m)	130	321,372
	Headline height above bottom (m)	130	327,890
	Water Temperature (^{o}C)	131	322,766
Seabird SBE19plus Seacat Profiler	Conductivity Of Sea Water (S/m)/ Salinity (PSU)	111	34,145
	Pressure (db)/ depth (m)	111	34,145
	Water Temperature (^{o}C)	111	34,145
Seabird SBE 43	Oxygen Voltage (V)/ Dissolved Oxygen (ml/L)	111	34,145
Seabird SBE39 Temperature And Pressure Recorder	Pressure (db)/ depth (m)	95	52,331
	Water Temperature (^{o}C)	95	52,331

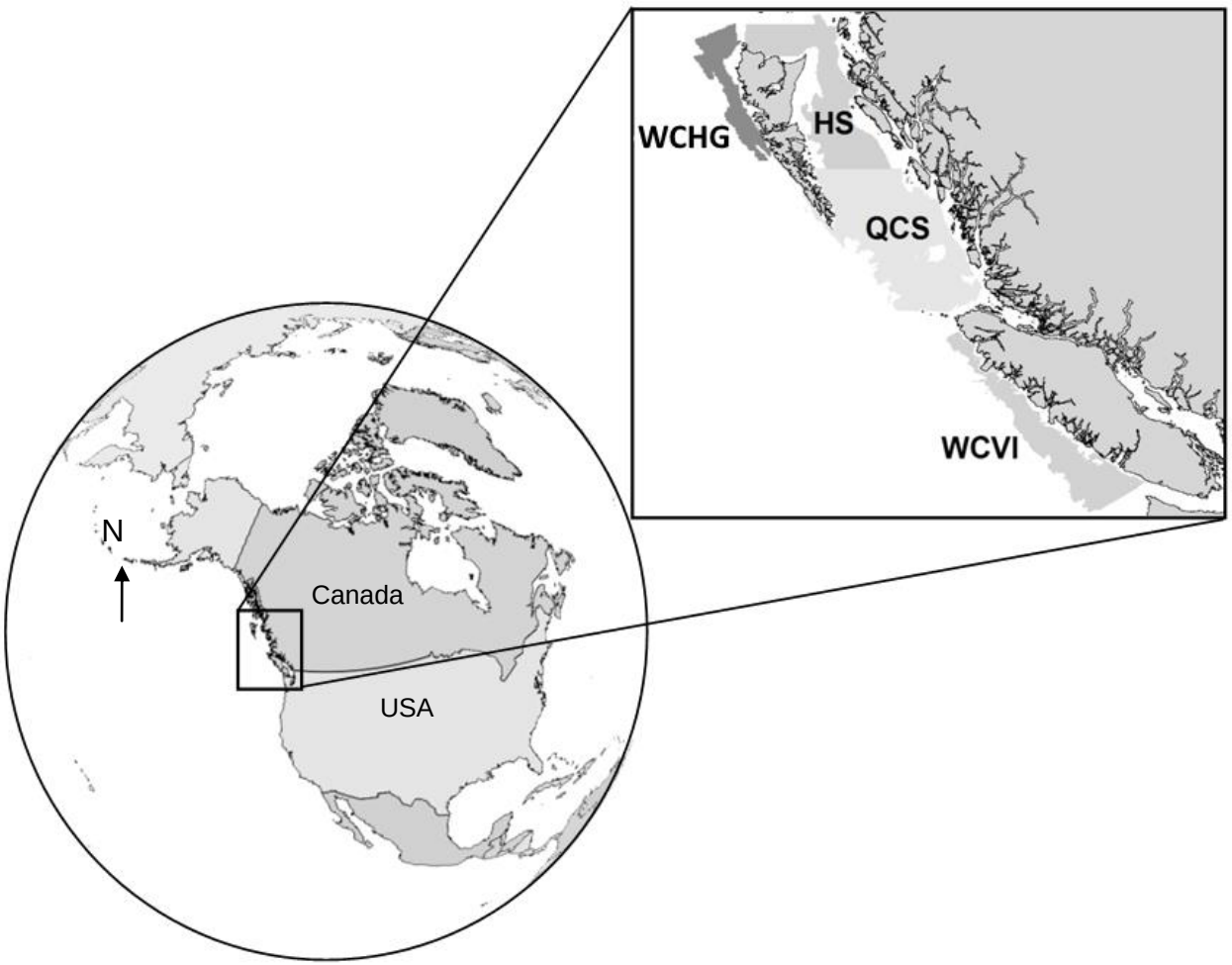

Figure 1. Locations of the current synoptic bottom trawl surveys on the coast of British Columbia, Canada. WCHG = West Coast Haida Gwaii; HS = Hecate Strait; QCS = Queen Charlotte Sound; WCVI = West Coast Vancouver Island.

Figure 2. The commercial stern trawler F/V Viking Storm used for the 2010 WCHG synoptic bottom trawl survey.

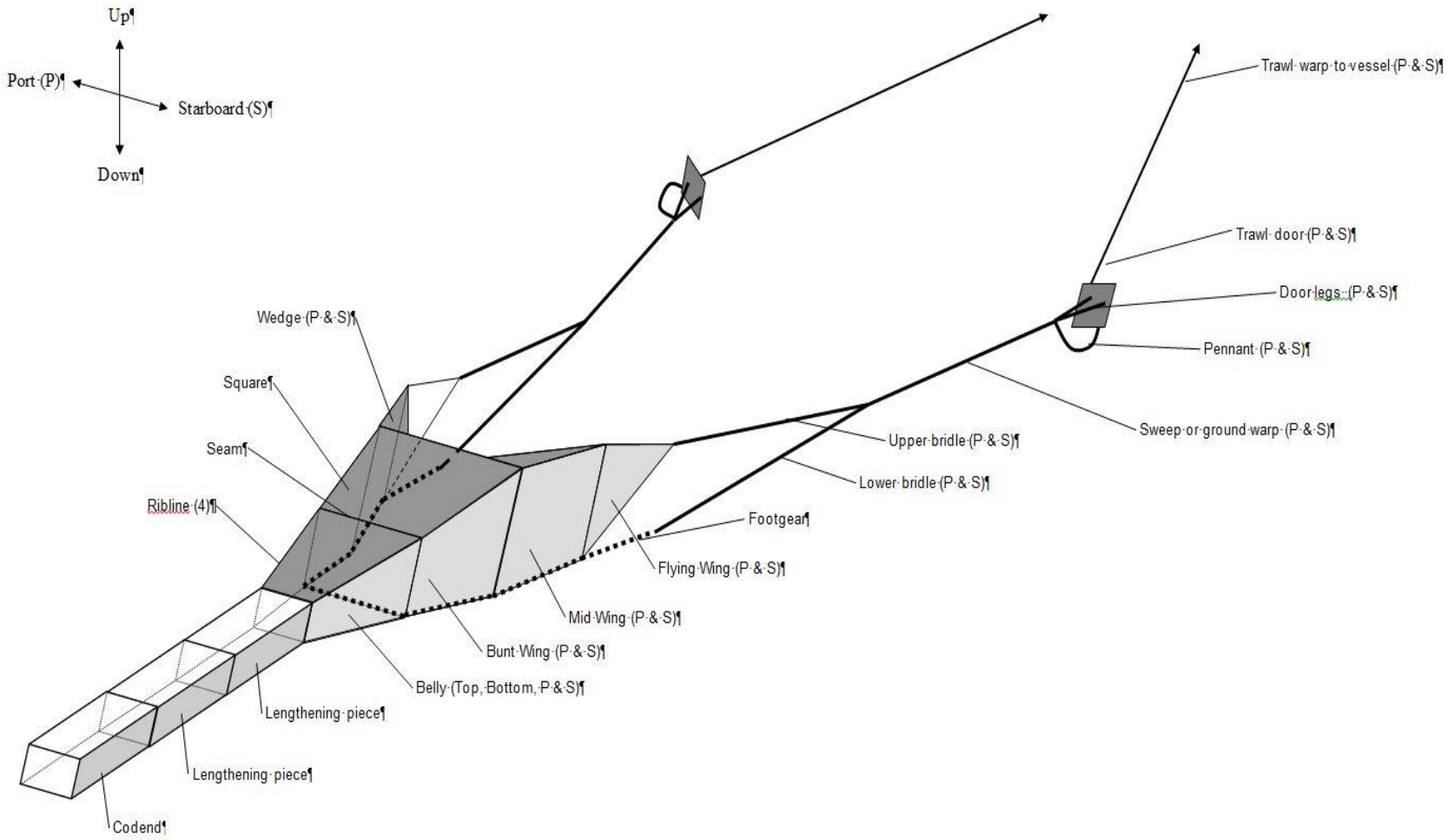

Figure 3. Overview diagram of the Atlantic Western IIa box trawl used on the 2010 WCHG synoptic bottom trawl survey.

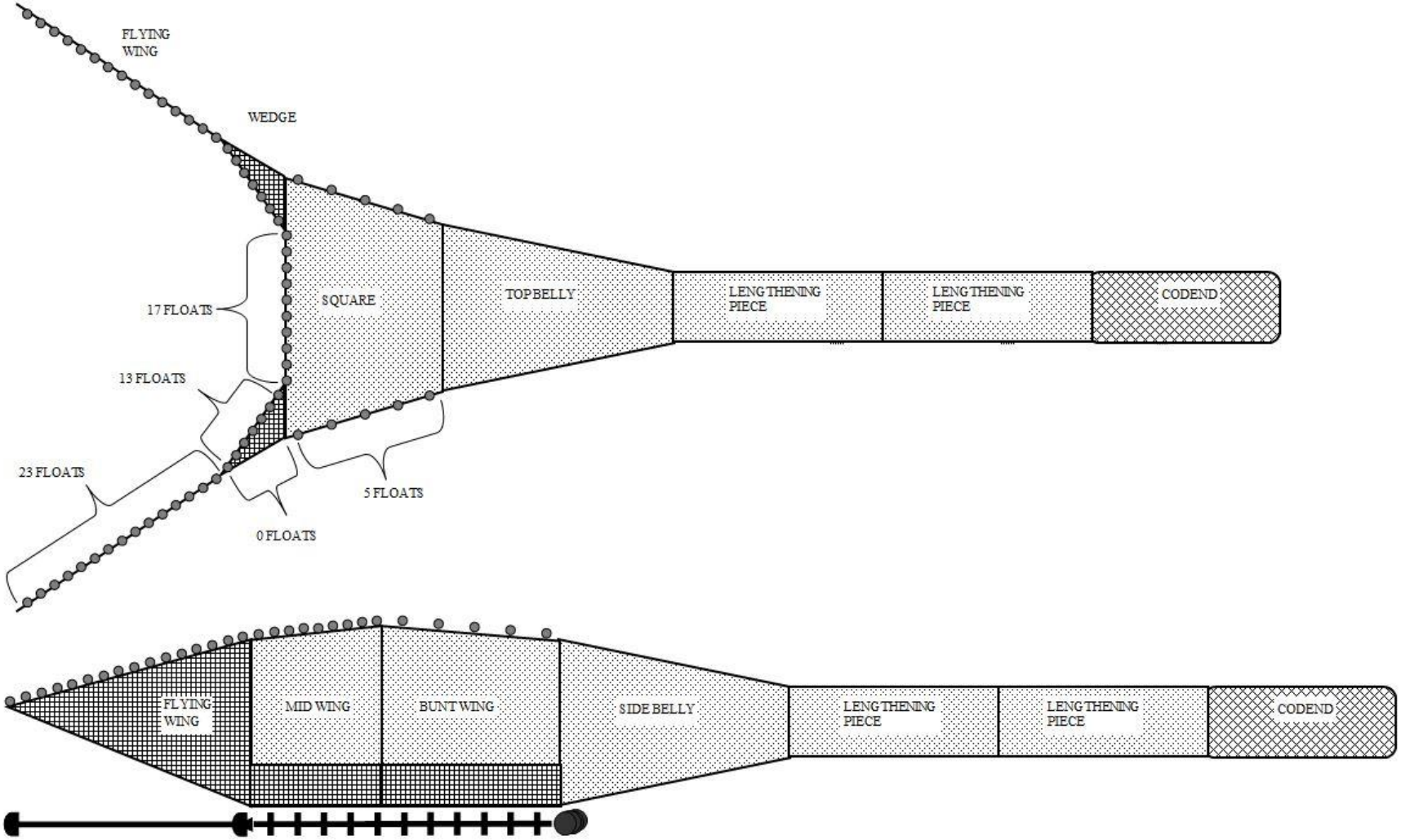

Figure 4. Top and side view of the Atlantic Western IIa box trawl used on the 2010 WCHG synoptic bottom trawl survey.

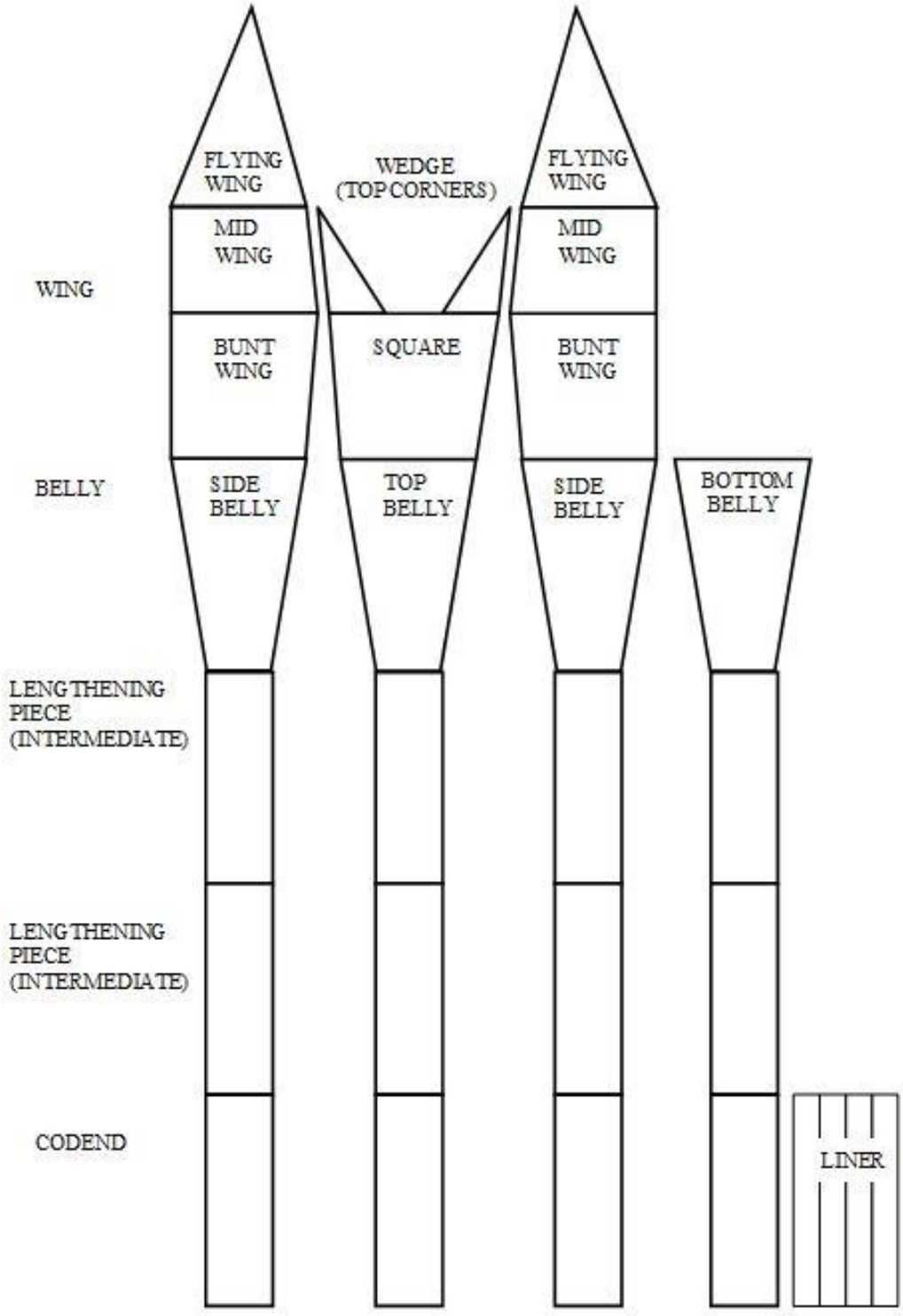

Figure 5. Diagram of the net panels with section names for the Atlantic Western IIa box trawl used on the 2010 WCHG synoptic bottom trawl survey.

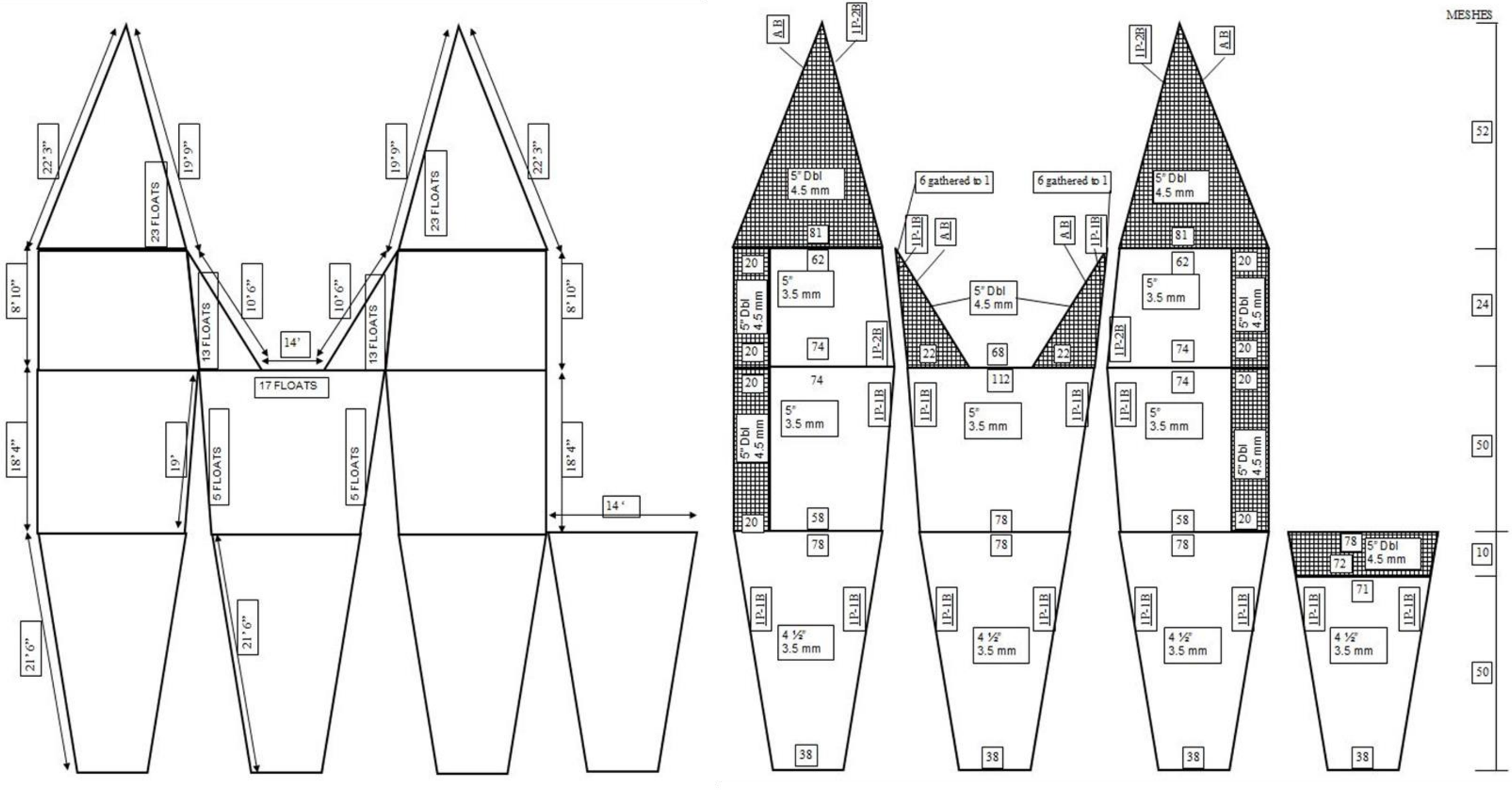

Figure 6. Schematics of the wing and belly sections of the Atlantic Western IIa box trawl used on the 2010 WCHG synoptic bottom trawl survey. Dimensions and the float arrangement are shown on the left while netting details, mesh counts, and mesh cuts are shown on the right side of the diagram.

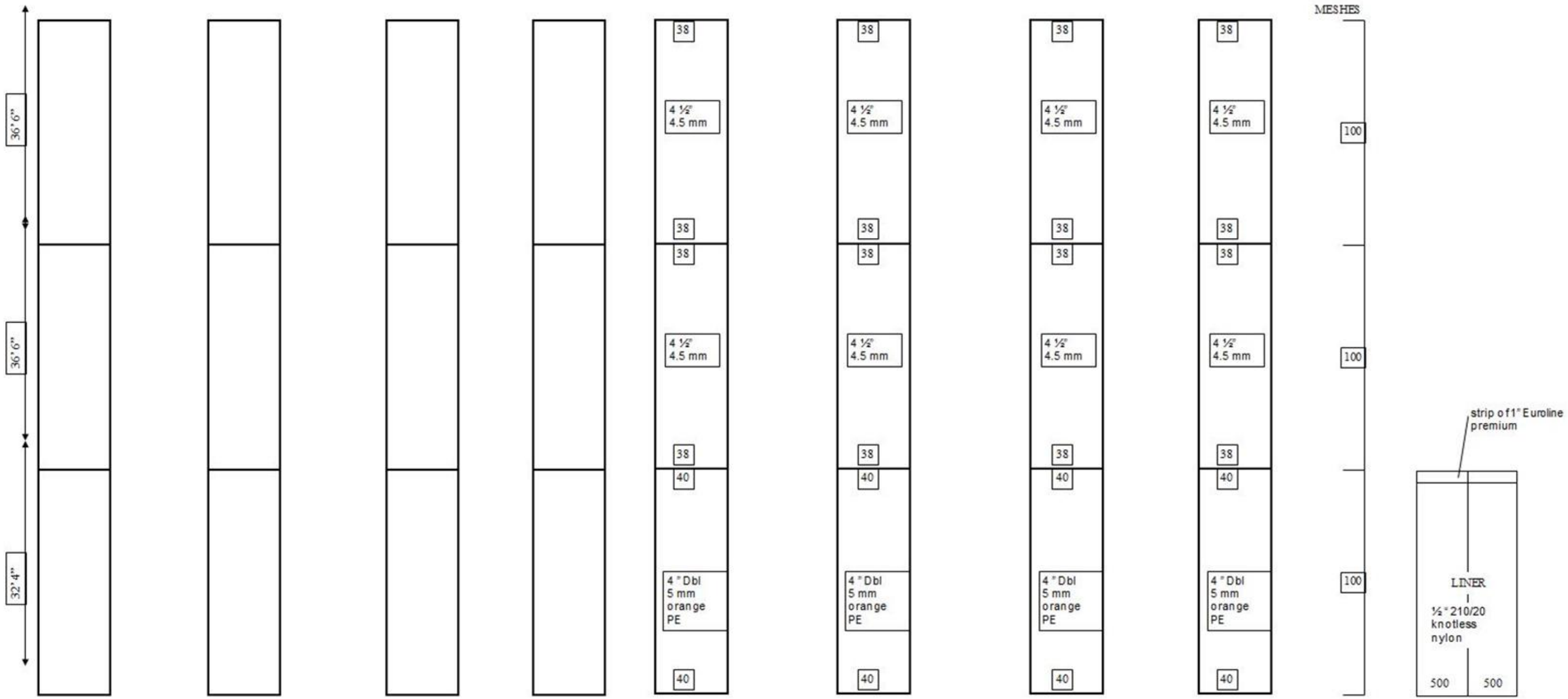

Figure 7. Details of the lengthening (intermediate) pieces and codend sections of the Atlantic Western IIa box trawl used on the 2010 WCHG synoptic bottom trawl survey. Dimensions are shown on the left while netting details, mesh counts, and mesh cuts including the codend liner are shown on the right side of the diagram.

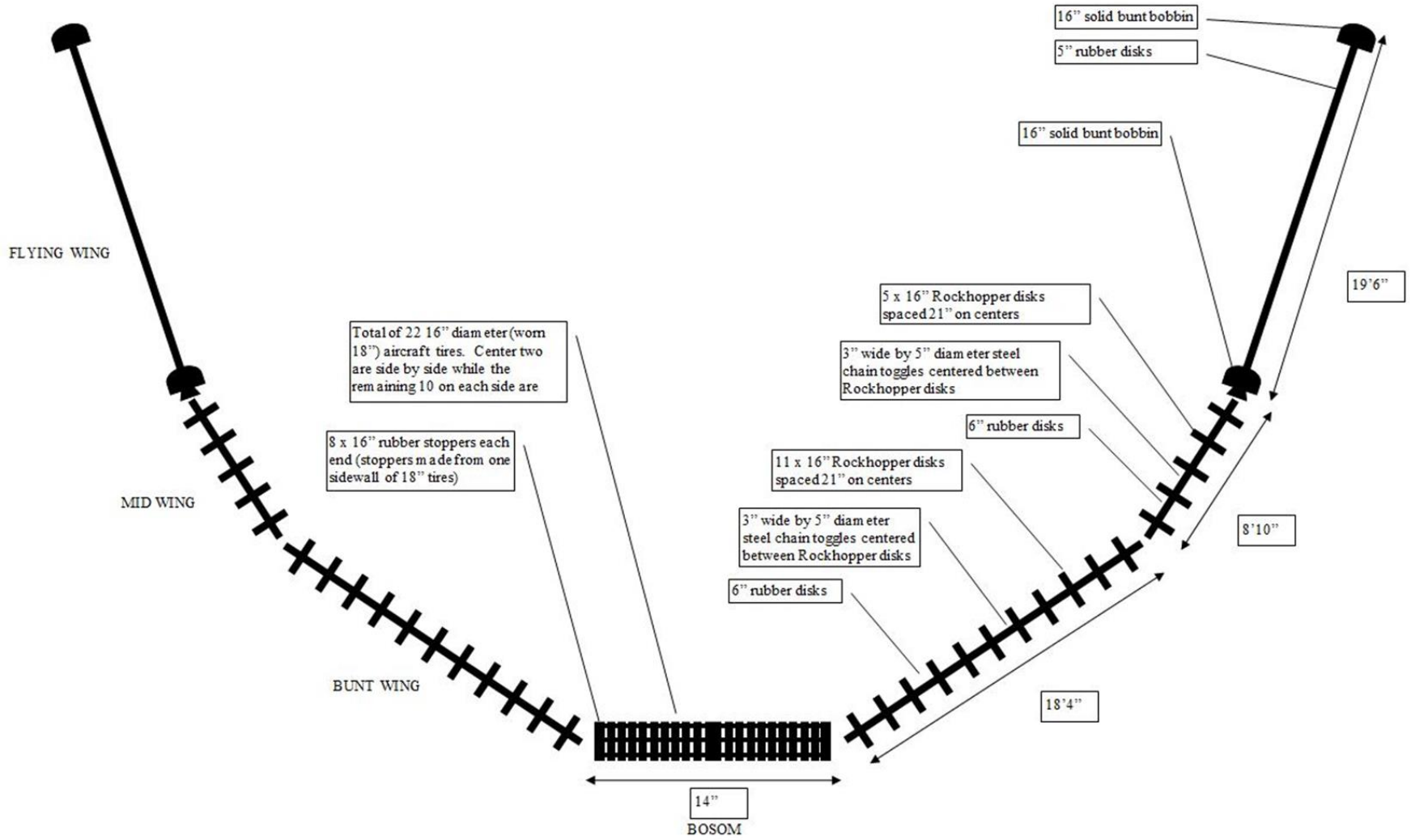

Figure 8. Details of the Rockhopper foot gear for the Atlantic Western IIa box trawl used on the 2010 WCHG synoptic bottom trawl survey.

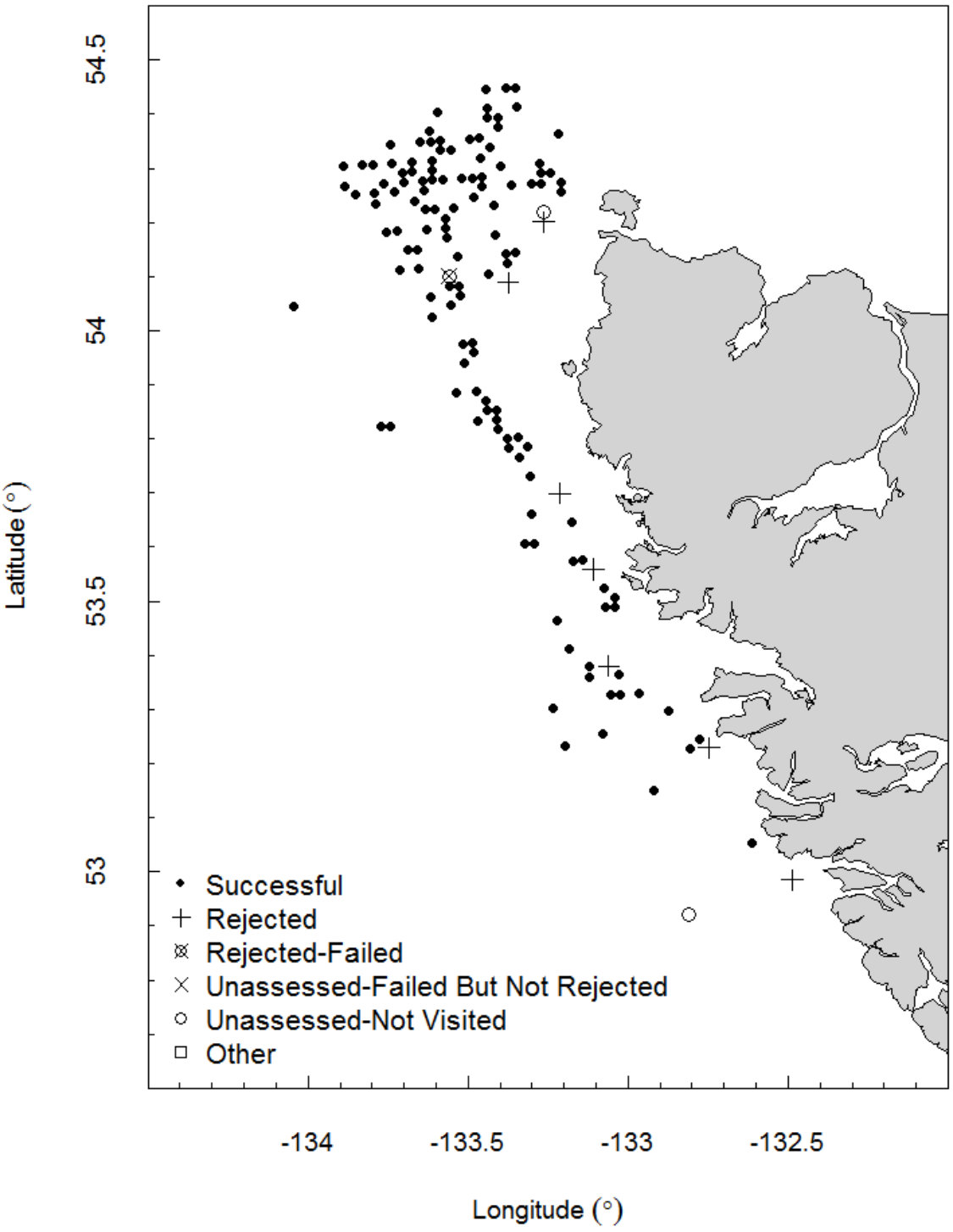

Figure 9. Final status of the 2010 WCHG synoptic bottom trawl survey showing 129 successfully fished blocks, seven blocks rejected after inspection, one block abandoned after one or more unsuccessful fishing attempts and two blocks that were not assessed.

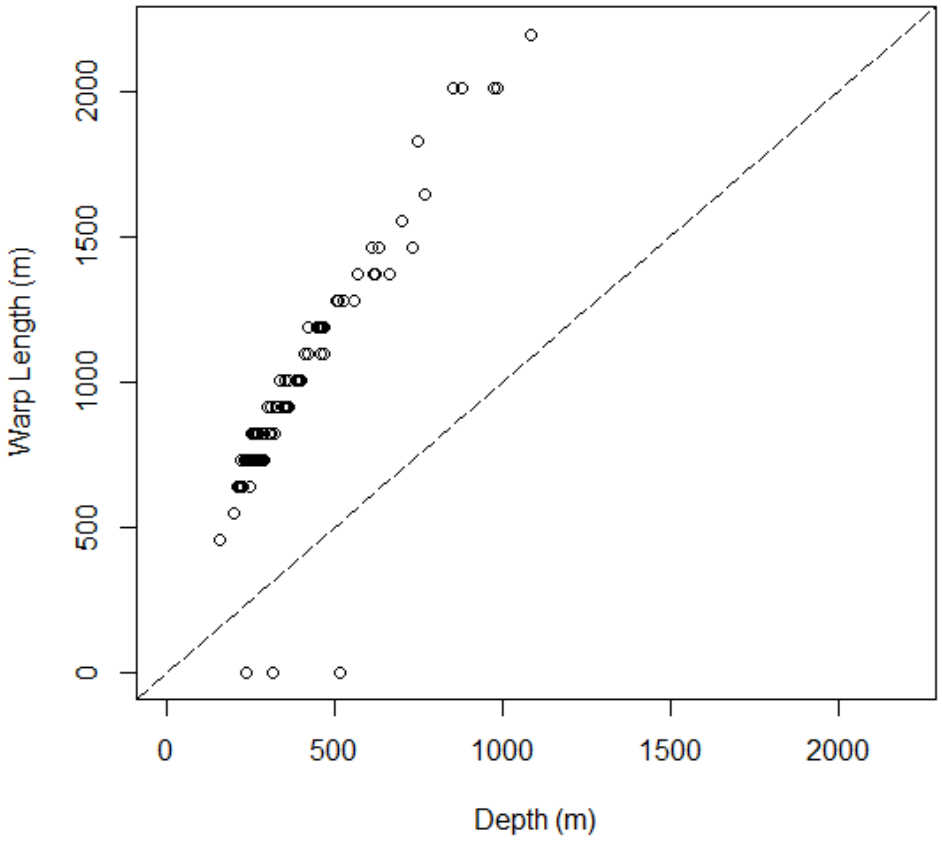

Figure 10. Warp length versus starting depth for each tow during the 2010 WCHG synoptic bottom trawl survey.

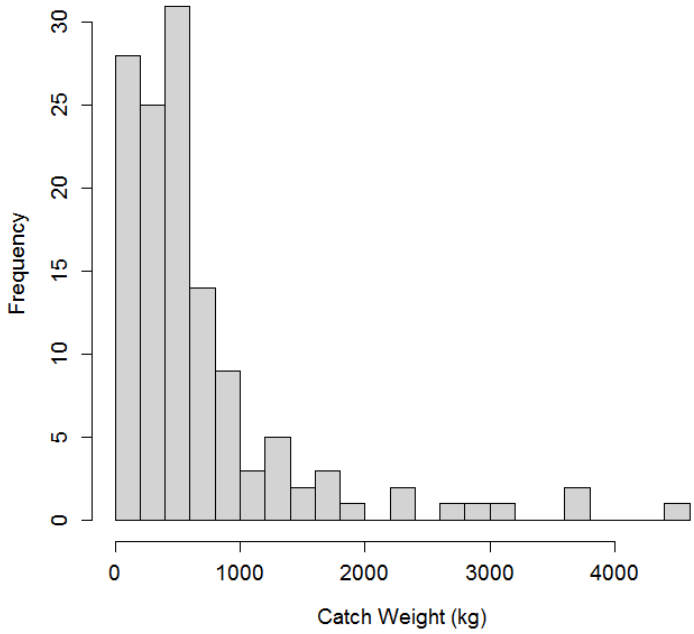

Figure 11. Histogram of catch weight per useable tow during the 2010 WCHG synoptic bottom trawl survey.

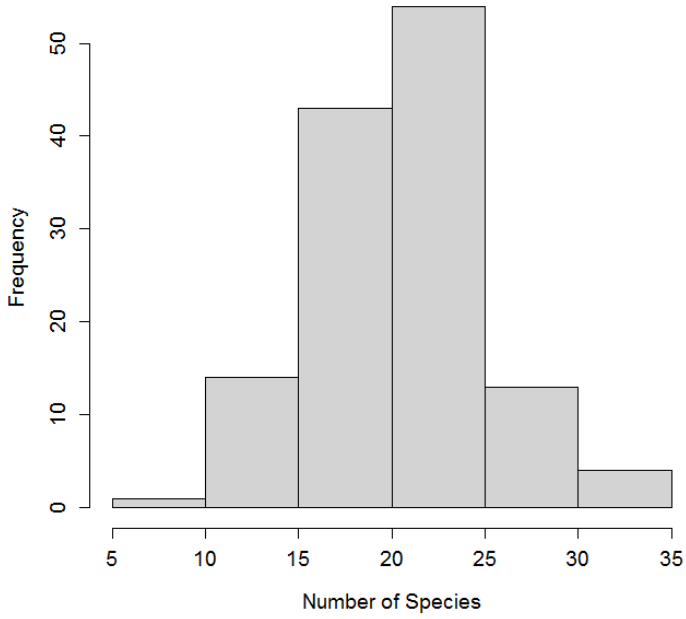

Figure 12. Histogram of species caught in useable tows during the 2010 WCHG synoptic bottom trawl survey.

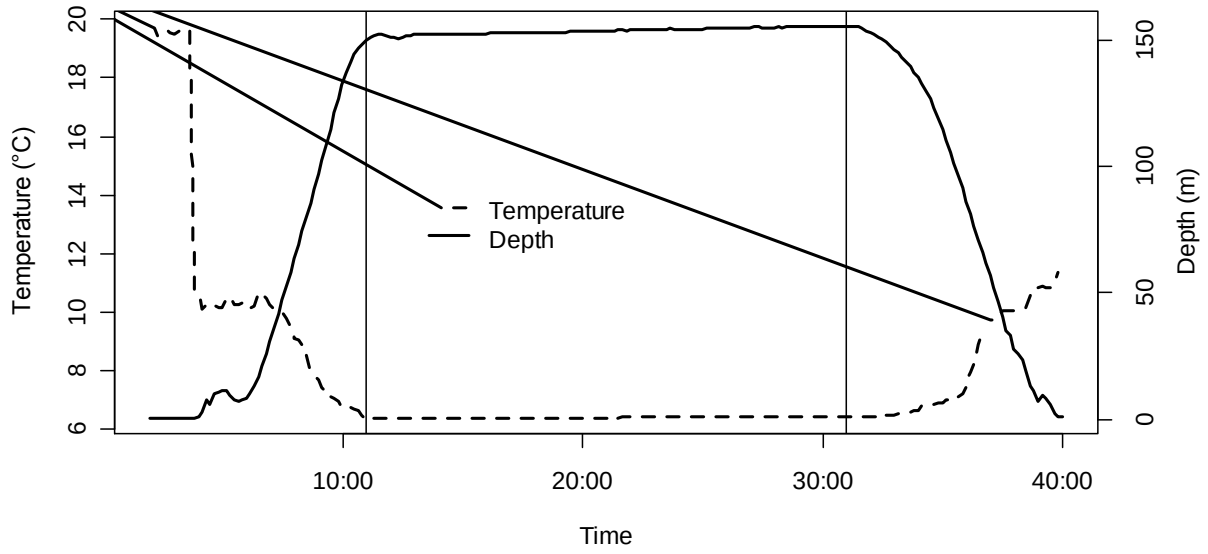

Figure 13. Example of a Seabird 39 temperature and depth profile collected during a synoptic bottom trawl survey. The vertical lines indicate the start and end of net contact with the sea floor.

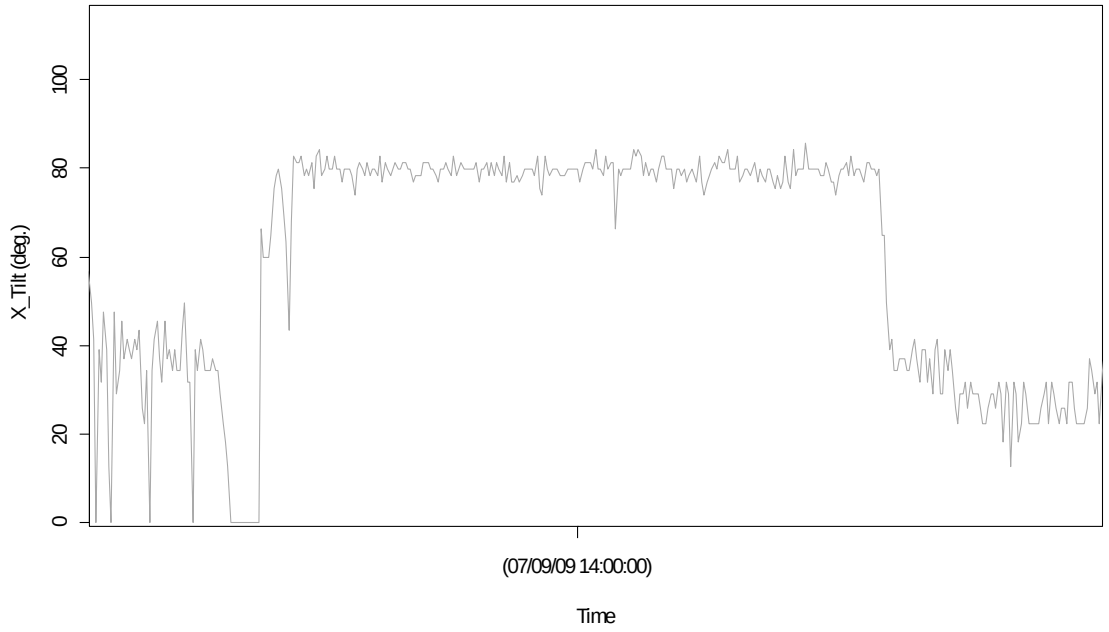

Figure 14. Example of a Mac Marine Industries bottom contact sensor profile collected during a bottom trawl survey. The raised segment in the middle of the profile at approximately 80° indicates where the net made contact with the sea floor.

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APPENDIX A: WCHG 2010 SURVEY BRIDGE LOG

Tow	Date	Start Time	Start Latitude	Start Longitude	Average Depth (m)	Bottom Duration (min)	Speed (km/h)	Warp (ftm)	Catch (kg)	Useable
1	Aug-28	7:06	53.2314	132.8156	616	29	5.2	750	152.0	Yes
2	Aug-28	9:09	53.2555	132.7924	310	19	5.4	450	840.6	Yes
3	Aug-28	11:02	53.3025	132.8828	528	30	5.7	700	452.7	Yes
4	Aug-28	12:51	53.3184	132.9528	619	29	5.5	750	102.6	Yes
5	Aug-28	14:17	53.3570	133.0158	733	29	5.2	800	98.1	Yes
6	Aug-28	17:12	53.4978	133.0461	217	19	5.7	350	205.4	Yes
7	Aug-28	18:40	53.5187	133.0627	215	19	6.3	350	136.7	Yes
8	Aug-29	7:53	53.5757	133.1427	392	22	5.5	550	567.3	Yes
9	Aug-29	9:33	53.5830	133.1553	399	22	5.3	550	484.2	Yes
10	Aug-29	11:17	53.5930	133.3191	517	6	4.7		95.5	No
11	Aug-29	12:37	53.6110	133.3255	511	28	5.5	700	329.8	Yes
12	Aug-29	14:23	53.6579	133.2879	851	29	5.5	1100	205.1	Yes
13	Aug-29	17:22	53.6509	133.1896	248	19	5.2	400	608.6	Yes
14	Aug-29	19:15	53.7254	133.2920	320	19	5.5	450	634.2	Yes
15	Aug-30	7:16	53.7769	133.3445	284	19	5.5	400	333.0	Yes
16	Aug-30	8:17	53.7749	133.3090	226	20	5.9	350	363.4	Yes
17	Aug-30	9:23	53.7925	133.3284	222	22	5.7	350	553.7	Yes
18	Aug-30	10:21	53.7914	133.3627	282	20	5.4	400	653.1	Yes
19	Aug-30	11:34	53.7960	133.3667	275	20	5.9	400	494.8	Yes
20	Aug-30	12:40	53.8117	133.3947	291	19	5.7	400	535.1	Yes
21	Aug-30	13:45	53.8252	133.4633	385	19	5.8	550	1285.6	Yes
22	Aug-30	15:06	53.8576	133.4573	311	20	5.5	450	267.9	Yes
23	Aug-30	16:06	53.8606	133.4247	226	20	5.9	350	828.8	Yes
24	Aug-30	17:06	53.8618	133.4251	226	20	5.5	350	628.4	Yes
25	Sep-01	7:20	53.8802	133.4592	255	19	5.7	400	457.6	Yes
26	Sep-01	8:33	53.9507	133.4879	223	19	5.5	350	471.1	Yes
27	Sep-01	9:39	53.9465	133.5102	287	20	5.6	400	268.6	Yes
28	Sep-01	11:30	54.0543	133.5447	247	20	5.5	400	551.3	Yes
29	Sep-01	12:37	54.0546	133.5346	224	19	6.0	350	1134.3	Yes
30	Sep-01	14:07	54.0977	133.4438	313	19	6.0	450	542.1	Yes
31	Sep-01	15:05	54.1176	133.3904	258	19	6.5	400	536.5	Yes
32	Sep-01	16:05	54.1423	133.3547	267	21	5.9	400	508.9	Yes
33	Sep-01	17:06	54.1521	133.3610	357	20	5.3	500	156.9	Yes
34	Sep-01	19:32	54.2498	133.2192	307	20	5.6	450	1404.2	Yes
35	Sep-02	7:57	54.2746	133.2740	466	19	5.6	600	159.0	Yes
36	Sep-02	9:09	54.2699	133.2920	466	16	5.4	650	137.6	Yes
37	Sep-02	11:06	54.2731	133.3589	445	21	5.7	650	180.7	Yes
38	Sep-02	12:45	54.2904	133.4582	356	19	5.6	500	667.8	Yes
39	Sep-02	14:06	54.2919	133.4949	308	20	5.6	450	271.6	Yes
40	Sep-02	15:15	54.2759	133.5177	314	19	5.2		553.1	Yes
41	Sep-02	17:06	54.3079	133.2804	452	22	5.5	650	156.5	Yes
42	Sep-04	8:14	54.3727	133.2000	455	20	4.9	600	143.6	Yes
43	Sep-04	10:16	54.4064	133.3562	324	21	5.8	500	197.6	Yes
44	Sep-04	11:46	54.4586	133.3402	288	19	5.5	450	220.0	Yes
45	Sep-04	13:06	54.4522	133.4349	275	20	6.0	450	151.3	Yes
46	Sep-04	14:09	54.4176	133.4436	272	20	5.8	450	337.3	Yes
47	Sep-04	15:18	54.3961	133.4099	288	19	5.9	450	174.6	Yes
48	Sep-04	16:17	54.3857	133.4250	261	20	5.6	450	685.6	Yes
49	Sep-04	17:23	54.3823	133.4164	262	20	6.5	450	399.3	Yes
50	Sep-04	18:52	54.3605	133.4753	238	16	6.6	400	272.7	Yes

Tow	Date	Start Time	Start Latitude	Start Longitude	Average Depth (m)	Bottom Duration (min)	Speed (km/h)	Warp (ftm)	Catch (kg)	Useable
51	Sep-05	7:38	54.4000	133.5988	202	20	6.5	300	2632.8	Yes
52	Sep-05	9:42	54.3644	133.6047	218	19	5.7	350	322.1	Yes
53	Sep-05	10:51	54.3566	133.6510	232	21	5.3	400	460.2	Yes
54	Sep-05	11:50	54.3493	133.5871	244	21	5.6	400	1169.3	Yes
55	Sep-05	13:13	54.3447	133.5475	247	21	6.0	400	545.7	Yes
56	Sep-05	14:43	54.3080	133.5953	261	20	6.1	400	404.2	Yes
57	Sep-05	16:06	54.3047	133.6577	256	19	6.2	400	495.2	Yes
58	Sep-05	17:16	54.2997	133.7021	249	20	5.9	400	937.5	Yes
59	Sep-05	18:42	54.2829	133.6317	265	20	6.3	400	513.1	Yes
60	Sep-06	7:39	54.2882	133.5674	278	19	4.9	400	946.1	Yes
61	Sep-06	8:45	54.2637	133.6249	271	19	4.6	400	138.2	Yes
62	Sep-06	10:10	54.2810	133.6275	267	19	5.5	450	544.6	Yes
63	Sep-06	11:15	54.2798	133.6854	258	19	5.5	450	830.7	Yes
64	Sep-06	12:35	54.2636	133.7156	254	19	6.4	450	799.1	Yes
65	Sep-06	14:11	54.2632	133.7597	235	19	5.4	400	1369.3	Yes
66	Sep-06	16:04	54.2468	133.6590	269	21	6.0	450	627.7	Yes
67	Sep-06	17:23	54.2305	133.6272	288	19	6.0	450	998.7	Yes
68	Sep-06	18:48	54.2388	133.5880	305	19	5.6	450	400.9	Yes
69	Sep-07	7:31	54.2979	133.7848	228	20	5.9	350	4827.2	Yes
70	Sep-07	9:18	54.2962	133.8308	420	20	5.8	600	614.3	Yes
71	Sep-07	11:11	54.2265	133.7847	249	20	5.6	350	3699.8	Yes
72	Sep-07	12:38	54.2456	133.7891	258	20	5.5	400	2965.9	Yes
73	Sep-07	14:35	54.1790	133.7460	274	20	6.1	400	3102.5	Yes
74	Sep-07	16:04	54.1800	133.7129	226	21	5.5	350	932.0	Yes
75	Sep-07	17:18	54.1593	133.6810	272	19	6.4	450	2305.4	Yes
76	Sep-07	18:56	54.1429	133.6657	298	20	6.2	500	1390.8	Yes
77	Sep-08	7:33	54.1736	133.4413	387	19	6.3	550	331.0	Yes
78	Sep-08	9:00	54.1456	133.5207	364	19	4.8	500	458.8	Yes
79	Sep-08	10:24	54.1671	133.5730	351	20	6.2	500	525.6	Yes
80	Sep-08	11:44	54.1928	133.6204	311	19	5.1	500	638.7	Yes
81	Sep-08	14:00	54.1150	133.7222	506	19	5.6	700	221.0	Yes
82	Sep-08	15:27	54.0765	133.5823	357	20	5.7	500	465.2	Yes
83	Sep-08	16:30	54.0801	133.5391	351	20	5.5	500	731.5	Yes
84	Sep-08	18:07	54.0684	133.6117	346	19	6.2	500	1402.7	Yes
85	Sep-09	7:34	54.2026	133.5793	335	19	6.2	550	310.4	Yes
86	Sep-09	8:50	54.2252	133.5433	351	20	6.2	550	206.8	Yes
87	Sep-09	10:05	54.2437	133.4864	383	20	6.4	550	169.8	Yes
88	Sep-09	11:39	54.2620	133.4489	411	23	6.2	600	290.5	Yes
89	Sep-09	13:27	54.3507	133.4887	245	20	6.2	400	617.4	Yes
90	Sep-09	14:35	54.3305	133.4734	242	20	6.3	400	1201.0	Yes
91	Sep-09	15:45	54.3349	133.4238	233	19	7.1	400	645.3	Yes
92	Sep-11	8:23	54.2963	133.2495	455	19	5.8	650	141.5	Yes
93	Sep-11	9:33	54.2775	133.2752	463	20	5.9	650	479.2	Yes
94	Sep-11	10:54	54.2789	133.2287	455	22	6.1	650	448.8	Yes
95	Sep-11	12:40	54.3128	133.3847	447	17	5.0	650	144.8	Yes
96	Sep-11	14:16	54.2382	133.4158	420	22	5.5	650	204.1	Yes
97	Sep-11	15:53	54.1955	133.5580	353	15	6.3	550	510.7	Yes
98	Sep-11	17:22	54.1119	133.5573	363	5	6.7	550	46.7	No
99	Sep-12	7:29	54.3178	133.8791	633	23	4.9	800	241.8	Yes
100	Sep-12	8:50	54.2790	133.8746	612	20	5.2	800	85.7	Yes
101	Sep-12	10:04	54.2560	133.8579	570	23	5.4	750	106.1	Yes
102	Sep-12	13:10	54.0400	134.0350	1083	31	4.5	1200	231.9	Yes
103	Sep-12	17:18	53.8321	133.7777	880	30	5.3	1100	85.7	Yes

Tow	Date	Start Time	Start Latitude	Start Longitude	Average Depth (m)	Bottom Duration (min)	Speed (km/h)	Warp (ftm)	Catch (kg)	Useable
104	Sep-13	7:15	53.8354	133.7622	973	30	5.0	1100	97.7	Yes
105	Sep-13	10:14	53.8297	133.4088	272	20	6.1	450	594.0	Yes
106	Sep-13	11:22	53.8780	133.5394	354	20	6.7	550	3657.7	Yes
107	Sep-13	13:27	53.9702	133.5109	223	20	6.6	400	2366.5	Yes
108	Sep-13	14:53	53.9806	133.4755	160	22	5.5	250	321.7	Yes
109	Sep-13	16:20	54.0332	133.6276	383	17	5.1	550	869.7	Yes
110	Sep-13	17:47	54.1072	133.6572	332	20	5.4	500	1151.7	Yes
111	Sep-14	7:42	53.0658	132.6311	221	20	5.7	350	340.9	Yes
112	Sep-14	10:19	53.1621	132.9201	769	19	5.3	900	55.5	Yes
113	Sep-14	12:19	53.2462	133.0621	702	20	5.5	850	476.6	Yes
114	Sep-14	14:00	53.2252	133.1820	984	30	5.5	1100	132.6	Yes
115	Sep-14	15:47	53.2935	133.2367	558	19	5.2	700	82.3	Yes
116	Sep-14	17:47	53.3324	133.0233	208	15	6.5	350	453.0	Yes
117	Sep-14	19:07	53.3218	133.0660	212	19	6.2	350	410.2	Yes
118	Sep-15	7:47	53.3905	133.1333	217	19	5.8	350	193.1	Yes
119	Sep-15	8:40	53.3668	133.1260	221	19	5.9	350	191.3	Yes
120	Sep-15	9:45	53.4076	133.1777	660	19	4.7	750	91.3	Yes
121	Sep-15	11:05	53.4544	133.2124	749	22	4.4	1000	96.8	Yes
122	Sep-15	14:05	53.4984	133.0471	212	21	5.5	350	203.0	Yes
123	Sep-15	15:29	53.4810	133.0675	267	20	6.1	400	1259.1	Yes
124	Sep-15	17:12	53.5955	133.2742	244	19	6.1	400	1610.3	Yes
125	Sep-16	7:45	54.4453	133.3985	282	21	6.0	450	222.2	Yes
126	Sep-16	9:57	54.3414	133.5747	246	15	5.8	400	582.2	Yes
127	Sep-16	10:51	54.3472	133.6047	243	21	5.5	400	689.6	Yes
128	Sep-16	12:06	54.3497	133.7304	235	20	6.4		763.8	Yes
129	Sep-16	13:05	54.3105	133.7374	239	19	6.0	400	1936.5	Yes
130	Sep-16	13:55	54.2890	133.6875	255	20	5.9	450	1603.4	Yes
131	Sep-16	15:13	54.2696	133.6221	271	21	5.8	450	927.2	Yes

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APPENDIX B: CATCH BY TOW (KG). <0.1 KG ENTERED AS –

Common Name	Scientific Name	Total Weight (Kg)	1	2	3	4	5
Abyssal Skate	*Bathyraja abyssicola*	8.0					
Aleutian Skate	*Bathyraja aleutica*	70.1					
Arrowtooth Flounder	*Reinhardtius stomias*	4076.8	10.3	48.0	98.1	8.5	
Aurora Rockfish	*Sebastes aurora*	15.8					
Bigfin Eelpout	*Lycodes cortezianus*	7.2					
Bocaccio	*Sebastes paucispinis*	64.6		8.8			
Brown Cat Shark	*Apristurus brunneus*	5.8					1.2
Canary Rockfish	*Sebastes pinniger*	122.6					
Darkblotched Rockfish	*Sebastes crameri*	44.9					
Darkfin Sculpin	*Malacocottus zonurus*	36.3		0.2			
Dover Sole	*Microstomus pacificus*	1233.1	26.3	3.6	20.0	19.8	4.5
Dusky Rockfish	*Sebastes variabilis*	3.1					
English Sole	*Parophrys vetulus*	25.3					
Giant Grenadier	*Albatrossia pectoralis*	129.3					8.5
Greenstriped Rockfish	*Sebastes elongatus*	170.6					
Harlequin Rockfish	*Sebastes variegatus*	632.1		0.4			
Lingcod	*Ophiodon elongatus*	278.5					
Longnose Skate	*Raja rhina*	326.7			3.9		
Longspine Thornyhead	*Sebastolobus altivelis*	321.9	6.2			0.4	11.1
North Pacific Spiny Dogfish	*Squalus suckleyi*	81.8		3.5			
Northern Lampfish	*Stenobrachius leucopsarus*	4.6	0.6		0.2	0.1	0.1
Pacific Cod	*Gadus macrocephalus*	268.8					
Pacific Flatnose	*Antimora microlepis*	3.6	-			-	0.1
Pacific Grenadier	*Coryphaenoides acrolepis*	186.3	0.1			0.1	0.3
Pacific Hake	*Merluccius productus*	2435.1		5.4	3.3	0.9	
Pacific Halibut	*Hippoglossus stenolepis*	215.7					
Pacific Ocean Perch	*Sebastes alutus*	38171.0		458.9			
Petrale Sole	*Eopsetta jordani*	65.7					
Popeye	*Coryphaenoides cinereus*	17.6					0.3
Prowfish	*Zaprora silenus*	6.3					
Redbanded Rockfish	*Sebastes babcocki*	948.4		5.9			
Redstripe Rockfish	*Sebastes proriger*	3285.5					
Rex Sole	*Glyptocephalus zachirus*	700.0	0.8	2.2	0.2	2.6	
Rosethorn Rockfish	*Sebastes helvomaculatus*	636.4		3.0			
Rougheye Rockfish	*Sebastes aleutianus*	7301.4		4.2	21.0	3.8	
Roughtail Skate	*Bathyraja trachura*	3.5					
Sablefish	*Anoplopoma fimbria*	2396.1	58.6	4.5	145.0	16.9	11.0
Sandpaper Skate	*Bathyraja interrupta*	45.3					
Sharpchin Rockfish	*Sebastes zacentrus*	9738.9		11.5			
Shortraker Rockfish	*Sebastes borealis*	1102.1	7.5	188.4	123.8		5.2
Shortspine Thornyhead	*Sebastolobus alascanus*	4078.6	33.0	70.0	30.9	46.1	52.3
Silvergray Rockfish	*Sebastes brevispinis*	6462.3		6.9	1.8		
Slender Sole	*Lyopsetta exilis*	26.8					
Splitnose Rockfish	*Sebastes diploproa*	673.3		-			
Spotted Ratfish	*Hydrolagus colliei*	235.1		1.8			
Walleye Pollock	*Theragra chalcogramma*	400.6		3.5			
Widow Rockfish	*Sebastes entomelas*	221.6					
Yelloweye Rockfish	*Sebastes ruberrimus*	39.9					
Yellowmouth Rockfish	*Sebastes reedi*	575.5		1.0			
Yellowtail Rockfish	*Sebastes flavidus*	103.5		1.7			
Other		622.3	8.7	7.4	4.6	3.5	3.5
Total		**88625.9**	**152.0**	**840.6**	**452.7**	**102.6**	**98.1**

Common Name	6	7	8	9	10	11	12	13	14	15	16
Abyssal Skate											
Aleutian Skate											
Arrowtooth Flounder	83.5	26.4	124.9	60.4	6.6	0.8		63.4	171.4	33.8	155.8
Aurora Rockfish			3.3	5.4	2.2	1.2	0.2				
Bigfin Eelpout									0.8	0.7	
Bocaccio								14.8			4.8
Brown Cat Shark											
Canary Rockfish											
Darkblotched Rockfish											
Darkfin Sculpin		-	0.1	-	-	0.2		0.2	0.2		
Dover Sole	2.9	0.6	56.2	43.3	1.0	9.1		4.1	11.5	6.3	2.0
Dusky Rockfish											
English Sole	0.6									2.1	
Giant Grenadier							10.4				
Greenstriped Rockfish	3.2	5.8						0.7			13.4
Harlequin Rockfish								0.2			
Lingcod	13.4										9.6
Longnose Skate	17.0		14.2	1.1				5.2	2.9		6.7
Longspine Thornyhead					5.1	7.3	32.0				
North Pacific Spiny Dogfish	1.9		2.0					3.4			3.5
Northern Lampfish				-	-	0.2	-				
Pacific Cod	2.6										
Pacific Flatnose											
Pacific Grenadier							7.6				
Pacific Hake			26.0	44.5		19.5			230.0	4.4	
Pacific Halibut		6.5								4.3	
Pacific Ocean Perch	27.7	26.7	14.1	4.7				62.6	11.2	34.6	6.0
Petrale Sole											
Popeye							2.9				
Prowfish											
Redbanded Rockfish	0.9	1.8	29.7	10.7	0.8			28.2	12.2	31.9	45.7
Redstripe Rockfish	4.0	1.8						1.6			23.7
Rex Sole	7.4	2.4	6.8	3.4	0.4	2.3		5.3	2.4	3.2	35.7
Rosethorn Rockfish	0.8	1.2	0.4					33.0	0.4		0.6
Rougheye Rockfish			75.4	141.0	31.8	172.1		5.7	3.6		
Roughtail Skate											
Sablefish		0.7	99.6	56.0	1.9	9.3	66.4	4.4	83.2	1.3	
Sandpaper Skate							1.7				
Sharpchin Rockfish	1.1	1.4						193.1		0.3	5.1
Shortraker Rockfish			73.5	52.0	25.5	61.3	4.7	8.2	25.7		
Shortspine Thornyhead	3.4	4.5	37.7	58.3	18.5	44.7	69.6	47.4	64.0	8.2	-
Silvergray Rockfish	14.5	38.6						76.7	7.4	36.8	23.8
Slender Sole	0.8	0.8	0.3					0.9	2.0	0.9	0.7
Splitnose Rockfish								32.4		150.3	5.7
Spotted Ratfish	3.0	1.2						0.5	1.2	2.4	0.3
Walleye Pollock	11.8	7.5	1.6					1.8	3.0	10.9	18.5
Widow Rockfish											1.7
Yelloweye Rockfish											
Yellowmouth Rockfish											
Yellowtail Rockfish	3.9	8.7						9.1			
Other	1.2	0.2	1.3	3.4	1.7	1.6	9.6	5.7	1.2	0.6	-
Total	**205.4**	**136.7**	**567.3**	**484.2**	**95.5**	**329.8**	**205.1**	**608.6**	**634.2**	**333.0**	**363.4**

Common Name	17	18	19	20	21	22	23	24	25	26	27
Abyssal Skate											
Aleutian Skate											
Arrowtooth Flounder	25.3	17.3	32.8	25.9	12.7	27.6	45.6	34.0	69.4	62.7	16.1
Aurora Rockfish											
Bigfin Eelpout		0.8	0.5	0.2		0.8			1.3		
Bocaccio									6.6	3.4	
Brown Cat Shark											
Canary Rockfish							2.5				
Darkblotched Rockfish			0.7			1.7	0.4				
Darkfin Sculpin		-	-	0.2		0.5			-		0.1
Dover Sole	1.7	4.8		0.4	13.1	0.3			0.7		1.9
Dusky Rockfish											
English Sole		1.3	0.7							0.5	
Giant Grenadier											
Greenstriped Rockfish	3.6						21.9	42.0		33.6	0.6
Harlequin Rockfish								0.4	0.5		
Lingcod									3.9	5.6	
Longnose Skate	7.5			5.9	3.7		21.6		13.5	4.4	
Longspine Thornyhead											
North Pacific Spiny Dogfish		0.9							2.5	15.2	1.6
Northern Lampfish											
Pacific Cod							9.2	26.4		9.2	
Pacific Flatnose											
Pacific Grenadier											
Pacific Hake		89.6	4.3	4.5	118.5	71.8	5.0		1.5		
Pacific Halibut								7.2	7.6		
Pacific Ocean Perch		198.0	120.0	259.0	34.5	87.2	20.5	5.6	30.3	1.9	29.8
Petrale Sole							1.4	0.6			
Popeye											
Prowfish											
Redbanded Rockfish	66.4	40.1	21.2	28.7	9.0	10.1	4.2	3.7	59.8	8.6	5.6
Redstripe Rockfish	119.9	2.9	0.8				551.1	420.8	2.0	15.3	0.7
Rex Sole	14.9	0.9	0.3	2.3	2.3	1.9	7.0	6.5	4.6	33.2	2.8
Rosethorn Rockfish	10.0	1.2		21.1		3.9	13.3	6.1		4.5	6.6
Rougheye Rockfish					1010.0						
Roughtail Skate											
Sablefish		2.5	1.0	3.5	28.0				2.5		0.9
Sandpaper Skate											
Sharpchin Rockfish	254.0	45.5	2.4	36.2		3.8	5.3		0.8	15.7	7.6
Shortraker Rockfish					11.7						
Shortspine Thornyhead	0.3	22.5	7.4	42.6	28.0	39.6	2.2		21.9		28.8
Silvergray Rockfish	30.0	52.6	131.1	52.2	3.1	8.2	76.2	60.6	205.5	200.9	105.9
Slender Sole	-	0.3	0.3	0.4	0.1	0.4		0.3	0.2	0.7	0.2
Splitnose Rockfish		157.1	155.2	24.6		2.2			2.7		52.9
Spotted Ratfish	0.4			0.4			0.5	1.8	2.2	1.3	
Walleye Pollock	9.0	12.9	14.3	5.3	7.6	6.1	14.7	10.2	17.2	53.9	6.4
Widow Rockfish											
Yelloweye Rockfish											
Yellowmouth Rockfish	6.9	0.6		1.1			0.7	1.4			
Yellowtail Rockfish	1.5						24.9				
Other	2.3	1.4	2.0	20.5	3.3	1.8	0.5	0.8	0.4	0.7	0.3
Total	**553.7**	**653.1**	**494.8**	**535.1**	**1285.6**	**267.9**	**828.8**	**628.4**	**457.6**	**471.1**	**268.6**

Common Name	28	29	30	31	32	33	34	35	36	37	38
Abyssal Skate											
Aleutian Skate								0.8	3.6		
Arrowtooth Flounder	100.5	16.4	152.2	126.3	177.6	76.4	572.4	13.4	13.9	15.1	19.5
Aurora Rockfish											
Bigfin Eelpout			0.4								
Bocaccio											
Brown Cat Shark											
Canary Rockfish											
Darkblotched Rockfish											
Darkfin Sculpin				0.1	0.1	0.1	-		-		0.6
Dover Sole	1.0		26.6	1.6	5.1	9.8	7.5	19.0	9.9	1.4	9.3
Dusky Rockfish		3.1									
English Sole	1.1		3.7	0.7	9.3		0.6				
Giant Grenadier											
Greenstriped Rockfish	4.5	4.7			2.2						
Harlequin Rockfish	1.2		0.2								
Lingcod	41.4			17.3	18.8						
Longnose Skate	12.4			6.0	2.5			2.7			
Longspine Thornyhead								1.4	3.0		
North Pacific Spiny Dogfish											
Northern Lampfish								-			
Pacific Cod	2.6	6.7			3.6	2.8					
Pacific Flatnose											
Pacific Grenadier											
Pacific Hake			207.0	10.7		14.5	74.9	15.1	10.9	58.7	14.4
Pacific Halibut											
Pacific Ocean Perch	55.3	2.8	37.9	111.3	94.8	12.0	620.8				321.4
Petrale Sole		1.1									
Popeye											
Prowfish											
Redbanded Rockfish	11.5		3.6	12.6	16.6		1.3				12.3
Redstripe Rockfish	0.4			0.5	4.8						
Rex Sole	7.5	0.5	19.2	6.5	18.7	13.9	11.9	9.8	5.7		1.5
Rosethorn Rockfish		0.2	0.6	15.7	4.9						0.8
Rougheye Rockfish			1.2			0.1	5.4	5.2	9.2	21.8	154.1
Roughtail Skate											
Sablefish	3.5		1.2				12.8	20.1	27.7	63.1	
Sandpaper Skate								2.6	1.1		1.4
Sharpchin Rockfish	12.2	2.0		25.2	11.9						
Shortraker Rockfish							73.4				25.6
Shortspine Thornyhead	0.6		24.7	39.8	18.8	7.4	5.5	52.4	43.8	10.7	103.9
Silvergray Rockfish	260.0	1080.6	56.7	145.6	89.4	18.9	2.2				
Slender Sole	0.5	0.2		0.2	1.9						
Splitnose Rockfish											
Spotted Ratfish	23.9	5.8		4.6	3.2					1.5	
Walleye Pollock	8.6	5.2	2.0	10.8	23.2		2.3				
Widow Rockfish	2.3	1.9									
Yelloweye Rockfish											
Yellowmouth Rockfish											
Yellowtail Rockfish		2.2									
Other	0.3	0.9	4.9	1.0	1.3	0.9	13.2	16.6	8.8	8.4	3.0
Total	**551.3**	**1134.3**	**542.1**	**536.5**	**508.9**	**156.9**	**1404.2**	**159.0**	**137.6**	**180.7**	**667.8**

Common Name	39	40	41	42	43	44	45	46	47	48	49
Abyssal Skate											
Aleutian Skate							12.3			15.1	
Arrowtooth Flounder	10.1	3.5	10.7	18.8	31.4	7.6	38.3	20.5	3.7	2.5	3.7
Aurora Rockfish											
Bigfin Eelpout							0.1				
Bocaccio											
Brown Cat Shark											
Canary Rockfish											
Darkblotched Rockfish					2.6						
Darkfin Sculpin	0.5	0.8			-	1.8		0.2	0.8	1.0	1.2
Dover Sole	7.8	13.2	16.0	34.6	32.4	4.8	0.9	6.4	2.2	0.5	2.5
Dusky Rockfish											
English Sole							1.8	1.2			
Giant Grenadier											
Greenstriped Rockfish											
Harlequin Rockfish								0.1		0.3	0.2
Lingcod											
Longnose Skate			9.6		4.8		22.9				
Longspine Thornyhead											
North Pacific Spiny Dogfish					1.5			1.3			
Northern Lampfish								-			
Pacific Cod											
Pacific Flatnose											
Pacific Grenadier											
Pacific Hake	6.0	24.2	14.5	4.3	15.2	1.2	2.9	13.8	3.6	1.2	2.5
Pacific Halibut								3.1			
Pacific Ocean Perch	134.7	378.6				96.6	32.2	189.1	89.2	423.8	253.8
Petrale Sole											
Popeye											
Prowfish											
Redbanded Rockfish	1.8	2.0			2.6	2.1	8.6	1.1	1.2	7.4	7.0
Redstripe Rockfish											0.6
Rex Sole	2.9	5.9	3.8	0.8	34.7	5.0	17.6	27.0	3.4	1.2	1.0
Rosethorn Rockfish	3.7	5.6						1.6	2.0	8.0	12.7
Rougheye Rockfish	1.6	1.5	5.0	1.5	6.3	9.8	1.5	2.4	5.2	3.1	1.0
Roughtail Skate											
Sablefish		17.4	34.6	33.5							
Sandpaper Skate		1.4	1.0								
Sharpchin Rockfish	2.0						0.2		-	166.2	52.6
Shortraker Rockfish						8.2					
Shortspine Thornyhead	98.6	93.4	41.0	34.9	20.4	62.7	4.9	36.4	40.2	32.3	47.2
Silvergray Rockfish						2.4	1.8	13.8	10.6	13.3	9.7
Slender Sole	0.2	0.2				0.4		-			0.4
Splitnose Rockfish											
Spotted Ratfish		1.0		1.1	1.2					1.3	1.2
Walleye Pollock		1.3			10.5	1.1	4.7	0.8	3.7		0.3
Widow Rockfish										5.3	
Yelloweye Rockfish											
Yellowmouth Rockfish											
Yellowtail Rockfish					1.8						
Other	1.7	3.3	20.3	14.0	32.3	16.2	0.6	18.4	8.8	2.9	1.6
Total	**271.6**	**553.1**	**156.5**	**143.6**	**197.6**	**220.0**	**151.3**	**337.3**	**174.6**	**685.6**	**399.3**

Common Name	50	51	52	53	54	55	56	57	58	59	60
Abyssal Skate											
Aleutian Skate											
Arrowtooth Flounder	3.4	11.8	6.5	11.4	9.2	5.4	8.2	6.1	4.1	7.8	11.4
Aurora Rockfish											
Bigfin Eelpout											
Bocaccio											
Brown Cat Shark											
Canary Rockfish											
Darkblotched Rockfish											
Darkfin Sculpin	0.4	-		-	0.9	1.0	-	-	0.4	0.3	-
Dover Sole			0.1	2.3	0.4	1.2	2.2	1.2		10.0	3.9
Dusky Rockfish											
English Sole											
Giant Grenadier											
Greenstriped Rockfish		1.5	1.6	0.5	0.3						
Harlequin Rockfish	0.1	322.2								0.2	
Lingcod		6.6									
Longnose Skate											6.9
Longspine Thornyhead											
North Pacific Spiny Dogfish		5.4	2.0	1.0	1.6						
Northern Lampfish											
Pacific Cod	0.7	4.0		1.9	4.3				4.7		
Pacific Flatnose											
Pacific Grenadier											
Pacific Hake					1.6	1.4	5.5			6.3	38.9
Pacific Halibut			30.0	4.7	1.7						
Pacific Ocean Perch	174.6		240.0	310.3	991.3	363.4	234.4	344.9	510.7	436.3	852.9
Petrale Sole		0.8		0.9							
Popeye											
Prowfish											
Redbanded Rockfish		33.1		1.4	5.1	3.2	3.1	3.7	6.5	4.5	1.8
Redstripe Rockfish	0.9	890.4	6.9	2.5	2.4	1.1	1.0	0.6	14.5		
Rex Sole	0.4	0.4		8.4	2.5	5.5	9.6	2.4	1.4	4.7	3.4
Rosethorn Rockfish	3.4	5.3	1.0	1.9	11.6	14.5	12.0	7.2	10.7	5.1	2.8
Rougheye Rockfish											0.1
Roughtail Skate											
Sablefish	4.0			0.8			3.8	0.9			
Sandpaper Skate											
Sharpchin Rockfish	52.0	1004.7	0.6	76.2	95.5	81.5	81.0	102.9	352.4	16.8	2.2
Shortraker Rockfish											
Shortspine Thornyhead	6.9	2.9	0.1	8.8	10.4	15.3	20.1	7.3	10.0	17.6	17.8
Silvergray Rockfish	18.1	298.5	28.7	20.6	17.9	42.0	16.9	13.6	20.2	1.9	2.1
Slender Sole	0.1		0.4		0.1	0.6	0.1	0.3	0.3	0.1	0.2
Splitnose Rockfish						-		0.2			
Spotted Ratfish		1.1	4.1	1.5	1.8	0.8					
Walleye Pollock	-		0.2	0.4	0.4	0.3		1.0	0.4	0.6	
Widow Rockfish					4.6	2.4					
Yelloweye Rockfish		39.9									
Yellowmouth Rockfish	4.2	3.9				4.5		0.8	0.6		
Yellowtail Rockfish											
Other	3.4	0.3	-	4.6	5.7	1.6	6.4	2.1	0.6	0.9	1.7
Total	**272.7**	**2632.8**	**322.1**	**460.2**	**1169.3**	**545.7**	**404.2**	**495.2**	**937.5**	**513.1**	**946.1**

Common Name	61	62	63	64	65	66	67	68	69	70	71
Abyssal Skate											
Aleutian Skate											20.1
Arrowtooth Flounder	4.6	8.2	8.0	10.8	11.4	8.4	7.9	13.8	17.9	50.3	6.4
Aurora Rockfish										1.2	
Bigfin Eelpout											
Bocaccio											
Brown Cat Shark											
Canary Rockfish											
Darkblotched Rockfish											
Darkfin Sculpin	-	0.1	0.5	0.5	1.2	0.1	-	0.2	-	-	-
Dover Sole	1.2	3.3	1.5	0.5		3.5	3.9	7.4		23.3	1.3
Dusky Rockfish											
English Sole											
Giant Grenadier											
Greenstriped Rockfish											
Harlequin Rockfish			0.2		0.6				38.0		
Lingcod											
Longnose Skate										5.2	
Longspine Thornyhead											
North Pacific Spiny Dogfish			2.8			2.5		3.8	1.8		
Northern Lampfish										-	
Pacific Cod			1.9	5.0					5.9		2.2
Pacific Flatnose											
Pacific Grenadier											
Pacific Hake	51.5	43.4	5.2	3.2	1.2	1.1	106.8	90.0	2.9	41.3	
Pacific Halibut			58.6						6.1		
Pacific Ocean Perch	72.7	413.3	466.7	434.5	562.5	387.4	825.2	232.9	2362.3	0.7	2589.9
Petrale Sole											
Popeye											
Prowfish											
Redbanded Rockfish	0.5	2.5	5.7	8.2	12.6	10.7	0.6		73.6		9.6
Redstripe Rockfish		0.5	0.8	13.0	152.2				423.3		
Rex Sole	0.3	1.8	1.7	1.4	2.5	4.7	3.7	5.9	8.0	0.8	
Rosethorn Rockfish	1.3	5.3	10.5	13.3	13.1	15.9	6.0		12.4		
Rougheye Rockfish										213.2	13.9
Roughtail Skate											
Sablefish							10.3	16.6	3.0	153.7	13.7
Sandpaper Skate											
Sharpchin Rockfish	0.9	47.4	240.5	247.4	486.4	151.2		0.5	1381.8		953.4
Shortraker Rockfish										51.5	11.6
Shortspine Thornyhead	4.1	10.5	10.3	11.9	7.0	23.0	26.3	23.0	25.6	68.7	15.2
Silvergray Rockfish		5.6	14.2	46.6	106.9	10.9	5.0	3.7	116.1		45.0
Slender Sole	0.2		0.2		0.4	0.2	0.8	0.2			
Splitnose Rockfish											
Spotted Ratfish	0.5			1.2	3.3				2.8		12.3
Walleye Pollock			1.3	1.0			0.7	0.5			0.8
Widow Rockfish					6.3	2.4			9.6		4.3
Yelloweye Rockfish											
Yellowmouth Rockfish					0.4				30.9		
Yellowtail Rockfish											
Other	0.6	2.8	0.2	0.7	1.2	5.5	1.6	2.6	1.2	4.4	
Total	**138.2**	**544.6**	**830.7**	**799.1**	**1369.3**	**627.7**	**998.7**	**400.9**	**4523.5**	**614.3**	**3699.8**

Common Name	72	73	74	75	76	77	78	79	80	81	82
Abyssal Skate											
Aleutian Skate		3.9									
Arrowtooth Flounder	14.1	34.8	0.3	8.8	36.6	20.6	14.7	16.6	7.3	4.2	18.5
Aurora Rockfish											
Bigfin Eelpout											
Bocaccio											
Brown Cat Shark										3.6	0.6
Canary Rockfish											
Darkblotched Rockfish	6.4	7.8							1.6		
Darkfin Sculpin		-	0.4		4.6		1.0		-		0.4
Dover Sole	3.2	3.9	1.4	4.5	33.1	21.0	26.9	19.9	21.7	83.4	11.8
Dusky Rockfish											
English Sole											
Giant Grenadier											
Greenstriped Rockfish											
Harlequin Rockfish	18.6								0.3		
Lingcod	5.8	12.4	8.1	9.5							
Longnose Skate		10.0				8.8					
Longspine Thornyhead										1.9	
North Pacific Spiny Dogfish	2.2										
Northern Lampfish		-								-	-
Pacific Cod				3.9	2.9				1.9		
Pacific Flatnose											
Pacific Grenadier											
Pacific Hake				1.0	2.7	28.1	56.6	193.8	3.2	5.8	9.6
Pacific Halibut							4.1				
Pacific Ocean Perch	1795.6	2781.5	536.3	1712.5	1177.7	37.3	139.8	143.0	534.1		112.1
Petrale Sole											
Popeye											
Prowfish											
Redbanded Rockfish	25.5	19.7		4.9	4.0	2.1	4.1	1.8	2.2		
Redstripe Rockfish	5.1		4.8				0.5				
Rex Sole			0.9	1.0	2.1	15.5	29.0	15.3	6.8	4.8	0.7
Rosethorn Rockfish	4.9	3.4	1.1	12.6	17.1		0.6	0.9	5.2		2.7
Rougheye Rockfish	13.2	5.4			6.7	139.1	111.9	49.5	10.3	8.8	172.7
Roughtail Skate											
Sablefish	8.1	21.0			3.0	15.3	19.3	22.8	3.0	30.5	6.8
Sandpaper Skate						1.6	3.3	3.1	1.4		
Sharpchin Rockfish	920.3	151.1	264.5	467.0	3.7						
Shortraker Rockfish	21.1									33.2	
Shortspine Thornyhead	22.9	22.5	0.4	49.7	87.1	38.2	41.3	45.7	31.7	44.7	128.1
Silvergray Rockfish	68.8	8.6	113.7	27.7	8.4		2.0	4.9			
Slender Sole								0.4	0.4		
Splitnose Rockfish											
Spotted Ratfish	26.0	16.4			0.6	2.2	1.5	2.7	2.9		
Walleye Pollock							0.5	0.5	2.4		
Widow Rockfish	4.2										
Yelloweye Rockfish											
Yellowmouth Rockfish											
Yellowtail Rockfish											
Other	-	-	0.1	2.3	0.6	1.2	1.7	4.7	2.1	-	1.1
Total	**2965.9**	**3102.5**	**932.0**	**2305.4**	**1390.8**	**331.0**	**458.8**	**525.6**	**638.7**	**221.0**	**465.2**

Common Name	83	84	85	86	87	88	89	90	91	92	93
Abyssal Skate											
Aleutian Skate											1.0
Arrowtooth Flounder	55.1	14.1	11.7	9.3	9.7	5.7	10.2	11.5	1.6	31.3	69.6
Aurora Rockfish											
Bigfin Eelpout											
Bocaccio											
Brown Cat Shark											
Canary Rockfish											
Darkblotched Rockfish											
Darkfin Sculpin	0.7	0.9		-	-	-	0.4	-	0.1		
Dover Sole	17.6	10.8	39.5	15.7	26.5	21.9	0.4	0.7	2.0	27.3	58.6
Dusky Rockfish											
English Sole											
Giant Grenadier											
Greenstriped Rockfish											
Harlequin Rockfish			0.2				0.5				
Lingcod								8.7	1.7		
Longnose Skate				5.7	11.4						14.0
Longspine Thornyhead											1.8
North Pacific Spiny Dogfish							2.8				
Northern Lampfish	-	-									
Pacific Cod								1.7	8.7		
Pacific Flatnose											
Pacific Grenadier											
Pacific Hake	29.0	2.0	75.2	18.1	3.7	9.1				13.4	21.8
Pacific Halibut	17.0								8.9		2.1
Pacific Ocean Perch	331.1	634.9	78.8	50.8	3.3	6.4	408.3	573.4	341.4		
Petrale Sole											
Popeye											
Prowfish											
Redbanded Rockfish		1.0	1.7	1.5	4.5	0.5	0.5	6.3	3.3		
Redstripe Rockfish							22.4	8.7	60.9		
Rex Sole	2.6		9.5	2.8	4.7	12.2	2.1	0.9	2.6	4.9	21.3
Rosethorn Rockfish	1.5	4.2	0.2	0.1			21.0	6.8	12.2		
Rougheye Rockfish	130.1	608.6	9.2	6.1	9.8	31.8	8.5			9.4	58.2
Roughtail Skate											
Sablefish	0.8	6.5	36.1	40.4	38.7	75.6	4.7			20.9	85.0
Sandpaper Skate			1.9	1.5	1.2	4.4	1.6				10.9
Sharpchin Rockfish		0.5		-			101.0	274.3	46.8		0.1
Shortraker Rockfish						1.8					
Shortspine Thornyhead	142.6	111.7	36.0	32.3	47.7	113.4	27.8	9.4	10.4	26.1	106.2
Silvergray Rockfish	2.8	7.6					1.8	102.4	31.3		
Slender Sole			-				0.3		0.1		
Splitnose Rockfish			0.3								0.3
Spotted Ratfish			3.0				0.4		3.1		
Walleye Pollock			0.4	0.6			0.5	1.1	2.3		
Widow Rockfish								33.6	5.7		
Yelloweye Rockfish											
Yellowmouth Rockfish								160.7	101.4		
Yellowtail Rockfish											
Other	0.6	-	6.9	21.7	8.6	7.8	2.2	0.7	0.7	8.2	28.5
Total	**731.5**	**1402.7**	**310.4**	**206.8**	**169.8**	**290.5**	**617.4**	**1201.0**	**645.3**	**141.5**	**479.2**

Common Name	94	95	96	97	98	99	100	101	102	103	104
Abyssal Skate									8.0		
Aleutian Skate	0.4				0.9						
Arrowtooth Flounder	62.0	5.1	8.8	9.0	5.4	1.6	7.2	15.9			
Aurora Rockfish											
Bigfin Eelpout											
Bocaccio											
Brown Cat Shark								0.4	-		
Canary Rockfish											
Darkblotched Rockfish											
Darkfin Sculpin	0.3										
Dover Sole	51.1	12.5		6.0	1.5	57.9	11.3	9.2			
Dusky Rockfish											
English Sole											
Giant Grenadier						36.2	1.3	3.3	25.4	7.5	5.2
Greenstriped Rockfish											
Harlequin Rockfish											
Lingcod											
Longnose Skate	15.7	6.0	19.8	13.3							
Longspine Thornyhead	2.0	1.0				15.3	1.4		10.0	39.1	29.8
North Pacific Spiny Dogfish											
Northern Lampfish	-	-				-	0.1	0.1	0.3	0.1	0.1
Pacific Cod											
Pacific Flatnose						0.5			2.7		
Pacific Grenadier									153.2	3.5	8.4
Pacific Hake	12.3	18.6	58.2	320.3	6.0	1.1		3.8			
Pacific Halibut	3.7										
Pacific Ocean Perch				84.8	17.2						
Petrale Sole											
Popeye						0.3			0.7	0.6	1.7
Prowfish											
Redbanded Rockfish											
Redstripe Rockfish											
Rex Sole	13.9	2.6	0.6	2.2	3.0	1.4	1.4	4.7			
Rosethorn Rockfish											
Rougheye Rockfish	66.6	19.0	8.8	24.9	4.0				2.4		
Roughtail Skate									0.3		0.8
Sablefish	55.5	10.0	85.8	19.2		33.7	10.8	14.2	10.5	20.1	40.8
Sandpaper Skate	3.5		1.7								
Sharpchin Rockfish	0.2										
Shortraker Rockfish	3.0							1.3	3.2		
Shortspine Thornyhead	135.8	66.3	11.4	21.1	8.6	89.2	50.5	47.9	11.9	13.2	6.3
Silvergray Rockfish											
Slender Sole											
Splitnose Rockfish											
Spotted Ratfish			1.4	2.5							
Walleye Pollock				1.0							
Widow Rockfish											
Yelloweye Rockfish											
Yellowmouth Rockfish											
Yellowtail Rockfish											
Other	22.9	3.6	7.6	6.4	-	4.6	1.6	5.2	3.4	1.6	4.8
Total	**448.8**	**144.8**	**204.1**	**510.7**	**46.7**	**241.8**	**85.7**	**106.1**	**231.9**	**85.7**	**97.7**

Common Name	105	106	107	108	109	110	111	112	113	114	115
Abyssal Skate											
Aleutian Skate											
Arrowtooth Flounder	112.6	14.0	45.8	2.9	16.9	40.1	75.4				
Aurora Rockfish		1.5			0.7						
Bigfin Eelpout	1.0										
Bocaccio							9.7				
Brown Cat Shark											
Canary Rockfish			7.2	103.7	7.5						
Darkblotched Rockfish		23.6									
Darkfin Sculpin	0.2	-			0.4	1.9					-
Dover Sole		1.1				38.3		3.4	4.6	1.4	8.3
Dusky Rockfish											
English Sole	1.6										
Giant Grenadier									0.7	19.7	0.7
Greenstriped Rockfish			6.7								
Harlequin Rockfish	0.3		-			0.4					
Lingcod			3.3	94.4		8.0					
Longnose Skate	2.9						15.4				
Longspine Thornyhead								18.3	24.1	18.3	28.0
North Pacific Spiny Dogfish				5.7			2.3				
Northern Lampfish								-		-	
Pacific Cod			128.9								
Pacific Flatnose									0.3		-
Pacific Grenadier								1.5	2.9	7.1	
Pacific Hake		2.0			5.1	0.9					
Pacific Halibut	14.7			10.2							
Pacific Ocean Perch	174.8	404.9			40.3	933.1	78.5				
Petrale Sole				58.1							
Popeye										1.5	
Prowfish											
Redbanded Rockfish	79.1	5.2				1.7					
Redstripe Rockfish			290.4				33.6				
Rex Sole	1.5		1.7				1.2				
Rosethorn Rockfish	1.1	12.5	7.7			12.8					
Rougheye Rockfish		3064.6			770.8						
Roughtail Skate										2.5	
Sablefish		42.6			8.5	4.7	23.0	22.5	407.1	66.2	16.1
Sandpaper Skate											
Sharpchin Rockfish	32.6		43.3			0.2					
Shortraker Rockfish		56.6			5.0	8.0					
Shortspine Thornyhead	32.0	21.7			11.3	101.7		6.0	22.9	3.8	21.8
Silvergray Rockfish	40.0	5.7	1664.2	2.2			57.7				
Slender Sole	0.4	0.1	0.3								
Splitnose Rockfish	66.0										
Spotted Ratfish	2.4		3.1	44.6	3.1		9.5				
Walleye Pollock	23.4	1.1	9.2				34.6				
Widow Rockfish			127.0								
Yelloweye Rockfish											
Yellowmouth Rockfish											
Yellowtail Rockfish	7.1		4.8								
Other	0.2	0.3	23.0	-		-		3.8	14.0	12.2	7.5
Total	**594.0**	**3657.7**	**2366.5**	**321.7**	**869.7**	**1151.7**	**340.9**	**55.5**	**476.6**	**132.6**	**82.3**

Common Name	116	117	118	119	120	121	122	123	124	125	126
Abyssal Skate											
Aleutian Skate											
Arrowtooth Flounder			2.4				63.8	158.2	5.4	22.9	3.2
Aurora Rockfish											
Bigfin Eelpout								0.6			
Bocaccio				6.4				5.1			5.1
Brown Cat Shark											
Canary Rockfish							1.7				
Darkblotched Rockfish											
Darkfin Sculpin	0.2	1.4		0.5			0.1	1.3			0.8
Dover Sole			3.3		12.6	11.0	0.7			18.7	1.0
Dusky Rockfish											
English Sole											
Giant Grenadier					5.8	4.6					
Greenstriped Rockfish	0.9	6.7	5.0	5.6			4.4	0.9			
Harlequin Rockfish	111.4	1.4							132.6		
Lingcod				10.1							
Longnose Skate											
Longspine Thornyhead					23.8	40.8					
North Pacific Spiny Dogfish							4.4	1.3			
Northern Lampfish				-		0.4					
Pacific Cod							2.8				
Pacific Flatnose											
Pacific Grenadier					1.1	0.6					
Pacific Hake										3.4	
Pacific Halibut								4.6			
Pacific Ocean Perch	59.8	49.5	93.0	64.6			30.5	571.5	1352.4	32.4	415.3
Petrale Sole							1.1				
Popeye					5.9	3.8					
Prowfish	4.8				1.5						
Redbanded Rockfish	3.5	0.7		0.2				23.8		3.0	2.4
Redstripe Rockfish	58.4	68.6	3.4	12.5			10.2	10.0	6.5		
Rex Sole			2.3	0.8			5.1			55.1	5.1
Rosethorn Rockfish	24.7	48.6		10.4			2.0	11.1	22.1		10.2
Rougheye Rockfish								2.2		16.8	
Roughtail Skate											
Sablefish			4.7	2.3	13.5	15.3		0.9		0.9	
Sandpaper Skate											
Sharpchin Rockfish	10.8	3.1		0.4			0.4	24.0		0.3	87.7
Shortraker Rockfish								211.1			
Shortspine Thornyhead				0.5	24.2	19.4	3.0	86.0	6.4	13.7	20.6
Silvergray Rockfish	116.9	139.3	74.2	64.5			28.8	87.9	8.3	1.8	26.2
Slender Sole		0.3	0.2	0.6			1.8	0.5			0.6
Splitnose Rockfish								23.4			
Spotted Ratfish							1.0	4.0	0.8		
Walleye Pollock			0.5				14.3	3.6		0.5	0.7
Widow Rockfish		1.6		2.4				1.8			
Yelloweye Rockfish											
Yellowmouth Rockfish	61.2	87.8	3.9	9.4					75.1		
Yellowtail Rockfish							23.5	14.3			
Other	0.3	1.2	-	0.1	3.0	0.9	3.7	11.0	0.7	52.9	3.6
Total	**453.0**	**410.2**	**193.1**	**191.3**	**91.3**	**96.8**	**203.0**	**1259.1**	**1610.3**	**222.2**	**582.2**

Common Name	127	128	129	130	131
Abyssal Skate					
Aleutian Skate		12.0			
Arrowtooth Flounder	6.1	19.4	13.1	13.7	10.3
Aurora Rockfish					
Bigfin Eelpout					
Bocaccio					
Brown Cat Shark					
Canary Rockfish					
Darkblotched Rockfish					
Darkfin Sculpin	0.5	0.4	3.3	2.2	0.1
Dover Sole	0.3	0.9	3.6	2.2	6.7
Dusky Rockfish					
English Sole					
Giant Grenadier					
Greenstriped Rockfish		0.3			
Harlequin Rockfish		0.8	0.5		
Lingcod					
Longnose Skate		23.0			
Longspine Thornyhead					
North Pacific Spiny Dogfish		0.9	1.9	2.2	
Northern Lampfish				2.3	
Pacific Cod	4.6	14.9	5.0		
Pacific Flatnose					
Pacific Grenadier					
Pacific Hake				1.1	4.6
Pacific Halibut		15.4	5.3		
Pacific Ocean Perch	1303.5	462.2	1382.1	1310.0	818.1
Petrale Sole		1.6			
Popeye					
Prowfish					
Redbanded Rockfish	20.4	2.4	3.1	10.8	5.3
Redstripe Rockfish		2.7	25.7		
Rex Sole	6.5	4.4	14.4	4.8	7.5
Rosethorn Rockfish	12.0	9.9	17.2	12.1	12.2
Rougheye Rockfish					
Roughtail Skate					
Sablefish		3.7		4.7	2.5
Sandpaper Skate					
Sharpchin Rockfish	293.3	155.5	418.8	207.6	
Shortraker Rockfish					
Shortspine Thornyhead	36.0	10.8	8.9	14.9	30.7
Silvergray Rockfish	25.7	8.2	24.2	9.8	24.9
Slender Sole	0.9	0.5	1.7		0.4
Splitnose Rockfish					
Spotted Ratfish	1.7	6.2	3.1		1.7
Walleye Pollock			1.3	2.7	1.1
Widow Rockfish		2.1	2.2		
Yelloweye Rockfish					
Yellowmouth Rockfish	14.5	4.4			
Yellowtail Rockfish					
Other	1.3	0.8	1.1	2.3	1.1
Total	**1727.2**	**763.8**	**1936.5**	**1603.4**	**927.2**